

# Year 9 – HT4



**Newsome  
Academy**  
Everyone Exceptional Everyday

# Knowledge Organisers

Name:

Team:



# Mathematics

Our students will:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

# 9F.11 Rounding and Approximation

The learning outcomes for this topic are:

- Round to powers of 10
- Round to the nearest integer
- Round to a given number of decimal places
- Round to a given number of significant figures
- Estimate the value of a simple one-step calculation
- Estimate the value of a multi-step calculation

Key Word	Definition
<b>Round</b>	to round a number is to express it to a given degree of accuracy
<b>Estimate</b>	to give an approximation of a n actual value
<b>Approximate</b>	nearly correct but not exact)
<b>Significant figures</b>	number of digits in a number giving a required degree of accuracy
<b>Decimal places</b>	the position of a digit after the decimal point
<b>Value</b>	is a calculated amount
<b>Integer</b>	a whole number, including negatives and zero

**Additional Resources**

MathsWatch: [31](#), [32](#), [90](#), [91](#)

Corbett Maths: Videos: [215](#), [276](#), [277a](#), [277b](#), [278](#), [279a](#)  
Worksheet: [215](#), [276](#), [277a](#), [277b](#), [278](#), [279a](#)

**Careers Focus – Where could this take you?**

I am an electrician. I use Maths in all aspects of my job, from how much material I need to order to complete a job to what my hourly fee is to ensure I make a profit. There is also a lot of Maths used in how circuits work and ensuring voltage and current are safe for homes.

**Curriculum Links - Coherence**

**Required Knowledge:**

- Place Value
- Order of operations

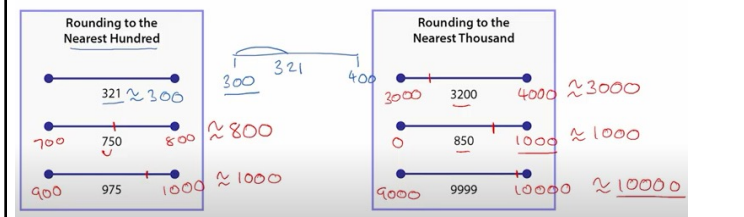
**Applied to:**

- Writing error intervals
- Limits of accuracy
- Measures
- Money Calculations
- Averages
- Shapes (areas and perimeters)

**Links across school:**

- Science ( use rounding for very large or small figures)
- History (use rounded figures to summarise events)
- PE (rounded measures for sporting events)

## Key Concepts



- To round to a decimal place:
1. look at the first digit after the decimal point if rounding to one decimal place or the second digit for two decimal places.
  2. draw a vertical line to the right of the place value digit that is required.
  3. look at the next digit.
  4. if it's 5 or more, increase the previous digit by one.

**3.248 rounded to 1 d.p.**

3 is the units digit.

2 is worth 2 tenths, and is the first decimal place.

4 is worth 4 hundredths, and is the second decimal place.

8 is worth 8 thousandths, and is the third decimal place.

You will sometimes see "decimal place" shortened to "d.p."

3.248 rounded to 1 d.p. → 3.2 (4 stays down - stay at 3.2)

3.248 rounded to 2 d.p. → 3.25 (8 rounds up - go to 3.25)

- In order to round to a given number of significant digits.
1. Locate the significant figure for the degree of accuracy required. The first non-zero digit is the first significant figure.
  2. Look at the next digit to the right, is it 5 or more?
  3. If it is 5 or more - round up by adding 1 to the previous digit. If it is less than 5 - round down by keeping the previous digit the same.
  4. If the degree of accuracy is 10 or more, fill in zeros to make the number the correct size.



**Concept – what it is**

**Round 12.34572 to:**

(1dp) = 12.3  
(2dp) = 12.35  
(3dp) = 12.346

**Round 34,605 to:**

(1sf) = 30,000  
(2sf) = 35,000  
(3sf) = 34,600

**Estimate:**

$$\frac{9.74 \times 3.5}{0.52} = \frac{10 \times 4}{0.5} = 80$$

**Non-Concept – what it isn't**

**Round 12.34572 to:**

(1dp) = 12.30000  
(2dp) = 12.34  
(3dp) = 12.357

**Round 34,605 to:**

(1sf) = 3  
(2sf) = 35  
(3sf) = 346

**Estimate:**

$$\frac{9.74 \times 3.5}{0.52} = \frac{10 \times 3.5}{1} = \frac{35}{1} = 35$$

**Standard Examples**

1.
  - (a) Round 466 to the nearest 10 **470**
  - (b) Round 3786 to the nearest hundred **3800**
  - (c) Round 3786 to one significant figure **4000**
  - (d) Round 0.003054 to two significant figures. **0.0031**
2. By writing each number to one significant figure find an estimate for this calculation.
 
$$\frac{23.6 \times 38}{1.8} = \frac{20 \times 40}{2} = \frac{800}{2} = 400$$

**Non-Standard Examples**

1.
 

David drives an average of 46.5 miles per week.

Work out an estimate for the number of miles he drives in a year.

**46.5 x 52  $\approx$  50 x 50 = 2500**

Is this an under-estimate or an over-estimate.  
Give a reason for your answer.  
*This is an over-estimate as 46.5 has been rounded up more than 52 has been rounded down.*

The learning outcomes for this topic are:

- Round to powers of 10
- Round to the nearest integer
- Round to a given number of decimal places
- Round to a given number of significant figures
- Estimate the value of a simple one-step calculation
- Estimate the value of a multi-step calculation



### Useful Formulae and Hints

**How to Round Numbers:**  
Decide which is the last digit to keep  
Leave it the same if the next digit is Less than 5 (rounding down)  
But increase it by 1 if the next digit is 5 or more (rounding up)

**Rounding Decimals:**  
Rounding to tenths means to leave one Number after the decimal point.  
Rounding to hundredths means to leave two numbers after the decimal point.

- To round to a decimal place:
1. look at the first digit after the decimal point if rounding to one decimal place or the second digit for two decimal places.
  2. draw a vertical line to the right of the place value digit that is required.
  3. look at the next digit.
  4. if it's 5 or more, increase the previous digit by one.

**Rounding to significant figures:**  
The first significant figure is the first non-zero number.

1. look at the first non-zero digit if rounding to one significant figure
2. look at the digit after the first non-zero digit if rounding to two significant figures
3. draw a vertical line after the place value digit that is required
4. look at the next digit
5. if it's 5 or more, increase the previous digit by one
6. if it's 4 or less, keep the previous digit the same
7. fill any spaces to the right of the line with zeros, stopping at the decimal point if there is one

**To estimate a calculation:**  
Round all figures to one significant figure. Then perform your calculation.

**1dp means one decimal place.**  
**2sf means two significant figures.**

### GCSE Questions

**3** (a) Round 32 629 to the nearest thousand.

(a) ..... [1]

(b) Round 32 629 to 1 significant figure.

(b) ..... [1]

(b) Round 184 329 to the nearest hundred.

(b) ..... [1]

(c) Estimate the value of  $\frac{23.1 \times 3.9}{8.12}$ .

**9** (a) Round 7.3065 to 2 decimal places.

(a) ..... [1]

(b) Round each number to 3 significant figures.

(i) 408 231

(b)(i) ..... [1]

(ii) 0.006 137 02

(ii) ..... [1]

**19** Asha worked out  $\frac{326.8 \times (6.94 - 3.4)}{59.4}$ .

She got an answer of 19.5, correct to 3 significant figures.

Write each number correct to 1 significant figure to decide if Asha's answer is reasonable.

.....

..... [3]

**15** A shape is formed by cutting a square out of a rectangle.

(a) Work out an estimate for the area of the shape.

.....m<sup>2</sup> (3)

(b) Is your answer to part (a) an underestimate or an overestimate?  
Give a reason for your answer.

.....

..... (1)

**(Total for Question 15 is 4 marks)**



# 9F.12 Reciprocals, fractions of an amount

## Adding and subtracting fractions

### The learning outcomes for this topic are:

- Find the reciprocal of a whole number or fraction
- Find a fraction of an amount with an integer solution
- Find a fraction of an amount with a fractional solution

- Add or subtract fractions with a common denominator
- Add and subtract fractions that need to be altered to get a common multiplier
- Add or subtract mixed number fractions

Key Word	Definition
Reciprocal	the inverse of a number, not including zero
Unitary	a single unit
Denominator	the bottom part of a fraction
Numerator	the top part of a fraction
Common denominator	same denominator based on lowest common multiple
Mixed number	a whole number with a proper fraction
Improper fraction	or 'top heavy' fraction, numerator is bigger than the denominator
Proper fraction	numerator is smaller than the denominator

**Additional Resources**

MathsWatch: [N33](#), [N35](#), [71](#), [76](#)

Corbett Maths: Video: [132](#), [133](#), [137](#), [139](#), [140](#), [145](#)  
Worksheet: [132](#), [133](#), [137](#), [139](#), [140](#), [145](#)

**Careers Focus – Where could this take you?**

I am a **mixologist** and I used fractions and proportions everyday in my job. I experiment using different fractions of ingredient to make brand new drinks and foods.

**Curriculum Links - Coherence**

**Required Knowledge:**

- Multiplication / Division
- Shading fractions of a shape
- Simplifying fractions
- Lowest common multiples

**Applied to:**

- Decimals
- Measures
- Ratios
- Time
- Percentages
- Parallel and perpendicular lines

**Links across school:**

- Chemistry (mixing compounds)
- Geography (grid references)
- Food Tech (recipe proportions)

### Key Concepts

**Reciprocals**

$\frac{a}{b} \times \frac{b}{a} = 1$

Number 8 → Its Reciprocal  $\frac{1}{8}$

Fractions	Reciprocal
$\frac{a}{b}$	$\frac{b}{a}$
$\frac{4}{5}$	$\frac{5}{4}$
$2\frac{2}{3}$	$\frac{3}{8}$

$\frac{1}{4}$  of 40 = 10

$\frac{3}{4}$  of \$40 = 30

$\frac{2}{9} + \frac{5}{9} = \frac{7}{9}$        $\frac{7}{9} - \frac{5}{9} = \frac{2}{9}$

$\frac{2}{15} + \frac{3}{5} = ?$        $\frac{21}{4} - \frac{8}{3}$

$\frac{2}{15} + \frac{3 \times 3}{5 \times 3}$        $\frac{63}{12} - \frac{32}{12} = \frac{31}{12}$

$\frac{2}{15} + \frac{9}{15} = \frac{2+9}{15} = \frac{11}{15}$  (Same denominator)

$= 2\frac{7}{12}$

**Adding Mixed Numbers**

$1\frac{1}{2} + 2\frac{1}{2}$

Find LCD and add:  $\frac{8}{5} + \frac{5}{2}$

$\frac{8}{5} + \frac{5}{2} = \frac{16}{10} + \frac{25}{10} = \frac{41}{10}$

$4\frac{1}{10}$

**Subtract Mixed Numbers**

$9\frac{1}{2} - 5\frac{1}{4}$

$= \frac{19}{2} - \frac{21}{4}$  (Change to improper fractions)

$= \frac{19 \times 2}{2 \times 2} - \frac{21}{4}$  (Change to common denominator)

$= \frac{38}{4} - \frac{21}{4}$  (Subtract the numerators)

$= \frac{17}{4} = 4\frac{1}{4}$  (Change to mixed numbers)

### Concept – what it is

1. Find  $\frac{2}{3}$  of 36 =  $\frac{2}{3} \times 36 = 36 \div 3 \times 2 = 24$

$12 + 12 = 36$        $36 \div 3 = 12$

2. Give your answers in its lowest terms:  $\frac{7}{15} + \frac{3}{15} = \frac{10}{15} = \frac{2}{3}$

3. Give your answers as a mixed number:  $\frac{2}{5} + \frac{3}{4} = \frac{8}{20} + \frac{15}{20} = \frac{23}{20} = 1\frac{3}{20}$

4.  $4\frac{3}{5} - 1\frac{1}{2}$

$\frac{23}{5} - \frac{3}{2} = \frac{46}{10} - \frac{15}{10} = \frac{31}{10} = 3\frac{1}{10}$

### Standard Examples

1. (a) Write the reciprocal of 5 =  $\frac{1}{5}$

(b) Write the reciprocal of  $\frac{2}{3} = \frac{3}{2}$  or 1.5

2. Find  $\frac{3}{5}$  of 40 =  $\frac{3}{5} \times 40 = 40 \div 5 \times 3 = 24$

3. (a)  $\frac{7}{10} + \frac{3}{15} = \frac{21}{30} + \frac{6}{30} = \frac{27}{30} = \frac{9}{10}$

(b)  $3\frac{1}{4} - 1\frac{1}{2}$

$\frac{13}{4} - \frac{3}{2} = \frac{13}{4} - \frac{5}{4} = \frac{7}{4} = 1\frac{3}{4}$

### Non-Concept – what it isn't

1. Find  $\frac{2}{3}$  of 36 =  $\frac{2}{3} \times 36 = 36 \div 3 = 12$

2. Give your answers in its lowest terms:  $\frac{7}{15} + \frac{3}{15} = \frac{10}{30}$

3. Give your answer as a mixed number:  $\frac{2}{5} + \frac{3}{4} = \frac{8}{20} + \frac{15}{20} = \frac{23}{20}$

4.  $4\frac{3}{5} - 1\frac{1}{2}$

$\frac{20}{5} - \frac{2}{2} = \frac{40}{10} - \frac{10}{10} = \frac{30}{10} = 3$

### Non-Standard Examples

1. Line a has a gradient of 3. Line B is perpendicular to line A. What is the gradient of line B.  $-\frac{1}{3}$  Jessica wants to attach ribbon around her wardrobe.

2.  $\frac{\square}{4} \frac{2}{3} \text{ m}$

She has 4 metres of ribbon.

How much more does she need? Give your answer as a fraction.

$1\frac{3}{4} + 1\frac{3}{4} + \frac{2}{3} + \frac{2}{3} = \frac{7}{4} + \frac{7}{4} + \frac{2}{3} + \frac{2}{3}$

$= \frac{7}{4} + \frac{7}{4} + \frac{2}{3} + \frac{2}{3} = \frac{21}{12} + \frac{21}{12} + \frac{8}{12} + \frac{8}{12}$

$= \frac{58}{12} = 4\frac{5}{6}$ ; she will need  $\frac{5}{6} \text{ m}$  more

- The learning outcomes for this topic are:*
- Find the reciprocal of a whole number or fraction
  - Find a fraction of an amount with an integer solution
  - Find a fraction of an amount with a fractional solution

- Add or subtract fractions with a common denominator
- Add and subtract fractions that need to be altered to get a common multiplier
- Add or subtract mixed number fractions



**Useful Formulae and Hints**

**Reciprocals** are the inverse of a value or a number.

**Reciprocal of an integer:** put a 1 over it

Eg: the reciprocal of 5 is  $\frac{1}{5}$ .

**Reciprocal of a fraction:** turn the fraction upside down.

Eg. The reciprocal of  $\frac{3}{4}$  is  $\frac{4}{3}$ .

**Fractions of amounts:** use a bar diagram.

The denominator tells us how many parts to divide into.

Finding  $\frac{1}{5}$  of an amount is the same as dividing that amount by 5.

So  $\frac{1}{5}$  of 30 = 6

$30 \div 5 = 6$

The numerator tells us how many parts we want.

If we're asked to find  $\frac{3}{5}$  of an amount, we need 3 parts.

If  $\frac{1}{5}$  of 30 = 6

Then  $\frac{3}{5}$  of 30 = 18

$6 \times 3 = 18$

**Adding fractions:** use a common denominator

**EXAMPLE**

What common denominator should we use?

$\frac{1}{4} + \frac{3}{5}$

Common denominator is 20.

$\frac{1}{4} = \frac{5}{20}$ ,  $\frac{3}{5} = \frac{12}{20}$

$\frac{5}{20} + \frac{12}{20} = \frac{17}{20}$

Common denominator is 12.

$\frac{1}{3} + \frac{1}{4}$

$\frac{1}{3} = \frac{4}{12}$ ,  $\frac{1}{4} = \frac{3}{12}$

$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

**Mixed Numbers:** (for adding you would do the same but add not subtract)

$3\frac{2}{5} - 1\frac{4}{7} = \frac{17}{5} - \frac{11}{7}$

change to improper fractions

$= \frac{17 \times 7}{5 \times 7} - \frac{11 \times 5}{7 \times 5} = \frac{119}{35} - \frac{55}{35}$

change to the LCD of 35

$= \frac{119 - 55}{35} = \frac{64}{35}$

**GCSE Questions**

2 (a) Work out.

(i)  $6\frac{1}{2} + \frac{3}{4}$

(a)(i) ..... [1]

(ii)  $\frac{4}{7}$  of 63

(ii) ..... [2]

Karen made 40 cakes.

She gives  $\frac{1}{5}$  of the cakes to Andrew.

She gives 10% of the 40 cakes to Chris.

What fraction of the 40 cakes does she have left?

13 (a) Calculate.

$\frac{3}{5} + \frac{5}{8}$

Give your answer as a mixed number in its simplest form.

(a) ..... [3]

3 (a) Complete each statement.

(i)  $\frac{3}{7} = \frac{\dots\dots}{28}$  [1]

(ii)  $4\frac{1}{2} = \frac{\dots\dots}{2}$  [1]

(b) Work out.

$\frac{2}{3} - \frac{1}{5}$

(b) ..... [2]

7 Work out the following, giving each answer as a fraction.

(a)  $1\frac{3}{4} + \frac{1}{2}$

(a) ..... [1]

The distance from Newtown to Milton is  $7\frac{2}{3}$  miles.

The distance from Milton to Redville is  $2\frac{2}{5}$  miles

Work out the distance from Newtown to Redville.

Key Word	Definition
Denominator	the bottom part of a fraction
Numerator	the top part of a fraction
Reciprocal	the inverse of a value or number, not zero
Cancel	divide numerator and denominator by highest common factor
Simplify	write a fraction in the smallest possible terms
Product	to multiply


**Additional Resources**

MathsWatch: [73](#), [74](#)

Corbett Maths: Video: [134](#), [139](#), [140](#), [142](#)  
Worksheet: [134](#), [139](#), [140](#), [142](#)

**Careers Focus – Where could this take you?**

I am a welder and I use my skills in construction to join different metals together using heat and electricity. My job requires a lot of precise measurements and calculations as my work can be used in all sorts of complex machinery.



**Curriculum Links - Coherence**

**Required Knowledge:**

- Multiplying
- Highest common factor
- Division
- Reciprocals

**Applied to:**

- Fractions of amounts
- Vectors
- Transformations
- Algebraic fractions

**Links across school:**

- Food technology (working to recipes)
- Art ( working with fractional shapes, patterns, position and movement)
- Physics (fractions in electrical circuits, rates of change)

**Key Concepts**

Multiply the numerator of the fraction by the whole number

$$2 \times \frac{3}{11} = \frac{6}{11}$$

Keep the denominator the same

$$\frac{12}{3} \div \frac{2}{3} = \frac{12}{1} \times \frac{3}{2} = \frac{36}{2} = 18$$

$$\frac{9}{17} \div 3 = \frac{9}{17} \div \frac{3}{1} = \frac{9}{17} \times \frac{1}{3} = \frac{9 \times 1}{17 \times 3} = \frac{9}{51} = \frac{9 \div 3}{51 \div 3} = \frac{3}{17}$$

**Multiplying Fractions**

$$\frac{2}{4} \times \frac{3}{6} = \frac{6}{24} = \frac{1}{4}$$

$$\frac{4}{11} \div \frac{5}{9} = \frac{4}{11} \times \frac{9}{5} = \frac{36}{55}$$

$$\frac{2}{4} \times \frac{3}{6} = \frac{6}{24} = \frac{1}{4}$$

Multiply the numerators. Multiply the Denominators.

$$1\frac{1}{2} \times 2\frac{1}{5} = 3\frac{3}{10}$$

Do the multiplication as Improper Fractions

$$\frac{3}{2} \times \frac{11}{5} = \frac{33}{10}$$

Simplify the fraction by dividing the numerator and denominator by their largest common factor.

$$5\frac{3}{5} \div 2\frac{1}{3}$$

convert mixed numbers to fractions

$$\frac{28}{5} \div \frac{7}{3}$$

divide and simplify

$$\frac{28}{5} \div \frac{7}{3} = \frac{28}{5} \times \frac{3}{7} = \frac{28 \times 3}{5 \times 7} = \frac{12}{5}$$

convert back to a mixed number

$$2\frac{2}{5}$$

**Concept – what it is**

$$\frac{2}{5} \div \frac{2}{3} = \frac{2}{5} \times \frac{3}{2} = \frac{2 \times 3}{5 \times 2} = \frac{6}{10} = \frac{3}{5}$$

take the reciprocal of the divisor

$$\frac{4}{7} \div 2 = \frac{4}{7} \times \frac{1}{2} = \frac{4 \times 1}{7 \times 2} = \frac{4}{14} = \frac{2}{7}$$

**Standard Examples**

- $\frac{2}{5} \times 7 = \frac{2}{5} \times \frac{7}{1} = \frac{2 \times 7}{5 \times 1} = \frac{14}{5} = 2\frac{4}{5}$
- $\frac{5}{6} \div 3 = \frac{5}{6} \div \frac{3}{1} = \frac{5}{6} \times \frac{1}{3} = \frac{5 \times 1}{6 \times 3} = \frac{5}{18}$
- $5 \div \frac{3}{4} = \frac{5}{1} \div \frac{3}{4} = \frac{5}{1} \times \frac{4}{3} = \frac{5 \times 4}{1 \times 3} = \frac{20}{3} = 6\frac{2}{3}$
- $\frac{2}{3} \times \frac{5}{7} = \frac{2 \times 5}{3 \times 7} = \frac{10}{21}$
- $\frac{5}{8} \div \frac{1}{4} = \frac{5}{8} \times \frac{4}{1} = \frac{5 \times 4}{8 \times 1} = \frac{20}{8} = 2\frac{1}{2}$
- $3\frac{1}{2} \times 2\frac{5}{6} = \frac{7}{2} \times \frac{17}{6} = \frac{7 \times 17}{2 \times 6} = \frac{119}{12} = 9\frac{11}{12}$
- $3\frac{1}{2} \div 2\frac{5}{6} = \frac{7}{2} \div \frac{17}{6} = \frac{7}{2} \times \frac{6}{17} = \frac{7 \times 6}{2 \times 17} = \frac{42}{34} = 1\frac{4}{17}$

**Non-Concept – what it isn't**

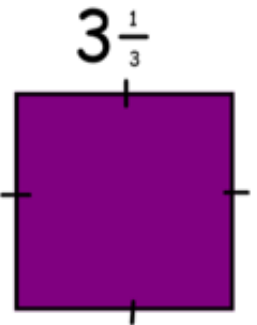
When multiplying fractions students cross multiply instead of row multiplying

Eg.

$$\frac{2}{3} \times \frac{5}{7} = \frac{2 \times 7}{3 \times 5} = \frac{14}{15}$$

**Non-Standard Examples**

Find the area of the shape below:



$$3\frac{1}{3} \times 3\frac{1}{3} = \frac{10}{3} \times \frac{10}{3} = \frac{10 \times 10}{3 \times 3} = \frac{100}{9} = 11\frac{1}{9}$$

# 9F.13 Multiplying and dividing fractions

The learning outcomes for this are:

- Multiply a fraction by an integer or vice versa
- Divide a fraction by an integer or vice versa
- Multiply a pair of fractions (no cancelling)
- Divide a pair of fractions (no cancelling)
- Multiply a pair of mixed number fractions
- Divide a pair of mixed number fractions



### Useful Formulae and Hints

Remember an integer can be turned into a fraction if you write a one underneath it.

**Multiplying a pair of fractions:**  
Multiply the numerators  
Multiply the denominators  
Simplify your answer by cancelling down (dividing numerator and the denominator by the highest common factor)

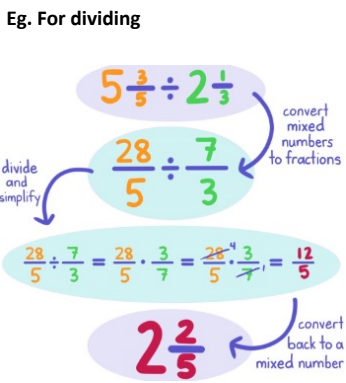
**Dividing a pair of fractions:**  
Multiply by the reciprocal instead.

$$\frac{8}{10} \div \frac{2}{3} = 1 \frac{4}{20}$$

Rotate the 2<sup>nd</sup> pair of Fractions

$$\frac{8}{10} \times \frac{3}{2} = \frac{24}{20} = 1 \frac{4}{20}$$

**Multiplying and dividing with mixed numbers:**  
Convert your mixed numbers into improper fractions first then apply the methods outlined above.



### GCSE Questions

2 Work out.

(a)  $\frac{1}{2}$  of 12 (a) ..... [2]

(b)  $8 \times \frac{1}{5}$   
Give your answer as a mixed number. (b) ..... [2]

(c) Isaac and Maya eat part of a pizza.  
Isaac eats  $\frac{1}{6}$  of the pizza.  
Maya then eats  $\frac{3}{5}$  of the remaining pizza.  
What fraction of the original pizza is left?

(b) Work out  $3 \frac{1}{2} \div 2 \frac{4}{5}$

Work out

$$3 \frac{3}{4} \times 2 \frac{2}{3}$$

- $\frac{x}{y} \times \frac{3}{5}$
- $\frac{x}{y} \times \frac{3}{6}$
- $\frac{x}{y} \times \frac{3}{6x}$
- $\frac{x}{xy} \times \frac{3}{6}$

9.  $\frac{7x}{xy} \div \frac{6y}{3}$

14 Work out  $\frac{2}{15} \times \frac{15}{22}$ .  
Give your answer in its lowest terms.

(b) Work out  $\frac{3}{4} \times \frac{1}{5}$       Work out  $2 \frac{1}{4} \div \frac{3}{5}$

Work out  $60 \times \frac{2}{3}$       Work out  $1 \frac{7}{8} \times 5 \frac{1}{3}$

If the area of the rectangle is  $19 \frac{1}{4}$ .  
Find the length of the rectangle

$3 \frac{1}{2}$  cm




- The learning outcomes for this topic are:**
- Complete a table of values for a simple linear equation
  - Draw a linear graph from a table of values
  - Complete a table of values and draw the graph for two-step functions

- Find missing values using a conversion graph
- Draw a conversion graph from a simple conversion factor
- Extrapolate a conversion graph to find unknown values

Key Word	Definition
Linear	(no variables above the power of 1 – straight line)
Coordinates	numbers that give the position of a point on a graph, usually written (x,y)
Axis/axes	horizontal or vertical line on a graph from which coordinates are measured
Quadrant	4 regions of a plane that is divided by the x-axis and y-axis
Table of values	table that holds coordinate values
Conversion	to change from one form to another
Scale factor	states the scale by which a figure is bigger or smaller than the original figure
Extrapolate	to predict result beyond the extent of the given values
Interpolate	to predict other results within a set of given values

**Careers Focus – Where could this take you?**

As a computer control programmer I use computers to manufacture products from car engines to computer keyboards. I write the programmes that computers use to control a wide variety of manufacturing machines, both old and new.



**Curriculum Links - Coherence**

**Required Knowledge:**

- Negative numbers
- Substitution
- Plotting coordinates
- Using conversion factors

**Applied to:**

- Simultaneous equations
- Gradients and intercepts
- Equations of straight line graphs

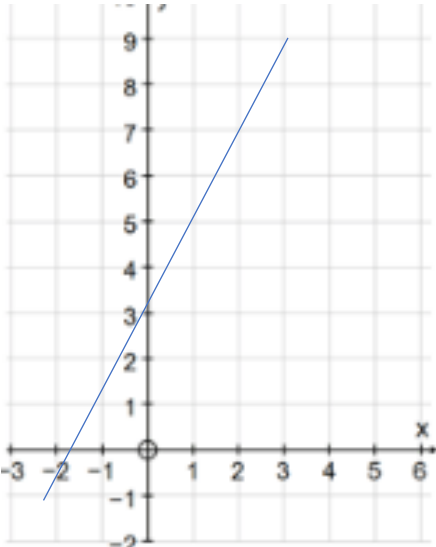
**Links across school:**

- Chemistry (rates of reactions)
- Physics (using conversion graphs)
- Geography (currency rates)

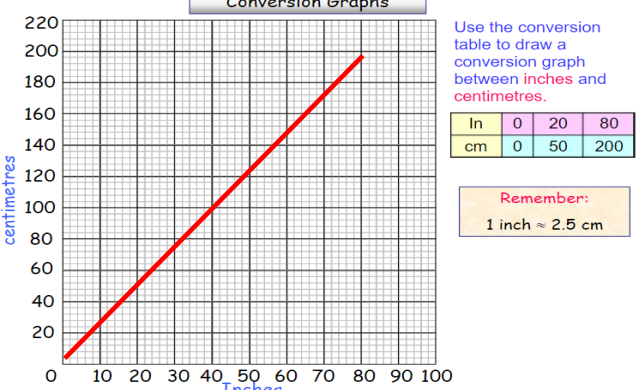
**Key Concepts**

Plot the graph of  $y = 2x + 3$  using the table of values.  
**To find the y values – double the x and then add 3**

x	-3	-2	-1	0	1	2	3
$y = 2x + 3$	-3	-1	1	3	5	7	9



**Conversion Graphs**



Use the conversion table to draw a conversion graph between inches and centimetres.

In	0	20	80
cm	0	50	200

**Remember:**  
1 inch ≈ 2.5 cm

**Concept – what it is**

Plot the graph of  $y = 2x - 5$  for x values between -2 and 3

X	-2	-1	0	1	2	3
Y	-9	-7	-5	-3	-1	1

Plot the coordinates:  
 (-2,-9) (-1,-7) (0,-5) (1,-3) (2,-1) (3,1)

Use a ruler to join your points with a straight line. Axes labelled x and y. Scale on axes are placed at equal intervals

**Non-Concept – what it isn't**

Plot the graph of  $y = 2x - 5$  for x values between -2 and 3

X	-2	-1	0	1	2	3
Y	9	7	-5	-3	-1	1

*Pupils working incorrectly with negative values of x*

Plot the coordinates:  
 (-2,9) (-1,7) (0,-5) (1,-3) (2,-1) (3,1)

*Plot the points and don't join. Plot the points, join the points freehand. Axes not labelled, intervals on scale not equal.*

**Standard Examples**

1. Complete the table of values for the graph  $y = 2x + 1$  for x values between -2 and 3.

X	-2	-1	0	1	2	3
Y	-3	-1	1	3	5	7

Plot the graph of  $y = 2x + 1$ .  
 Plot coordinates;  
 (-2,-3), (-1,-1), (0,1), (1,3), (2,5) and (3,7).

**Non-Standard Examples**

1. Complete the table of values for the graph  $y = 2x + 1$  for x values between -2 and 3.  
*No table given, you are expected to draw it yourself and complete with values and then plot the graph.*

2. Plot the graph of  $2y = 4x + 6$  for x values between -2 and 3.  
*Here you would simplify the equation (by dividing by 2) to get  $y = 2x + 3$ . Then proceed as above, draw a table, complete values and plot.*



**The learning outcomes for this topic are:**

- Complete a table of values for a simple linear equation
- Draw a linear graph from a table of values
- Complete a table of values and draw the graph for two-step functions
- Find missing values using a conversion graph
- Draw a conversion graph from a simple conversion factor
- Extrapolate a conversion graph to find unknown values



**Useful Formulae and Hints**

**Key things to get right when plotting straight line graphs:**

Use a ruler for your x and y axes.  
 Use tick marks to ensure equal intervals are used on the axes when placing your scale.  
 Plot the points (x,y); remember along the corridor and then up or down the stairs.  
 Use a ruler to join your plotted points. They should form a straight line, if not go back and check your table of values or your plotting.  
 Label your x and y axes.  
 Use the equation 'y=' to calculate your y values, substitute your x values into the equation to obtain the corresponding y value.  
 If no table is provided you may draw one yourself.

**Conversion graphs:**

Use the scale factor to develop your coordinates. Then plot your graph as mentioned above.  
 Eg. Converting between inches and cm.

**1 inch = 2.5cm**

2 inches = 2.5 x 2 = 5cm

4 inches = 2.5 x 4 = 10cm

10 inches = 10 x 2.5 = 25cm

**Additional Resources**

MathsWatch: [96](#)  
 Corbett Maths: [151](#), [152](#), [186](#) ;  
 Worksheets: [151](#), [152](#), [186](#)

**GCSE Questions**

(a) Complete the table of values for  $y = 2x + 5$

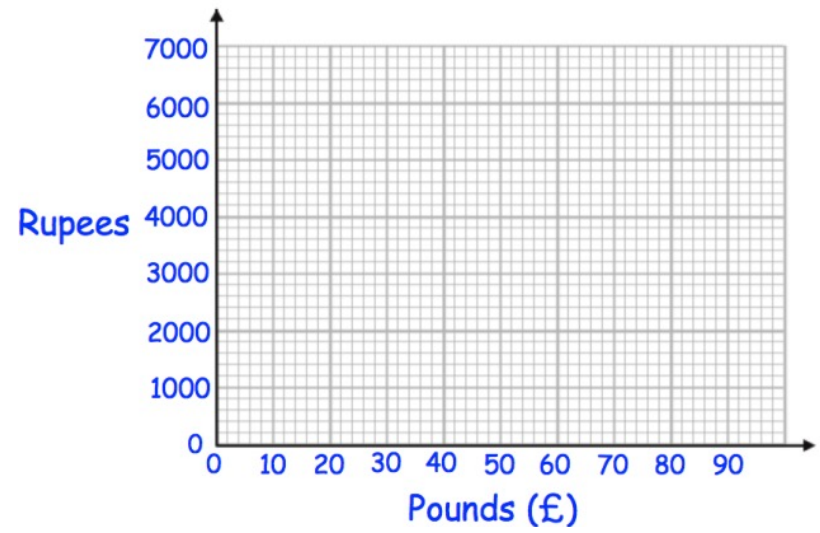
x	-2	-1	0	1	2
y	1		5		

The exchange rate to change pounds into Indian rupees is £1 = 90 Rupees

(a) Complete the table below.

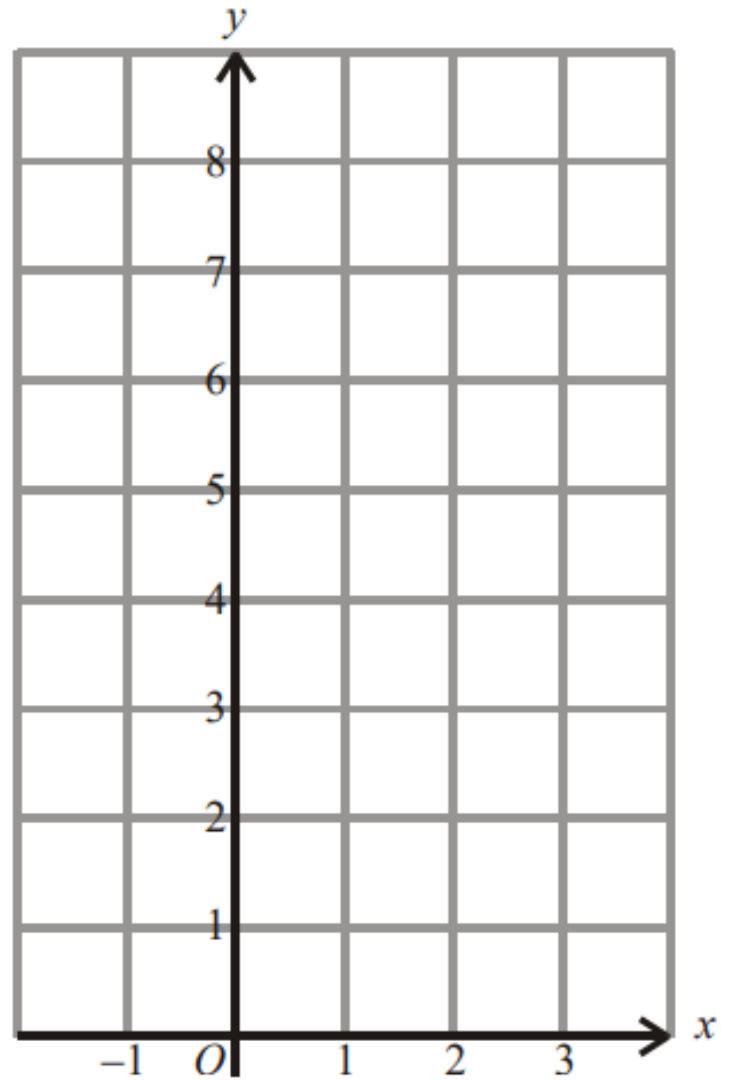
Pounds	0	1	10	50
Rupees	0	90		

(b) Draw a conversion graph for converting between pounds and rupees.



(c) Change 3000 Rupees into Pounds.

7. On the grid, draw the graph of  $x + y = 5$



# 9F.15 Gradient and equation of lines

The learning outcomes for this topic are:

- Write the y-axis intercept of a straight line
- Identify gradient and intercept from an equation in the form  $y = mx + c$
- Find a positive gradient of a line (integer or fraction)
- Find a negative gradient of a line
- Find the equation of a straight line from its graph
- Find the equations of a parallel line given the initial line and a new coordinate

Key Word	Definition
Gradient	measure of the steepness of a slope
Change in y	change between points in the y-direction on a graph
Change in x	change between points in the x-direction on a graph
Rise	as above, change in y-direction
Run	as above, change in x-direction
Y axis intercept	the point at which the straight line crosses the y-axis
Equation	a mathematical statement showing things that are equal
$Y=mx+c$	general form of the equation of a straight line
Parallel	lines that are parallel never meet, always the same distance apart

**Additional Resources**

MathsWatch: [96](#), [159a](#), [159b](#)

Corbett Maths: [187](#), [188](#), [189](#), [190](#), [191](#), [192](#), [193](#), [194](#), [195](#), [196](#);  
worksheets: [187](#), [188](#), [189](#), [190](#), [191](#), [192](#), [193](#), [194](#), [195](#), [196](#)

**Careers Focus – Where could this take you?**

I am a **highway engineer** who plans and maintains road networks and structures such as bridges and tunnels. I have to be able to foresee problems and account for them as well as leading a team and managing projects.

**Curriculum Links - Coherence**

**Required Knowledge:**

- Reading coordinates
- Subtraction / division
- Rearranging formulae

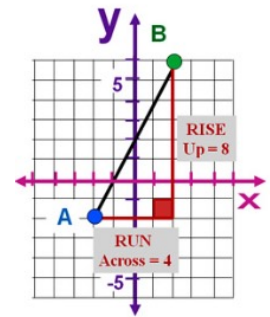
**Applied to:**

- Parallel and perpendicular lines
- Conversion factors
- Speed and acceleration

**Links across school:**

- Physics ( distance/time and speed/time graphs)
- Biology (modelling)

## Key Concepts



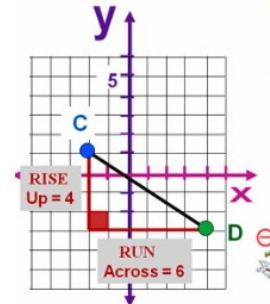
The "Gradient" or "Slope" between two points is how far UP we have gone, compared to how far we have gone ACROSS.

$$m = \frac{\text{RISE}}{\text{RUN}}$$

OR

$$m = \frac{\text{Change in Y}}{\text{Change in X}}$$

Find the Gradient between points "C" and "D".

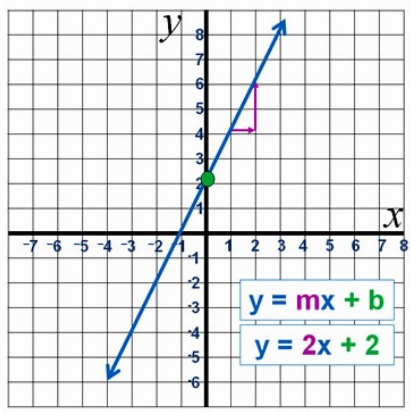


$$m = \frac{\text{RISE}}{\text{RUN}}$$

$$m = \frac{4}{6}$$

$$m = 4/6 = -2/3 \checkmark$$

(Downhill Negative Gradient)



The value of b or c is the point at which the line crosses the y-axis

$$b = 2$$

m is the gradient slope which is the

Rise Up / Run Across

Each time the line moves 1 place to the right, it goes UP by 2 places.

$$m = 2/1 = 2$$

$$y = mx + b$$

$$y = 2x + 2$$

### Concept – what it is

- The equation of a line is  $y = 5x - 6$ 
  - Find the gradient **5**
  - Find the intercept **-6**
- The equation of a line is  $2x + 3y = 6$ 
  - Find the gradient  $-\frac{2}{3}$  ( $y = -\frac{2}{3}x + 2$ )
  - Find the intercept **2**
- Line AB has coordinates A (3, 8) and B (5,20).
  - Find the gradient  $\frac{20-8}{5-3} = 6$
  - Find the intercept **-10**  
Substitute (3,8) into  $y = 6x + c$   
 $8 = 18 + c$   
 $c = 8 - 18 = -10$   
Write the equation of line AB  
 $Y = 6x - 10$

### Non-Concept – what it isn't

- The equation of a line is  $y = 5x - 6$ 
  - Find the gradient **-6**
  - Find the intercept **5**
- The equation of a line is  $2x + 3y = 6$ 
  - Find the gradient **2**
  - Find the intercept **6**
- Line AB has coordinates A (3, 8) and B (5,20).
  - Find the gradient  $\frac{5-3}{20-8} = \frac{1}{6}$
  - Find the intercept **-10**  
Substitute (3,8) into  $y = \frac{1}{6}x + c$   
 $8 = 0.5 + c$   
 $c = 8 - 0.5 = 7.5$   
Write the equation of line AB  
 $Y = 6x - 7.5$

### Standard Examples

A line passes through the point (0, 5). The gradient of the line is -2. Write the equation of the line.

**Gradient = -2**  
**Intercept = 5** (coordinate tells us  $y=5$  @  $x=0$ )

**The equation of the line becomes:**

$$Y = -2x + 5$$

### Non-Standard Examples

- Are the lines  $y = 2x + 5$  and  $2x + y = 8$  parallel?  
**No because the gradients are not the same (2 and -2) as the second equation needs to be rearranged to  $y = -2x + 8$**
- A straight line L passes through the points (0,6) and (4,-2)  
**gradient =  $(-2 - 6) / (4 - 0) = -2$**   
A straight line M passes through the points (0,1) and is parallel to L.  
**Parallel so gradient is the same = -2**  
**Find the equation of the line M.**  
 **$Y = -2x + 1$  ; as intercept is 1 from (0,1)**



- The learning outcomes for this topic are:**
- Write the y-axis intercept of a straight line
  - Identify gradient and intercept from an equation in the form  $y = mx + c$
  - Find a positive gradient of a line (integer or fraction)

- Find a negative gradient of a line
- Find the equation of a straight line from its graph
- Find the equations of a parallel line given the initial line and a new coordinate



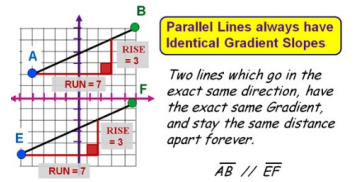
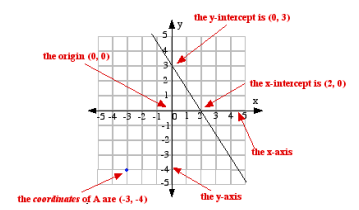
### Useful Formulae and Hints

Intercept – where the straight line crosses the y-axis.

Gradient -  $\frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

The general form of a straight line graph is  $y = mx + c$   
Where m is the gradient  
And c is the intercept on the y-axis.

A horizontal line – zero gradient



If we are given a Line Equation in  $y = mx + b$  form, we can find the Slope and Y-Intercept, without drawing any graphs.

$y = \frac{2}{3}x + 5$ $y = mx + b$ Slope $m = \frac{2}{3}$ Y-Int $b = 5$ or (0, 5)	$y = -3x + 5$ $y = mx + b$ Slope $m = -3$ Y-Int $b = 5$ or (0, 5)	$y = -3x - 5$ $y = mx + b$ Slope $m = -3$ Y-Int $b = -5$ or (0, -5)
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Note that "Slope" is also called "Gradient"

### GCSE Questions

**23** A straight line with gradient 4 passes through the point (1, 5).  
Find the equation of the line in the form  $y = mx + c$ .

3. A straight line has equation  $y = 5 - 3x$   
(a) Write down the gradient of the line. .... (1)

(b) Write down the coordinates of the point where the line crosses the y axis. .... (1)

(a) Rearrange the equation  $x + 2y = 6$  to make y the subject. .... (2)

(b) Write down the gradient of the line with equation  $x + 2y = 6$  .... (2)

**12** (a) Find the coordinates of the point where  $y - 2x = 1$  crosses the y-axis.  
(a) (....., .....) [2]

(b) The diagram shows the graph of  $y = 3x + c$ , where c is a constant.

Find the value of k.

(b) This graph shows part of another straight line.

(i) Find the gradient of this line.

(b)(i) ..... [2]

(ii) This line is continued to the right.  
Will the line pass through the point (200, 102)?  
Show how you decide.

**22** This graph shows part of a straight line.

(a) Write down the y-intercept.

(a) ..... [1]

(b) Show that the gradient of the line is -2. [1]

**24** The graph shows two parallel lines, Line A and Line B.

Line A has equation  $y = 6x + 7$ .  
Line B passes through the point (4, 26).

Find the equation of Line B.

## The learning outcomes for this topic are:


- Collect like terms (with or without indices)
- Simplify expressions with multiplication of variables
- Substitute integers (positive and negative) into an expression
- Expand a single bracket (numerical or variable multiplier)
- Factorise an expression into a single bracket
- Expand two, single brackets and simplify the result.

Key Word	Definition
Gradient	measure of the steepness of a slope
Change in y	change between points in the y-direction on a graph
Change in x	change between points in the x-direction on a graph
Rise	as above, change in y-direction
Run	as above, change in x-direction
Y axis intercept	the point at which the straight line crosses the y-axis
Equation	a mathematical statement showing things that are equal
Y=mx+c	general form of the equation of a straight line
Parallel	lines that are parallel never meet, always the same distance apart

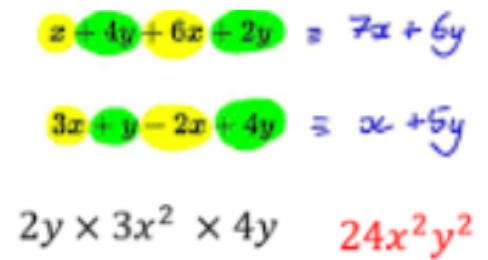
Additional Resources
MathsWatch: <a href="#">A6</a> , <a href="#">A7a</a> , <a href="#">A8</a> , <a href="#">A9</a> , <a href="#">A10</a> , <a href="#">93</a> , <a href="#">134a</a>
Corbett Maths: <a href="#">9</a> , <a href="#">13</a> , <a href="#">18</a> , <a href="#">20</a> ; Worksheets <a href="#">9</a> , <a href="#">13</a> , <a href="#">18</a> , <a href="#">20</a>

### Careers Focus – Where could this take you?

I am a product design engineer so I am able to use my Maths problem solving skills with my passion for design to create a wide variety of items. I create initial concepts, design and develop items and then test the final product.



Curriculum Links - Coherence
<p><b>Required Knowledge:</b></p> <ul style="list-style-type: none"> <li>- Negative numbers</li> <li>- Order of operations</li> <li>- Powers and roots</li> </ul>
<p><b>Applied to:</b></p> <ul style="list-style-type: none"> <li>- Index Laws</li> <li>- Solving equations</li> <li>- Factorizing</li> </ul>
<p><b>Links across school:</b></p> <ul style="list-style-type: none"> <li>- Physics (using formulae)</li> <li>- Computing (developing algorithms)</li> </ul>

Key Concepts	Concept – what it is	Non-Concept – what it isn't
 <div style="border: 1px solid purple; padding: 5px; margin: 10px 0;"> <p><b>Multiply terms</b></p> <p><math>4a^2 \times 2a^5</math></p> <p>Multiply Numbers      Add Powers</p> <p><math>= 8a^7</math></p> </div> <p>Find the value of <math>3b + 4</math> when <math>b = 10</math></p> <p><math>3b</math> means <math>3 \times b = 3 \times 10 = 30</math></p> <p>So <math>3b + 4 = 30 + 4 = 34</math></p> <div style="display: flex; justify-content: space-around;"> <div style="background-color: #fff9c4; padding: 5px;"> <math display="block">3(x+2)</math> <math display="block">\begin{array}{r} \times \\ 3 \end{array} \begin{array}{ c c } \hline x &amp; +2 \\ \hline \hline 3x &amp; +6 \\ \hline \end{array}</math> <math display="block">3x + 6</math> </div> <div style="background-color: #c8e6c9; padding: 5px;"> <math display="block">3x(4x+2)</math> <math display="block">\begin{array}{r} \times \\ 3x \end{array} \begin{array}{ c c } \hline 4x &amp; +2 \\ \hline \hline 12x^2 &amp; +6x \\ \hline \end{array}</math> <math display="block">12x^2 + 6x</math> </div> </div> <p><b>Expand &amp; Simplify...</b></p> $5(x+3) + 6(x-4)$ $5x + 15 + 6x - 24$ $11x - 9$	<p><b>Concept – what it is</b></p> <p><math>5x</math> means 5 lots of <math>x</math></p> <p><math>3(2x + 4)</math> means 3 lots of <math>(2x + 4)</math></p> <p><math>a + a + a + a + a = 5a</math></p> <p><math>a \times a \times a \times a \times a = a^5</math></p> <p><math>2a^2b \times 6ab^3 = 2aab \times 6abbb</math></p> <p><math>= 12a^3b^4</math></p> <p><math>5(2x - 4) = 10x - 20</math></p> <p><math>4(3y - 7) - 4(2y - 5) =</math></p> <p><math>12y - 28 - 8y + 20 = 4y - 8</math></p>	<p><b>Non-Concept – what it isn't</b></p> <p><math>a + a + a + a + a = a5</math> or <math>a^5</math></p> <p><math>a \times a \times a \times a \times a = 5a</math></p> <p><math>2a^2b \times 6ab^3 = 12aa^2bb3</math></p> <p><math>5(2x - 4) = 10x + 1</math></p> <p><math>4(3y - 7) - 4(2y - 5) =</math></p> <p><math>12y - 28 - 8y - 20 = 20y - 48</math></p>
	Standard Examples	Non-Standard Examples
	<p>Simplify <math>3x + 4x - 2x</math> <math>5x</math></p> <p>Simplify <math>2a \times 3b</math> <math>6ab</math></p> <p>Simplify <math>2 \times n \times 6 \times m</math></p> <p><math>12mn</math></p> <p>Simplify <math>2x - 3y - 6x - 4y</math></p> <p><math>-4x - 7y</math></p> <p>Expand <math>7(2x + 7)</math> <math>14x + 49</math></p>	<p>Simplify <math>p^2 + p^2 + p^2</math> <math>3p^2</math></p> <p><math>5x^2 + 2x - 3x^2 - x</math> <math>2x^2 + x</math></p> <p>Expand <math>a(a + b)</math> <math>a^2 + ab</math></p> <p>Expand <math>2x^2(4x - 9)</math> <math>8x^3 - 18x^2</math></p> <p>Expand:</p> <p><math>-6(c - d + 3) = -6c + 6d - 18</math></p>

## The learning outcomes for this topic are:

- Collect like terms (with or without indices)
- Simplify expressions with multiplication of variables
- Substitute integers (positive and negative) into an expression

- Expand a single bracket (numerical or variable multiplier)
- Factorise an expression into a single bracket
- Expand two, single brackets and simplify the result.



### Useful Formulae and Hints

**Collecting like terms;** is a way of simplifying algebraic expressions. It is also known as combining like terms. To do this we identify the like terms in an algebraic expression and combine them by adding or subtracting.

Eg. Simplify

$$3a + 4b + 2a - 2b$$

$3a$  and  $+2a$  are like terms  
 $+4b$  and  $-2b$  are also like terms, but they are different to the terms with the letter  $a$ . The plus or minus sign in front of a term belongs to that term.

$$= 3a + 2a + 4b - 2b$$

$$= 5a + 2b$$

**Substitution;** involves the replacement of the variable with its known value. If you then follow your order of operations you can calculate the value of an expression

Find the value of  $3b + 4$  when  $b = 10$

$$3b \text{ means } 3 \times b = 3 \times 10 = 30$$

$$\text{So } 3b + 4 = 30 + 4 = 34$$

**To expand and simplify;**

everything inside the bracket is multiplied by the term directly outside it (taking extra care of signs). You can then simplify by collecting like terms.

$$\begin{array}{l} \text{multiply} \rightarrow \\ 4(3x - 5) - 2x \\ 12x - 20 - 2x \\ 12x - 2x - 20 \\ 10x - 20 \end{array}$$

$$\begin{array}{l} \text{multiply} \rightarrow \quad \text{multiply} \rightarrow \\ 8(y - 7) + 5(y - 2) \\ 8y - 56 + 5y - 10 \\ 8y + 5y - 56 - 10 \\ 13y - 66 \end{array}$$

### GCSE Questions

Simplify

(i)  $c + c + c + c$

(ii)  $p \times p \times p \times p$

(iii)  $3g + 5g$

(iv)  $2r \times 5p$

(a) Simplify  $5bc + 2bc - 4bc$

(b) Simplify  $4x + 3y - 2x + 2y$

(c) Simplify  $m \times m \times m$

(d) Simplify  $3n \times 2p$

(a) Simplify

$$2x \times y \times 3$$

(b) Simplify

$$5x + 3y - 2x + y$$

(c) Simplify

$$y \times y \times y$$

Simplify  $p^2 + p^2 + p^2$

$$p = 5$$

$$r = 2$$

(a) Work out the value of

$$4p + 3r$$

Expand  $3(2y - 5)$

Expand  $5p(p - 3)$

Expand  $x(x^2 + 2)$

Expand and simplify  $3(x + 4) + 2(5x - 1)$

Expand and simplify  $3(x + 5) + 2(5x - 6)$

Expand and simplify  $2(x - y) - 3(x - 2y)$

$$S = 2p + 3q$$

$$p = -4$$

$$q = 5$$

(a) Work out the value of  $S$ .

The learning outcomes for this topic are:

- Calculate a percentage of an amount
- Calculate simple interest
- Increase an amount by a percentage

- Decrease an amount by a percentage
- Calculate compound interest
- Find the original amount before a percentage change

Key Word	Definition
Percentage	a proportion where 100 represents a whole
Increase	to grow in size, add
Decrease	to reduce in size, subtract
Interest	a percentage added to a loan or savings account
Depreciate	another word for decrease
Multiplier	a decimal that will find/increase/decrease by a percentage when multiplied by a quantity
Compound	interest system where the interest is added on before the next round of interest is calculated
Simple	interest system where interest is calculated separately and added at the end

### Additional Resources

MathsWatch: [86](#), [87](#), [88](#), [89](#), [108](#), [109](#), [110](#), [111](#), [164](#)

Corbett Maths: Videos [234](#), [235](#), [236](#), [236a](#), [237](#), [238](#), [239](#), [240](#); Worksheets [234](#), [235](#), [236](#), [236a](#), [237](#), [238](#), [239](#), [240](#)

### Careers Focus – Where could this take you?

Games designers combine their artistic and mathematical skills in their work. Their job entails building prototypes, creating interactive narration and developing a game's mechanics.



### Curriculum Links - Coherence

#### Required Knowledge:

- 7.15 Fractions, decimals and percentages
- 7.17 Calculating percentages
- 8.13 Simple interest

#### Applied to:

- 10H.05 Similar triangles
- 11H.02 Direct and inverse proportion

#### Links across school:

- Geography – percentage increase and decrease in temperatures, populations etc
- Science

### Key Concepts

#### Percentage of an Amount

A **percentage of an amount** allows us to calculate a percentage of a given number by either calculating simple percentages such as 10% and 1% and building the percentage up from there, or by using a percentage multiplier.

E.g. Find **21%** of **£500**.

##### Using simple percentages

100% is the original amount.

10% = £50

1% = £5

21% of £500 = 2 x £50 + £5  
= £105

##### Using percentages multipliers

$$21\% = \frac{21}{100} = 0.21$$

$$21\% \text{ of } £500 = 0.21 \times 500 = £105$$

#### Percentage Increase

Percentage increase means **adding a given percentage of a value onto the original value**. To do this we can either calculate the given percentage of the value and then add it on to the original value or use a percentage multiplier.

E.g.  
Increase £50 by 10%

Add on percentage:	Multiplier:
10% of £50 = £5 £50 + £5 = £55	£50 x 1.1 = £55

#### Percentage Decrease

Percentage decrease means **subtracting a given percentage of a value from the original value**. To do this we can either calculate the given percentage of the value and then subtract it from the original or use a percentage multiplier.

E.g.  
Decrease £50 by 10%

Subtract percentage:	Multiplier:
10% of £50 = £5 £50 - £5 = £45	£50 x 0.9 = £45

#### Reverse Percentages

**Reverse (or inverse) percentages** means working backwards to find an original amount, given a percentage of that amount.

E.g.

45% of a number is 36. Find the original number.

$$\begin{array}{ccc}
 & 45\% = 36 & \\
 \div 45 & \downarrow & \div 45 \\
 & 1\% = 0.8 & \\
 \times 100 & \downarrow & \times 100 \\
 & 100\% = 80 & 
 \end{array}$$

#### Percentage Change

When we calculate percentage change, we are calculating by what percentage of its original value something has increased or decreased.

To do this we use the percentage change formula:

$$\text{Percentage change} = \frac{\text{Change}}{\text{Original}} \times 100$$

#### Compound interest

$$\text{amount of money after } x \text{ years} = \text{amount} \times \text{multiplier}^x$$

- Calculate a percentage of an amount
- Calculate simple interest
- Increase an amount by a percentage
- Decrease an amount by a percentage
- Calculate compound interest
- Find the original amount before a percentage change



### Useful Formulae and Hints

$$\text{Percentage change} = \frac{\text{Change}}{\text{Original}}$$

Profit and loss are calculated in the exact same way as percentage change is calculated, the terms are just specific to the context of the question

For repeated percentage change, compound change, we use the formula

$$\text{New} = \text{Original} \times \text{multiplier}^{\text{repeats}}$$

A multiplier is found by adding or subtracting the percentage interest/less to 100% and then converting to a decimal. Generally the number of 'repeats' is the number of years, but it signifies how many times the interest is being added.

For simple interest

$$\text{New} = \text{Original} + \text{interest} \times \text{repeats}$$

When finding an original amount, or when we are given an amount that represents a percentage other than 100, we should consider how to calculate 1% first and then use this to find the original (100%).

### GCSE Questions

When you earn money you pay income tax.  
The amount you pay depends on how much you earn that year.  
You pay  
0% on the first £12 500 you earn  
20% on the next £37 500 you earn  
40% on the next £112 500 you earn.  
One year, Kim paid £9260 income tax.  
Work out how much she earned that year.

$w$  is a positive number.  
 $x$  is 10% more than  $w$ .  
 $y$  is 10% less than  $x$ .  
Which statement is true?  
Tick **one** box.

$w < x$  and  $w < y$

$w < x$  and  $w = y$

$x > y$  and  $w > y$

$x > y$  and  $w = y$

The value of a new car is £18 000  
The value of the car decreases by  
25% in the first year  
12% in each of the next 4 years.  
Work out the value of the car after 5 years.

The price of a computer is reduced by 17.5%  
The reduced price is £264  
By how much is the price reduced?

Work out 320 as a percentage of 80  
Circle your answer.

25%                      75%                      300%                      400%

(Total 1 mark)

Circle the calculation that decreases 250 by 15%

$250 \div 1.15$                        $250 \times 0.15$                        $250 \times 0.85$                        $250 \div 0.85$

(Total 1 mark)

Mirek invests £6000 at a compound interest rate of 1.5% per year.  
He wants to earn more than £1000 interest.  
Work out the **least** time, in whole years, that this will take.



- Find missing angles on a line or around a point
- Find missing angles in a triangle
- Calculate missing angles in a quadrilateral
- Use isosceles triangle rules
- Use rules for special quadrilaterals
- Find angles in multi-step problems

Key Word	Definition
Line	a straight line where all angles meet at a single point; an angle sum of 180 degrees
Point	a single point of intersection of multiple lines; an angle sum of 360 degrees
Triangle	a 2D shape with three sides; an angle sum of 180 degrees
Isosceles	a triangle with two sides that are equal and two angles that are equal
Equilateral	a triangle with three sides that are equal and three angles that are equal; all angles are 60 degrees
Quadrilateral	a 2D shape with four sides; an angle sum of 360 degrees
Sum	a total, an addition

**Additional Resources**

MathsWatch: [45](#), [46a](#), [46b](#), [121](#), [122](#)

Corbett Maths: Videos [29](#), [30](#), [31](#), [33](#), [35](#), [37](#), [39](#); Worksheets [29](#), [30/5/9](#), [31](#), [33](#), [37](#)

**Careers Focus – Where could this take you?**

A financial trader buys and sells shares, bonds and assets for investors, including banks and their clients. You set prices and execute trades seeking to maximise profits and minimise risk.

**Curriculum Links - Coherence**

**Required Knowledge:**

- 7.01 Adding and subtracting
- 7.20 Measuring and drawing angles
- 7.22 Angles in a triangle

**Applied to:**

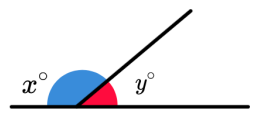
- 9H.15 Angles in a polygon
- 9H.16 Angles in parallel lines
- 11H.01 Circle theorems

**Links across school:**

- Geography – angles in a pie chart

**Key Concepts**

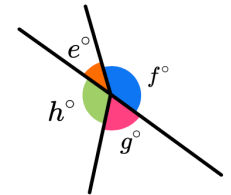
**Angles on a straight line**



$$x + y = 180^\circ$$

(The sum of angles on a straight line equals 180°)

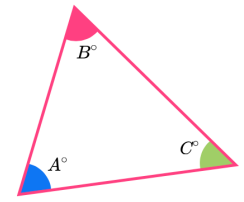
**Angles around a point**



$$e + f + g + h = 360^\circ$$

(The sum of angles around a point equals 360°)

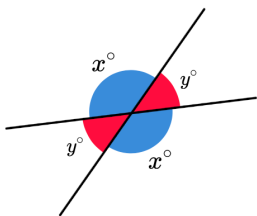
**Angles in a triangle**



$$A + B + C = 180^\circ$$

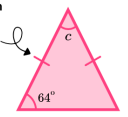
(The sum of angles in a triangle equals 180°)

**Vertically Opposite angles**



(Vertically opposite angles are the same size)

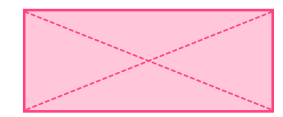
These lines mean that these two sides are equal.



**isosceles triangle**

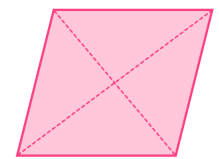
When two sides of a triangle are equal, the angles at the ends of those sides will also be equal.

**Rectangle:**



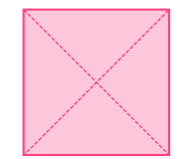
- All the properties of a parallelogram and
- All edges meet at right angles

**Rhombus:**



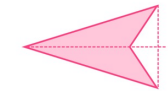
- All properties of a parallelogram and
- All sides are equal in length
- The diagonals form 4 congruent triangles

**Square:**



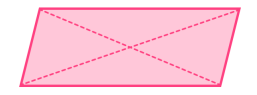
- All the properties of a rectangle and a rhombus and
- The diagonals form 4 isosceles triangles

**Arrowhead:**



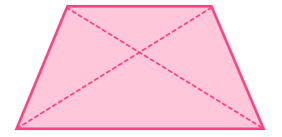
- Diagonals bisect at 90 degrees external to the shape (if symmetrical)
- One pair of congruent angles (if symmetrical)
- One reflex interior angle

**Parallelogram:**



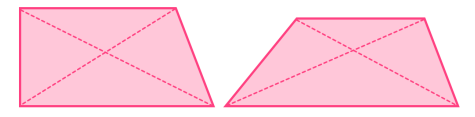
- Opposite angles are the same (congruent)
- Opposite sides are the same
- Two pairs of supplementary angles (co-interior)
- Vertically opposite angles at the intersection of the diagonals

**Isosceles trapezium:**



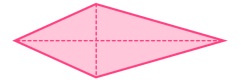
- All properties of a trapezium and
- Two pairs of congruent angles

**Trapezium:**



- Angles at the intersection of the diagonals are vertically opposite.
- One pair of parallel sides, therefore two pairs of supplementary angles (co-interior)

**Kite:**



- The diagonals are perpendicular lines
- One pair of opposite angles are congruent



- Find missing angles on a line or around a point
- Find missing angles in a triangle
- Calculate missing angles in a quadrilateral
- Use isosceles triangle rules
- Use rules for special quadrilaterals
- Find angles in multi-step problems



**Useful Formulae and Hints**

Angles on a straight line add to 180 degrees

Angles around a point add to 360 degrees

Angles in a triangle add to 180 degrees

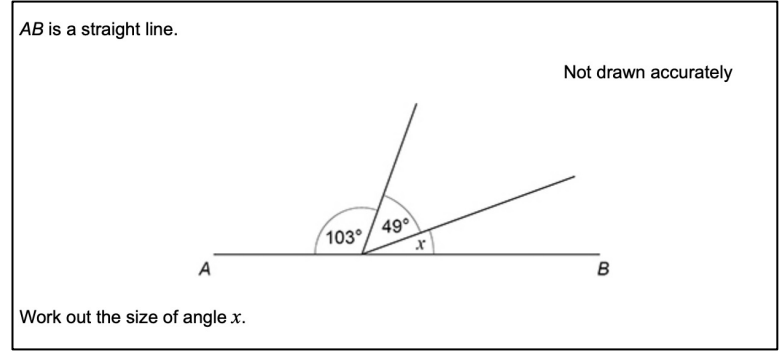
Angles in a quadrilateral add to 360 degrees

The base angles of an isosceles triangle are equal (remember that this does not mean the angles at the bottom of the diagram, it means the two angles at the bases of the equal sides)

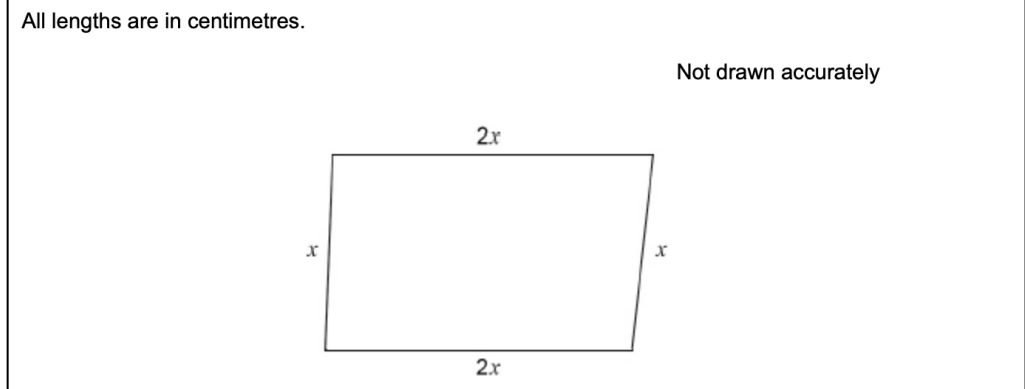
For angles to be on a **straight line** that must **meet at a single point**. Different angles at different points along the line will have **separate 180 sums**.

A **small square** in a corner is the symbol that denotes a **right angle** (90 degrees)

**GCSE Questions**



Here is a **sketch** of a quadrilateral.



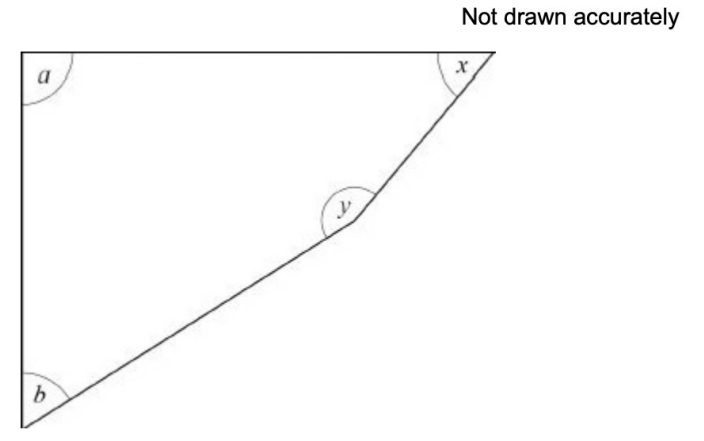
Tick **one** box for each statement.

	True	May be true	Not true
The quadrilateral is a rectangle			
The quadrilateral is a parallelogram			
The quadrilateral is a rhombus			
The quadrilateral is a kite			

(Total 3 marks)

Here is a quadrilateral.

Not drawn accurately



$a = 90^\circ$  and  $a : b = 5 : 3$

$x : y = 1 : 3$

Show that  $b = x$



Work out the size of angle x.



## The learning outcomes for this topic are:

- Calculate the exterior angle of a regular polygon
- Find an interior or exterior angle given the other
- Find a missing angle inside an irregular polygon
- Calculate the number of sides of a regular polygon from an exterior angle
- Solve problems with joined polygons
- Use an exterior angle to check whether a shape is regular

Key Word	Definition
<b>Exterior</b>	the angle between the side of a shape and an extended side; $360 \div \text{sides}$
<b>Interior</b>	the angles inside the polygon
<b>Angle sum</b>	the total of all the interior angles of the polygon
<b>Polygon</b>	a 2D shape with straight edges
<b>Regular</b>	a polygon where all the sides are the same length and all the angles are equal
<b>Irregular</b>	a polygon that is not regular, not all of the sides are equal and not all of the angles are equal


**Additional Resources**

MathsWatch: [123](#)

Corbett Maths: Videos [32](#) ; Worksheets [32](#)

**Careers Focus – Where could this take you?**

Insurance underwriters decide if applications for insurance cover should be accepted and, if so, what the terms and conditions should be. An insurance writer assesses the risk of insuring a person or company by working closely with actuaries, brokers and risk and claims managers.



**Curriculum Links - Coherence**

**Required Knowledge:**

- 7.01 Adding and subtracting
- 7.20 Measuring and drawing angles
- 7.22 Angles in a triangle
- 8.19 Interior and exterior angles

**Applied to:**

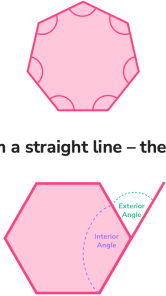
- 9H.16 Angles in parallel lines
- 11H.01 Circle theorems

**Links across school:**

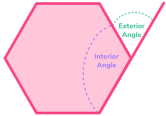
- Art – angles in shapes

**Key Concepts**

Interior angles are the angles inside a shape. They are the angles within a polygon made by two sides:



Interior and exterior angles form a straight line – they add to  $180^\circ$ :



**Interior Angles of Polygons**

Sum of Interior Angles =  $(n - 2) \times 180$


'n' is the number of sides the polygon has

E.g. What is the sum of the interior angles of 7 sided shape?

$n = 7$

Sum of Interior Angles =  $(7 - 2) \times 180^\circ$

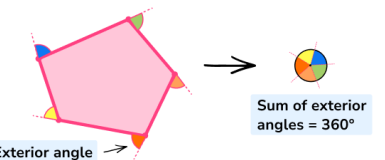
$= 900^\circ$



**Exterior Angles of Polygons**

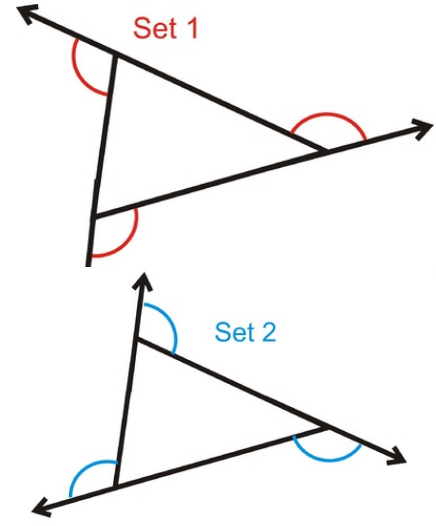
Exterior angles are angles between a polygon and the extended line from the vertex of the polygon.

Sum of Exterior Angles of a Polygon =  $360^\circ$



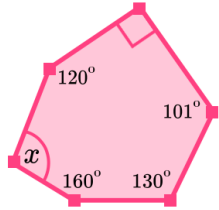
Sum of exterior angles =  $360^\circ$

**Concept – what it is**



**Standard Examples**

The diagram shows a polygon. Find the size of angle  $x$ .



Sum of interior angles =  $(n - 2) \times 180^\circ$

Sum of interior angles for a hexagon =  $(6 - 2) \times 180^\circ$

Sum of interior angles for a hexagon =  $720^\circ$

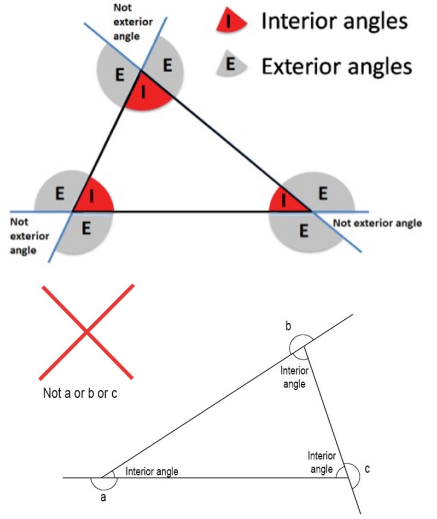
$$120 + 90 + 101 + 130 + 160 + x = 720$$

$$601 + x = 720$$

$$x = 119$$

The size of angle is  $119^\circ$ .

**Non-Concept – what it isn't**



Interior angles

Exterior angles

Not exterior angle

Not exterior angle

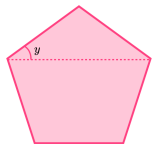
Not a or b or c

Interior angle

Interior angle

**Non-Standard Examples**

Shown is a regular pentagon. Find  $y$ .



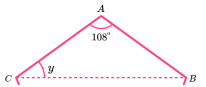
Angle  $y$  is equal to  $36^\circ$ .

Sum of interior angles =  $(n - 2) \times 180^\circ$

Sum of interior angles for a decagon =  $(5 - 2) \times 180^\circ$

Sum of interior angles for a decagon =  $540^\circ$

As the polygon is regular you can find the size of one interior angle by:

$$540^\circ \div 5 = 108$$


As the polygon is regular  $AC = AB$

Therefore  $ABC$  is an isosceles triangle where angles  $ACB$  and  $ABC$  are equal to one another and are therefore both  $y$ .

We know that the interior angles of a triangle add to  $180^\circ$ .

## The learning outcomes for this topic are:

- Calculate the exterior angle of a regular polygon
- Find an interior or exterior angle given the other
- Find a missing angle inside an irregular polygon

- Calculate the number of sides of a regular polygon from an exterior angle
- Solve problems with joined polygons
- Use an exterior angle to check whether a shape is regular



### Useful Formulae and Hints

The sum of the interior angles of any regular polygon =

$$180 \times (\text{sides} - 2)$$

An individual interior angle of a regular polygon =

$$180 \times (\text{sides} - 2) \div \text{sides}$$

The sum of the exterior angles for any regular polygon is 360 degrees

A single exterior angle of a regular polygon =

$$360 \div \text{sides}$$

An interior and exterior angle form a straight line, so sum to 180 degrees

$$\text{Interior angle} + \text{exterior angle} = 180$$

An exterior angle is formed between an edge and the line formed by extending an adjacent edge. It is **NOT** the angle on the outside of the shape at a given corner.

### GCSE Questions

This hexagon has two lines of symmetry.

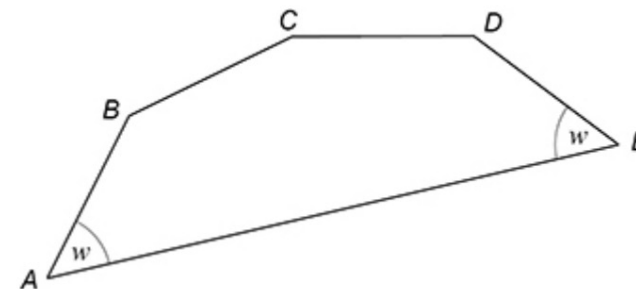
Not drawn accurately



Work out the size of angle  $y$ .

$AB$ ,  $BC$ ,  $CD$  and  $DE$  are four of the sides of a regular decagon.

Not drawn accurately



Work out the size of angle  $w$ .

Part of a regular polygon with 15 sides is shown.

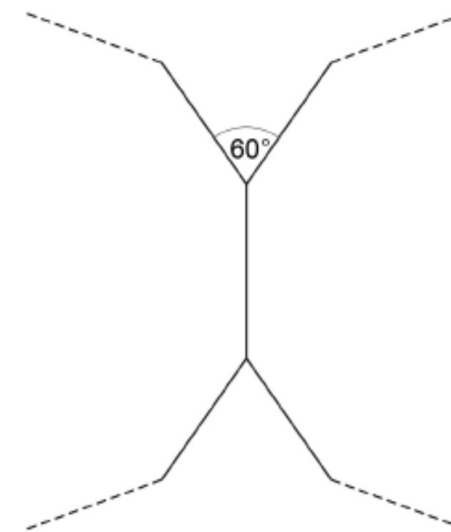
Not drawn accurately



Work out the size of an **interior** angle.

Two congruent regular polygons are joined together.

Not drawn accurately



Work out the number of sides on each polygon.

# 9H.16 Angles in parallel lines

The learning outcomes for this topic are:

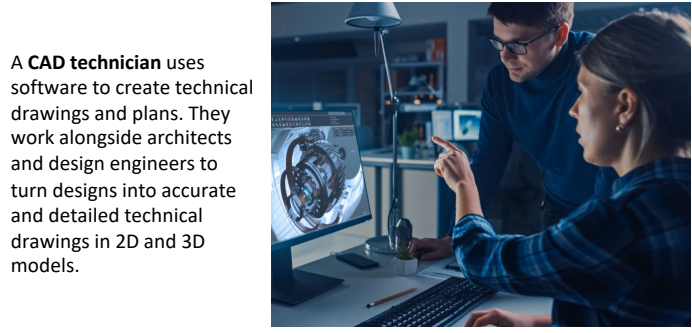
- Recognise the parallel line rules
- Calculate single-step missing angles
- Calculate multi-step missing angles
- Solve problems with parallel lines and triangles
- Show that two lines are parallel
- Solve problems with parallel lines and isosceles triangles

Key Word	Definition
<b>Parallel</b>	two lines that have the same gradient/slope; two lines that will never meet no matter how long they are extended
<b>Alternate</b>	two angles that are equal on parallel and intersecting lines; 'Z' angles
<b>Corresponding</b>	two angles that are equal on parallel and intersecting lines' 'F' angles
<b>Allied</b>	two angles on parallel and intersecting lines that add to 180 degrees; 'C' angles

**Additional Resources**

- MathsWatch:** [120](#)
- Corbett Maths:** Videos [25](#) ; Worksheets [25](#)

**Careers Focus – Where could this take you?**



A CAD technician uses software to create technical drawings and plans. They work alongside architects and design engineers to turn designs into accurate and detailed technical drawings in 2D and 3D models.

**Curriculum Links - Coherence**

- Required Knowledge:**
- 7.01 Adding and subtracting
  - 7.20 Measuring and drawing angles
  - 7.22 Angles in a triangle

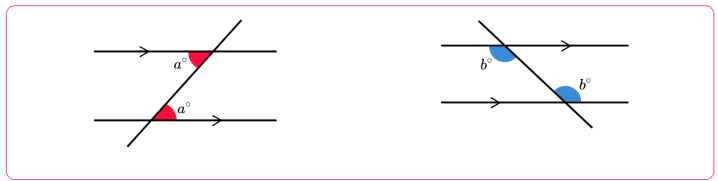
- Applied to:**
- 11H.01 Circle theorems

**Links across school:**

**Key Concepts**

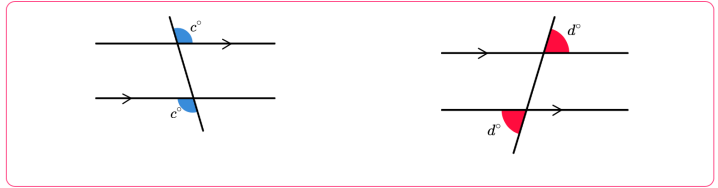
**Alternate interior angles:**

Here, the two angles of  $a$  and  $b$  are in between the parallel lines and therefore are pairs of alternate interior angles.

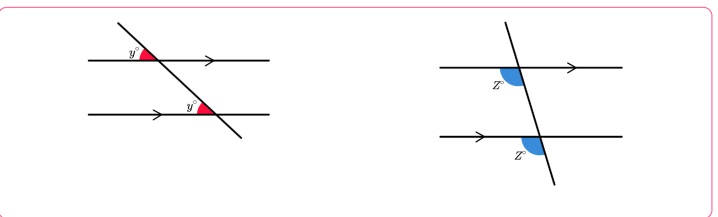
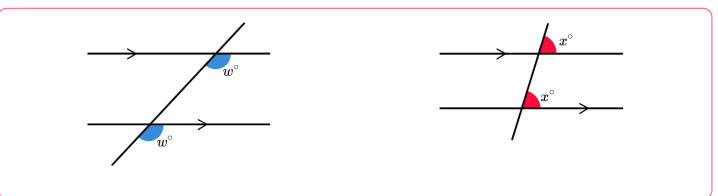


**Alternate exterior angles:**

Here, the two angles of  $c$  and  $d$  are outside of the parallel lines and so these are two examples of pairs of alternate exterior angles.

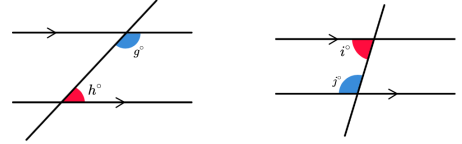


**Corresponding angles are equal**



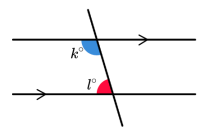
**Concept – what it is**

**Co-interior angles add up to 180°**

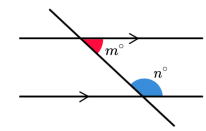


$g + h = 180^\circ$

$i + j = 180^\circ$



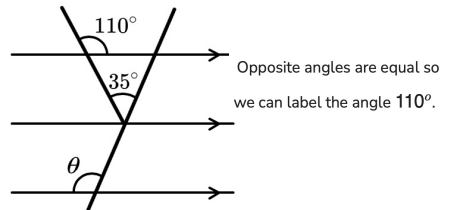
$k + l = 180^\circ$



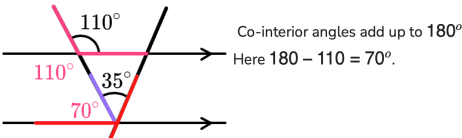
$m + n = 180^\circ$

**Standard Examples**

Calculate the size of the missing angle  $\theta$ . Show all your working.



Opposite angles are equal so we can label the angle  $110^\circ$ .

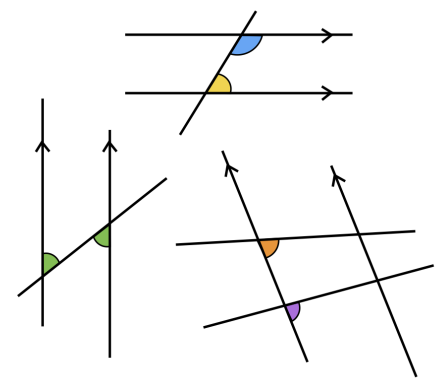


Co-interior angles add up to  $180^\circ$ . Here  $180 - 110 = 70^\circ$ .

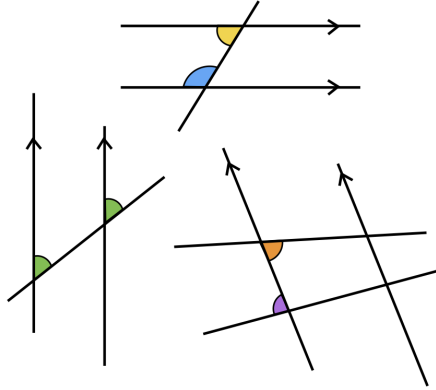
$\theta$  is corresponding to  $70 + 35$  so  $\theta = 70 + 35 = 105^\circ$ .

**Non-Concept – what it isn't**

Not corresponding angles



Not alternate angles



The learning outcomes for this topic are:

- Recognise the parallel line rules
- Calculate single-step missing angles
- Calculate multi-step missing angles

- Solve problems with parallel lines and triangles
- Show that two lines are parallel
- Solve problems with parallel lines and isosceles triangles



## Useful Formulae and Hints

There can be more than two parallel lines, there could be three or more. You can even add in your own parallel lines if they help.

The parallel lines in the diagram do not have to go straight up (vertically) or straight across (horizontally)

'F' angles are **corresponding angles** and are **equal**. They are either above both parallel lines or below both and are on the same side of the intersecting line.

'Z' angles are **alternate angles** and are **equal**. If one is above a parallel line the other is below and they should be on different sides of the intersecting line.

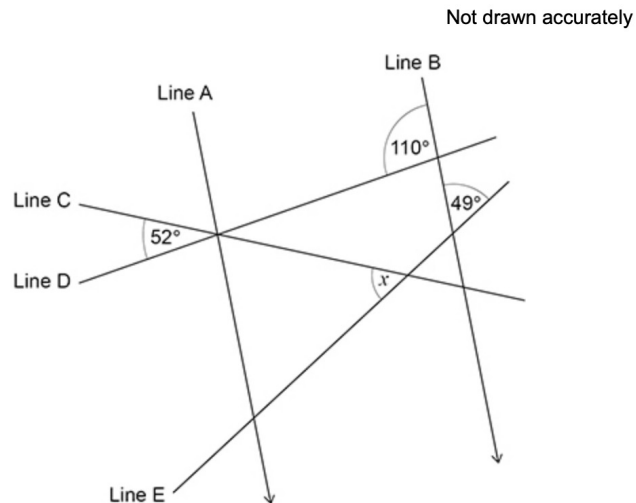
'C' angles are **allied angles** (sometimes called co-interior angles) and **add to 180 degrees**. If one is above a parallel line the other is below and they should be on the same side of the intersecting line.

Don't forget your basic angles rules, you'll often need to combine parallel line rules with angles in a triangle or on a straight line.

## GCSE Questions

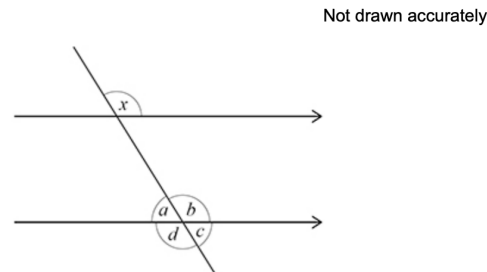
Lines A, B, C, D and E intersect as shown.

Lines A and B are parallel.



Work out the size of angle  $x$ .

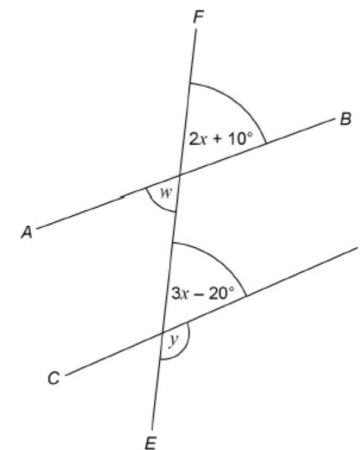
A straight line passes through two parallel lines.



Circle the angle that is **corresponding** to angle  $x$ .

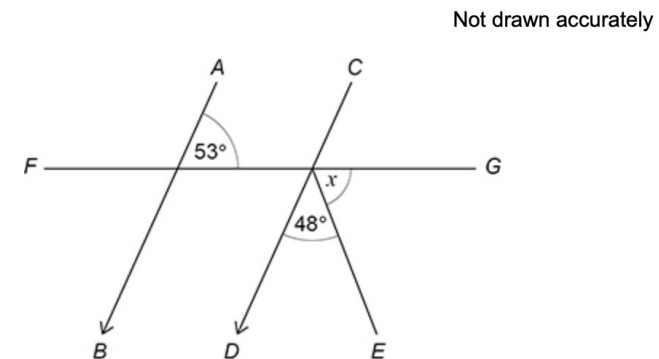
$a$        $b$        $c$        $d$

$AB$ ,  $CD$  and  $EF$  are straight lines.



(a) Ava assumes that  $AB$  and  $CD$  are parallel. What answer should she get for the size of angle  $y$ ?

$AB$  is parallel to  $CD$ .  
 $FG$  is a straight line.



Work out the size of angle  $x$ .

**The learning outcomes for this topic are:**

- Translate shapes
- Reflect a shape in a vertical or horizontal line
- Rotate a shape around a given point

- Enlarge a shape by a positive scale factor
- Enlarge a shape by a fractional or negative scale factor
- Describe a transformation or a combination of transformations

Key Word	Definition
<b>Translation</b>	moving a shape left or right, up or down; usually described using a column vector
<b>Vector</b>	instructions for translating a shape, the top number – left (-) and right (+), bottom number – up (+) and down (-)
<b>Rotation</b>	spinning a shape; described by an angle or rotation, a centre that is spun around and a direction
<b>Direction</b>	the way in which a shape is turned; clockwise or anticlockwise
<b>Enlargement</b>	changing the size of a shape - either larger or smaller
<b>Scale factor</b>	the number of times larger or smaller a shape has become when enlarged
<b>Reflection</b>	mirroring a shape

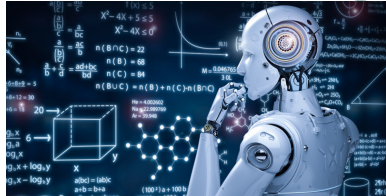
**Additional Resources**

**MathsWatch:** [48](#), [49](#), [50](#), [148](#), [181a](#), [182](#)

**Corbett Maths:** Videos [104](#), [104a](#), [105](#), [106](#), [107](#), [108](#), [109](#), [272](#), [273](#), [274](#), [275](#), [325](#), [326](#); Worksheets [104](#), [104a/5/6](#), [107](#), [108](#), [109](#), [272/3/4](#), [275](#), [325/6](#)

**Careers Focus – Where could this take you?**

As a **machine learning engineer** you work on artificial intelligence with a responsibility for creating programmes and algorithms that enable machines to take actions without being directed. For examples a customised newsfeed or a self-driving car.



**Curriculum Links - Coherence**

**Required Knowledge:**

- 8.01 Lines of symmetry
- 8.02 Reflection and rotation

**Applied to:**

- 11H.07 Transformations of graphs

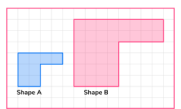
**Links across school:**

- Art – creating and using templates, tessellation

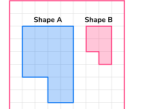
**Key Concepts**

**Enlargement** is a type of transformation that changes the size of a shape by making it bigger or smaller by multiplying its side lengths by a scale factor.

Enlarging a shape by a scale factor **greater than 1** will make the shape **bigger**. E.g. Shape A has been enlarged by scale factor 2 to make shape B.



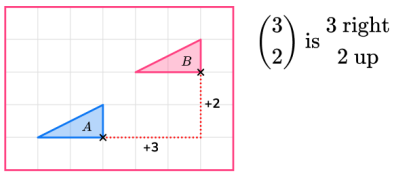
Enlarging a shape by a scale factor **between 0 and 1** will make the shape **smaller**. E.g. Shape A has been enlarged by scale factor  $\frac{1}{2}$  to make shape B.



**Translation** is a type of transformation that moves a shape in a horizontal direction (left and right) and in a vertical direction (up and down).

We use a **column vector** to help record the movement.

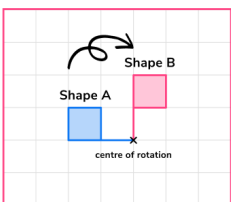
E.g. Shape A has been translated to shape B by a column vector. The column vector gives instructions on how to move each point of the original shape.



A **rotation** is a transformation that turns a shape around a fixed point.

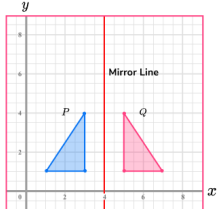
To rotate a shape we need:

- A centre of rotation
- An angle of rotation (given in degrees)
- A direction of rotation - either clockwise or anti-clockwise. (Anticlockwise direction is sometimes known as counterclockwise direction).



E.g. Rotate shape A 90 clockwise, about a fixed point.

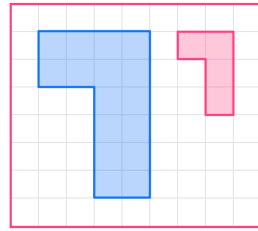
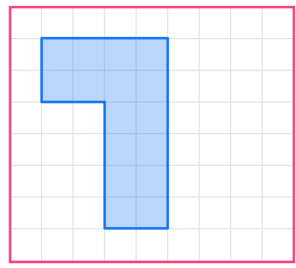
**Reflection** is a **type of transformation** that flips a shape in a mirror line (also called a line of reflection) so that each point is the same distance from the mirror line as its reflected point.



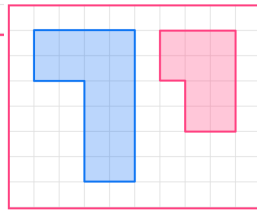
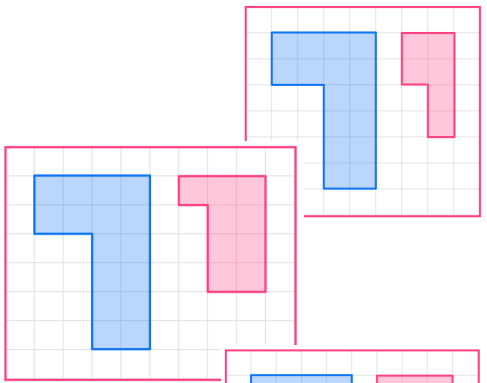
E.g. Triangle P has been reflected in the line  $x = 4$  to give Triangle Q.

**Concept – what it is**

Enlarge the shaded shape by scale factor  $\frac{1}{2}$ .



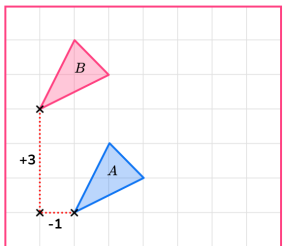
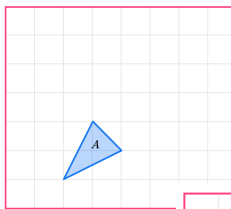
**Non-Concept – what it isn't**



**Standard Examples**

Translate shape A by the column vector and label the image B

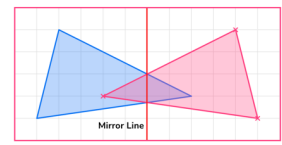
$$\begin{pmatrix} -1 \\ 3 \end{pmatrix}$$



**Non-Standard Examples**

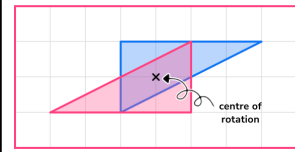
The original shape (the object) and its reflection (the image) are allowed to overlap each other.

E.g.



The centre of rotation can be within the object shape.

E.g.





The learning outcomes for this topic are:

- Translate shapes
- Reflect a shape in a vertical or horizontal line
- Rotate a shape around a given point
- Enlarge a shape by a positive scale factor
- Enlarge a shape by a fractional or negative scale factor
- Describe a transformation or a combination of transformations



### Useful Formulae and Hints

When describing a transformation it is important to make sure that you give all of the information needed to accurately perform it.

#### Rotation

- Angle of rotation
- Centre of rotation
- Direction of travel

#### Reflection

Equation of the mirror line

#### Translation

The column vector of translation

#### Enlargement

- Centre of enlargement
- Scale factor of enlargement

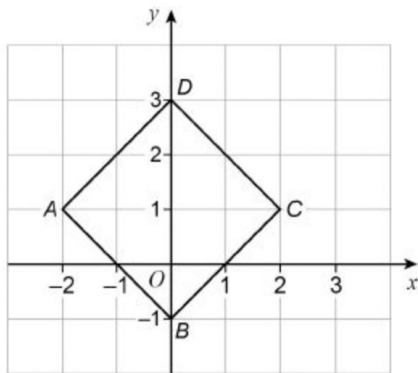
When a question asks for a **single** transformation you must choose **one** of the four transformations and use only that one. You **cannot** say 'then' or 'and' and given a second transformation as this will forfeit **ALL** of the marks.

Remember that an enlargement **doesn't mean** to make the shape larger. If the scale factor is **smaller than one** (but still positive) then the shape will **shrink**.

### GCSE Questions

$ABCD$  is a square.

$A$  is  $(-2, 1)$     $B$  is  $(0, -1)$     $C$  is  $(2, 1)$     $D$  is  $(0, 3)$



(a) A **single** transformation of  $ABCD$  is such that

$B$  is mapped to  $D$

$D$  is mapped to  $B$

$A$  and  $C$  are invariant points.

Describe fully the transformation.

A different **single** transformation of  $ABCD$  is such that

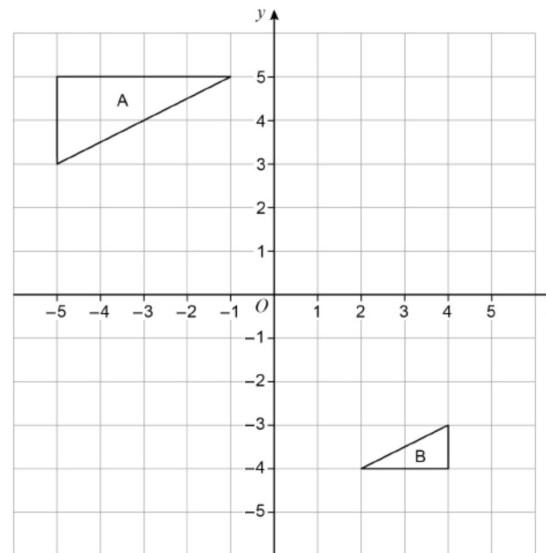
$B$  is mapped to  $D$

$D$  is mapped to  $B$

the only invariant point is  $(0, 1)$

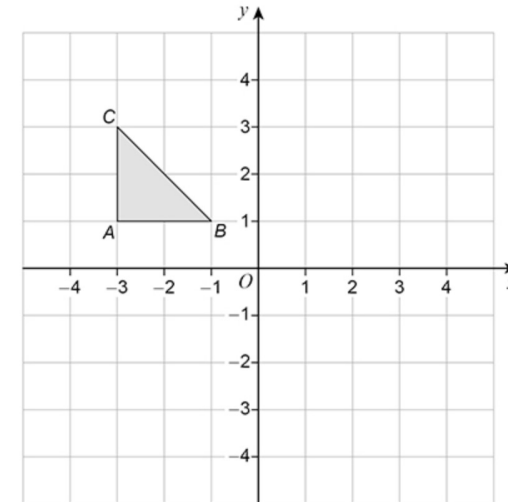
Describe fully the transformation.

Shape A and shape B are shown on the grid.



Describe the **single** transformation that maps shape A to shape B.

Here is triangle ABC on a grid.



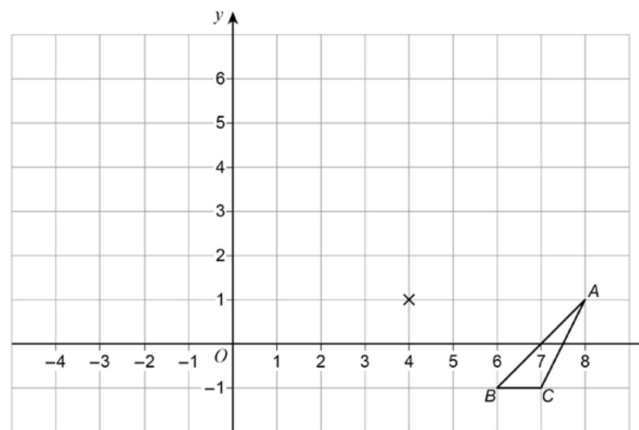
Describe a **single** transformation of the triangle so that

point  $B$  is invariant

point  $A$  moves to  $(1, 1)$

point  $C$  moves to  $(1, -1)$

Enlarge triangle  $ABC$  by scale factor  $-2$ , centre  $(4, 1)$



(Total 2 marks)

Key Word	Definition
Sketch	to draw without accuracy and label the diagram
Construction	to draw a diagram accurately, with measured lengths and angles
Locus	plural <i>loci</i> ; the set of points that satisfy a condition
Perpendicular	two lines that meet at a right angle – 90 degrees
Bisect	to cut in half
Region	an area of space
Feasible	a region that satisfies given conditions

**Additional Resources**

MathsWatch: [145a](#), [145b](#), [146](#)

Corbett Maths: Videos [70](#), [72](#), [75](#), [76](#), [77](#), [78](#), [79](#), [80](#), [81](#), [82](#), [83](#) ; Worksheets [70](#), [72/8](#), [75/6/7](#), [79/80](#), [81/2/3](#)

**Careers Focus – Where could this take you?**

An airline pilot uses both loci and bearings to plot the course they are flying on. Most of the calculations are completed by the machines and instruments on the plane but it is important that the pilot can read and understand the information.

**Curriculum Links - Coherence**

**Required Knowledge:**

- 7.20 Measuring and drawing angles

**Applied to:**

- 9H.19 Scale drawings and bearings

**Links across school:**

- Geography – suitability of habitats and towns

## Key Concepts

Construct a perpendicular bisector of the given line  $AB$ :

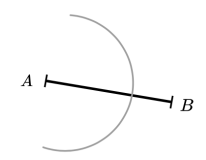


1 Use compasses to draw an arc.

Open the compasses to about three-quarters of the length of the line.

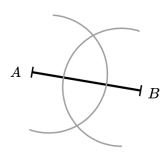
Put the point of the compasses on one of the endpoints of the line.

Draw an arc:



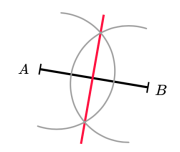
2 Use compasses to draw a second arc, intersecting the first arc.

Keeping the compasses the same, draw another arc from the other end of the line:

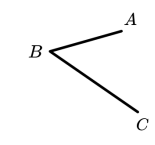


3 Join the two points where the arcs intersect.

Using a straight-edge (a ruler), join up the two points where the arcs intersect each other:

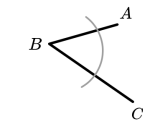


Construct an angle bisector of angle  $ABC$



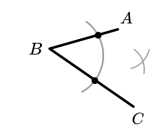
1 Use compasses to draw an arc.

Set your compasses to a length that is less than the shortest arm. Putting the point of the compasses on  $B$ , draw one arc going through both  $AB$  and  $BC$ .



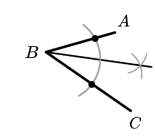
2 Use compasses to draw two more arcs.

Put the point of the compasses on the point where the first arc crossed  $AB$  and draw an arc. Keep the compass on the same setting. Repeat by putting the point of the compasses on the point where the first arc crossed  $BC$  and draw an arc. These two arcs need to intersect.



3 Join the vertex with the point where the arcs intersect.

Using a straight-edge – a ruler, join up the point where the arcs intersect each other with the vertex  $B$ .



- Equidistant from a straight line

Equidistant from a line

- Equidistant from two intersecting straight lines (an angle bisector)

Equidistant from 2 intersecting lines

- Equidistant from a fixed point (an arc or circle)

Equidistant from a point

- Equidistant from two fixed points (perpendicular bisector)

Equidistant from 2 points

Incorrect      Correct

Shade the region within 3cm



The learning outcomes for this topic are:

- Construct a perpendicular bisector
- Construct an angle bisector
- Construct the locus of points a given distance from a point

- Construct a 60 degree angle
- Construct the loci around a line or a rectangle
- Find a feasible region that satisfies multiple conditions



## Useful Formulae and Hints

When a question refers to being closer, or equidistant, to **two points** we should be drawing a **perpendicular bisector**

When a question refers to being closer, or equidistant, to **two lines** we should be drawing an **angle bisector** at the shared point

The loci of points **inside** a rectangle will form a **smaller rectangle**. The loci of points **outside** a rectangle will form a larger rectangle but with **curved corners**

When you are using your compasses you should keep them the **same width** throughout each construction

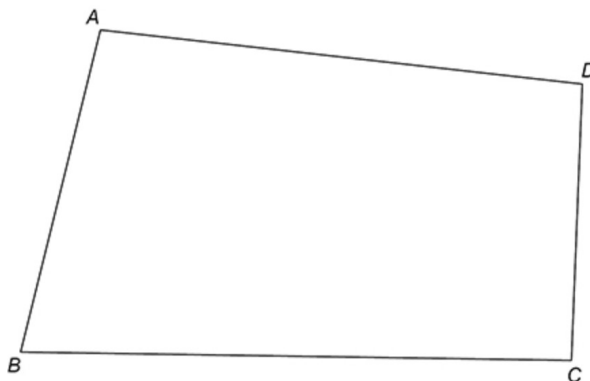
Always carefully consider the region you are shading in your diagram, make sure you don't accidentally ignore sections where your construction arcs are

## GCSE Questions

Construct a locus of points that are the same distance from points *A* and *B*.



*ABCD* represents the plan of a field.

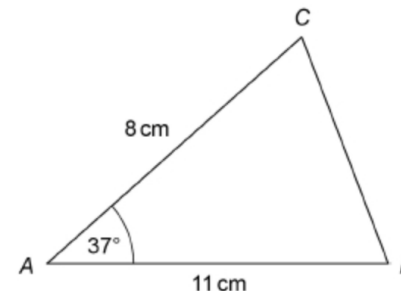


There is a path across the field that starts at *B* is the same distance from *BA* and *BC*.

Using ruler and compasses, show the position of the path.

(Total 2 marks)

A sketch of triangle *ABC* is shown.



Not drawn accurately

In the space below, complete an accurate drawing of triangle *ABC*.



(Total 2 marks)



Our students will:

- read easily, fluently and with good understanding
- develop the habit of reading widely and often, for both pleasure and information
- acquire a wide vocabulary, an understanding of grammar and knowledge of linguistic conventions for reading, writing and spoken language
- appreciate our rich and varied literary heritage
- write clearly, accurately and coherently, adapting their language and style in and for a range of contexts, purposes and audiences
- use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas
- are competent in the arts of speaking and listening, making formal presentations, demonstrating to others and participating in debate.







The aims of the sequence of learning are to ensure that all students:

- develop a love of reading, and read increasingly challenging material
- read critically through studying setting, plot, and characterisation, and the effects of these

- know how language, including figurative language, vocabulary choice, grammar, text structure and organisational features, presents meaning

Keyword	Definition
<b>Tragedy</b>	A play dealing with tragic events and having an unhappy ending.
<b>Antithesis</b>	direct opposite of something else
<b>Oxymoron</b>	figure of speech - contradictory terms (cold fire, pretty ugly)
<b>Imagery</b>	visually descriptive language
<b>Sonnet</b>	a poem of 14 lines using a formal rhyme scheme
<b>Iambic Pentameter</b>	a line of verse with 5 metrical feet -one stressed, one unstressed syllable.
<b>Rhyming Couplet</b>	A pair of lines that are successive ad rhyme.
<b>Protagonist</b>	Leading character
<b>Antagonist</b>	Character who actively opposes or is hostile to someone.
<b>Foreshadowing</b>	A warning or indication of a future event
<b>Simile</b>	Comparison using 'like' or 'as'
<b>Metaphor</b>	A word/phrase is applied to an object which isn't literal
<b>Soliloquy</b>	The act of speaking one's thoughts aloud on stage
<b>Dramatic Irony</b>	When the audience are aware of more than the actors/characters
<b>Unrequited love</b>	love that is not mutual or reciprocated; one person loves someone who does not love them back

### Key Concepts – Romeo and Juliet

<p><b>Shakespeare's Time</b> – Shakespeare wrote his plays at the time of two monarchs: <u>Queen Elizabeth I</u> and <u>James I</u>. <i>Romeo and Juliet</i> was written relatively early in Shakespeare's career (the bulk of his tragedies were written in the 17<sup>th</sup> century) yet was extremely popular in his lifetime, as it is now. Shakespeare borrowed heavily from two texts: <i>The Tragical History of Romeo and Juliet</i> (1562) and <i>Palace of Pleasure</i> (1567)</p> 
<p><b>Religion</b> – The heavy religious presence is evident across several parts of <i>Romeo and Juliet</i>. This is reflective of a society across Europe that was <u>deeply religious</u> (predominantly catholic or protestant). Several characters demonstrate their <u>commitment to the church</u>, such as Romeo and Juliet who choose to marry rather than fornicate, and the Capulets, who are quick to contemplate that Juliet is in a better place (heaven) after she is found 'dead.'</p> 
<p><b>Astrology the Supernatural</b> – At the time of Shakespeare, the belief in both astronomy and the supernatural was far more preeminent than in society today. The reference to '<u>star-cross'd</u> lovers demonstrates the large role of horoscopes and planet positions in being used to <u>predict fate</u>. Also, Romeo and Juliet make reference to the fact that they feel they are being guided by a supernatural force (e.g. 'fortune's fool).</p> 
<p><b>Elizabethan England and Italy</b> – Shakespeare frequently engaged with Italy in his plays, leading many to believe that he travelled there between the late 1580s and early 1590s. Italy was a place that Shakespeare's contemporaries would have had a keen interest in; it was already an <u>advanced and beautiful</u> place for travel. Shakespeare's depictions of many areas of Italian life at the time are deemed largely accurate.</p> 
<p><b>Patriarchal Society</b> – Society throughout the Middle Age and at Shakespeare's time was <u>patriarchal</u> – women were considered inferior to men. This was also the case in much of Europe, including Italy. Women belonged to their fathers (or brothers if their fathers had died) and then their husbands, so Juliet would be expected to obey her father. Women were not permitted to own land or enter most professions. They were instead expected to bear children, be gentle and womanly.</p> 
<p><b>Healthcare and Medicine</b> – Healthcare and medicine were not as advanced in Shakespeare's age as they are today – there were numerous ailments and diseases that were not yet understood. This makes it much more believable for both the Capulets and Romeo that Juliet could have died so suddenly and so young. The high death count in the play would seem slightly more common in those days!</p> 

<p><b>Themes</b> – A theme is an idea or message that runs throughout a text.</p> <p><b>Love</b> – In <i>Romeo and Juliet</i>, love is an extremely overpowering force that supersedes all other values, emotions, and loyalties. Through their love, Romeo and Juliet conspire to go against the forces of their entire social world. Romeo returns to visit Juliet at points, even though he is well aware of the threat of death. At times, love is presented as fickle (Mercutio's speeches, Romeo + Rosaline).</p> <p><b>Individual vs Society</b> – Romeo and Juliet are forced to undermine the oppressive rules of society at the time. For example, rules of the patriarchal family force Juliet to be subservient to her parents, rules of religion mean that they must marry in haste, and rules of masculinity force Romeo into conflict with Tybalt.</p> <p><b>Violence</b> – Extreme violence takes place sporadically throughout the play. The feud between the two families is so bitter that the mere sight of each other can be the cause of a fight to the death. Unchecked violence is personified through the character of Tybalt. The violence culminates in Act 3 Scene 1, in which both Mercutio and Tybalt are murdered.</p> <p><b>Fate</b> – In the first address to the audience, the Chorus states that Romeo and Juliet are 'star-cross'd' lovers, meaning that fate had intended for their paths to cross, and that fate controls their actions. A series of unfortunate accidents towards the end of the play thwart Friar Laurence's plan and eventually manifest in both Romeo and Juliet committing suicide, thus adding to the sense of fate.</p>
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Dramatic Devices in Romeo and Juliet	Features of a Tragedy in Romeo and Juliet
<p><b>Dramatic Irony</b></p> <p>Mercutio and Benvolio think Romeo is still pining over Rosaline, but the audience knows he has moved on to Juliet. A2 S1</p>	<p><b>Tragic Hero</b> - A main character cursed by fate and possessed of a tragic flaw (Romeo, and to an extent Juliet).</p>
<p><b>Soliloquy</b></p> <p>Juliet's opening speech in A3 S2 in which she pours her heart out over her love for Romeo.</p>	<p><b>Hamartia</b> - The fatal character flaw of the tragic hero (his passion and impulsiveness).</p>
<p><b>Aside</b></p> <p>Juliet secretly hopes for the 'villain' Romeo: <i>Villain and he be many miles asunder. God pardon him!</i> A3 S5</p>	<p><b>Catharsis</b> - The release of the audience's emotions through empathy with the characters.</p>
<p><b>Foreshadowing</b></p> <p>Friar Laurence: <i>These violent delights have violent ends, And in their triumph die, like fire and powder.</i> A2 S6</p>	<p><b>Internal Conflict</b> - The struggle the hero engages in with his/her fatal flaw.</p>



The aims of the sequence of learning are to ensure that all students:

- develop a love of reading, and read increasingly challenging material
- read critically through studying setting, plot, and characterisation, and the effects of these

- know how language, including figurative language, vocabulary choice, grammar, text structure and organisational features, presents meaning



## Retrieval Practice

Questions	Answers
At the beginning of this tragic tale, who is the girl that Romeo is 'love sick' over?	Rosaline
How soon do Romeo and Juliet fall in love?	At first sight
How soon do they get married?	The next day
To whom do Romeo and Juliet go to get married?	Friar Lawrence
After getting married, Romeo tries to stop a fight between Mercutio and Tybalt. Who kills who first?	Tybalt kills Mercutio
Where did Shakespeare get his inspiration from?	Arthur Brooke's The Tragical History of Romeus and Juliet (1562).
What is the Great Chain of Being?	A belief system which underpinned Elizabethan society and taught that there was a hierarchical ordering of all creation
What is Petrarchan love?	Love that is unrequited.
What is Courtly Love?	Courtly love incorporates ideas such as love at first sight and dying for one's true love. It was a Medieval ideal or, at least, an ideal which was imposed in the Middle Ages



## Career Focus - Where could this take you?

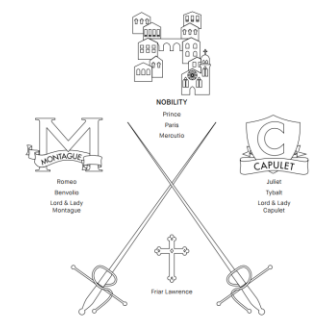


**I am a playwright.** I write stories that are meant to be performed on a stage by actors. I create the words that the actors say and the actions they take, kind of like a director for a movie. It's like writing a book, but instead of people reading it, it's brought to life by actors performing it in front of an audience.



## Challenge Activities

Re-write Act 2, Scene 3:  
Imagine how the conversation sound today?  
Re-write this scene using modern language  
Create a character map:



## Topic Links



This topic links to:  
**History - Jacobean Era, Tragedy**  
**Geography - Italy, Verona**  
**Drama - performance of a play, audience**

## Additional Resources



To further practise and develop your knowledge see:  
Quick summary  

- <https://www.youtube.com/watch?v=sj0LpiU-dVQ>
- Top Quotes <https://www.youtube.com/watch?v=0IPUtwhKTJE>
- BBC Bitesize - <https://www.bbc.co.uk/bitesize/topics/z8642p3>



Our students will:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.



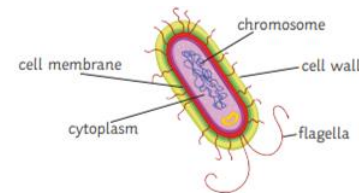
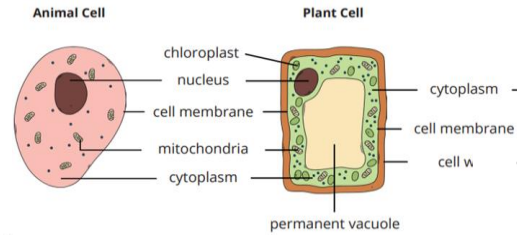
The aims of the sequence of learning are to ensure that all students are able:

- to describe the structure of an animal and plant cells including identifying organelles and their functions
- to explain how animal and plant cells are specialised cells
- to describe how use a microscope to observe plants cells
- to describe the 3 types of cell transport (diffusion, active transport and osmosis)

Keyword	Definition
Cell	Basic unit of life.
Cell membrane	Controls the movement of substances in and out of the cell.
Nucleus	Contains genetic information and controls the activity of the cell
Cytoplasm	Jelly-like substance where chemical reactions take place.
Mitochondria	Where respirations takes place. Releases energy.
Chloroplasts	Contains the green pigment chlorophyll, the site of photosynthesis.
Vacuole	Contains cell sap and supports the cell.
Cell wall	Provides support to plant cells.
Specialised cell	Cells designed to carry out a particular role in the body.
Diffusion	The movement of particles from an area of high concentration to an area of low concentration.
Active transport	The movement of particles from an area of low concentration to an area of high concentration.
Osmosis	The movement of water from an area of high concentration to an area of low concentration, through a partially permeable membrane.

## Cell structure

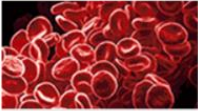
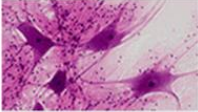

Cells of animals, plants and fungi are called **eukaryotic cells**. They contain membrane bound organelles such as a nucleus and mitochondria.



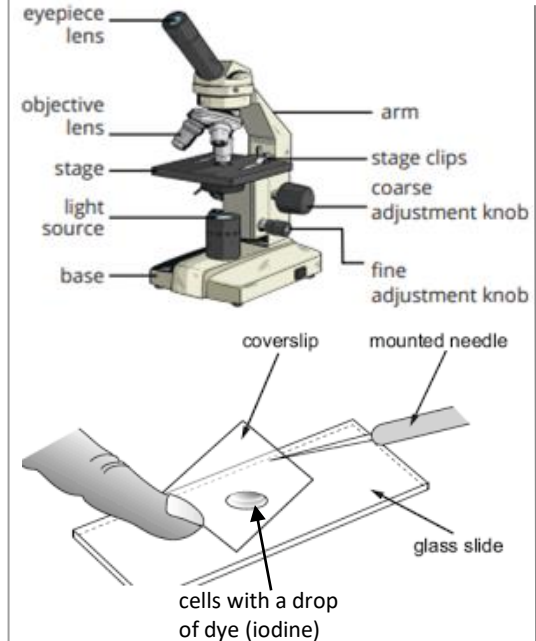
Bacterial cells are called **prokaryotic cells**. Bacteria are made of single cells. Their cell structure is simpler than the cells of eukaryotes and cells are smaller, most are 0.2  $\mu\text{m}$  - 2.0  $\mu\text{m}$ . These cells do not contain membrane bound **organelles** such as a nucleus and mitochondria.

## Specialised Cells

Humans are multicellular. That means we are made of lots of cells, not just one cell. The cells in many multicellular animals and plants are specialised, so that they can share out the processes of life. They work together like a team to support the different processes in an organism.

Image	Type of animal cell	Function	Special features
	<b>Red blood cells</b>	To carry oxygen	<ul style="list-style-type: none"> <li>• Large surface area, for oxygen to pass through</li> <li>• Contains haemoglobin, which joins with oxygen</li> <li>• Contains no nucleus</li> </ul>
	<b>Nerve cells</b>	To carry nerve impulses to different parts of the body	<ul style="list-style-type: none"> <li>• Long</li> <li>• Connections at each end</li> <li>• Can carry electrical signals</li> </ul>
	<b>Root hair cell</b>	To absorb water and minerals	<ul style="list-style-type: none"> <li>• Large surface area</li> </ul>

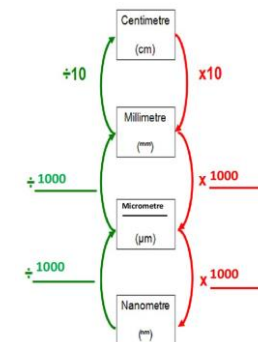
## Using a light microscope



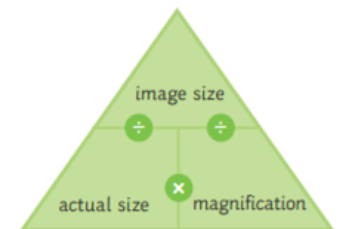
### Method:

- Prepare a slide. Use dye to stain.
- Plug in microscope and turn on light.
- Place slide on stage and hold with clips.
- On the lowest magnification objective lens move the stage as close to the lens as possible
- Focus the image using the focusing wheel.
- Then turn up the magnification by turning to a higher power objective lens.
- Draw a labelled diagram of sample.

## Math skills



Magnification calculation:  
Magnification = image size / actual size

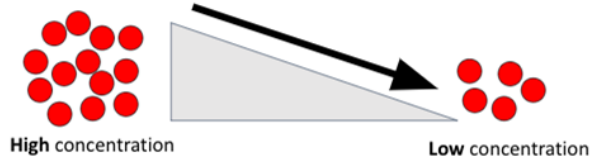


The aims of the sequence of learning are to ensure that all students are able:

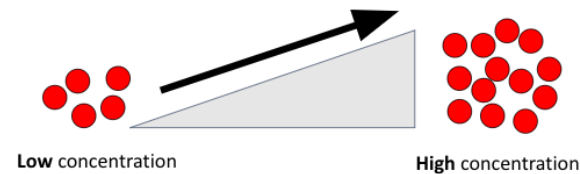
- to describe the structure of an animal and plant cells including identifying organelles and their functions
- to explain how animal and plant cells are specialised cells
- to describe how use a microscope to observe plants cells
- to describe the 3 types of cell transport (diffusion, active transport and osmosis)

## Cell transport

**Diffusion**  
(does not require energy)



**Active transport**  
(Requires energy from respiration)



## Cell division

A type of cell division called mitosis ensures that when a cell divides each new cell produced has the same genetic information.

**DNA** exists as a double helix in a cell's nucleus within structures called **chromosomes**. In a human cell there are 24 pairs of chromosomes (total of 48 chromosomes). Each section of a chromosome contains the code to produce a particular protein is called a **gene**.

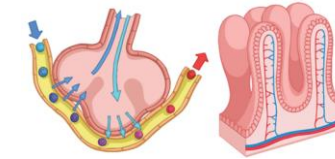


Cells divide via **the cell cycle** and **mitosis** when

- an organism grows
- an organism becomes damaged and needs to produce new cells

It is essential that any new cells produced contain genetic information that is identical to the parent cell.

## Exchange in animals and plants

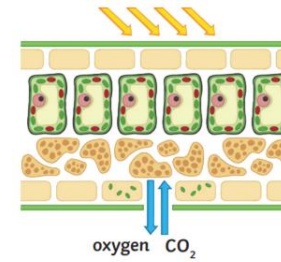


**Gas exchange: Lungs**

Alveoli have large surface area, short diffusion pathway and good blood supply.

**Food absorption: Small intestine**

Millions of villi increase surface area for food to be absorbed. They have a short diffusion pathway and good blood supply.



**Gas exchange: Leaves**

Carbon dioxide enters and oxygen exits leaves through stomata. Guard cells open and close to help control water loss. The surface of the leaf is flattened to increase the surface area for more gas exchange by diffusion.

## Cell transport - Osmosis

**Osmosis** is the **diffusion** of water molecules, from a region where the water molecules are in higher concentration, to a region where they are in lower concentration, through a **partially permeable** membrane.

A dilute **solution** contains a high concentration of water **molecules**, while a concentrated solution contains a low concentration of water molecules.

### Required practical - the effect of osmosis on plant tissue

Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.

- Independent variable – concentration
- Dependent variable – change in mass
- Control variables – volume of solution, temperature, time and surface area

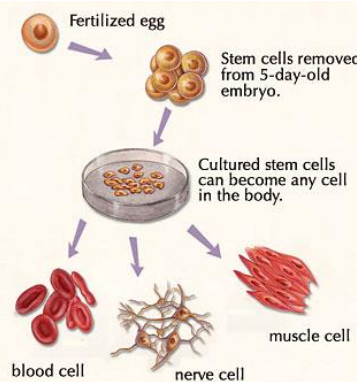
The potato in the pure water will gain mass



The potato in the sugar solution will lose mass

## Stem cells

**Stem cells** are cells that have not undergone **differentiation**. A cell which has not yet become **specialised** is called undifferentiated.



## Keyword

## Definition

DNA

The genetic information found in the nucleus. The DNA exists as a double helix inside structures known as chromosomes.

Chromosomes

Humans have 24 pairs of chromosomes made up of DNA and sub-divided into genes.

Gene

A section of a chromosome that codes for a protein.

Cell cycle

The stages that a growing and dividing cell goes through. Stage 1 - cell grows, organelles and chromosomes copied. Stage 2 - Mitosis (nucleus divides). Stage 3 - cell divides to form 2 identical daughter cells

Mitosis

Cell division for growth and repair that produces identical daughter cells

Embryonic stem cells

Stem cells that develop from a fertilised egg. Can differentiate into ANY cell.

Adult stem cell


Stem cells found in specific locations that can only differentiate into a few different types of cells



- to describe the structure of an animal and plant cells including identifying organelles and their functions
- to explain how animal and plant cells are specialised cells
- to describe how use a microscope to observe plants cells
- to describe the 3 types of cell transport (diffusion, active transport and osmosis)

Retrieval Practice	
Questions	Answers
What is an organelle?	Specialised structures that perform various jobs inside cells.
What is the function of the nucleus?	Contains genetic information (DNA) that controls cell activities.
What is the function of the cell membrane?	To control what enters and leaves the cell.
What is the function of the cytoplasm?	Where chemical reactions take place.
What is the function of mitochondria?	The site of respiration - where energy is released.
What is the function of the cell wall?	To strengthen and support plant cells.
What is the function of chloroplasts?	Contains chlorophyll to absorb light energy for photosynthesis.
How is a red blood cell adapted to its function?	No nucleus, large surface area and contains haemoglobin to allow the red blood cell to transport oxygen around the body.
How is a root hair cell adapted to its function?	Large surface area for absorption of water and minerals, lots of mitochondria for active transport of minerals.
How is diffusion different to active transport?	In diffusion, particles move from a high to low concentration and it doesn't require energy. In active transport, particles move from a low to high concentration and it does require energy.
What happens when a plant cell is put into different concentrations of sugar solution?	In low sugar concentrations and pure water the plant cells increase in mass as water moves in via osmosis. The opposite happens in high sugar concentrations.
Describe the cell cycle and mitosis.	Stage 1 - DNA/organelles are copied. Stage 2 - Mitosis (nucleus divides). Stage 3 - cell divides into 2 identical cells
What is the difference between embryonic and adult stem cells?	Embryonic cells can differentiate into ANY cell whereas adult stem cells can only differentiate into a few different cells.

### Career Focus - Where could this take you?



**I am a pathologist.** This is a medical healthcare provider who examines bodies and body tissues, I am also responsible for performing lab tests. I help other healthcare providers reach diagnoses and I play an important role in the treatment team. I could work in an NHS or private hospital or in a laboratory. My job is exciting and fulfilling because I get to use my problem solving and analytical skills to come up with a better solution to fight viruses, infections, and other life-threatening conditions.

### Challenge Activities

1. Make flashcards for the definitions and retrieval practice questions.
2. Make a mindmap for this topic. Remember to include keywords and the links between information.
3. Research specialised cells found in both animals and plants and turn the information into a leaflet.
4. Research how a bacterial cell is different to a plant or animal cell.
5. Find out more about pathologists and what they do. What qualifications would you need for this career? What current research is being done? What is the salary?
6. Construct a fact file about a famous historical scientist that helped us to understand more about cells.

Topic Links	Additional Resources
<p>This topic links to other science topics such as</p> <ul style="list-style-type: none"> <li>• Scientific Skills</li> <li>• Organisation</li> <li>• Energy</li> </ul> <p>We will also be practising how to</p> <ul style="list-style-type: none"> <li>• Carry out practicals safely</li> <li>• Write descriptively to compare cells</li> </ul>	<p>Educake - <a href="https://www.educake.co.uk/">https://www.educake.co.uk/</a>            BBC Bitesize – link <a href="#">here</a>            YouTube Cognito -  <a href="https://www.youtube.com/watch?v=QCCp-Y_-7J0">https://www.youtube.com/watch?v=QCCp-Y_-7J0</a>  <a href="https://www.youtube.com/watch?v=qHkUOIC8Nbo">https://www.youtube.com/watch?v=qHkUOIC8Nbo</a></p>

- Describe the difference between compounds and mixtures
- Describe the structure of an atom
- Calculate number of protons, neutrons and electrons
- Recall the history of the development of the atom

Keyword	Definition
Atom	The smallest unit of matter.
Element	A substance made up of only one type of atom.
Compound	Contains two or more different elements that are chemically bonded together.
Mixture	Contains two or more different substances that are not chemically joined together.
Proton	Positively charged particle in the atom.
Neutron	Neutral particle in the atom.
Electron	Negatively charged particle in the atom.
Subatomic particle	Particles that make up the atom.
Nucleus	The centre of the atom, containing protons and neutrons.
Periodic table	A table of elements which are organised into groups and periods.
Group	A column on periodic table (all elements in the same group have similar properties).
Period	A row on the periodic table.
Properties	Characteristics or features of something.

## Atomic Structure

Overall, atoms have no charge (they are neutral). This is because they have the same number of protons (+1 charge) and electrons (-1 charge).

Particle	Relative Mass	Charge
proton	1	+1
neutron	1	0
electron	Very small	-1

Located in the nucleus: proton, neutron  
 Located in the electron shells: electron

## Substances

**Element**      **Compound**      **Mixture**

The properties of a compound are **different** to that of the elements that make it up. For example, iron (element) is magnetic but iron sulphide (compound) is not magnetic.

## Number of Subatomic Particles

Number of protons + neutrons = mass number → 4

Number of protons = atomic number → 2

element symbol: He

---

Worked example (sodium):

23	Na	Protons = 11
11		Neutrons = 23 - 11 = 12

Electrons = 11

## History of Atom

**Rutherford's Gold foil experiment**

- Describe the difference between compounds and mixtures
- Describe the structure of an atom

- Calculate number of protons, neutrons and electrons
- Describe the arrangement of the periodic table

## Mendeleev

Before the discovery of protons, neutrons and electrons, scientists attempted to classify the elements by arranging them in order of their atomic weights. The early periodic tables were incomplete and some elements were placed in inappropriate groups if the strict order of atomic weights was followed.



Mendeleev overcame some of the problems by leaving gaps for elements that he thought had not been discovered and in some places changed the order based on atomic weights. Elements with properties predicted by Mendeleev were discovered and filled the gaps. Knowledge of isotopes made it possible to explain why the order based on atomic weights was not always correct

## Groups of the periodic table

### Group 1

Li  
Na  
K  
Rb  
Cs  
Fr

Reactivity increases down the group

This is because... the outer electron is getting further away from the nucleus

This means the attraction is lower

The outer electron is easier to lose

### Group 7

F  
Cl  
Br  
I  
At  
Ts

Reactivity increases up the group

This is because... the outer electron is getting closer to the nucleus

This means the attraction is higher

It is easier to gain an electron

### Group 1

All the Group 1 elements are very **reactive**. They must be stored under oil to keep air and water away from them. Group 1 elements form **alkaline** solutions when they react with water, which is why they are called alkali metals.

### Group 7

Chlorine, bromine and iodine are the three common Group 7 elements. Group 7 elements form salts when they react with metals. The term 'halogen' means 'salt former'.

### Group 0

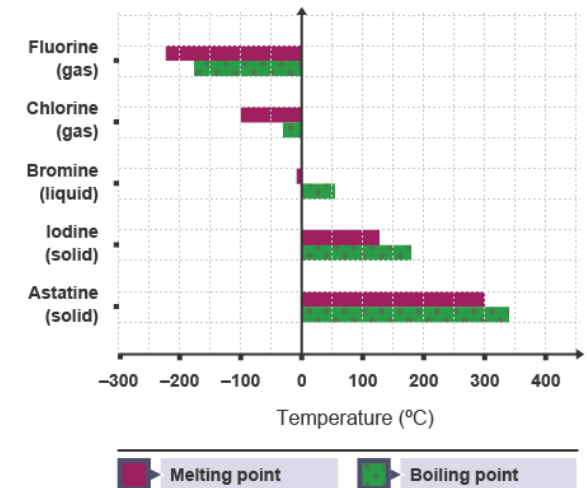
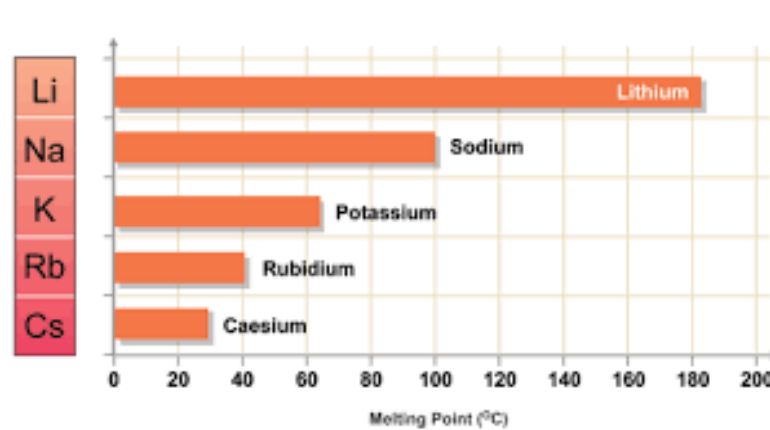
Compared to other **elements**, the **noble gases** are **inert** - they are extremely **unreactive** and do not take part in chemical reactions. All the noble gases have complete outer shells.

## The Periodic Table

Groups												Periods						
1	2	3	4	5	6	7	0											
	H															He	1	
Li	Be		B	C	N	O	F	Ne									2	
Na	Mg		Al	Si	P	S	Cl	Ar									3	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	4
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	5
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	6
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og	7

Metals (yellow) Non-metals (blue)

## Properties of the Group 1 and Group 7 elements





- Describe the difference between compounds and mixtures
- Describe the structure of an atom
- Calculate number of protons, neutrons and electrons
- Recall the history of the development of the atom



## Retrieval Practice

Questions	Answers
What is an element?	A substance made up of only one type of atom.
What is a compound?	Contains two or more different elements that are chemically bonded together.
What is the structure of an atom?	Protons and neutrons located in the nucleus, with electrons in electron shells.
What is the charge, mass and location of a proton?	Charge = +1, Mass = 1, Location = nucleus.
What is the charge, mass and location of a neutron?	Charge = 0, Mass = 1, Location = nucleus.
What is the charge, mass and location of an electron?	Charge = -1, Mass = very small, Location = shell
What does the mass number tell you?	Number of protons + neutrons an element has.
What does the atomic number tell you?	Number of protons an element has.
What is the overall charge of an atom?	An atom has no charge because it has an equal number of protons (+1) and electrons (-1).
How is the periodic table arranged?	In groups and periods (elements in the same group all have similar properties).
How does the reactivity of the group 1 elements change as you go down the group?	As you go down the group the elements get more reactive.
How does the reactivity of the group 7 elements change as you go down the group?	As you go down the group the elements get less reactive.
Why are the group 0 not reactive?	They have full outer shells.

## Career Focus - Where could this take you?



I am a chemical engineer. My job is to changing the chemical, biochemical and physical state of a substance to turn it into something else, such as making plastic from oil. I need to understand how to alter raw materials into required products, while taking into consideration health and safety and cost issues. My main workplace is in a lab, office or processing plant develop raw materials into a range of useful products. A career in the field will see you creating petrochemicals, medicine and plastics.

## Challenge Activities



1. Make flashcards for the definitions and retrieval practice questions.
2. Make a mind map for this topic. Remember to include keywords and the links between information.
3. Research how the periodic table was created? What scientists were involved?
4. Make a 3D model of an atom (showing the subatomic particles)
5. Find out more about chemical engineers and what they do. What qualifications would you need for this career? What is the average salary?
6. Research the history of the atomic model? What were the previous models? How do we know the atom looks the way we think it does?

## Topic Links



This topic links to other science topics such as:

- Bonding
- States of matter
- Radiation
- Chemical reactions

## Additional Resources



Educake - <https://www.educake.co.uk/>  
 BBC Bitesize - <https://www.bbc.co.uk/bitesize/topics/zcckk2p>  
 YouTube Cognito - <https://www.youtube.com/watch?v=fN8kH9Vvqo0>  
<https://www.youtube.com/watch?v=jBDr0mHyc5M>





- The aims of the sequence of learning are to ensure that all students:
- Recall the levels of organisation
  - Describe the digestive system and how enzymes work
  - Describe the heart, blood vessels and blood.

- Explain CHD, the lifestyle factors that influence it and possible treatments
- Describe the parts of a leaf and how substances are transported around plants

Keyword	Definition
Cell	Basic unit of life.
Tissue	A group of cells with a similar structure and function.
Organ	A group of tissues carrying out a particular function.
Organ System	Organs working together as a system.
Organism	Organ systems all working together to form a living organism.
Digestive system	A system that breaks down large molecules into smaller molecules and absorbs them into the bloodstream.
Enzyme	A biological catalyst that speeds up reactions in the body.
Circulatory system	A system that transports substances around the body in the blood.
Heart	The organ that pumps blood around the body.
CHD	A condition where the arteries supplying the heart become narrowed or blocked.
Breathing system	Network of organs and tissues that help you breathe including airways, lungs and blood vessels.
Gas exchange	The exchange of gases (oxygen and carbon dioxide) in the lungs. Occurs in the alveoli.

## Key Concepts

### Principles of Organisation

Cells are the basic building blocks of all living organisms. A tissue is a group of cells with a similar structure and function. Organs are aggregations of tissues performing specific functions. Organs are organised into organ systems, which work together to form organisms

The diagram illustrates the levels of biological organization. It starts with a single cell, which forms a tissue. Multiple tissues form an organ (like the heart). Organs work together to form an organ system (like the human respiratory system). Finally, all organ systems work together to form a complete organism (like a person running).

### The Digestive System

Labels in the diagram: tongue, mouth, salivary glands, oesophagus, liver, gall bladder, stomach, pancreas, small intestine, large intestine, anus, rectum.

The purpose of the digestive system is to break down large molecules into smaller soluble molecules that can then be absorbed into the bloodstream. The rate of these reactions is increased by enzymes.

### Enzymes

An enzyme is a biological catalyst; enzymes speed up chemical reactions without being used up. This happens because it lowers the activation energy required for the reaction to occur. Enzymes are made up of chains of amino acids folded into a globular shape.

An enzyme is a biological catalyst; enzymes speed up chemical reactions without being used up. This happens because it lowers the activation energy required for the reaction to occur. Enzymes are made up of chains of amino acids folded into a globular shape. They have an active site which the substrate (reactant) fits into. Enzymes are very specific and will only catalyse one specific reaction. Enzymes only work optimally at specific temperatures and pHs.

Enzyme	Reactant	Product
amylase	starch	sugars (glucose)
protease	protein	amino acids
lipase	lipid	glycerol and fatty acids

In extremes of temperature and pH the enzyme will denature. This means that the bonds that hold the 3D shape of the enzyme together break and the active site will deform. The substrate will no longer fit in the active site and the enzyme will not work.

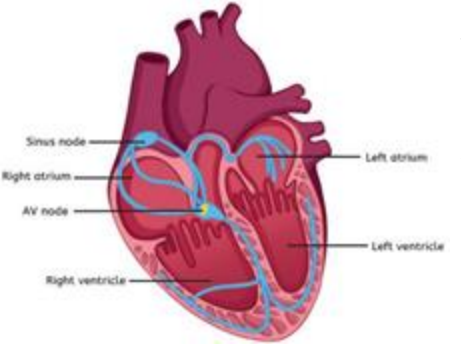




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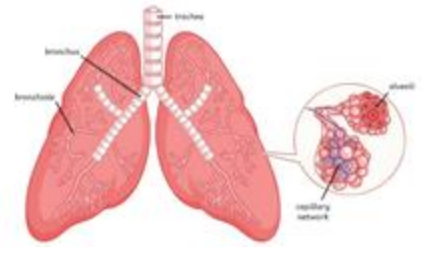
- Explain CHD, the lifestyle factors that influence it and possible treatments
- Describe the parts of a leaf and how substances are transported around plants

## The Heart and Blood Vessels



The heart is an organ that pumps blood around the body in a double circulatory system. The right ventricle pumps blood to the lungs where gas exchange takes place. The left ventricle pumps blood around the rest of the body.

The natural resting heart rate is controlled by a group of cells located in the right atrium that act as a pacemaker. Artificial pacemakers are electrical devices used to correct irregularities in the heart rate.

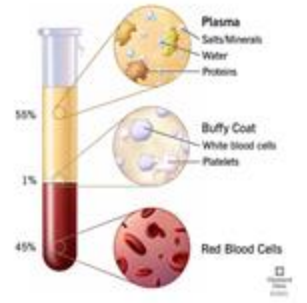


The three types of blood vessels are each adapted to carry out their specific function.

Capillaries are narrow vessels that form networks between arteries and veins. They allow substances to be exchanged with the blood and cells/tissues. They are only 1 cell thick to allow a short diffusion pathway.

	Artery	Vein
direction of blood flow	away from the heart	towards the heart
oxygenated or deoxygenated blood?	oxygenated (except the pulmonary artery)	deoxygenated (except the pulmonary vein)
pressure	high	low (negative)
wall structure	thick, elastic, muscular, connective tissue for strength	thin, less muscular, less connective tissue
lumen (channel inside the vessel)	narrow	wide (with valves)

## The Blood



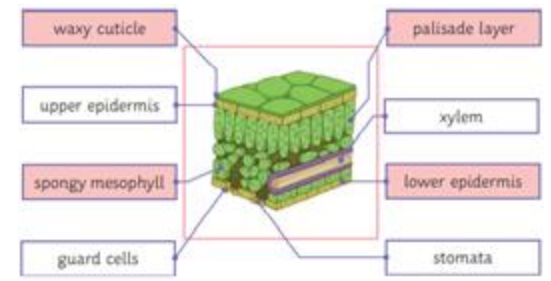
Blood is a tissue consisting of plasma, in which the red blood cells, white blood cells and platelets are suspended. Each of the blood components has a specific function. Plasma transports red blood cells, carbon dioxide, nutrients, hormones and urea. Red blood cells transport oxygen. They do not contain a nucleus so they can contain more haemoglobin. White blood cells are part of the immune system. Platelets are important blood clotting factors.

## CHD

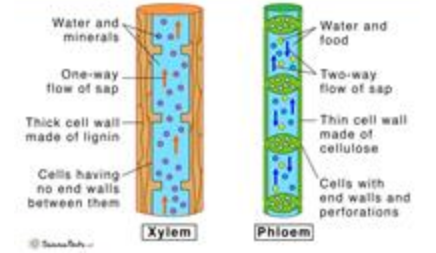


In coronary heart disease layers of fatty material build up inside the coronary arteries, narrowing them. This reduces the flow of blood through the coronary arteries, resulting in a lack of oxygen for the heart muscle. Lifestyle factors can increase the risk of someone developing coronary heart disease. These include high fat diets, smoking and stress.

## Plant Tissues, Organs and Systems



### Xylem and Phloem



Treatment	Description	Advantages	Disadvantages
<b>statins</b>	<b>Drugs</b> used to lower cholesterol levels in the blood, by reducing the amount produced in the liver.	<ul style="list-style-type: none"> <li>• Can be used to prevent heart disease developing.</li> <li>• Improved quality of life.</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term treatment.</li> <li>• Possible negative side-effects.</li> </ul>
<b>stents</b>	<b>Mechanical device</b> which is used to stretch narrow or blocked arteries, restoring blood flow.	<ul style="list-style-type: none"> <li>• Used for patients where drugs are less effective.</li> <li>• Offers long-term benefits.</li> <li>• Made from metal alloys so will not be rejected by the patients body.</li> <li>• Improved quality of life.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires surgery under general anaesthetic, which carries risk of infection.</li> </ul>
<b>heart transplant</b>	The entire organ is replaced with one from an organ donor (a person who has died and previously expressed a wish for their organs to be used in this way).	<ul style="list-style-type: none"> <li>• Can treat complete heart failure in a person.</li> <li>• extended life</li> <li>• Improved quality of life.</li> <li>• Artificial plastic hearts can be used temporarily until a donor is found.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires major surgery under general anaesthetic, which carries risks.</li> <li>• Lack of donors available.</li> <li>• Risk of infection or transplant rejection.</li> <li>• Long recovery times.</li> </ul>



- Recall the levels of organisation
- Describe the digestive system and how enzymes work
- Describe the heart, blood vessels and blood.

- make inferences and refer to evidence in the text
- Describe the parts of a leaf and how substances are transported around plants



## Retrieval Practice

Questions	Answers
What is an organ?	A group of tissues that work together to perform a function.
What is an organ system?	A group of organs working together to perform a function.
Name the parts of digestive system	Mouth, oesophagus, stomach, small intestine, liver, pancreas, gall bladder, large intestine, rectum and anus.
What is the function of the small intestine?	To breakdown food and absorb nutrients.
Enzymes are biological catalysts. What does this mean?	A protein molecule that speeds up chemical reactions inside the cells.
Where is amylase produced and what does it do?	Amylase is produced in the salivary glands and breaks down starch.
Describe the path the blood takes through the heart.	Vena Cava, Right Atrium, Right Ventricle, Pulmonary Artery, Pulmonary Vein, Left Atrium, Left Ventricle, Aorta.
Describe the structure and function of an artery.	Thick muscular elastic walls with small lumen. Transports oxygenated blood under high pressure from the heart to body.
What is coronary heart disease?	The build up of fatty plaques in the coronary arteries supplying the heart. Can result in heart attack.
How is CHD treated?	Statins, stents or heart transplant.
What is the blood made up of?	Plasma, red blood cells, lymphocytes and platelets.
What is the structure and function of xylem?	Thick lign walls with no separation between cells. Transports water and minerals up the plant via transpiration.
What is the structure and function of phloem?	Thin cell walls with sieves between cells. Transports sugars around the plants via translocation.

## Career Focus - Where could this take you?



**I am a veterinary assistant.** I work in a veterinary practice assisting in the care and treatment of animals. This can be a physically and emotionally demanding job where I have a variety of day-to-day tasks such as preparing animals for treatments, giving injections and medicines, taking x-rays, keeping the practice and equipment clean and assisting pet owners. The skills I need for this job include knowledge of animal health, customer service, keeping calm in stressful situations and excellent communication skills.

## Challenge Activities



1. Make flashcards for the definitions and retrieval practice questions.
2. Make a mind map for this topic. Remember to include keywords and the links between information.
3. Research the possible treatments for CHD, the risks and benefits and turn the information into a leaflet.
4. Research how lifestyle factors influence other non-communicable diseases such as cancer.
5. Find out more about veterinary assistants and what they do. What qualifications would you need for this career? What current research is being done? What is the salary?
6. Construct a fact file about a famous historical scientist that helped us to understand more about the organisation of the human body.

## Topic Links



- This topic links to:
- Cells
  - Infectious Disease
  - Chemical reactions (catalysts)
- We will also be practising how to
- Calculate blood rate
  - Write an evaluation to compare treatment

## Additional Resources



To further practise and develop your knowledge see:

Educake - <https://www.educake.co.uk/>  
 BBC Bitesize - <https://www.bbc.co.uk/bitesize/topics/zwtcng8>  
 YouTube Cognito - <https://www.youtube.com/watch?v=6jz9WVfKDVc>  
<https://www.youtube.com/watch?v=UN5BIPfMUKg>



- The aims of the sequence of learning are to ensure that all students:
- The learning outcomes for this topic are:
  - Describe the difference between compounds and mixtures

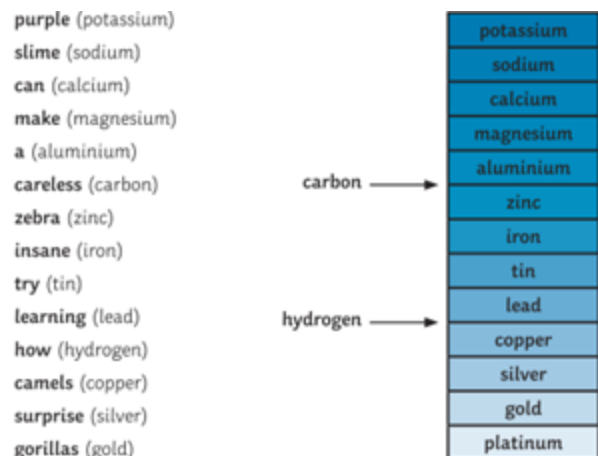
- Describe the structure of an atom
- Calculate number of protons, neutrons and electrons
- Describe the arrangement of the periodic table

Keyword	Definition
Physical changes	When a substance changes state. It does not make any new chemical substances forming.
Chemical changes	When a chemical reaction occurs leading to the formation of new elements or compounds.
State of Matter	The three states of matter; solid, liquid or gas.
Chemical Bonds	When atoms join together chemically, they share or transfer electrons. These bonds are difficult to break.
Reactivity	How much a substance reacts when it is mixed with another substance.
Reactivity Series	In a reactivity series, the most reactive element is placed at the top and the least reactive element at the bottom.
Displacement	A more reactive element can displace a less reactive element out of its compound during a chemical reaction.
Conservation of mass	No atoms are lost during a chemical reaction.
Reactants	The substance(s) that undergoes change in a chemical reaction.
Products	The substance(s) that are made during a chemical reaction.
Exothermic	Energy is transferred to the surroundings.
Endothermic	Energy is taken in from the surroundings.

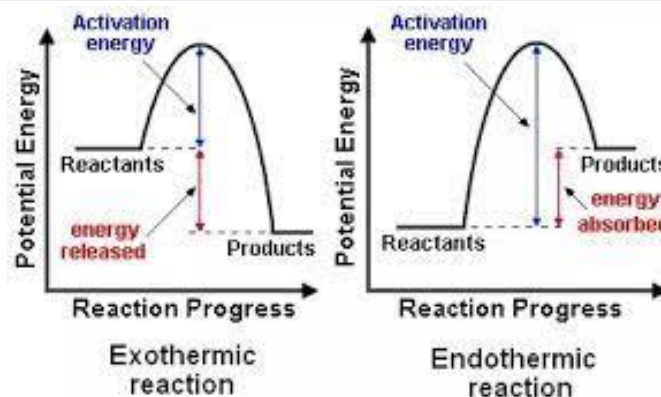
## Key Concepts

### The Reactivity Series

The reactivity series is a league table for metals. The more reactive are near the top of the table with the least reactive near the bottom. In chemical reactions the more reactive metal will displace a less reactive metal.



### Exothermic and Endothermic Reactions



### Conservation of Mass

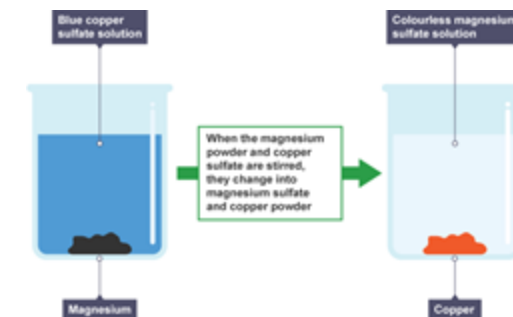
The law of conservation of mass states that no atoms are lost or during a chemical reaction so the mass of the products equals the mass of the reactants

Proving the conservation of mass:



### Displacement Reactions

A chemical is described as being reactive if it takes part easily and quickly in chemical reactions. Some metals are more reactive than others. Metals can be arranged in order of their reactivity. This is called a reactivity series. Displacement reactions involve a metal and the compound of a different metal.







## Retrieval Practice

Questions	Answers
What is the difference between a physical and chemical change?	A physical change only changes state (solid, liquid or gas). A chemical change produces a new substance.
State the law of conservation of mass.	No atoms are gained or lost during a reaction.
How can you prove the law of conservation of mass.	Record the mass of the reactants and products in a closed system. They will be the same.
Describe the metals at the top of the reactivity series.	Highly reactive.
Describe the metals at the bottom of the reactivity series.	React very slowly or not at all.
What is displacement?	When a more reactive metal removes a less reactive metal from its compound.
Using the series, name a metal that would displace aluminum.	Potassium, sodium, calcium or Magnesium
Using the series, name a metal that would not displace copper.	Gold, Silver or Platinum.
What happens to the metal that is displaced during a reaction.	It becomes an element – solid metal.
What happens to the metal that displaces the metal from its compound?	It goes into solution and becomes a salt.
How will you know a reaction is exothermic?	The temperature of the reaction increases.
How will you know a reaction is endothermic?	The temperature of the reaction decreases.

## Career Focus - Where could this take you?



**I am a chemical engineer.** I develop and design chemical manufacturing processes. Chemical engineers apply the principles of chemistry, biology, physics, and math to solve problems that involve the production or use of chemicals, fuel, drugs, food, and many other products. I will mostly be working in laboratories and offices.

The skills I use in this career are problem solving, good verbal and written communication, strong IT skills, understanding of engineering and working as part of a team. I have a degree in chemistry.

## Challenge Activities



1. Make flashcards for the definitions and retrieval practice questions.
2. Make a mindmap for this topic. Remember to include keywords and the links between information.
3. Research how exothermic and endothermic reactions are used in sport.
4. Find out more about chemical engineers and what they do. What qualifications would you need for this career? What current research is being done? What is the salary?
5. Research displacement reactions and produce a poster of the displacement of the halogens (group 7).
6. Construct a fact file about a famous historical scientist that helped us to understand more about chemical changes.

## Topic Links



- This topic links to:
- Energy
  - Atoms and Elements
  - Enzymes
- We will also be practising how to
- Calculate temperature change
  - Use numerical data to support ideas

## Additional Resources



To further practise and develop your knowledge see:

Educake - <https://www.educake.co.uk/>  
 BBC Bitesize - <https://www.bbc.co.uk/bitesize/topics/zcdj97h>  
<https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zb7wvnb>  
 YouTube Cognito - <https://www.youtube.com/watch?v=dstRL5xB0Sk>




# Humanities

Our students will:

- know and understand the history of these islands as a coherent, chronological narrative, from the earliest times to the present day: how people's lives have shaped this nation and how Britain has influenced and been influenced by the wider world
- understand historical concepts such as continuity and change, cause and consequence, similarity, difference and significance, and use them to make connections, draw contrasts, analyse trends, frame historically-valid questions and create their own structured accounts, including written narratives and analyses
- understand the methods of historical enquiry, including how evidence is used rigorously to make historical claims, and discern how and why contrasting arguments and interpretations of the past have been constructed
- develop contextual knowledge of the location of globally significant places – both terrestrial and marine – including their defining physical and human characteristics and how these provide a geographical context for understanding the actions of processes
- understand the processes that give rise to key physical and human geographical features of the world, how these are interdependent and how they bring about spatial variation and change over time



Keyword	Definition 
Epicentre	The point on the earth's surface vertically above the focus of an earthquake
Focus	The point of origin in the ground of an earthquake
Geothermal energy	A type of renewable energy that uses the Earth's natural heat to heat homes and businesses or generate electricity
Immediate response	The reaction of people as the disaster happens and in the immediate aftermath.
Long-term responses	Later reactions that occur in the weeks, months and years after the event.
Monitoring	Using equipment to detect the warning signs of tectonic events
Planning	Identifying and avoiding places at risk from tectonic activity
Prediction	Using evidence and monitoring to predict when a tectonic hazard might happen
Protection	Designing buildings that will withstand tectonic hazards
Primary effects	The initial impact of a natural event on people and property, caused directly by it.
Secondary effects	The after-effects that occur as indirect impacts of a natural event, sometimes on a longer timescale
Richter Scale	A numerical scale for expressing the magnitude of an earthquake from 0 -10
Seismograph	An instrument that measures and records details of an earthquake
Tsunami	Giant waves caused by earthquakes or volcanic eruptions under the sea

## Key Concepts

### Responses to hazards

**Immediate Responses:**

Immediate responses to tectonic hazards include:

- Issuing warnings
- Rescue teams searching for survivors
- Providing treatment to injured people
- Food, drink and shelter provided
- Bodies recovered
- Fires extinguished

**Long-Term Responses:**

Long term responses to tectonic hazards include:

- Rebuilding and repairing properties
- Rebuilding and repairing transport infrastructure
- Improving building regulations
- Restoring utilities such as water, electric and gas
- Resettling local people
- Developing opportunities for the economy to recover
- Install monitoring equipment

### Why live at risk of hazards?

**Economic reasons for living at risk**

- Geothermal energy can be used to generate electricity and heat people's homes.
- Nutrient rich soils are ideal for agriculture.
- Resources and income is provided from mining minerals.
- Tourism creates jobs and provides income.



**Social reasons for living at risk**

- People want to stay close to family and friends.
- People may not understand the risk or the threat may not be great enough.
- People are confident that the measures taken to monitor, predict, plan and protect from tectonic hazards will keep them safe.



## Key Concepts

### Chile Earthquake 2010 - A HIC

February 27th 2010

8.8 magnitude



#### Primary Effects:

- 500 people died
- 12,000 people were injured
- 800,000 affected
- 220,000 homes damaged/destroyed along with 4500 schools, 56 hospitals and 53 ports.

#### Secondary Effects:

- Landslides destroyed up to 1500 km of roads, cutting off remote communities for days
- Tsunami waves devastated coastal towns.

#### Immediate Responses:

- Emergency services responded quickly.
- International support provided field hospitals, satellite phones and floating bridges.
- Within 24 hours, the north-south highway was temporarily repaired, allowing aid to be transported from Santiago.
- Within ten days, 90% of homes had their power and water restored.

#### Long-term responses:

- Chile's government launched a housing reconstruction plan just one month after the earthquake to help nearly affected 200,000 families.
- The recovery took over four years.

### Nepal Earthquake 2015 - A LIC

April 25th 2015

7.9 magnitude



#### Primary Effects:

- 8632 people died.
- 19,009 people were injured.
- 8 million affected.
- 3 million people made homeless.
- 1.4 million people needed support with access to water, food and shelter.

#### Secondary Effects:

- At least nineteen people lost their lives on Mount Everest due to avalanches.
- 250 people were missing in the Langtang region due to an avalanche.

#### Immediate Responses:

- India and China provided over \$1 billion of international aid.
- Over 100 search and rescue responders, medics and disaster experts were provided by The UK, including 3 Chinook helicopters.
- Support from aid workers from charities such as the Red Cross

#### Long-term responses:

- Many countries donated aid. £73 million was donated by the UK (£23 million by the government and £50 million by the public).
- Stricter building codes were introduced.



## Key Concepts - Managing tectonic hazards

### Monitoring

#### Earthquakes

- Foreshocks monitored using seismometers.
- Radon detection devices used to monitor the release of radon from cracks prior to earthquakes.

#### Volcanoes

- GPS is used to monitor changes in the shape of a volcano.
- Seismometers used to detect magma moving.

### Prediction

#### Earthquakes

- Predicting location, date and time of earthquakes is notoriously difficult, though foreshocks can give an indication of a potential event.

#### Volcanoes

- Advance warning signals, such as earthquakes swarms and the deformation of land can support predicting volcanic eruptions.

### Planning

#### Earthquakes

- Practice drills can be help e.g. Japan, Sept 1<sup>st</sup>.
- Emergency supplies and evacuation centres.
- Securing objects/furniture.

#### Volcanoes

- Exclusion zones
- Evacuation
- Educating people how to response

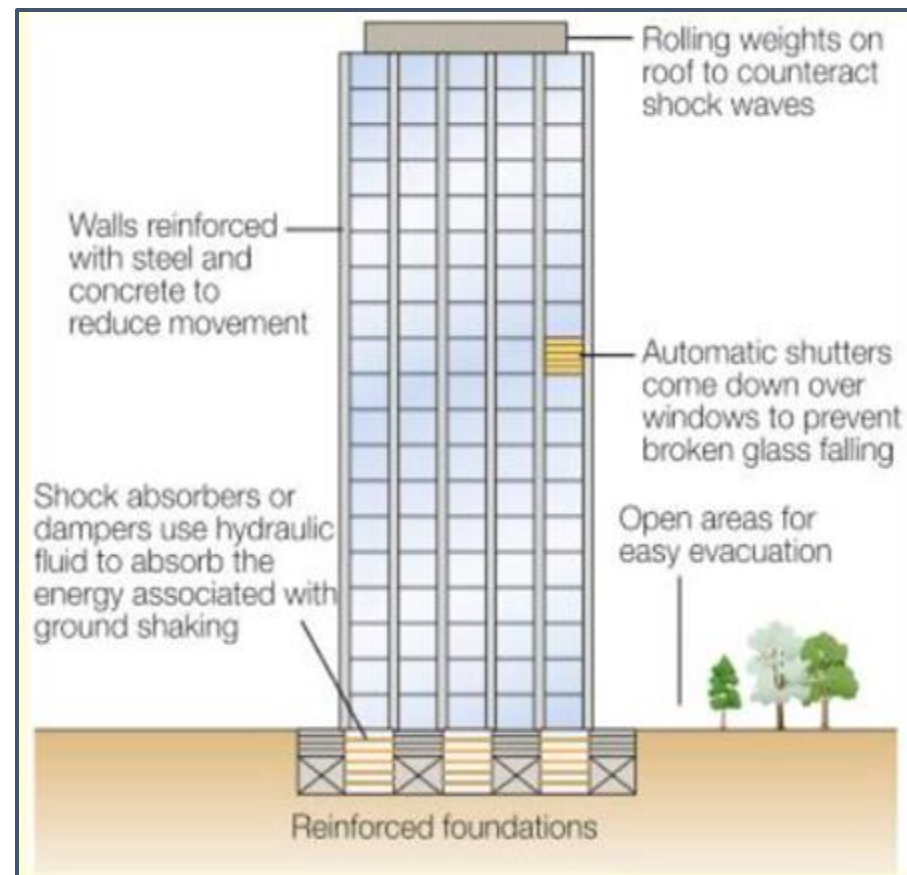
### Protection

#### Earthquakes

- Building and transport infrastructure design can include shock absorbers.
- Sea walls constructed to protect from tsunamis.

#### Volcanoes

- Buildings cannot be completely designed to protect from volcanic eruptions.
- Evacuation by the authorities is likely to be the most effective method of protection.





Retrieval Practice	
Questions	Answers
Give 2 immediate responses to a tectonic hazard	Rescue teams searching for survivors and providing treatment to injured people
Give 2 long-term responses to a tectonic hazard	Rebuilding and repairing properties and improving building regulations
Give 2 reasons why people might live near volcanoes	Tourism increases with those interested in volcanoes. Ash breaks down, providing nutrients to farmland.
Two primary effects of the Chile Earthquake?	500 people died 12,000 people were injured
One secondary effect of the Chile Earthquake?	Tsunami waves devastated coastal towns.
Two primary effects of the Nepal Earthquake?	8632 people died 3 million people made homeless
One secondary effect of the Nepal Earthquake?	250 people were missing in the Langtang region due to an avalanche
What are the 3 Ps of tectonic management	Prediction, Planning and Protection
How can buildings be designed to withstand earthquakes?	Rolling weights on the top and shock absorbers in the foundations to absorb shockwaves

## Career Focus - Where could this take you?



I am an aid worker for the Red Cross. We provide emergency aid like food, shelter and medical supplies. We have to oversee the distribution of goods write reports, monitor budgets and do general administration network with other organisations and government officials in affected areas. Our aim is to work with communities longer term, to roll out healthcare, education programmes, or work on buildings.

## Challenge Activities



- Create a model of an erupting volcano - if you need help watch this video - How to make a volcano: <https://www.nhm.ac.uk/discover/how-to-make-a-volcano.html>
- Research a recent volcanic eruption and write a news report on the causes, the effects and how people tried to reduce the impacts
- Design (draw or build) an earthquake safe building - add details to explain its shape, materials used and foundations

## Topic Links Additional Resources

**This topic links to:**

- Science
- Weather Hazards - in Year 10 Geography

To further practise and develop your knowledge see:

Earthquakes	Nepal	Chile
		



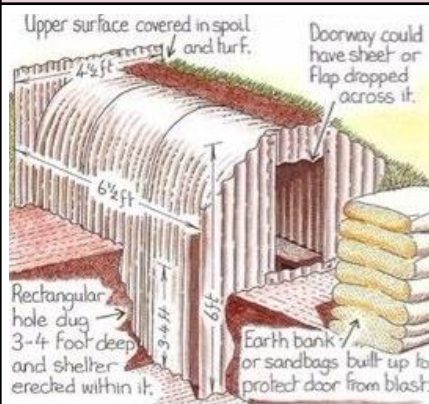


- Explore what life was like on Britain's Home Front during World War Two. Including; shelters, gas masks, evacuation and rationing.
- Describe what the Blitz was and the effects it had in Britain.

- Explain how the government motivated people to work for the war effort.
- Evaluate the roles of women on the Home Front and the significance this had on the war effort.

Keyword	Definition
Total War	All resources in society are channelled into the war effort and civilians are often targets of military attacks.
Anderson Shelter	An air raid shelter made from corrugated steel or iron panels, designed to be dug in peoples' gardens.
Morrison Shelter	A movable air raid shelter, shaped like a table and used indoors. Designed mainly for use in cities.
Evacuation	The movement of children and vulnerable people from cities to the countryside, to protect them from air raids.
The Blitz	The Blitz was a German bombing campaign against the United Kingdom, in 1940 and 1941. They targeted factories, docks and civilians.
Luftwaffe	The German Air force in World War Two.
Gas mask	A protective mask used to cover a person's face as a defence against poison gas.
Morale	The confidence and enthusiasm of a person or group e.g. The football team's <b>morale</b> was high after winning the game.
DORA	Defence of the Realm Act.
Propaganda	Information, especially of a biased or misleading nature, used to promote a political cause or point of view.
Rationing	Due to food shortages, the government issued points to each person to be spent on restricted items e.g. bread.
ARP Warden	An Air Raid Precaution warden's main task was to try and protect people during air raids.
Munitions	Military weapons, ammunition and equipment.
Censorship	A system of controlling the information that people are allowed to see. For example, Newspapers not being able to show photos of dead bodies in the Blitz.
Conscription	Compulsory military service for all men aged 18 - 41.

## Key Concepts



### Anderson Shelters:

This type of air-raid shelter was designed for use in the garden. When covered with earth the shelter would give some protection from shell fragments and bomber splinters. However, dampness was an ever-present problem and it wouldn't survive a direct hit.



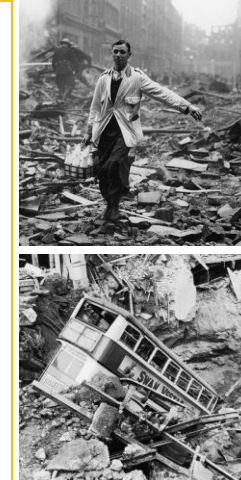
### Evacuation-

Heavy bombing was expected in Britain's large industrial centres. The government thought that children and other groups of vulnerable people would be safer in the countryside, so plans were drawn up to evacuate them from cities to rural areas. This was code-named 'Operation Pied Piper' and the first children were evacuated on 1<sup>st</sup> September 1939. Huge numbers of people were evacuated, altogether, nearly 1.5 million people moved in September 1939. Britain's entire transport system was taken over by evacuation for 4 days. The government used posters, leaflets and messages on the radio to persuade parents how important evacuation was.

**Morrison Shelter-** The Morrison shelter was effectively a metal cage, in which the occupants would lie during an air raid. It often doubled up as a kitchen table

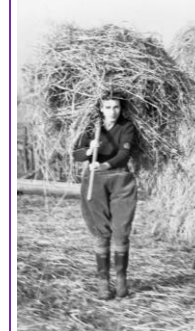


**The Blitz-** On the afternoon of 7<sup>th</sup> of September 1940 at 4.36.p.m., air raid sirens sounded in London and within minutes wave after wave of German bombers appeared, showering London with bombs. Many men, women and children were appallingly injured and some were blown to pieces; only a foot, hand or piece of raw flesh remained. The all clear didn't sound until 5am the next day. The Blitz had begun. London was then bombed for 57 consecutive nights and the air raids continued until 11<sup>th</sup> May 1941. In these nine months, over 43,500 civilians were killed, millions of people in towns and cities across Britain were made homeless, key factories and docks vital for producing and transporting resources for the war effort, were destroyed. Key locations of the Blitz include, London, Plymouth, Coventry, Birmingham, Bristol, Sheffield, Liverpool and Manchester.



**Keeping up Morale-** The government knew that if they could not maintain the morale of the British people they would be less likely to win the war. In order to keep up morale, the government launched a campaign of propaganda and censorship to encourage patriotism and restore belief that victory was possible.

**Women at war-** Conscription was introduced in 1939, meaning that hundreds of thousands of men were removed from the domestic workforce. This meant that the women replaced men in many jobs such as factory work and farming in the 'Land army'. All single women aged between 19 and 30 had to register for war work. This gave women a greater sense of independence as they were earning their own money and also contributing to the war effort.



**The post war era-** People had sacrificed so much during WW2, they believed they had fought for a better future. As a result, although Winston Churchill was viewed as a hero for leading Britain to victory, he was not elected as Prime minister after the war. Instead, a Labour Government was elected because they were dedicated to creating a welfare state which provided free healthcare, pensions and affordable housing for the British public.








- The aims of the sequence of learning are to ensure that all students:
- Explore what life was like on Britain's Home Front during World War Two. Including; shelters, gas masks, evacuation and rationing.
  - Describe what the Blitz was and the effects it had in Britain.

- Explain how the government motivated people to work for the war effort.
- Evaluate the roles of women on the Home Front and the significance this had on the war effort.

Retrieval Practice 	
Questions	Answers
Name three types of air raid shelter from World War Two:	Anderson Shelter, Morrison Shelter and underground stations.
Name two groups of people who were evacuated from cities in WWII:	Children, Disabled people, elderly people, teachers, pregnant women and mothers with very young children.
What difficulties did evacuated Children face?	Many were home sick and missed their families. Some children also struggled to settle into country life as it was so different to city life. Furthermore, many children from cities lived in poverty and were treated poorly by some wealthy families in the countryside.
When was The Blitz?	7 <sup>th</sup> September 1940 until 11 <sup>th</sup> May 1941.
Why was the Blitz a feature of Hitler's Total war?	The Blitz targeted civilians. The purpose of this was to destroy the morale of the British public and encourage them to surrender.
Name three items that were rationed during WWII:	Sugar, gasoline, meat, flour, bread, coffee, butter, canned goods and shoes.
When was rationing introduced?	8 <sup>th</sup> January 1940
Describe one way the government tried to maintain morale amongst the public:	Propaganda was widely used to maintain moral on the Home Front. Posters, radio broadcasts and newspaper articles were all used to boost the mood of the people. Government schemes such as 'Dig for victory' were popularised to spread a patriotic messages.
Name two roles that Women performed during WWII:	Mechanics, engineers, munitions workers, air raid wardens, bus and fire engine drivers, Farmers.
How did WWII change political attitudes in Britain?	People had sacrificed so much in the war, they wanted a better future. This led to a Labour government being elected which pledged to ensure everyone benefited from the post war victory. One key development was the creation of the NHS.

## Career Focus - Where could this take you?



**I am a Radio broadcaster:** My job is to carry out my own research on current affairs, sport and culture; and broadcast my findings live on the radio to the general public. When I conduct my research, I have to ensure that I am looking at both sides of every story so that I can give an accurate version of events when I broadcast my findings. Radio is a powerful tool that reaches millions of people, so this is a big responsibility!

## Challenge Activities

1. Write a newspaper report about different aspects of life on the Home Front. For example, air raid shelters, evacuation, the Blitz, rationing and the role of women in the war. Make sure you use evidence from sources in your article! You can find some great source material in the additional resources below. Also include images to go alongside your articles.
2. Create a model of an Anderson shelter. By doing some research online you will find some really good ideas and inspiration to help you get started! OR, draw / paint your own shelter and label it.
3. Produce a PowerPoint or information booklet to show what life was like in Britain during World War Two. You should include all you have learnt in your lessons, research you have found and images on each slide / page.

## Topic Links

This topic links to other humanities topics such as:

- World War Two
- From Democracy to Dictatorship
- Medicine through time (GCSE)
- The Suffragettes

## Additional Resources

To further practise and develop your knowledge see:

- <https://www.rafmuseum.org.uk/research/online-exhibitions/history-of-the-battle-of-britain/air-raid-shelter-protection/>
- <https://www.bbc.co.uk/teach/school-radio/history-ks2-world-war-2-clips-ww2-evacuation-index/zvs3scw>
- [https://www.bbc.co.uk/history/ww2peopleswar/categories/c54690/index\\_2.shtml](https://www.bbc.co.uk/history/ww2peopleswar/categories/c54690/index_2.shtml)
- <https://www.bbc.co.uk/bitesize/topics/zk94jxs/articles/z7cgg7h#zrnhhcw3>

Keyword	Definition
Akhirah	Belief in life after death, judgment of Allah
Allah	Arabic word for God
Night of Power	The night that Muhammad received the first revelation from Allah
Prophet	a person who proclaims the message of God
Predestination	God knows or determines everything that will happen in the universe
Revelation	Information given by God to someone directly
Shirk	Depicting Allah as someone or something else.
Tawhid	There is only one God & God cannot be divided.
Muslim	A follower of Islam. It means 'one who has accepted Islam'.
Qur'an	The Muslim holy book. The words were revealed to Muhammad directly from God
Muhammad	Believed to be the final messenger of Allah.
Risalah	Prophethood
Hadith	Teachings of the Prophet Muhammad
Angels	Messengers of Allah
Revelation	Information given by God to someone directly

## Key Concepts

**Religion**  
 Founded: **7th century** Founder: **Prophet Muhammad** Sacred text: the **Qur'an**  
 Sacred building: **mosque/masjid**  
 Location: **Saudi Arabia**  
 Followers: **Worldwide – 2 billion, UK – 2.8 million**  
**Sunni & Shi'a:**  
 These are two main **traditions** in Islam. Sunni is the largest and believed **Abu Bakr** was the rightful **successor** to Muhammad, Shi'as thought it was **Ali**, Muhammad's son-in-law.

"In the name of God, the Merciful, the Compassionate. Say (O' Muhammad) He is God the One God, the Everlasting Refuge, who has not begotten, nor has been begotten, and equal to Him is not anyone."

Qur'an, Chapter 112

**What do Muslims believe in?** Muslims believe in One, Unique, Incomparable God; in the Angels created by Him; in the prophets through whom His revelations were brought to mankind; in the Day of Judgement and individual accountability for actions; in God's complete authority over human destiny and in life after death. Muslims believe in a chain of prophets starting with Adam and including Noah, Abraham, Ishmael, Isaac, Jacob, Joseph, Job, Moses, Aaron, David, Solomon, Elias, Jonah, John the Baptist, and Jesus, peace be upon them. But God's final message to man, a reconfirmation of the eternal message and a summing-up of all that has gone before was revealed to the Prophet Muhammad through Gabriel.

**Beliefs**

- Belief in **Allah**, the **one** and only **God**.
- Belief in **angels**, who are **beings of light**
- and bring **messages** to Muslims.
- Belief in **prophets**, who are sent by God to provide **guidance** to humanity. The first of these prophets was **Adam** and the last was **Muhammad**.
- Belief in the **holy books**, in particular the **Qur'an** as the final revelation of Allah.
- Belief in the Day of **Judgment** and the afterlife.
- Belief in **Divine Predestination**. Allah has already decided everything but we all still have free will.

**What is Islam?** Islam is not a new religion, but the same truth that God revealed through all His prophets to every people. For a fifth of the world's population, Islam is both a religion and a complete way of life. Muslims follow a religion of peace, mercy, and forgiveness, and the majority have nothing to do with the extremely grave events which have come to be associated with their faith

**The Nature of Allah**  
 There is no plural for Allah which highlights that Muslims believe in Allah's oneness (Tawhid). Muslims believe the characteristics of Allah are found in the Qur'an (the direct word of Allah). The Qur'an includes 99 names for Allah, these include: the creator; the Ever-providing; the Tremendous; the All-seeing; the Bestower; the Judge and the All-knowing. Many Muslims remind themselves of the 99 names of Allah using a rosary of 33 or 99 beads.

**What does Islam mean?** The Arabic word 'Islam' simply means 'submission' and derives from a word meaning 'peace'. 'Allah' is the Arabic name for God, which is used by Arab Muslims and Christians alike.

**Oneness (Tawid) Sunni**  
 This is the basis of Islam, as the first part of the Muslim creed (shahadah, the first pillar) states, "I bear witness that there is no god, but God/Allah." Allah is believed to be the creator of everything since he is the only God. It also means that Allah must be all-powerful and in control of everything and that Allah must be present in the universe He has created.  
*"And verily, We have sent among every nation a Messenger proclaiming: 'Worship Allah Alone, and avoid all false deities.'" (Surah 16:36)*  
 There is only one God who created everything. If God created everything Muslims must try to preserve the oneness of the world he has created. The Muslim community must itself be one entity (ummah). There can only be one law for Muslims – Allah's law (Shari'ah). Muslims must only worship Allah.



## Key Concepts

### Why are angels important?

Angels are a vital part. Muslims believe that Allah cannot communicate directly with humans. Allah created angels as immortal beings without free will.

- They are male and have wings.
- They obey all of Allah's commands so never commit sins
- Angels can have direct contact with Allah and pass his message to humans

Angels have many functions such as:

- Praise Allah in heaven
- Guardians of the gates of hell
- Record the good and bad deeds of humans to present to Allah on the Last Day

Angels are important because:

- Angels communicated the Qur'an to Muhammad, without them Muslims would not have instructions on what to believe or how to live
- Angels ensure that on the Day of Judgement God will have all the facts when judging people's lives
- Angels make sure that heaven is safe from evil



### Prophet Muhammad PBUH

Received a **revelation** from Allah through the **Angel Jibril**,

It showed Muhammad there was only **one true God**. It became known as the **Night of Power**.

It occurred during the month of **Ramadan** Muhammad passed on the **information** he received from his revelations to his followers.

This information became the **Qur'an**.

Muhammad and the early Muslims had **to fight to survive**

They eventually succeeded & Muhammad **rededicated** the **Kaaba** to God.

Prophet Muhammad:



### The Qur'an

Muslims believe that God decided that his word needed revealing in a new way because: He had sent it before and each time humans distorted it.

Humans had ignored or disobeyed His message

This meant that the Qur'an need to be sent to a prophet who could not read or recite but recite God's words; but highly intelligent.

Muhammad was that chosen prophet. He ensured his followers memorised the revelations and later had secretaries to write them down. He checked them for accuracy and his wife Hafsa kept them for him.



### Risalah (prophet)

Muslims believe that Allah created humans to look after the earth for him (Khalifah or vicegerents) and humans need prophets to know how to do this.

Prophets were all ordinary human beings; what made them different as that they were chosen to receive Allah's messages.

The prophets teach Muslims: Islam is the original religion. Allah taught Islam to Adam and all the following prophets

Each prophet was given Allah's true message and so Muslims should follow their teachings

All prophets lived lives whose example could be followed, especially Muhammad. (**Sunnah** contains the prophet's life)

### Al-Qadr (fate)

This means power, fate or predestination. This means that everything in the universe is following a divine plan

### Al-Qadr and the Day of Judgement

Muslims believe that on the final judgement, Allah will judge everyone on the basis of their beliefs and actions and reward or punish accordingly. People can only be punished for actions which they are responsible and could have done differently.

This means that the concept of al-Qadr and Allah's final judgement contradict one another. This has led to two different Muslim explanations:

Shi'a Muslims – Allah created humans with free will and his vicegerents responsible for the world. It is therefore up to humans to decide what happens and take responsibility for their actions and so pay the price on the Last Day.

Sunni Muslims – Allah knows what people will do before they do it, but they do it of their own free will.

### Akhirah (Life after death)

Muslims believe that when they die their body stays in the grave until the Last Day.

The Qur'an teaches that Allah will bring this world to an end (Last Day). This will be after Isa (Jesus) has returned, the angel Israfil will sound the trumpet and the dead will be raised. We will stand before God on the plain of Arafat to be judged and either sent to heaven or hell.

All Muslims believe that heaven is paradise. It is described in the Qur'an as **al'Jannah** (the Garden):

Hell is **Jahannam** and is portrayed in the Qur'an as a place of fire and torture. Most Muslims believe that this a place for eternity, some Muslims believe that bad Muslims only stay to be punished for their sins or for as long as God wills and that there are 7 classes/realms of hell.



## Retrieval Practice

Questions	Answers
How many names does Allah go by?	99
What does Tawhid mean?	Oneness of Allah
What does Risalah mean?	Risalah literally translated means message
What is a source of authority?	A holy book, a source of wisdom
What is the night of power?	Muhammad received the first revelation of the Qur'an by the angel Jibril on this night
Who revealed God's message to the prophets?	Jibril
Who was Muhammed?	The Prophet Muhammad (pbuh) was a merchant born in the city of Mecca. Muhammad was respected as he was a wise and fair businessman.
Why are sources of authority needed for Muslims?	To ensure they are following the right path and follow the ways of Allah
What does Akhirah mean?	to describe the belief in everlasting life after death.
What does al-Qadar mean?	Predestination, fate
What is Predestination?	They believe that before we were born, God decided what would happen to us in our life
Why are angels important?	Angels are a vital part of communicating a person's good and bad thoughts and deeds back to Allah on the Day of Judgement. Muslims believe that angels communicate the exact, uncorrupted message of Allah to human beings. Many Muslims believe that angels (as well as Allah himself) protect them when they pray.

## Career Focus - Where could this take you?



I work for Islamic Relief a Non-Governmental Organisation as a Social Media Coordinator, in the Marketing Division, I am responsible for the development and implementation of the organisation's social media on various platforms. I work as part of the social media team who deliver high profile and impactful social media campaigns that raise funds for the charity. The biggest skill I need is communication this is either verbally and/or written and working as part of a team.

## Challenge Activities

- Explain two ways the revelation may influence Muslims today
- Why is the Qur'an fundamental today?
- How Muslims show their respect for the Qur'an?
- Explain what Al-Qadr means
- How do Muslims try to show their belief in the oneness of Allah?
- Why is belief in Risalah important?

## Topic Links Additional Resources

This topic links to:

- Islam Practices
- What is religion?
- Muslim ideas about a good life
- Christianity Beliefs

To further practise and develop your knowledge see:

- <https://www.bbc.co.uk/bitesize/topics/zfwhfg8>
- <https://www.bbc.co.uk/bitesize/topics/zfwhfg8/articles/znhjcgq#:~:text=Muslims%20believe%20here%20is%20one,a%20man%20called%20Prophet%20Muhammad.>

Our students will:

- understand and respond to spoken and written language from a variety of authentic sources
- speak with increasing confidence, fluency and spontaneity, finding ways of communicating what they want to say, including through discussion and asking questions, and continually improving the accuracy of their pronunciation and intonation
- can write at varying length, for different purposes and audiences, using the variety of grammatical structures that they have learnt
- discover and develop an appreciation of a range of writing in the language studied.



- Learn how to say what they and others play.
- Learn how to give detailed opinions about music.
- Learn how to use the near future tense.
- Learn how to talk about a concert in the past tense.
- Learn how to ask and answer questions in French.



Keyword	Definition
Tu aimes la chanson?	Do you like the song?
Pourquoi? Pourquoi pas?	Why? Why not?
<b>Qu'est-ce que</b> tu aimes comme musique?	<b>What</b> do you do?
<b>Qu'est-ce que</b> tu n'aimes pas écouter?	What do you not like to listen to?
<b>Le jazz</b> est plus relaxant que <b>la techno.</b>	<b>Jazz</b> is more relaxing than <b>techno.</b>
<b>Le hip hop</b> est meilleur que <b>le rap.</b>	<b>Hip hop</b> is better than <b>rap</b>
Est-ce que tu écoutes souvent de la musique?	<u>Do you often listen to music?</u>
Je n'écoute jamais de.....	<i>I never listen to.....</i>
Qui est ton chanteur préféré?	Who is your favourite singer?
<b>Qu'est-ce que</b> tu vas faire à l'avenir?	<b>What</b> are you going to do in the future?
Je vais + infinitive	I'm going to .....
Ce sera + opinion.	That will be.....
<u>Tu es allé à un concert?</u>	Have you been to a concert?
<b>Qu'est-ce que</b> tu as fait?	<b>What</b> did you do?
C'était <b>comment</b> ?	What was it like?

### Key Concepts

#### Est-ce que tu aimes la musique?

J'adore / J'aime la chanson ... Je n'aime pas / Je déteste la chanson ... parce que ... le chanteur est ... la chanteuse est ... le rythme est ... la mélodie est ... la chanson est ... amusant(e) / démodé(e). intéressant(e). bon(ne) / nul(le). ennuyeux/ennuyeuse.	<i>I love / I like the song ...</i> <i>I don't like / I hate the song ...</i> <i>because ...</i> <i>the singer (male) is ...</i> <i>the singer (female) is ...</i> <i>the rhythm is ...</i> <i>the tune/melody is ...</i> <i>the song is ...</i> <i>fun / old-fashioned.</i> <i>interesting.</i> <i>good / rubbish.</i> <i>boring.</i>
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#### Qu'est-ce que tu vas faire à l'avenir?

**Je vais....**

faire une tournée avec la chorale. <i>to do a tour with the choir</i>	chanter toutes sortes de chansons <i>to sing all sorts of songs</i>
visiter les États-Unis. <i>to visit the USA</i>	prendre beaucoup de photos <i>to take loads of photos</i>
voyager en avion <i>to travel by plane</i>	être musicien(ne) professionnel(le) <i>to be a professional musician</i>

Use expressions of frequency to say how often you do things.

<b>tout le temps</b>	all the time
<b>souvent</b>	often
<b>parfois</b>	sometimes
<b>de temps en temps</b>	occasionally, from time to time
<b>ne ... jamais</b>	never

### Phonics and Vocabulary

## tion

<b>La natation</b> 	<b>L'équitation</b> 	<b>addition</b> 
---	--	--

#### Est-ce que tu es allé à un concert?

<b>Je suis allé(e) à un concert samedi dernier</b>	<i>I went to a concert last Saturday</i>
<b>J'ai acheté un billet en ligne</b>	<i>I bought a ticket online</i>
<b>J'ai acheté une casquette</b>	<i>I bought a cap</i>
<b>J'ai retrouvé mes amis au stade</b>	<i>I met my friends at the stadium</i>
<b>J'ai chanté et j'ai dansé</b>	<i>I sang and I danced</i>
<b>J'ai pris beaucoup de photos</b>	<i>I took lots of photos</i>
<b>J'ai mangé un hamburger</b>	<i>I ate a burger</i>
<b>J'ai bu un coca</b>	<i>I drank a cola</i>
<b>Je n'ai pas mangé de pizza</b>	<i>I didn't eat pizza</i>
<b>J'ai vu mon groupe préféré</b>	<i>I saw my favourite group</i>
<b>C'était fantastique!</b>	<i>It was fantastic!</i>



- Learn how to say what they and others play.
- Learn how to give detailed opinions about music.
- Learn how to use the near future tense.

- Learn how to talk about a concert in the past tense.
- Learn how to ask and answer questions in French.

## Retrieval Practice



Questions	Answers
<u>Est-ce que tu aimes la chanson ?</u>	Oui, j'aime la chanson parce que <b>le rythme est cool.</b> 👍 Non, je n'aime pas la chanson car <b>le chanteur est ridicule.</b> 🗨️
Qu'est-ce que tu aimes comme musique?	Je préfère <b>le rap.</b> À mon avis c'est plus <b>intéressant</b> que <b>le jazz.</b>
Qu'est-ce que tu n'aimes pas écouter?	Je n'aime pas vraiment <b>la techno.</b> Je trouve <b>la mélodie monotone.</b>
Est-ce que tu écoutes souvent de la musique?	<b>Normalament</b> j'écoute la musique <b>tous les jours.</b> ( quand je fais mes devoirs)
Qui est ton chanteur préféré? Quel est ton groupe préféré?	Personnellement, j'adore <b>"The Arctic Monkeys"</b> parce que à mon avis <b>le chanteur est talentueux.</b>
<u>Qu'est-ce que</u> tu vas faire à l'avenir?	Je veux visiter <b>le Canada</b> et je veux voyager <b>en avion.</b> Je voudrais aller à un concert de <b>Stromae.</b> Ce serait <b>chouette.</b>
<u>Tu es allé à un concert?</u>	<b>Oui, l'année dernière, je suis allé à un concert de Green Day. Je pense que c'était inoubliable</b>
Qu'est-ce que tu as fait?	Je suis allé <b>au stade</b> avec <b>mes amis. J'ai chanté et j'ai dansé</b> Après, <b>j'ai mangé une pizza.</b>

## Career Focus - Where could this take you?



I work in music marketing and promotion. I have the chance to work all over Europe and even worldwide promoting new music from around the world. It helps me that I can speak another language and understand the customs in that country.

## Challenge Activities



- 1) Research some French musicians and groups. Send any recommendations to Mrs Fox and we can listen to them in class.
- 2) Create a fact file of a French speaking artist. Include as much detail as you can.
- 3) Complete the activities on Languagenut

## Topic Links



- This topic links to:
- Hobbies
  - The past tense.
  - My future plans.
  - All about me.

## Additional Resources



To further practise and develop your knowledge see:

- Language nut
- Active learn.



# Computing

Our students will:

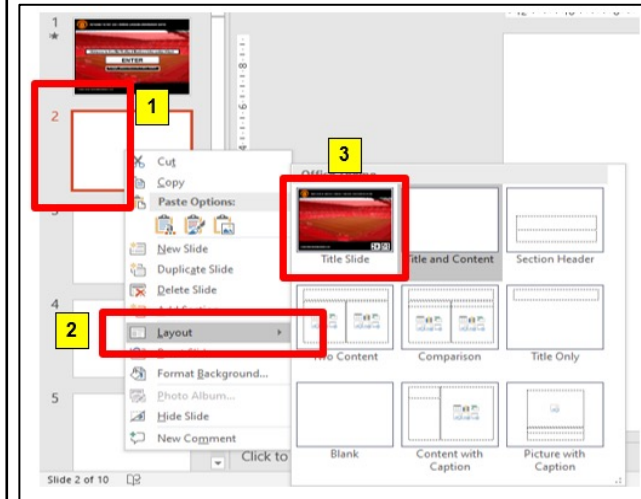
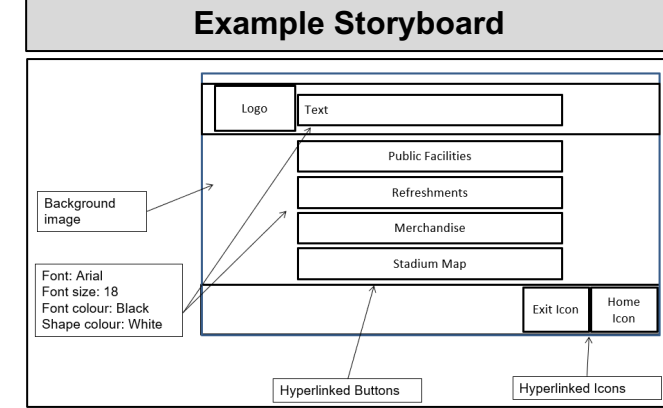
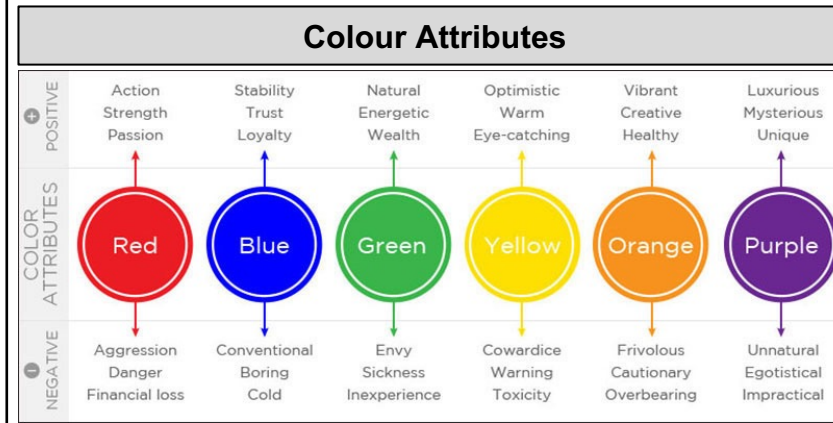
- can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- are responsible, competent, confident and creative users of information and communication technology

- The aims of the sequence of learning are to ensure that all students:
- Evaluate on the planning and design process for the creation of a user interface
  - Evaluate on the development process for the creation of a user interface

- Evaluate on the testing process for the creation of a user interface
- Describe the definitions of some key words related to the unit

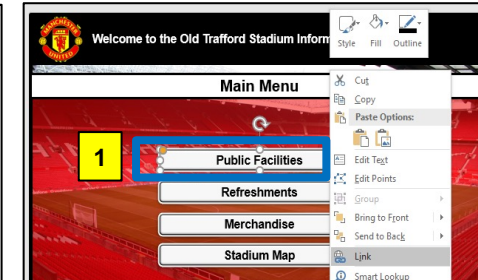
Keyword	Definition
User Interface (UI)	The method in which a person controls and interacts with a software application or hardware device
Mock-up	A realistic representation or a visual draft of the design of a digital product e.g. app, website...
Mood board	A 'collage' of design ideas, colours or other inspirations used to show the thinking towards a design task
Storyboard	A graphical representation of the main sequence of steps/screens that users will use on an interface
Project Requirements	The features, functions, and tasks that need to be completed for a project to be deemed successful
House Style	A company's preferred manner of presentation and layout of written or digital material
Master Slide	A feature in Microsoft PowerPoint that helps you create a template design that can be applied across the whole document.
Hyperlink	An object (word, shape or image) that you can click on to jump to a new section within the current document or to a brand new document
Professional Design	A design that aims to replicate the design quality or style of something that has been created by a professional

## Key Concepts



### Applying the Master Slide to the document

- 1) Right click on a new slide
- 2) Select the 'Layout' option
- 3) Select the Master Slide template



### How to create Hyperlinks

1) Right click on button > Link

### Insert Hyperlink

Link to: Text to display: <<Selection in Document>>


2) Place in this document > [3] [Select Slide] > [4] OK


3

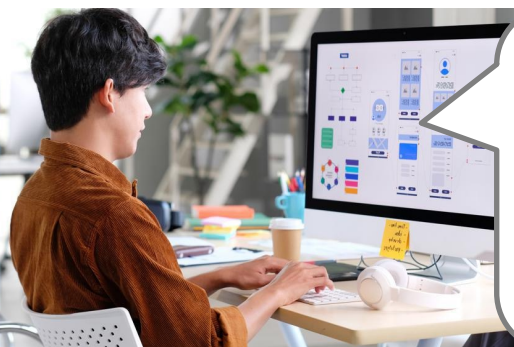
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OK




Retrieval Practice 	
Questions	Answers
What is a 'User Interface' and what is the purpose of it?	A user interface, also called a "UI", is the method in which a person controls and interacts with a software application or hardware device. The UI acts as the layer between the software and the computer hardware – most software will be unusable without a UI.
Why is it important to carefully consider the use of a colour when designing a user interface?	Colour can speak, as powerful as language. It is the visual appearance, which largely depends on colour, that always leaves you the very first impression.
Which details do you need to include on a 'Storyboard' design?	A storyboard must include the following: Details such as font name, font size, font colour, shape colour, logo position, text box position and positioning of other objects.
What are you able to do using the 'Slide Master' tool in MS PowerPoint?	In MS PowerPoint, a Slide Master is a feature that allows you to create master templates (or master slides). One template design can be applied to slides within the document – this reduces interface development time and allows the designer to develop a clear house style.
Which features and tools in MS PowerPoint are useful when developing a user interface?	Some useful features and tools are: <ul style="list-style-type: none"> <li>• Slide Master – to create template designs</li> <li>• Hyperlinks – to create a navigation bar and other interactive buttons</li> <li>• Drawing tools e.g. Shape -Fill, -Outline, -Effects...</li> <li>• Arrange tool – for layering of objects (sent to front and send to back)</li> <li>• Text boxes – add content on each slide</li> <li>• Insert Online Pictures tool – to insert images from the web</li> </ul>
Explain what a 'Hyperlink' allows you to do and how you could it on your user interface?	A hyperlink is an object (word, shape or image) that you can click on to jump to a new section within the current document or to a brand new document. They allow users to click their way from page to page.
What is the purpose of testing a digital product or interface?	There are many benefits to testing a digital product or interface: <ul style="list-style-type: none"> <li>• Refines the whole product before release</li> <li>• It reduces development and maintenance costs</li> <li>• Provides better usability and enhanced functionality</li> <li>• Reduces the number of 'bugs' or errors</li> <li>• Creates a positive impression of you/ your company</li> </ul>



**Career Focus - Where could this take you?** 



In my role as a **User experience (UX) designer** I create accessible, aesthetically appealing and meaningful physical and digital products that people find enjoyable to use. It is about understanding users' emotions and feelings to make sure they continue to come back to the product.

**Challenge Activities** 

1. Create a professionally designed and formatted questionnaire or survey to gather feedback for the user interface. Include questions that clearly check if you have met the requirements of the project. Use the feedback to make improvements to your user interface.
2. Create a tutorial video or document to explain how to create an interactive user interface using MS PowerPoint. Make sure it includes a step-by-step breakdown of each task.
3. Do some research on the internet to find out which other pieces of software can be used to create a user interface. Create a table which compares the features, tools and functionality of each piece of software and then decide which software you think is the most appropriate to use to create a most professional looking user interface.

Topic Links 	Additional Resources 
This topic links to: <u>Computing Curriculum:</u> <ul style="list-style-type: none"> <li>• Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems</li> <li>• Create and re-purpose digital artefacts for a given audience, with attention to trustworthiness and usability</li> <li>• Art and design (creative design, colour schemes etc..)</li> <li>• English (appropriate language for a target audience)</li> </ul>	To further practise and develop your knowledge see: <ul style="list-style-type: none"> <li>• Colour scheme designer: <a href="https://paletton.com/">https://paletton.com/</a></li> <li>• Master Slide Tutorial: <a href="youtu.be/bDk7z0mYmeE">youtu.be/bDk7z0mYmeE</a></li> <li>• Hyperlinks Tutorial <a href="youtu.be/bYkUuaA63vc">youtu.be/bYkUuaA63vc</a></li> </ul>




Our students will:

- produce creative work, exploring their ideas and recording their experiences
- become proficient in drawing, painting, sculpture and other art, craft and design techniques
- evaluate and analyse creative works using the language of art, craft and design
- know about great artists, craft makers and designers, and understand the historical and cultural development of their art forms.
  
- develop competence to excel in a broad range of physical activities
- are physically active for sustained periods of time
- engage in competitive sports and activities
- lead healthy, active lives.

- The aims of the sequence of learning are to ensure that all students:
- Describe the difference between graffiti and street art
  - Create your own stencil and printmaking materials

- Explain how street art is inspired by social/contextual and current affairs

Keyword	Definition 
<b>Graffiti</b>	writing or drawings scribbled, scratched, or sprayed illicitly on a wall or other surface in a public place.
<b>Vandalism</b>	action involving deliberate destruction of or damage to public or private property.
<b>Stencil</b>	a thin sheet of card, plastic, or metal with a pattern or letters cut out of it, used to produce the cut design on the surface below by the application of ink or paint through the holes.
<b>Mural</b>	a painting or other work of art executed directly on a wall.
<b>Satire</b>	the use of humour, irony, exaggeration, or ridicule to expose and criticize people's stupidity or vices, particularly in the context of contemporary politics and other topical issues.
<b>Typography</b>	the style and appearance of printed matter.

## Key Concepts



Scan the QR code to watch the video a brief history on graffiti, is graffiti art or vandalism.

What are your thoughts? Is Graffiti Art or is it vandalism?



**SCAN ME**



Scan the QR code to watch a video on the Street Artist Ben Eine.



**SCAN ME**




**SCAN ME**

Scan the QR code on the left to take you to some examples of local street art.





- Describe the difference between graffiti and street art
- Create your own stencil and printmaking materials
- Explain how street art is inspired by social/contextual and current affairs

Retrieval Practice 	
Questions	Answers
What is street art/graffiti?	Street art is related to graffiti art in that it is created in public locations and is usually unsanctioned, but it covers a wider range of media and is more connected with graphic design
What is a stencil?	This is a form of street art creation whereby a design is cut into paper or cardboard, then spray painted onto the canvas (wall)
What is a mural?	A mural is an enormous piece of street art, and may be created by a single artist or a group. It may show a single large scene, or depict a series of either standalone or connected images to tell a story.
What is mono printing?	The monoprint is a form of printmaking where the image can only be made once.
What is satire?	Humour that is used to make fun of and often show the weaknesses of someone or something.
What is typography?	This is the art of arranging letters and text in a way that makes the font style legible, clear, and visually appealing to the reader.

## Career Focus - Where could this take you?



I am a **set designer** and I work in creating large pieces of art work for sets of television programmes, movies or theatre productions. My work is similar to street art in my use of stencils and large wall canvases.

## Challenge Activities

1. Look through the examples of Street Art you will find in Leeds and explain what pieces you like/dislike and why you have made these choices. Comment on things like colour, pattern and the style of the work.
2. Working in the style of Ben Eine design a mural that could go somewhere in the Academy. Remember the key characteristics of Ben Eine's work when designing your mural.

## Topic Links

This topic links to:

- English – arguing for or against a statement, e.g. whether street art is or is not graffiti
- History – culture and social circumstances that would influence street art

## Additional Resources

To further practise and develop your knowledge see:







The aims of the sequence of learning are to ensure that all students:

- Replicate a set phrase of movement.
- Select and apply a formation to my performance
- Recognise and describe dance elements

- Develop a duet/group using spatial content to communicate a choreographic intention
- Perform sequences with control, accuracy and fluency.
- Apply choreographic devices to enhance choreographed routines
- Perform basic and more complex lifts.

Keyword	Definition
<b>Swansong</b>	The last act you do before retirement or death
<b>Human Rights</b>	Equality, Individuality, Freedom of speech
<b>Amnesty International</b>	An organisation that look after human rights
<b>Prisoner of conscience</b>	Prisoned for your social or political beliefs
<b>Physical setting</b>	Scenery, Props, lighting
<b>Theme</b>	An idea that reoccurs
<b>Choreography</b>	The art of making dances
<b>Costume</b>	A set of clothes in a style typical of a particular country or historical period
<b>Prop</b>	a portable object other than furniture or costumes used on the set of a play or film
<b>Stimulus</b>	an interesting and exciting quality.

## Key Concepts

### FACT FILE - CHRISTOPHER BRUCE (Choreographer)

- Bruce was born in Leicester in 1945.
- He trained at the Ballet Rambert School, which he later choreographed for.
- He then became choreographer for English National Ballet, then Houston Ballet.
  - Bruce is now Artistic Director of Rambert.
- Bruce prefers an audience to keep an open mind about his works, often avoiding programme notes and specific statements. However, he does recognize that his pieces are concerned with ideas rather than being abstract pieces of dance, there is usually strong imagery.
  - Some of his works have an autobiographical element
- Several of Bruce's works express his political, social and ecological awareness.
- His dances generally develop from a stimulus such as music, painting or literature, but he selects themes which can be conveyed through dance.
- Bruce chooses a wide range of music, from popular songs, world music, classical, contemporary, to specially commissioned scores in close collaboration with the composers. The dance often responds closely to the music
- Bruce uses a blend of dance techniques, notably ballet and contemporary. His own contemporary training was in Martha Graham technique and strong use of the back and a low centre of gravity are important elements in his choreography.



### FACT FILE - SWANSONG

First premiered - **1987**  
 Company - **Ballet Rambert**  
 choreographer - **Christopher Bruce**  
 lighting designer - **David Mohr**  
 Musical director - **Philip Chambon**  
 Costume designer - **Christopher Bruce**  
 Set Designer - **Christopher Bruce**  
 Dancers - **Trio**  
 Set - **Black Box**  
 Lighting - **beam of light symbolizing a window or freedom.**  
 Costume guard - **Khaki trousers and shirt, Black jazz shoes**  
 Costume prisoner - **Faded red T shirt and blue jeans**  
 Props - **Chair, Cap, Canes, Cigarette**  
 Stimulus - **The work of Amnesty International, saying goodbye, The experiences of Victor Jara a Chilean poet and the novel A MAN by Oriana Fallaci.**  
 Themes - **Human Rights, Prisoner of Conscience.**  
 Dance Styles - **Contemporary, Physical Contact, Ballet, Jazz, Tap, Folk, Ballroom and Vaudeville.**  
 Choreographic style - **Episodic, Dramatic, Thematic.**



The aims of the sequence of learning are to ensure that all students:

- Replicate a set phrase of movement.
- Select and apply a formation to my performance
- Recognise and describe dance elements

- Develop a duet/group using spatial content to communicate a choreographic intention
- Perform sequences with control, accuracy and fluency.
- Apply choreographic devices to enhance choreographed routines
- Perform basic and more complex lifts.



## Retrieval Practice

Questions	Answers
What dance techniques does Bruce use?	Bruce uses a blend of dance techniques, notably ballet and contemporary. His own contemporary training was in Martha Graham technique and strong use of the back and a low centre of gravity are important elements in his choreography
What are some of the stimuli from Swansong?	The work of Amnesty International, saying goodbye, The experiences of Victor Jara a Chilean poet and the novel A MAN by Oriana Fallaci.
What is vaudeville style?	a type of entertainment popular chiefly in the US in the early 20th century, featuring a mixture of speciality acts such as burlesque comedy and song and dance
What is contemporary dance?	Contemporary dance is a style of expressive dance that combines elements of several dance genres including modern, jazz, lyrical and classical ballet. Contemporary dancers strive to connect the mind and the body through fluid dance movements. The term "contemporary" is somewhat misleading: it describes a genre that developed during the mid-20th century and is still very popular today.

## Career Focus - Where could this take you?



As a **Costume Designer** I use my creative skills to make new and exciting costumes and outfits. It is important that I understand the themes of the piece I am creating for and can communicate them through my designs.

## Challenge Activities



[Swansong worksheet](#)

[Interview with christopher Bruce - the creation of swansong](#)

[Swansong clip](#)

## Topic Links




- This topic links to:
- Drama Performance skills
  - PE - Physical skills
  - English - Understanding terminology and verbs.
  - Maths - Problem solving.

## Additional Resources



To further practise and develop you knowledge see:

- <https://www.scottishballet.co.uk/profile/christopher-bruce>
- <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEWjc6cLpoO75AhW4SkEAHdcAATIQtWJ6BAgLEAI&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3D038BdfaaVV&usq=AOvVaw2-2GFIU4Hgo9nbivk-7fB8>

Retrieval Practice 	
Questions	Answers
Action	What you do, Based the six basic actions Travel , Turn, Gesture, stillness , Jump , Transfer of weight.
Spatial awareness	Formation , Level , Direction, Size, Pathway
Dynamics	How you move, Soft , Sharp , Fast , Slow.
Relationship	With who or what – Dancer to dancer, Dancer to audience, Dancer to prop.
Motif	A short sequence that can be repeated or developed.
Motif Development	Develop a motif using the elements involving space, relationship and action.

## Career Focus - Where could this take you?



I am an **artistic director** and it is my role to lead and organise the performers in my show. I need to be able to communicate effectively so that everyone understands their roles and the overall vision. I need to collaborate with experts in many different areas to create a cohesive performance.

## Challenge Activities

[choreography - Janelle Gineshra](#)

[\\_Director Luke Davis](#)

[\\_Andrew winghart - choreography](#)

## Topic Links

This topic links to:  
Drama Performance skills  
PE - Physical skills  
English - Understanding terminology and verbs.  
Maths - Problem solving

## Additional Resources

To further practise and develop your knowledge see:  
[Interview cast and creative team - some like it hip hop](#)

Keyword	Definition
Choreographic Devise	Tools to help develop a motif
Stimulus	Initial idea or starting point
Motif	A short sequence that can be developed
Devising	A group response to a stimulus
Transition	Linking movements
Theme	An idea that reoccurs
Spatial Awareness	Formation, Level, Pathway and Direction.

## Key Concepts

**STRUCTURING DEVICES and FORM - including binary, ternary, rondo, narrative, episodic, beginning/middle/end, unity, logical sequence, transitions**

### Structures of Dance

Binary – A B – The first section contrasts the second section but both have a common nature.

Ternary – ABA' – The first section contrasts the second section but the third is very similar to the first as it is developed through the use of devices.

Rondo - ABACAD... - Like a verse and a chorus, the A section is very similar (but uses different devices to differentiate it) but the other sections are different.

Episodic – ABCDE... - each section is different from each other but they all have some elements in common

• Binary:



• Ternary:




• Rondo:





# Year 9 Scripting, Staging, Directing & Performing

Keyword 	
Accents	Articulation
Blocking	Centre Stage
Character	Cold Reading
Duologue	Ensemble
Exposition	Genre
Gesture	Interpretation
Performance	Projection
Role	Situation
Setting	Staging



## Key Concepts

### Thinking Questions

- How am I showing my character?
- What is my body language?
- How is it different to my normal?
- What is my character feeling?
- Do my facial expressions match this?
- What is my posture like?
- How do I walk? What is my gait like?
- How do I react to the other characters?
- How close do I stand next to others?

### Techniques:

**Status** (Looking at who is important in a scene and how to show their importance)

**Tension** (Creating a feeling of unease)

**Pitch** (How high or low you speak to give effect and show character)

**Pace** (How quickly or slowly you speak to show character and give effect)

**Volume** (How loudly or quietly you speak to give effect and show character)

### THE SCRIPT

You will be looking at a set script. You will bring a scene to life, using the performance skills learned and developed over the year so far and create a interesting and engaging performance.

### PAGE TO STAGE

You will create a piece of documentary theatre.. We will be looking at vocal skills, physicalizing a script, and setting a scene

### A good scripted performance

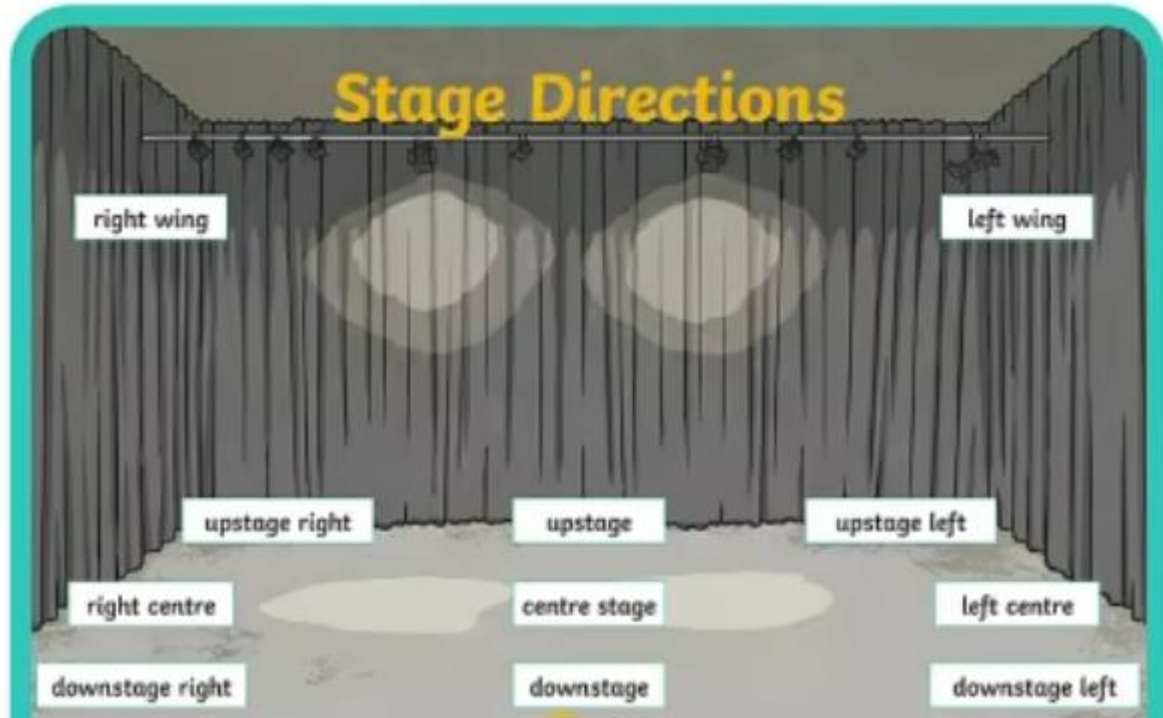
Will demonstrate the character and the scene as the director intended and create a clear meaning or message for the audience. It will be interesting to watch and focus on the performance not just the words.

### Assessment

You will take part in several peer and self assessment tasks over the project, as well as your teacher assessment. receiving feedback from your teacher.

Your assessment for this Topic will be based on a performance of a set script that the teacher will give you and an evaluation of your performance.

# Year 9 Scripting, Staging, Directing & Performing



## Career Focus - Where could this take you?



I am a stage director. I have to have excellent communication skills as my job includes managing time and organising people and space. attending production meetings with set designers. organising rehearsals. communicating and liaising with all parties involved, including actors, the creative team, the production team and producers.

## Challenge Activities



### TASK 1

Look at the list of **Drama practitioners** below.

You need to **pick ONE** of these people to **research**.

You will be researching a lot of information about them. So make sure it is someone you find interesting!

Chris Pratt – Actor (Easy)

Jennifer Lawrence – Actor (Easy)

Konstantin Stanislavski – Came up with the style of drama we see today on telly and normally on stage (Medium)

Bertolt Brecht – Came up with a very different way to perform plays on the stage (Hard)

### TASK 2

You need to research key things about them and then write down all the information you found in a fun and engaging way. This could be a poster, a blog post, a fact file, a facebook style page, a vlog, anything you like as long as it has the information.

You need to research –

Who they are

What they do

Their career

Their life

The work they have done or things they took part in

Any books they wrote or work they created

You also need to write about *why* you chose that person to research. Please do NOT write, because it was an easy one, or because it was the only one I knew. I would like to see things like – inspiring, different, fun personality, good role model, interesting, etc.

## Topic Links



Music  
English  
Maths  
Science  
Art  
Dance  
Music

## Additional Resources



If you want to do more and extend yourself in Drama...Explore the Arts as a participant

Watch to learn more about performing and staging Macbeth

<https://youtu.be/vumgtbMObAA>













- The aims of the sequence of learning are to ensure that all students:
- Describe common cuisines from different regions of the world
- Discuss the environmental impact of how we use food

- Explain different types of heating
- Evaluate dishes using the five taste sensations






Keyword	Definition
<b>Environment</b>	The air, water and land where people and animals live
<b>Sustainability</b>	Looking after our environment by using less energy, reducing the consumption of water, avoiding waste and recycling as much as possible
<b>Carbon footprint</b>	A measure of the impact your lifestyle has on the environment (including your food choices)
<b>Landfill</b>	Sites where waste is collected and left to decompose
<b>Composting</b>	Left over food is collected and piled in the garden to decompose into useable compost (meat, fish and dairy products cannot be composted)
<b>Reuse</b>	Using items again after their initial use; using leftover food to make another dish
<b>Recycle</b>	Taking package and other used items and forming them into something new to be used again
<b>Staple food</b>	Crops that are grown in particular parts of the world due to their climate and conditions (wheat in Europe, rice in Asia, maize in South America)
<b>Cuisine</b>	A style of cooking from a particular country or region of the world. Different cuisine has different ingredients, styles and preparation/cooking techniques)
<b>Convection</b>	when heat travels through air or water. E.g. in an oven or a pan of boiling water
<b>Conduction</b>	when heat travels by direct contact through solid materials such as food or metal
<b>Radiation</b>	when heat rays travel towards food, e.g. grilling, toasting, microwaving

## Key Concepts

### Skills and Processes Used In Year 9

 <b>Spicy wedges (Mexican),</b> Knife skills. Stir frying. Protein denaturation (chicken). Checking for readiness (no pink left inside chicken). Working with <u>high risk</u> foods (chicken).	 <b>Churros (Mexican)</b> Weighing & measuring deep frying. Creating a sweet dough, piping control, temperature
 <b>Chilli Con Carne (Mexican),</b> Knife Skills. High risk foods (raw meat). Protein denaturation. Simmering a reduction sauce.	 <b>Tortilla (Mexican),</b> Weighing & measuring Flavouring using spices. Using flour dough (must be kept damp during rise). Dry frying
 <b>Mexican Bean Salad (Mexican),</b> Knife skills. Combining different textures, ingredients.	 <b>Spicy Mexican wraps (British),</b> Knife skills, peeling, Frying, protein denaturation chicken). Checking for readiness, working with <u>high risk</u> foods (chicken). Frying.
 <b>Mexican Salsa and sour cream dip (Mexican)</b> Taste testing spices, blending, knife skills to create Julian vegetables	 <b>Taste testing (Mexican).</b> Understanding 5 taste sensations, recording findings. Using knowledge gained to add balance to dishes

## Foods and Cuisines from Around The World

 <b>UK</b> Roast dinner. Fish & Chips. Bakewell Tart.	 <b>Japan</b> Sushi. Ramen. Udon noodles. Jasmine Rice.
 <b>Italy</b> Pizza, Pasta, Lasagne, Risotto, Gelato.	 <b>China</b> Spring Rolls. Stir fry. Sweet & Sour. Chow Mein.
 <b>Mexico</b> Chilli Con Carne, Burritos, Tacos, Salsa, Guacamole	 <b>India</b> Samosas, Curries, Tandoori Chicken, Nan Breads

## 5 ways to reduce your carbon FOOTPRINT

- 1 only buy what you need**  
20-50% of everything we buy ends up in landfill
- 2 eat less meat and dairy**  
70% of the world's footprint is from animal products
- 3 eat less processed food**  
the more processed a food is, the bigger its footprint
- 4 buy local and in season**  
these foods have travelled less and stored less
- 5 grow your own food**  
the ultimate in local, seasonal, unprocessed food

**DID YOU KNOW?**

ENDS UP IN LANDFILLS

THAT COULD BE COMPOSTED

95% OF FOOD WASTE







- The aims of the sequence of learning are to ensure that all students:
- Describe common cuisines from different regions of the world
  - Discuss the environmental impact of how we use food

- Explain different types of heating
- Evaluate dishes using the five taste sensations



## Retrieval Practice

Questions	Answers
What are common features of Mexican cooking?	Mexican food uses a variety of herbs and spices including chillies both fresh and dried as well as paprika. Garlic is also a common spice used along with cumin and the herb oregano. Chipotle is another spice used in Mexican cooking. Maize is the main ingredient of the pancake called the tortilla. This can be served in many ways; When it is fried crisp and golden on both sides it is called a tostada. Tacos are tortillas curled into a shell shape and fired. Tortillas which are rolled up with onion and cheese then covered in sauce are called enchiladas.

What are the three heat transfer methods?	<p><b>Convection</b></p>  <p><b>Conduction</b></p> <p><b>Radiation</b></p> 
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## Career Focus - Where could this take you?



I am a **Dietician** and am an expert in food and nutrition. I work with individual or population groups to study nutritional requirement and devise eating plans and recipes.



## Challenge Activities

Read the sections on the varying dietary habits of the different religious groups. Plan a meal or dish for each group that doesn't use any of the prohibited ingredients.

For an extra challenge try to use authentic cuisines in your meal.

Topic Links	Additional Resources
<p>This topic links to:</p> <ul style="list-style-type: none"> <li>• RE – studying the different eating habits and dietary requirements of persons from different religious or cultural groups</li> </ul>	<p>To further practise and develop you knowledge see:</p> <ul style="list-style-type: none"> <li>• <a href="https://www.chefspencil.com/most-popular-mexican-foods/">https://www.chefspencil.com/most-popular-mexican-foods/</a></li> <li>• <a href="https://www.bbc.co.uk/bitesize/guides/zjnsrd/revision/1">https://www.bbc.co.uk/bitesize/guides/zjnsrd/revision/1</a></li> </ul>



## Islam



### **Prohibited animal flesh: pork.**

The Koran outlines the foods which can be eaten (halal) and those forbidden (haram). Beef, lamb and chicken can only be eaten if the animal has been slaughtered by the halal method. This means that the animal must be killed by slitting its throat. The animal will then have all the blood drained from its body. The method of slaughter in the UK is carried out following strict animal welfare guides, the same as for non halal meat.

Muslims will only eat meat slaughtered by Muslims, Christians or Jews.

Haram are foods which are forbidden. Examples include pork, blood, alcohol and meat sacrificed to idols.

During the month of Ramadan, Muslims need to refrain from eating, drinking and smoking from sunrise to sunset. Ramadan is the ninth month of the Islamic calendar.

### **Eid**

- Eid-ul-Fitr – day celebrating end of Ramadan.
- Eid ul-Adha – day that celebrates the end of the Hajj.

Eid can be celebrated with special foods shared with friends and family, such as Eid sweets.



## Hinduism



### **Prohibited animal flesh: all, except lamb, chicken and fish.**

Strict Hindus are vegetarian. The cow is held in high regard and a symbol of abundance, therefore Hindus do not eat beef.

Some Hindus may also avoid certain foods, such as domestic fowl, salted pork, milk, ghee, onions, garlic, eggs and coconut.

It is particularly important to check food products like bread, biscuits, cheese and jam to ensure that the forbidden ingredients are not present.

Some devout Hindus observe fasting on special occasions, or on certain days of the week or month, as a mark of respect to personal Gods or as part of their penance.

The religious festival **Diwali** marks the end of the Hindu year and the start of a new. Special Diwali sweets are eaten.



## Seventh-day Adventist Church



The Seventh-day Adventist Church is a Protestant Christian denomination. (A religious denomination is a subgroup within a religion that operates under a common name, tradition, and identity).

Many Adventists are ovo-lacto vegetarians, which means they do not consume animal flesh of any kind, but will consume dairy and egg products.

Some Adventists avoid food and drinks which contain caffeine, therefore they do not consume tea and coffee. They also avoid alcohol.



## Judaism



### **Prohibited animal flesh: pork and non-kosher beef, lamb and chicken.**

The Torah (the law of God as revealed to Moses and recorded in the first five books of the Hebrew scriptures) outlines which foods are allowed for Jews to eat. Permissible foods are called Kosher and forbidden foods are called Trefa.

Kosher animals have a completely split hoof and chew cud, e.g. cows, goat and sheep. Horses and pigs are not Kosher animals.

Kosher fish must have fins and scales, therefore shellfish and eels are excluded. All plant foods are Kosher, unless damaged by rot or insects.

Kosher meat is prepared by using a single knife to cut open the throat to kill the animal, with all the blood drained. The meat should be soaked in water and salted to remove the last traces of blood.

The method of slaughter in the UK is carried out following strict animal welfare guides, the same as for non kosher meat.

Meat and dairy foods must not be prepared or eaten together.

Jews should not prepare food on the Sabbath, which begins at sundown on Friday and ends at sundown on Saturday.

There are other periods of fasting in the Jewish calendar, e.g. Feast of Pesach (Passover).





## Sikhism



**Prohibited animal flesh:** pork, beef, halal and kosher.

Sikhs do not eat halal or kosher meat because they are not meant to take part in religious rituals apart from the Sikh Rehat Maryada (Code of Conduct). They should also refrain from food and drinks which may harm their body, e.g. alcohol.

Some older Sikhs may fast during full moon or specific holidays, but most are discouraged from fasting and going on pilgrimages.

Sikhs believe in sharing food. Every gurdwara (place of worship) has a langar (common kitchen). The congregation eats together here after the service.

Sikhs also celebrate the festival **Diwali**.



## Buddhism



**Prohibited animal flesh:** all.

Buddhists believe they should not be responsible for the death of any other living organism. Therefore, most, but not all, Buddhists follow a strict vegetarian, if not vegan diet.

They also avoid the consumption of alcohol.

**Wesak** is a festival celebrating the birth, enlightenment and death of Siddhartha (who some people believe to be Buddha). Foods such as eight treasure rice can be eaten on Wesak (Chinese rice pudding).



## Christianity

The general beliefs in Christianity are that there is **no restriction** on kinds of animals that can be eaten, however some Christians may choose to follow a vegetarian or vegan diet. Some Christian denominations follow a meat free diet but only during the holy period of lent.

Christian views on alcohol are varied however, alcohol consumption is found frequently throughout the bible and its stories.

There are a number of occasions in the Church year where special food may be eaten. This includes:

**Christmas** – a day celebrating the birth of Jesus;

**Easter** – celebrates Jesus' resurrection from the dead; Simnel cake is often eaten during the Easter period. The cake is topped with eleven marzipan balls to represent the eleven disciples of Jesus Christ (excluding Judas).

**Shrove Tuesday** – Shrove Tuesday is the Tuesday prior to Lent, where Christians remember the time Jesus fasted in the desert. They often give up certain food during this period. Shrove Tuesday was traditionally the last chance to use up the foods Christians would not be eating during Lent (e.g. eggs, fats).



## Rastafari Movement

**Prohibited animal flesh:** all.

Most Rastafarians are vegetarians or vegans.

Foods approved for Rastafarians are called Ital, which should be natural or pure, without the addition of artificial colours, flavourings or preservatives.

Rastafarians avoid alcohol and some also avoid tea, coffee and other caffeinated drinks because these are considered to confuse the soul.



# Year 9 Band Skills: Hooks and Riffs

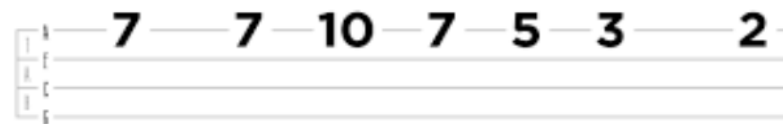
- The aims of the sequence of learning are to ensure that all students:
- develop knowledge of the skills required to perform in a band
  - Build confidence to perform for an audience

Keyword	Definition
Riff	A short, repeated, 'catchy' phrase in popular music, typically used as an introduction or refrain in a song. Often played on a guitar or some other lead instrument.
Hook	A short riff, passage, or phrase, that is used in popular music to make a song appealing, memorable and "catchy".
Structure	The order of the different sections in a song.
Composition	A song or piece of music.
Ensemble	A group of musicians (most often used in classical music).
Band	A group of musicians (most often used in pop music)
Rehearsal	A set time a band get together to practise and learn their songs.
Performance	When a musician or group of musicians play music, usually in front of an audience.
Tab	A form of music notation for guitar and bass.

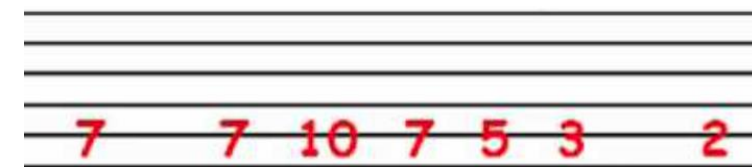
## Key Concepts

### 'Seven Nation Army' Tabs

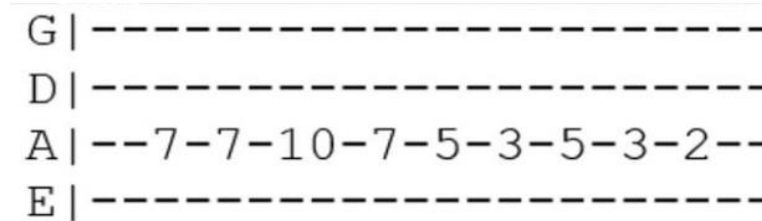
#### Ukulele



#### Guitar



#### Bass



### A rock band:




### An acoustic band:





- develop knowledge of the skills required to perform in a band
- Build confidence to perform for an audience

Retrieval Practice 	
Questions	Answers
What is a genre?	A genre is a type, style or category of music, e.g. rock, metal, jazz.
What is an ostinato?	An ostinato is a short, repeating pattern.
What does duration mean?	Duration is the length of time that a note is held.
What is the difference between a rhythm and a pulse?	A rhythm is a pattern of notes with <i>different</i> durations. A pulse is a sequence of notes with the <i>same</i> duration.
What is a scale?	A scale is a pattern of notes ascending and decreasing in pitch. They can be played on any pitched instrument.
What is a chord?	A chord is more than one note played at the same time.
In music, what does song structure mean?	Song structure is all the parts of a song (for example, the verses and choruses) and how they are arranged.

## Career Focus - Where could this take you?



Being in a band will really strengthen your time management. Getting to rehearsals, gigs and studio sessions on time is vital in our band. While we don't always get along, we have to overcome these difficulties and learn to work well with others. Through the years we have developed our creative thinking skills by coming up with ideas and writing over 150 songs!

## Challenge Activities

1. Create your own guitar or piano riff using a scale (eg. Pentatonic, Minor).
2. Here is a compilation of riffs played using the pentatonic scale. See how many you can play on an instrument:  
[https://www.youtube.com/watch?v=9teYiPih-X8&ab\\_channel=MartyMusic](https://www.youtube.com/watch?v=9teYiPih-X8&ab_channel=MartyMusic)
3. Become a multi-instrumentalist: Can you play 'Seven Nation Army' on three different instruments?

## Topic Links

- This topic links to:
- Drama – General skills (voice projection, stage presence, costumes)
  - Voice 21 Oracy skills (through performance)
  - English literature – Lyrics, poetry and creative writing

## Additional Resources

To further practise and develop your knowledge see:  
BBC Bitesize:  
<https://www.bbc.co.uk/bitesize/guides/z6ch8xs/revisio/n/4>

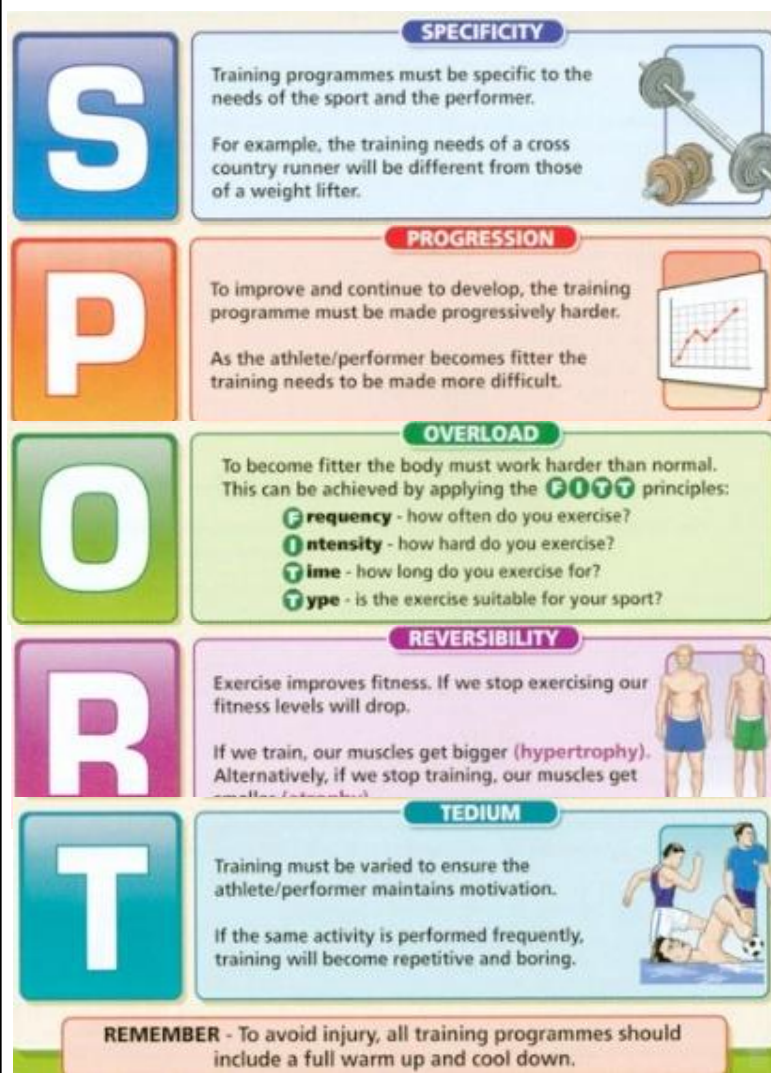
Billboard list of the 25 catchiest hooks ever:  
<https://www.billboard.com/music/music-news/greatest-catchiest-pop-hooks-ever-6731053/>



Keyword	Definition
Power	This is the ability to perform maximum strength and maximum speed of your muscles in order to generate forces to move an object or propel yourself forward. Power = strength x speed.
Co-ordination	The ability for muscles to work together in pairs to move different body parts at the correct time with ease and efficiency.
Reaction Time	The time taken for a person to respond and initiate movement to a stimulus (object or person or sound).
Agility	The ability to change direction at speed in a controlled movement without losing balance.
Balance	The ability to maintain your centre of mass and control of sports performance either statically (stationary) or dynamically (moving).
Speed	The rate at which a person moves as fast as possible to cover a distance over the shortest time possible. Speed = distance/time.
Cardiovascular endurance	The ability for the heart and blood vessels to transport oxygenated blood to the working muscles in sports performance. The performer can work at a moderate level of intensity for a long period of time without getting fatigued (tired).
Muscular strength	This is the maximum force that can be applied from muscles in order to overcome resistance (external force) so that movement can take place.
Muscular endurance	The ability for muscles to work in a repeated muscular action in unison at moderate intensity for a long period of time without them getting fatigued (tired).
Flexibility	This is the range of movement that can be performed around a joint by the muscles, ligaments and tendons without any pain or over stretching.
Body composition	This is the combined total percentage of fat, bone and muscles ratio (amount) made up by a person's body.

**Key Concepts** You should already know: - Some components of fitness and be able to apply them to a healthy and active lifestyle  
You will be assessed on: - Understanding - Technique - Application - Leadership

## Health and Fitness Key Concepts



**SPECIFICITY**  
Training programmes must be specific to the needs of the sport and the performer.  
For example, the training needs of a cross country runner will be different from those of a weight lifter.

**PROGRESSION**  
To improve and continue to develop, the training programme must be made progressively harder.  
As the athlete/performer becomes fitter the training needs to be made more difficult.

**OVERLOAD**  
To become fitter the body must work harder than normal. This can be achieved by applying the **FITT** principles:  
**F**requency - how often do you exercise?  
**I**ntensity - how hard do you exercise?  
**T**ime - how long do you exercise for?  
**T**ype - is the exercise suitable for your sport?

**REVERSIBILITY**  
Exercise improves fitness. If we stop exercising our fitness levels will drop.  
If we train, our muscles get bigger (**hypertrophy**). Alternatively, if we stop training, our muscles get smaller (**atrophy**).

**TEDIUM**  
Training must be varied to ensure the athlete/performer maintains motivation.  
If the same activity is performed frequently, training will become repetitive and boring.

**REMEMBER** - To avoid injury, all training programmes should include a full warm up and cool down.

**The Principles of Training (SPORT) is used to create a training programme that is designed to improve a person's performance over time. What changes have been made in the programme below?**

Action	1.-3. Week	4.-6. Week	7.-8. Week
	Action/ Repetition	Action/ Repetition	Action/ Repetition
Jump Squat	20 sec x 3 repetition	35 sec x 3	40 sec x 3 repetition
Alternate Legs Jump	20 repetition	25 repetition	25 repetition
Squat	25 repetition	35 repetition	25 repetition
Chunch	30 repetition	35 repetition	30 repetition
Lying Twist Trunk	25 sec x 2 repetition	30 sec x 2 repetition	25 sec x 3 repetition
Lunge	30 sec x 3 repetition	35 sec x 3 repetition	30 sec x 3 repetition
Side Plank	30 sec x 2 repetition	40 sec x 2 repetition	35 sec x 3 repetition
Burpee	30 sec x 2 repetition	40 sec x 3 repetition	35 sec x 3 repetition
Mountain Climber	30 sec x 2 repetition	40 sec x 2 repetition	35 sec x 2 repetition
Twist With Medicine Ball	30 sec x 3 repetition	45 sec x 2 repetition	30 sec x 3 repetition



**Retrieval Practice:**  
Match the word banks to the for a correct explanation on the methods of training

**Questions:**  
Use the word banks below:

**Answers:**  
Use the words to match to create the correct sentence for each method of training.

times  
rest  
activity  
swimming  
time  
week  
aerobic

**Continuous training:**  
Continuous Training involves performing an \_\_\_\_\_ for an extended period of \_\_\_\_\_ without \_\_\_\_\_ (often longer than 20 minutes). Activities might be jogging, \_\_\_\_\_, cycling, walking or rowing and should be completed at least 3 or 4 \_\_\_\_\_ a \_\_\_\_\_ to improve \_\_\_\_\_ endurance.

Pace  
Repetitions  
Resistance  
Hill  
Striding  
Standing  
walking

**Acceleration Sprints**  
Acceleration sprints involve changing the \_\_\_\_\_ of the sprint and gradually increase speed from a \_\_\_\_\_ or rolling start to jogging, followed by \_\_\_\_\_ and a maximum sprint. Different drills can be used such as \_\_\_\_\_ drills and \_\_\_\_\_ sprints where speed is the focus. This type of training requires regular rest intervals of jogging or \_\_\_\_\_ that is used in between \_\_\_\_\_.

strength stronger  
weights stress tears  
fibres size hours repair

**Weight training**  
Weight Training is an effective way to improve \_\_\_\_\_, this is done by free \_\_\_\_\_ or resistance machines to place \_\_\_\_\_ on certain muscles. As the muscle works lifting weights, small \_\_\_\_\_ occur in between individual muscle \_\_\_\_\_ which \_\_\_\_\_ naturally over 24 \_\_\_\_\_ so that they become bigger and \_\_\_\_\_. This also leads to increases in \_\_\_\_\_ and strength of the overall muscle.



**Career Focus - Where could this take you?**



My career is known as a gym fitness technician. My role is to visit gyms within a designated area and make sure all the equipment is safe and in a good working condition. This is so that the people using the equipment can exercise and avoid any injuries. If the equipment has stopped working, I have to investigate the problem. I order new parts and repair them so the machines can be used again.



**Challenge Activities**

**Design a training programme:-**  
Can you create a 4-week training programme that shows 5 different exercises that get progressively harder each week. Use the example provided on the previous page for guidance.

**Create a match the keywords to definition poster:-**  
This can be used by all students in their PE lessons as memory recall revision task. Select between five to eight different key words and match them to the correct definition answers. Make sure on the reverse of your skill card you have included the correct answers so students can test and assess themselves and others.

**Topic Links**

**Additional Resources**

- This topic links to:
- RSHE – Understanding how physical activity can reduce stress and anxiety and promote physical, mental and social wellbeing
  - English – understanding and defining key terminology
  - Mathematics – problem solving, recording figures and analysing performance.
  - Voice 21 – coaching peers with their training sessions

To further practise and develop your knowledge see:  
<https://www.topendsports.com/testing/tests/>  
<https://www.brianmac.co.uk/eval.htm>



- Identify at least 6 core trampolining skills.
- Demonstrate core skills such as a swivel hips.

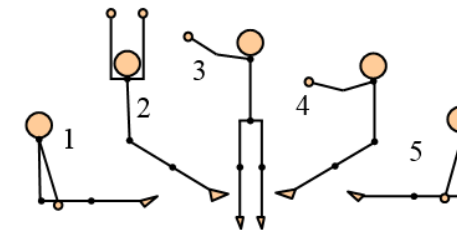
- Demonstrate a 10 bounce routine.
- Lead a small group of peers in a cool down.

Keyword	Definition
Spotting	Standing around the trampoline to help prevent the performer from falling.
Aesthetic	The way something looks/something looking artistic.
Flexibility	The range of motion allowed at a joint.
Pike	Jumping with the legs extended out in front of the body and toes pointed.
Tuck	Jumping with the knees flexed and toes pointed down.
Straddle	Jumping with the legs extended diagonally from the hips.
Feedback	Information given to an individual/team about their performance.
Bounce count	The amount of times the bed is touched during a routine.
Parallel	Straight lines that do not intersect.
Routine	A set of core skills performed together to create a routine.
Biomechanics	The study of the mechanical laws relating to the movement or structure of living organisms.

## Key Concepts



**Plantar-flexion** occurs at the ankle to allow you to point your toes. The angle at the joint changes to allow the toes to point. This is a biomechanical principle which you will need to know throughout the trampolining block.



Above shows the basic **biomechanics** of the **swivel hips**. By the end of the block, you should be able to master this skill with aesthetic performance skills.

Peer feedback sentence starters:

- Moving forwards you need to...
- For your next performance include...
- To improve your aesthetics make sure that you...
- You showed great...

What you should already know:

- At least 5 core trampolining skills.
- Demonstrate an 8 bounce routine.
- The biomechanics of a seat drop.





- Identify at least 6 core trampolining skills.
- Demonstrate core skills such as a swivel hips.

- Demonstrate a 10 bounce routine.
- Lead a small group of peers in a cool down.



## Retrieval Practice

Questions	Answers
Why does a trampolinist require good flexibility?	Without flexibility, a trampolinist will struggle to perform their moves aesthetically due to a lack of pointed toes and straight body lines.
Explain the importance of an aesthetic performance.	An aesthetic performance is important as it allows people to fully enjoy the performance and ensures the performance looks good to the audience.
Why does a seat drop require good core strength?	Because without good core strength, the body will not stay tense and upright.
Give 3 safety points for trampolining.	All jewellery removed, hair tied back, socks worn.
What are some benefits of trampolining?	Trampolining can improve cardiovascular health, coordination, balance, and flexibility. It can also be a fun way to get exercise and relieve stress.
Describe the term pike	Jumping with the legs extended out in front of the body and toes pointed.



## Career Focus - Where could this take you?



I am a biomechanics lecturer. I teach about how the human body moves and works. I help students understand the science of movement and the forces that act on the body during physical activities like running, jumping, and throwing. This job requires a lot of knowledge about anatomy, physics, and engineering, as well as strong communication and teaching skills to help students learn and succeed.



## Challenge Activities

- Create:
- Create a 10 bounce routine using the correct trampolining terminology. You can use this routine in class so make sure it only has skills in which you can perform. Try to include at least 2 different shapes.
  - Create a skill card for a skill of your choice. Include diagrams and key terminology.

## Topic Links

- This topic links to:
- Science – anatomy and physiology
  - Maths – Angles
  - Voice 21 – verbal feedback to peers
  - English – understanding and defining key terminology

## Additional Resources

- To further practise and develop your knowledge see:
- <https://www.bbc.co.uk/bitesize/guides/z39ck7h/revision/1>
  - <https://www.british-gymnastics.org/technical-pages/trampoline-technical-resources>



# Username and Passwords




Newsome Academy



RESPECT | INTEGRITY | TEAMWORK | ASPIRATION

FAIL EARLY - FAIL FORWARD - FAIL OFTEN | SEIZE EVERY MINUTE | BE BRAVE - BE PRESENT - BE YOU

## NON NEGOTIABLE EQUIPMENT

BLACK PEN

PURPLE PEN

PENCIL



### BONUS ITEMS

HIGHLIGHTER | RUBBER | GLUE STICK | CALCULATOR

# RULER

PLACE YOUR EQUIPMENT ON THE PLACEMAT TO SHOW YOUR TEACHER YOU ARE PREPARED AND READY FOR LEARNING