Full paper B2

Paper 2 style · Calculator · Foundation

80 marks
1 hour 30 minutes

Name	Date	Score / 80

Answer ALL questions. Write your answers in the spaces provided. You must write down all the stages in your working. You may use a calculator. Diagrams are **NOT** accurately drawn unless it says so.

Help on the longer questions

Underlined words tell you what the question wants.

Remember reminds you of a fact you need.

1 **Write** 23% as a fraction.

.....

(1)

(Total for Question 1 is 1 mark)

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2 **Write** 200 minutes in hours and minutes.

(1)

(Total for Question 2 is 1 mark)

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

0.68 0.608 0.6 0.06

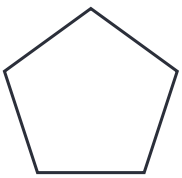
.....

(1)

(Total for Question 3 is 1 mark)

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4 **Write down** the mathematical name of this polygon.



.....

(1)

(Total for Question 4 is 1 mark)

Turn over ►

5 **Find** the number that is exactly halfway between −6 and 4

.....

(1)

(Total for Question 5 is 1 mark)

6 Kai uses beads to make necklaces.
For each necklace he uses 4 blue beads and 9 green beads.
Kai has 70 blue beads and 150 green beads.
Work out the greatest number of necklaces Kai can make.
You must show all your working.

> **Remember** Line up the digits. To divide by a decimal, multiply both numbers by 10 (or 100) first. Check with an estimate.

.....

(3)

(Total for Question 6 is 3 marks)

7 Here are the ages, in years, of 8 children.

13 9 11 12 16 9 13 13

> **Remember** Mean = total ÷ how many. Median = middle value when in order. Mode = most common. Range = biggest − smallest.

(a) **Work out** the mean age.

..... years

(2)

(b) **Work out** the range of the ages.

..... years

(2)

(c) One of the children is chosen at random.
On the probability scale below, mark with a cross (×) the probability that this child has an age of 13



(1)

(Total for Question 7 is 5 marks)

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8 **(a)** Leo says that 12 is a square number because $6^2 = 12$
Is Leo correct?
Give a reason for your answer.

(1)

(b) Maya says,

"When you subtract an odd number from an odd number the answer is always odd."

Write down an example to show that Maya is wrong.

(1)

(Total for Question 8 is 2 marks)

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9 There are 84 blue counters and 140 green counters in a box.

Write down the ratio of the number of blue counters to the number of green counters.

Give your ratio **in its simplest form**.

.....

(2)

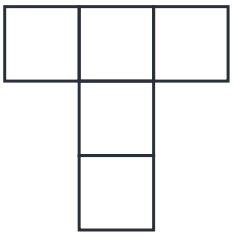
(Total for Question 9 is 2 marks)

10 Here is a square.



The square has a perimeter of 32 cm.

Five of these squares are used to make the shape below.



Work out the perimeter of this shape.

> **Remember** Perimeter: add all the sides. Rectangle area = length × width. Triangle area = ½ × base × height.

..... cm

(3)

(Total for Question 10 is 3 marks)

11

> **Remember** Collect like terms: the same letter (and power) together. Watch the sign in front of each term.

(a) **Simplify** $4a \times 5b$

.....

(1)

(b) **Simplify** $5m - 2n + 3m + 4n$

.....

(2)

(Total for Question 11 is 3 marks)

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12 240 tickets are sold for a play.
35% of the tickets are child tickets.
The rest of the tickets are adult tickets.
The total cost of the 240 tickets is £3096
Each child ticket costs £9
Work out the cost of each adult ticket.

> **Remember** Write down each cost or amount as you work it out, then add them up. Write money with 2 decimal places (£4.50). 100p = £1.

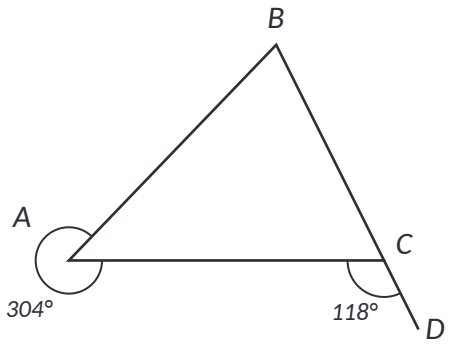
£ .....

(4)

(Total for Question 12 is 4 marks)

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13 *ABC* is a triangle.



BCD is a straight line.

Show that triangle *ABC* is isosceles.

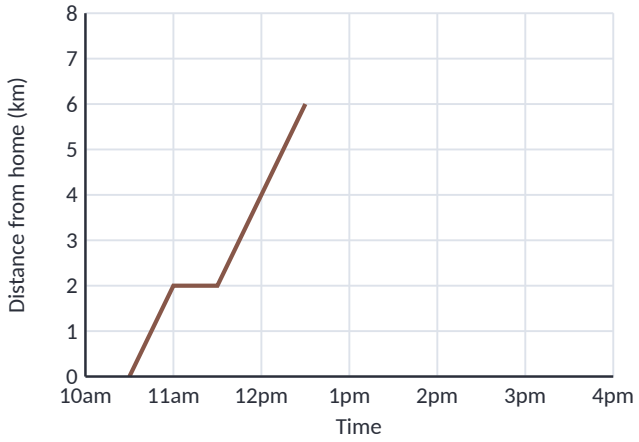
Give a reason for each stage of your working.

> **Remember** Straight line = 180°. Around a point = 360°. Triangle = 180°. Quadrilateral = 360°. Isosceles: two equal base angles. Write the reason for each angle.

(4)

(Total for Question 13 is 4 marks)

14 Ben walked from his home to the park.
The travel graph of Ben's walk to the park is shown below.



On the way to the park Ben stopped at a shop.

> **Remember** A flat line means stopped. Steeper line = faster. Speed = distance ÷ time.

(a) How far is it from the shop to the park?

..... km

(1)

(b) Ben stayed at the park for 1 hour 30 minutes.
Then he walked home at a steady speed.
He took 1 hour to walk home.
Complete the travel graph.

(2)

(Total for Question 14 is 3 marks)

---

15 A map has a scale of 1 : 40 000
On the map, a road has a length of 12 cm.
Work out the real length of the road.
Give your answer in kilometres.

> **Remember** Real distance = map distance × scale. 100 cm = 1 m, 1000 m = 1 km (100 000 cm = 1 km).

..... kilometres

(3)

(Total for Question 15 is 3 marks)

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16 Omar has two bags of marbles, bag **A** and bag **B**.
In bag **A**, there are only 12 red marbles and 28 green marbles.
In bag **B**, there are only 8 red marbles and 17 green marbles.
Omar is going to take at random a marble from bag **A** and a marble from bag **B**.
Which bag gives Omar the greater probability of taking a red marble, bag **A** or bag **B**?
You must show how you get your answer.

> **Remember** Probabilities add up to 1. P(event) = number of ways it can happen ÷ total number of outcomes. AND means multiply.

(3)

(Total for Question 16 is 3 marks)

17

> **Remember** Percentage change = change ÷ original × 100. Multipliers: increase by 5% → × 1.05, decrease by 5% → × 0.95.

(a) Last year Zara's phone contract cost £340
This year her phone contract costs 6% less.
Work out the cost of Zara's phone contract this year.

£ .....

(3)

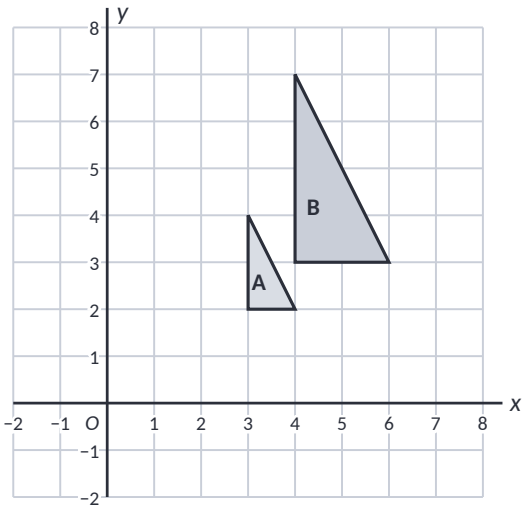
(b) Ravi sells cars.
Each month he is paid £1800 plus a bonus.
The bonus is 4% of the total value of the cars he sells that month.
Last month Ravi was paid £2240
Work out the total value of the cars he sold last month.

£ .....

(3)

(Total for Question 17 is 6 marks)

18



Describe fully the single transformation that maps triangle **A** onto triangle **B**.

(2)

(Total for Question 18 is 2 marks)

19

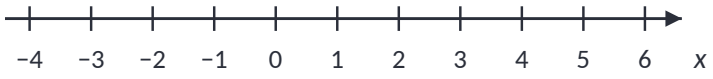
Remember Expand: multiply every term inside the bracket. Factorise: take out the highest common factor. Quadratics: two numbers that multiply to the last term and add to the middle.

(a) **Factorise fully** $12p^2 - 4p$

.....

(2)

(b) On the number line below, show the set of values of x for which $-3 \leqslant x < 2$



(2)

(Total for Question 19 is 4 marks)

20 Use your calculator to work out the value of

$$\sqrt{\frac{186.4 - 22.9}{4.83 + 2.1^2}}$$

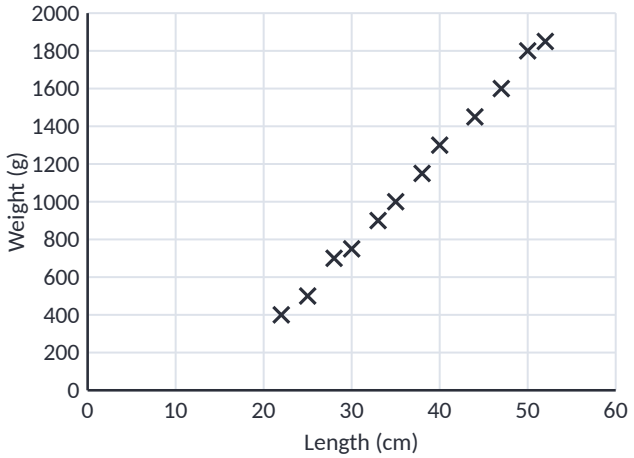
Write down all the digits on your calculator display.

.....

(2)

(Total for Question 20 is 2 marks)

21 The scatter graph shows information about some fish.
It shows the length and the weight of each fish.



Remember Positive: both go up. Negative: one goes up, the other down. Draw a line of best fit through the middle of the points.

(a) What type of correlation does this scatter graph show?

.....

(1)

(b) **Draw** a line of best fit on the scatter graph.

(1)

(c) A different fish has a length of 42 cm.
Use your line of best fit to find an estimate for the weight of this fish.

..... g

(1)

(Total for Question 21 is 3 marks)

22

Coffee
250 g
£4.20

London

Coffee
400 g
7.90 euros

Paris

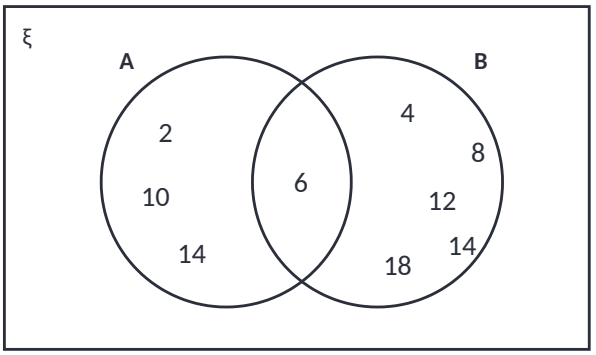
In London, a 250 g bag of coffee costs £4.20
In Paris, a 400 g bag of coffee costs 7.90 euros.
The exchange rate is £1 = 1.16 euros.
In which city is the coffee the better value for money, London or Paris?
You must show how you get your answer.

> **Remember** Find the cost of the same amount for each one (e.g. per 100 g or per item), then compare. Write a conclusion.

(3)

(Total for Question 22 is 3 marks)

23 ξ = {even numbers between 0 and 20}
A = {2, 6, 10, 14}
B = {4, 6, 8, 12, 14, 18}
Tom was asked to draw a Venn diagram for this information.
Here is his answer.



Write down two things Tom should do to make his answer fully correct.

(2)

(Total for Question 23 is 2 marks)

24

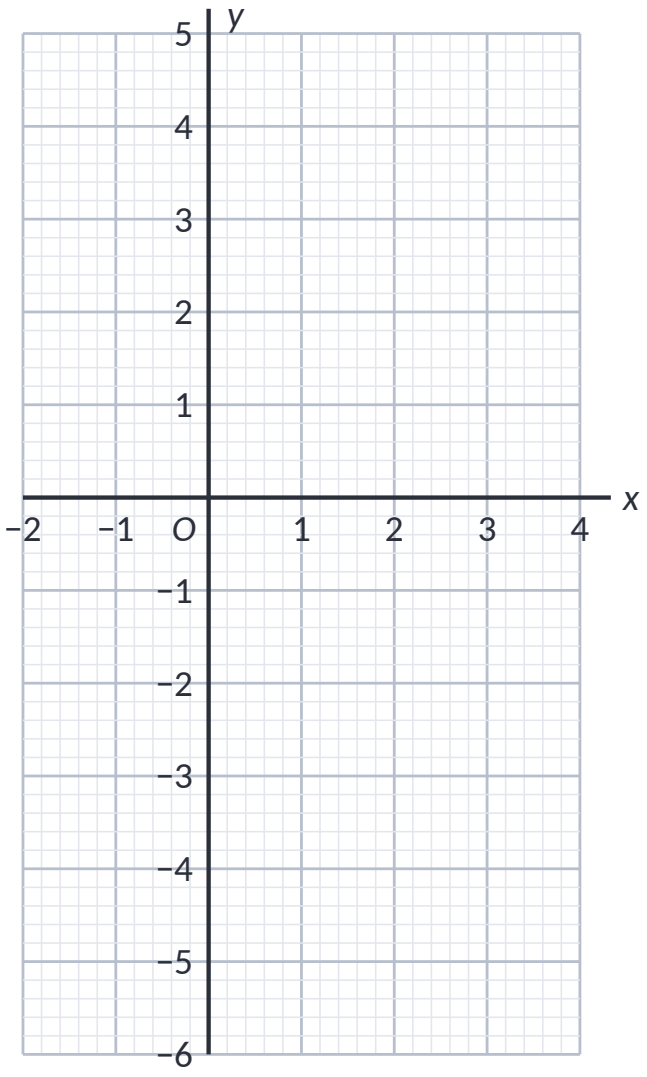
Remember Square first: $(-2)^2 = 4$. Plot each point and join with a smooth curve, not a ruler.

(a) **Complete** the table of values for $y = x^2 - 2x - 4$

x	−2	−1	0	1	2	3	4
y			−4			−1	

(2)

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



(2)

(Total for Question 24 is 4 marks)

25 The cost of sending a large parcel increased from 70p to 84p.
The cost of sending a small parcel increased from 64p to 65p.
Sana says,

> "The percentage increase in the cost of sending a large parcel is more than 12 times the percentage increase in the cost of sending a small parcel."

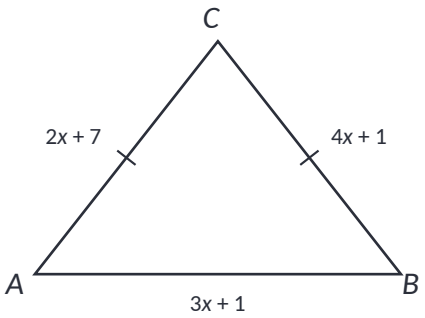
Is Sana correct?
You must show all your working.

> **Remember** Percentage change = change ÷ original × 100. Multipliers: increase by 5% → × 1.05, decrease by 5% → × 0.95.

(4)

(Total for Question 25 is 4 marks)

26 The diagram shows triangle *ABC*.



In the diagram, all measurements are in centimetres.
AC = *BC*
Work out the area of the triangle.

> **Remember** Triangle = ½ × base × height. Trapezium = ½ × (a + b) × height. Use the perpendicular height.

..... cm^2

(5)

(Total for Question 26 is 5 marks)

27 $2.4 \times 10^{-9} = k \times (6 \times 10^{-15})$

Work out the value of k.

Give your answer in standard form.

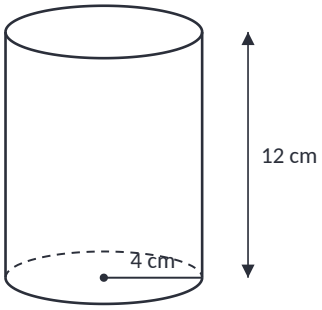
$k =$ .....

(2)

(Total for Question 27 is 2 marks)

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28 The diagram shows a solid cylinder with base radius 4 cm and height 12 cm.



The cylinder is made from steel.

It has a mass of 4500 g.

Work out the density of the steel.

Give your answer **correct to 3 significant figures**.

> **Remember** Density = mass ÷ volume. Mass = density × volume. Volume = mass ÷ density. Pressure = force ÷ area.

..... g/cm^3

(3)

(Total for Question 28 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

B2 mark scheme

Q		Answer	Mark	Notes
1		$\frac{23}{100}$	B1	
2		3 hours 20 minutes	B1	
3		0.06, 0.6, 0.608, 0.68	B1	
4		pentagon	B1	
5		−1	B1	
6		16	M1 M1 A1	M1 for 70 ÷ 4 (= 17.5) or 150 ÷ 9 (= 16.6...) M1 for both A1 cao
7	(a)	12	M1 A1	M1 for 96 ÷ 8 A1 cao
	(b)	7	M1 A1	M1 for 16 − 9 A1 cao
	(c)	Cross at $\frac{3}{8}$	B1	B1
8	(a)	No, $6^2 = 6 \times 6 = 36$	C1	C1
	(b)	e.g. 5 − 3 = 2, which is even	C1	C1
9		3 : 5	M1 A1	M1 for 84 : 140 or a partly simplified ratio A1 cao
10		96	M1 M1 A1	M1 for 32 ÷ 4 (= 8) M1 for 12 × their 8 A1 cao
11	(a)	$20ab$	B1	
	(b)	$8m + 2n$	B2	B2 (B1 for one term correct)
12		15	M1 M1 M1 A1	M1 for 0.35 × 240 (= 84) M1 for 3096 − 84 × 9 (= 2340) M1 for 2340 ÷ (240 − 84) A1 cao

Mark scheme continues ►

Q		Answer	Mark	Notes
13		Angle $A = 56°$, angle $ACB = 62°$, angle $B = 62°$, so two angles are equal	M1 M1 C1 C1	M1 for 360 − 304 (= 56) or 180 − 118 (= 62) M1 for 180 − 56 − 62 (= 62) C1 for angles around a point add up to 360° and angles on a straight line add up to 180° C1 for angles in a triangle add up to 180° and a conclusion
14	(a)	4	B1	B1
	(b)	Horizontal line at 6 km from 12.30pm to 2pm, then a straight line to 0 km at 3pm	B2	B2 (B1 for one section correct)
15		4.8	M1 M1 A1	M1 for 12 × 40 000 (= 480 000 cm) M1 for ÷ 100 000 A1 cao
16		Bag B ($\frac{12}{40}$ = 0.3, $\frac{8}{25}$ = 0.32)	M1 M1 C1	M1 for $\frac{12}{40}$ or $\frac{8}{25}$ M1 for both in a form that can be compared C1 Bag B with correct values
17	(a)	319.60	M1 M1 A1	M1 for 340 × 0.06 (= 20.40) M1 for 340 − 20.40 or 340 × 0.94 A1 cao
	(b)	11 000	M1 M1 A1	M1 for 2240 − 1800 (= 440) M1 for 440 ÷ 0.04 A1 cao
18		Enlargement, scale factor 2, centre (2, 1)	B1 B1	B1 enlargement B1 scale factor 2 and centre (2, 1)
19	(a)	$4p(3p - 1)$	B2	B2 (B1 for a partial factorisation)
	(b)	Filled circle at −3, open circle at 2, joined	B2	B2 (B1 for one end correct)
20		4.2065193682	M1 A1	M1 for 163.5 or 9.24 A1 for answer starting 4.2065
21	(a)	positive	B1	B1
	(b)	Line of best fit drawn	B1	B1
	(c)	1350	B1	B1 for 1250 to 1450 (ft their line)

Mark scheme continues ►

Q		Answer	Mark	Notes
22		London (£1.68 per 100 g compared with £1.70 per 100 g)	M1 M1 C1	M1 for 7.90 ÷ 1.16 (= 6.81…) or 4.20 × 1.16 (= 4.872) M1 for comparable values e.g. cost per 100 g C1 London with correct figures
23		14 should only be in the overlap (not in *A* only or *B* only) 16 should be written outside the circles	C2	C1 for each correct point
24	(a)	4, −1, −5, −4, 4	B2	B2 all correct (B1 for 2 or 3 correct)
	(b)	Smooth curve through all points	B2	B2 (B1 for at least 5 points plotted correctly)
25		Yes: 20% ÷ 1.5625% = 12.8	M1 M1 M1 C1	M1 for 14 ÷ 70 × 100 (= 20) M1 for 1 ÷ 64 × 100 (= 1.5625) M1 for 20 ÷ 1.5625 or 12 × 1.5625 (= 18.75) C1 Yes with correct figures
26		60	M1 A1 M1 M1 A1	M1 for $2x + 7 = 4x + 1$ A1 for $x = 3$ M1 for $AC = 13$ and $AB = 10$ M1 for $\sqrt{(13^2 - 5^2)}$ (= 12) A1 cao
27		4×10^5	M1 A1	M1 for 2.4 ÷ 6 (= 0.4) or 10^6 A1 cao
28		7.46	M1 M1 A1	M1 for $\pi \times 4^2 \times 12$ (= 603.18…) M1 for 4500 ÷ their volume A1 for 7.46

B1 = mark for a correct answer · **M1** = method mark · **A1** = accurate answer after M1 · **C1** = reason · **cao** = correct answer only

Score ____ / 80