Grade 8 Math Model Paper 8

ANSWER KEY

Full marks 50 · 2 hours

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

A practice paper by Science Playground, made to CDC's Specification Grid 2078, Mathematics, Grades 6–8; not an official CDC or exam board paper.

Question 1 — 3 marks

a. When **every element of A is also an element of B.** **[1]**

Marking scheme

- When every element of A is in B.

b. $\{5, 10, 20\}$**,** $\{5, 10, 50\}$**,** $\{5, 20, 50\}$ **and** $\{10, 20, 50\}$**.** Each leaves out one of the four values. **[1]**

Marking scheme

- All four subsets.

c. **No.** The note of 50 is too much on its own. Without it, all the other notes together make only $5 + 10 + 20 = 35$, which is less than 40. **[1]**

Marking scheme

- No, with the reason (50 is too much, and the others add up to only 35).

Question 2 — 5 marks

a. In the same unit, 1.2 kg $= 1200$ g, so the ratio is $1200{:}800 = 3{:}2$. **[1]**

Marking scheme

- $3{:}2$.

b. At a loss of 10%, the selling price is 90% of the cost price. **[2]**

$$\text{CP} = \frac{7200 \times 100}{90} = 8000$$

Rs 8,000.

Marking scheme

- The selling price as 90% of the cost price.
- Rs 8,000.

c. **[1]**

$$110010_2 = 32 + 16 + 2 = 50$$

50 kg.

Marking scheme

- 50.

d. **No.** In 8 years the interest is $8 \times 12\% = 96\%$ of the principal, which is less than 100%. It takes a little more than 8 years to double. **[1]**

Marking scheme

- No, with the reason (the interest is only 96% of the principal).

Question 3 — 4 marks

a. **Direct variation** is when two quantities increase or decrease together by the same factor: twice the time, twice the flour. **[1]**

Marking scheme

- Both quantities increase or decrease together, by the same factor.

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b. In one hour it grinds $150 \div 3 = 50$ kg, so in 7 hours it grinds $7 \times 50 = \mathbf{350\ kg}$. **[1]**

Marking scheme

- 350 kg.

c. In 5 hours one mill grinds $5 \times 50 = 250$ kg. **[2]**

$$\text{Mills} = \frac{2000}{250} = 8$$

8 mills.

Marking scheme

- 250 kg by one mill in 5 hours.
- 8 mills.

Question 4 — 5 marks

a. $a \times 10^n$, where $1 \leq a < 10$ and n is an integer. **[1]**

Marking scheme

- $a \times 10^n$, with $1 \leq a < 10$.

b. 50 kg $= 50000$ g $= 5 \times 10^4$ g. **[2]**

$$\frac{5 \times 10^4}{2 \times 10^{-2}} = 2.5 \times 10^{4+2} = 2.5 \times 10^6$$

2.5×10^6 **grains.**

Marking scheme

- 50 kg changed to 5×10^4 g and divided by the weight of a grain.
- 2.5×10^6.

c. 10 sacks hold $10 \times 2.5 \times 10^6 = 2.5 \times 10^7$ grains. **[2]**

Both numbers have 10^7, so compare 2.5 and 2.9: $2.5 \times 10^7 < 2.9 \times 10^7$. **No: 10 sacks are not enough.**

Marking scheme

- 2.5×10^7 grains in 10 sacks.
- No, because that is less than 2.9×10^7.

Question 5 — 5 marks

a. $A = b \times h$ **[1]**

Marking scheme

- $A = b \times h$.

b. **[1]**

$$A = 40 \times 20 = 800$$

800 m².

Marking scheme

- 800 m².

c. The radius is 7 m, so the bed is half a circle: **[2]**

$$\frac{1}{2} \times \frac{22}{7} \times 7 \times 7 = 77$$

Area except the bed $= 800 - 77 =$ **723 m².**

Marking scheme

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- The bed's area, 77 m².
- 723 m².

d. **No.** The area of a parallelogram is the base times the **height**, not the slanting side. AD leans, so it is longer than the height of 20 m, and the plot is only 800 m². **[1]**

Marking scheme

- No, with the reason (the height must be used, not the slanting side).

Question 6 — 3 marks

a. When they have the **same denominator**. **[1]**

Marking scheme

- When they have the same denominator.

b. **[2]**

$$\frac{5^{n+2} \times 5^{1-n}}{25} = \frac{5^{n+2+1-n}}{5^2} = \frac{5^3}{5^2} = 5$$

5

Marking scheme

- The powers added: $5^{n+2+1-n} = 5^3$.
- 5.

Question 7 — 3 marks

a. Because **the power of each variable is 1**, and the graph of each one is a straight line. **[1]**

Marking scheme

- The power of each variable is 1 (or, the graph is a straight line).

b. For $2x + 3y = 12$, that is $y = \frac{12 - 2x}{3}$: **[2]**

x	0	3	6
y	4	2	0

For $x - y = 1$, that is $y = x - 1$:

x	1	3	5
y	0	2	4

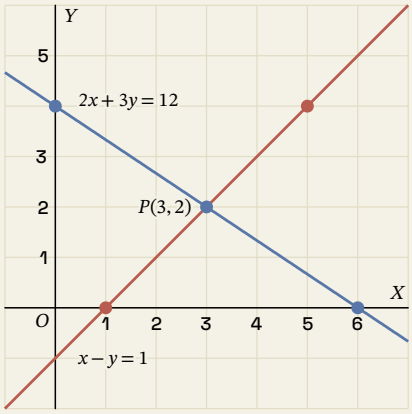


Figure 3 The two lines cross at $(3, 2)$.

The lines cross at $(3, 2)$. Check: $2 \times 3 + 3 \times 2 = 12$ ✓ and $3 - 2 = 1$ ✓. $x = 3, y = 2$.

Marking scheme

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- Both tables, and both lines drawn on the graph.
- $x = 3, y = 2$, read from where they cross.

Question 8 — 4 marks

a. Group the terms in pairs: **[2]**

$$\begin{aligned} x^3 - 2x^2 + 3x - 6 &= x^2(x-2) + 3(x-2) \\ &= (x-2)(x^2+3) \end{aligned}$$

$(x-2)(x^2+3)$

Marking scheme

- Grouped: $x^2(x-2) + 3(x-2)$.
- $(x-2)(x^2+3)$.

b. $99^2 - 1$ has the form $a^2 - b^2$, so **[2]**

$$99^2 - 1 = (99+1)(99-1) = 100 \times 98$$

Yes. It is 100 times a whole number, so it ends in two zeros: it is 9,800.

Marking scheme

- Factorized: $(99+1)(99-1) = 100 \times 98$.
- Yes, because it is a multiple of 100.

Question 9 — 4 marks

a. **12 edges:** four round the top, four round the bottom and four up the sides. **[1]**

Marking scheme

- 12.

b. 240° is more than 180°, so the bearing back is $240^\circ - 180^\circ =$ **060°**. **[2]**
A clockwise turn adds to a bearing, so he now faces $060^\circ + 90^\circ =$ **150°**.

Marking scheme

- The bearing of H from L is 060°.
- 150°.

c. **[1]**

$$AB = \sqrt{(2+2)^2 + (4-1)^2} = \sqrt{16+9} = 5, \qquad BC = \sqrt{(5-2)^2 + (0-4)^2} = \sqrt{9+16} = 5$$

Yes. B is 5 km from each of them.

Marking scheme

- Yes, with $AB = BC = 5$ km as the reason.

Question 10 — 5 marks

a. Sketch $ABCD$ first, with the measures on it. Draw $AB = 7$ cm. At A, construct 30° with a compass. With center B and radius 4.5 cm, cut the arm at C, the point farther from A. Join AC and BC. **[3]**
With center A and radius 4.5 cm, and center C and radius 7 cm, draw arcs that meet at D. Join AD and CD.

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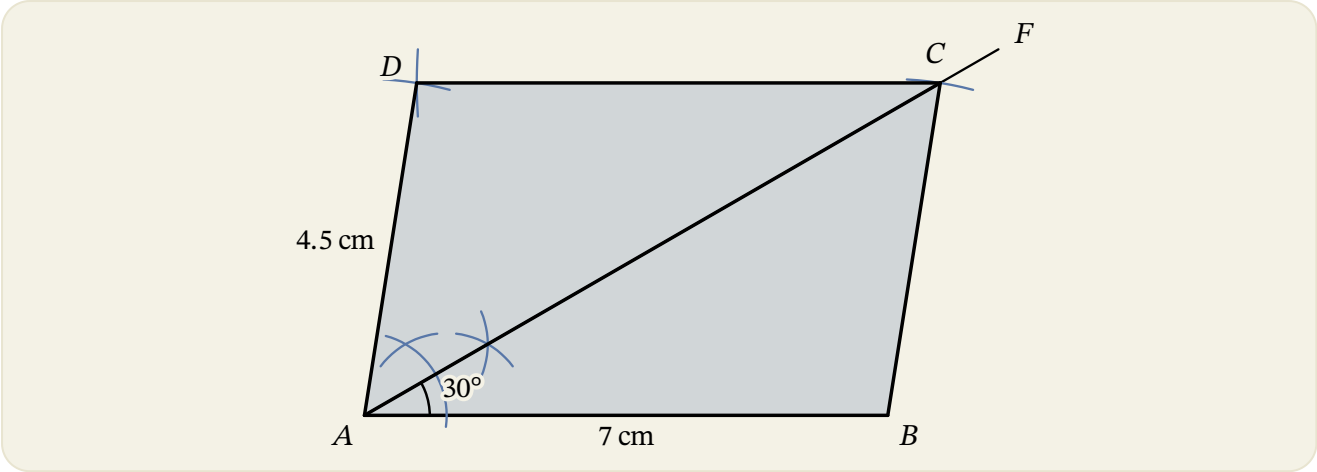


Figure 4 $ABCD$ with its arcs. See the steps in Construct it.

Marking scheme

- $AB = 7$ cm drawn, with a rough sketch.
- $30\circ$ at A with a compass, and C cut on its arm by an arc of 4.5 cm from B.
- D found by arcs of 4.5 cm from A and 7 cm from C, and the parallelogram completed.

b. **[2]**

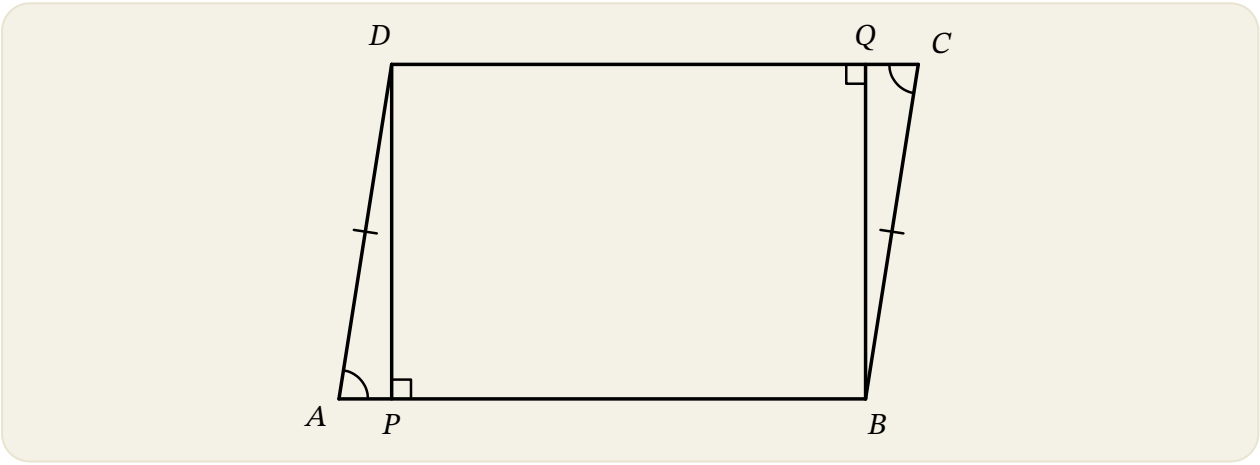


Figure 5 $DP \perp AB$ and $BQ \perp DC$.

	Statements	Reasons
1.	$\angle APD = \angle CQB$ (A)	both are right angles
2.	$\angle DAP = \angle BCQ$ (A)	opposite angles of a parallelogram
3.	$AD = CB$ (S)	opposite sides of a parallelogram
4.	$\triangle ADP \cong \triangle CBQ$	AAS

Proved.

Marking scheme

- The three pairs (two angles and a side not between them), with their reasons.
- $\triangle ADP \cong \triangle CBQ$ by AAS, with the letters in matching order.

Question 11 — 6 marks

a. **An equilateral triangle.** Six of them meet at each corner. **[1]**

Marking scheme

- An equilateral triangle.

b. x° and the angle of $62\circ$ are corresponding angles, so $x = 62$. **[2]**

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x° and y° lie on a straight line, so $y = 180 - 62 = \mathbf{118}$.

Marking scheme

- $x = 62$, with the reason (corresponding angles).
- $y = 118$, with the reason (angles on a straight line).

c. In the X-axis, $(x, y) \to (x, -y)$. So $P(1, 2) \to P'(1, -2), Q(6, 2) \to Q'(6, -2), R(5, 5) \to R'(5, -5)$ and $S(2, 5) \to S'(2, -5)$. **[3]**

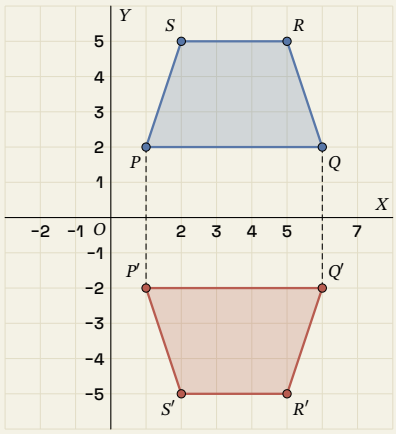


Figure 8 $PQRS$ and its image.

$P'(1, -2)$, $Q'(6, -2)$, $R'(5, -5)$ **and** $S'(2, -5)$.

Marking scheme

- The rule used, $(x, y) \to (x, -y)$, or the vertices read correctly.
- $P'(1, -2), Q'(6, -2), R'(5, -5)$ and $S'(2, -5)$.
- The image drawn and named on the graph.

Question 12

3 marks

a. The angles of a pie chart add up to 360°, so $x = 360 - 130 - 90 - 60 = \mathbf{80}$. **[1]**

Marking scheme

- $x = 80$.

b. 720 books stand for 360°, so every 1° stands for 2 books. **[2]**

Stories: $130 \times 2 = \mathbf{260\ books}$. History: $80 \times 2 = 160$. So there are $260 - 160 = \mathbf{100\ more}$ books of stories.

Marking scheme

- 260 books of stories.
- 100 more than the 160 books of history.

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