Full paper E3

Paper 3 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** the number five thousand and forty-two in figures.

.....

(1)

(Total for Question 1 is 1 mark)

---

2 **Write** $\frac{7}{10}$ as a percentage.

..... %

(1)

(Total for Question 2 is 1 mark)

---

3 **Simplify** $k + k + k$

.....

(1)

(Total for Question 3 is 1 mark)

---

4 **Change** 3000 metres into kilometres.

..... kilometres

(1)

(Total for Question 4 is 1 mark)

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5 6 −4 2 8 −1

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

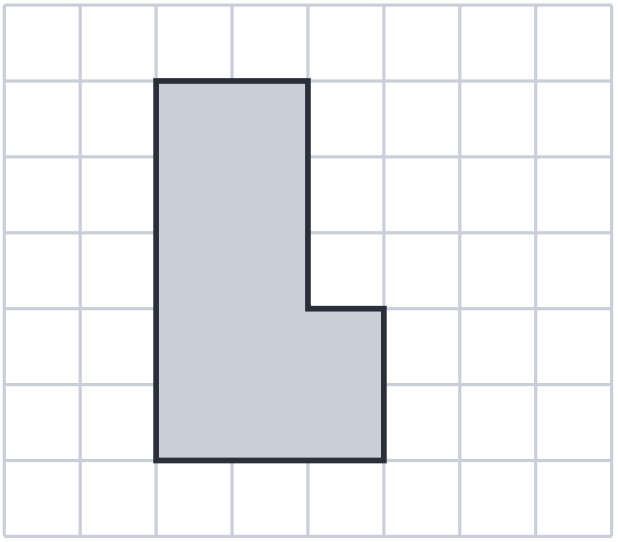
.....

(1)

(Total for Question 5 is 1 mark)

Turn over ►

6 The diagram shows a shape on a centimetre grid.



(a) **Find** the area of the shape.

..... cm^2

(1)

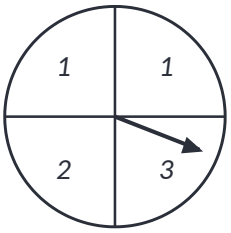
(b) **Find** the perimeter of the shape.

..... cm

(1)

(Total for Question 6 is 2 marks)

7 Here is a 4-sided spinner with equal sections.



Mia spins the spinner once.

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

(a) **Choose** the word that best describes the probability that the spinner lands on 1

impossible	unlikely	evens	likely	certain

.....

(1)

(b) **Choose** the word that best describes the probability that the spinner lands on a number less than 5

impossible	unlikely	evens	likely	certain

.....

(1)

(c) Raj rolls a biased dice once.
The probability that he gets the number 6 is 0.35
Work out the probability that Raj does **not** get the number 6

.....

(1)

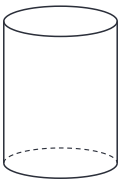
(Total for Question 7 is 3 marks)

8 **(a)** A quadrilateral has 4 right angles.
Its opposite sides are equal but its sides are not all the same length.
Write down the mathematical name of this quadrilateral.

.....

(1)

(b) The diagram shows a solid shape.



Write down the mathematical name of this shape.

.....

(1)

(Total for Question 8 is 2 marks)

9 The table shows the number of books read by four people in one month.

Person	Number of books
Ali	6
Beth	3
Cara	8
Dev	4

Remember Check the scale on the axis: what does one square stand for? Label bars and use a ruler.

(a) **Work out** the median number of books.

.....

(2)

(b) **Find** the range.

.....

(1)

(c) On the grid, draw a bar chart to show the information in the table.

(3)

(Total for Question 9 is 6 marks)

10 Sara begins walking at 9 15 am.
She walks for 1 hour and 50 minutes.
Sara then rests for 20 minutes.
She then cycles for 70 minutes to a café.
Does Sara get to the café before 12 30 pm?
You must show how you get your answer.

> **Remember** 60 minutes = 1 hour. Count on in steps to the next hour. Read across the row for one bus or train.

(4)

(Total for Question 10 is 4 marks)

11 Amir thinks of a number.
He multiplies his number by 4 and then subtracts 9
His answer is 63
What number did Amir think of?

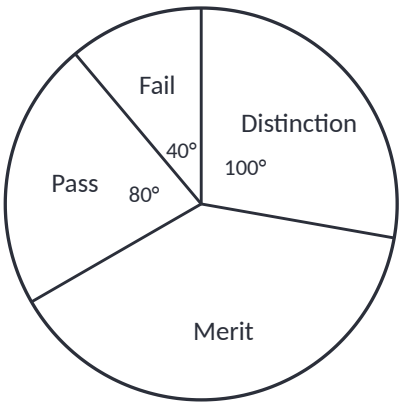
> **Remember** Go forwards through the machine for the output. To find the input, work backwards using the inverse (× becomes ÷).

.....

(3)

(Total for Question 11 is 3 marks)

12 Some students took a piano exam.
The pie chart shows information about the grades the students got.



Remember Angle for each = frequency × (360 ÷ total). The angles must add up to 360°.

(a) **Write down** the modal grade.

.....

(1)

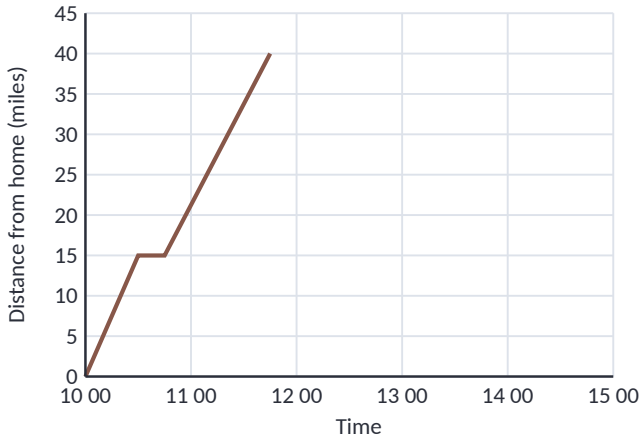
(b) 5 students got distinction.
Work out the total number of students who took the piano exam.

.....

(3)

(Total for Question 12 is 4 marks)

13 Ella drove from her home to a park.
Here is a travel graph for her journey.



Ella stopped at a shop on her way to the park.

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

(a) How many minutes did Ella take to drive to the shop?

..... minutes

(1)

(b) **Write down** the distance from Ella's home to the shop.

..... miles

(1)

(c) Ella stayed at the park for $1\frac{1}{2}$ hours.
She then drove home without stopping.
Ella arrived home at 14 15
On the grid, complete the travel graph.

(2)

(d) **Work out** the average speed for the journey from the park to Ella's home.

..... miles per hour

(1)

(Total for Question 13 is 5 marks)

14 140 boxes cost £5

320 bags cost £9

A bag is cheaper than a box.

How much cheaper?

Give your answer in pence **correct to 1 decimal place**.

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

..... p

(4)

(Total for Question 14 is 4 marks)

15 There are only red beads and green beads in a bag.

number of red beads : number of green beads = 1 : 5

There are 28 red beads in the bag.

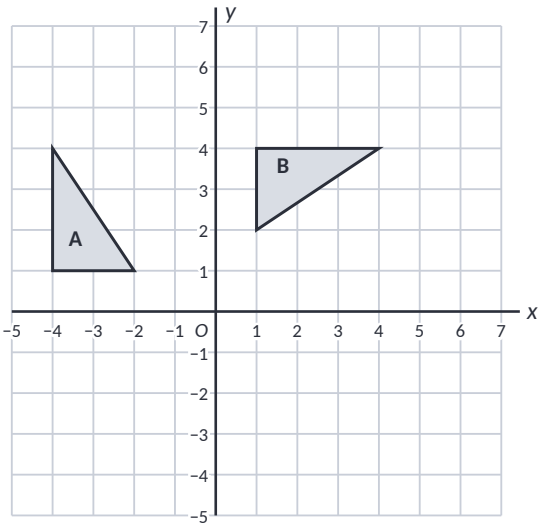
Work out the total number of beads in the bag.

.....

(2)

(Total for Question 15 is 2 marks)

16



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

(2)

(Total for Question 16 is 2 marks)

17 ✎ Complete this question on paper (printed at actual size)

The diagram shows the position of town *T*.



Town *R* is 45 km from town *T* on a bearing of 120°
Mark the position of town *R* with a cross (×).
Use a scale of 1 cm to 10 km.

(2)

(Total for Question 17 is 2 marks)

18 **Solve** $3(3x - 2) = 30$

> **Remember** Do the same to both sides. Undo + with −, undo × with ÷. Expand brackets first.

$x =$ .....

(3)

(Total for Question 18 is 3 marks)

19 Zak invests £2500 for 4 years at y% simple interest per year.
At the end of the 4 years, Zak has received a total of £300 in interest.
Work out the value of y.

> **Remember** Simple interest is the same every year: interest for one year × number of years.

$y =$ .....

(3)

(Total for Question 19 is 3 marks)

20

> **Remember** Multiply: add the powers. Divide: subtract the powers. Power of a power: multiply the powers. Anything to the power 0 = 1.

(a) **Simplify** $(n^4)^2$

.....

(1)

(b) **Simplify** $y^3 \times y^6$

.....

(1)

(c) **Expand** $3a(a^2 + 5a)$

.....

(2)

(Total for Question 20 is 4 marks)

21 Ben wants to know how much tea he will need for 600 people at a conference.
Each person who drinks tea will drink 3 cups of tea.
2.4 g of tea is needed for each cup of tea.
Ben assumes 55% of the people will drink tea.

> **Remember** Fraction of an amount: ÷ by the bottom, × by the top. Percentage: 10% = ÷ 10, 1% = ÷ 100, or use a multiplier (35% = 0.35).

(a) Using this assumption, work out the amount of tea Ben needs.
Give your answer **correct to the nearest gram**.

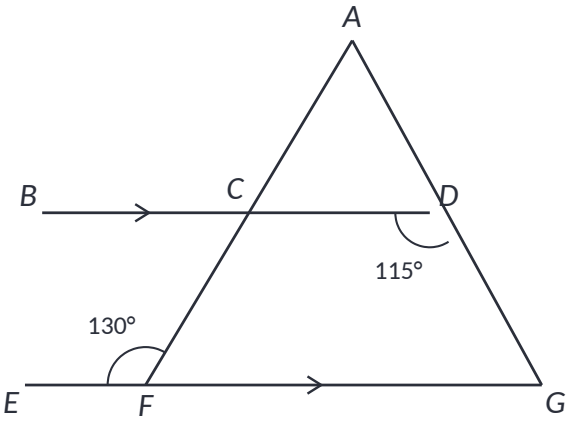
..... g
(4)

(b) Ben's assumption is wrong.
60% of the people will drink tea.
How does this affect your answer to part (a)?

(1)

(Total for Question 21 is 5 marks)

22 *ACF* and *ADG* are straight lines.
BCD and *EFG* are parallel lines.



Show that triangle *ACD* is isosceles.
Give a reason for each stage of your working.

> **Remember** Alternate angles are equal (Z). Corresponding angles are equal (F). Co-interior angles add up to 180° (C). Name the rule you use.

(5)

(Total for Question 22 is 5 marks)

---

23 It takes 10 hours for 6 identical pumps to empty a pond.
How many hours would it take 4 of these pumps to empty another pond of the same size?

..... hours

(2)

(Total for Question 23 is 2 marks)

---

24 A and B are numbers such that

$$A = 2^3 \times 3^2 \times 5$$
$$B = 2 \times 3^3 \times 5^2$$

> **Remember** Use a factor tree. HCF = the primes both numbers share. LCM = the smallest number in both times tables.

(a) **Find** the highest common factor (HCF) of A and B.

.....

(1)

(b) **Find** the lowest common multiple (LCM) of A and B.

.....

(2)

(Total for Question 24 is 3 marks)

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25 Water flows out of a dam at a constant rate of 14.5 m^3/s

How many days does it take for 52 000 000 m^3 of water to flow out of the dam?

Give your answer **correct to the nearest day**.

> **Remember** Speed = distance ÷ time. Distance = speed × time. Time = distance ÷ speed. Change minutes to hours: ÷ 60 (30 min = 0.5 h).

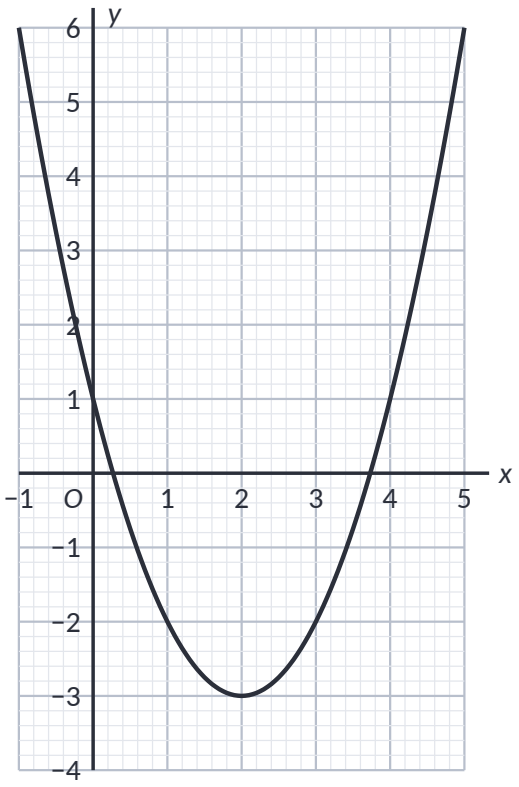
..... days

(3)

(Total for Question 25 is 3 marks)

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26 Here is the graph of $y = x^2 - 4x + 1$



(a) **Write down** the coordinates of the turning point on the graph of $y = x^2 - 4x + 1$

(1)

(b) **Write down** an estimate for one of the roots of $x^2 - 4x + 1 = 0$

.....

(1)

(Total for Question 26 is 2 marks)

27 A solid cuboid is made of metal.
The metal has a density of 8 g/cm^3
The volume of the cuboid is 45 cm^3
Work out the mass of the cuboid.

..... g

(2)

(Total for Question 27 is 2 marks)

28

Remember $A \times 10^n$ where A is between 1 and 10. Big numbers: positive power. Small numbers: negative power.

(a) **Write** $(6 \times 10^3) : (4.8 \times 10^5)$ in the form $1 : n$ where n is an integer.

.....

(2)

(b) **Write** the following numbers in order of size.
Start with the smallest number.

4.36×10^4 4360 $43\,600 \times 10^{-3}$ $0.004\,36 \times 10^5$

.....

(2)

(Total for Question 28 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

E3 mark scheme

Q		Answer	Mark	Notes
1		5042	B1	
2		70	B1	
3		$3k$	B1	
4		3	B1	
5		−4, −1, 2, 6, 8	B1	
6	(a)	12	B1	
	(b)	16	B1	
7	(a)	evens	B1	
	(b)	certain	B1	
	(c)	0.65	B1	
8	(a)	rectangle	B1	
	(b)	cylinder	B1	
9	(a)	5	M1 A1	M1 for ordering 3, 4, 6, 8 A1 cao
	(b)	5	B1	
	(c)	Bars at 6, 3, 8, 4 with labels and a scale	B3	B3 (B2 for 3 correct bars with labels, B1 for a correct scale or labels)
10		No: she arrives at 12 35 pm	M1 M1 A1 C1	M1 for 9 15 + 1 h 50 min (= 11 05) M1 for adding 20 minutes (= 11 25) A1 for 12 35 C1 No with 12 35
11		18	M1 M1 A1	M1 for 63 + 9 (= 72) M1 for 72 ÷ 4 A1 cao

Mark scheme continues ►

Q		Answer	Mark	Notes
12	(a)	Merit	B1	
	(b)	18	M1 M1 A1	M1 for 100° represents 5 students M1 for 360 ÷ 100 × 5 or 360 ÷ 20 A1 cao
13	(a)	30	B1	
	(b)	15	B1	
	(c)	Horizontal line at 40 miles from 11 45 to 13 15, then a straight line to 0 at 14 15	B2	B2 (B1 for one section correct)
	(d)	40	B1	B1 ft
14		0.8	M1 M1 M1 A1	M1 for 500 ÷ 140 (= 3.57...) M1 for 900 ÷ 320 (= 2.8125) M1 for subtracting A1 for 0.8
15		168	M1 A1	M1 for 28 × 5 or 28 × 6 A1 cao
16		Rotation 90° clockwise about (0, 0)	B1 B1	B1 rotation B1 90° clockwise and centre (0, 0)
17		Cross 4.5 cm from T on a bearing of 120°	B1 B1	B1 for a bearing of 120° (±2°) B1 for 4.5 cm (±2 mm)
18		4	M1 M1 A1	M1 for $9x - 6 = 30$ or $3x - 2 = 10$ M1 for $9x = 36$ or $3x = 12$ A1 cao
19		3	M1 M1 A1	M1 for 300 ÷ 4 (= 75) M1 for 75 ÷ 2500 × 100 A1 cao
20	(a)	n^8	B1	
	(b)	y^9	B1	
	(c)	$3a^3 + 15a^2$	B2	B2 (B1 for one term correct)

Mark scheme continues ►

Q		Answer	Mark	Notes
21	(a)	2376	M1 M1 M1 A1	M1 for 0.55 × 600 (= 330) M1 for 330 × 3 (= 990) M1 for 990 × 2.4 A1 cao
	(b)	More tea is needed (the answer to (a) is too small)	C1	C1
22		Angle *ACD* = 50°, angle *ADC* = 65°, angle *CAD* = 65°, so two angles are equal	M1 M1 M1 M1 C1	M1 angle *CFG* = 50° (angles on a straight line) M1 angle *ACD* = 50° (corresponding angles) M1 angle *ADC* = 65° (angles on a straight line) M1 angle *CAD* = 180 − 50 − 65 = 65° C1 all reasons and a conclusion
23		15	M1 A1	M1 for 10 × 6 (= 60) A1 cao
24	(a)	90	B1	B1 for 90 or $2 \times 3^2 \times 5$
	(b)	5400	M1 A1	M1 for $2^3 \times 3^3 \times 5^2$ A1 cao
25		42	M1 M1 A1	M1 for 52 000 000 ÷ 14.5 (= 3 586 206.8…) M1 for ÷ (60 × 60 × 24) A1 for 42
26	(a)	(2, −3)	B1	
	(b)	0.3 or 3.7	B1	B1 for 0.2 to 0.4 or 3.6 to 3.8
27		360	M1 A1	M1 for 8 × 45 A1 cao
28	(a)	1 : 80	M1 A1	M1 for 6000 : 480 000 or $4.8 \times 10^5 \div 6 \times 10^3$ A1 cao
	(b)	$43\,600 \times 10^{-3}$, 0.004 36×10^5, 4360, 4.36×10^4	M1 A1	M1 for converting at least two numbers to ordinary form (43.6, 436, 43 600) A1 cao

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

Score ____ / 80

Write your score on the front page