AQA Paper 3H Practice Booklet

26 practice questions based on the advance information

Copies of this booklet, as well as hints & solutions, are available at bossmaths.com/advanceinfo

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Question 1

Write these in order of size, starting with the smallest:

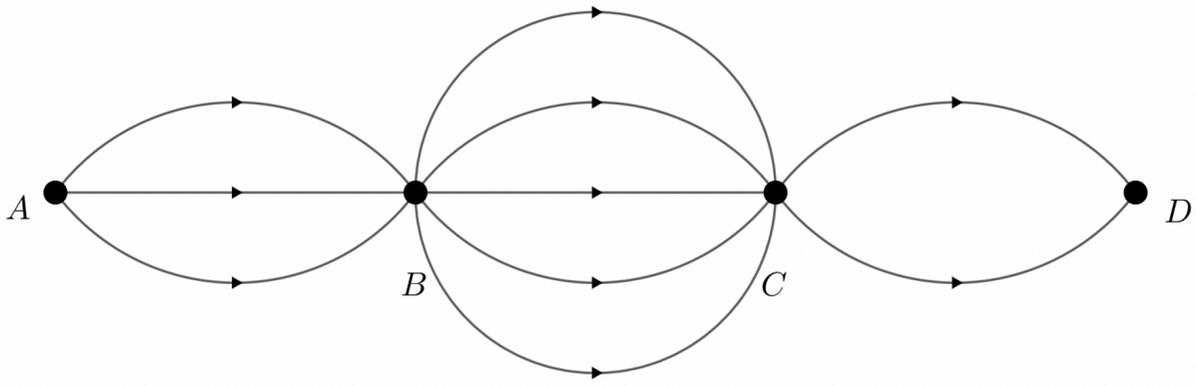
$0.\dot{4}7\dot{8}$ 0.478 $0.47\dot{8}$ $0.4\dot{7}\dot{8}$

$= 0.478478\ldots$ $= 0.4788\ldots$ $= 0.47878\ldots$

Order :

Question 2

This diagram shows that there are three possible paths from A to B, five paths from B to C, and two paths from C to D. The arrowheads on each path show the direction of travel allowed on each path.



Assuming it is only possible to travel along each path in the direction of D, how many different routes are there from A to D?

Hint: there are 15 routes from A to C.

Can you see why?

Question 3

$x = 0.4$ correct to 1 decimal place
$y = 7200$ correct to 2 significant figures

Find the error interval for xy

	UB	LB
x	0.45	0.35
y	7250	7150

$\leqslant xy <$

Question 4

(a) Factorise $16x^2 - 9$

Difference of two squares

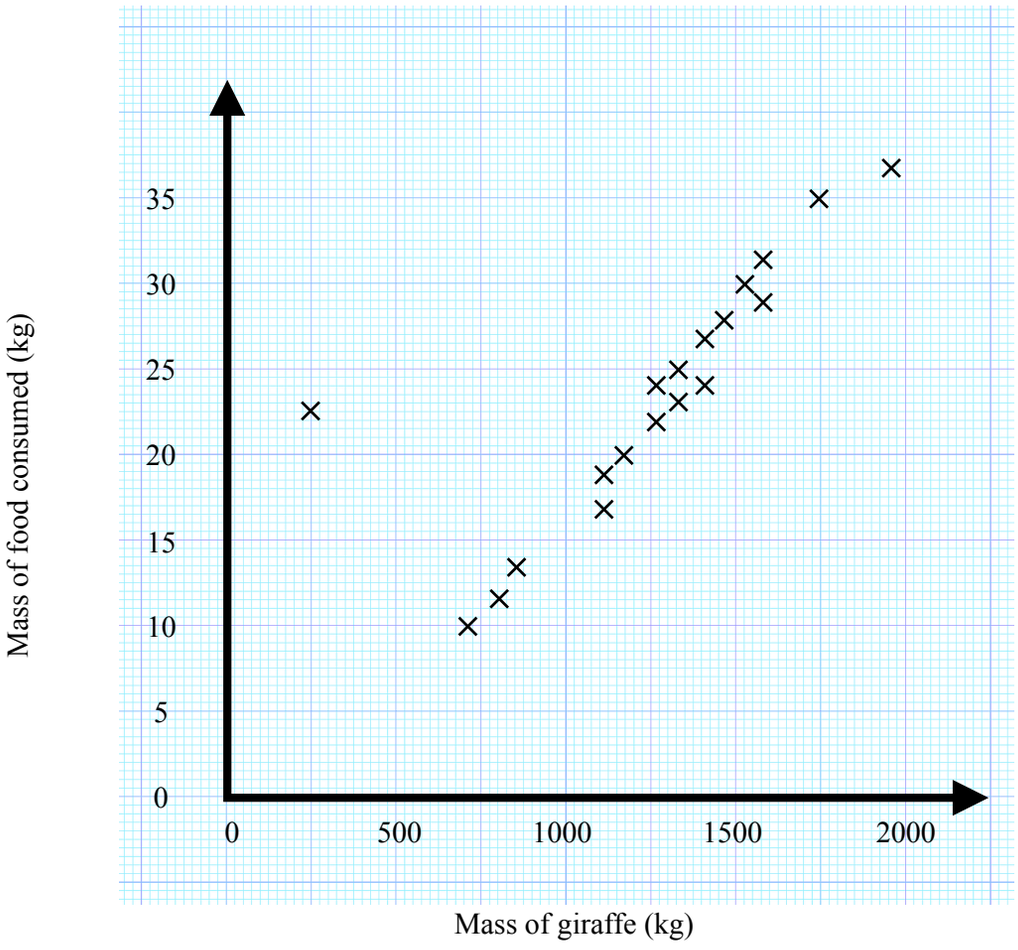
(b) Expand and simplify $t(7t-4) - 5(7t-4) + t(4-7t) + 3(7t-4)$

There is a shortcut here, but even if you don't spot it, you can just expand and then collect like terms:

$7t^2 - 4t - 35t + 20 + \ldots$

Question 5

This scatter diagram shows information on the masses of food consumed in a day by 19 giraffes in a zoo, and the masses of those giraffes.



(a) An error was made when recording the mass of one giraffe. On the scatter diagram, circle the plot that is most likely to correspond to this giraffe.

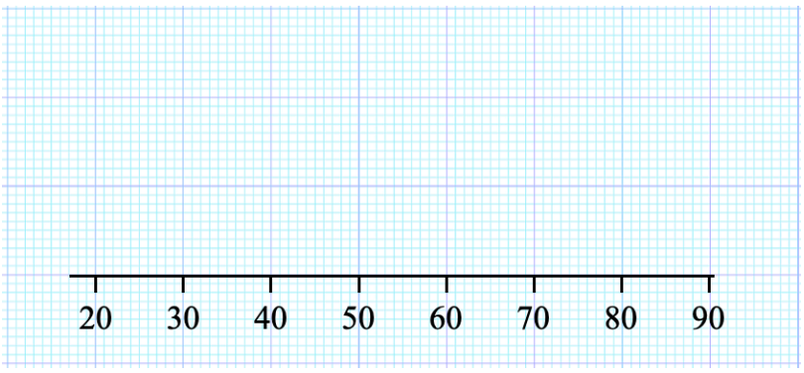
(b) Draw a line of best fit on this diagram.

(c) Another giraffe was recorded as having a mass of 1000 kg. Use your line of best fit to estimate the mass of food consumed by this giraffe.

Question 6

A group of Year 10 students sit a test. The lowest mark achieved is 22. The median mark achieved is 50. The range in marks is 54. The upper quartile 68 and the interquartile range was 38.

Draw a box plot showing this information.



Question 7

Jasmine flipped a 10p coin, a 20p coin, and a £1 coin fifty times each.
The 10p coin came up tails 23 times. The £1 coin came up heads 24 times. Across the three coins, tails came up a total of 70 times.

Complete this two-way table.

	10p	20p	£1	Total
Heads			24	
Tails	23			70
Total	50	50	50	

Question 8

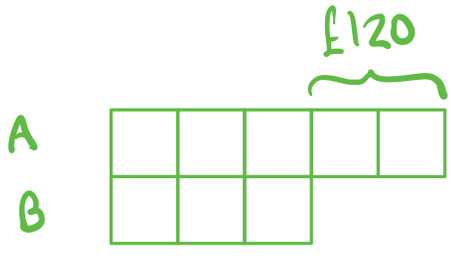
The bearing of B from A is 241°. Work out the bearing of A from B.

Opposite directions ⇒ difference between the bearings is 180°

Question 9

Amy and Bob would like to share some money in the ratio 5 : 3 so that Amy gets £120 more than Bob.

How much money should they each receive?



Question 10

Sarah travels 120 miles from London to Leicester at an average speed of 40 mph.
She later travels 120 miles from Leicester to York at an average speed of 60 mph.

Calculate Sarah's average speed for her journey from London to York.

How far does she travel in total?

How much time does she take?

Question 11

James invests £1350 into a savings account on 1 January 2022.
The account pays 5.8% compound interest on 1 January each subsequent year.
In which year will the amount in James' account first exceed £2000?

2022 £1350 → ×1.058

2023 → ×1.058

2024

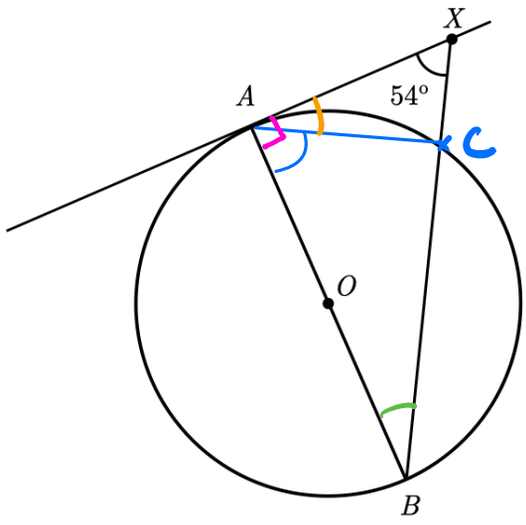
⋮

Question 12

The diagram shows a circle with centre O, a tangent to the circle at point A, point X on the tangent, diameter AB, and a line segment BX.

Angle $AXB = 54°$

BX intersects the circle at two points: B and C.



(a) Label the point C on the diagram.

(b) Work out the size of angle BAC. Give reasons for your answer

$\angle XAB = 90°$ (angle between a tangent and diameter or radius)

$\angle ABX =$

$\angle XAC =$

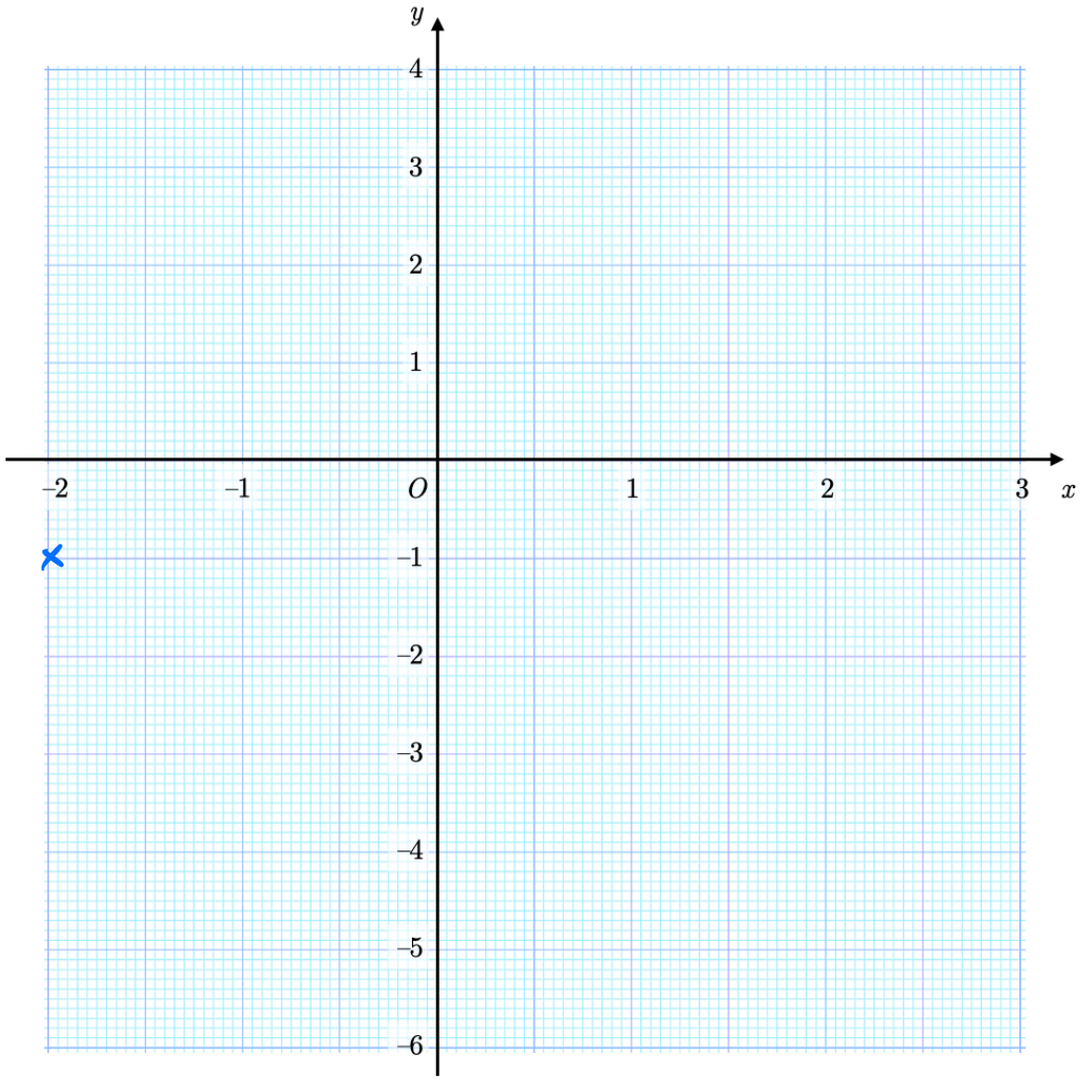
$\angle BAC =$

Question 13

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

x	–2	–1	0	1	2	3
y	−1	−				

(b) On the grid, draw the graph of $y = x^2 - 5$ for values of x from –2 to 3.



(c) Write down the coordinates of the turning point of the graph.

Question 14

Work out $\begin{pmatrix} 5 \\ 7 \end{pmatrix} + \begin{pmatrix} 3 \\ 14 \end{pmatrix}$

Question 15

① The highest common factor of m and n is 21.
② The lowest common multiple of m and n is 126.
③ m is an even number less than 50.

Find the values of m and n.

① m and n are multiples of 21

② m and n are factors of 126

So m and n could be ____, ____, ____, or ____.

m must be ____ because of ③

n must be ____ to make sure ① and ② are true.

Question 16

$ABCD$ is a quadrilateral.

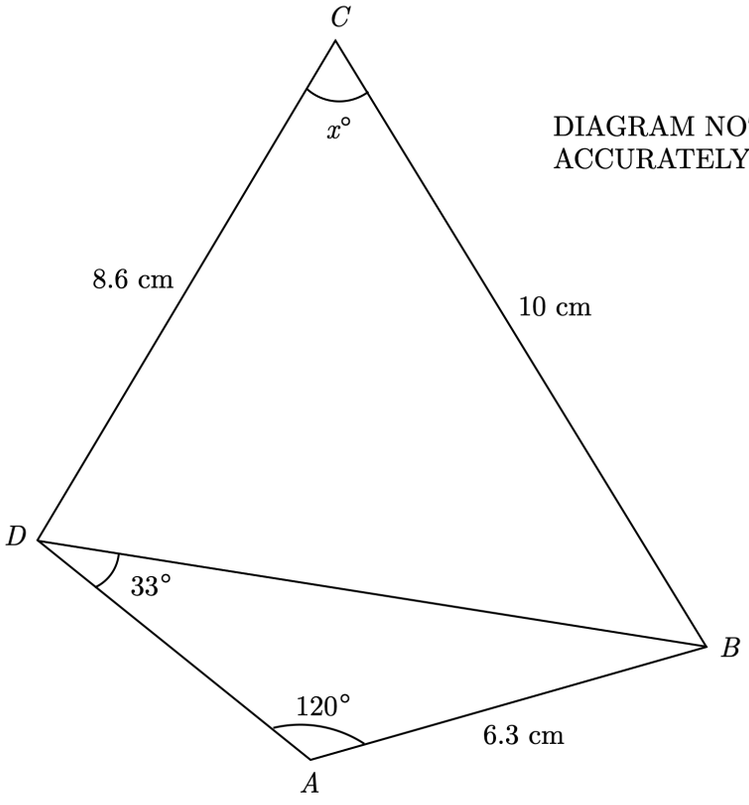


DIAGRAM NOT ACCURATELY DRAWN

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

$\Rightarrow \cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

$\Rightarrow A = \cos^{-1}\left(\dfrac{b^2 + c^2 - a^2}{2bc}\right)$

Find the value of x.

1) Find length BD using the sine rule.

2) Use the cosine rule to find x.

Question 17

(a) Which of these form the first four terms of a geometric progression?
Circle your answer.

↳ a constant multiplier from term to term

2, 10, 18, 26

2, 10, 50, 250

2, 10, 12, 22

2, 10, 50, 112

(b) The nth term of a sequence is $7n - 3$. Calculate the 23rd term of this sequence.

Substitute $n = 23$ into $7n - 3$

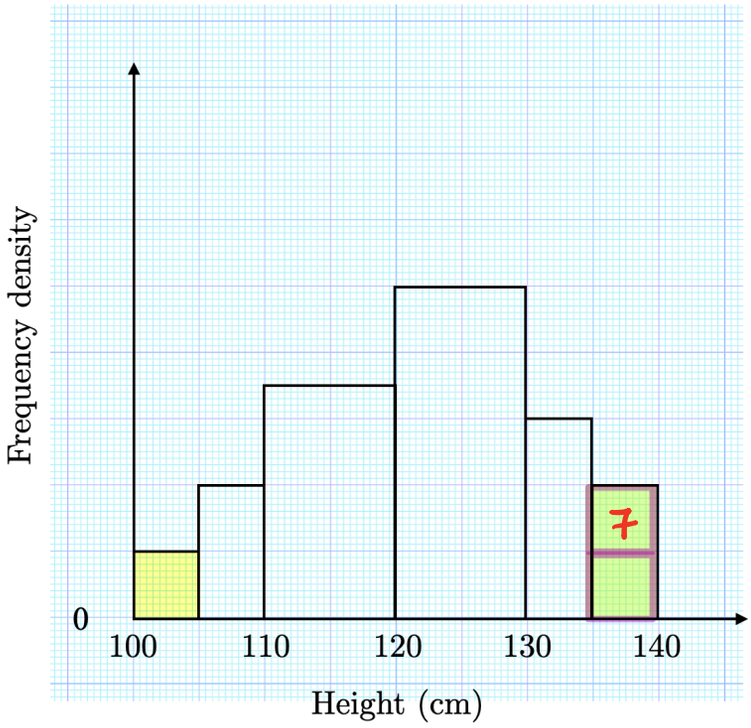
Question 18

The country of Mauritius has an area of 2040 km^2 and a population of 1,265,500.
Calculate the population density of Mauritius in people/km^2.

$$\frac{\text{Number of people}}{\text{Area}}$$

Question 19

This histogram shows information about the heights of a number of children.



The number of children are taller than 135 cm is seven greater than the number of children that are at most 105 cm tall.

How many children are more than 120 cm tall?

Question 20

Solve algebraically the simultaneously equations

$$-6x + 3y = 24 \Rightarrow 3y = 24 + 6x \Rightarrow y = 8 + 2x$$
$$y = x^2 - 7x + 8$$

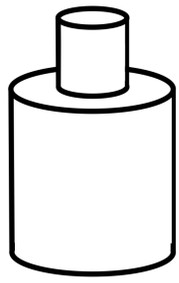
$$8 + 2x = x^2 - 7x + 8$$

...

Question 21

A solid cylinder of radius 2 cm and height 6 cm is glued, as shown, on to another solid cylinder of radius 5 cm and height 10 cm.

(a) Work out the volume of the combined solid.



Large cylinder $V = \pi r^2 h = \pi \times 5^2 \times 10$

$= 250\pi \text{ cm}^3$

Small cylinder $V = \pi r^2 h = \pi \times 2^2 \times 6$

$=$

Total volume $=$

(b) Work out the surface area of the combined solid.

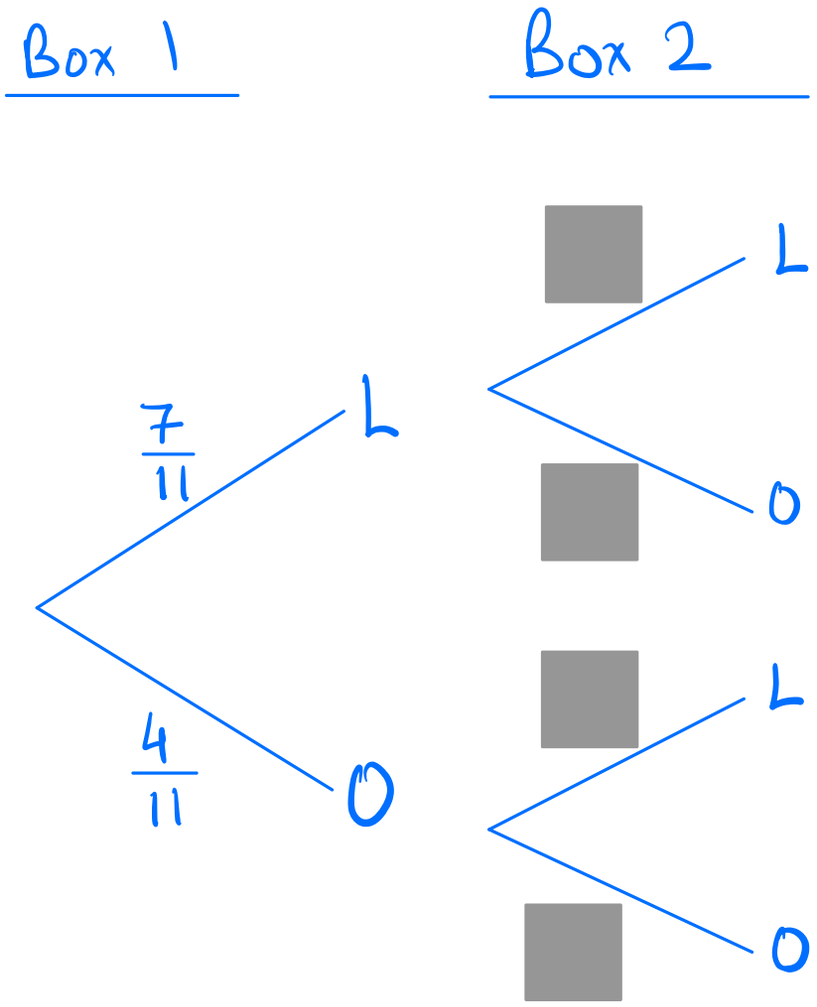
Total SA = SA of large cylinder + SA of small cylinder − 2 × base of small cylinder

$=$

Question 22

A box contains 7 lemon sweets and 4 orange sweets.
Another box contains 3 lemon sweets and 8 orange sweets.

Anne picks one sweet at random from each box. Find the probability that the two sweets are the same flavour.



P(2 lemons) + P(2 oranges)

=

Question 23

$\mathrm{f}(x) = \dfrac{2x+3}{3}$ and $\mathrm{g}(x) = 9 - 3x$

Find an expression for $\mathrm{fg}(x)$, writing your answer as simply as possible.

$$fg(x) = f(g(x))$$

$$= \frac{2g(x) + 3}{3}$$

$$= \ldots$$

Question 24

The diagram shows a trapezium $ABCD$ and one of its diagonals, BD.

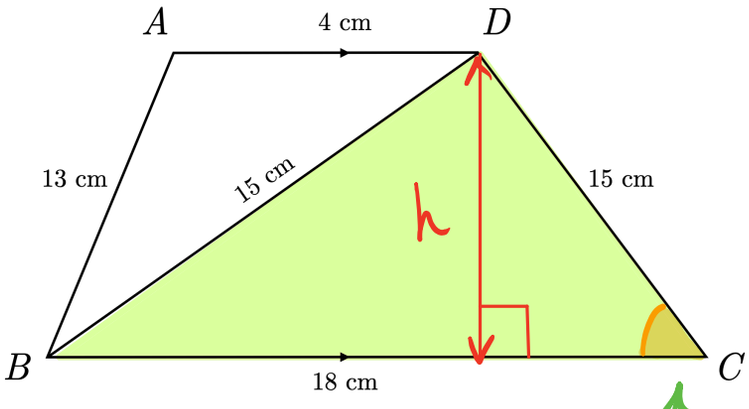


DIAGRAM NOT DRAWN ACCURATELY

Find the area of this trapezium.

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

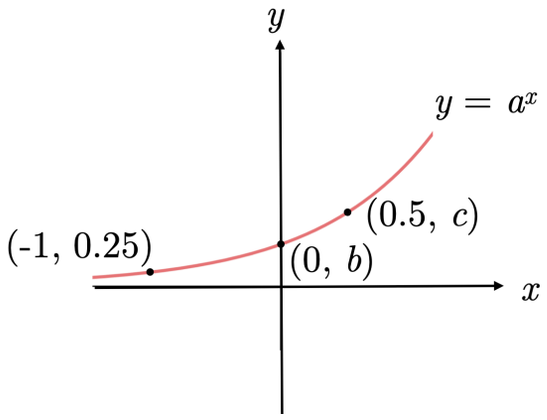
$\Rightarrow \cos A = \dfrac{b^2+c^2-a^2}{2bc}$

$\Rightarrow A = \cos^{-1}\left(\dfrac{b^2+c^2-a^2}{2bc}\right)$

Use the cosine rule to find this angle.
Then find h.

Question 25

The sketch shows the graph of $y = a^x$.
The points with coordinates $(-1, 0.25)$, $(0, b)$, and $(0.5, c)$ all lie on the curve.



Find the values of a, b, and c.

Substituting $(-1, 0.25)$ into $y = a^x$, we get

$0.25 = a^{-1} \Rightarrow a =$ _____

Substituting $(0, b)$ into $y = 4^x$, we get

$b =$ _____ $\Rightarrow b =$ _____

Substituting $(0.5, c)$ into $y = 4^x$, we get

$c =$ _____ $\Rightarrow c =$ _____

Question 26

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

$\equiv (x^2 - 3x - 4)(x-5)$

. . .

(b) Solve $x + 4 = \frac{10}{x}$

Round your solutions to 3 decimal places.

$x + 4 = \frac{10}{x}$

Multiply both sides by x

$x^2 + 4x = 10$

. . .