AQA Model Solutions

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

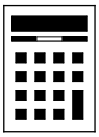
F

Foundation Tier Paper 2 Calculator

Thursday 7 June 2018 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	
TOTAL	

Answer **all** questions in the spaces provided

Do not write outside the box

1 Circle the expression that can be written as $2y$

[1 mark]

$y + y = 2y$

$y + y$ $\quad$ y^2 $\quad$ $2 + y$ $\quad$ $y \times y$

2 Circle the decimal that is greater than $\frac{3}{10}$ and less than $\frac{2}{5}$

[1 mark]

$\frac{3}{10} = 0.3$ $\quad$ $\frac{2}{5} = \frac{4}{10} = 0.4$

0.32 $\quad$ 0.035 $\quad$ 0.4 $\quad$ 0.24

3 What is 625 as a power of 5 ?

Circle your answer.

[1 mark]

5^3 $\quad$ 5^4 $\quad$ 5^5 $\quad$ 5^{125}

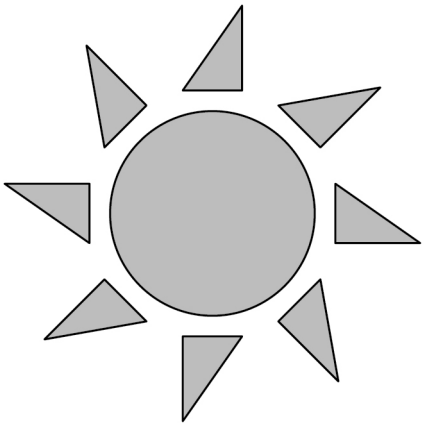
$5^2 = 25$

$5^3 = 125$

$5^4 = 625$

Do not write outside the box

4 Circle the order of rotational symmetry of this drawing.



[1 mark]

0 2 4 8

the no. of orientations for which the shape will look the same when rotated.

5 Work out the value of $3^6 - \sqrt{841}$

[2 marks]

$3^6 - \sqrt{841}$

$729 - 29 = 700$

Answer 700

Turn over for the next question

6

Do not write outside the box

6 Gemma has four groups of friends on a social media site.

The table shows the number of friends in each group.

Group	Number of friends
Family	8
Netball	8
School	26
Guides	11

6 (a) Which group is the mode?

mode is the value that appears most often.

[1 mark]

Answer School

6 (b) Gemma wants a pictogram to show the information.

She has drawn the first two rows.

Complete the pictogram.

Remember to complete the key.

[3 marks]

Key: ◯ represents 4 friends

Family	◯ ◯
Netball	◯ ◯
School	◯ ◯ ◯ ◯ ◯ ◯ ◔
Guides	◯ ◯ ◔

Do not write outside the box

7 e is 3 **more** than d.

f is 5 **less** than d.

7 (a) Write an expression for e in terms of d.

[1 mark]

Answer $e = 3+d$

7 (b) Write an expression for f in terms of d.

[1 mark]

Answer $f = d-5$

7 (c) Work out $e-f$

Simplify your answer.

[2 marks]

$e-f = (3+d)-(d-5)$

$= 3+d-d+5$

$= 8$

Answer 8

Turn over for the next question

8

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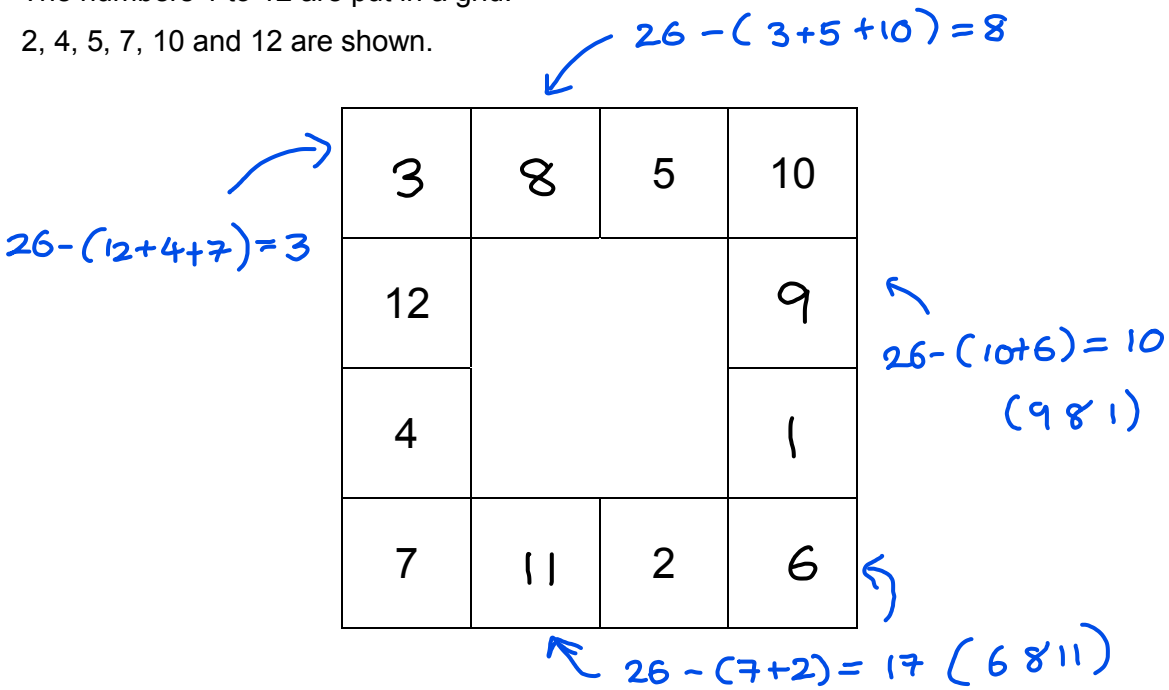
8 The numbers 1 to 12 are put in a grid.

2, 4, 5, 7, 10 and 12 are shown.



Each of the four sides of the grid must add up to 26

Complete the grid using the numbers

1, 3, 6, 8, 9 and 11

[3 marks]

Do not write outside the box

9 In this question, use

1 foot = 12 inches

1 inch = 2.5 centimetres

Change 5 feet 8 inches to centimetres.

[3 marks]

5feet = 5x12 = 60 inches

So 5feet 8 inches = 68 inches

in cm ⇒ 68x2.5 = 170

Answer 170 cm

10 Which of these numbers has **exactly four** factors?

Circle your answer.

[1 mark]

4 (8) 12 16

factors of 8: 1, 2, 4, 8

Turn over for the next question

7

Do not write outside the box

11 Nick has a 6-digit code.

He remembers it as three 2-digit numbers.

The first number is between 10 and 20

The second number is 3 times the first number.

The third number is 5 times the first number.

All six digits are **different**.

Work out the code.

[3 marks]

First digit starts with 1 as the first number $10 < x < 20$.

So second digit can't be 1:

12 36 60
13 39 65
14 42 70
15 45 75
16 48 80
17 51 85
18 54 90
19 57 95

Not possible, as each code contains atleast one repeated digit.

×3 ×5

Answer 1 8 5 4 9 0

12 How many minutes are there in $5\frac{1}{4}$ hours?

Circle your answer.

[1 mark]

(315) 325 515 525

5.25 hours

$5.25 \times 60 = 315$ min

↑ minutes per hour

Do not write outside the box

13 Here is a formula for the amount of water needed to cook rice.

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (a) How many cups of water are needed to cook 7 cups of rice?

[2 marks]

Sub $r=7$; $w = 1.5(7) + 0.5$

$= 10.5 + 0.5$

$= 11$

Answer 11

13 (b) How many cups of rice can be cooked with 20 cups of water?

[3 marks]

$w = 20$; $20 = 1.5r + 0.5$

$19.5 = 1.5r$

$r = \frac{19.5}{1.5} = 13$ cups of rice.

Answer 13

Turn over for the next question

9

Do not write outside the box

14 (a) Use your calculator to work out $9.95^2 \times 29.8$

Give your answer as a decimal.

Write down your full calculator display.

[1 mark]

Answer 2950.2745

14 (b) Is your answer to part (a) sensible?

Use approximations to decide.

You **must** show your working.

[3 marks]

$9.95 \approx 10$ (1 sf)

$29.8 \approx 30$ (1sf)

$10^2 \times 30 = 100 \times 30 = 3000$

So answer to (a) is sensible.

Tick a box.

☑ Sensible ☐ Not sensible

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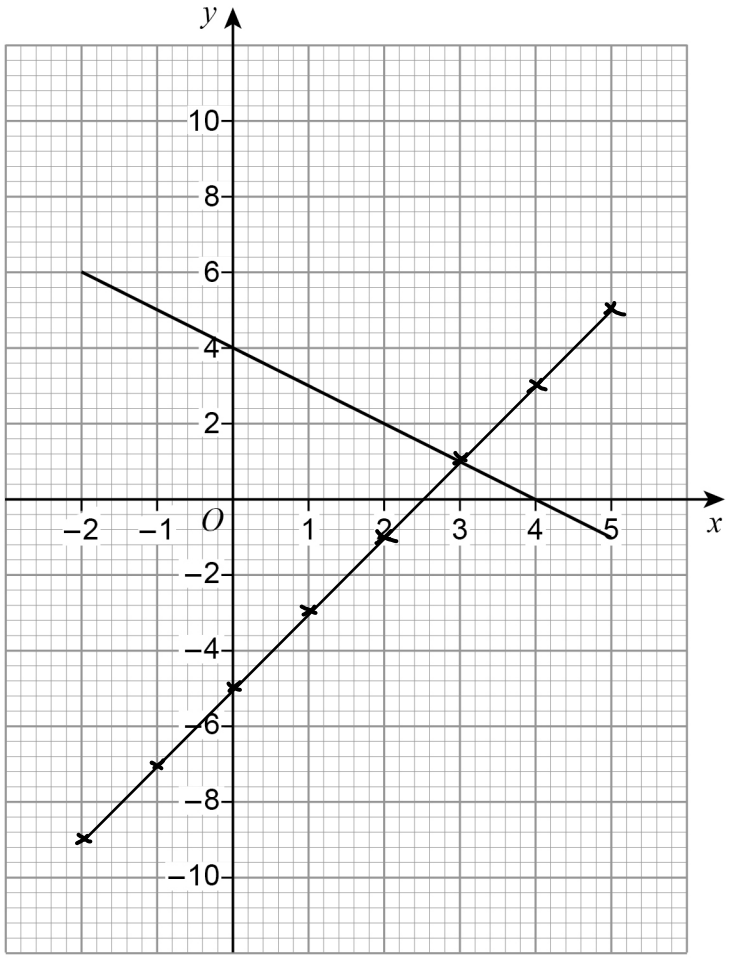
15 The graph of $y = 4 - x$ for values of x from –2 to 5 is shown on the grid.

15 (a) On the grid, draw the graph of $y = 2x - 5$ for values of x from –2 to 5

[3 marks]

x	–2	–1	0	1	2	3	4	5
y	–9	–7	–5	–3	–1	1	3	5



15 (b) Use your graph to solve $2x - 5 = 4 - x$

[1 mark]

$x =$ 3 ← Point where the graphs cross.

8

Turn over ►

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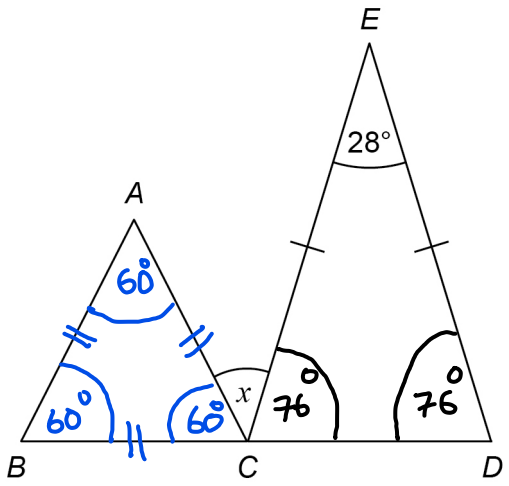
16 (a) *BCD* is a straight line.

Triangle *ABC* is equilateral.

CE = *DE*

Not drawn accurately



Work out the size of angle x.

[4 marks]

$E\hat{C}D = \frac{180-28}{2} = \frac{152}{2} = 76^\circ$ (base angles in an isosceles triangle are equal and Δ in a Δ sum to 180).

$60 + x + 76 = 180$

$x = 180 - 60 - 76$

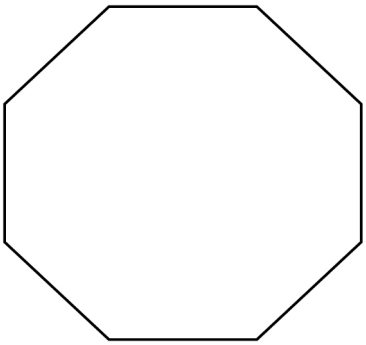
$= 44^\circ$

angles in a straight line sum to 180°.

Answer 44 degrees

Do not write outside the box

16 (b) Amba is working out the size of an **interior** angle of a regular octagon.



Not drawn accurately

Her method is Interior angle = 360 ÷ 8

Is her method correct?

Tick a box.

☐ Yes ☑ No

Give a reason for your answer.

[1 mark]

Her method gives the value of an exterior angle. She would need to subtract her answer from 180° to give the interior angle.

Turn over for the next question

5

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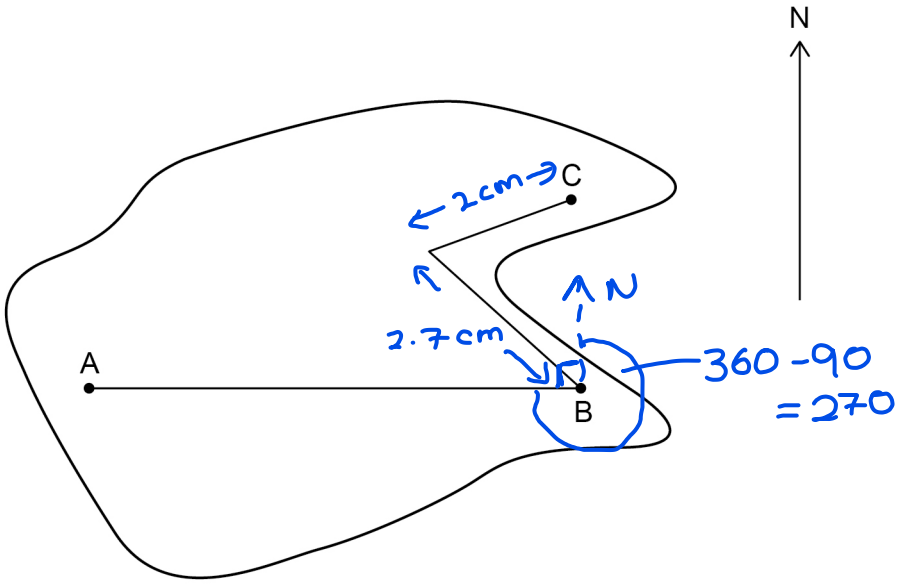
17 Here is a map of an island with cities A, B and C.

The straight lines represent roads.

Scale: 1 cm represents 200 km



17 (a) A is due West of B.

Write down the bearing of A from B.

[1 mark]

Answer 270 °

Do not write outside the box

17 (b) Umar drives from A to B on the route shown.

Kaz drives from B to C on the route shown.

Use the map to work out how much further Umar drives than Kaz.

You **must** show your working.

[5 marks]

Distance AB = 6.5 cm (using ruler)

Distance CB = 4.7 cm (2 cm + 2.7 cm = 4.7 cm)

6.5 − 4.7 = 1.8 cm further.

×1.8 (1 cm : 200 km
1.8 cm : 200 × 1.8 km) ×1.8

200 × 1.8 = 360 km

Answer 360 km

Turn over for the next question

6

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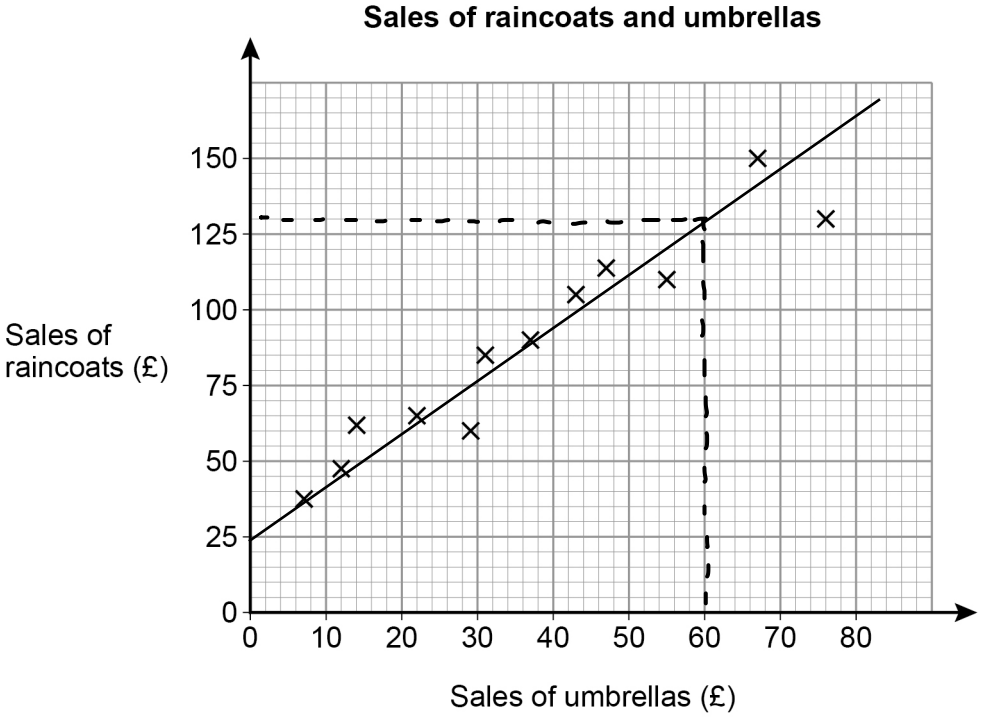
18 A shop sells raincoats and umbrellas.

The scatter graph shows the monthly sales for 12 months.



18 (a) Write down the type of correlation shown by the graph.

[1 mark]

Answer positive

18 (b) The manager expects the sales of umbrellas next month to be £60

Draw a line of best fit to estimate the sales of raincoats next month.

[3 marks]

Answer £ 130

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19 Multiply out $x(x-4)$

Circle your answer.

[1 mark]

$x(x-4) = x^2 - 4x$

$x^2 - 4$ $\quad$ $2x - 4$ $\quad$ $x^2 - 4x$ $\quad$ $-3x^2$

20 $a : b = 5 : 2$

How many times larger is a than b?

Circle your answer.

[1 mark]

0.4 $\quad$ 1.5 $\quad$ 2.5 $\quad$ 3

$a : b = 5 : 2$

$\div 2$ $\quad$ $\div 2$

$2.5 : 1$

(a) $\quad$ (b)

So, a is 2.5x larger than b.

6

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21 (a) A circle has radius 4.2 cm

Work out the length of the circumference.

Give your answer to 1 decimal place.

[3 marks]

Circumference = $2\pi r$

$= 2 \times \pi \times (4.2)$

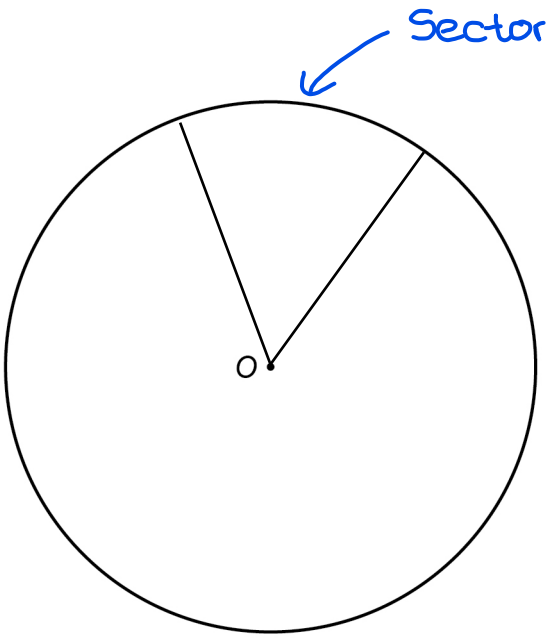
$= 26.4$ cm

Answer 26.4 cm

21 (b) The circle below has centre *O*.

Draw a sector on the circle.

[1 mark]



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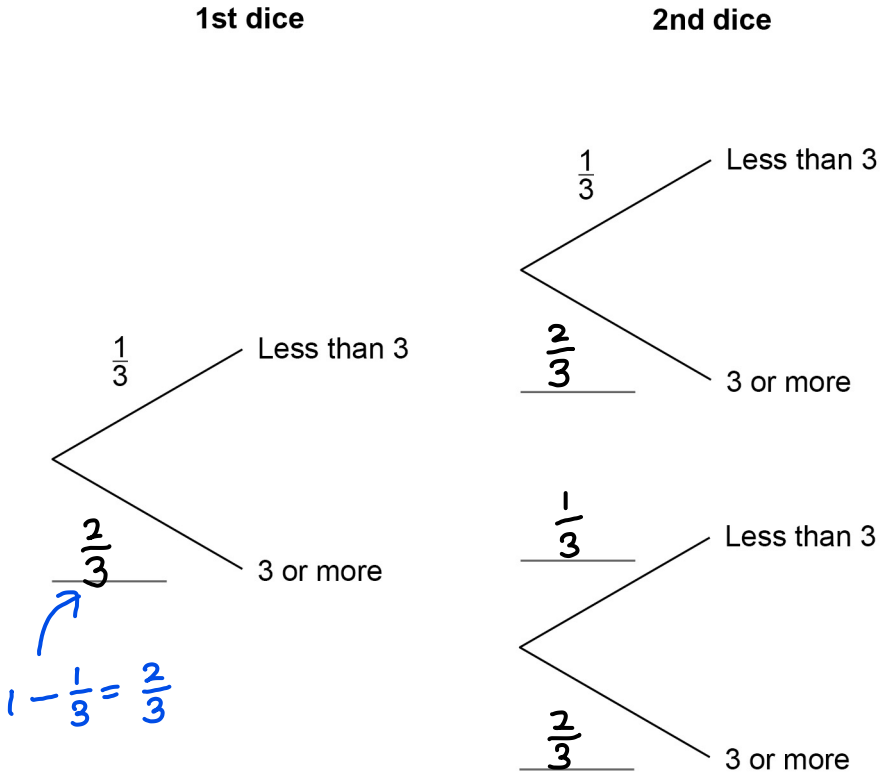
22 Two ordinary fair dice are rolled.

22 (a) Complete the tree diagram.

[1 mark]



22 (b) Work out the probability that **both** dice land on a number less than 3

[1 mark]

$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

Answer $\frac{1}{9}$

Turn over for the next question

6

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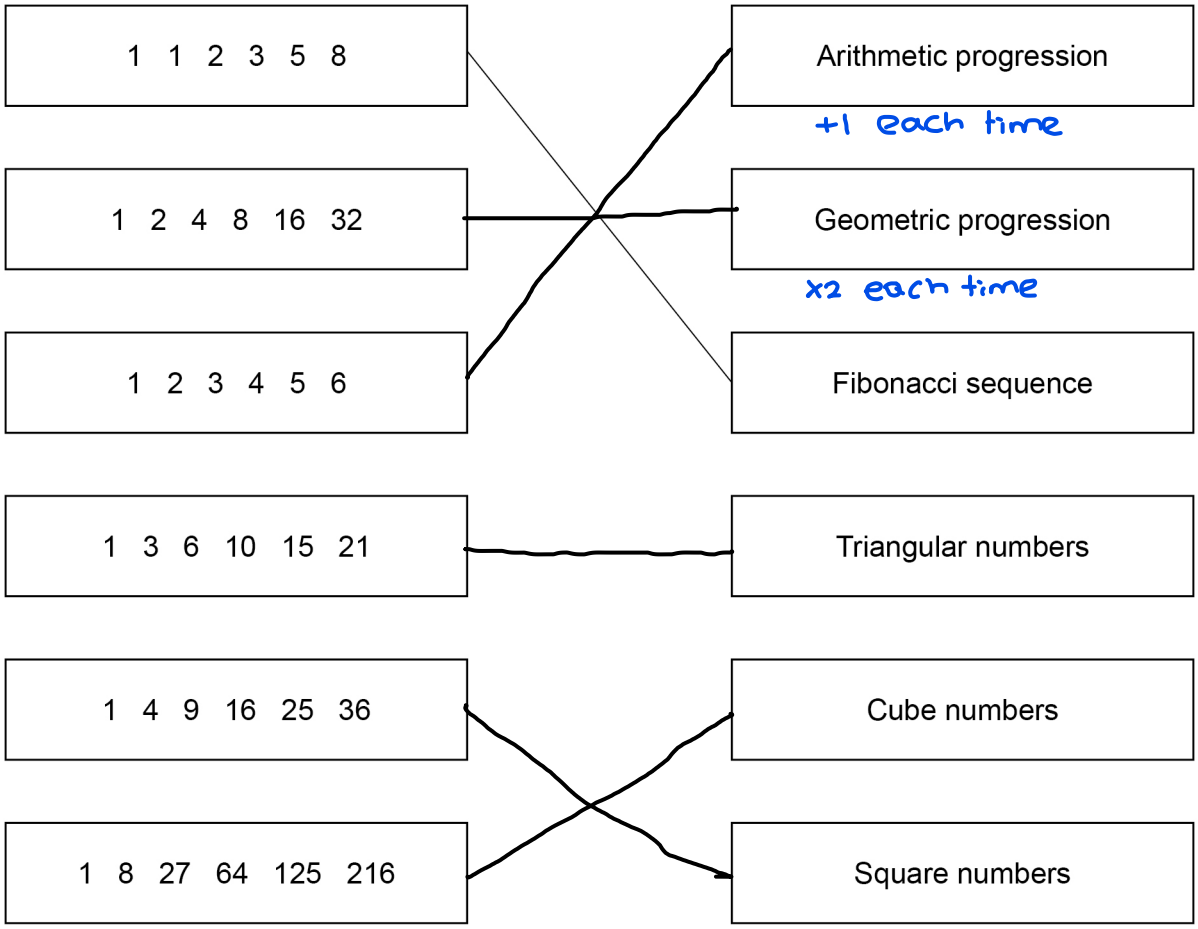
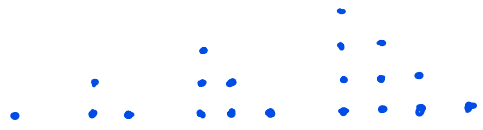
23 Match each sequence to its description.

One has been done for you.

[4 marks]



Triangular numbers :



1, 3, 6, 10.

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24 The table shows information about the population of a city.

Population in 2001	Population in 2011
420 000	480 000

Liam claims,

"From 2011 to 2021 the population of the city will increase by the same percentage as from 2001 to 2011"

He works out,

population increase from 2001 to 2011 = 480 000 – 420 000
= 60 000

population in 2021 = 480 000 + 60 000 ← Increase between 2011 and 2021.
= 540 000

Does the population of 540 000 match his claim?

You **must** show your working.

[3 marks]

$\frac{60000}{420000} \times 100 = 14.3\%$.

There is a 14.3% increase in population between 2001 and 2011.

$\frac{60000}{480000} \times 100 = 12.5\%$.

There is only a 12.5% increase between 2011 and 2021.

Answer No, the population does not increase by the same amount

7

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25 On three days, Ali throws darts at a target.

Here are his results.

	Number of throws	Number of hits	Number of misses
Monday	20	15	5
Tuesday	30	22	8
Wednesday	40	17	23
Total	90	54	36

25 (a) Work out **two** different estimates for the probability of Ali hitting the target.

[2 marks]

Probability of hitting the target = $\frac{\text{no. of hits}}{\text{number of throws.}}$

Answer $\frac{15}{20}$ and $\frac{22}{30}$

25 (b) Which of your two answers is the better estimate for the probability of Ali hitting the target?

Give a reason for your answer.

[1 mark]

Answer $\frac{22}{30}$

Reason Because this probability was calculated from a greater number of throws.

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26 Theo starts with savings of £18

James starts with no savings.

Each week from now,

Theo will save £4.50 and James will save £4

In how many weeks will Theo and James have savings in the ratio 15 : 8 ?

[3 marks]

x is the number of weeks:

$$\frac{18+(4.5)x}{15} = \frac{(4)x}{8}$$

Cross multiply

$$8(18+4.5x) = 15(4x)$$

$$144 + 36x = 60x$$

$-36x$ $-36x$

$$144 = 24x$$

$$x = \frac{144}{24} = 6 \text{ weeks}$$

Answer 6 weeks

Turn over for the next question

6

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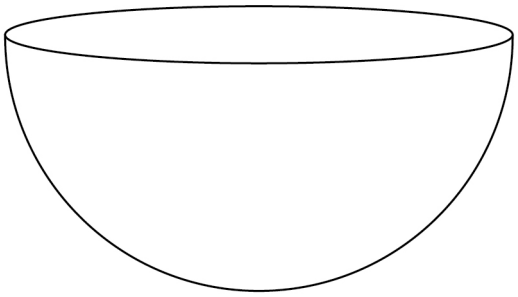
27

Volume of a sphere = $\frac{4}{3}\pi r^3$ where r is the radius

A container is a hemisphere of radius 30 cm



Sand fills the container at a rate of 4000 cm^3 per minute.

Does it take **less than** a quarter of an hour to fill the container?

You **must** show your working.

[3 marks]

Volume of container = $\frac{1}{2} \times \frac{4}{3} \times \pi \times (30)^3$ ← hemisphere

$= \frac{2}{3} \times 27000 \times \pi = 18000\pi\ cm^3$

$\frac{18000\pi\ cm^3}{4000\ cm^3/min} = \frac{9}{2}\pi$ minutes. ← rate

$\frac{9}{2}\pi = 14.1$ min

Answer Yes as $14.1 < 15$ min

$\frac{1}{4}$ hr $= \frac{1}{4} \times 60 = 15$ min

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28 The length of each side of a regular pentagon is 8.4 cm to 1 decimal place.

28 (a) Complete the error interval for the length of one side.

[2 marks]

8.35 cm ⩽ length < 8.45 cm

28 (b) Complete the error interval for the perimeter.

[1 mark]

8.35 x 5 = 41.75 8.45 x 5 = 42.25

41.75 cm ⩽ perimeter < 42.25 cm

END OF QUESTIONS

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