



THIRD SPACE
LEARNING

30 Problem Solving Maths Questions, Solutions & Strategies

GCSE Maths

Introduction

We know from talking to school leaders and maths teachers that one of their biggest challenges is developing confidence and skills to tackle problem solving questions, particularly approaching GCSEs. Problem solving questions of the type that students will encounter in exams often combine several elements of maths which means there is no 'one size fits all' approach to answering them.

Although learners can be taught how to follow a process to answer these questions, with each new problem they will be making sense of different information and applying different skills. What they need therefore is practice and lots of opportunities to apply these skills.

This is why we've developed this collection of problem solving questions.

6 tips to tackling problem solving maths questions

There is no 'one size fits all' approach to successfully tackling problem solving maths questions however, here are 6 general tips for students facing a problem solving question:

- 1 Read the whole question, underline important mathematical words, phrases or values.
- 2 Annotate any diagrams, graphs or charts with any missing information that is easy to fill in.
- 3 Think of what a sensible answer may look like. E.g. Will the angle be acute or obtuse?
Is £30,000 likely to be the price of a coat?
- 4 Tick off information as you use it.
- 5 Draw extra diagrams if needed.
- 6 Look at the final sentence of the question. Make sure you refer back to that at the end to ensure you have answered the question fully.

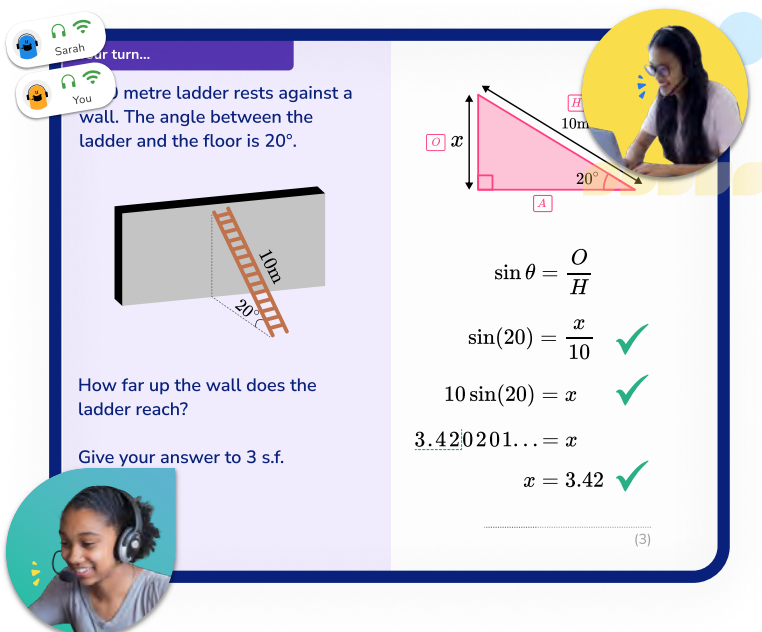
In this resource you will find:

- ✓ **10 foundation** problem solving maths questions
- ✓ **10 crossover** problem solving maths questions
- ✓ **10 higher** problem solving maths questions
- ✓ Suggested **strategies** to help answer the questions
- ✓ Worked **solutions** for every question



At Third Space Learning, we specialise in maths interventions for schools. As well as providing free GCSE resources, we help schools raise attainment through online one to one maths tuition.

Our lessons are designed by maths teachers to break down complex problems into their constituent parts. Our specialist tutors then carefully scaffold learning to build students' confidence in key skills before combining them to tackle problem solving questions.



10 metre ladder rests against a wall. The angle between the ladder and the floor is 20° .

How far up the wall does the ladder reach?

Give your answer to 3 s.f.

$$\sin \theta = \frac{O}{H}$$

$$\sin(20) = \frac{x}{10} \quad \checkmark$$

$$10 \sin(20) = x \quad \checkmark$$

$$3.420201... = x$$

$$x = 3.42 \quad \checkmark$$

(3)

How to use this resource

- 1 Print off the questions and distribute them to individual students or to small groups.
- 2 You could assign specific questions to specific students or give the class the same problems.
- 3 Allow students to first attempt the questions independently.
- 4 If a student is finding a question difficult, provide them with the corresponding set of strategies.
- 5 When students have completed the problem, provide the corresponding solution.
- 6 Identify any key skills that students need to develop. Determine the appropriate level of intervention required, such as providing practice questions to develop fluency, using applied questions to practise the skill in a context, or perhaps reteaching the specific skill.

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Foundation & Higher Crossover

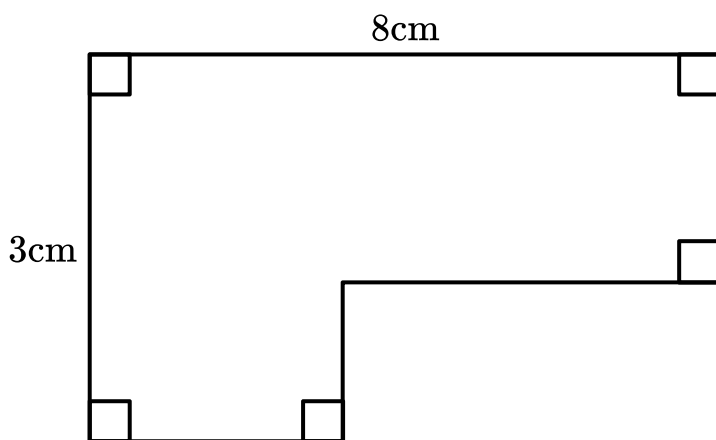
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Higher

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1 L-shape perimeter

Here is a shape.

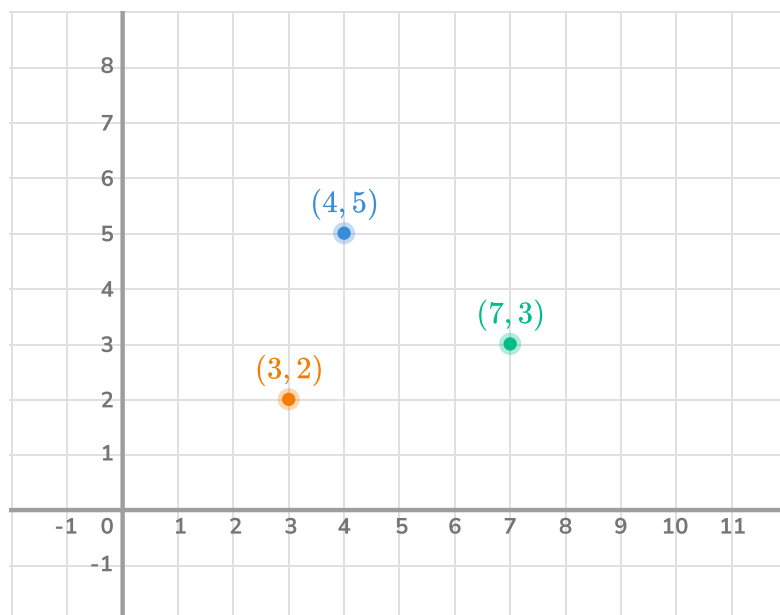


Sarah says, "There is not enough information to find the perimeter."

Is she correct? What about finding the area?

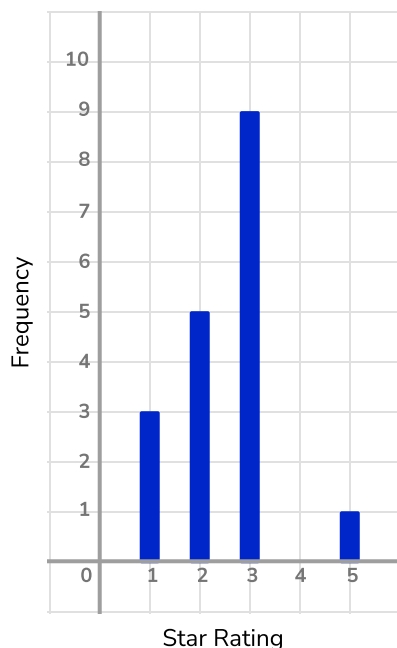
2 Find the missing point

Here is a coordinate grid with three points plotted. A fourth point is to be plotted to form a parallelogram. Find all possible coordinates of the fourth point.



3 That rating was a bit mean!

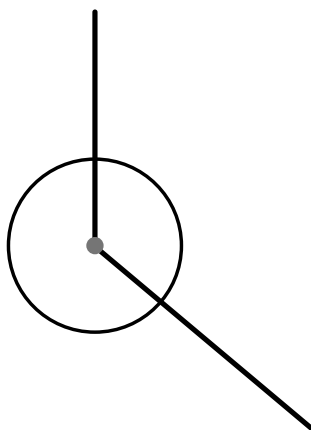
The vertical line graph shows the ratings a product received on an online shopping website. The vertical line for 4 stars is missing.



If the mean rating is 2.65, use the information to complete the vertical line graph.

4 Changing angles

The diagram shows two angles around a point. The sum of the two angles around a point is 360° .



Peter says "If we increase the small angle by 10% and decrease the reflex angle by 10%, they will still add to 360° ."

Explain why Peter might be wrong.

Are there two angles where he would be correct?

5 Base and power

The integers 1, 2, 3, 4, 5, 6, 7, 8 and 9 can be used to fill in the boxes.

$$\begin{array}{c} \square \\ \square \end{array} = \begin{array}{c} \square \\ \square \end{array}$$

How many different solutions can be found so that no digit is used more than once?

6 Just an average problem

Place six single digit numbers into the boxes to satisfy the rules.

--	--	--	--	--	--

The mean is $5\frac{1}{3}$

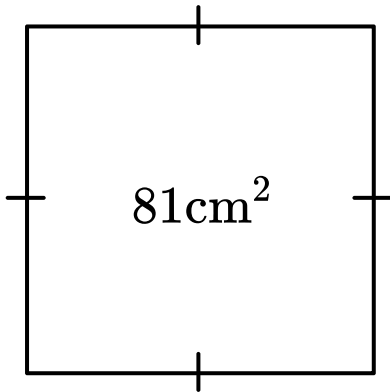
The median is 5

The mode is 3.

How many different solutions are possible?

7 Square and rectangle

The square has an area of 81cm^2 . The rectangle has the same perimeter as the square. Its length and width are in the ratio 2:1.



Find the area of the rectangle.

8 It's all prime

The sum of three different prime numbers is equal to another prime number.

$$\square + \square + \square = \square$$

If the sum is less than 30, how many different solutions are possible?

9 Unequal share

Bob and Jane have £10 altogether. Jane has £1.60 more than Bob. Bob spends one third of his money. How much money have Bob and Jane now got in total?

10 Somewhere between

Fred says, “An easy way to find any fraction which is between two other fractions is to just add the numerators and add the denominators.” Is Fred correct?

11 What's the difference?

An arithmetic sequence has an n^{th} term in the form $an + b$.

4 is in the sequence.

16 is in the sequence.

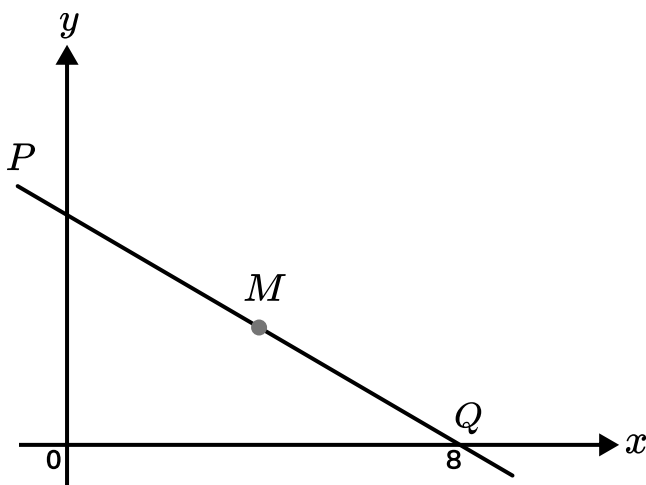
8 is not in the sequence.

-2 is the first term of the sequence.

What are the possible values of a and b ?

12 Equation of the hypotenuse

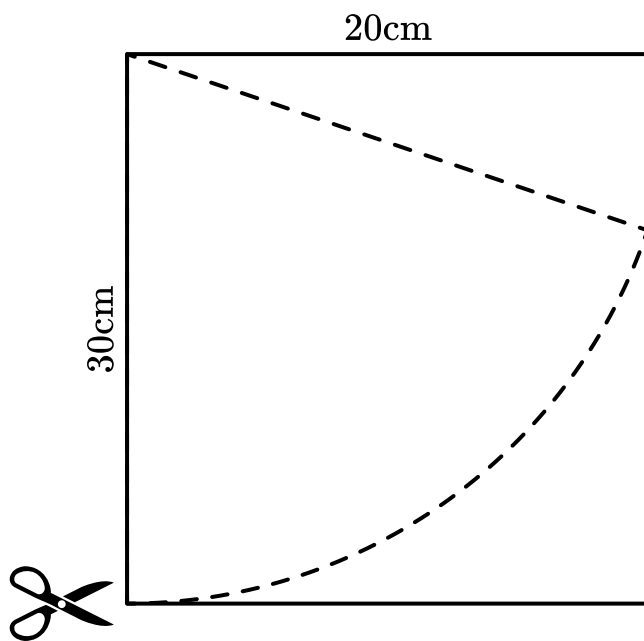
The diagram shows a straight line passing through the axes at point P and Q.
Q has coordinate $(8, 0)$. M is the midpoint of PQ and MQ has a length of 5 units.



Find the equation of the line PQ.

13 What a waste

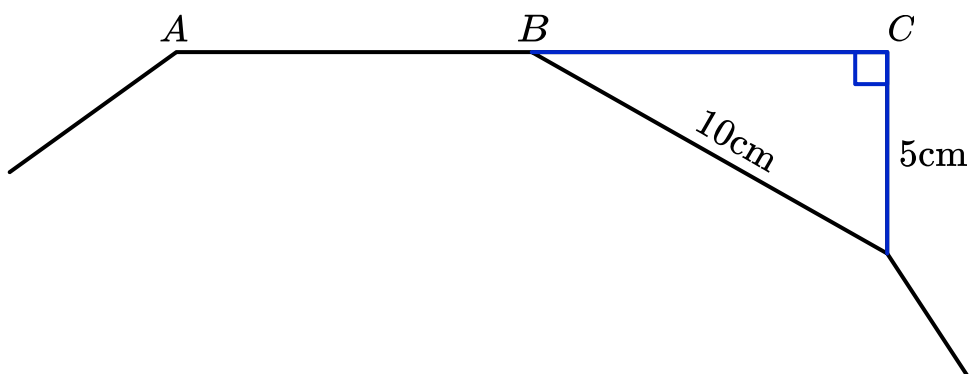
Harry wants to cut a sector of radius 30cm from a piece of paper measuring 30cm by 20cm .



What percentage of the paper will be wasted?

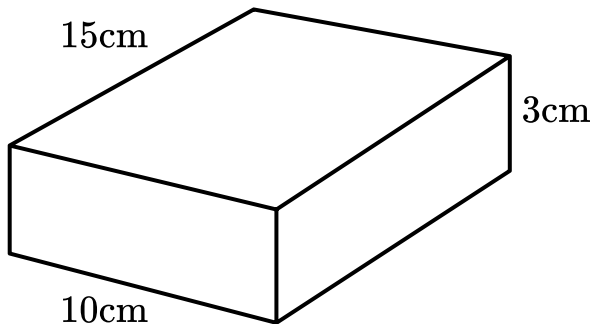
14 Tri-polygonometry

The diagram shows part of a regular polygon and a right angled triangle. ABC is a straight line. Find the sum of the interior angles of the polygon.



15 That's a lot of Pi

A block of ready made pastry is a cuboid measuring 3cm by 10cm by 15cm .



Anne is making 12 pies for a charity event. For each pie, she needs to cut a circle of pastry with a diameter of 18cm from a sheet of pastry 0.5cm thick.

How many blocks of pastry will Anne need to buy?

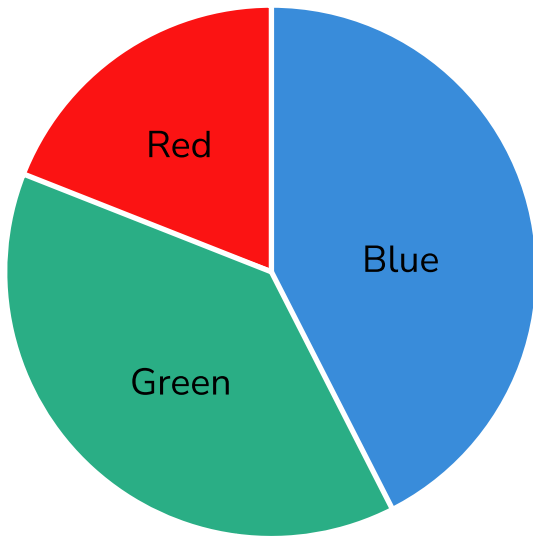
16 Is it right?

A triangle has sides of $(x + 4)\text{cm}$, $(2x + 6)\text{cm}$ and $(3x - 2)\text{cm}$. Its perimeter is 80cm .

Show that the triangle is right angled and find its area.

17 Pie chart ratio

The pie chart shows sectors for red, blue and green.



The ratio of the angles of the red sector to the blue sector is 2:7.

The ratio of the angles of the red sector to the green sector is 1:3.

Find the angles of each sector of the pie chart.

18 DIY simultaneously

Mr Jones buys 5 tins of paint and 4 rolls of decorating tape. The total cost was £167.

The next day he returns 1 unused tin of paint and 1 unused roll of tape. The refund amount is exactly

the amount needed to buy a fan heater that has been reduced by 10% in a sale.

The fan heater normally costs £37.50.

Find the cost of 1 tin of paint.

19 Triathlon pace

Jodie is competing in a Triathlon.

A triathlon consists of a 5km swim, a 40km cycle and a 10km run.

Jodie wants to complete the triathlon in 5 hours.

She knows she can swim at an average speed of 2.5km/h and cycle at an average speed of 25km/h.

There are also two transition stages, in between events, which normally take 4 minutes each.

What speed must Jodie average on the final run to finish the triathlon in 5 hours?

20 Indices

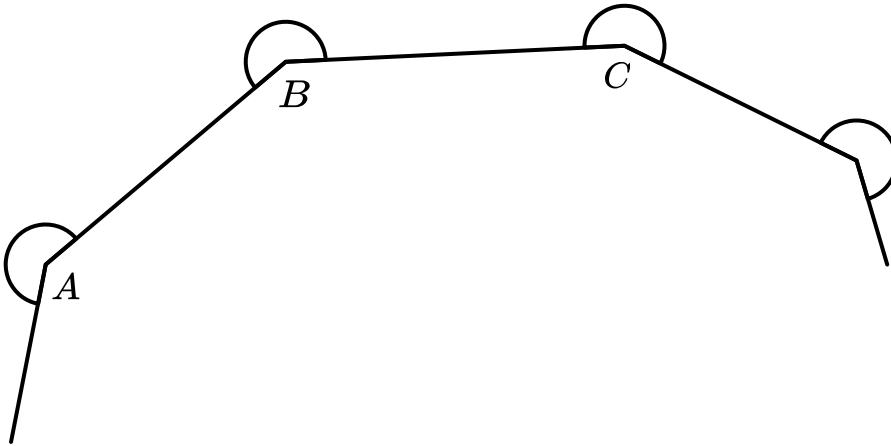
$$a^{2x} \times a^y = a^3$$

$$(a^3)^x \div a^{4y} = a^{32}$$

Find x and y .

21 Angles in a polygon

The diagram shows part of a regular polygon.



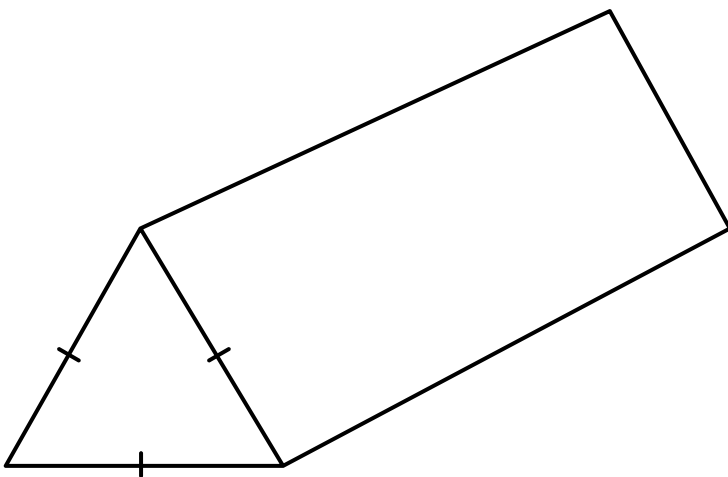
A, B and C are vertices of the polygon.

The size of the reflex angle ABC is 360° minus the interior angle.

Show that the sum of all of these reflex angles of the polygon will be 720° more than the sum of its interior angles.

22 Prism and force

The diagram shows a prism with an equilateral triangle cross-section.



When the prism is placed so that its triangular face touches the surface, the prism applies a force of 12 Newtons resulting in a pressure of $\frac{\sqrt{3}}{4} \text{ N/m}^2$.

Given that the prism has a volume of 384m^3 , find the length of the prism.

23 Geometric sequences

A geometric sequence has a third term of 6 and a sixth term of $14\frac{2}{9}$.

Find the first term of the sequence.

24 Printing factory

A printing factory is producing exam papers. When all 10 of its printers are working, it can produce all of the exam papers in 12 days.

For the first two days of printing, 3 of the printers are broken.

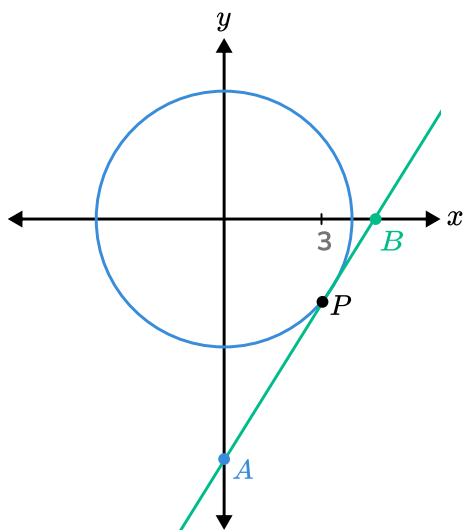
At the beginning of the third day it is discovered that 2 more printers have broken down, so the factory continues to print with the reduced amount of printers for 3 days.

The broken printers are repaired and now all printers are available to print the remaining exams.

How many days in total does it take the factory to produce all of the exam papers?

25 Circles

The diagram shows a circle with equation $x^2 + y^2 = 13$.



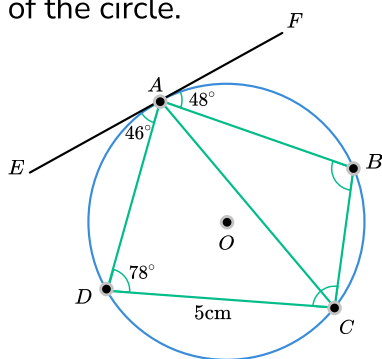
A tangent touches the circle at point P when $x = 3$ and y is negative.

The tangent intercepts the coordinate axes at A and B.

Find the length AB.

26 Circle theorems

The diagram shows a circle with centre O. Points A, B, C and D are on the circumference of the circle.



EF is a tangent to the circle at A.

Angle EAD = 46°

Angle FAB = 48°

Angle ADC = 78°

CD = 5cm

Find the area of ABCD to the nearest integer.

27 Quadratic function

The quadratic function $f(x) = -2x^2 + 8x + 11$ has a turning point at P.

Find the coordinate of the turning point Q after the transformation $-f(x - 3)$.

28 Probability with fruit

A fruit bowl contains only 5 grapes and n strawberries.

A fruit is taken, eaten and then another is selected.

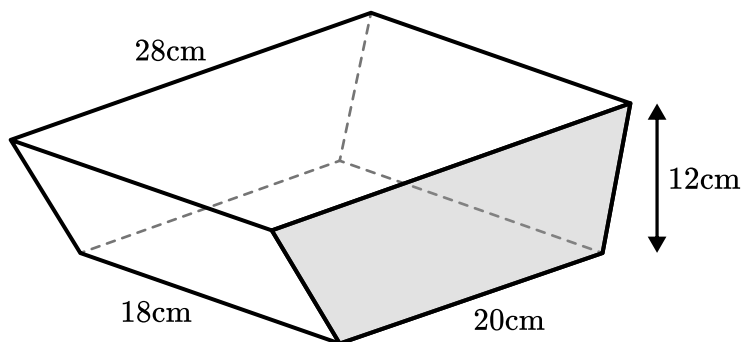
The probability of taking two strawberries is $\frac{7}{22}$.

Find the probability of taking one of each fruit.

29 Ice cream tub volume

An ice cream tub in the shape of a prism with a trapezium cross-section has the dimensions shown.

These measurements are accurate to the nearest *cm*.



An ice cream scoop has a diameter of 4.5cm to the nearest millimetre and will be used to scoop out spheres of ice cream from the tub.

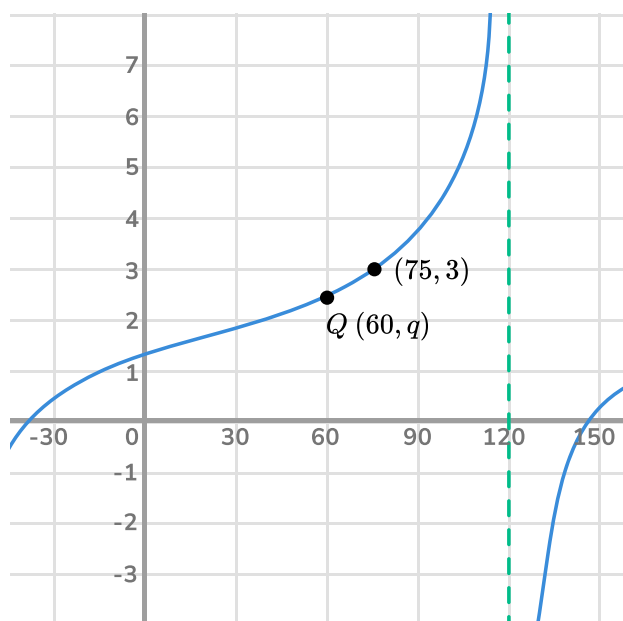
Using bounds find a suitable approximation to the number of ice cream scoops that can be removed from a tub that is full.

30 Translating graphs

The diagram shows the graph of $y = a + \tan(x - b)$.

The graph goes through the points $(75, 3)$ and $Q(60, q)$.

Find exact values of a , b and q .





THIRD SPACE
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Strategies and Solutions

GCSE Maths

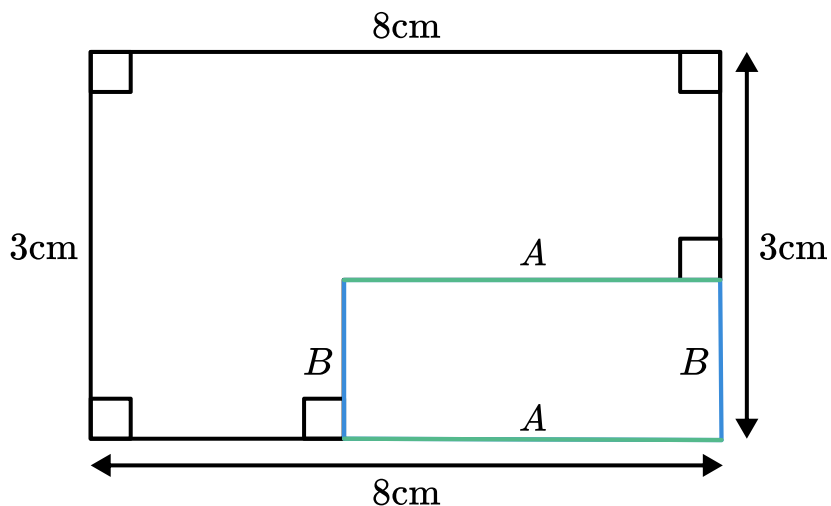
1 L-shape perimeter

Strategies

- Try adding more information - giving some missing side measurements that are valid.
- Change these measurements to see if the answer changes.
- Imagine walking around the shape if the edges were paths. Could any of those paths be moved to another position but still give the same total distance?

Solution

The perimeter of the shape does not depend on the lengths of the unlabelled edges.



Edge A and edge B can be moved to form a rectangle, meaning the perimeter will be 22 cm. Therefore, Sarah is wrong.

The area, however, will depend on those missing side length measurements, so we would need more information to be able to calculate it.

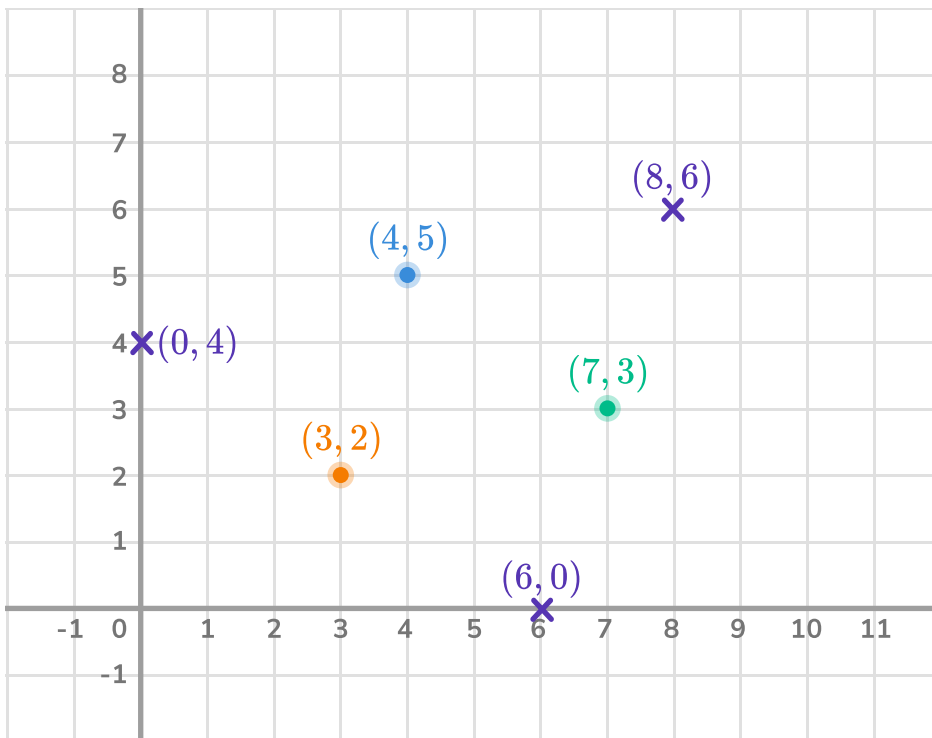
2 Find the missing point

Strategies

- What are the properties of a parallelogram?
- Can we count squares to see how we can get from one vertex of the parallelogram to another? Can we use this to find the fourth vertex?

Solution

There are 3 possible positions.



3 That rating was a bit mean!

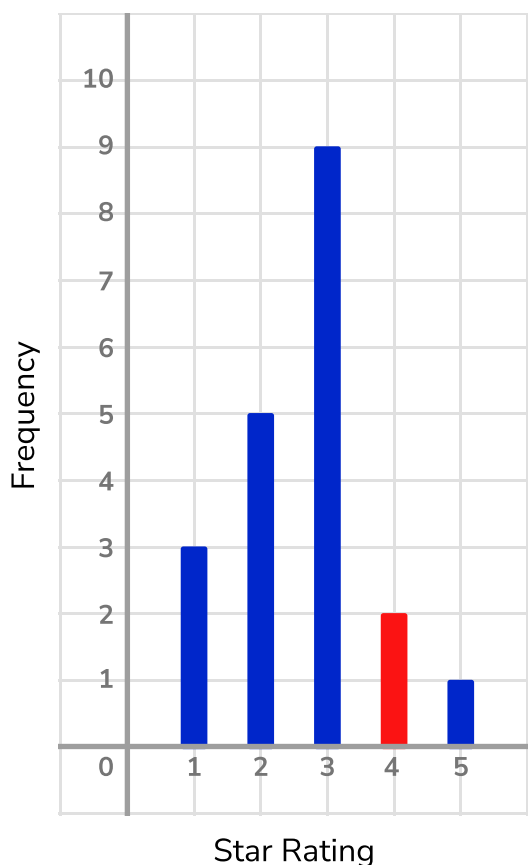
Strategies

- Can the information be put into a different format, either a list or a table?
- Would it help to give the missing frequency an algebraic label, x ?
- If we had the data in a frequency table, how would we calculate the mean?
- Is there an equation we could form?

Solution

Letting the frequency of 4 star ratings be x , we can form the equation $\frac{45 + 4x}{18 + x} = 2.65$

Giving $x = 2$



4 Changing angles

Strategies

- How do we find 10%?
- How do we increase and decrease by 10%?
- What two angles add to 360° and would be easy to find 10%?
- What happens to the sum of the new angles when we change the original?

Solution

Peter is wrong, for example, if the two angles are 40° and 320° , increasing 40° by 10% gives 44° , decreasing 320° by 10% gives 288° . These sum to 332° .

10% of the larger angle will be more than 10% of the smaller angle so the sum will only ever be 360° if the two original angles are the same, therefore, 180° .

5 Base and power

Strategies

- Use a step by step systematic approach
- Keep the base number on the left the same and just change the other values, remembering to not use a digit more than once.
- Look for patterns in the bases and powers of previous solutions.

Solution

There are 8 solutions.

$$2^3 = 8^1$$

$$2^6 = 4^3$$

$$2^9 = 8^3$$

$$3^2 = 9^1$$

$$3^4 = 9^2$$

$$3^8 = 9^4$$

$$4^3 = 8^2$$

$$4^9 = 8^6$$

6 Just an average problem

Strategies

- Put numbers into the boxes in ascending order, making the median easier to calculate.
- What could go in the middle two boxes to give a median of 5?
- The mode is 3, so we need more of them than anything else.
- Do we know what the total sum of the numbers should be?

Solution

There are 4 solutions.

2, 3, 3, 7, 8, 9

3, 3, 4, 6, 7, 9

3, 3, 3, 7, 7, 9

3, 3, 3, 7, 8, 8

7 Square and rectangle

Strategies

- What can we find out about the square? Can we find the side length then the perimeter?
- Could we label the length and width of the rectangle with something to show the 2:1 ratio?
- Can we share an amount in the ratio or form an equation?

Solution

The sides of the square are 9cm giving a perimeter of 36cm .

We can then either form an equation using a length $2x$ and width x .

$$2x + x + 2x + x = 36$$

Or, we could use the fact that the length and width add to half of the perimeter and share 18 in the ratio 2:1.

The length is 12cm and the width is 6cm , giving an area of 72cm^2 .

8 It's all prime

Strategies

- Use a step by step systematic approach.
- Write a list of the first 10 primes as a guide.
- Start with the small primes and change just one at a time.
- Can we use 2? Explain your answer?

Solution

There are 6 solutions.

$$3 + 5 + 11 = 19$$

$$3 + 7 + 13 = 23$$

$$3 + 7 + 19 = 29$$

$$5 + 7 + 11 = 23$$

$$5 + 7 + 17 = 29$$

$$5 + 11 + 13 = 29$$

2 can never be used as it would force two more odd primes into the sum to make the total even.

9 Unequal share

Strategies

- To work out how much Bob and Jane each have at the start, try working up from zero.
- Could you form an equation that shows the sum of the amounts that Bob and Jane have?
- Give Jane £1.60 and then think about what is left to give them both.
- Try drawing a bar model to show the amounts they both have.

Solution

Initially Bob has £4.20 and Jane has £5.80. Bob spends £1.40, meaning the total £10 has been reduced by £1.40, leaving £8.60 after the subtraction.

10 Somewhere between

Strategies

- We need to pick two fractions to try Fred's method. Which will be easy to use?
- How can you compare the new fractions with the old ones? Keep them as fractions?
- Change them to decimals and use place value?

Solution

Fred is correct. His method does work and can be shown algebraically which could be a good problem for higher tier learners to try.

If we use these two fractions $\frac{3}{8}$ and $\frac{5}{12}$, Fred's method gives us $\frac{8}{20} = \frac{2}{5}$.

$$\frac{3}{8} = \frac{45}{120}, \quad \frac{2}{5} = \frac{48}{120}, \quad \frac{5}{12} = \frac{50}{120}. \text{ So } \frac{3}{8} < \frac{2}{5} < \frac{5}{12}$$

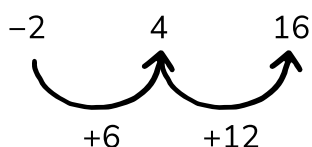
11 What's the difference?

Strategies

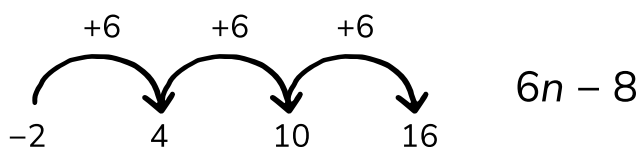
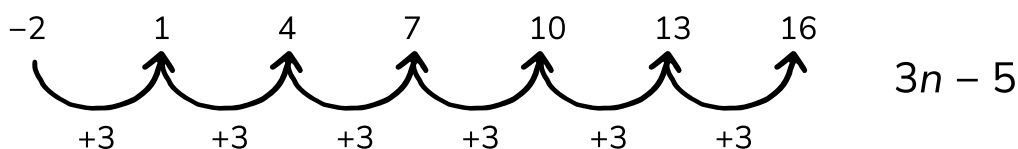
- We know that the first number in the sequence is -2 and 4 is in the sequence.
- Can we try making a sequence to fit? Would using a number line help?
- Try looking at the difference between the numbers we know

Solution

If we try forming a sequence from the information, we get this:



We can now try to fill in the missing numbers, making sure 8 is not in the sequence. Going up by 2 would give us 8, so that won't work.



The only solutions are $3n - 5$ and $6n - 8$.

12 Equation of the hypotenuse

Strategies

- We know MQ is 5 units, what is PQ and OQ?
- What type of triangle is OPQ?
- Can we find OP if we know PQ and OQ?
- A line has an equation in the form $y = mx + c$. How can we find m ? Do we already know c ?

Solution

PQ is 10 units. Using Pythagoras' Theorem $OP = 6$

The gradient of the line will be $\frac{-6}{8} = -\frac{3}{4}$ and P gives the intercept as 6.

$$y = -\frac{3}{4}x + 6$$

13 What a waste

Strategies

- What information do we need to calculate the area of a sector? Do we have it all?
- Would drawing another line on the diagram help find the angle of the sector?

Solution

The angle of the sector can be found using right angle triangle trigonometry.

The angle is 41.81° .

This gives us the area of the sector as 328.37cm^2 .

The area of the paper is 600cm^2 .

The area of paper wasted would be $600 - 328.37 = 271.62\text{cm}^2$.

The wasted area is 45.27% of the paper.

14 Tri-polygonometry

Strategies

- What information can we calculate using the right angled triangle? How is it related to the polygon?
- Is there a formula for the sum of the interior angles? What information would we need to use it?

Solution

Finding the angle in the triangle at point B using trigonometry gives 30° .

This is the exterior angle of the polygon.

Dividing 360° by 30° tells us the polygon has 12 sides.

One interior angle is 150° therefore, the sum of the interior angles is 1800° .

15 That's a lot of Pi

Strategies

- What can we find out about the pastry block?
- Does Anne cut out a circle or a cylinder?
- Do we want to find volume or surface area?

Solution

The volume of one block of pastry is 450cm^3 .

The volume of one cylinder of pastry is 127.23cm^3 .

12 pies will require 1526.81cm^3 .

Dividing the volume needed by 450 gives 3.39(...).

Rounding this up tells us that 4 pastry blocks will be needed.

16 Is it right?

Strategies

- What can you form with the side lengths and the perimeter?
- How can you test if a triangle has a right angle? Is there a theorem?
- Which sides will you use to find the area? Which sides will be perpendicular?

Solution

Forming an equation gives $6x + 8 = 80$

This gives us $x = 12$ and side lengths of 16cm, 30cm and 34cm.

Using Pythagoras' Theorem

$$16^2 + 30^2 = 1156$$

$$\sqrt{1156} = 34$$

Therefore, the triangle is right angled.

The area of the triangle is $(16 \times 30) \div 2 = 240\text{cm}^2$.

17 Pie chart ratio

Strategies

- Look carefully at the ratios, which colour is mentioned twice?
- Can we find equivalent ratios so that the colour mentioned twice has the same number of parts in each ratio?
- Can we write a ratio involving all three colours?
- What do the angles in the pie chart need to sum to? Can we share this in a ratio?

Solution

Multiplying the ratio of red:green by 2, it can be written as 2:6.

Now the colour each ratio has in common, red, has equal parts in each ratio.

The ratio of red:blue is 2:7, this means red : blue : green = 2:7:6.

Sharing 360° in this ratio gives red:blue:green = $48^\circ : 168^\circ : 144^\circ$.

18 DIY simultaneously

Strategies

- Working backwards - can you find the sale price of the fan heater?
- Using p for the cost of paint and t for the cost of the tape, can you form two equations?

Solution

The sale price of the fan heater is £33.75. This gives the simultaneous equations

$$p + t = 33.75 \text{ and } 5p + 4t = 167.$$

We only need the price of a tin of paint so multiplying the first equation by 4 and then subtracting from the second equation gives $p = 32$. Therefore, 1 tin of paint costs £32.

19 Triathlon pace

Strategies

- We need to find the time remaining for Jodie to complete the run.
- How long does each of the other sections of the triathlon take?
- How do we calculate time if we know average speed and distance?

Solution

Dividing the distances by the average speeds for each section gives times of 2 hours for the swim and 1.6 hours for the cycle, 216 minutes in total.

Adding 8 minutes for the transition stages gives 224 minutes.

To complete the triathlon in 5 hours, that would be 300 minutes.

$300 - 224 = 76$ minutes.

Jodie needs to complete her 10km run in 76 minutes, or $\frac{19}{15}$ hours.

This gives an average speed of 7.89km/h.

20 Indices

Strategies

- Does each expression have the same base?
- Can we use some index laws?
- There are 2 unknowns, how many equations do we need to find the values?

Solution

Forming the simultaneous equations

$$2x + y = 3$$

$$3x - 4y = 32$$

Solving these gives

$$x = 4, y = -5$$

21 Angles in a polygon

Solution

Each of the reflex angles is 180 degrees more than the exterior angle: $180 + \frac{360}{n}$

The sum of all of these angles is $n(180 + \frac{360}{n})$.

This simplifies to $180n + 360$

The sum of the interior angles is $180(n - 2) = 180n - 360$

The difference is $180n + 360 - (180n - 360) = 720^\circ$

22 Prism and force

Solution

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Area} = 12 \div \frac{\sqrt{3}}{4} = 16\sqrt{3} m^2$$

Therefore, the length of the prism is $384 \div 16\sqrt{3} = 8\sqrt{3} m$

23 Geometric sequences

Solution

The third term is $ar^2 = 6$

The sixth term is $ar^5 = \frac{128}{9}$

Dividing these terms gives $r^3 = \frac{64}{27}$

Giving $r = \frac{4}{3}$

Dividing the third term twice by $\frac{4}{3}$ gives the first term $a = \frac{27}{8}$.

24 Printing factory

Solution

If we assume one printer prints 1 exam paper per day, 10 printers would print 120 exam papers in 12 days. Listing the number printed each day for the first 5 days gives:

Day 1: 7

Day 2: 7

Day 3: 5

Day 4: 5

Day 5: 5

This is a total of 29 exam papers.

91 exam papers are remaining with 10 printers now able to produce a total of 10 exam papers each day.

10 more days would be required to complete the job.

Therefore, 15 days in total are required.

25 Circles

Solution

Using the equation $x^2 + y^2 = 13$ to find the y value for P gives $y = -2$.

The gradient of the radius at this point is $-\frac{2}{3}$, giving a tangent gradient of $\frac{3}{2}$.

Using the point $(3, -2)$ in $y = \frac{3}{2}x + c$ gives the equation of the tangent as $y = \frac{3}{2}x - \frac{13}{2}$.

Substituting $x = 0$ and $y = 0$ gives A and B as $(0, -\frac{13}{2})$ and $(\frac{13}{3}, 0)$

Using Pythagoras' Theorem gives the length of AB as $\frac{13\sqrt{13}}{6} = 7.812$.

26 Circle theorems

Solution

The Alternate Segment Theorem gives angle ACD as 46° and angle ACB as 48° .

Opposite angles in a cyclic quadrilateral summing to 180° gives angle ABC as 102° .

Using the sine rule to find AC will give a length of 5.899.

Using the sine rule again to find BC will give a length of 3.016cm.

We can now use the area of a triangle formula to find the area of both triangles.

$$0.5 \times 5 \times 5.899 \times \sin(46) + 0.5 \times 3.016 \times 5.899 \times \sin(48) = 17 \text{ units}^2 \text{ (to the nearest integer).}$$

27 Quadratic function

Solution

There are two methods that could be used. We could apply the transformation to the function and then complete the square, or, we could complete the square and then apply the transformation.

Here we will do the latter.

$$\begin{aligned}
 & -2x^2 + 8x + 11 \\
 & -2(x^2 - 4x) + 11 \\
 & -2[(x - 2)^2 - 4] + 11 \\
 & -2(x - 2)^2 + 8 + 11 \\
 & -2(x - 2)^2 + 19
 \end{aligned}$$

This gives a turning point for $f(x)$ as (2, 19).

Applying $-f(x - 3)$ gives the new turning point as (5, -19).

28 Probability with fruit

Solution

There are $n + 5$ fruits altogether.

$$P(\text{Strawberry and Strawberry}) = \frac{n}{n+5} \times \frac{n-1}{n+4} = \frac{7}{22}$$

This gives the quadratic equation $15n^2 - 85n - 140 = 0$

This can be divided through by 5 to give $3n^2 - 17n - 28 = 0$

This factorises to $(n - 7)(3n + 4) = 0$

n must be positive so $n = 7$.

The probability of taking one of each fruit is therefore, $\frac{5}{12} \times \frac{7}{11} + \frac{7}{12} \times \frac{5}{11} = \frac{70}{132}$.

29 Ice cream tub volume

Solution

We need to find the upper and lower bounds of the two volumes.

$$\text{Upper bound tub volume} = 5665.625\text{cm}^3$$

$$\text{Lower bound tub volume} = 4729.375\text{cm}^3$$

$$\text{Upper bound scoop volume} = 49.32\text{cm}^3$$

$$\text{Lower bound scoop volume} = 46.14\text{cm}^3$$

We can divide the upper bound of the ice cream tub by the lower bound of the scoop to get the maximum possible number of scoops.

$$\text{Maximum number of scoops} = 122.79$$

Then divide the lower bound of the ice cream tub by the upper bound of the scoop to get the minimum possible number of scoops.

$$\text{Minimum number of scoops} = 95.89$$

These both round to 100 to 1 significant figure,

Therefore, 100 scoops is a suitable approximation the the number of scoops.

30 Translating graphs

Solution

The asymptote has been translated to the right by 30° .

$$\text{Therefore, } b = 30$$

$$75 - 30 = 45, \tan(45) = 1$$

So the point $(45, 1)$ has been translated to the point $(75, 3)$.

$$\text{Therefore, } a = 2$$

$$y = 2 + \tan(x - 30)$$

$$q = 2 + \tan(60 - 30)$$

$$q = 2 + \tan(30)$$

$$q = 2 + \frac{\sqrt{3}}{3} = \frac{6 + \sqrt{3}}{3}$$

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