Surname

Other name

LH Worked Solutions

Candidate number

Subject

Tier Foundation

Mathematics

Paper 1F Year 11

21st 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 must not 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 $= \frac{1}{2}(a + b)h$

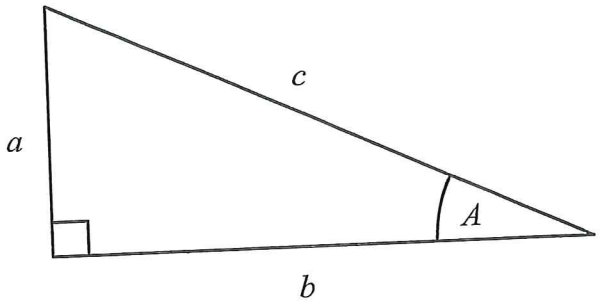
Volume of a prism = area of cross section × length

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:

P (A or B) = P (A) + P (B) – P (A 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 $\frac{3}{10}$ as a percentage.

30 %

(Total for Question 1 is 1 mark)

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

8 –7 –10 1 0 –2

–10, –7, –2, 0, 1, 8

(Total for Question 2 is 1 mark)

3 Write $\frac{9}{100}$ as a decimal.

0.09

(Total for Question 3 is 1 mark)

4 Write 327 correct to the nearest ten.

330

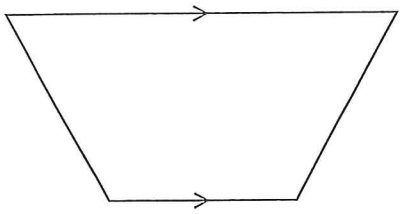
(Total for Question 4 is 1 mark)

5 Write down the value of 7^2

49

(Total for Question 5 is 1 mark)

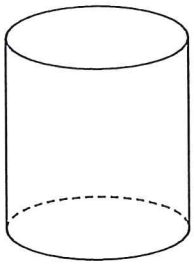
6 (a) Write down the mathematical name of this quadrilateral.



trapezium

(1)

(b) Write down the mathematical name of this 3-D shape.



cylinder

(1)

(Total for Question 6 is 2 marks)

7 £42 is shared equally between 3 friends.

How much does each friend get?

$$3\overline{)42} = 14$$

£ 14

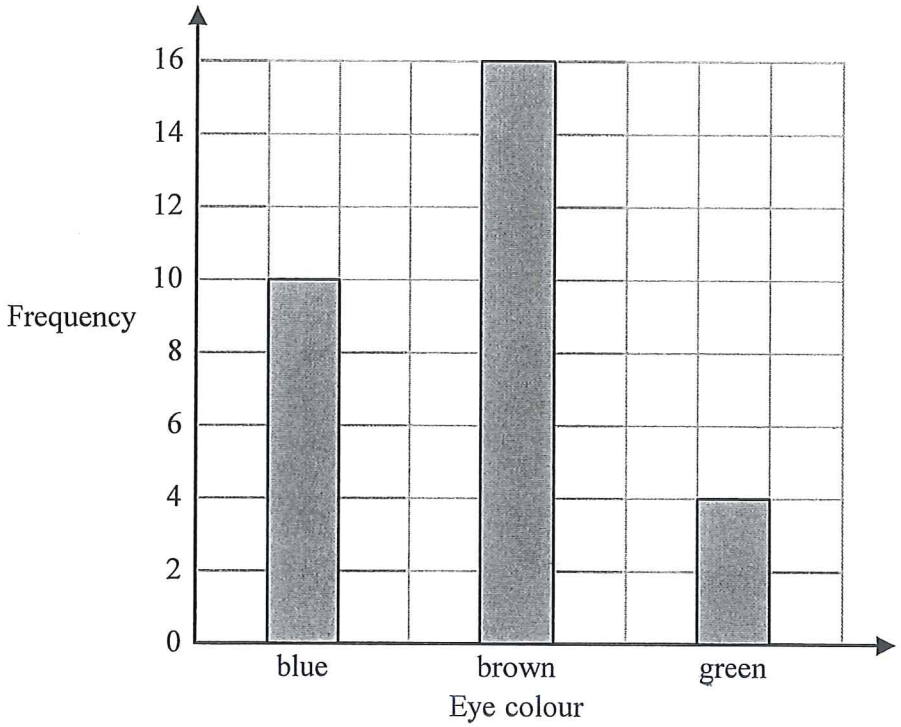
(Total for Question 7 is 2 marks)

8 Grace recorded the eye colour of each of the students in her class.

The frequency table below shows her results.

Eye colour	Frequency
blue	10
brown	15
green	4

Grace then drew the bar chart below for this information.



Write down one thing that is wrong with this bar chart.

Brown is drawn as 16 on the bar chart but the frequency table says that brown is 15.

(Total for Question 8 is 1 mark)

9 Danny buys,

1 loaf of bread for £1.20
1 bottle of milk for 70p
2 packets of cheese for £2.30 each packet

Danny pays with a £10 note.

He says,

"I should get £3.30 change."

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

Bread £1·20
Milk £0·70
Cheese £2·30
Cheese £2·30 +
£6·50
1

cost £6·50

Change £10·00
− £6·50
£3·50

① Danny is wrong. He will get £3·50 change

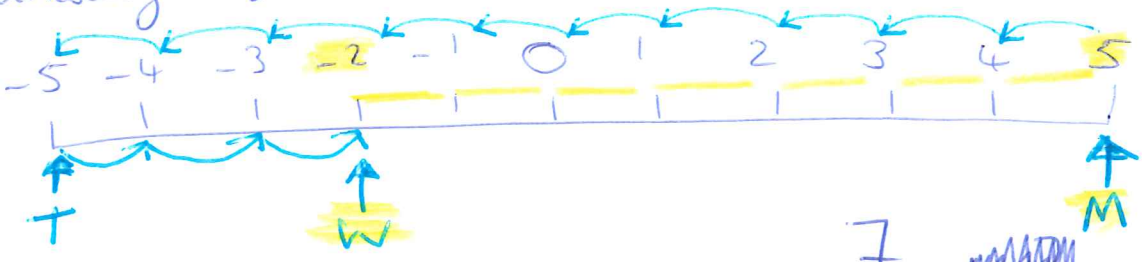
(Total for Question 9 is 3 marks)

10 Rachel records the temperature in her garden at noon each day.

On Monday, the temperature was 5 °C.
On Tuesday, the temperature was 10° less than the temperature on Monday.
On Wednesday, the temperature was 3° greater than the temperature on Tuesday.

Find the difference between the temperature on Monday and the temperature on Wednesday.
You must show all your working.

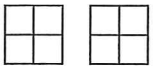
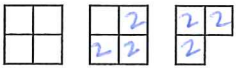
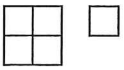
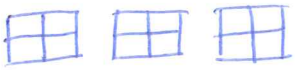
Monday 5°C
Tuesday −5°C
Wednesday −2°C



7 °C

(Total for Question 10 is 2 marks)

11 The pictogram shows information about the number of video games sold in a shop on Monday, on Tuesday and on Wednesday.

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Key:

 represents 8 video games

(a) How many video games were sold on Monday?

16

(1)

More video games were sold on Tuesday than on Wednesday.

(b) How many more?

12

(2)

On Thursday and Friday, a total of 32 video games were sold in the shop.

$\frac{1}{4}$ of these 32 video games were sold in the shop on Thursday.

(c) Complete the pictogram for Thursday and Friday.

$\frac{1}{4}$ of 32

$= 32 \div 4$

$= 8$

Thursday

Friday $= 32 - 8$

$= 24$

(3)

(Total for Question 11 is 6 marks)

12 There are two drama groups in a school.

In one group there are 36 boys and 48 girls. group 1

In the other group, $\frac{3}{7}$ of the students are boys and the rest of the students are girls. group 2

Ann says,

"The ratio of the number of boys to the number of girls is the same for both groups."

Is Ann correct?

You must show how you get your answer.

group 1

Boys : Girls

36 : 48

÷6 ÷6

6 : 8

÷2 ÷2

3 : 4

group 2

Boys : Girls

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

B	B	B	G	G	G	G

3 : 4

Ann is correct. The ratio of Boys : Girls is 3 : 4 in both groups

(Total for Question 12 is 3 marks)

13 A number sequence starts 1 2 4 7 (+1, +2, +3)

Emma says that the next term is 7

(a) Explain why Emma may be correct.

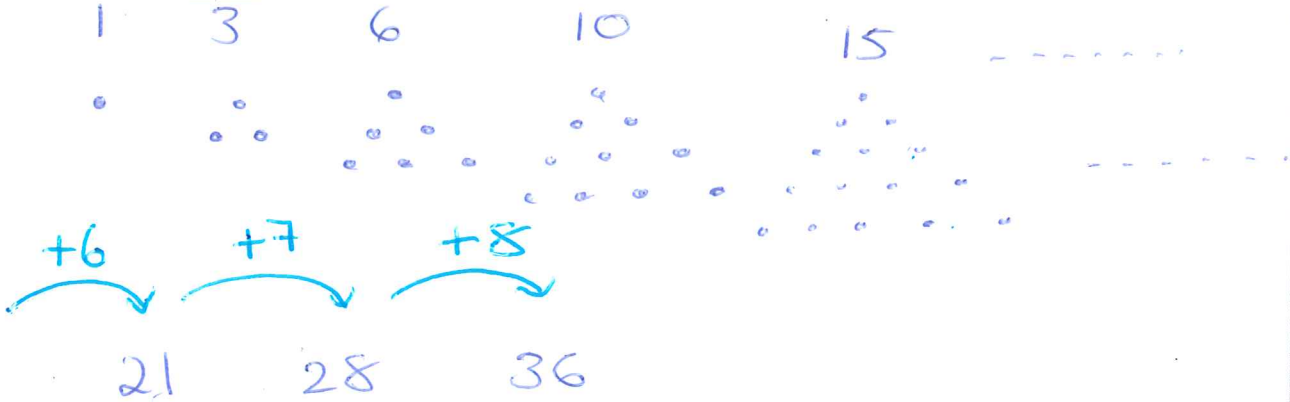
Emma is adding one more each time

(1)

Here are the first four terms of the sequence of triangle numbers.

1 3 6 10 (+2, +3, +4, +5)

(b) Find the 8th term of this sequence.



36

(2)

(Total for Question 13 is 3 marks)

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DO NOT WRITE IN THIS AREA

14 3 kg of carrots cost £1.80
2 kg of carrots and 5 kg of potatoes cost a total of £3.45

Work out the total cost of 4 kg of carrots and 2 kg of potatoes.
You must show all your working.

carrots 3kg cost £1.80

£0.60
3) £1.80

1kg of carrots costs £0.60

2kg carrots + 5kg potatoes = £3.45

carrots £0.60
carrots £0.60
£1.20

2kg carrots cost £1.20

£3.45
− £1.20
£2.25

5kg potatoes cost £2.25

£0.45
5) £2.25

1kg potatoes cost £0.45

How much do 4kg carrots and 2kg potatoes cost?

£ 3.30

(Total for Question 14 is 4 marks)

carrots £0.60
carrots £0.60
carrots £0.60
carrots £0.60
potatoes £0.45
potatoes £0.45 +
£3.30
3 1

15 (a) Expand $2(a + d)$

$2 \times a + 2 \times d$

$2a + 2d$

(1)

(b) Factorise $6y^2 - 5y$

$6yy - 5y$

$= y(6y - 5)$

$y(6y-5)$

(1)

(c) Solve $4x - 7 = 37$

$x \rightarrow [\times 4] \rightarrow [-7] \rightarrow 37$

$11 \leftarrow [\div 4] \leftarrow 44 \leftarrow [+7] \leftarrow 37$

$x =$ 11

(2)

(Total for Question 15 is 4 marks)

OR

$4x - 7 = 37$ [+7

$4x = 44$ [÷4

$x = 11$

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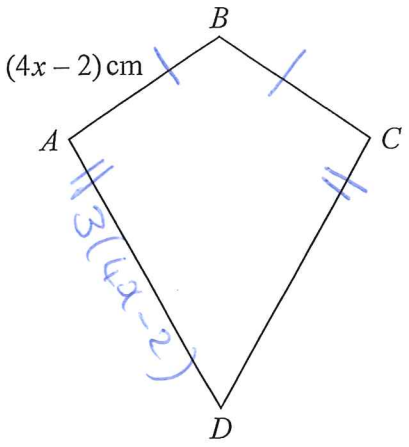
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

16 *ABCD* is a kite.



Kite
AB = BC
AD = DC

$AB = (4x - 2)$ cm

Jasper says that x could be 0.5

(a) Explain why Jasper cannot be correct.

When $x = 0.5$, $AB = 4 \times 0.5 - 2$
$= 2 - 2$
$= 0$

AB is a length so cannot be zero (1)

$AD = 3AB$
The kite has a perimeter of 64 cm.

(b) Find the value of x.

Perimeter
$2(4x - 2) + 2 \times 3(4x - 2) = 64$
$8x - 4 + 6(4x - 2) = 64$
$8x - 4 + 24x - 12 = 64$
$32x - 4 - 12 = 64$
$32x - 16 = 64$ [+16
$32x = 80$ [÷32
$x = \frac{80}{32}$

$x = \frac{80}{32} = \frac{5}{2}$ or 2.5 ✗ (÷16)

$x = \frac{5}{2}$

(3)

(Total for Question 16 is 4 marks)

17 Heidi wants to make some biscuits using this recipe.

Makes 12 biscuits
125 g butter
200 g flour
50 g sugar

6 BISCUITS
62.5 g
~~100 g~~
25 g

Heidi thinks that she has,

500 g butter
700 g flour
250 g sugar

Assuming that these weights are correct,

(a) work out the greatest number of biscuits Heidi can make.
You must show all your working.

	12 BISCUITS	24 BISCUITS	36 BISCUITS	48 BISCUITS
Butter	125	250	375	500
Flour	200	400	600	800
Sugar	50	100	150	200

36 + 6 = 42 biscuits

42

(4)

Heidi is wrong.
She has more than 250 g of sugar.

(b) Does this affect the greatest number of biscuits Heidi can make?
Give a reason for your answer.

No
Heidi had plenty of sugar already but only enough flour for 42 biscuits

(1)

(Total for Question 17 is 5 marks)

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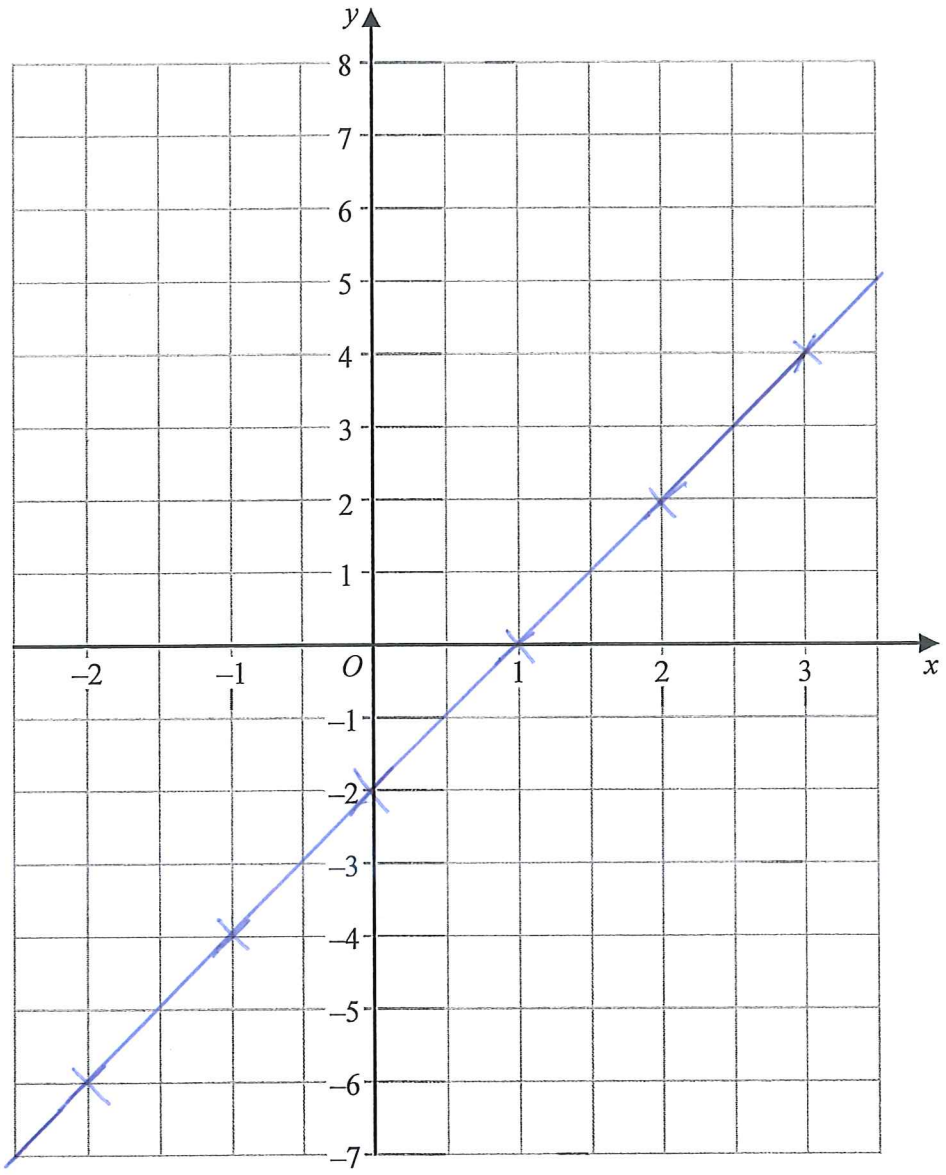
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

18 On the grid below, draw the graph of $y = 2x - 2$ for values of x from -2 to 3

x	-2	-1	0	1	2	3
y	-6	-4	-2	0	2	4



(Total for Question 18 is 3 marks)

19 Robin buys a watch for £80
He sells the watch for £56

Work out his percentage loss.

£56 $\xrightarrow{+4}$ £60 $\xrightarrow{+20}$ £80

$$\%\ \text{change} = \frac{\text{Actual Change}}{\text{Original amount}} \times 100$$

$$\begin{array}{r} £\overset{7}{\cancel{8}}\overset{1}{0} \\ -\ £56 \\ \hline £24 \end{array} \quad \text{loss}$$

$$\%\ \text{loss} = \frac{24}{80} \times 100$$

$$= \frac{3}{10} \times 100$$

30 %

(Total for Question 19 is 3 marks)

$$\frac{24}{80} \xrightarrow{\div 2} \frac{12}{40} \xrightarrow{\div 2} \frac{6}{20} \xrightarrow{\div 2} \frac{3}{10}$$

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Higher Tier Q1

20 (a) Work out 3.67×4.2

Estimate to help replace decimal point
3.67×4.2
$\approx 4 \times 4$
$= 16$

$$\begin{array}{r} 367 \\ \times \quad 42 \\ \hline 734 \\ 14680 \\ \hline 15414 \\ 11 \end{array}$$

15.414

(3)

(b) Work out $59.84 \div 1.6$ $= \dfrac{59.84}{1.6} = \dfrac{598.4}{16}$ (×10 on both)

$$\begin{array}{r} 37.4 \\ 16\overline{)598.4} \\ 48 \\ \hline 118 \\ 112 \\ \hline 64 \\ 64 \\ \hline \end{array}$$

16 × 3 = 48, 1

16 × 4 = 64, 2

16 × 7 = 112, 4

16 × 6 = 96, 3

37.4

(3)

(Total for Question 20 is 6 marks)

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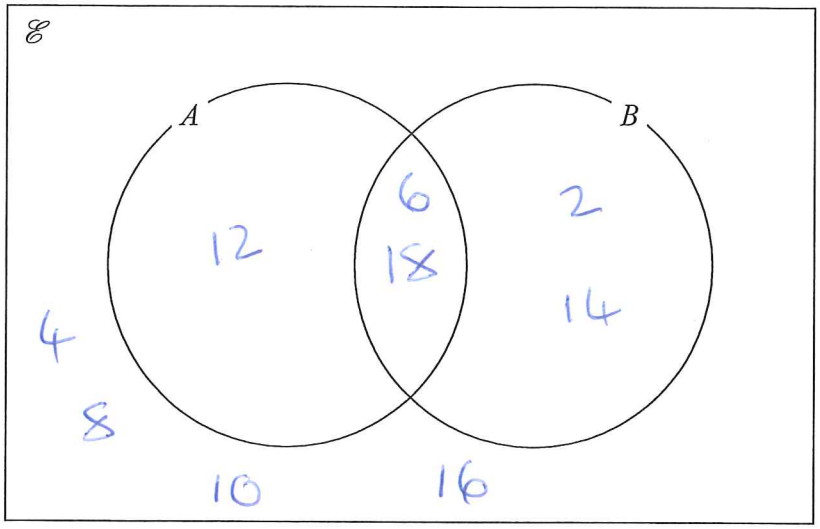
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Higher Tier Q2

21 $\mathscr{E}$ = {even numbers less than 19} = {2, 4, 6, 8, 10, 12, 14, 16, 18}
A = {6, 12, 18}
B = {2, 6, 14, 18}

Complete the Venn diagram for this information.



(Total for Question 21 is 3 marks)

Higher Tier Q3

22 Work out $4\frac{1}{5} - 2\frac{2}{3}$

Give your answer as a mixed number.

$4\frac{1}{5} = \frac{21}{5}$ $\quad 2\frac{2}{3} = \frac{8}{3}$

$\frac{21 \times 3}{5 \times 3} - \frac{8 \times 5}{3 \times 5}$

$= \frac{63}{15} - \frac{40}{15}$

$= \frac{23}{15}$

$= 1\frac{8}{15}$

$63 - 40 = 23$

$1\frac{8}{15}$

(Total for Question 22 is 3 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

Higher Tier Q4

23 At the end of 2017
the value of Tamara's house was £220 000
the value of Rahim's house was £160 000

At the end of 2019
the value of Tamara's house had decreased by 20%
the value of Rahim's house had increased by 30%

At the end of 2019, whose house had the greater value?
You must show how you get your answer.

Tamara

£220 000 ×80%→ £176 000

220 000 → 10% 22000, 20% 44000

£220 000
−£ 44000
176000

Rahim

£160 000 ×130%→ £208 000

160 000 → 10% 16000, 30% 48000

£160 000
+£ 48 000
208000

16 × 3 = 48

Rahim's house had the greater value at the end of 2019

(Total for Question 23 is 4 marks)

Higher Tier Q5

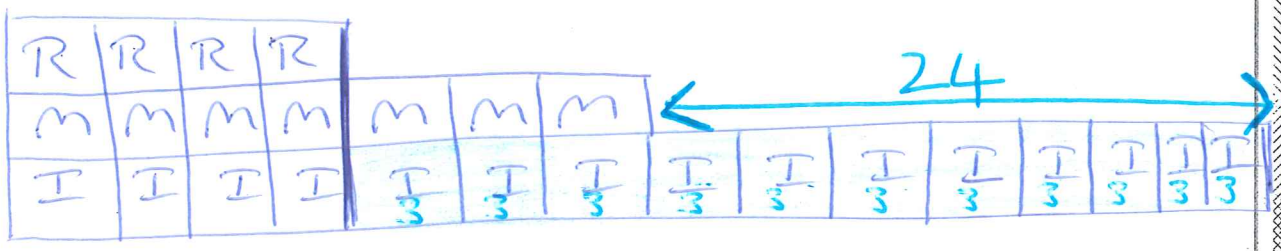
24 Rosie, Matilda and Ibrahim collect stickers.

R:M:I

number of stickers Rosie has : number of stickers Matilda has : number of stickers Ibrahim has = 4 : 7 : 15

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.
How many more?



24 ÷ 8 = 3

11 x 3 = 33

Ibrahim has 33 more stickers than Rosie

33

(Total for Question 24 is 3 marks)

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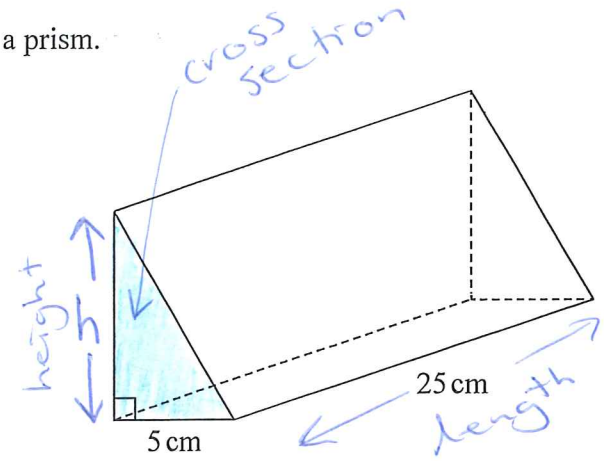
Higher Tier Q6

25 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

The prism has length 25 cm
The prism has volume 750 cm^3

Work out the height of the prism.

Volume of Prism = Area cross section × length

$750 = \text{Area triangle} \times 25 \quad [\div 25$

$\frac{750}{25} = \text{Area triangle}$

$30 = \text{Area triangle}$

The triangle has area 30 cm^2

$\frac{\text{base} \times \text{height}}{2} = 30$

$\frac{5h}{2} = 30 \quad [\times 2$

$5h = 60 \quad [\div 5$

$h = 12$

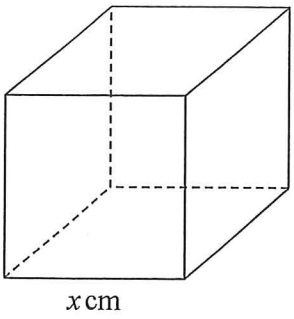
$25\overline{)750}$ 30

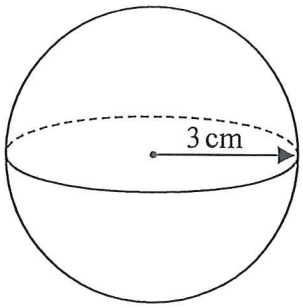
12 cm

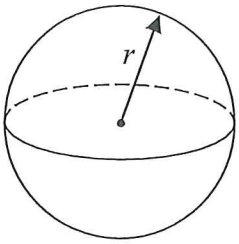
(Total for Question 25 is 3 marks)

Higher Tier Q7

26 The diagram shows a cube with edges of length x cm and a sphere of radius 3 cm.







Surface area of sphere $= 4\pi r^2$

The surface area of the cube is equal to the surface area of the sphere.

Show that $x = \sqrt{k\pi}$ where k is an integer.

Surface Area of Cube $= 6 \times x^2$
$= 6x^2$

Surface Area of Sphere $= 4 \times \pi \times 3^2$
$= 36\pi$

$6x^2 = 36\pi$ [÷ 6

$x^2 = 6\pi$ [√

$x = \sqrt{6\pi}$

(Total for Question 26 is 4 marks)

27 Freddie measured the length of a pencil as 7.2 cm correct to 1 decimal place.

Complete the error interval for the length, p cm, of the pencil.

7.15 $\leqslant p <$ 7.25

(Total for Question 27 is 2 marks)

Q28 not on Higher

28 The equation of a straight line **L** is $y = 3 - 4x$

(i) Write down the gradient of **L**.

-4

(1)

(ii) Write down the coordinates of the point where **L** crosses the y-axis.

(0 , 3)

(1)

(Total for Question 28 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS