

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

\_\_\_\_\_

Forename(s)

\_\_\_\_\_

Candidate signature

\_\_\_\_\_



## GCSE MATHEMATICS

# F

Foundation Tier      Paper 2 Calculator

Thursday 7 November 2019      Morning      Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- a calculator
- mathematical instruments.



### 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 more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

### Advice

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

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>	



Answer all questions in the spaces provided

Do not write  
outside the  
box

- 1 Simplify  $8a - 3a + a$   
Circle your answer.

[1 mark]

$4a$

$6a$

$5 + a$

$8a - 3a^2$

- 2 Which of these numbers is three less than a square number?  
Circle your answer.

[1 mark]

$25 - 3 = 22$

5

19

22

34

- 3 Circle the length of time between 1.50 pm and 3.35 pm

[1 mark]

1 h 45 min

2 h 15 min

2 h 25 min

3 h 5 min

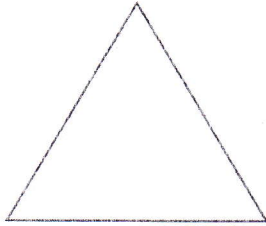


4

Circle the letter of the shape that has rotational symmetry of order 2

[1 mark]

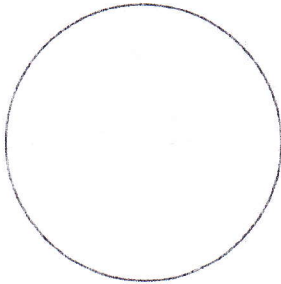
P



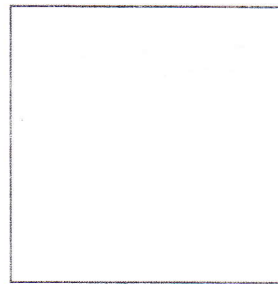
Q



R



S



Turn over for the next question

Turn over ►



5 Here are eight numbers.

~~4~~ ~~10~~ ~~9~~ ~~3~~ ~~4~~ ~~12~~ ~~5~~ ~~14~~  
3 4 4 5  $\uparrow$  9 10 12 14

5 (a) Work out the range.

$$14 - 3 = 11$$

[1 mark]

Answer 11

5 (b) Work out the median.

[2 marks]

$$\frac{8+1}{2} = \frac{9}{2} = 4.5^{\text{th}} \text{ value}$$

$$\frac{5+9}{2} = \frac{14}{2} = 7$$

Answer 7



6

A shop has this offer.

£5 reduction if you spend more than £100

or

£10 reduction if you spend more than £150

or

£20 reduction if you spend more than £200

At the shop, dresses cost £42 each.

Amira buys 3 dresses.

Bobbi buys 5 dresses.

How much **more** than Amira does Bobbi pay?

[3 marks]

Amira	$\begin{array}{r} 42 \times \\ 3 \\ \hline 126 \end{array}$	$126 - 5 = \pounds 121$
Bobbi	$\begin{array}{r} 42 \times \\ 5 \\ \hline 210 \end{array}$	$210 - 20 = \pounds 190$
		$190 - 121 =$

Answer £ 69

Turn over for the next question

Turn over ►



7 (a) Solve  $x + 17 = 12$

[1 mark]

$$x = 12 - 17$$

$$x = -5$$

7 (b) Solve  $\frac{w}{4} = 12$

[1 mark]

$$w = 4 \times 12 = 48$$

$$w = 48$$

7 (c) Simplify fully  $\frac{9m}{12m}$

[2 marks]

$$\text{Answer } \frac{3}{4}$$



8

The cost of a taxi journey is

£3 plus £2 per mile.

Circle the cost of a journey of 6 miles.

$$3 + 6 \times 2$$

$$3 + 12 = 15$$

[1 mark]

£5

£12

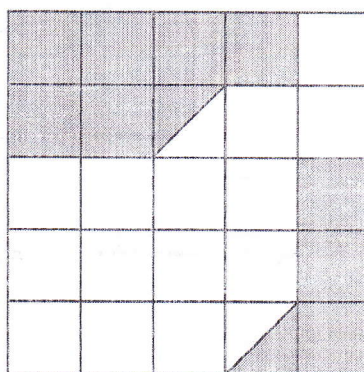
£15

£30

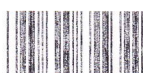
9

What percentage of this shape is shaded?

[2 marks]



$$\frac{10}{25} \times 100 = 40\%$$

















Answer 40 %

10

A group of students were asked to name their favourite burger.

The pictogram shows the results.

The key is missing.

Chicken	   
Beef	     
Turkey	
Veggie	    

40 students said Veggie.

$$\bigcirc = 8$$

How many students said Chicken?

[3 marks]

$$40 \div 5 = 8$$

$$3 \times 8 + 4 = 28$$

Answer 28



11

$$c = 250 - 16^2$$

$$d = \frac{18 \times 14}{-28}$$

Work out the value of  $c \times d$

[2 marks]

$$(250 - 16^2) \times \left( \frac{18 \times 14}{-28} \right)$$

on calculator

$$= 54$$

Answer

54

12

When a spinner is spun, it shows

Blue (B) or Green (G) or Red (R) or White (W).

When a coin is tossed, it shows

Heads (H) or Tails (T).

The spinner is spun and the coin is tossed.

Complete this list of possible outcomes.

[2 marks]

BH	GH	RH	WH
BT	GT	RT	WT



13

A quadrilateral  $PQRS$  has

$$PQ = 5 \text{ cm}$$

 $QR$  perpendicular to  $PQ$ 

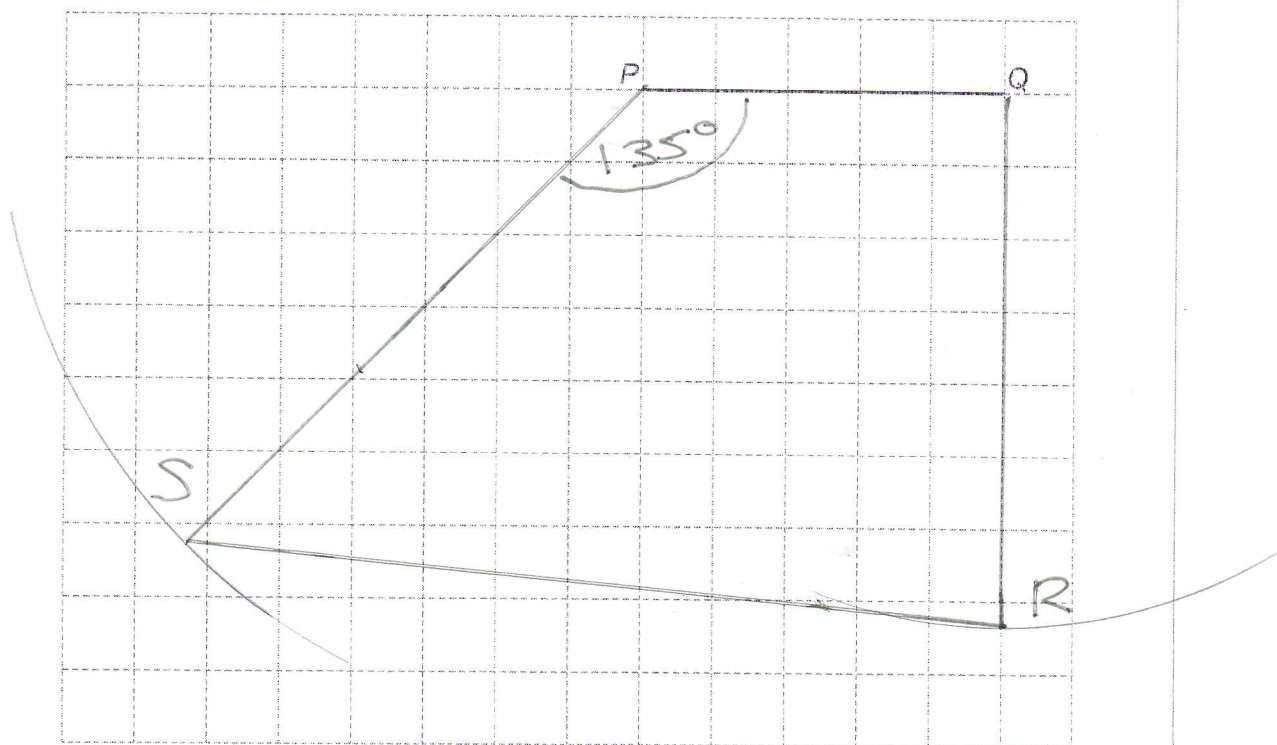
$$QR = 7 \text{ cm}$$

$$\text{angle } QPS = 135^\circ$$

$$PS = 8.5 \text{ cm}$$

On the grid, draw the quadrilateral  $PQRS$ . $PQ$  has been drawn for you.

[4 marks]



14

Circle the solid that has six vertices.

[1 mark]

cone

cuboid

triangular prism

square-based pyramid

15

Which of these fractions is closer in value to 1?

$$\frac{3}{4}$$

$$\frac{13}{10}$$

You must show your working.

[2 marks]

$$1 - \frac{3}{4} = 0.25 \quad \frac{13}{10} - 1 = 0.3$$

$$\frac{3}{4} \text{ closer as}$$

$$0.25 < 0.3$$

Answer

$$\frac{3}{4}$$

Turn over for the next question

Turn over ►



16

Three teams, A, B and C, play in a competition.

games won by A : games won by B =  $2 : 1$

games won by B : games won by C =  $3 : 1$

Team B has won 6 games.

In total, how many games have the three teams won?

[3 marks]

A : B

B : C

2 : 1

3 : 1

(12) : 6  
x2

6 : (2)  
÷3

A + B + C

12 + 6 + 2 = 20

Answer

20



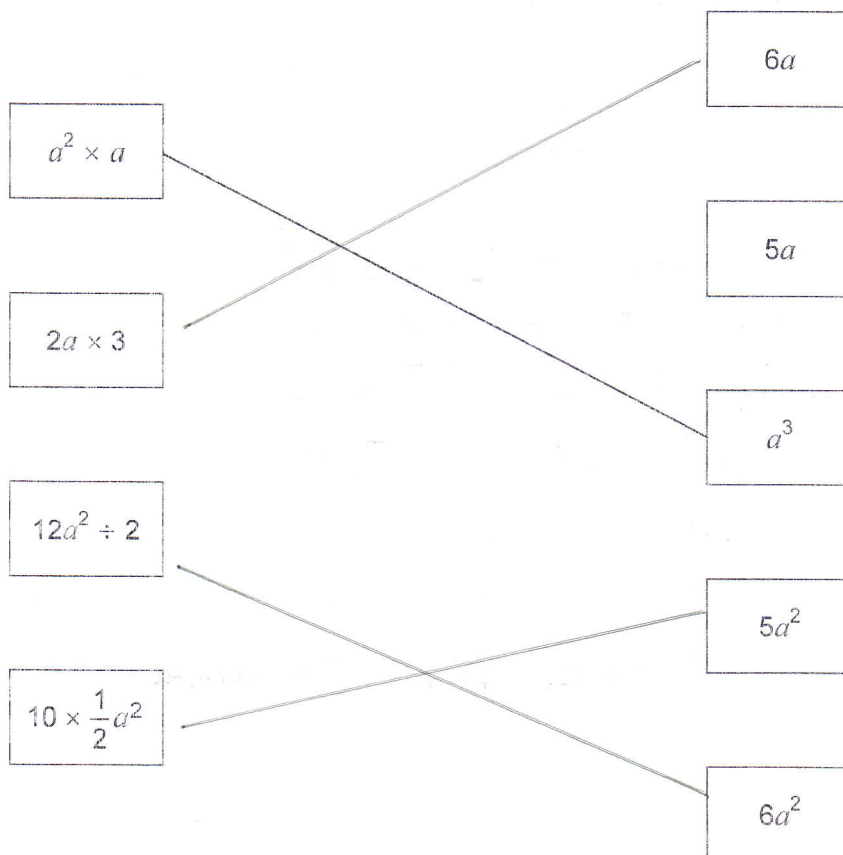
17

Match each expression in Column P with the equivalent expression in Column Q.  
One has been done for you.

[3 marks]

Column P

Column Q



Turn over for the next question

Turn over ►



18

A drink is made by adding water to juice.

Do not write  
outside the  
box

**Instructions**

Add an amount of water that is between 2 times and 3 times the amount of juice

Rana has 120 ml of juice.

She adds some water.

She has now made 450 ml of the drink.

Has Rana followed the instructions?

You **must** show your working.

[3 marks]

$$120 \times 2 = 240 \text{ ml}$$

$$120 \times 3 = 360 \text{ ml}$$

$$\text{Lower Limit} = 120 + 240 = 360 \text{ ml}$$

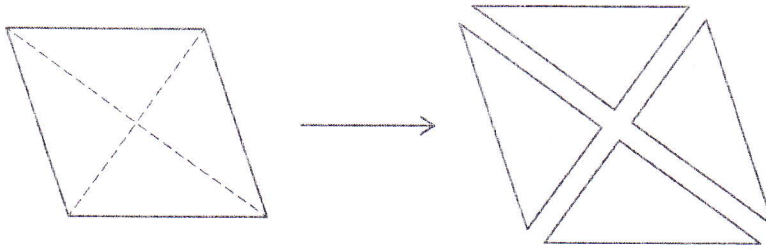
$$\text{Upper limit} = 120 + 360 = 480 \text{ ml}$$

450 is in the correct range  
Rana has followed the instructions



19

A rhombus is cut along the diagonals to make four triangles.

Not drawn  
accuratelyWhich **three** statements are correct for any rhombus?Tick **three** boxes.**[2 marks]**
☒

All four triangles are right-angled

☐

All four triangles are isosceles

☒

All four triangles are congruent

☒
Area of rhombus =  $4 \times$  area of one triangle
☐
Perimeter of rhombus =  $4 \times$  perimeter of one triangle

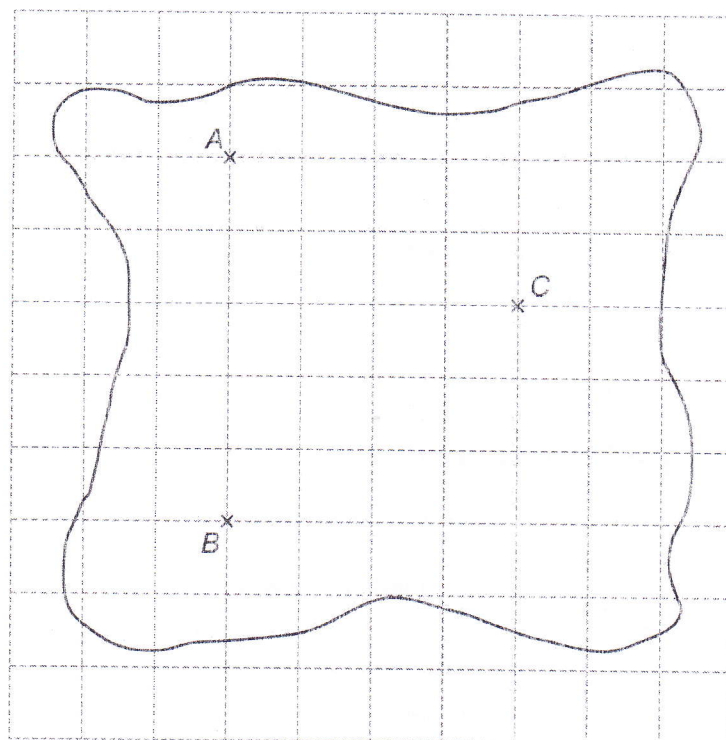
Turn over for the next question



20

A map of an island is shown on a centimetre grid.

A, B and C are houses.



- 20 (a) The actual distance between A and B is 1500 metres.

Show that the scale on the map is 1 : 30 000

[2 marks]

$$AB \text{ on map} = 5 \text{ cm}$$

$$5 \text{ cm represents } 1500 \text{ m}$$

$$5 \text{ cm} \quad " \quad 150000 \text{ cm}$$

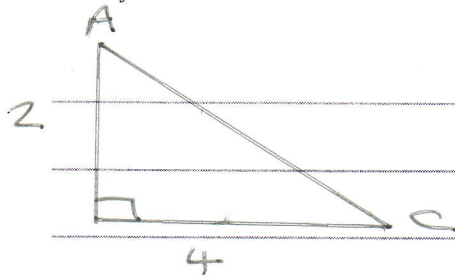
$$\div 5 \quad \swarrow \quad 1 \text{ cm represents } 30000 \text{ cm} \quad \searrow \div 5$$

$$\therefore \text{ scale is } 1 : 30000$$



- 20 (b) Work out the actual distance between A and C.  
Give your answer in kilometres.

[4 marks]



$$AC = \sqrt{2^2 + 4^2}$$

$$= 2\sqrt{5}$$

$$2\sqrt{5} \times 30000$$

$$= 134164.0786 \text{ cm}$$

$$= 1341.640786 \text{ m}$$

$$= 1.341640786 \text{ km}$$

Answer 1.34 km  
(3 sf)

- 21  $a$  and  $b$  are both prime numbers.  
They are each less than 20

Give an example where  $a + b$  is odd but not prime.

[2 marks]

$$2 + 7 = 9$$

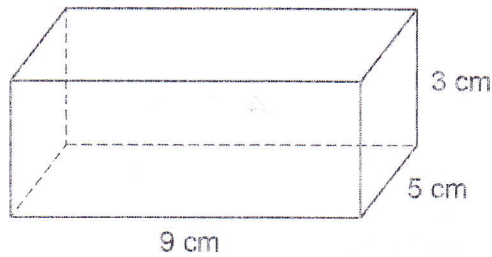
↑ odd and not prime.

$$a = \underline{2} \quad b = \underline{7}$$



22

Here is a cuboid.

Do not write  
outside the  
boxThe two **largest** faces are blue.

The other four faces are green.

Is the total blue area greater than the total green area?

You **must** show your working.

[3 marks]

$$9 \times 5 = 45 \text{ cm}^2 \quad \text{— blue}$$

$$5 \times 3 = 15 \text{ cm}^2 \quad \text{— green}$$

$$9 \times 3 = 27 \text{ cm}^2 \quad \text{— green}$$

$$\text{Total blue} = 45 \times 2 = 90 \text{ cm}^2$$

$$\text{Total green} = 42 \times 2 = 84 \text{ cm}^2$$

$$27 + 15$$

Yes, the total blue area is  
greater than the total  
green area.



23

The result of a game is Win, Lose or Draw.

After 80 games

relative frequency of the result Win is 0.4relative frequency of the result Lose is 0.25

How many of the games had the result Draw?

[3 marks]

$$0.4 + 0.25 = 0.65$$

$$\text{Draw} = 1 - 0.65 = 0.35$$

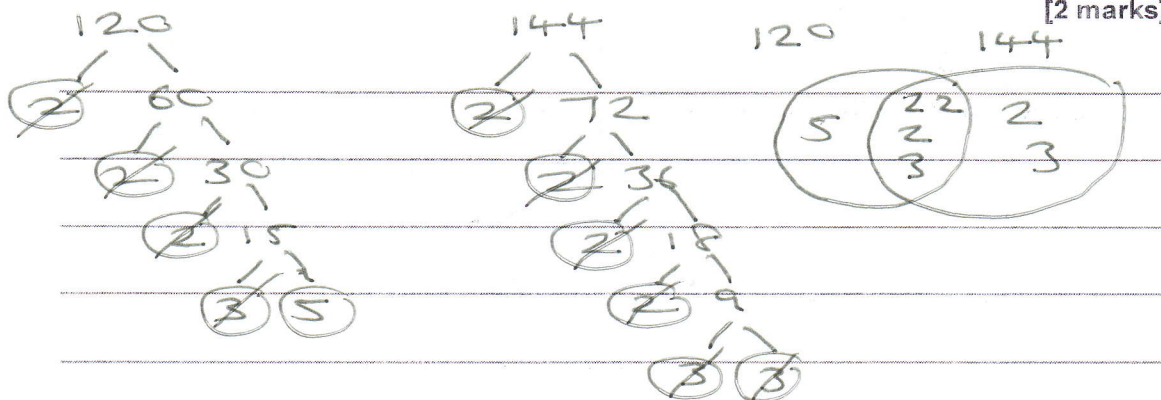
$$0.35 \times 80 = 28$$

Answer 28

24

Work out the lowest common multiple (LCM) of 120 and 144

[2 marks]

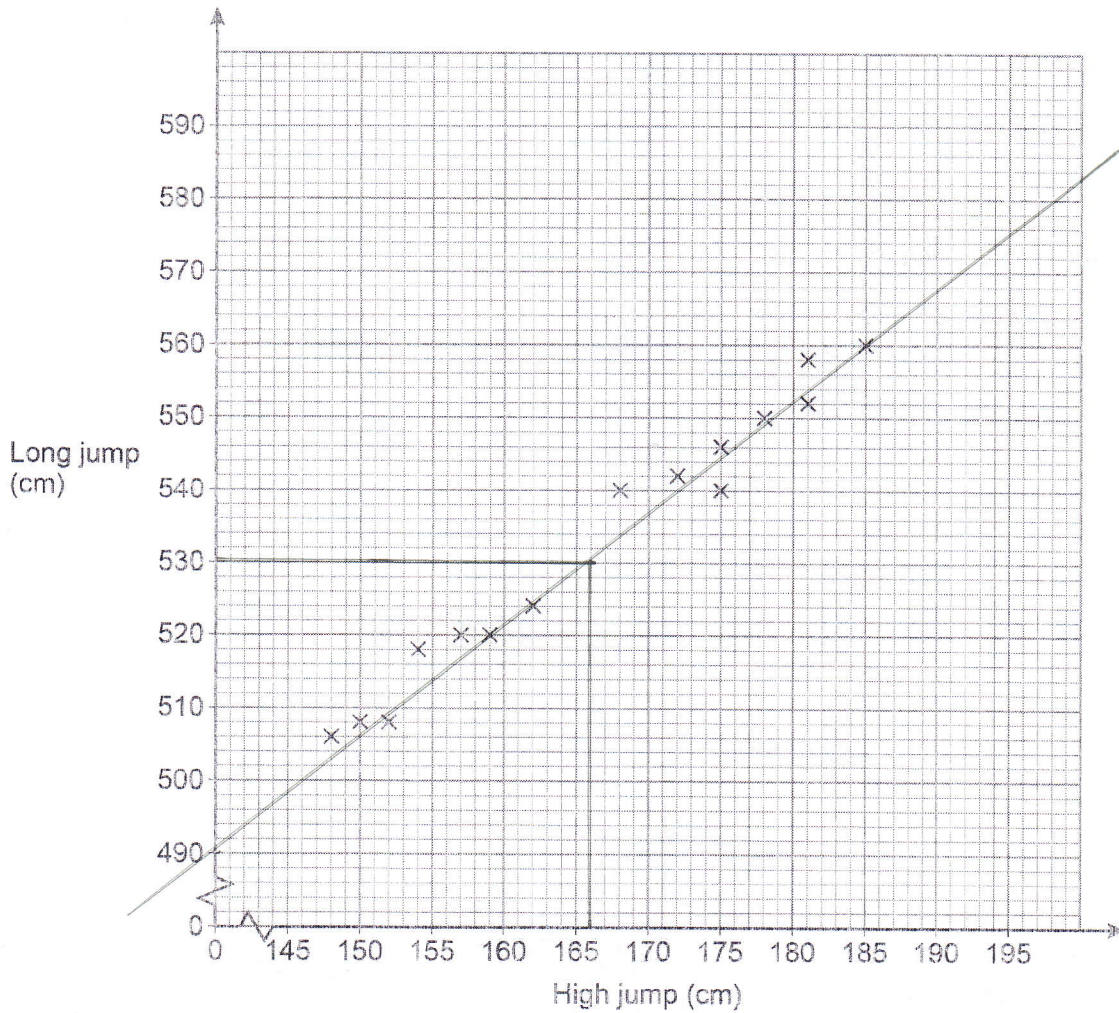
Answer 720

$$\text{LCM} = 5 \times 2 \times 2 \times 2 \times 3 \times 2 \times 3 = 720$$



25

The scatter graph shows the best high jump and the best long jump for 15 boys.



25 (a) Write down the type of correlation shown.

[1 mark]

Answer Positive



- 25 (b) Liam has a best high jump of 166 cm

Use a line of best fit to estimate his best long jump.

[2 marks]

Answer 530 cm

- 25 (c) Another boy has a best high jump of 195 cm

Give a reason why you should **not** use a line of best fit to estimate his best long jump.

[1 mark]

195 is outside the range  
of the data

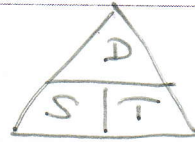
Turn over for the next question

Turn over ►



26

A car journey is in two stages.  $\begin{matrix} D \\ T \end{matrix}$



Stage 1 The car travels 110 miles in 2 hours.

Stage 2 The car travels 44 miles at the same average speed as Stage 1

Work out the time for Stage 2  $\begin{matrix} D \\ T \end{matrix}$

Give your answer in minutes.

[3 marks]

$$\text{Stage 1 } S = \frac{110}{2} = 55 \text{ mph}$$

$$\text{Stage 2 } T = \frac{44}{55} = \frac{4}{5} \text{ hour}$$

$$\frac{4}{5} \times 60 = 48 \text{ minutes}$$

Answer 48 minutes

27

Here is an identity.

$$a(3x - 10) \equiv 21x + 2b$$

Work out the values of  $a$  and  $b$ .

[3 marks]

$$3ax - 10a \equiv 21x + 2b$$

$$\text{Equating } x\text{'s } 3a = 21$$

$$a = 7$$

$$\therefore -10 \times 7 = 2b$$

$$-70 = 2b$$

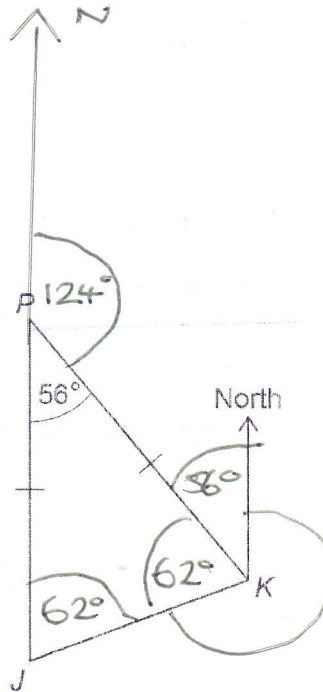
$$b = -35$$

$a = \underline{7}$   $b = \underline{-35}$

Do not write  
outside the  
box



28

*J* and *K* are ships.*P* is a port.*J* is due South of *P*.Angle  $JPK = 56^\circ$  $JP = KP$ Not drawn  
accuratelyWork out the bearing of *J* from *K*.

[3 marks]

$$(180 - 56) \div 2 = 62^\circ$$

$$180 - 124 = 56^\circ$$

$$x = (360 - 62 - 56) = 242^\circ$$

Answer 242°

Turn over for the next question

Turn over ►



29

The 5th term of a linear sequence is 17The 6th term of the sequence is 21

Work out the 100th term of the sequence.

[3 marks]

$$a + 4d = 17 \quad (1)$$

$$a + 5d = 21 \quad (2)$$

$$(2) - (1) \quad d = 4$$

$$\text{in } (1) \quad a + 4 \times 4 = 17$$

$$a = 1$$

$$100^{\text{th}} \text{ term is } a + 99d = 1 + 99 \times 4$$

Answer 397

30

$$a = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \quad b = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

Work out  $3a + b$ 

[2 marks]

$$3 \begin{pmatrix} 2 \\ 7 \end{pmatrix} + \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

$$= \begin{pmatrix} 6 \\ 21 \end{pmatrix} + \begin{pmatrix} 5 \\ -2 \end{pmatrix} = \begin{pmatrix} 11 \\ 19 \end{pmatrix}$$

Answer

$$\begin{pmatrix} 11 \\ 19 \end{pmatrix}$$



31

The value of a house is £120 000

The value is expected to increase by 5% each year.

Work out the expected value after 4 years.

Give your answer to 2 significant figures.

You **must** show your working.

[4 marks]

$$100\% + 5\% = 105\% = 1.05$$

$$120000 \times 1.05^4 = 145860.75$$

Answer £ 15 0000 (2sf)

END OF QUESTIONS

