GCSE Revision Webinar (2) for Mathematics

Effective preparations and revision techniques for GCSE mathematics 2022
01-03-22 : 1530

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https://maths.hias.hants.gov.uk

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HIAS Maths Moodle

Open resources

Secondary

GCSE 2022

GCSE 2022

Find out more

- Edexcel Foundation Exam aid formula sheet 2022
- Edexcel Higher Exam aid formula sheet 2022
- GCSE Mathematics - Advance Information Guidance 2022
- OCR Advance Information for Summer 2022
- Edexcel GCSE Mathematics Advance Information
- AQA Advance Information for Summer 2022

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Material covered in the last meeting

(available in the GCSE 2022 folder in open resources on the HIAS maths moodle

- Advance information on exam content from (AQA, Edexcel, OCR)
- A quick look at the formula sheets (F and H)
- Cognitive Psychology: six strategies for effective learning and remembering
- Brief discussion around exam preparation and revision

Agenda

- All info in Open Resources
- Cognitive strategies for learning and remembering
- Flash cards
- Mind-maps
- Variation using a past question
- Low stakes testing resources
- Task design for access and success
- Other resources
- Final discussion and sharing

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This webinar is to support your thinking around how best to prepare your students for GCSE maths 2022:

GCSE exams are being adapted this year by Ofqual (the exams regulator) and the DfE

Part of a larger ‘safety net’ to reduce the impact of lost learning due to the coronavirus

The adaptations for GCSE maths for 2022 are:

- A formula sheet which will be available in the exam
- Advance notice of certain topics that will appear on the exam papers

- **If you haven’t done so already, go to your exam board’s website and download this information**
- Make sure your students are familiar with the formula sheet and can select and use the information appropriately
- They will get a new copy in each exam, so fine to give everyone their own copy and encourage them to make notes/write on this version as required.

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Foundation Tier Formulae Sheet

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Taken from OCR website Nov2021

Perimeter, Area and Volume

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

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

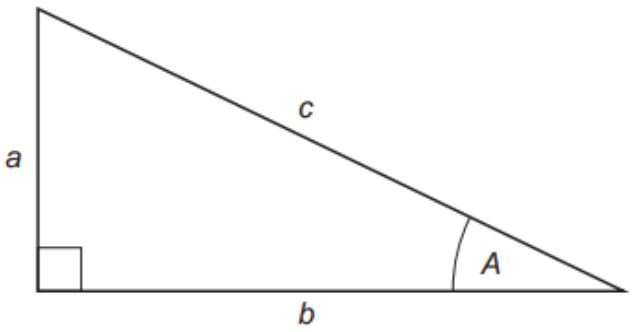
Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

Circumference of a circle = $2\pi r = \pi d$

Area of a circle = πr^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:

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

Opposite
Adjacent
Hypotenuse

Compound Interest

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

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 Formulae Sheet

Perimeter, Area and Volume

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

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

Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

Circumference of a circle $= 2\pi r = \pi d$

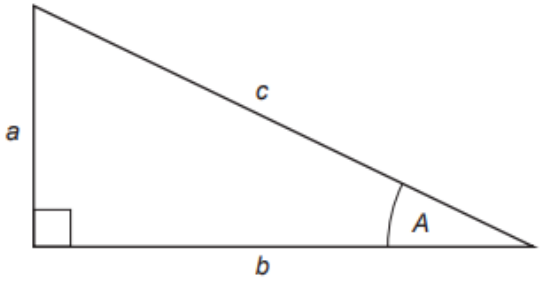
Area of a circle $= \pi r^2$

The Quadratic Formula

The solutions 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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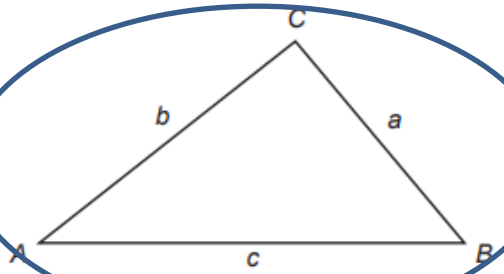
$$\sin A = \frac{a}{c} \qquad \cos A = \frac{b}{c} \qquad \tan A = \frac{a}{b}$$



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

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 $= \frac{1}{2}ab\sin C$

Compound ~~Interest~~

Where P is the principal amount, r is the interest rate over a given period and n is the 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:

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

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

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Taken from OCR website Nov2021

A reminder…..

Advance information:

- can be used flexibly by centres to achieve its purpose of supporting revision. Advance information should not, however, be used to narrow teaching and learning.
- can be used by teachers in supporting their students' revision and referred to by students in their revision and final examination preparation.
- cannot be brought into the examinations.
- is not at a level that allows questions to be predicted or answers prepared.
- students' preparation for examinations should continue to focus on knowledge and understanding that can be applied appropriately in the context of unseen examination questions.

Cognitive Psychology:
Six strategies for effective learning and remembering

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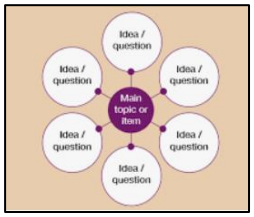
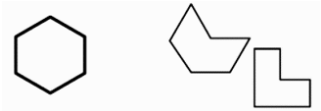
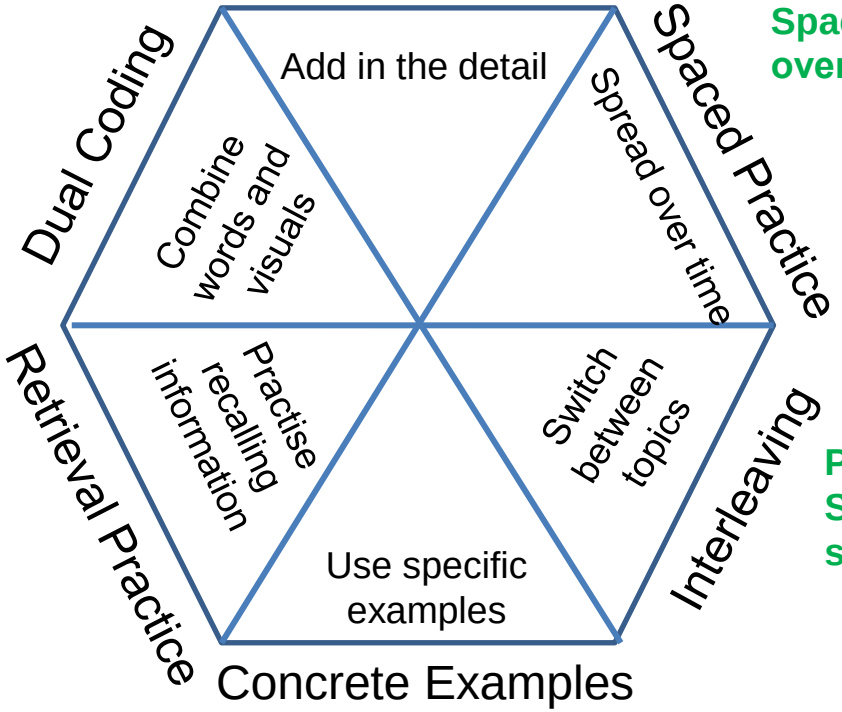
The development of understanding:
Explain and describe ideas with many details



'A hexagon has 6 edges'

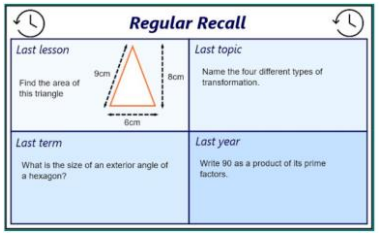


The development of understanding:
Combine words and visuals



Planning:
Space out study of a topic over time (A…….A…….A)

Reinforcement:
Practise bringing information to mind



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Planning:
Switch between ideas while studying (ACB / CBA / BCA topics)

$2^n \div 2^m = 2^{n-m}$

$2^8 \div 2^2 = 2^6$

$\frac{2x2x2x2x2x2x2x2}{2x2}$

$5^n \div 5^m = 5^{n-m}$

$5^8 \div 5^2 = 5^6$

$\frac{5x5x5x5x5x5x5x5}{5x5}$

The development of understanding: Use specific examples to understand abstract ideas

MOCK exam question level analysis : Be organised

Where did your students score least well?
Tailor your teaching and revision lessons so that you can teach the weaknesses and revise the strengths.
Make a list and look for connected topics
Make a timed plan for your lessons and to guide students with a schedule for their own independent work.

Multiplication facts
Histograms
Frequency tables (Foundation)
Geometric progression
Rounding including upper lower bounds
Indices/index/standard form
Speed time graphs
Formula – recall of, rearranging, substituting
Multi-step problems
Inequalities (Higher)
Converting units
Negative numbers within substitution etc.
Graphs
Fractions – especially mixed numbers

PREDICTIONS AND TARGETS : BE PROACTIVE

Be clear about where you and your students need to be by the end of April.
What percentage of grades 4 and 5+ do you want?
How many pupils is that?
What classes are they in?

Be clear about the strategies you will use for **specific groups of students.**

- Interventions:
- Maths tutor group
- Use of HLTA
- Collapsed class taught by one good practitioner with others to support
- Rotation teaching (pupils go to the topic they need more practice with)
- Extra revision sessions in various forms
- Maths teachers allocated two or three ‘key’ pupils to mentor
- Use of connected past questions
- Use of practice papers
- Other strategies ?

Using Flash Cards for Revision

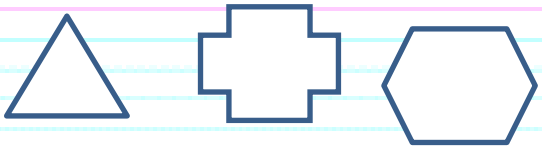
What are the strategies that work best ?
(Spaced practice, Retrieval practice, Interleaving)

Flashcards are a valuable revision tool.
They allow a student to test their knowledge of definitions and key ideas – an essential part of successful exam preparation.

What do I mean by flashcards?

Flashcards are sets of small, double-sided cards used to learn and revise details, keywords and vocabulary. They are useful for learning the relationship between two pieces of information You write a question or key term on the front and then the answer or definition on the back.

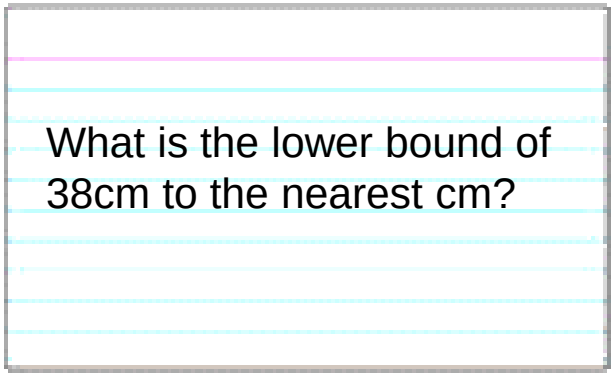
What is a polygon?

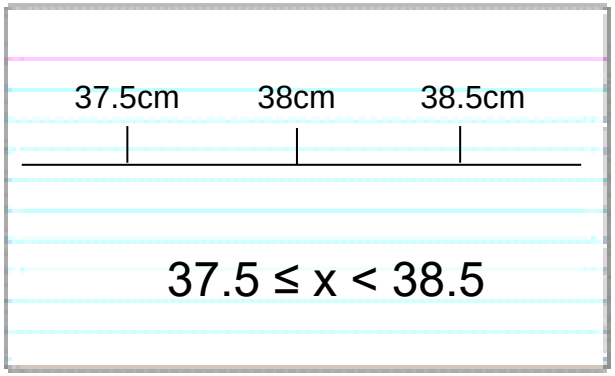


A closed flat shape with at least 3 straight sides, or edges

Flashcards are for testing not summarising

- Flashcards should be used to test knowledge, not just to condense information.
- Students often list bullet points on flashcards that they carry around with them to reread.
- Rereading notes is a passive learning activity so is not an economical use of revision time.
- **Instead, use flashcards as a quick way of testing what is known.**
  1. On the front of the card, write a key term or question
  2. On the back of the card, answer that question or write the definition for the term
  3. Try to work out the answer/definition on the front before checking the answer on the back.





One idea, one flashcard

- The goal isn't to fill the flashcards with points to make the most of the space.
- The most effective flashcards include one question followed by one answer (or one term followed by one definition).
- Split up longer questions into smaller, simpler ones. It is easier to process simple, small items of information than complex, wordy ones. You will end up with more flashcards this way, but the learning will be a lot more effective.
- Splitting the information allows each part to be learnt separately at the student's own pace which should save time and improve memory retention.

What is $\frac{8}{56}$ in its simplest terms ?

$$\frac{8}{56} = \frac{1\,x\,8}{7x\,8} = \frac{1}{7}$$

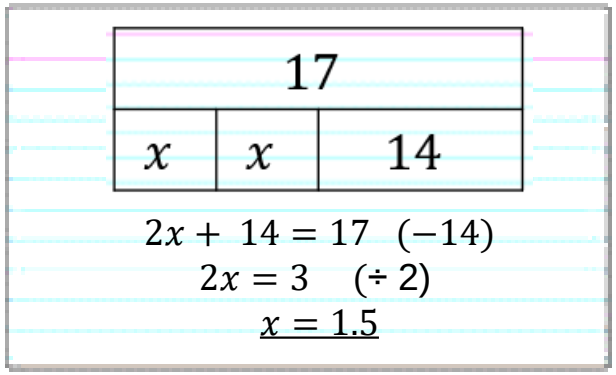
Boost your memory by combining pictures and words

Dual coding theory explains that our brains find it easier to recognise and recall visual inputs with verbal prompts – pictures and sounds are easier to remember than written words.

It takes time to decode and memorise text so pictures that support text work well– especially in the revision world.

Research suggests that, after three days, someone is likely to remember around 10% of information they read. If an image is added to text this figure increases and up to 65% of information is remembered.

Can I solve $2x + 14 = 17$?



Use spaced repetition to revise with flashcards

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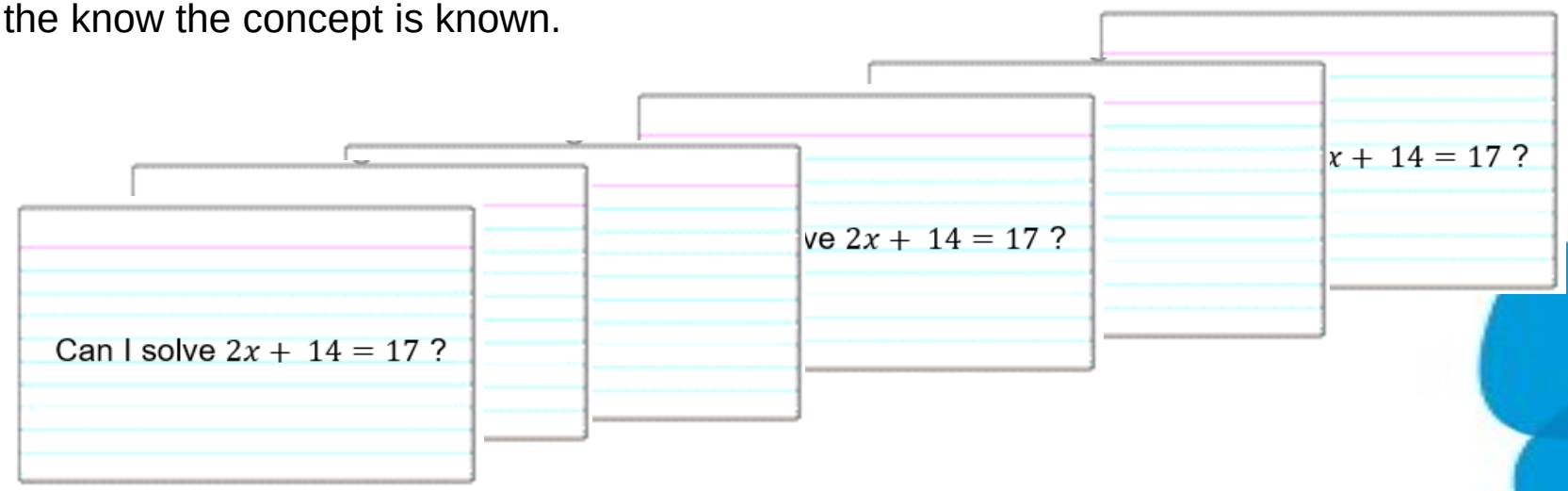
Great revision strategies share the same principle: testing your learning multiple times.

Flashcards are simple to create and quick and convenient for self-testing.
The power of flashcards is seen when we allocate time to review them multiple times.

Testing with each flashcard ten times could be a waste of precious revision time. There will be some concepts students struggle to learn and remember, with others they might become confident quickly.

This is where spaced repetition comes in: a technique to help students revise what they need to, when they need to.

Spaced repetition is the technique of testing multiple times, at intervals dependent on how well the know the concept is known.



Use spaced repetition to revise with flashcards

The concepts that should be retested most often are those the student is struggling to learn and commit to memory.

The time between these retests should be low.

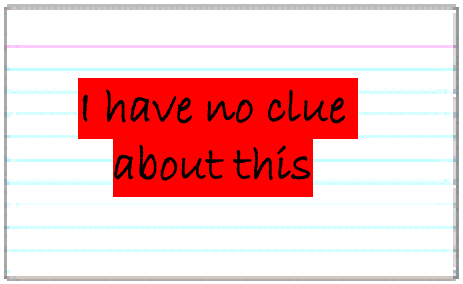
The concepts the student feels confident with should be retested less frequently.

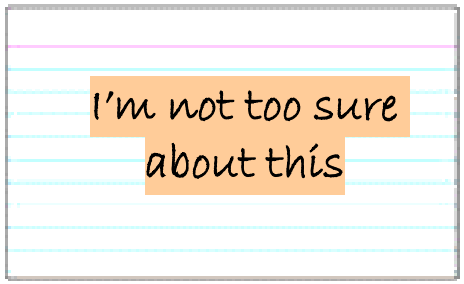
Once confident, the student should retest these flashcards just enough to not forget them.
A simple way of implementing this tip is to sort the flashcards as they revise with them.

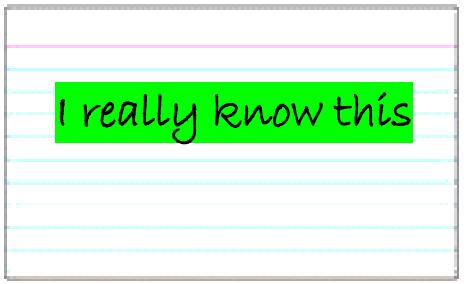
After answering a flashcard, put it into one of three piles:

- I have no clue about this
- I'm not too sure about this
- I really know this

The '*no clue*' pile should be tested soonest. As they retest their knowledge, their flashcards should change piles until (hopefully) all of them are in the '*I really know this*' pile.







Don’t just use flashcards

Flashcards are a great revision tool, but they do have disadvantages like every other technique.

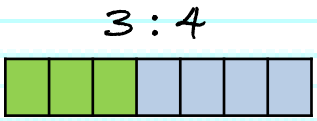
Flashcards allow the learner to learn the answers to simple questions and the relationship between two pieces of information.

They don’t allow the learner to apply this information to situations, understand it in depth or in a wider context.

You need to add other techniques too.

How are fractions linked to ratio ?

3 : 4



$\frac{3}{7}$ $\frac{4}{7}$

Other revision techniques

Mind-maps can illustrate all the key ideas and details of a concept or topic.

Quizzes can test knowledge of broader and deeper ideas.

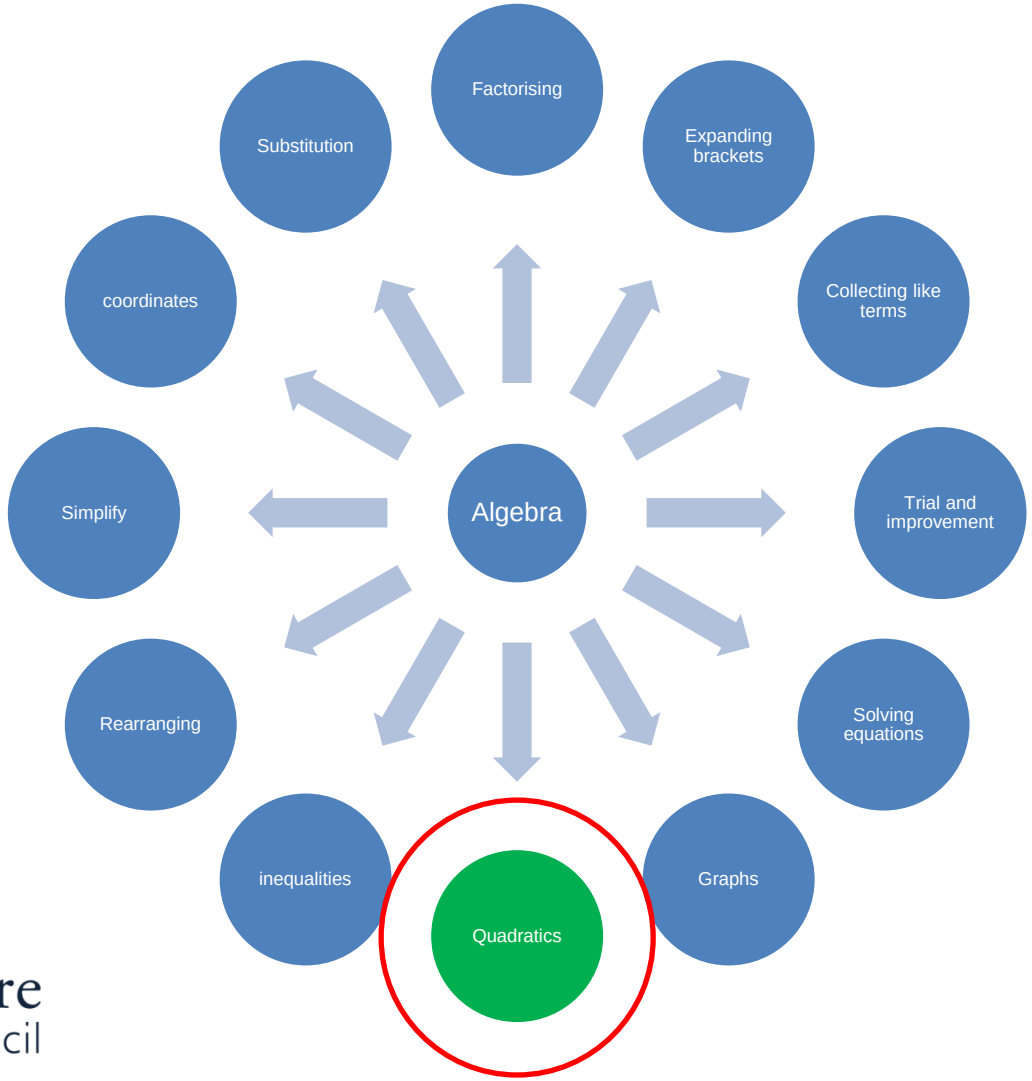
Practice exam questions allow the learner to apply their knowledge to a situation or example, engage in critical analysis, synthesise ideas to create new understanding and practice for the exam.

For effective revision, using a range of active revision techniques together. Perhaps flashcards, mind-maps, anchor questions with a varied sequence of related problems, low stakes quizzes and …..?

Mind Maps for Revision

Using the ‘elaboration strategy’

Mind-maps can illustrate all the key ideas and details of a concept or topic.



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Mind Maps for Revision

Using the ‘elaboration strategy’

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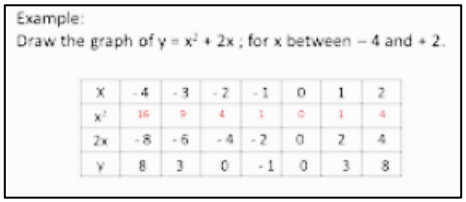
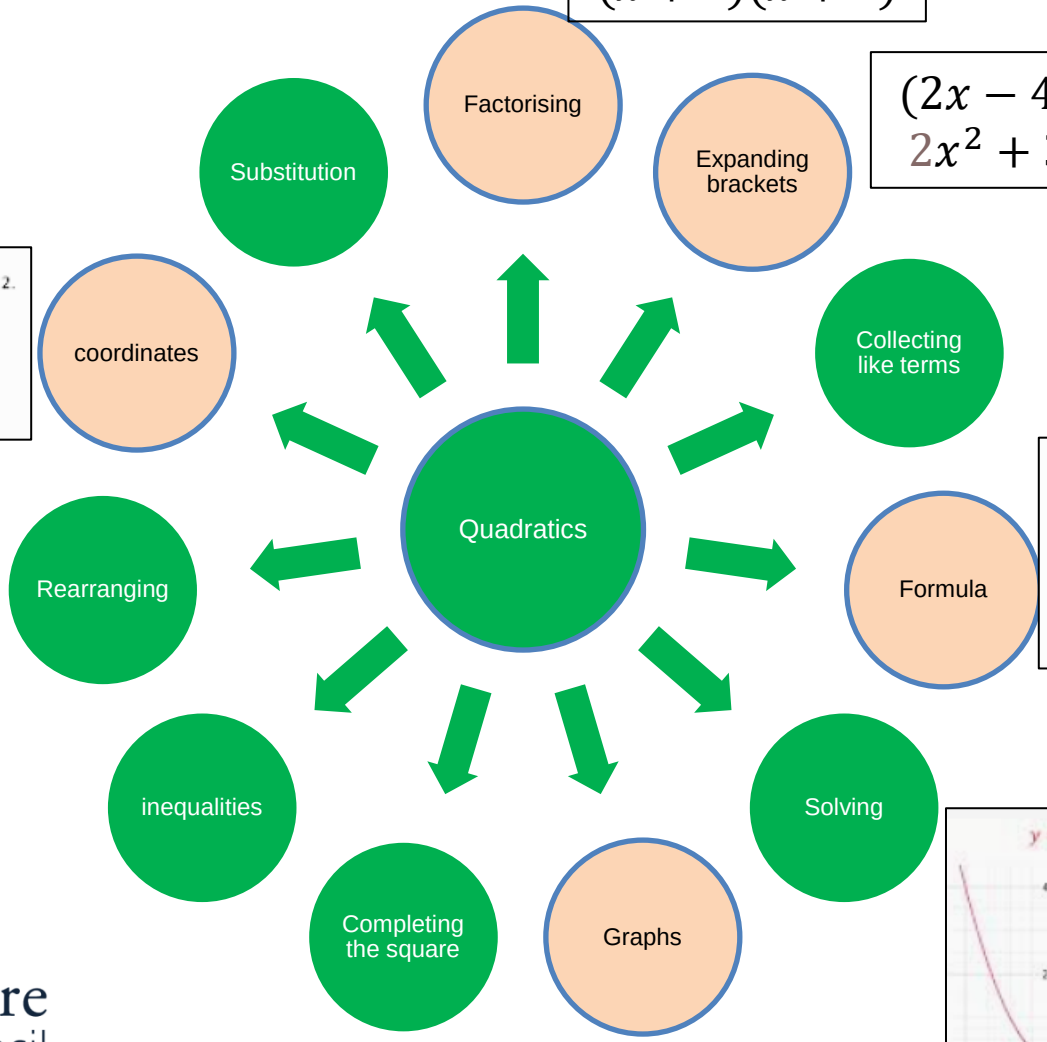
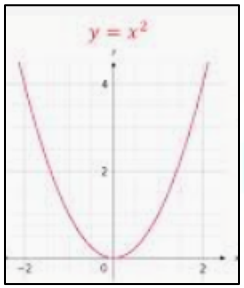
$$x^2 + 3x + 2$$
$$(x + 2)(x + 1)$$

$$(2x - 4)(x + 7)$$
$$2x^2 + 3x - 28$$





$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



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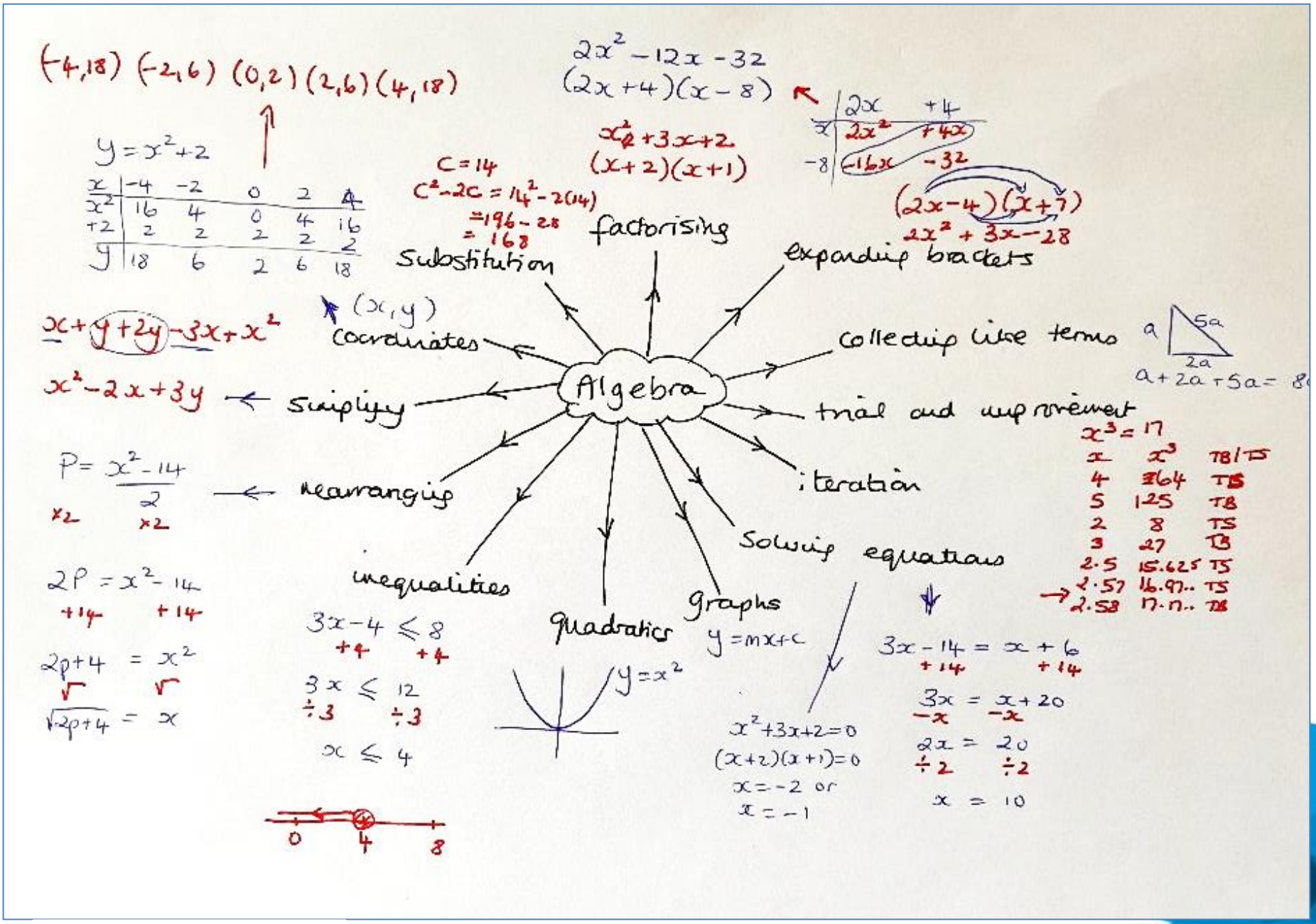

(-4,18) (-2,6) (0,2) (2,6) (4,18)
y = x² + 2
x | -4 | -2 | 0 | 2 | 4
x² | 16 | 4 | 0 | 4 | 16
+2 | 2 | 2 | 2 | 2 | 2
y | 18 | 6 | 2 | 6 | 18
2x² − 12x − 32
(2x + 4)(x − 8)
2x | +4
x | 2x² | +4x
−8 | −16x | −32
x² + 3x + 2
(x + 2)(x + 1)
C = 14
C² − 2C = 14² − 2(14)
= 196 − 28
= 168
(2x − 4)(x + 7)
2x² + 3x − 28
Substitution
factorising
expanding brackets
(x, y)
coordinates
collecting like terms
a
5a
2a
a + 2a + 5a = 8
x + y + 2y − 3x + x²
x² − 2x + 3y
simplify
Algebra
trial and improvement
x³ = 17
x | x³ | TB/TS
4 | 364 | TS
5 | 125 | TB
2 | 8 | TS
3 | 27 | TB
2.5 | 15.625 | TS
2.57 | 16.97.. | TS
2.58 | 17.07.. | TB
P = (x² − 14) / 2
×2 ×2
rearranging
iteration
2P = x² − 14
+14 +14
2p + 4 = x²
√ √
√(2p + 4) = x
inequalities
3x − 4 ≤ 8
+4 +4
3x ≤ 12
÷3 ÷3
x ≤ 4
0 4 8
quadratics
y = x²
graphs
y = mx + c
solving equations
x² + 3x + 2 = 0
(x + 2)(x + 1) = 0
x = −2 or
x = −1
3x − 14 = x + 6
+14 +14
3x = x + 20
−x −x
2x = 20
÷2 ÷2
x = 10

Using a past question as part of a sequence of similar problems

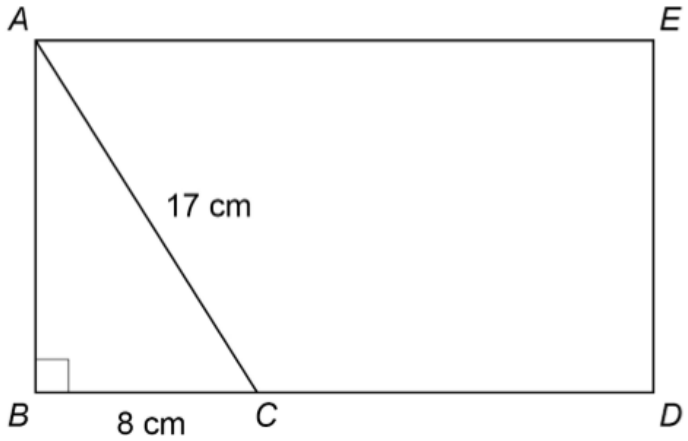
Higher tier : AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

Using a past question as part of a sequence of similar problems

Higher tier : AQA 2019 P2 Q7

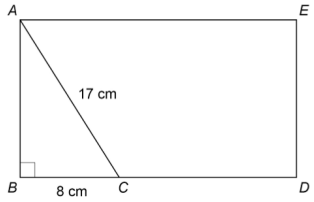
Step 1

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

First: solve the problem to check required prior knowledge.
This helps you to **model** the thinking process for learners.

The area of a rectangle is length x width
We need to find the length and width of the rectangle

The length is BD = BC + CD
We know that BC:CD = 1:2

BC	:	CD
1		**2**
8		**16**

x8 x8

So, when BC is 8cm, CD is 16cm

8 + 16 = 24cm

<u>The length of the rectangle is 24cm</u>

Using a past question as part of a sequence of similar problems

Higher tier : AQA 2019 P2 Q7

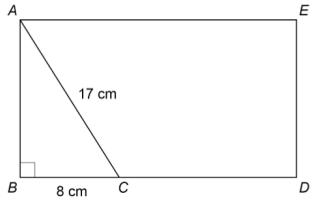
Step 2

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

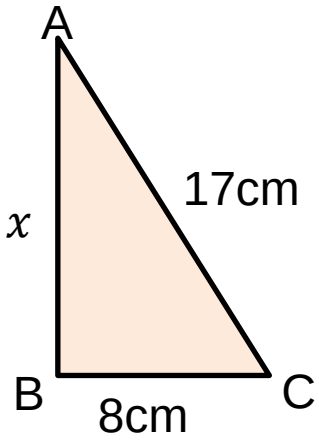
Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]



The area of a rectangle is length x width
We need to find the length and width of the rectangle

The width of the rectangle is AB

We can use Pythagoras' Theorem

$$x^2 + 8^2 = 17^2$$

$$x^2 = 17^2 - 8^2$$

$$x^2 = 289 - 64$$

$$x^2 = 225$$

$$x^2 = \sqrt{225}$$

$$\boldsymbol{x = 15 \text{ cm}}$$

The width of the rectangle is 15cm

Using a past question as part of a sequence of similar problems

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Higher tier : AQA 2019 P2 Q7

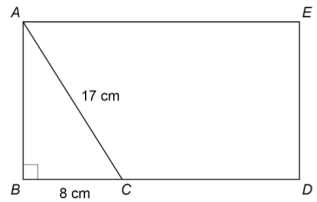
Step 3

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

The area of a rectangle is length x width
We need to find the length and width of the rectangle

The area of the rectangle is AB x BD

15 x 24 = 260

The area of the rectangle is 260 cm^2

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Using a past question as part of a sequence of similar problems

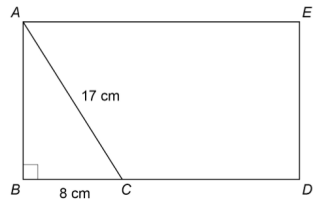
Higher tier : AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

Next : Check the mark scheme
This question has a range of alternative methods

You should work through each method to be clear about what you want to teach / revise in advance of the lesson

8^2 or 64 and 17^2 or 289	M1	
$\sqrt{17^2 - 8^2}$ or $\sqrt{225}$ or 15	M1dep	oe implies M2 may be seen on diagram
8 × 3 × their 15 or 24 × their 15	M1dep	dep on M2 oe eg (8 + 16) × their 15 or 0.5 × 8 × their 15 × 6
360	A1	SC2 [448.8, 456]

Using a past question as part of a sequence of similar problems

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Higher tier : AQA 2019 P2 Q7

Alternative method 1

8^2 or 64 and 17^2 or 2		
$\sqrt{17^2 - 8}$		
8 × 3 × t or 24 ×		
360		

Alternative method 2

$\cos C = \frac{8}{17}$ or C = [61.9, 62]	M1	may be seen on diagram
17 × s or [14		
8 × 3 or 24 or [35		
360		

Alternative method 3

$\sin A = \frac{8}{17}$ or A = [28, 28.1]	M1	may be seen on diagram
17 × cos their [28, 28.1] or [14.9,		may be seen on diagram
8 × 3 × th or 24 × tl or [357.6		
360		

Alternative method 4

$\cos C = \frac{8}{17}$ or C = [61.9, 62]	M1	may be seen on diagram
$\frac{1}{2}$ × 8 × 17 × sin their [61.9, 62] or [59.9, 60.1]	M1dep	oe
6 × their [59.9, 60.1] or [357.6, 362.4]	M1dep	oe
360	A1	SC2 [448.8, 456]

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Using a past question as part of a sequence of similar problems

Higher tier : AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

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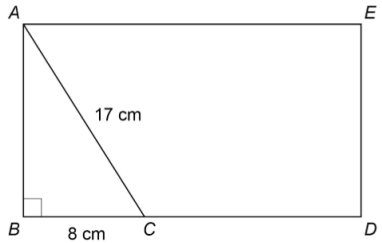


BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

Example 1: Teacher modelled alongside learners 'having a go'

Discuss ~ 'co-construct'

Now create a sequence of questions that are similar to this one.

Allow learners to work in pairs at first

Check methods and solutions together as a class

For the final one, learners work alone

Give them one to do at home (you could save these up until you have several different questions)

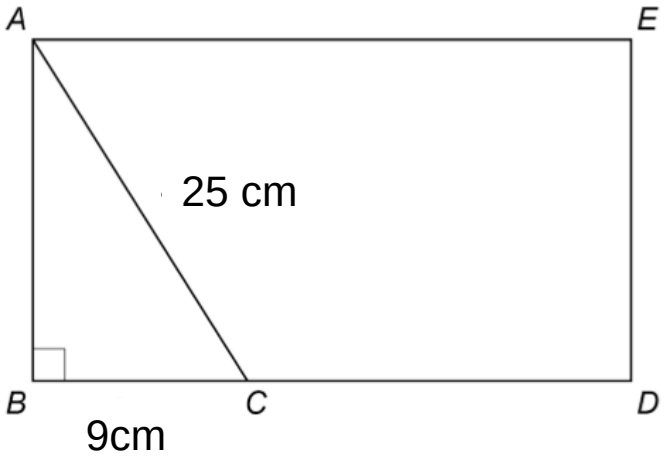
Using a past question as part of a sequence of similar problems

Higher tier : A similar question to AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 25cm
BC = 9cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

Example 2: Paired work

Share solutions as a group

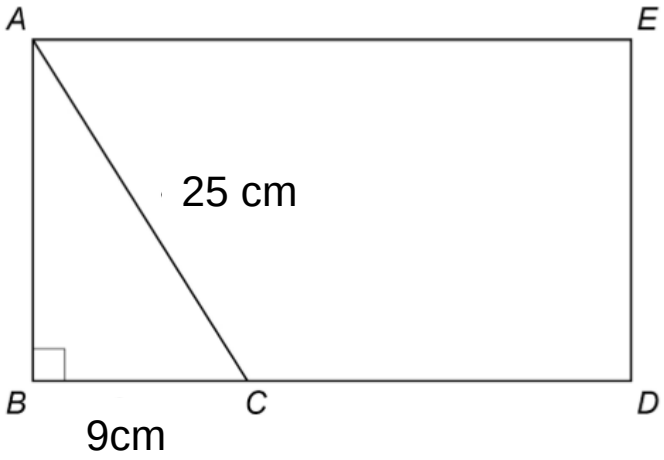
Using a past question as part of a sequence of similar problems

Higher tier : A similar question to AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 25cm
BC = 9cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

Example 3: Paired work

Share solutions as a group

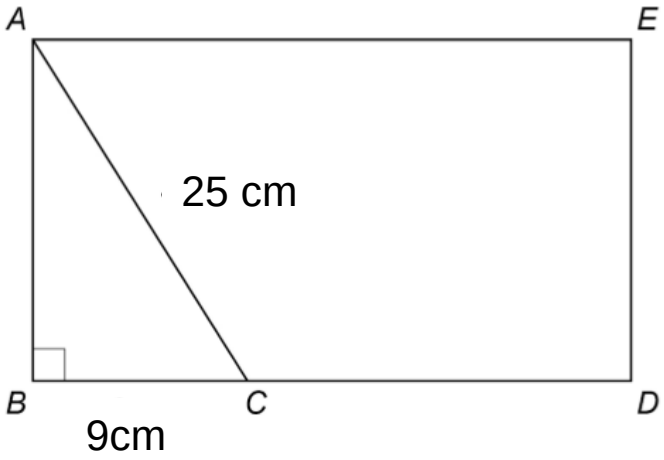
Using a past question as part of a sequence of similar problems

Higher tier : A similar question to AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 25cm
BC = 9cm

Not drawn accurately



BC : *CD* = 1 : 3

Work out the area of rectangle *ABDE*.

[4 marks]

Example 4: Independent

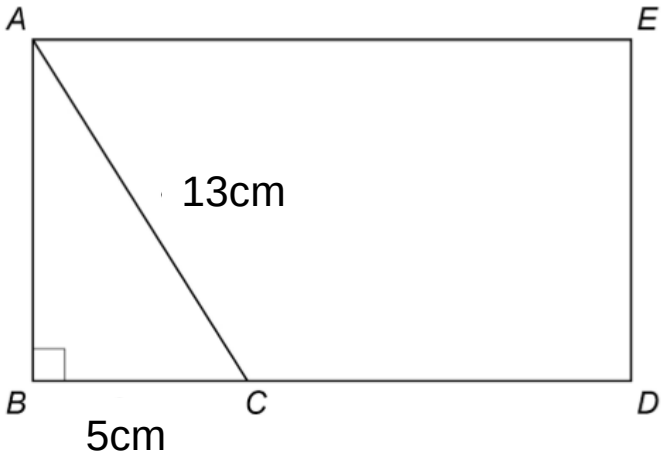
Share solutions as a group

Using a past question as part of a sequence of similar problems

Higher tier : A similar question to AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 13cm
BC = 5cm



Not drawn accurately

BC : *CD* = 2 : 3

Work out the area of rectangle *ABDE*.

[4 marks]

Example 5: Independent

Share solutions as a group

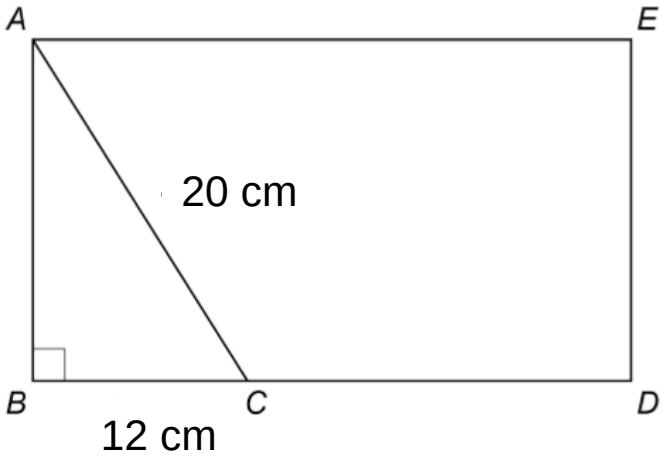
Using a past question as part of a sequence of similar problems

Higher tier : A similar question to AQA 2019 P2 Q7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 20 cm
BC = 12 cm

Not drawn accurately



BC : *CD* = 3 : 5

Work out the area of rectangle *ABDE*.

[4 marks]

Example 6: Independent

Home learning task as part of a collection of questions from different domains

Low Stakes ‘mini-tests’ such as ‘Connect4Maths

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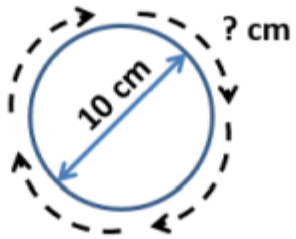
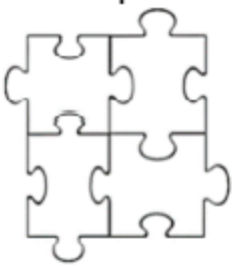
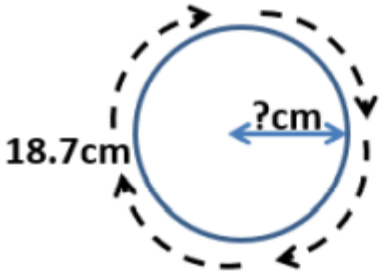
$\pi =$ □ .1415926……



Write down the value of the circumference.
Give your answer to 3 sig.figs





Calculate the value of the radius.
Give your answer to 4 dps.

The diameter of a circle is given as ‘d’
What is the area of this circle ?

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Low Stakes ‘mini-tests’ such as ‘Connect4Maths

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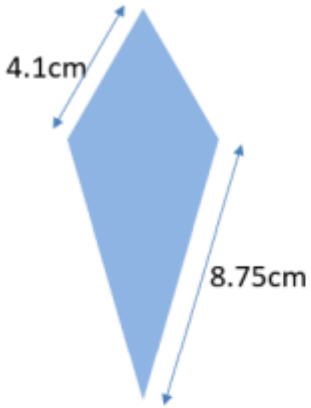
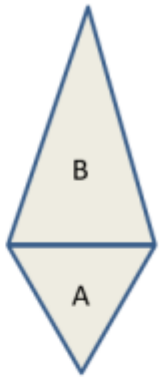
VEMENT



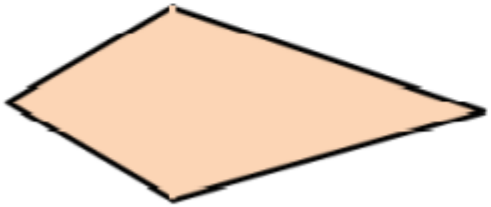
Calculate the perimeter of this kite



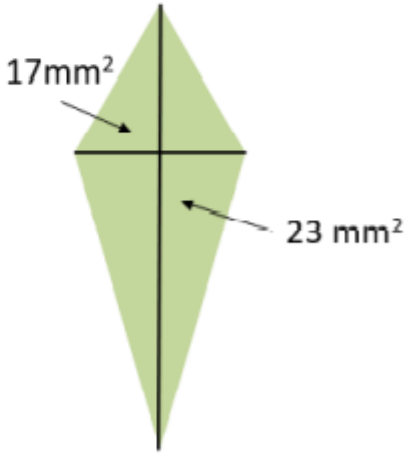
Area A is $\frac{1}{3}$ Area B

Area A = 1.7m²

What is the area of the kite ?



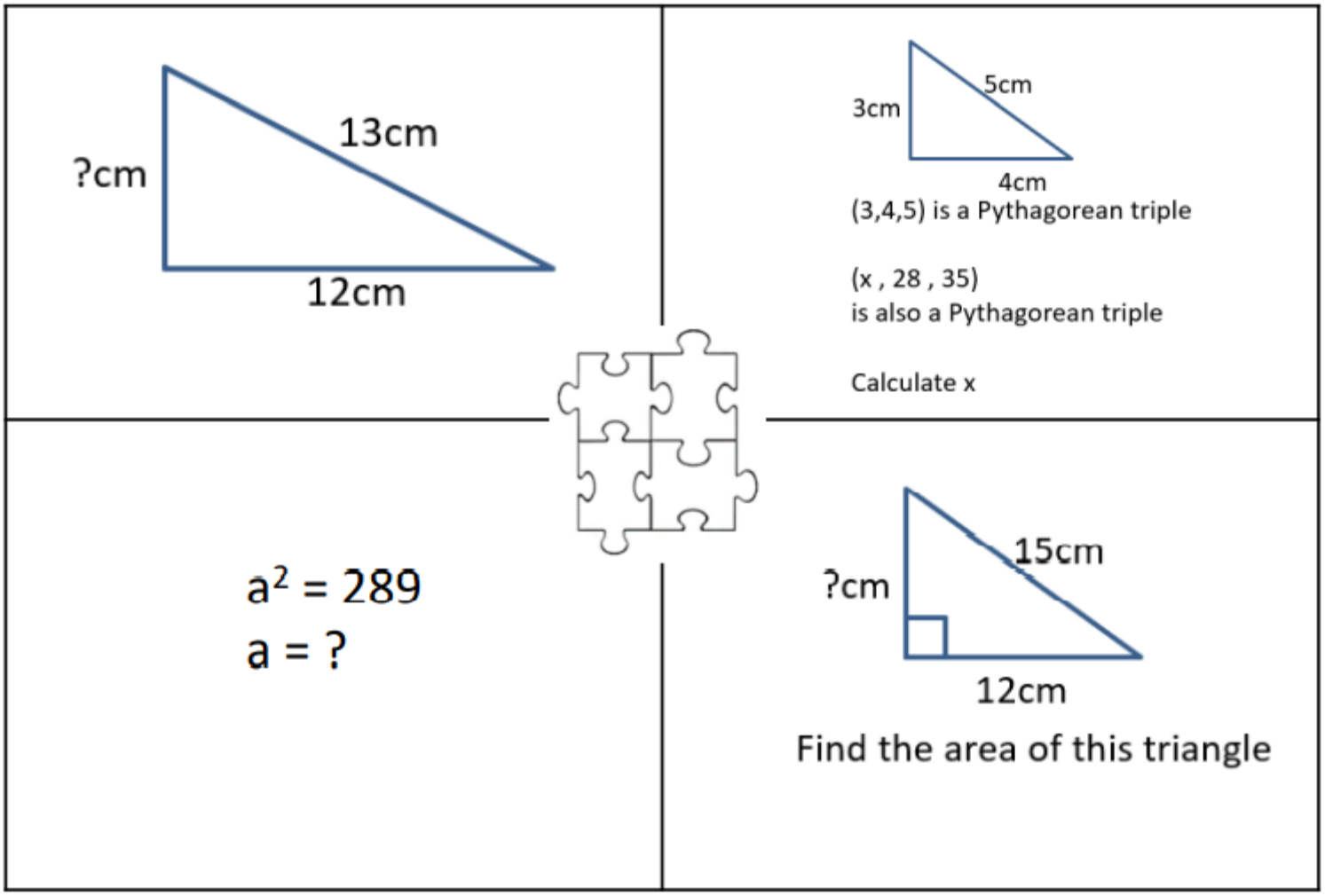
The perimeter of this kite is 50 mm.
What could the side lengths be?



Calculate the area of this kite

Ha
Cou

Low Stakes ‘mini-tests’ such as ‘Connect4Maths



Low Stakes ‘mini-tests’ such as ‘SSDD’ problems (Craig Barton)

List all the factors of 48

List three factors of 48 that add up to 16

A rectangle has an area of 48cm^2
The length is at least double the width
The width is greater than 1
List 3 possible sets of dimensions

A rectangle has an area of 48cm^2
Two sets of dimensions can be used which give a difference of 10cm when you calculate the perimeter

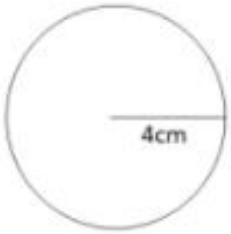
Find the two sets of dimensions

Factors of 48

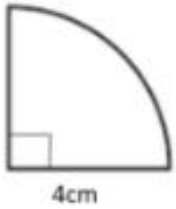
https://ssddproblems.com/

Low Stakes ‘mini-tests’ such as ‘SSDD’ problems

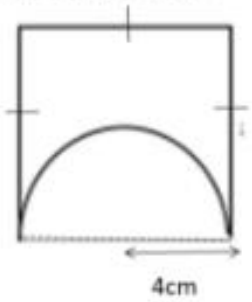
Find the circumference



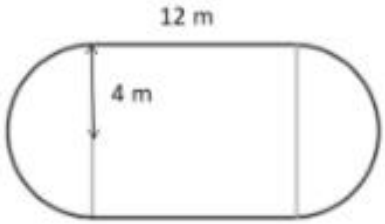
Find the area



Find the perimeter



The field below is being laid with grass The grass is sold in bags of 5 square metres. Each bag costs $130.
How much will it cost to lay grass on the field.



The radius is 4

https://ssddproblems.com/

Low Stakes ‘mini-tests’ such as ‘SSDD’ problems

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Simplify
$4y^3 \times 2y^8$

Work out the value of
$(4 \times 10^3) \times (2 \times 10^8)$
giving your answer in standard form

Simplify
$\frac{4y^3}{2y^8}$

Work out the value of
$\frac{4 \times 10^3}{2 \times 10^8}$
giving your answer in standard form

4s and 2s

https://ssddproblems.com/

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Access and Success for All

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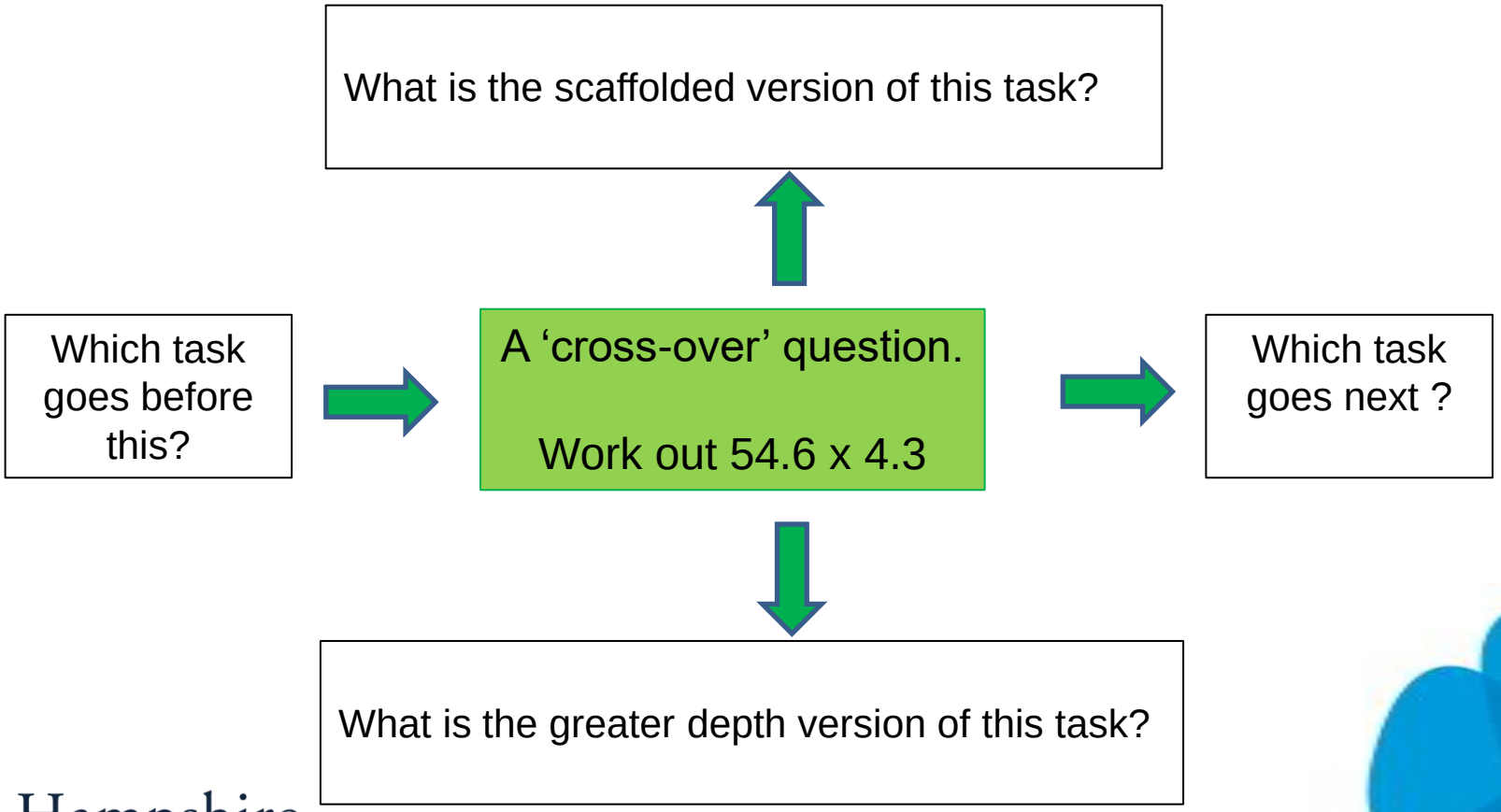
How can we scaffold and deepen a task such as a past question so that all students in the group feel that they can ‘have a go with some success’ ?



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Ensuring access and success for all

Work out 54 x 4
Work out 54 x 3
Work out 54 x 0.3
(patterning strategy)

Work out 54.6 x 4

50 x 4 =
4 x 4 =
0.6 x 4 =

(partitioning strategy to see the structure)

A ‘cross-over’ question.

Work out 54.6 x 4.3

Work out 54.67 x 41.3

Partition
Pattern
Other strategies?

If I know that 54.6 x 4.3 < 250, then what else do I know?

Strategies
Analysis
Evaluation
Connections

Inclusion : How do we promote access and success for all ?

Scaffolding

‘Scaffolding’ is a metaphor for temporary support that is removed when it is no longer required. Initially, a teacher would provide enough support so that pupils can successfully complete tasks that they could not do independently.

This requires effective assessment to gain a precise understanding of the pupil’s current capabilities. Support could be visual, verbal, or written.
The teacher will gradually remove the support (the scaffold) as the pupil becomes able to complete the task independently.

Scaffold the main task:

- **Use of part –whole models e.g. bar models and ‘cherry’ models to show the structure of the mathematics**
- **A model answer using a CPA approach to support learning preferences**
- **Breaking down process into smaller , more manageable steps**

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Inclusion : How do we promote access and success for all ?

Deepening

Deepening is the way in which the teacher offers an insight into mathematical structure and connections to **develop a pupils' ability to generalise.** It is not about 'harder maths' , it is about having deep and secure foundations to your understanding so that you can not only solve the current problem, but future problems that are related to this one, seeing those relationships for yourself.

Deepen the main task:

- **Encourage a range of representations or methods to explore the structure of the mathematics**
- **Connect to other areas of mathematics**
- **Explore alternative versions of the same problem to see it from different perspectives**
- **Ask insightful questions to develop 'noticing' and 'wondering'**

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The next few slides are website resource ideas for:

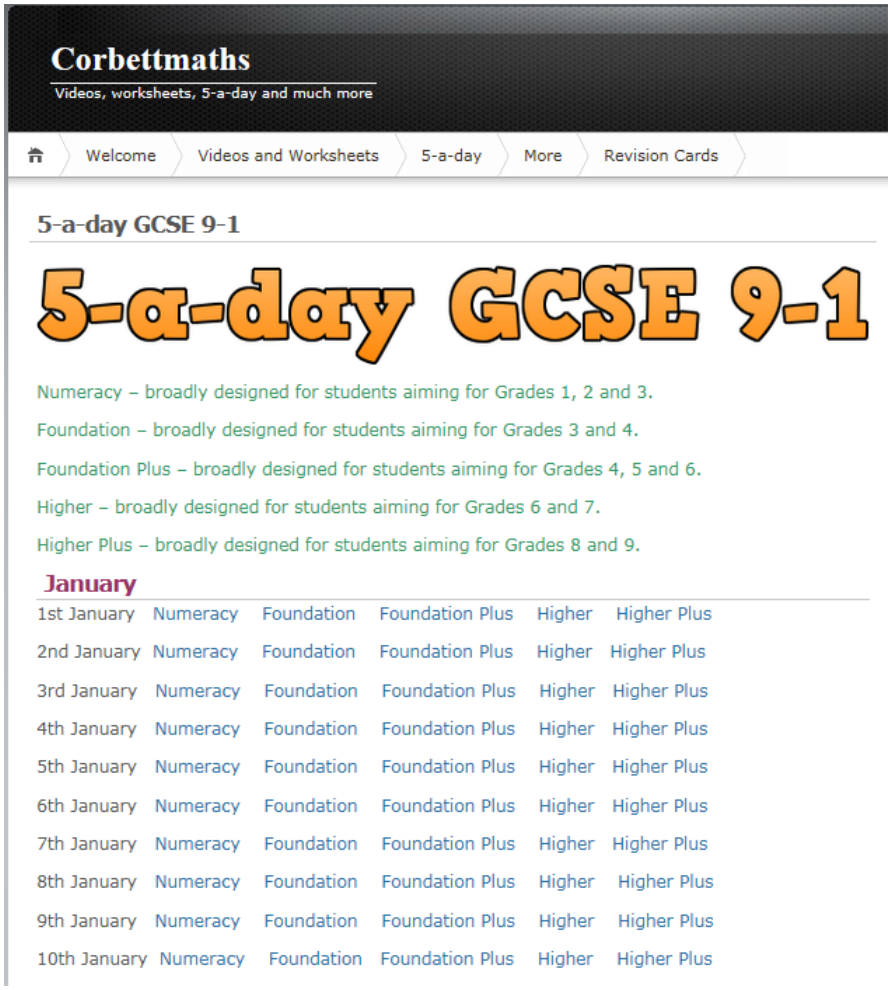
- Starters for regular practice of basic skills
- Homework/revision for students at home
- Breaking up working through papers
- Intervention groups

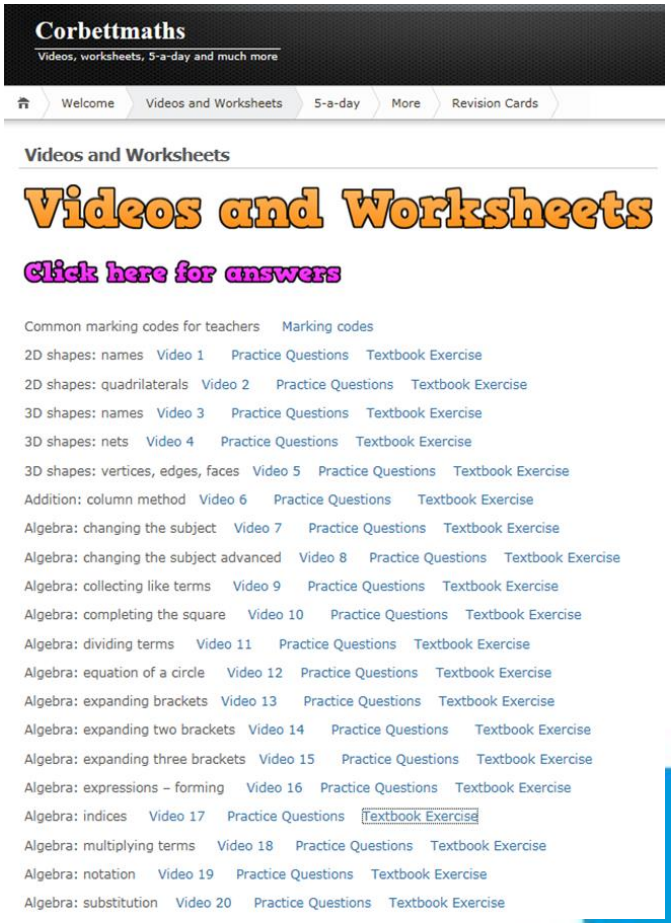
Crossover questions

Work out 54.6×4.3

Foundation tier: difficult questions

Write 56.78 correct to one significant figure.


Corbettmaths
Videos, worksheets, 5-a-day and much more
Welcome
Videos and Worksheets
5-a-day
More
Revision Cards
5-a-day GCSE 9-1
5-a-day GCSE 9-1
Numeracy – broadly designed for students aiming for Grades 1, 2 and 3.
Foundation – broadly designed for students aiming for Grades 3 and 4.
Foundation Plus – broadly designed for students aiming for Grades 4, 5 and 6.
Higher – broadly designed for students aiming for Grades 6 and 7.
Higher Plus – broadly designed for students aiming for Grades 8 and 9.
January
1st January Numeracy Foundation Foundation Plus Higher Higher Plus
2nd January Numeracy Foundation Foundation Plus Higher Higher Plus
3rd January Numeracy Foundation Foundation Plus Higher Higher Plus
4th January Numeracy Foundation Foundation Plus Higher Higher Plus
5th January Numeracy Foundation Foundation Plus Higher Higher Plus
6th January Numeracy Foundation Foundation Plus Higher Higher Plus
7th January Numeracy Foundation Foundation Plus Higher Higher Plus
8th January Numeracy Foundation Foundation Plus Higher Higher Plus
9th January Numeracy Foundation Foundation Plus Higher Higher Plus
10th January Numeracy Foundation Foundation Plus Higher Higher Plus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Videos, worksheets, 5-a-day and much more
Welcome
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Videos and Worksheets
Click here for answers
Common marking codes for teachers Marking codes
2D shapes: names Video 1 Practice Questions Textbook Exercise
2D shapes: quadrilaterals Video 2 Practice Questions Textbook Exercise
3D shapes: names Video 3 Practice Questions Textbook Exercise
3D shapes: nets Video 4 Practice Questions Textbook Exercise
3D shapes: vertices, edges, faces Video 5 Practice Questions Textbook Exercise
Addition: column method Video 6 Practice Questions Textbook Exercise
Algebra: changing the subject Video 7 Practice Questions Textbook Exercise
Algebra: changing the subject advanced Video 8 Practice Questions Textbook Exercise
Algebra: collecting like terms Video 9 Practice Questions Textbook Exercise
Algebra: completing the square Video 10 Practice Questions Textbook Exercise
Algebra: dividing terms Video 11 Practice Questions Textbook Exercise
Algebra: equation of a circle Video 12 Practice Questions Textbook Exercise
Algebra: expanding brackets Video 13 Practice Questions Textbook Exercise
Algebra: expanding two brackets Video 14 Practice Questions Textbook Exercise
Algebra: expanding three brackets Video 15 Practice Questions Textbook Exercise
Algebra: expressions – forming Video 16 Practice Questions Textbook Exercise
Algebra: indices Video 17 Practice Questions Textbook Exercise
Algebra: multiplying terms Video 18 Practice Questions Textbook Exercise
Algebra: notation Video 19 Practice Questions Textbook Exercise
Algebra: substitution Video 20 Practice Questions Textbook Exercise

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StudyMaths

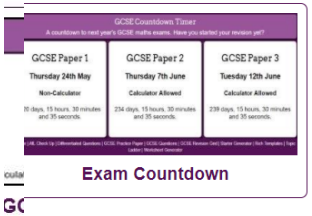
hare

MathsBot.com

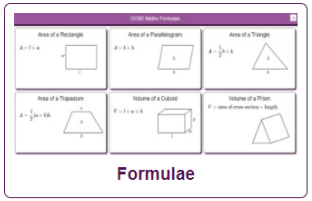
Tools for Maths Teachers

GCSE Resources | Manipulatives | Question Generators | Starters and Drills | Tools

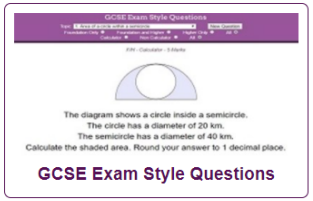
GCSE Resources



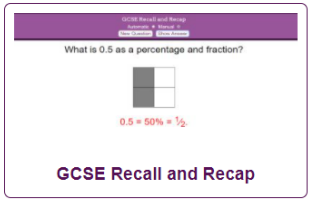
Exam Countdown



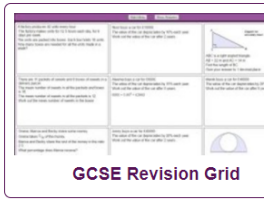
Formulae



GCSE Exam Style Questions



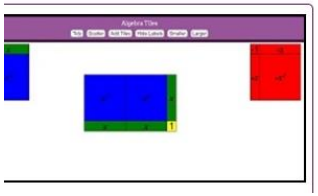
GCSE Recall and Recap

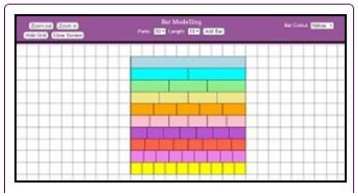


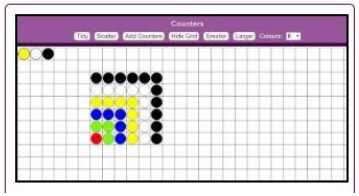
GCSE Revision Grid

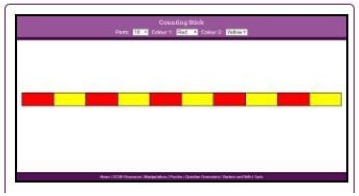
View All GCSE Resources

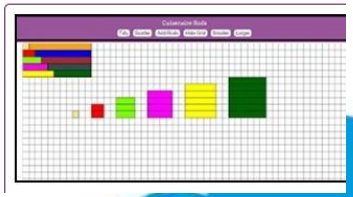
Manipulatives











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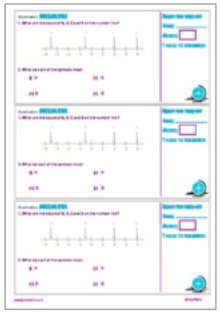
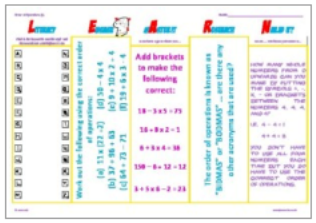
Boarding Cards

These are available for every topic in the JustMaths Crossover. Basically, a quick exercise to assess prior knowledge before starting each of the topics.

Inequalities (0.2 MiB)





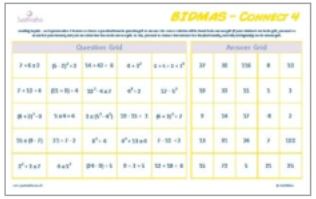
LEARN Homework

These are available for every topic in the JustMaths Crossover and provide a consistent style of homework across all topics that include an element of literacy, practice and research.

Bidmas (0.3 MiB)

Connect 4

Our "connect 4's" are student worksheets, in which they work in pairs (or individually) to connect 4 in the answer grid (not the question grid), which will mean that they have to answer questions of varying difficulty. It is self-checking so that if the answer isn't in the grid the student must check their working.



Bidmas (0.1 MiB)

Fractional And Negative Indices (0.2 MiB)

Standard Form (0.1 MiB)

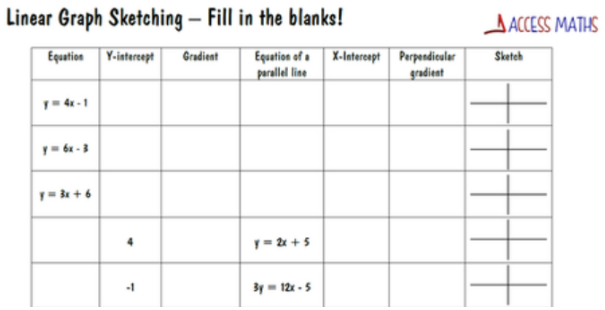
Surds (0.2 MiB)

9-1 Revision Material

Seasonal | Start with Confidence | Pentagon Problems | Octagon Revision | Revision Maz

Revision Material that is being uploaded as and when I make them for my year 11's up to their GCSE this year.

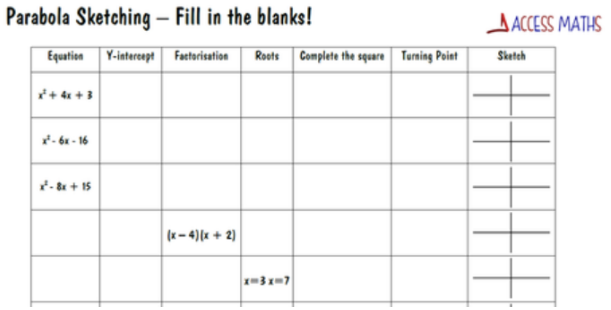
Fill in the blanks! - Graph Revision



Linear Graph Sketching – Fill in the blanks!

ACCESS MATHS

Equation	Y-intercept	Gradient	Equation of a parallel line	X-Intercept	Perpendicular gradient	Sketch
$y = 4x - 1$						
$y = 6x - 3$						
$y = 3x + 6$						
	4		$y = 2x + 5$			
	-1		$3y = 12x - 5$			



Parabola Sketching – Fill in the blanks!

ACCESS MATHS

Equation	Y-intercept	Factorisation	Roots	Complete the square	Turning Point	Sketch
$x^2 + 4x + 3$						
$x^2 - 6x - 16$						
$x^2 - 8x + 15$						
		$(x - 4)(x + 2)$				
			$x = 3$ $x = 7$			

Progressive Overload - Algebra

PROGRESSIVE OVERLOAD ALGEBRA

ACCESS MATHS

SIMPLIFY
EXPAND
EXPAND
FACTORISE
FACTORISE
SOLVE
SOLVE
SUBSTITUTE
INDICES
REARRANGE

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Progressive Overload - Number

PROGRESSIVE OVERLOAD NUMBER

ACCESS MATHS

MULTIPLY
DIVIDE
ESTIMATE
ROUND
ORDER
CALCULATE
POWERS
FRACTIONS
FRACTIONS
PERCENTAGE

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Number Progressive Overload 90 Questions.pdf
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Final Countdown Foundation Revision Mat 1

1) Calculate the **mean**, **median**, **mode** and **range** from the following list of numbers.

5, 12, 10, 8, 13, 12, 7, 12, 11

2) Calculate the **nth term rule** of the sequence.

2, 5, 8, 11, 14 ...

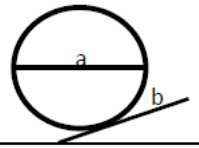
3) Expand and Simplify

$4(x-3)-2(x-9)$

4) Work out

$\frac{2}{5}$ of £140

5) Name the parts of the circle a and b.

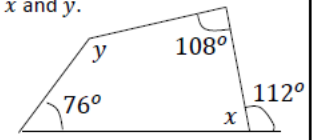


6) Evaluate

$5+\ -9$

$18 \div -6$

7) Calculate the missing angles x and y.



8) Place the following numbers in ascending order.

1.02, 0.4, 1, 0.04, 0.24, 0.042

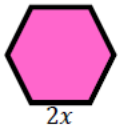
9) Solve

$4(x-5)=12$

10) Complete the following sentence with either; Impossible, unlikely, even, likely or certain.

Abdullah rolls a dice. It is _____ he will roll a six.

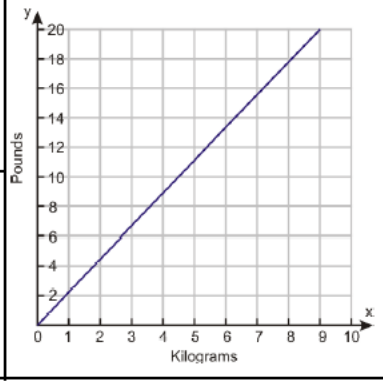
11) Write a formula for the perimeter of the regular shape.



12) 657 passengers paid £247 each for a cruise on a small cruise ship.
Estimate the amount paid by the passengers in total.

13) A shop has a 15% sale. Originally a computer cost £275. How much does the computer cost in the sale?

14)



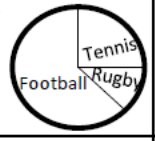
Brittney weighs a car on a set of industrial scales.

It weighs 900kg.

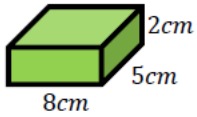
Estimate the cars weight in pounds.

15) The area of a rectangle is 48 cm^2. What is the difference between the smallest and largest perimeter the shape could have?

16) A sample of boys were asked their favourite sport. 45 boys said tennis. How many boys were in the sample in total?



17) Draw the net of the cuboid on cm squared paper.



Challenge

Georgia and Courtney share sweets in the ratio 4: 7.
Courtney gets 24 more sweets than Georgia.
How many sweets do they both get?

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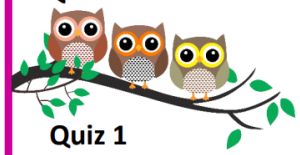
Higher Interleaving Quiz

Branch 1

Quizzes 1 to 3



Quiz 1

Q	Topic	∑	R	A	G
1	Product of Prime Factors				
2	Difference of Two Squares				
3	Area Problem				
4	Cumulative Frequency				

Home Study Focus

Home Study Completed ☐

Higher Interleaving Quiz

Branch 1 Quiz 1

1) Express 126 as a product of it's prime factors in index form. ***(3 marks)***

Answer: _____

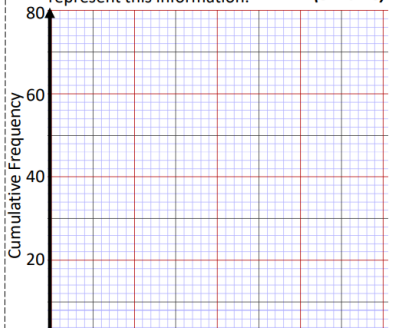
2) Factorise and solve $9x^2 - 25 = 0$ ***(3 marks)***

emi circle is $8cm$.
of the shaded section.
in terms of pi. ***(4 marks)***

4) This frequency table gives information about the ages of 60 fire fighters.

Age (A) in years	Frequency		
$25 < A \leq 30$	15		
$30 < A \leq 40$	19		
$40 < A \leq 50$	14		
$50 < A \leq 55$	9		
$55 < A \leq 60$	3		

a) Draw a cumulative frequency graph to represent this information. ***(3 marks)***

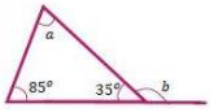


QUICK WITS

FOUNDATION 1

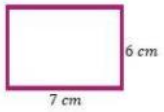
Angles in Triangles

Calculate the size of the missing angles a and b.



Area

Calculate the area of this shape.



Percentage Increase and Decrease

A smart watch costs £240.
The shop selling the watch has a 15% sale. How much does the coat cost in the sale?

Multiplication

John needs 32 pens.
Each pen costs 15p.
John has £5.
Does he have enough money?
Give a reason for your answer.

Yes ☐ No ☐

Ratio

Shannon and Courtney share £42 into the ratio 3:4.
How much money do they each receive?

Expand and Factorise

1) Expand
$3(x + 4)$

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

3) Expand
$(x + 2)(x + 7)$

4) Factorise Fully
$12x - 18$

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Hampshire

MENT

Fractions

1) In a pack 15 oranges, 3 of the oranges are mouldy. What fraction of the pack are mouldy?

2) Find the fraction half way between $\frac{1}{5}$ and $\frac{3}{10}$.

Fractions

Explain how you know the answer is wrong without working out the correct answer.

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

Number Properties

Make the statement true.

$12 \times 30 = 4 \times \square = 3 \times \square$

Number Properties

1) Write down a prime number between 20 and 30.

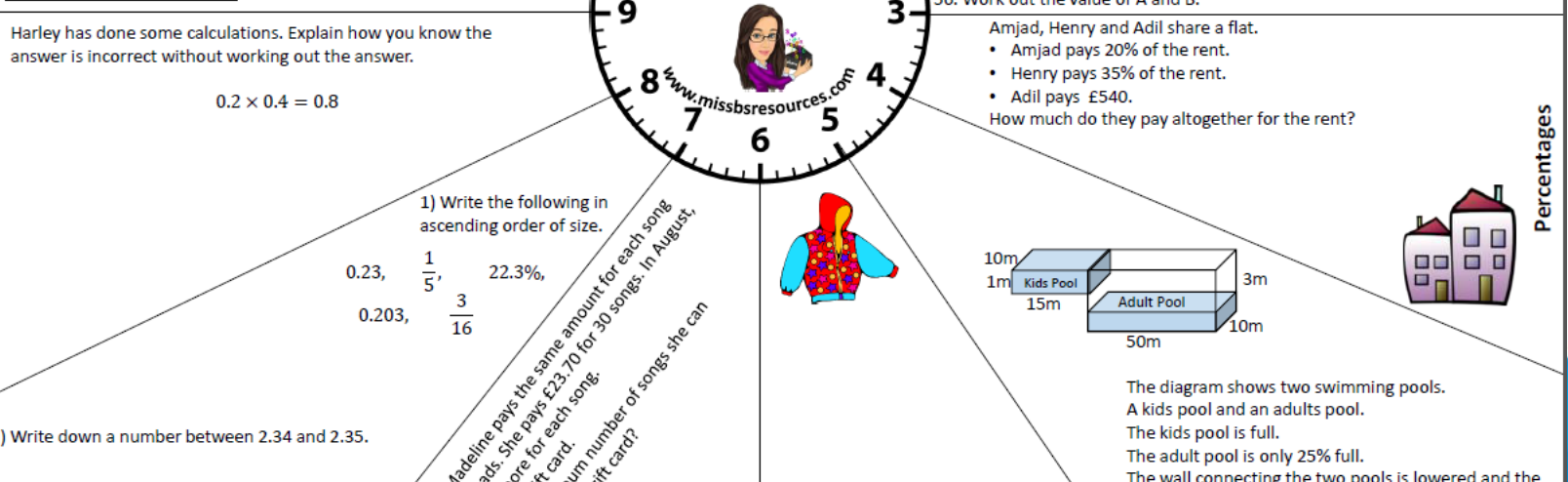
2) Write down an even multiple of 13.

3) Write down three different factors of 24 that add together to give a prime number.

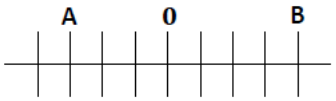
Fractions

Complete the table.

Minutes	Hours
15	$\frac{1}{4}$
20	
	$1\frac{1}{2}$
100	



Number Properties



Two numbers, A and B, are shown on a scale. The difference between A and B is 56. Work out the value of A and B.

Decimals

Harley has done some calculations. Explain how you know the answer is incorrect without working out the answer.

$0.2 \times 0.4 = 0.8$

Percentages

Amjad, Henry and Adil share a flat.

- Amjad pays 20% of the rent.
- Henry pays 35% of the rent.
- Adil pays £540.

How much do they pay altogether for the rent?

Decimals

1) Write the following in ascending order of size.

0.23, $\frac{1}{5}$, 22.3%, 0.203, $\frac{3}{16}$

2) Write down a number between 2.34 and 2.35.

Decimals

In June, Madeline pays the same amount for each song she downloads. She pays £23.70 for 30 songs. In August, she pays 6p more for each song. She has a £25 gift card. What is the maximum number of songs she can purchase using this gift card?

Percentages

In the shop the normal price of a coat is £85.The shop has a sale. The price of the coat is reduced by 12%.
Work out the price of the coat in the sale.

Percentages

The diagram shows two swimming pools.
A kids pool and an adults pool.
The kids pool is full.
The adult pool is only 25% full.
The wall connecting the two pools is lowered and the water from the Kids pool is released into the adults pool before the wall is raised again.
What percentage of the adults pool is now filled?

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