



# Model Solutions

Please write clearly in block capitals.

Centre number

Candidate number

Surname \_\_\_\_\_

Forename(s) \_\_\_\_\_

Candidate signature \_\_\_\_\_

# GCSE MATHEMATICS

# F

Foundation Tier Paper 1 Non-Calculator

Thursday 24 May 2018

Morning

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- mathematical instruments



You must **not** use a calculator.

### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for graph paper, tracing paper and more answer paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
<b>TOTAL</b>	

### Advice

- In all calculations, show clearly how you work out your answer.



JUN1883001F01

Answer **all** questions in the spaces provided

1 Work out  $\frac{1}{2} \times 5$

Circle your answer.

[1 mark]

$$\frac{5}{10}$$

$$\left(2\frac{1}{2}\right)$$

$$\frac{1}{10}$$

$$2\frac{1}{5}$$

$$\frac{1}{2} \times 5 = \frac{5}{2} = \frac{4}{2} + \frac{1}{2} = 2\frac{1}{2}$$

2 Circle the number that is 5 less than  $-2$

[1 mark]

$$-10$$

$$\left(-7\right)$$

$$-3$$

$$3$$

$$-2 - 5 = -7$$

3 Simplify  $3 \times a \times 3 \times a$

Circle your answer.

[1 mark]

$$9a$$

$$6a^2$$

$$\left(9a^2\right)$$

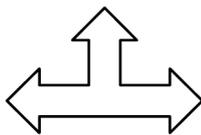
$$6a$$

$$(3 \times 3) \times (a \times a)$$

$$9 \times a^2 = 9a^2$$



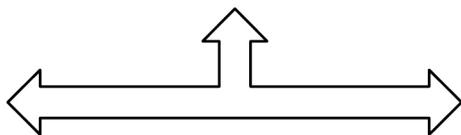
4 Which shape is **similar** to shape X?



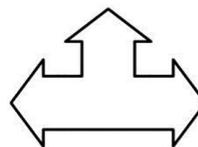
X

Circle the correct letter.

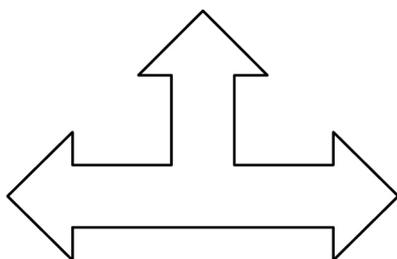
[1 mark]



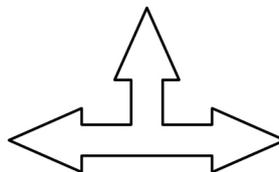
A



B



C



D

X B and D have different shaped arrows compared to x.

X A has been stretched horizontally but not vertically, so is not similar to x.



5 Work out 20% of 14 000

[2 marks]

$$10\% \text{ of } 14000 = \frac{14000}{10} = 1400$$

$$20\% = 2 \times 10\%$$

$$= 2 \times 1400$$

$$= 2800$$

Answer 2800

6 (a) Write 0.85 as a fraction in its simplest form.

[2 marks]

$$0.85 = \frac{85}{100} = \frac{17}{20}$$

$$5 \overline{)85} \\ \underline{35} \\ 50$$

Answer  $\frac{17}{20}$ 6 (b) Write  $\frac{5}{8}$  as a decimal.

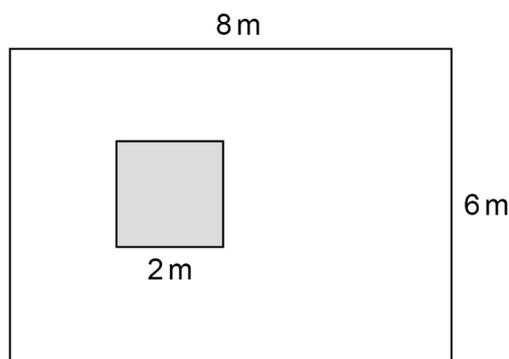
[1 mark]

$$0.625$$

$$8 \overline{)5.000} \\ \underline{50} \\ 00 \\ \underline{00} \\ 00$$

Answer 0.625

- 7 A rectangular carpet measures 8 m by 6 m  
Part of the carpet is covered by a square rug of length 2 m



Not drawn  
accurately

Show that  $\frac{1}{12}$  of the carpet is covered by the rug.

[2 marks]

$$\text{area of carpet} = 8 \times 6 = 48\text{m}^2$$

$$\text{area of rug} = 2^2 = 4\text{m}^2 \quad \text{Square ; length = breadth}$$

$$\begin{array}{l} \text{fraction of} \\ \text{carpet covered} = \frac{4}{48} = \frac{2}{24} = \frac{1}{12} // \\ \text{by the rug} \end{array}$$

*(Handwritten blue annotations: arrows and '÷2' above and below the fractions indicate simplification steps.)*



8 Sam, Carl and Erik share 40 sweets.  
Erik gets the largest share.

What is the **smallest** possible number of sweets that Erik could get?

[2 marks]

$$\frac{40}{3} \Rightarrow 13 \text{ r } 1$$

40 sweets shared  
between 3 people.

Erik gets the largest share, so gets  $13+1=14$

(14 is the smallest possible number of sweets  
he could get.)

Answer 14

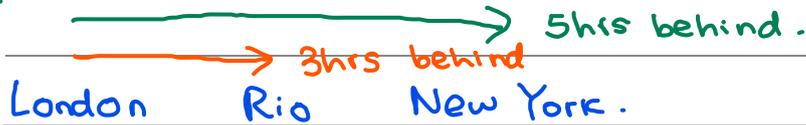
9 The time in Rio is three hours behind London.  
The time in New York is five hours behind London.

What is the time in New York when it is 1.00 am in Rio?

[2 marks]

New York is 2 hours behind Rio.

$$1.00 \text{ am} - 2 \text{ hrs} = 11.00 \text{ pm}$$



Answer 11.00 pm





- 11 300 passengers go on a coach trip.  
 Each coach takes 50 passengers.  
 Each passenger pays £25

The table shows the costs for the coach company.

	Cost for each coach
Pay for driver	£90
Fuel	70p per mile

Each coach travels 200 miles.

Work out the **total** profit the company makes from this trip.

[6 marks]

Total Passengers

Passengers Per coach

$$\frac{300}{50} = 6 \text{ coaches}$$

Total Income:  $300 \times £25 = £7500$

x	300
20	6000
5	1500

$6000 + 1500 = 7500$

Cost for drivers:  $6 \times £90 = £540$

Total cost for fuel:  $6 \times £0.70 \times 200$  (6 coaches, 70p/mile, 200 miles per coach)  
 $= 6 \times £0.70 \times 100 \times 2$   
 $= 12 \times £70 = £840$

Profit: income - costs  $\Rightarrow £7500 - (£540 + £840)$

Answer £ 6120

$£7500 - (£1380)$   
 $= £6120$



12 (a) Work out  $16.4 - 3.92 + 7.8$

[2 marks]

BIDMAS. ∴ '+' first, then '-'

$$\begin{array}{r}
 16.4 + 7.8 - 3.92 \\
 24.2 - 3.92 \\
 \hline
 20.28
 \end{array}
 \qquad
 \begin{array}{r}
 + 16.4 \\
 \quad 7.8 \\
 \hline
 24.2 \\
 \hline
 - 24.20 \\
 \quad 3.92 \\
 \hline
 20.28
 \end{array}$$

Answer 20.28

12 (b) Work out  $2843.61 \div 7$

[2 marks]

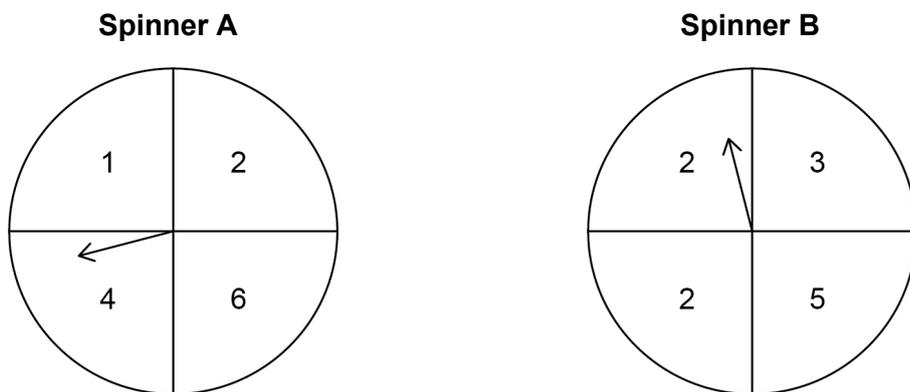
$$\begin{array}{r}
 0406.23 \\
 7 \overline{) 2843.61} \\
 \underline{28} \phantom{43.61} \\
 43 \phantom{.61} \\
 \underline{42} \phantom{.61} \\
 11 \phantom{.61} \\
 \underline{14} \phantom{.61} \\
 21 \\
 \underline{21} \\
 0
 \end{array}$$

Answer 406.23

Turn over for the next question



13 In a game, two fair spinners are spun.



If the numbers the arrows land on are different, the score is the **higher** number.  
If the numbers the arrows land on are the same, the score is 0

13 (a) Complete the table to show the possible scores.

[2 marks]

		Spinner B			
		2	2	3	5
Spinner A	1	2	2	3 ✓	5 ✓
	2	0	0	3 ✓	5 ✓
	4	4	4	4	5 ✓
	6	6	6	6	6

(5 odd numbers)

13 (b) Write down the probability that the score is an **odd** number.

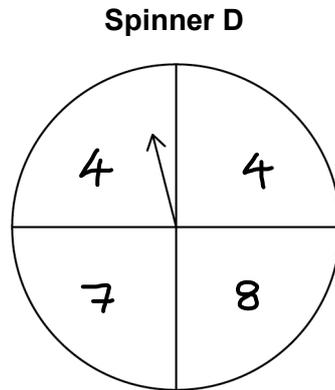
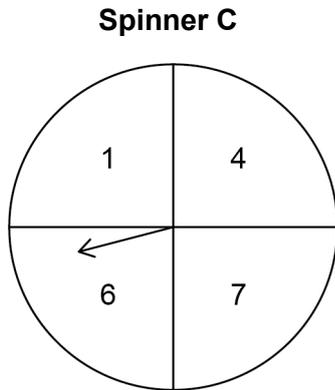
[1 mark]

$4 \times 4 = 16$  possible scores.  $P(\text{odd}) = \frac{5}{16}$

Answer            $\frac{5}{16}$           



- 13 (c) The same game is played using spinners C and D.  
The numbers on C are shown.



The table shows some of the possible scores.

Spinner D

Highest is 4

Score is 0, so the Scores are Same.

Highest is 8.

	4	4	7	8
1	4			
4		0		
6				
7			0	8

Spinner C

Write the missing numbers on spinner D.

[2 marks]



14 2 people working at the same rate will take 6 hours to paint a room.

14 (a) Assuming that they **all** work at this rate,  
how long will it take 3 people to paint the room?

[2 marks]

$$2 \times 6 = 12 \text{ man hours.}$$

$$\frac{12 \text{ man hours}}{3 \text{ men}} = 4 \text{ hours}$$

Answer 4 hours

14 (b) In fact, the **third** person works at a faster rate.  
How does this affect the time to paint the room?

[1 mark]

It will take less time.



15  $3a + b = 7$  and  $6x + 8y = 40$

Show that  $9a + 3b$  has a **greater** value than  $3x + 4y$

[2 marks]

$$\begin{array}{l} \times 3 \left( \begin{array}{l} 3a + b = 7 \\ 9a + 3b = 21 \end{array} \right) \times 3 \qquad \div 2 \left( \begin{array}{l} 6x + 8y = 40 \\ 3x + 4y = 20 \end{array} \right) \div 2 \end{array}$$

$$21 > 20$$

$$\therefore 9a + 3b > 3x + 4y .$$

Turn over for the next question



16 Circle the point that lies on the line  $x - 3 = 0$  [1 mark]  
 $+3 \left( \begin{array}{l} x - 3 = 0 \\ x = 3 \end{array} \right. +3$   
 line is  $x = 3$

(3, 0) (0, 3) (-3, 0) (0, -3)

17  $a$  is a negative odd number. Circle the words that describe  $a^2$  [1 mark]

odd  $\times$  odd = odd  
 $(-)\times(-) = (+)$

negative and odd

negative and even

positive and odd

positive and even

18 Circle the ratio which is the same as the scale 1 cm represents 1 km [1 mark]

1 : 100

1 : 1000

1 : 10 000

1 : 100 000

100 cm  $\rightarrow$  1 m  
 1000 m  $\rightarrow$  1 km  
 $\times 100 \left( \begin{array}{l} 100000 \text{ cm} \rightarrow 1 \text{ km} \end{array} \right.$



19 Circle the percentage that is closest in value to  $\frac{1}{3}$  [1 mark]

30%                      33%                      33.3%                      33.4%

$\frac{1}{3} = 0.333\dots$                        $0.333 \times 100 = 33.3\%$

20 Work out  $\sqrt{121} - (13 - 5 \times 2)^2$  **BIDMAS** [3 marks]

$(13 - 5 \times 2)^2 = (13 - 10)^2 = (3)^2 = 9$

$\sqrt{121} = 11 / -11$

①  $11 - 9$   
 $= 2$

②  $-11 - 9$   
 $= -20$

Answer 2, -20

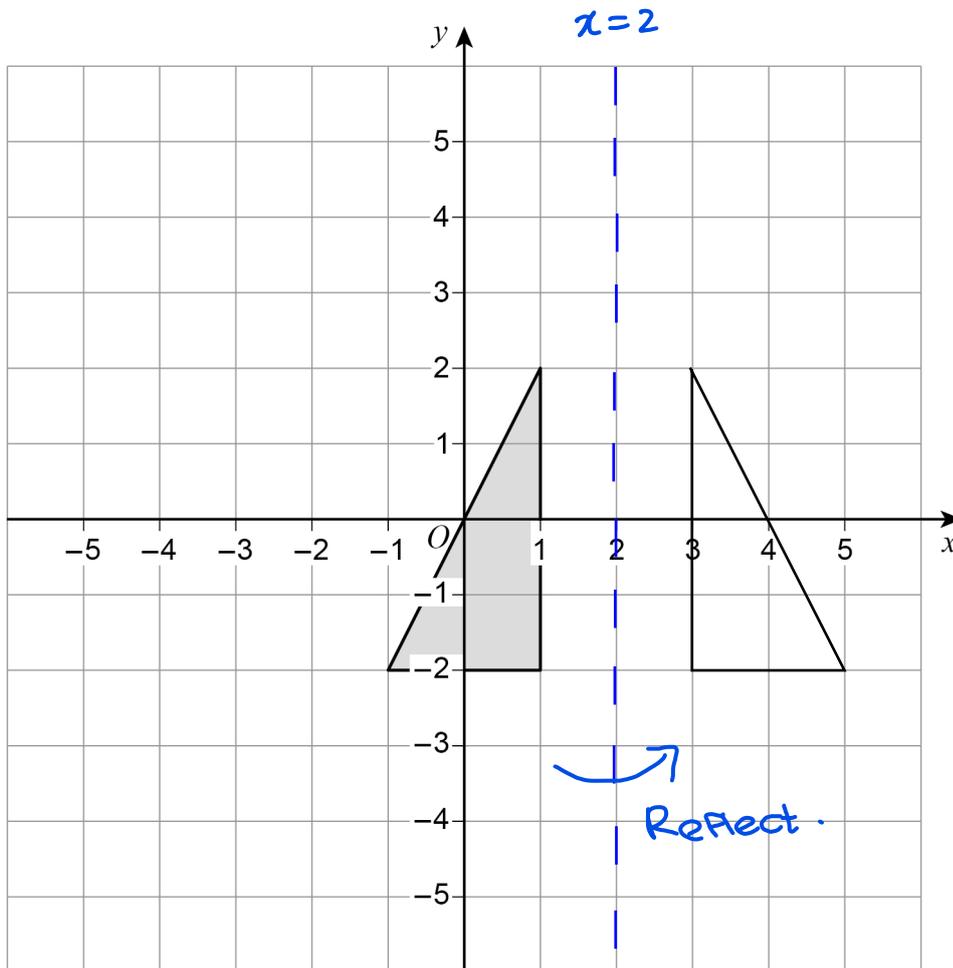
Turn over for the next question



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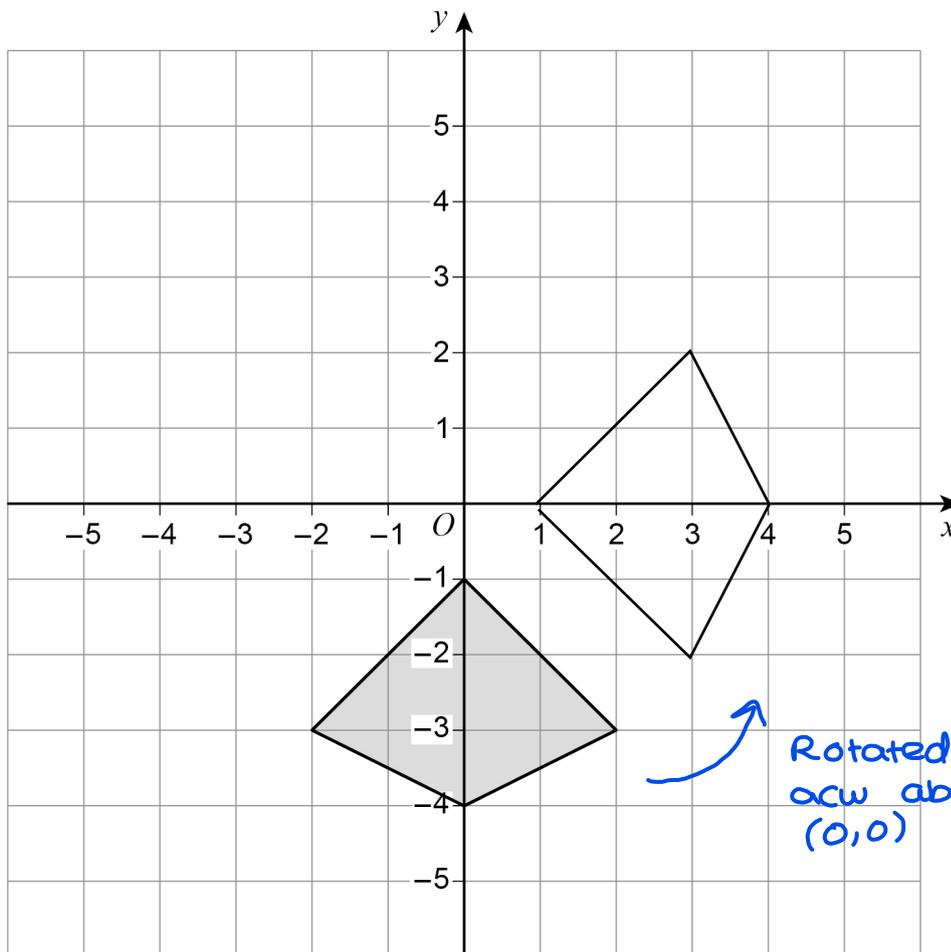
21 (a) Reflect the triangle in the line  $x = 2$

[2 marks]



21 (b) Rotate the kite  $90^\circ$  anticlockwise about  $(0, 0)$

[2 marks]



Turn over for the next question

Turn over ►



22

Anna plays a computer game.

Each game is a win or a loss.

She wins three quarters of her first 24 games.

She then wins her next 12 games.

For all 36 games, work out the ratio wins : losses

Give your answer in its simplest form.

[3 marks]

$$\frac{3}{4} \times 24 = 3 \times \frac{24}{4} = 3 \times 6 = 18$$

So she wins 18 of the first 24 games.

In total wins  $18 + 12 = 30$  games and loses  
6 games.

wins : losses

$$\begin{array}{ccc} \div 6 & \left( \begin{array}{ccc} 30 & : & 6 \end{array} \right) & \div 6 \\ & \left( \begin{array}{ccc} 5 & : & 1 \end{array} \right) & \end{array}$$

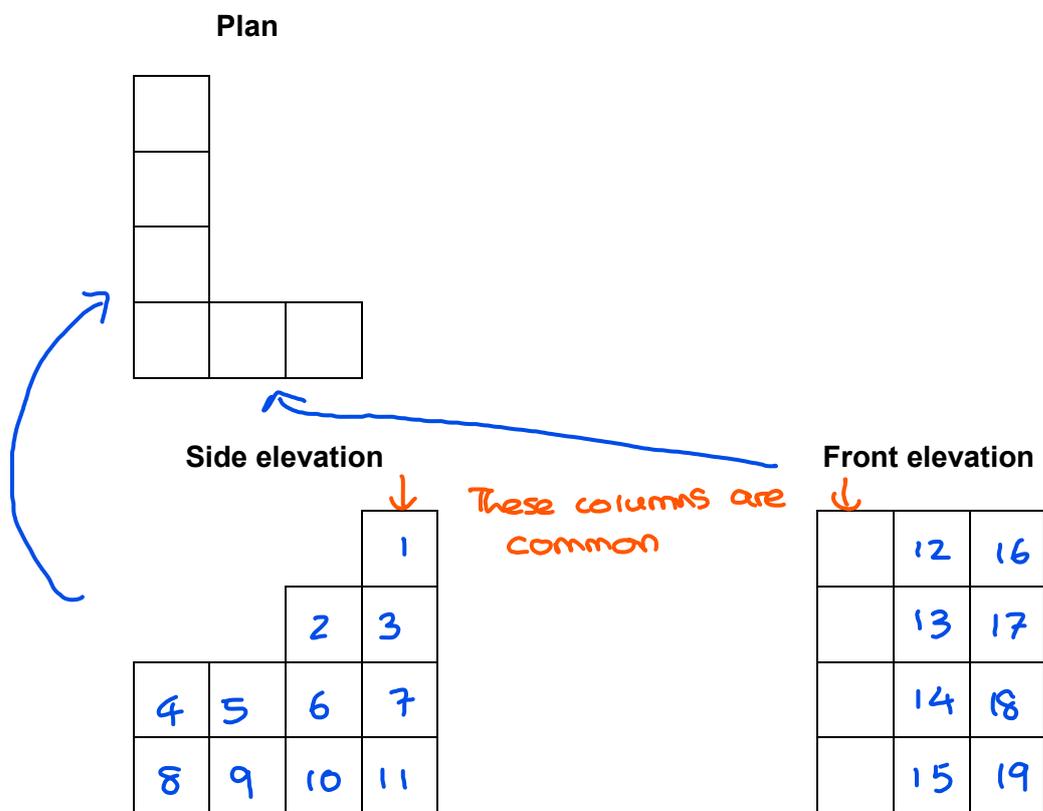
Answer 5 : 1



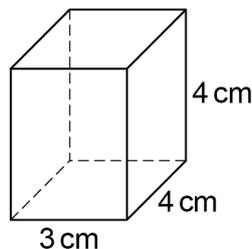
23

A solid shape is made from centimetre cubes.

Here are the plan, side elevation and front elevation of the shape.



Centimetre cubes are added to make this cuboid.



How many cubes are added?

[3 marks]

Number of cubes in the cuboid =  $3 \times 4 \times 4 = 3 \times 16 = 48$

Number of cubes in original shape = 19       $48 - 19 = 29$  (cubes added)

Answer 29

6

Turn over ►



24 Divide 405 in the ratio 4 : 11

[3 marks]

$$4 : 11 \Rightarrow 4 + 11 = 15 \text{ parts.}$$

$$\frac{405}{15} = 15 \overset{027}{\overline{)405}}$$

$$\begin{array}{l} \times 27 \left( \begin{array}{l} 4 : 11 \\ 108 : 297 \end{array} \right) \times 27 \end{array}$$

$$\begin{array}{r} \times 27 \\ \underline{4} \\ 28 \\ \underline{80} \\ 108 \end{array} \qquad \begin{array}{r} \times 27 \\ \underline{11} \\ 27 \\ \underline{270} \\ 297 \end{array}$$

Answer 108 and 297

25 The height of Zak is 1.86 metres.  
The height of Fred is 1.6 metres.

Write the height of Zak as a fraction of the height of Fred.  
Give your answer in its simplest form.

[3 marks]

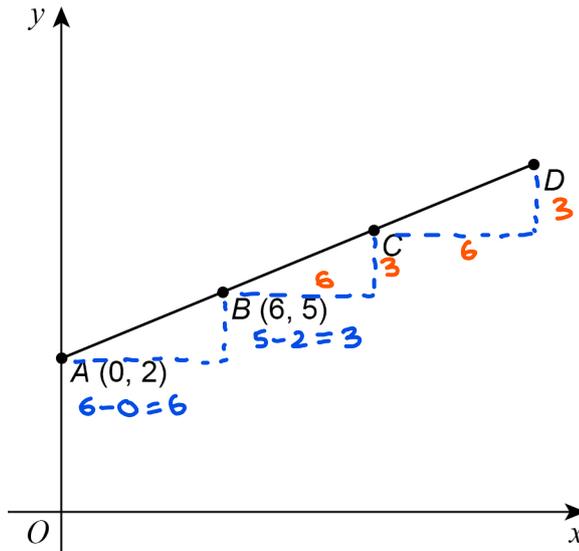
$$\frac{\text{Zak}}{\text{Fred}} = \frac{1.86}{1.6} = \frac{186}{160} = \frac{93}{80}$$

$\times 100 \quad \div 2$

Answer  $\frac{93}{80}$



26 A (0, 2) and B (6, 5) are points on the straight line ABCD.



Not drawn  
accurately

$AB = BC = CD$

Work out the coordinates of D.

[3 marks]

$A \rightarrow D \quad 6 \times 3 = 18 \text{ in } x \text{ axis}$

$3 \times 3 = 9 \text{ in } y \text{ axis}$

$(0, 2)$

$D = (18, 11)$

Answer ( 18 , 11 )

Turn over for the next question



27 A coin is thrown 50 times.  
It lands on heads 31 times.

27 (a) Write down the relative frequency it lands on heads.

[1 mark]

Answer  $\frac{31}{50}$

27 (b) Raj says,  
"The coin is biased towards heads."

Use the data to give a reason why he might be correct.

[1 mark]

The frequency that coin lands on tails is  $50 - 31 = 19$ .  
 $31 > 19$ .

Alternatively: A fair coin will have 25 heads in 50  
throws.

28 Solve  $5(x + 3) < 60$

[2 marks]

$$\begin{array}{l} 5x + 15 < 60 \\ -15 \quad \left. \begin{array}{l} \phantom{5x + 15} \\ \phantom{5x + 15} \end{array} \right\} -15 \\ \hline 5x < 45 \\ \div 5 \quad \left. \begin{array}{l} \phantom{5x} \\ \phantom{5x} \end{array} \right\} \div 5 \\ \hline x < 9 \end{array}$$

Answer  $x < 9$



29 The range of a set of numbers is  $15\frac{1}{4}$

The smallest number is  $-2\frac{7}{8}$

Work out the largest number.

[3 marks]

Range = Largest number - Smallest number.

$$15\frac{1}{4} = \text{largest} - \left(-2\frac{7}{8}\right)$$

$$15\frac{2}{8} = \text{largest} + 2\frac{7}{8}$$

$$15\frac{2}{8} = \frac{(15 \times 8) + 2}{8}$$

$$15\frac{2}{8} - 2\frac{7}{8} = \text{largest}$$

$$\frac{122}{8} - \frac{23}{8} = \frac{122 - 23}{8} = \frac{99}{8}$$

$$2\frac{7}{8} = \frac{(2 \times 8) + 7}{8}$$

Answer  $\frac{99}{8}$

30  $y$  is inversely proportional to  $x$ .

Complete the table.

[2 marks]

$x$	12	6	3
$y$	2	4	8

$$y \propto \frac{1}{x} \text{ so } y = \frac{k}{x}$$

$$\text{when } x=6, y=4 \Rightarrow 4 = \frac{k}{6} \Rightarrow k = 4 \times 6 = 24$$

$$\therefore y = \frac{24}{x}$$

Turn over for the next question

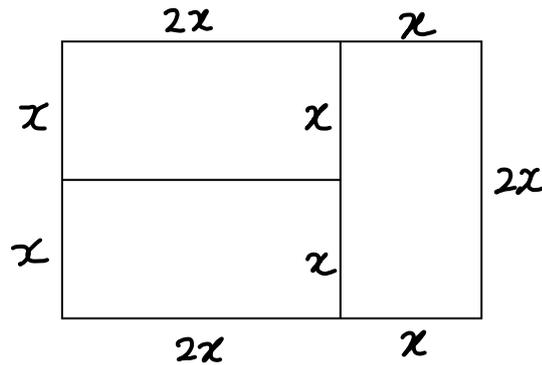
$$x=12; y = \frac{24}{12} = 2$$

$$y=8;$$

$$8 = \frac{24}{x} \Rightarrow x = \frac{24}{8} = 3$$



- 31 A large rectangle is made by joining three identical small rectangles as shown.



Not drawn  
accurately

The perimeter of one small rectangle is 15 cm

Work out the perimeter of the large rectangle.

[4 marks]

Perimeter of Small rectangle:

$$2x + x + 2x + x = 15$$

$$6x = 15$$

$$x = 2.5$$

$$\text{large rectangle} \Rightarrow x + x + 2x + x + 2x + x + 2x = 10x$$

$$10(2.5) = 25 \text{ cm}$$

Answer 25 cm



32

Put these numbers in order from smallest to largest.

$8 \times 10^{-4}$

②

$4 \times 10^{-2}$

③

$6 \times 10^{-4}$

①

$0.07$

④

[2 marks]

$$8 \times 10^{-4} = 8 \div 10000 = 0.0008$$

$$4 \times 10^{-2} = 4 \div 100 = 0.04$$

$$6 \times 10^{-4} = 6 \div 10000 = 0.0006$$

Smallest  $\rightarrow$  largest :  $0.0006, 0.0008, 0.04, 0.07$

Smallest  $6 \times 10^{-4}$

$$8 \times 10^{-4}$$

$$4 \times 10^{-2}$$

Largest  $0.07$

END OF QUESTIONS



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