

1.

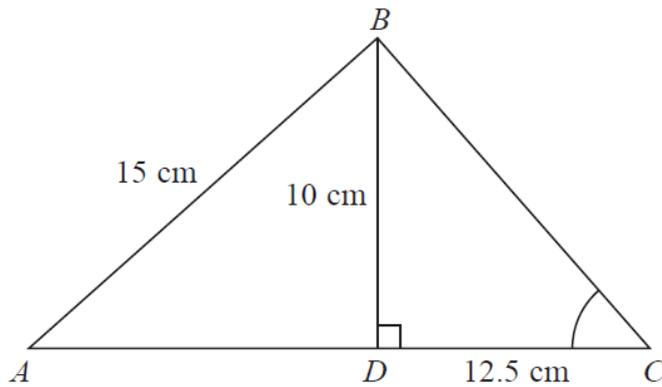


Diagram **NOT**
accurately drawn

ABC is a triangle.

The point D lies on AC .

Angle $BDC = 90^\circ$

$BD = 10$ cm, $AB = 15$ cm and $DC = 12.5$ cm.

- (a) Calculate the length of AD .
Give your answer correct to 3 significant figures.
- (b) Calculate the size of angle BCD .
Give your answer correct to 1 decimal place.

2. (a) Find the gradient of the line with equation $3y - 2x = 6$

3. Solve the simultaneous equations

$$\begin{aligned}5y - 4x &= 8 \\ y + x &= 7\end{aligned}$$

Show clear algebraic working.

4. Lisa, Max and Punita share £240 in the ratio 3 : 4 : 8.

How much more money than Lisa does Punita get?

5. Al, Ben and Dan share some in the ratio 3 : 4 : 8.

How much does Dan get if Ben has £20?

6. Lisa, Max share some money in the ratio 3 : 8. If Max has £35 more than Lisa

How much do they get?

7. (a) Factorise $c^2 - 9$

(b) Factorise $x^2 + x - 30$

(c) Make b the subject of $P = \frac{1}{2}ab^2$

8. (a) Write 0.000076 in standard form.

The area covered by the Pacific Ocean is 1.6×10^8 km².
The area covered by the Arctic Ocean is 1.4×10^7 km².

(b) Write 1.6×10^8 as an ordinary number.

9. Kwo invests HK\$ 40000 for 3 years at 2.5% per year compound interest.
Work out the value of the investment at the end of 3 years.

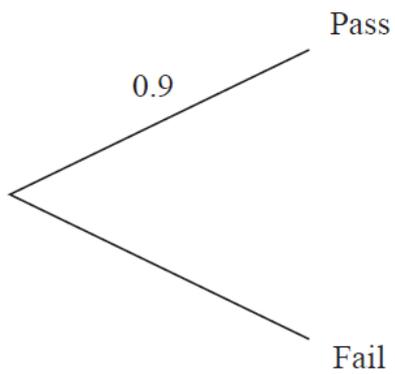
10. Chris and Sunil each take a driving test.

The probability that Chris passes the driving test is 0.9.
The probability that Sunil passes the driving test is 0.65.

(a) Complete the probability tree diagram.

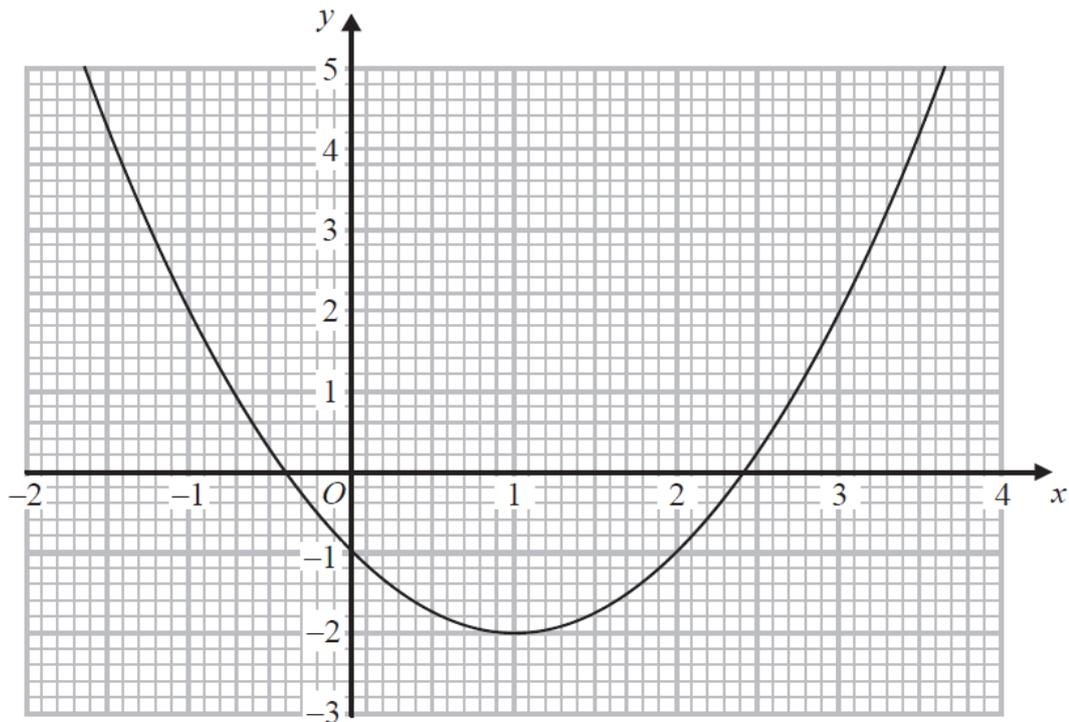
Chris

Sunil



(b) Work out the probability that both fail the driving test.

11. Here is the graph of $y = x^2 - 2x - 1$



Use the graph to solve the equation $x^2 - 2x - 1 = 0$

12. Here is a list of the ingredients needed to make leek and potato soup for 6 people.

Leek and Potato Soup
Ingredients for 6 people
900 ml chicken stock
900 ml water
750 g leeks
350 g potatoes
350 g onions

(a) Ainsley wants to make leek and potato soup for 13 people.

Work out the amount of chicken stock he needs.

(b) Delia makes leek and potato soup for a group of people.
She uses 1250 g of leeks.

Work out the number of people in the group.

13. A plane flew from Frankfurt to Hong Kong.
The flight time was 10 hours 45 minutes.
The average speed was 852 km/h.

Work out the distance the plane flew.

14.

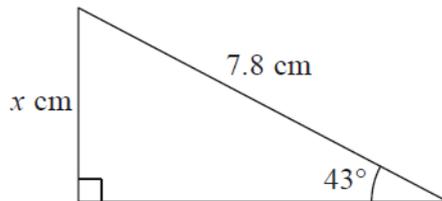


Diagram **NOT**
accurately drawn

Work out the value of x .
Give your answer correct to 3 significant figures.

15. (a) Write $2^3 \times 2^4$ as a single power of 2.

(b) $280 = 2^n \times 5 \times 7$

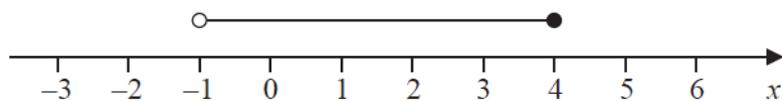
Find the value of n .

16. (a) Simplify $5c \times 4c$.

(b) Factorise $4x + x^2$.

(c) Work out the value of $y^3 + 5y$ when $y = 2$.

17.



An inequality is shown on the number line.

Write down this inequality.

(b) (i) Solve the inequality $2(y - 3) \geq 1$

(ii) Write down the lowest **integer** which satisfies this inequality.

18. A box contains 80 tea bags.

The table shows information about the weight of each tea bag.

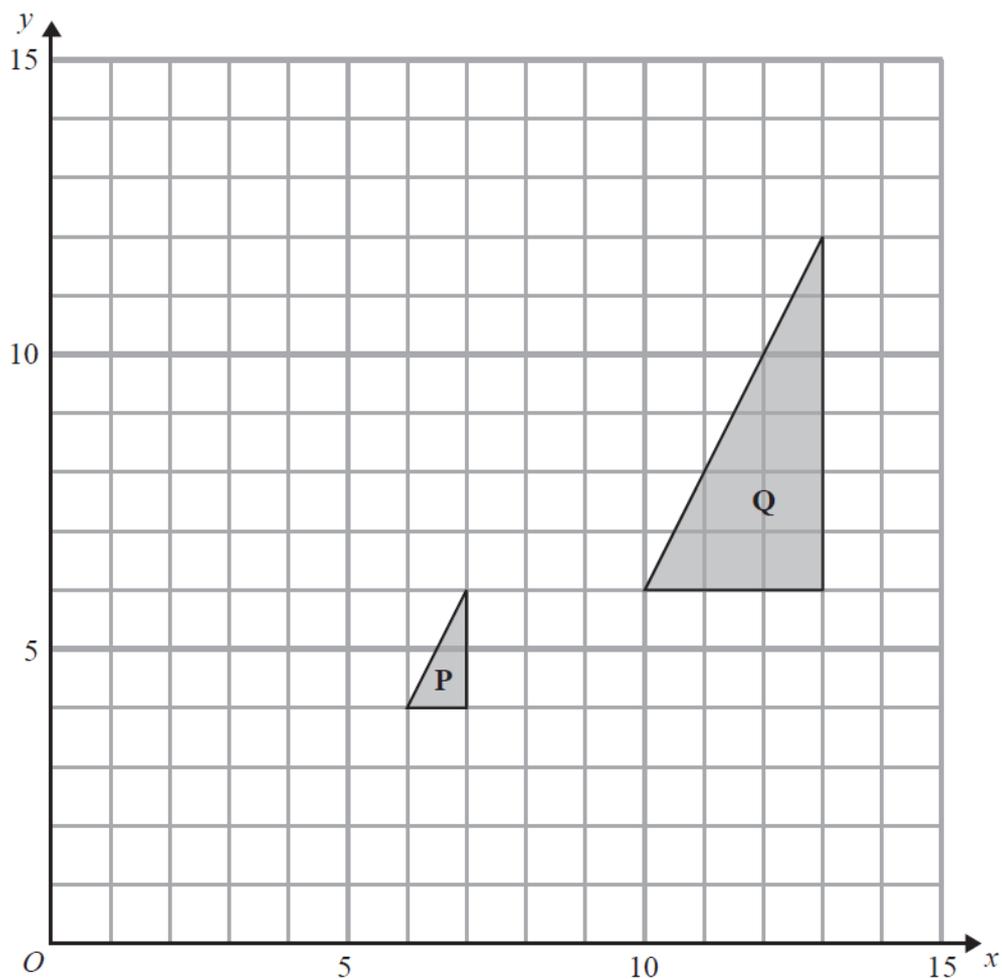


Weight (w grams)	Number of tea bags
$2.8 < w \leq 2.9$	2
$2.9 < w \leq 3.0$	4
$3.0 < w \leq 3.1$	22
$3.1 < w \leq 3.2$	32
$3.2 < w \leq 3.3$	14
$3.3 < w \leq 3.4$	6

(a) Work out the percentage of the 80 tea bags that weigh more than 3.1 grams.

(b) Work out an estimate for the total weight of the 80 tea bags.

19.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} -8 \\ 2 \end{pmatrix}$.

Label the new triangle **R**.

(c) Describe fully the single transformation which maps triangle **R** onto triangle **P**.

20. Serena bought a car that had a value of \$16 000.
At the end of each year, the value of her car had depreciated by 15%.

Calculate the value of her car at the end of 3 years.

21.

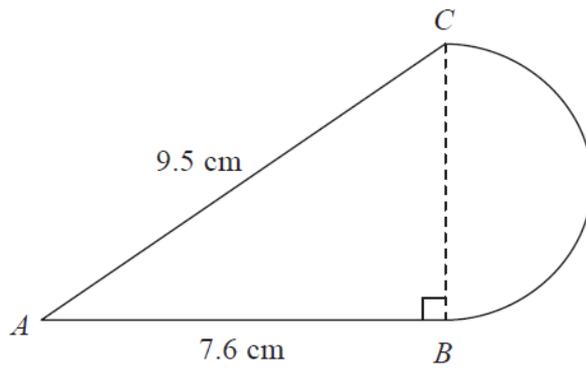


Diagram NOT
accurately drawn

The diagram shows a shape made from triangle ABC and a semicircle with diameter BC .
Triangle ABC is right-angled at B .
 $AB = 7.6$ cm and $AC = 9.5$ cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

22. A box contains 20 nails.
The table shows information about the length of each nail.

Length of nail (mm)	25	30	40	50	60
Number of nails	1	8	4	5	2



- (a) Viraj takes at random one nail from the box.

Find the probability that the length of the nail he takes is

- (i) 50 mm or 60 mm,

(ii) less than 35 mm.

- (b) Jamila puts all 20 nails into a bag.
She takes at random one of the nails and records its length.
She replaces the nail in the bag.
She then takes at random a second nail from the bag and records its length.

Calculate the probability that the two nails she takes

each have a length of 60 mm,

23.

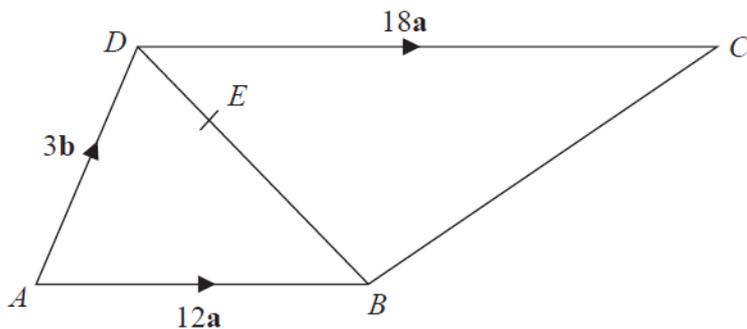


Diagram **NOT** accurately drawn

$ABCD$ is a trapezium.
 AB is parallel to DC .

$$\overrightarrow{AB} = 12\mathbf{a}$$

$$\overrightarrow{AD} = 3\mathbf{b}$$

$$\overrightarrow{DC} = 18\mathbf{a}$$

E is the point on the diagonal DB such that $DE = \frac{1}{3} DB$.

(a) Find, in terms of \mathbf{a} and \mathbf{b} ,

(i) \overrightarrow{DB} ii) BC

24.

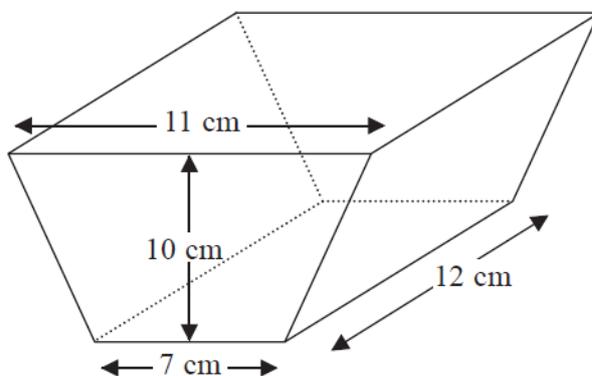


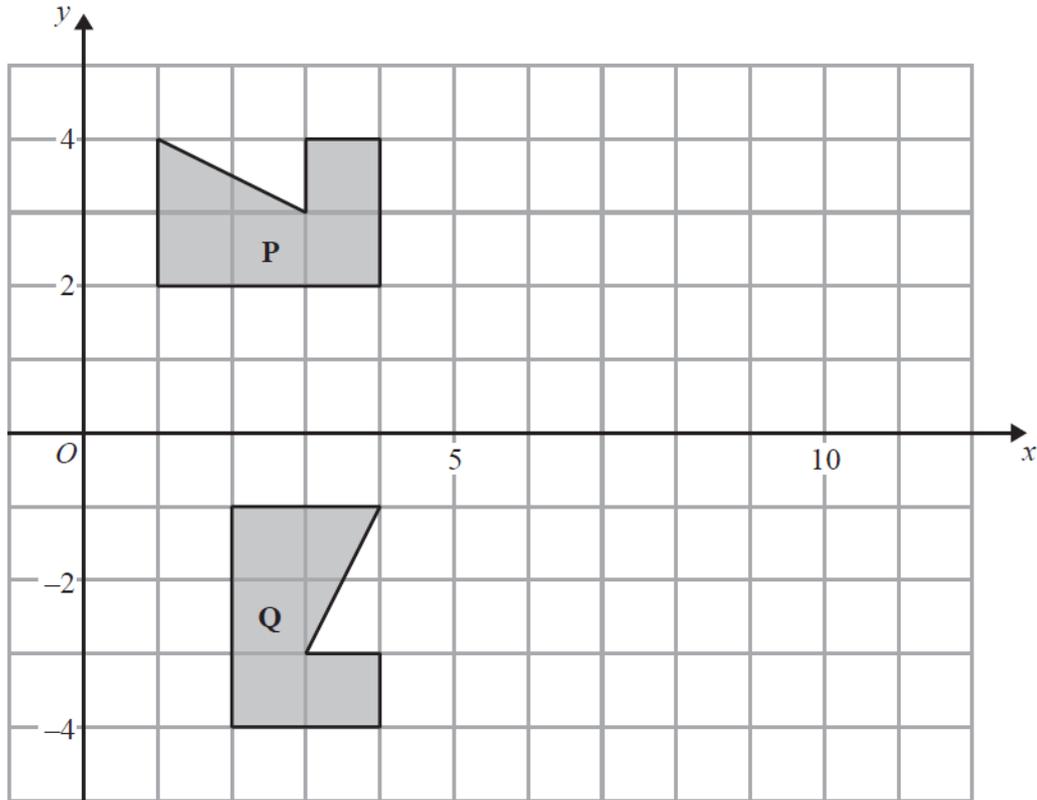
Diagram **NOT** accurately drawn

The diagram shows a solid prism.
 The cross section of the prism is a trapezium.
 The lengths of the parallel sides of the trapezium are 11 cm and 7 cm.
 The perpendicular distance between the parallel sides of the trapezium is 10 cm.
 The length of the prism is 12 cm.

(a) Work out the area of the trapezium.

(b) Work out the volume of the prism.

25. The diagram shows a shape **P**, a shape **Q**.



Describe fully the single transformation which maps shape **P** onto shape **Q**.

26. (a) Simplify $k \times k \times k \times k \times k$

(b) Expand $2(7t - 3)$

(c) Expand and simplify fully

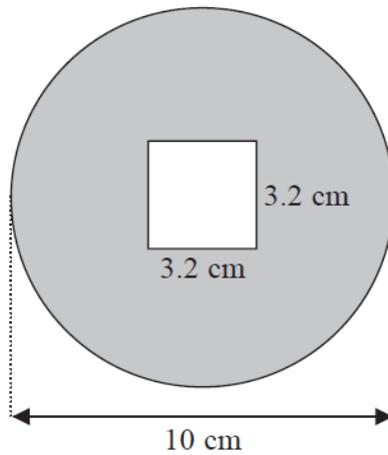
(i) $4(2y + 6) - 3(2y - 7)$

(ii) $(x - 6)(x - 4)$

(d) Simplify fully $\frac{v^4 \times v^7}{v^5}$

27. A square hole is cut from a circular piece of card.

Diagram **NOT**
accurately drawn



The square has sides of length 3.2 cm.
The diameter of the circular piece of card is 10 cm.

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

28. Express 825 as a product of its prime factors.
29. The mean of four numbers is 2.6.
One of the four numbers is 5.
Find the mean of the other three numbers.
30. The table shows the land areas, in km^2 , of four countries.

Country	Land area (km^2)
Ethiopia	1.13×10^6
Algeria	2.38×10^6
Nigeria	9.24×10^5
Kenya	5.83×10^5

- (a) Which country has the largest land area?
(b) Calculate the total land area, in km^2 , of all four countries.
Give your answer in standard form.

Population density is calculated by the formula

$$\text{Population density} = \text{Population} \div \text{Land area}$$

- (c) In one year, the population of Ethiopia was 7.91×10^7 .
Calculate the population density of Ethiopia for that year.

31.

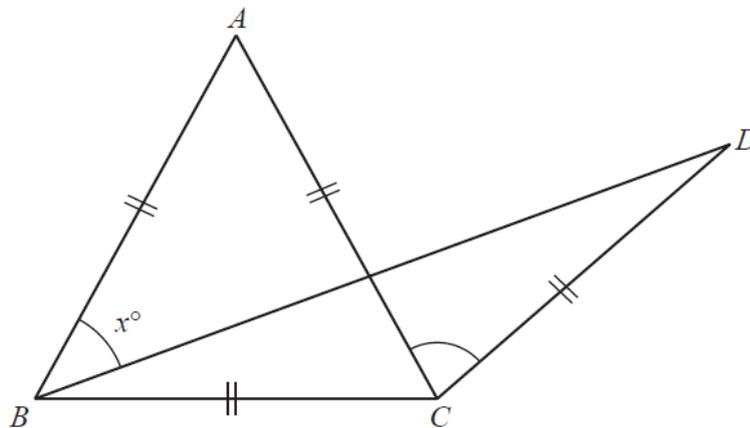
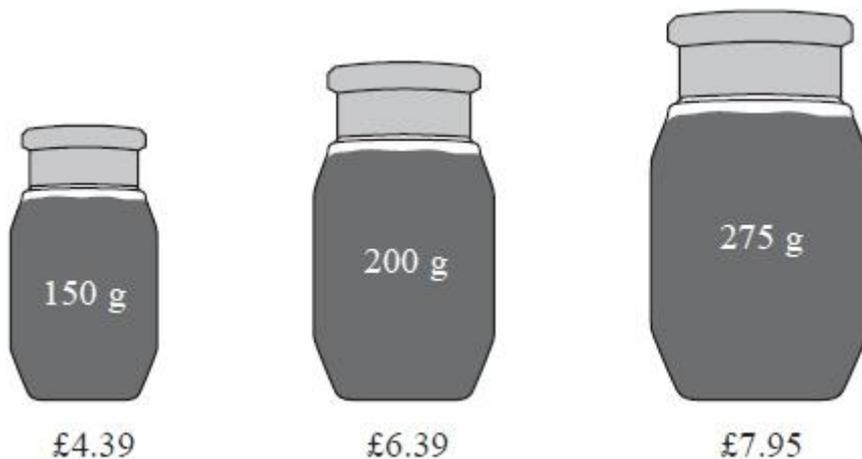


Diagram NOT
accurately drawn

The diagram shows an equilateral triangle ABC and an isosceles triangle BCD .
 $AB = AC = BC = CD$.
Angle $ABD = x^\circ$.

Express the size of angle ACD in terms of x° , giving your answer as simply as possible.
Give a reason for each step in your working.

32. A shop sells coffee in 3 different sizes of jar.



A 150 g jar of coffee costs £4.39

A 200 g jar of coffee costs £6.39

A 275 g jar of coffee costs £7.95

Which size of jar is the best value for money?

You must show all your working.

33. Here are the ages, in years, of 15 students.

19 18 20 25 37

33 21 17 29 20

42 18 23 37 22

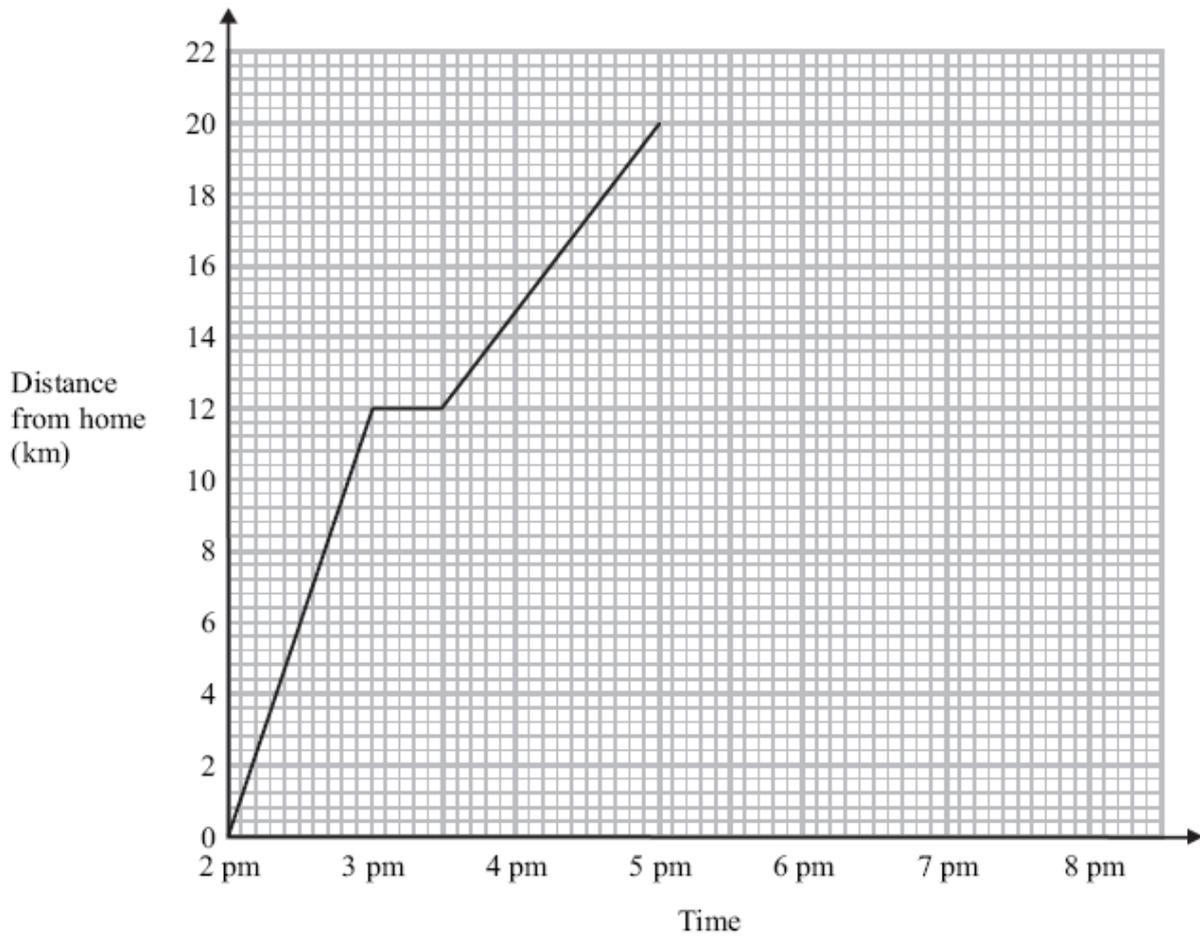
Show this information in an ordered stem and leaf diagram.



Key:

34. Simon went for a cycle ride.
He left home at 2 p.m.

The travel graph represents part of Simon's cycle ride.



At 3 p.m. Simon stopped for a rest.

(a) How many minutes did he rest?

(b) How far was Simon from home at 5 p.m.

At 5 p.m. Simon stopped for 30 minutes.
 Then he cycled home at a steady speed.
 It took him 1 hour 30 minutes to get home.

(c) Complete the travel graph.

35. Mr Watkins needs to buy some oil for his central heating.

Mr Watkins can put up to 1500 litres of oil in his oil tank.
 There are already 850 litres of oil in the tank.
 Mr Watkins is going to fill the tank with oil.

The price of oil is 67.2p per litre.
 Mr Watkins gets 5% off the price of the oil.

How much does Mr Watkins pay for the oil he needs to buy?

36. Here is a solid prism.

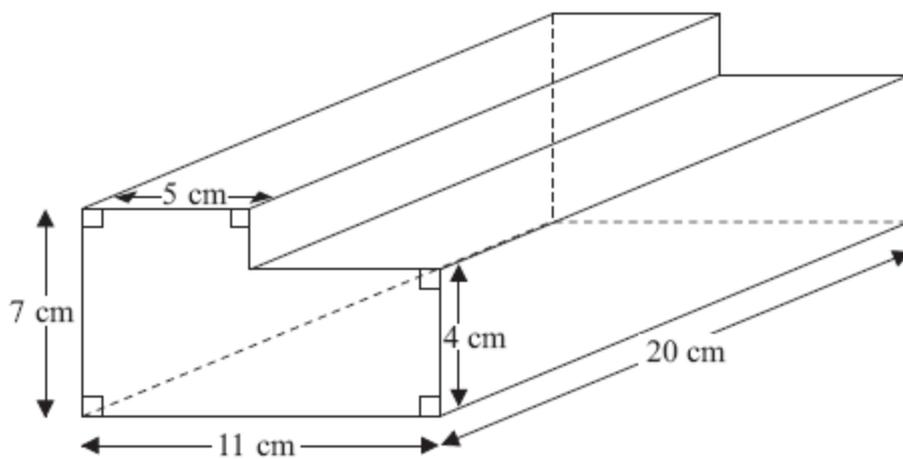


Diagram NOT accurately drawn

Work out the volume of the prism.

37.

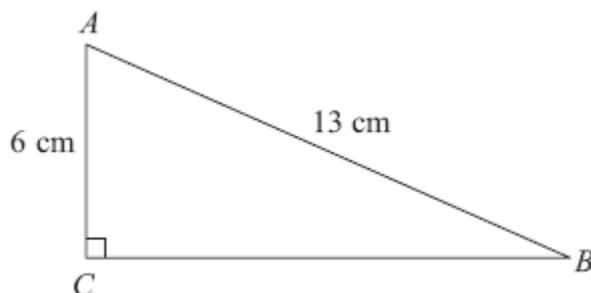


Diagram NOT accurately drawn

ABC is a right-angled triangle.

$AC = 6$ cm

$AB = 13$ cm

(a) Work out the length of BC .

Give your answer correct to 3 significant figures.

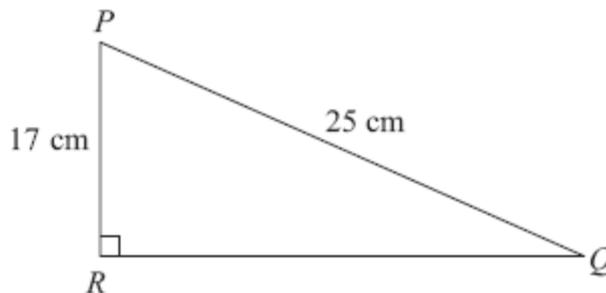


Diagram **NOT** accurately drawn

PQR is a right-angled triangle.

$PR = 17\text{ cm}$

$PQ = 25\text{ cm}$

- (b) Work out the size of angle RPQ .
Give your answer correct to 1 decimal place.

38.

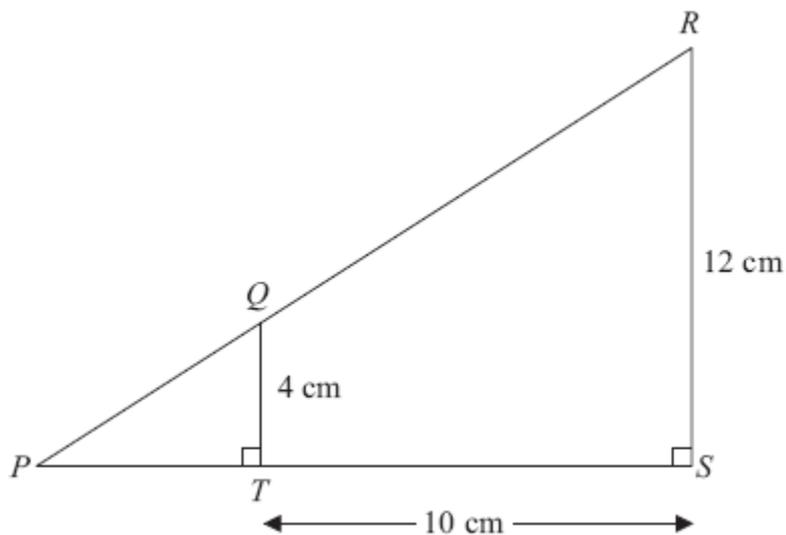


Diagram **NOT** accurately drawn

PQR and PTS are straight lines.

Angle $PTQ = \text{Angle } PSR = 90^\circ$

$QT = 4\text{ cm}$

$RS = 12\text{ cm}$

$TS = 10\text{ cm}$

- (a) Work out the area of the trapezium $QRST$.
- (b) Work out the length of PT .

39. Derek buys a house for £150 000
He sells the house for £154 500

(a) Work out Derek's percentage profit.

Derek invests £154 500 for 2 years at 4% per year compound interest.

(b) Work out the value of the investment at the end of 2 years.

40. Calculate the value of $\sqrt{\frac{\tan 60^\circ + 1}{\tan 60^\circ - 1}}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

41. The diagram shows a garden in the shape of a rectangle.

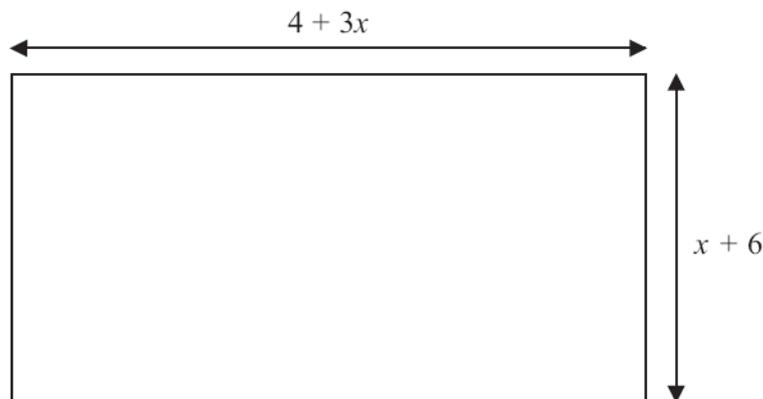


Diagram **NOT**
accurately drawn

All measurements are in metres.
The perimeter of the garden is 32 metres.

Work out the value of x .

- 42 There are 40 people at a meeting.
Each person travelled to the meeting either by car or by train.

13 of the people are male.
10 females travelled by train.
8 males travelled by car.

Work out the total number of people who travelled by car.

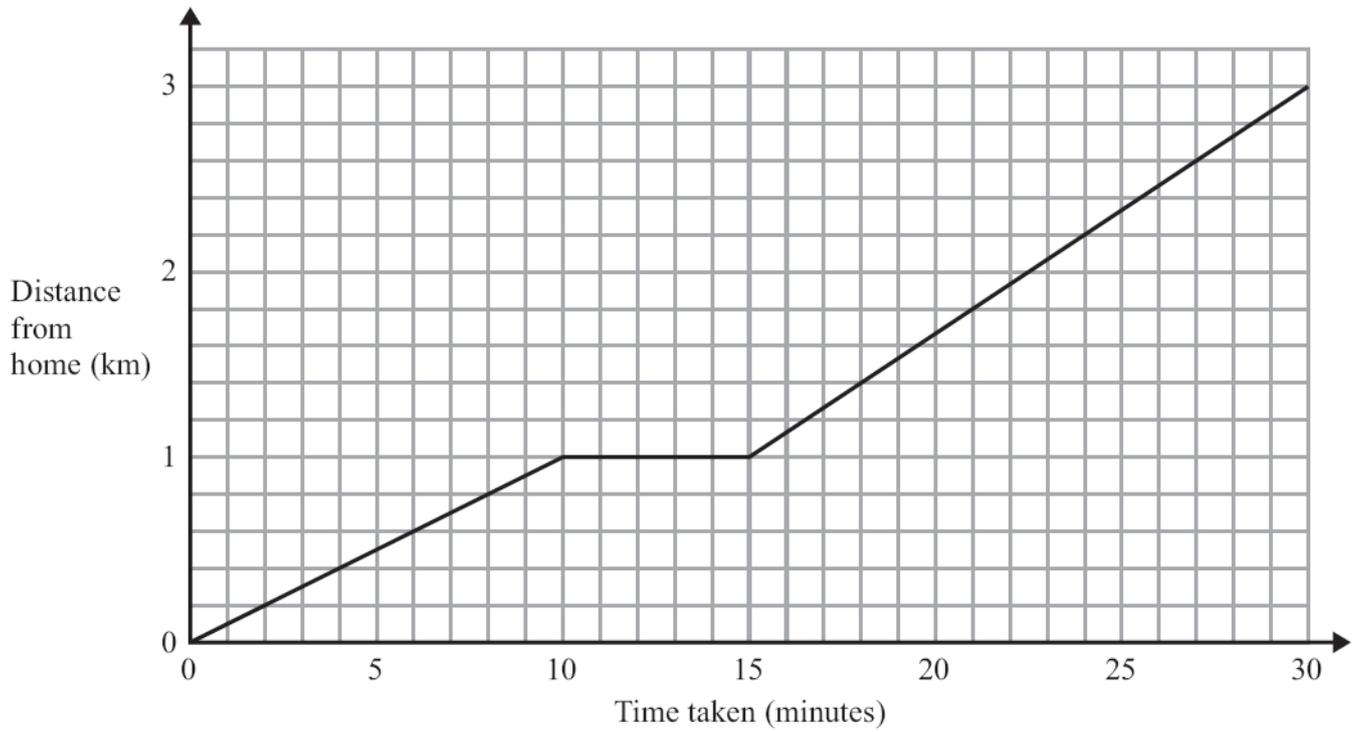
43. On Monday, Holly walked from her home to school.

She stopped at her friend's house on the way to school.

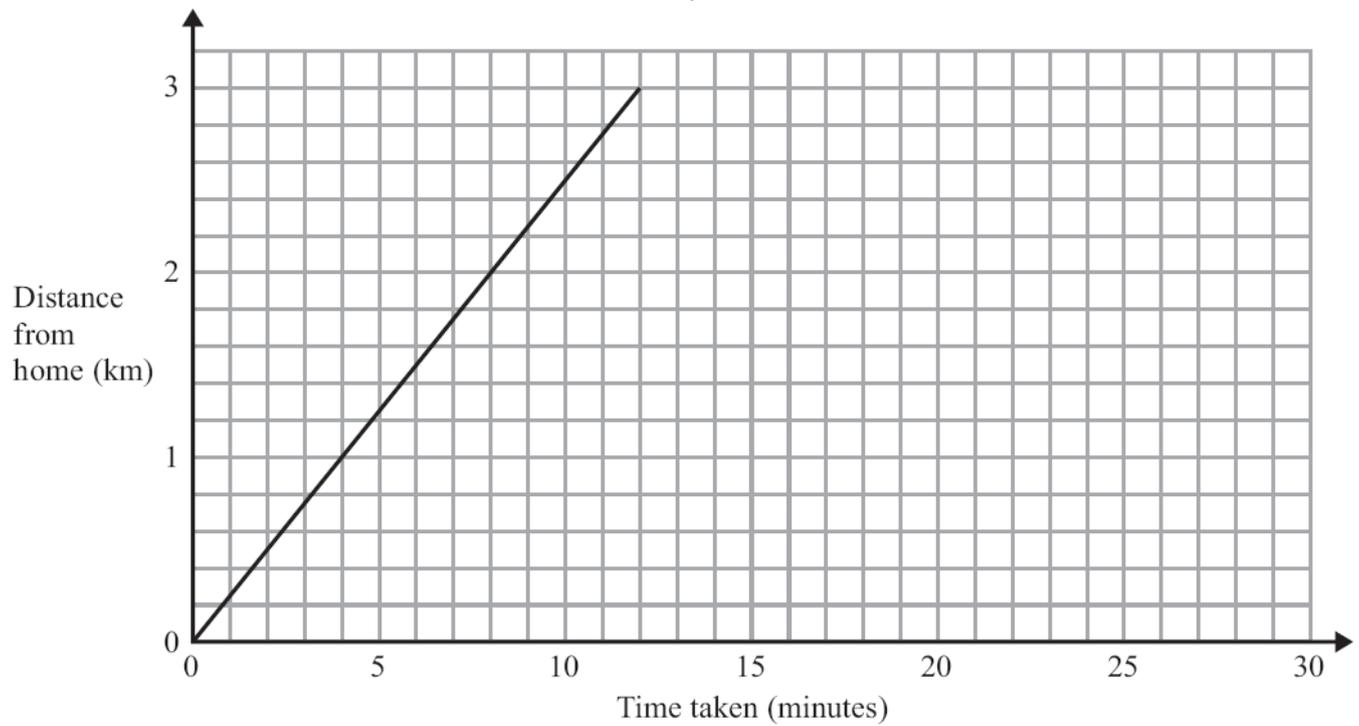
On Tuesday, Holly cycled from her home to school.

The travel graphs show Holly's journey on Monday and on Tuesday.

Monday



Tuesday

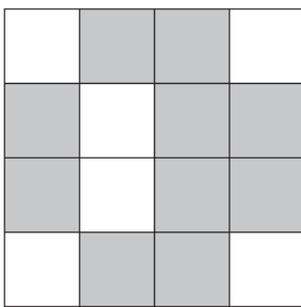


- (a) Write down the distance from Holly's home to school.
- (b) Write down how long Holly stopped at her friend's house on Monday.

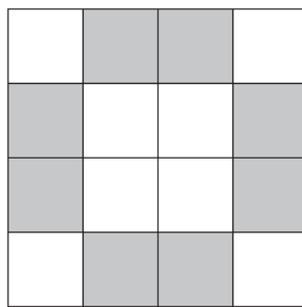
Holly took less time to get to school on Tuesday than on Monday.

- (c) How many minutes less?

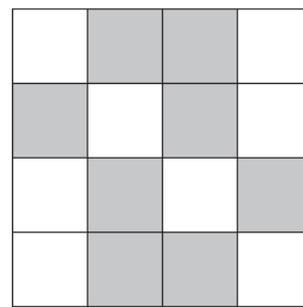
44. The diagrams show patterns made from grey tiles and white tiles.



A



B

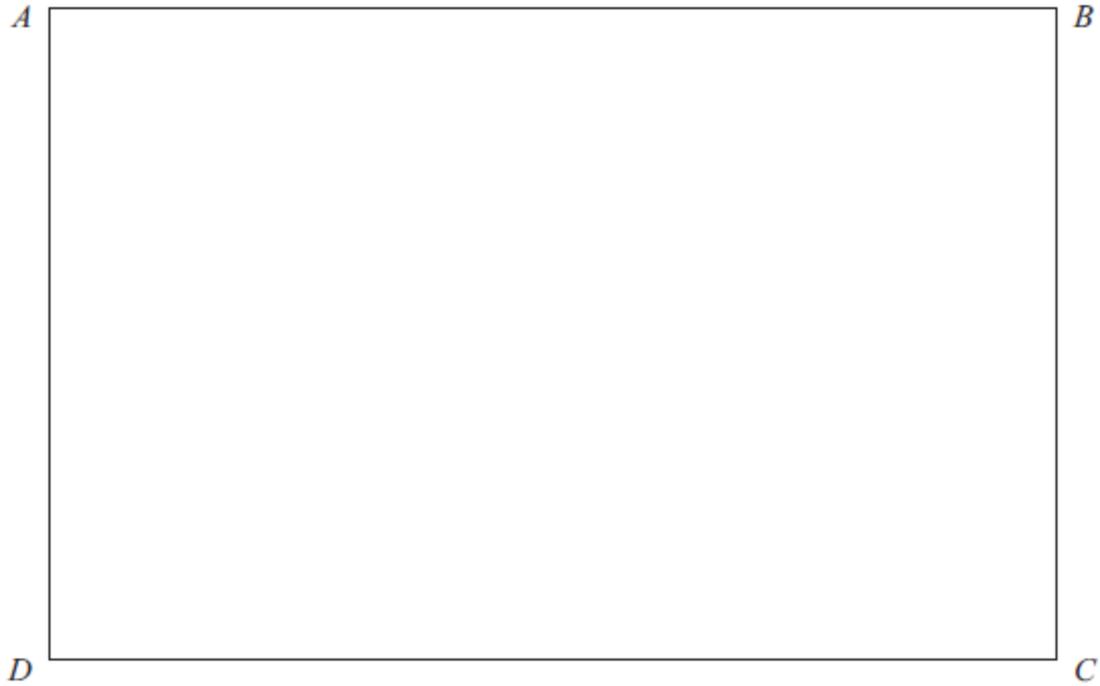


C

One of the patterns has exactly 1 line of symmetry.

- (a) Write down the letter of this pattern.
- (b) Write down the order of rotational symmetry of pattern C.

45. Here is a scale drawing of a rectangular garden $ABCD$.



Scale: 1 cm represents 1 metre.

Jane wants to plant a tree in the garden

at least 5m from point C ,
nearer to AB than to AD
and less than 3m from DC .

On the diagram, shade the region where Jane can plant the tree.