



GCSE Maths: Supporting Your Child

February 2024

GCSE Maths



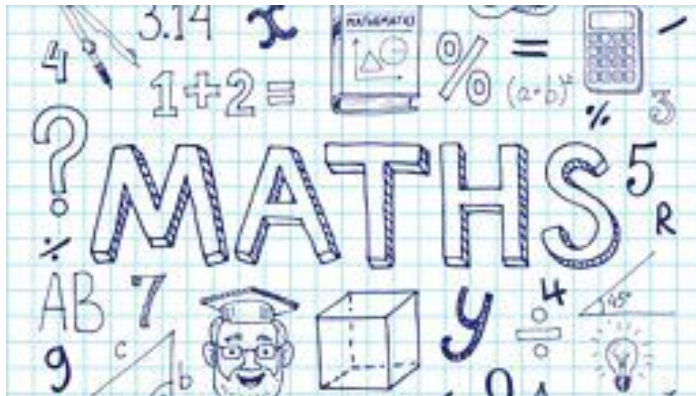
- Higher Tier (Grades 9-4)
- Foundation Tier (Grades 5-1)

- 3 papers - 1h 30 mins each, equal weighting
 - Thursday 16th May - Non Calculator
 - Monday 3rd June - Calculator
 - Monday 10th June - Calculator



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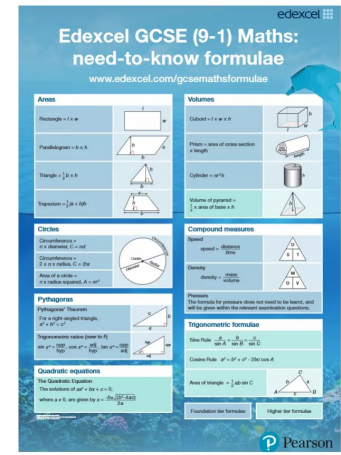
for



Formulae - revision cards, mats



- Students are expected to learn some formulae.
- For 2024 students will be provided with an exam aid with some formulas printed



Foundation tier



Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

$$\text{Area of a trapezium} = \frac{1}{2} (a + b) h$$

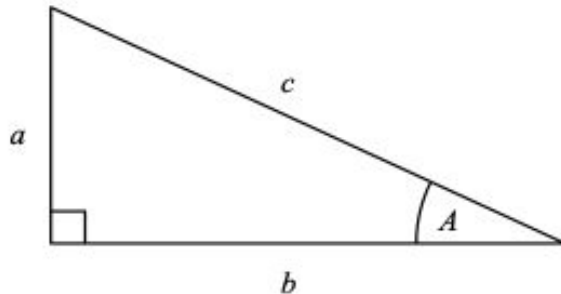
Volume of a prism = area of cross section \times length

Where r is the radius and d is the diameter:

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

Pythagoras' Theorem and Trigonometry



In any right-angled triangle where a , b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a , b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100} \right)^n$$

Probability

Where $P(A)$ is the probability of outcome A and $P(B)$ is the probability of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Higher tier



Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

$$\text{Area of a trapezium} = \frac{1}{2} (a + b) h$$

Volume of a prism = area of cross section \times length

Where r is the radius and d is the diameter:

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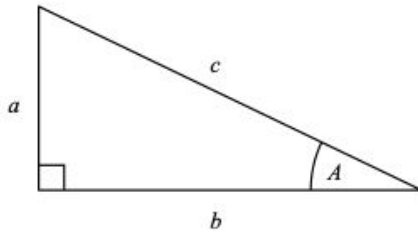
Quadratic formula

The solution of $ax^2 + bx + c = 0$

where $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Pythagoras' Theorem and Trigonometry

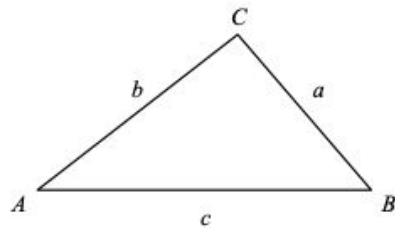


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$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$



In any triangle ABC where a , b and c are the length of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of triangle} = \frac{1}{2} a b \sin C$$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100} \right)^n$$

Probability

Where $P(A)$ is the probability of outcome A and $P(B)$ is the probability of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B) P(B)$$

There are still some to learn



GCSE Maths Higher Formula Sheet

These formulae are not given to you and you need to know them

Areas

Parallelogram = $b \times h$

Triangle = $\frac{1}{2} b \times h$

Trapezium = $\frac{1}{2} (a + b)h$

Volumes

Cuboid = $l \times w \times h$

Prism = area of cross section \times length

Cylinder = $\pi r^2 h$

Pyramid = $\frac{1}{3} \times$ area of base \times h

Pythagoras

Pythagoras' Theorem
For a right-angled triangle,
 $a^2 + b^2 = c^2$

Trigonometric ratios (new to P)
 $\sin x^\circ = \frac{\text{opp}}{\text{hyp}}$, $\cos x^\circ = \frac{\text{adj}}{\text{hyp}}$, $\tan x^\circ = \frac{\text{opp}}{\text{adj}}$

Compound measures

Speed
 $\text{speed} = \frac{\text{distance}}{\text{time}}$

Density
 $\text{density} = \frac{\text{mass}}{\text{volume}}$

Quadratic equations

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Direct & Inverse Proportion

If x is directly proportional to y^n then
 $x \propto y^n$ so $x = ky^n$

If x is inversely proportional to y^n then
 $x \propto \frac{1}{y^n}$ so $x = \frac{k}{y^n}$

Lowest Common Multiple

The LCM of two numbers, a and b , is
 $\text{LCM} = \frac{a \times b}{\text{HCF}}$

Constructing Pie Charts

The angle to draw for each sector is
 $\text{Angle} = \frac{\text{frequency}}{\text{total}} \times 360^\circ$

Length of diagonal across a Cuboid (3D Pythagoras)

$d^2 = a^2 + b^2 + c^2$

Circles

Circumference = $n \times \text{diameter}$, $C = \pi d$

Circumference = $2 \times \pi \times \text{radius}$, $C = 2\pi r$

Area of a circle = $\pi \times \text{radius squared}$, $A = \pi r^2$

Area of a Sector
 $A = \frac{\theta}{360^\circ} \times \pi r^2$

Length of an Arc
 $A = \frac{\theta}{360^\circ} \times \pi d$

Gradient of a Line

$m = \frac{y_2 - y_1}{x_2 - x_1}$

or

$m = \frac{\text{height}}{\text{base}}$

Equation of a straight Line

Given a point (x_1, y_1) and the gradient m , the equation of a straight line is
 $y - y_1 = m(x - x_1)$

Substitute the numbers in, expand and simplify

Angles in Polygons

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

Where n is the number of sides of the shape

Exterior Angles add up to 360°

One exterior angle in a REGULAR polygon:
 $\frac{360^\circ}{n}$

Pairs of Interior and Exterior Angles add up to 180°

Perpendicular Gradients

Given a gradient of a line m , the gradient of the line perpendicular to it is:
 $-\frac{1}{m}$

Midpoint of two points

between (x_1, y_1) and (x_2, y_2)
 $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Stratified Sampling

The frequency for a group in a stratified sample is
 $\frac{\text{frequency of group}}{\text{total frequency}} \times \text{sample size}$

Quadratic Sequences

The n^{th} term of a quadratic sequence form $an^2 + bn + c$, where
 $2a = 2^{\text{nd}}$ difference
 $3a + b = 1^{\text{st}}$ difference (between 1 and 2)
 $a + b + c = 1^{\text{st}}$ term in the sequence

Median from a Histogram/Frequency Polygon

$L + \frac{\frac{m-p}{f} \times w$

L is the lower limit of the median class
 m is the median point
 p is the total frequency of the previous class
 f is the frequency of the median class
 w is the class width of the median class

Compound Growth & Decay

The amount after n years (or days) is
 $\text{starting amount} \times (1 \pm \frac{r}{100})^n$

where r is the rate of change.
The \pm means $+$ for growth and $-$ for decay

Trigonometric formulae

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$

Formulae



Flash cards

Flashcards are another good tool, provided they are used in a way that triggers this memory retrieval aspect of practice testing. Students can create a pile of flashcards to assist with memorising key [GCSE maths formulas](#) for their exams, with a prompt on one side and the answer on the other.

They then work through the flashcards, putting the correctly answered ones in one pile, and the ones they don't know in another pile. The crucial part is that the unknown ones should then be reviewed again, and ideally the process should be repeated until all contents have been recalled from memory at least once.

Frequency- Maths Genie, Sparx



- To improve requires regular practice
- 20 minutes at a time is enough
- The more you revisit something, the more likely you are to be able to remember it



Frequency- Maths Genie, Sparx



Maths genie

[Maths Genie • Learn GCSE Maths for Free](#)

Sparx Maths - independent learning



Fluency - revision guides



- One of the biggest barriers to achieving a grade 4 is fluency in common mathematical procedures
- However, this is also true of higher grades, as students sometimes focus on the harder topics and forget the easier topics

Fluency

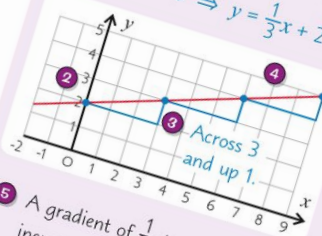


- Using $y = mx + c$
- 1 Rearrange into the form $y = mx + c$.
 - 2 Put a dot on the y-axis at the value of c .
 - 3 Use m to go across and up/down an appropriate number of units. Make a dot and repeat.
 - 4 Draw a straight line through the dots.
 - 5 Check gradient looks correct.

EXAMPLE

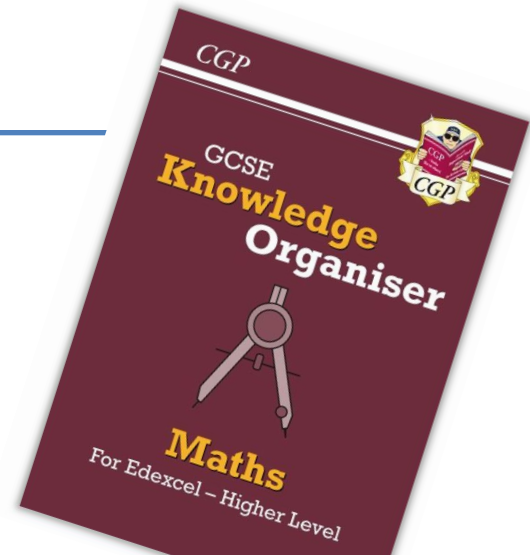
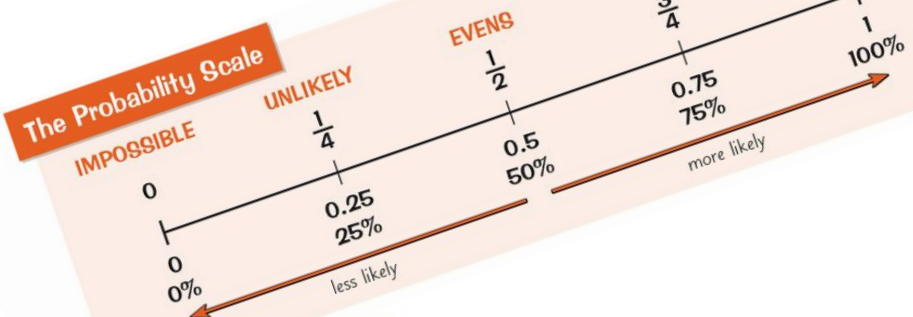
Draw the graph of $3y = x + 6$.

1 $3y = x + 6 \Rightarrow y = \frac{1}{3}x + 2$

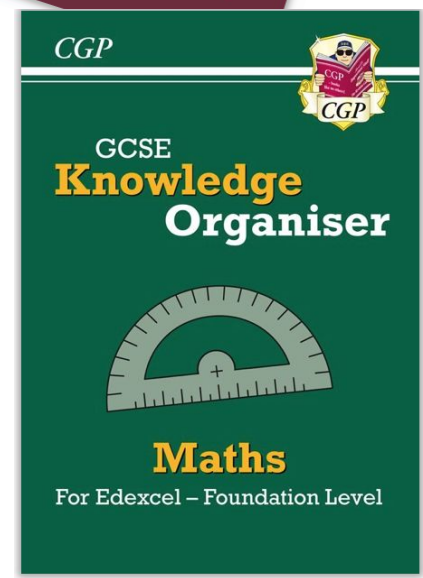


5 A gradient of $\frac{1}{3}$ is gentle and increases from left to right

All probabilities are between 0 and 1.



£3.15
or
£5.50



Fluency - high frequency topics



Worked examples

In GCSE Maths, my first top tip is for students to use worked examples from classwork and try to reproduce the solution without looking at the original notes, supporting the memory recall aspect. If students get a step wrong, they should review where they went wrong, and then attempt the example again, until each step has been recalled correctly.

We should support students to make meaningful class notes to help with this. I've previously used an A5 reference book (or 'Maths Bible' as some students nicknamed it) for students to record key points, definitions, and an illustrative example or two, removing the need for students to hunt through several larger exercise books to find the relevant work.

Flexibility - past papers



- All grades require students to be flexible with their knowledge and approach. **Have a go.**
- The information might be in the wrong order or in an unfamiliar context. **Highlight and tick off**
- The last question isn't necessarily the hardest. **Keep going past the staples & grab cheeky marks**



Flexibility - past papers



[Edexcel GCSE Exam Papers](#) maths genie

[Onmaths](#)

[Past papers](#) | [Past exam papers](#) | [Pearson qualifications](#)

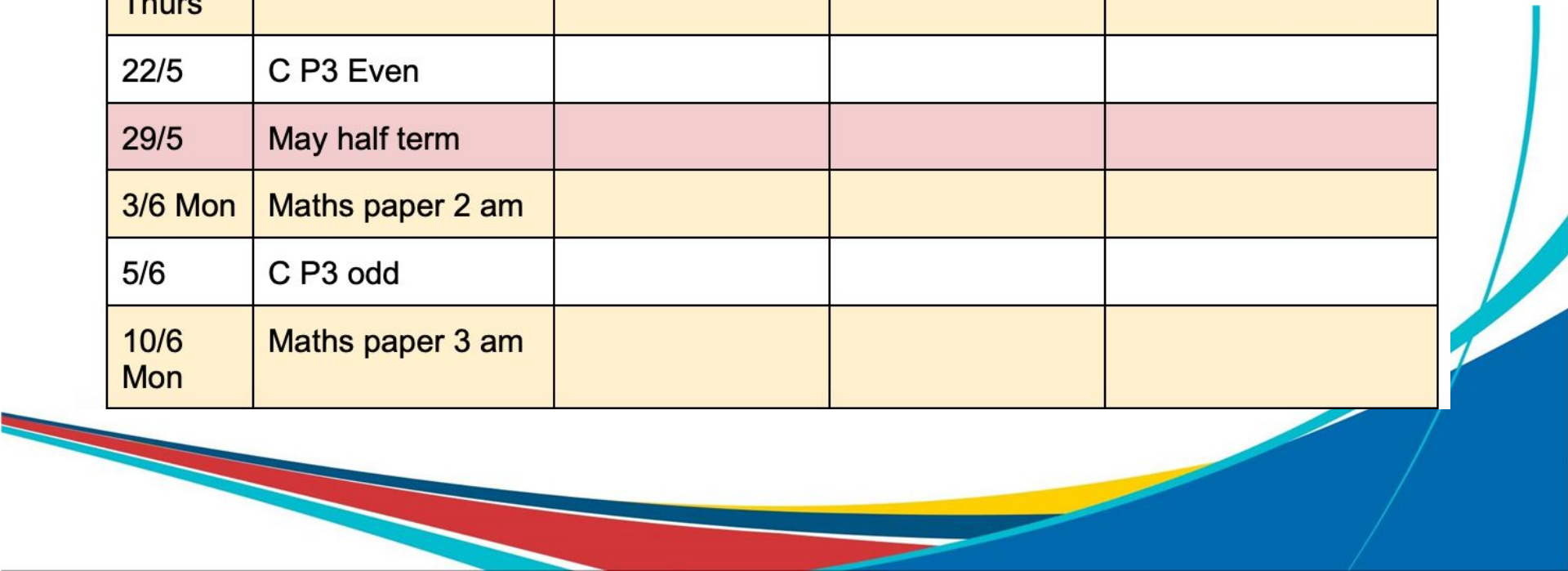


Name.....

GCSE TargetFoundation

Date set	Paper	%	Grade	Extra % needed for target
17/1	A P1 Odd			
24/1	A P1 Even			
31/1	A P2 Odd			
7/2	A P2 Even			
14/2	A P3 Odd			
21/2	Feb half term			
28/2	A P3 Even			
6/3	B P1 Odd			
13/3	B P1 Even			
20/3	B P2 Odd			
27/3	B P2 Even			

3/4	Easter			
10/4	Easter			
17/4	B P3 Odd			
24/4	B P3 Even			
1/5	C P2 Even			
8/5	C P2 Odd			
15/5	C P1 even			
16/5 Thurs	Maths Paper 1 am			
22/5	C P3 Even			
29/5	May half term			
3/6 Mon	Maths paper 2 am			
5/6	C P3 odd			
10/6 Mon	Maths paper 3 am			



Faith - **YOU**

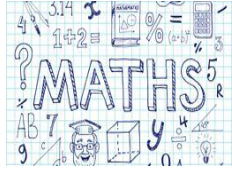


- If you go in with the mindset that it is too hard and you can't do it, then it probably will be. Believe in yourself.
- The better prepared you are, the better you will do
- Don't give up because it is tricky - do what you can on EVERY question



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Formulae Frequency Fluency Flexibility Faith



How can students prepare?



Maths Genie GCSE Revision GCSE Papers

ONMATHS.COM

Corbettmaths

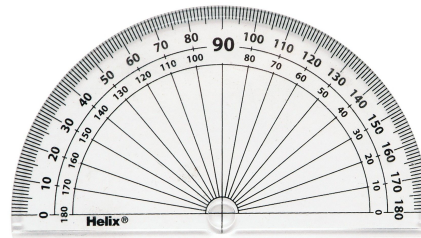
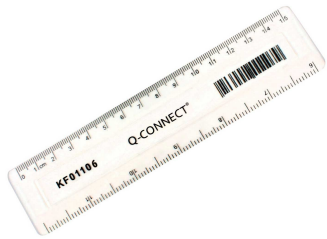
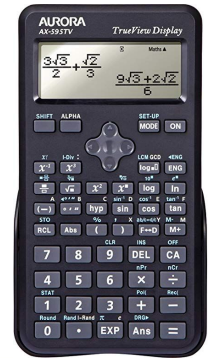
Videos, worksheets, 5-a-day and much more

How can students prepare?



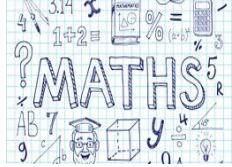
- Learn formulae
- Checklist / Revision Guide / Revision Websites
- Past Papers
- Revision Classes

Equipment



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Formulae Frequency Fluency Flexibility Faith



What do questions look like?



Solve the simultaneous equations

$$4x + y = 10$$

$$x - 5y = 13$$

Crossover
Previously
Higher

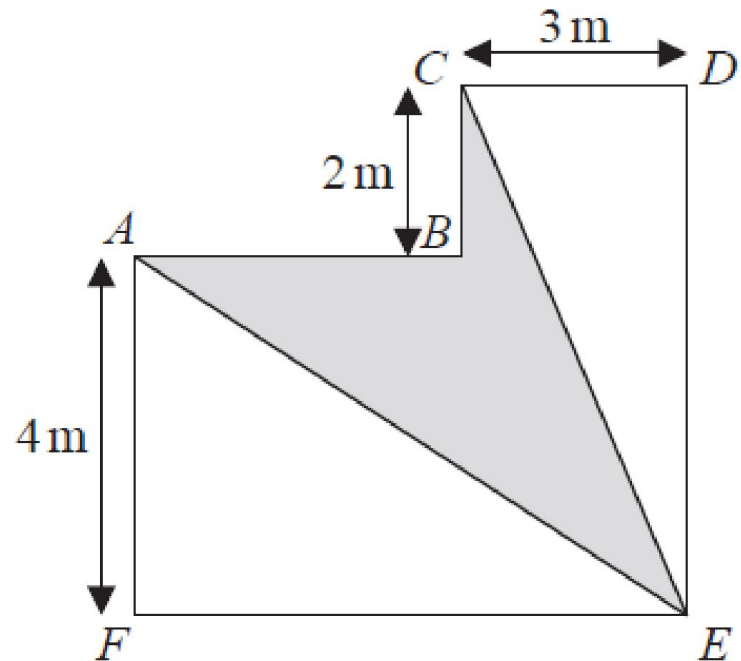
What do questions look like?



The diagram shows a shape $ABCDEF$.

All the corners of the shape are right angles.

The perimeter of the shape is 28 m.
Work out the area of $ABCE$ shown shaded on the diagram



**Crossover
Problem
Solving**

What do questions look like?



Given that $a : b = 8 : 5$ and $b : c = 3 : 4$

find the ratio $a : b : c$

Give your answer in its simplest form.

New content at both tiers

What do questions look like?

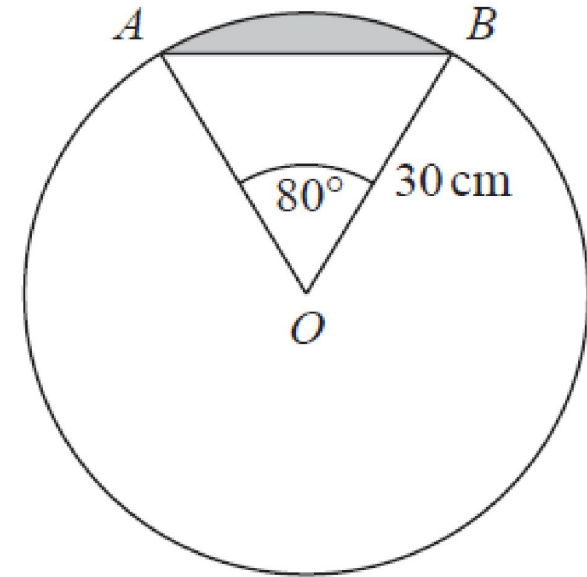


AB is a chord of a circle centre O .

The radius of the circle is 30 cm.

Angle $AOB = 80^\circ$

Work out what percentage of the area of the circle is shaded.



Higher Problem Solving

Percentage – additional level of processing