Surname Other name

L H Worked Solutions.

Candidate number

Subject

Mathematics

Tier Foundation ✓

Tracing Paper

Paper 2F Year 11

23rd February 2022

Time: 1 hour 30 minutes

+10% 1h 39 mins +25% 1h 53 mins

Instructions

- Use **black** ink or ball-point pen.
- Answer **all** questions.
- Answer the questions in the spaces provided
- **Calculators may be used**

Information

- There are 28 questions on this paper
- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  - *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Show all of your working out.

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

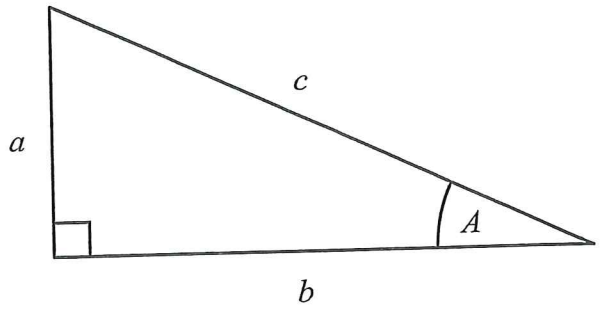
Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

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

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

Pythagoras' Theorem and Trigonometry



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

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

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

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

Compound Interest

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

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

Probability

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

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

END OF EXAM AID

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write 31% as a fraction.

$\frac{31}{100}$

(Total for Question 1 is 1 mark)

2 Change 3 metres into centimetres.

1m = 100cm

m $\xrightarrow{\times 100}$ cm

300 centimetres

(Total for Question 2 is 1 mark)

3 Write the following numbers in order of size.
Start with the smallest number.

	1.02	0.12	1.20	0.21
think.....	102	12	120	21

0.12, 0.21, 1.02, 1.20

(Total for Question 3 is 1 mark)

4 (a) Simplify $m + m + m + m$

$4m$

(1)

(b) Simplify $12p \div 4$

$3p$

(1)

(Total for Question 4 is 2 marks)

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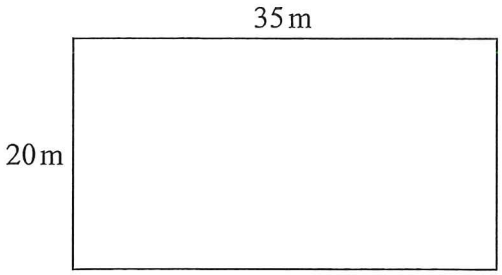
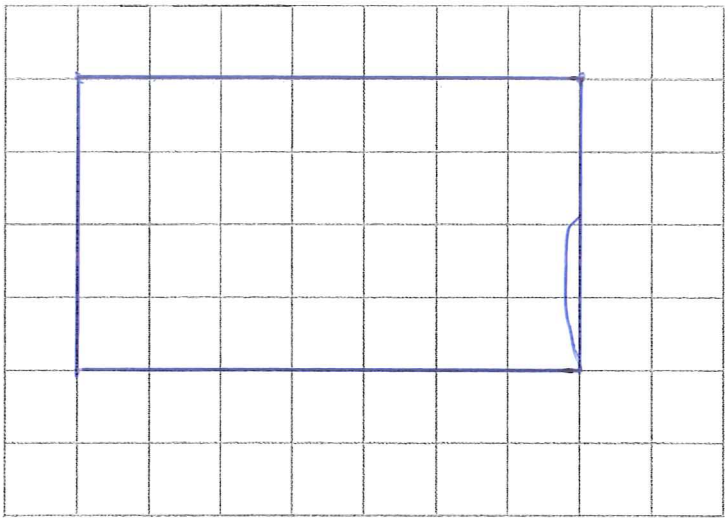
5 The diagram shows a rectangle.



On the centimetre grid below, draw an accurate scale drawing of this rectangle.
Use a scale of 1 cm to represent 5 m.



(Total for Question 5 is 2 marks)

6 Here is a list of whole numbers from 21 to 30

21 22 23 24 25 26 27 28 29 30

(a) From the list, write down a square number.

25

(1)

(b) From the list, write down a multiple of 8

24

(1)

(Total for Question 6 is 2 marks)

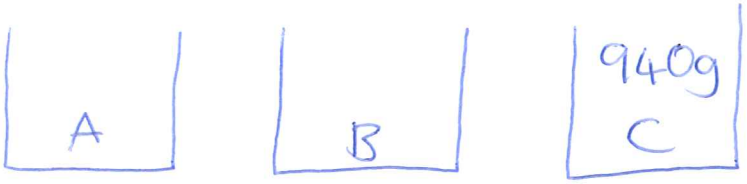
7 A baker has three bags of flour, **A**, **B** and **C**.

Bag **A** and bag **B** contain the same amount of flour.
Bag **C** contains 940 g of flour.

In the three bags, there is a total of 2500 g of flour.

Work out the amount of flour in bag **A**.

2500 − 940
= 1560



these two bags add up to 1560g

1560 ÷ 2
= 780g

780 g

(Total for Question 7 is 3 marks)

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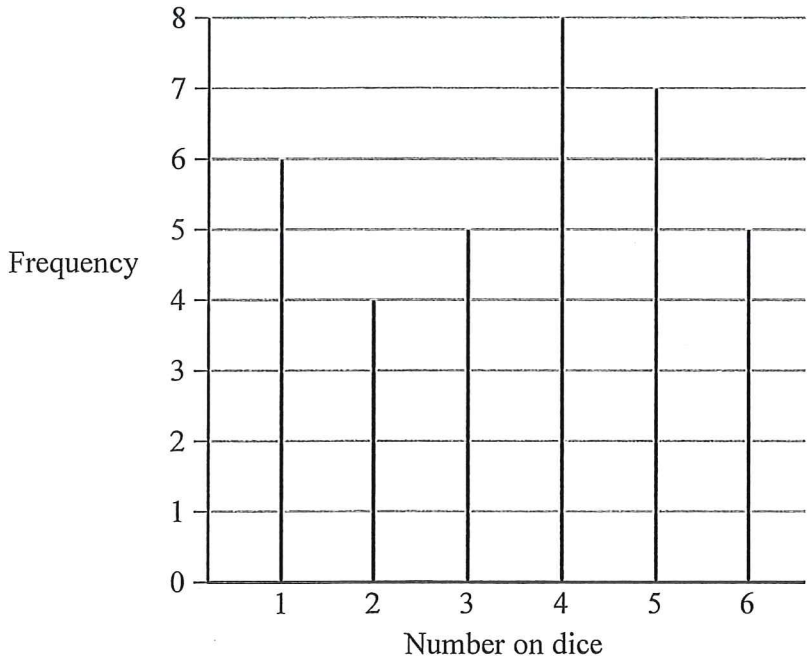
8 5 students throw a dice.
They each throw the dice the same number of times.

The diagram gives information about the number of times the dice lands on each number.



Work out how many times each student throws the dice.

total frequency = 6 + 4 + 5 + 8 + 7 + 5
= 35

35 ÷ 5 students = 7 throws each

7

(Total for Question 8 is 3 marks)

9 Alec needs to work out the value of $2 + 3 \times 4$

He writes

$$2 + 3 = 5 \text{ and } 5 \times 4 = 20, \text{ so } 2 + 3 \times 4 = 20$$

Alec is wrong.
Explain why.

Alec did not use BIDMAS

he should have multiplied 3 by 4 first and then added 2

$2 + 3 \times 4$
$= 2 + 12$
$= 14$

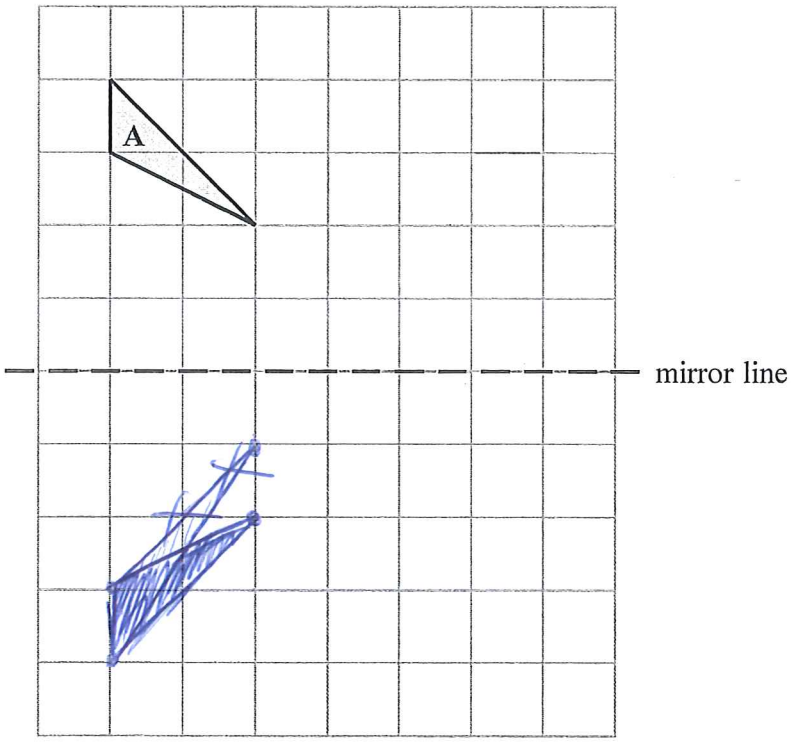
(Total for Question 9 is 1 mark)

10 Write 17 as a fraction of 30

$\frac{17}{30}$

(Total for Question 10 is 1 mark)

11 Reflect shape **A** in the mirror line.



(Total for Question 11 is 2 marks)

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12 (a) Work out $\sqrt{\frac{13.82}{4.06}}$

Write down all the figures on your calculator display.

1.844977205

(2)

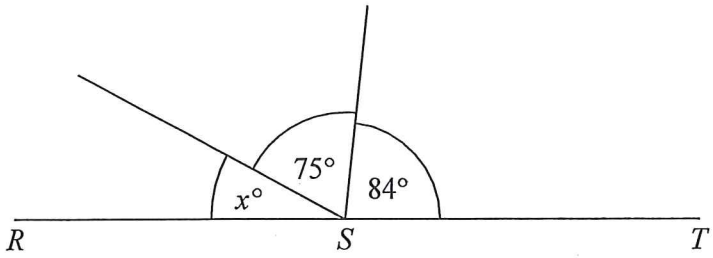
(b) Give your answer to part (a) correct to 2 decimal places.

1.84

(1)

(Total for Question 12 is 3 marks)

13



RST is a straight line.

(i) Work out the value of x.

$x = 180° - (75° + 84°)$
$= 180° - 159°$
$= 21°$

21°

(2)

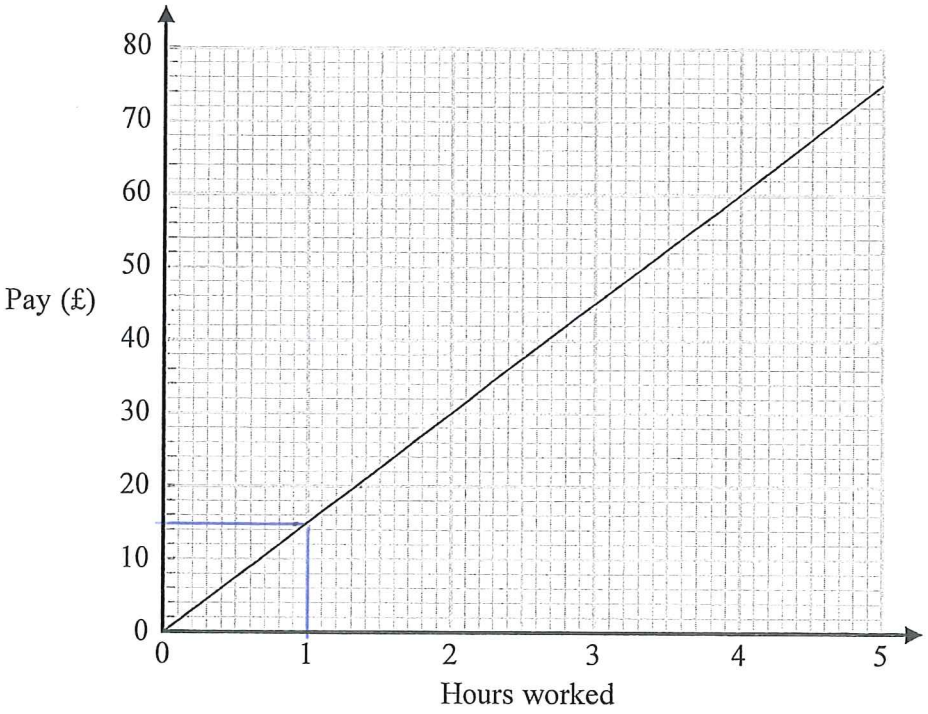
(ii) Give a reason for your answer.

angles on a straight line add up to 180°

(1)

(Total for Question 13 is 3 marks)

14 Nazima uses this graph to find out how much money she is paid for the number of hours she has worked.



(a) How much money is Nazima paid for each hour she works?

£ 15

(1)

Last week Nazima worked for 36 hours.

(b) How much money was Nazima paid?

36 × £15

£ 540

(2)

(Total for Question 14 is 3 marks)

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15 Write the following fractions in order of size.
Start with the smallest fraction.

$\frac{5}{8}$ $\frac{2}{3}$ $\frac{4}{9}$ $\frac{3}{5}$

0.625 0.6̇ 0.4̇ 0.6

$\frac{4}{9}$, $\frac{3}{5}$, $\frac{5}{8}$, $\frac{2}{3}$

(Total for Question 15 is 2 marks)

use your calculator to turn the fractions into decimals

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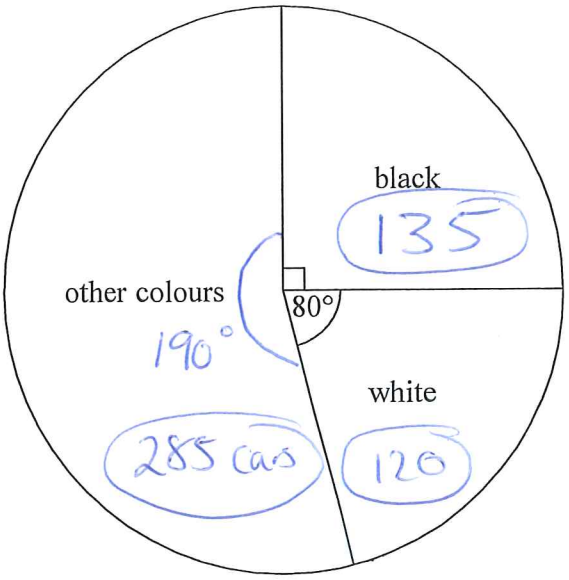
16 The pie chart gives information about the colour of each car in a car park.



There are 135 black cars in the car park.

(a) Work out the number of white cars in the car park.

$90° = 135$ cars

$\div 90$ ↓ $1° = 1.5$ cars ↓ $\times 80$

$80° = 120$ cars

120

(3)

There are 50 grey cars in the car park.

A car in the car park is picked at random.

(b) Find the probability that this car is grey.

$1° = 1.5$ cars

$190° = 285$ cars

Total cars $= 135 + 120 + 285$

$= 540$

$P(\text{Grey}) = \frac{50}{540} = \frac{5}{54}$

(2)

(Total for Question 16 is 5 marks)

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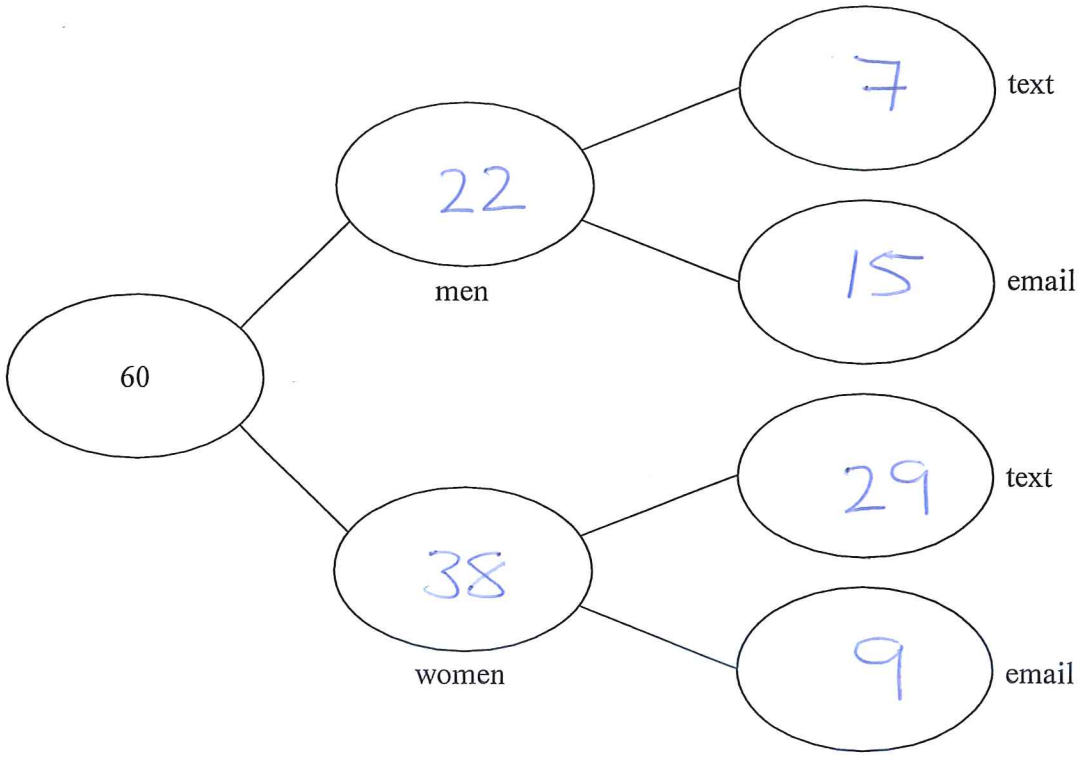
17 60 people are asked if they prefer to text or to email their friends.

38 of the people are women and the rest are men.
15 of the men prefer to email their friends.
60% of the people prefer to text their friends.

60% of 60 = 36
36 − 7 = 29

Complete the frequency tree for this information.



(Total for Question 17 is 5 marks)

18 The incomplete table gives some information about the lengths of the planks of wood in Ben's workshop.

Length of plank (metres)	Number of planks
3	5
2.5	8
2	13
1.5	14
1	10

The total length of these planks is 92 metres.

Work out the number of planks of length 2 metres in Ben's workshop.

$3 \times 5 + 2.5 \times 8 + 1.5 \times 14 + 1 \times 10 = 66$

$92 - 66 = 26$

$26 \div 2 = 13$

13

(Total for Question 18 is 3 marks)

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19 Rachel, Samina and Tom share £600 between them.

Rachel gets $\frac{2}{5}$ of the £600

Samina gets $\frac{1}{4}$ of the money that is left over.

Tom gets the rest of the money.

Tom says,
"I would have got more money if we had shared the £600 equally between us."

Is Tom correct?
You must show how you get your answer.

$\frac{2}{5}$ of £600 = £240 Rachel

left over £600 − £240 = £360

$\frac{1}{4}$ of £360 = £90 Samina

Rachel + Samina
£240 + £90 = £330

Tom gets
£600 − £330 = £270

If the money was shared equally Rachel, Samina and Tom would all have got
£600 ÷ 3 = £200

Tom is wrong. He gets less if the money is shared equally.

(Total for Question 19 is 4 marks)

20 (a) Simplify $c^5 \div c^2$

$= c^{5-2}$

c^3

(1)

(b) Simplify $(d^4)^3$

$= d^{4 \times 3}$

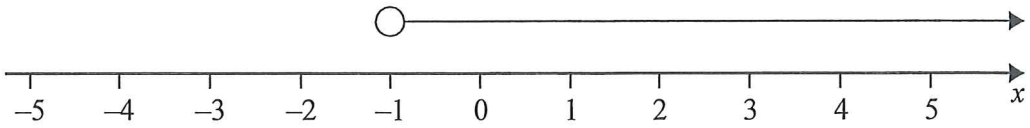
d^{12}

(1)

(Total for Question 20 is 2 marks)

Higher Tier Q1

21 (a) Write down the inequality shown on this number line.

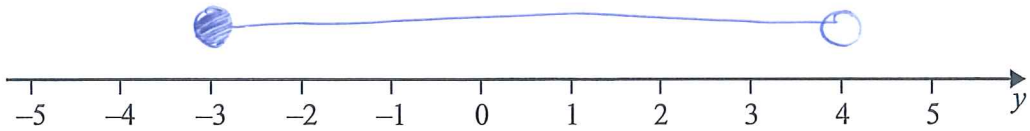


or $-1 < x$

$x > -1$

(1)

(b) On the number line below, show the inequality $-3 \leqslant y < 4$



(2)

(Total for Question 21 is 3 marks)

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Higher Tier Q2

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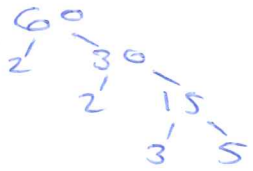
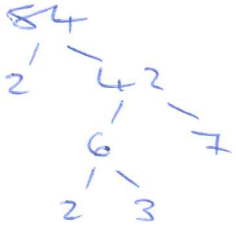
22 (a) Find the Highest Common Factor (HCF) of 60 and 84

60
1 × 60
2 × 30
3 × 20
4 × 15
5 × 12
6 × 10

84
1 × 84
2 × 42
3 × 28
4 × 22
6 × 14
7 × 12

OR





$60 = 2 \times 2 \times 3 \times 5$

$84 = 2 \times 2 \times 3 \times 7$

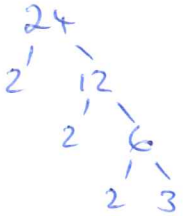
12

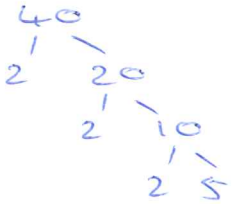
(2)

(b) Find the Lowest Common Multiple (LCM) of 24 and 40

24, 48, 72, 96, 120
40, 80, 120

OR





$24 = 2 \times 2 \times 2 \times 3$

$40 = 2 \times 2 \times 2 \times 5$

LCM = 8 × 3 × 5
= 120

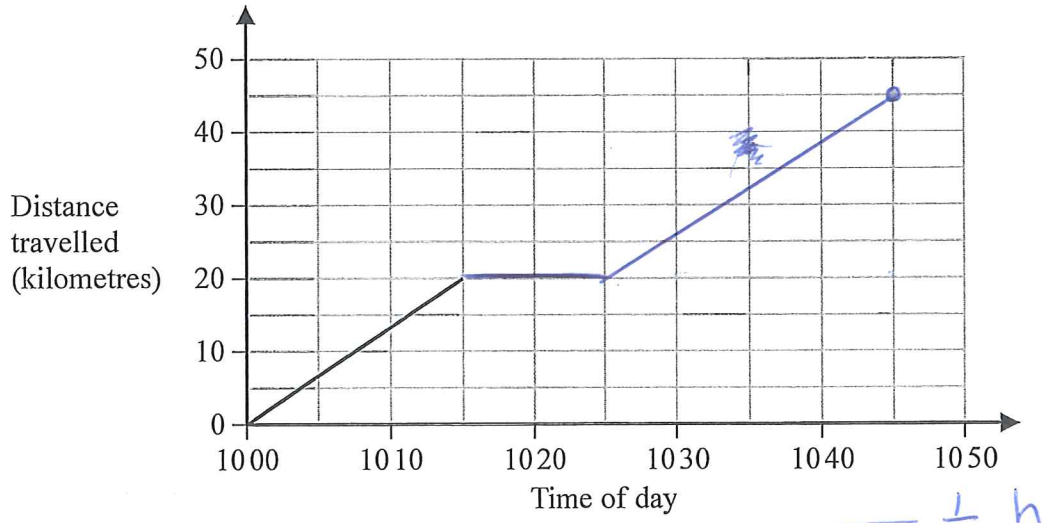
120

(2)

(Total for Question 22 is 4 marks)

Higher Tier Q3

23 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



$\frac{1}{4}$ hour

(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

20 km : 15 mins
×4 ×4
80 km : 60 mins
80 km/h

OR $S = \frac{D}{T}$

$= \frac{20}{0.25}$

$= 80$

..... km/h

(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

$\frac{1}{3}$ hour

(b) On the grid, complete the travel graph for Sam's journey.

75 km : 60 minutes
÷3 ↓ ÷3
25 km : 20 minutes

OR $D = S \times T$

$= 75 \times \frac{1}{3}$

$= 25$ km

(3)

(Total for Question 23 is 5 marks)

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Higher Tier Q4

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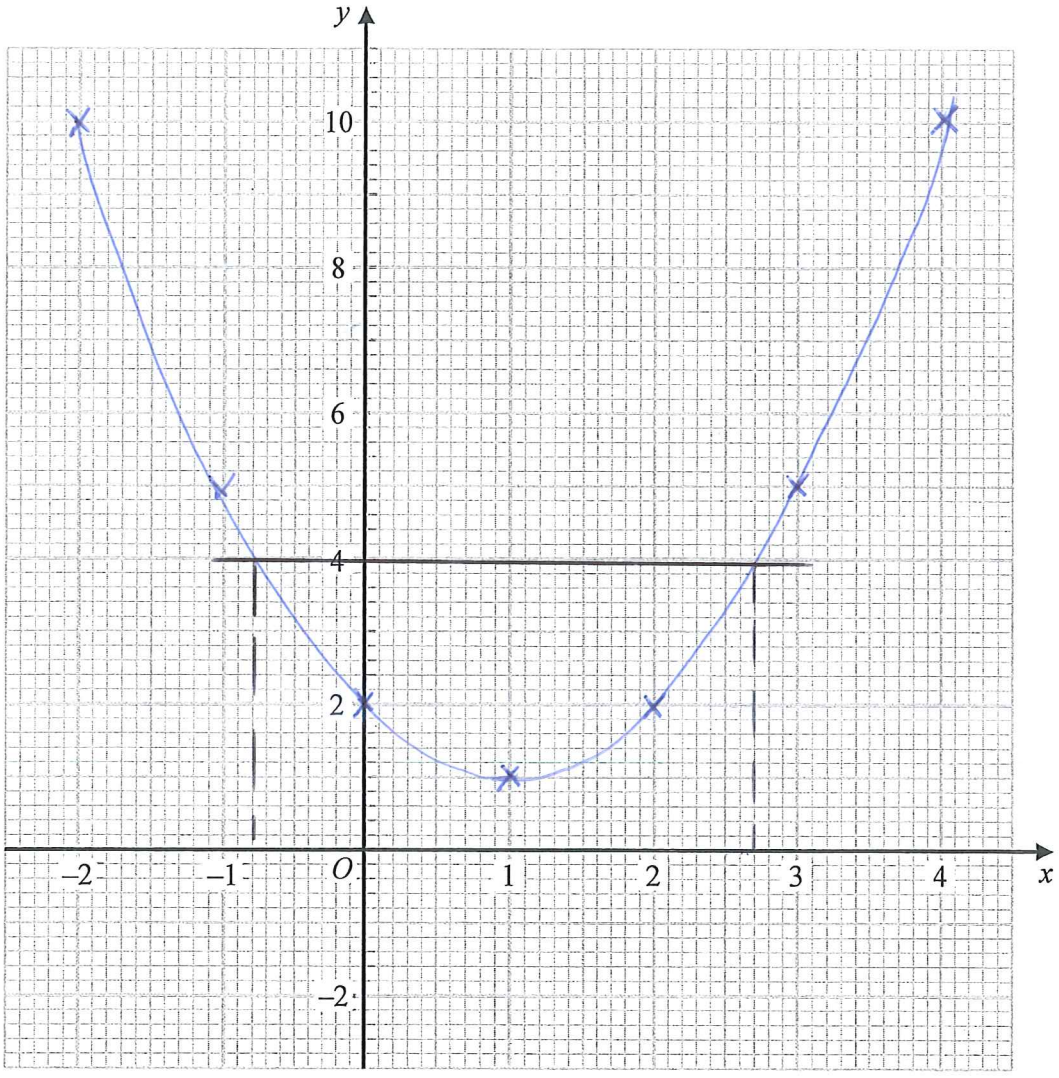
24 (a) Complete the table of values for $y = x^2 - 2x + 2$

x	–2	–1	0	1	2	3	4
y	10	5	2	1	2	5	10

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x + 2$ for values of x from –2 to 4

(2)



(c) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

① Draw $y = 4$

$x = -0.8$, $x = 2.7$

(2)

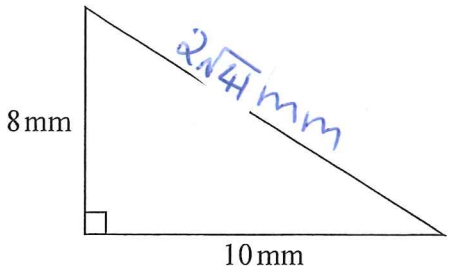
(Total for Question 24 is 6 marks)

Higher Tier Q5

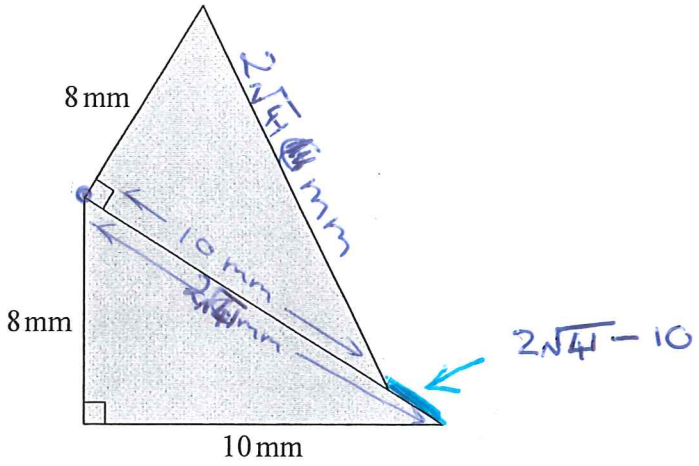
25 Here is a right-angled triangle.

$\sqrt{8^2+10^2}$

$= 2\sqrt{41}$



The shaded shape below is made from two of these triangles.



Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

Perimeter $= 10 + 8 + 8 + 2\sqrt{41} + 2\sqrt{41} - 10$

$= 8 + 8 + 4\sqrt{41}$

$= 41.6124969\ldots$

$= 41.6$ mm (3sf)

41.6

~~5.8~~ mm

(Total for Question 25 is 4 marks)

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Higher Tier Q6

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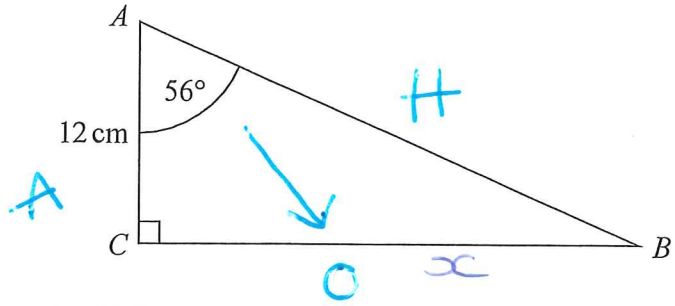
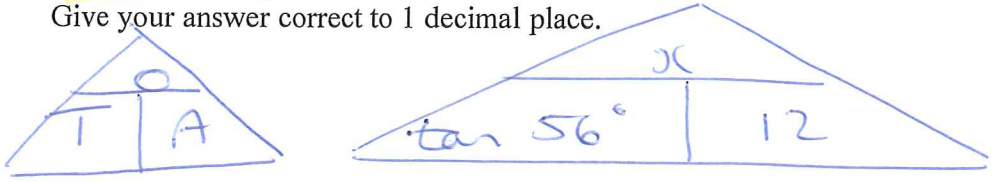
26 *ABC* is a right-angled triangle.



(a) Work out the length of *BC*.
Give your answer correct to 1 decimal place.

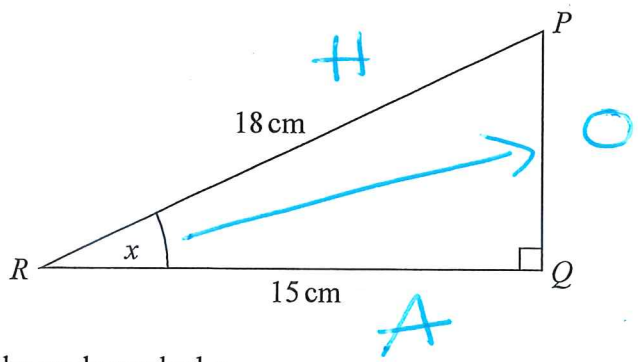


$x = \tan(56) \times 12$
$= 17.79073$
$= 17.8$ cm (1dp)

17.8 cm

(2)

PQR is a right-angled triangle.



(b) Work out the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

$\cos x = \frac{15}{18}$

$x = \cos^{-1}\left(\frac{15}{18}\right)$
$= 33.557309$

33.6 °

(2)

(Total for Question 26 is 4 marks)

Q27 not on H tier

27 Solve $x^2 - 7x - 18 = 0$

$(x+2)(x-9)=0$

$x+2=0 \qquad x-9=0$

$x = -2 \qquad x = 9$

$x = -2, 9$

(Total for Question 27 is 3 marks)

Q28 not on H tier

28 In a sale, the normal price of a boat is reduced by 15%
The sale price of the boat is £272 000

Work out the normal price of the boat.

Sale price = 100% − 15%
= 85%

£272 000 = 85%

÷85 ↓ ↓ ÷85

£3200 = 1%

×100 ↓ ↓ ×100

£320 000 = 100%

↑
normal price

£ 320 000

(Total for Question 28 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS

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