Grade 8 Math Model Paper 10

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. $U = \{x : x \text{ is a natural number less than } 10\}$ **[1]**

Marking scheme

- $U = \{x : x \text{ is a natural number less than } 10\}$ (or $x \leq 9$).

b. $\{2\}$**:** 2 is the only even prime number. **[1]**

Marking scheme

- $\{2\}$.

c. **Yes.** Both A and B hold $\{3, 5, 7\}$, which is 3 slips, and neither holds $\{4, 6, 8\}$, which is also 3 slips. Each of them has the same number of winning slips. **[1]**

Marking scheme

- Yes, with the reason (3 slips for each of them).

Question 2 — 4 marks

a. $I = A - P$ **[1]**

Marking scheme

- $I = A - P$.

b. $I = 68000 - 50000 =$ **Rs 18,000**. **[1]**

Marking scheme

- Rs 18,000.

c. **[2]**

$$R = \frac{I \times 100}{P \times T} = \frac{18000 \times 100}{50000 \times 4} = 9$$

9% a year.

Marking scheme

- The values put in the formula for R.
- 9% a year.

Question 3 — 5 marks

a. The means are the two middle numbers: **2 and 30**. **[1]**

Marking scheme

- 2 and 30.

b. There are 7 parts, so 1 part is $42 \div 7 = 6$ kg: **30 kg of rice and 12 kg of lentils**. **[2]**

For the ratio 2:1, the 30 kg of rice needs $30 \div 2 = 15$ kg of lentils, so **3 kg more**.

Marking scheme

- 30 kg of rice and 12 kg of lentils.
- 3 kg more of lentils.

c. After 5 days, the food left would last 12 people $15 - 5 = 10$ days. Now there are $12 + 4 = 16$ people, and more people means fewer days: **[2]**

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$$\text{Days} = \frac{12}{16} \times 10 = 7.5$$

No. The food will last 7.5 days, which is less than the 8 days left.

Marking scheme

- 10 days left for 12 people, and 16 people now.
- 7.5 days, so no.

Question 4 — 5 marks

a. The point moves 11 places to the left: 5×10^{11}. **[1]**

Marking scheme

- 5×10^{11}.

b. First change it to decimal: $1110_2 = 8 + 4 + 2 = 14$. **[2]**

Then $14 \div 5 = 2$ remainder 4, and $2 \div 5 = 0$ remainder 2. Reading the remainders upward: 24_5.

Marking scheme

- $1110_2 = 14$.
- 24_5.

c. **[1]**

$$\frac{5 \times 10^{11}}{2 \times 10^{9}} = 2.5 \times 10^{2} = 250$$

250 films.

Marking scheme

- 250 (or 2.5×10^2).

d. "Buy 3, pay for 2" costs $2 \times 900 = 1800$. "30% off each" costs $3 \times 630 = 1890$. **"Buy 3, pay for 2" is cheaper,** by Rs 90. **[1]**

Marking scheme

- "Buy 3, pay for 2", with Rs 1,800 compared with Rs 1,890.

Question 5 — 5 marks

a. **[1]**

$$A = \frac{\sqrt{3}}{4}a^2$$

Marking scheme

- $A = \frac{\sqrt{3}}{4}a^2$.

b. **[1]**

$$A = \frac{1.73}{4} \times 10^2 = 43.25$$

43.25 m².

Marking scheme

- 43.25 m².

c. Flower bed: $6 \times 43.25 = 259.5$ m². Lawn: $3.14 \times 10 \times 10 = 314$ m². **[2]**

Outside the bed: $314 - 259.5 = $ **54.5 m²**.

Marking scheme

- The two areas, 259.5 m² and 314 m².
- 54.5 m².

d. **No.** The edge of the lawn is $2 \times 3.14 \times 10 = 62.8$ m, which is 2.8 m more than 60 m. **[1]**

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Marking scheme

- No, with 62.8 m compared with 60 m.

Question 6 — 3 marks

a. $(a+b)(a-b)$ **[1]**

Marking scheme

- $(a+b)(a-b)$.

b. **[2]**

$$\frac{x^{a+b} \times x^{a-b}}{(x^a)^2} = \frac{x^{a+b+a-b}}{x^{2a}} = \frac{x^{2a}}{x^{2a}} = x^0 = 1$$

1

Marking scheme

- Top and bottom both x^{2a}.
- 1.

Question 7 — 3 marks

a. $x^2 - 7x - 18 = 0$ **[1]**

Marking scheme

- $x^2 - 7x - 18 = 0$.

b. Two numbers that multiply to -18 and add up to -7 are -9 and 2. **[2]**

$$\begin{aligned} x^2 - 9x + 2x - 18 &= 0 \\ x(x-9) + 2(x-9) &= 0 \\ (x-9)(x+2) &= 0 \end{aligned}$$

So $x = 9$ **or** $x = -2$. Check: $81 - 63 = 18$ ✓ and $4 + 14 = 18$ ✓.

Marking scheme

- Factorized: $(x-9)(x+2) = 0$.
- $x = 9$ or $x = -2$.

Question 8 — 4 marks

a. **[2]**

$$\begin{aligned} \frac{x^2-9}{x^2+5x+6} \times \frac{x+2}{x-3} &= \frac{(x+3)(x-3)}{(x+3)(x+2)} \times \frac{x+2}{x-3} \\ &= 1 \end{aligned}$$

1

Marking scheme

- $x^2 - 9$ and $x^2 + 5x + 6$ factorized.
- 1.

b. $20t - 5t^2 = 15$, so $5t^2 - 20t + 15 = 0$, that is $t^2 - 4t + 3 = 0$, and **[2]**

$$(t-1)(t-3) = 0$$

So $t = 1$ or $t = 3$. **No: the ball is 15 m high twice,** after 1 second on the way up and after 3 seconds on the way down.

Marking scheme

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- The equation $t^2 - 4t + 3 = 0$, factorized.
- No: $t = 1$ and $t = 3$, on the way up and on the way down.

Question 9

4 marks

a. **The equilateral triangle, the square and the regular hexagon.** **[1]**

Marking scheme

- The equilateral triangle, the square and the regular hexagon.

b. $\angle ATB = 200^\circ - 110^\circ = \mathbf{90}^\circ$. **[2]**

200° is more than 180°, so the bearing of T from B is $200^\circ - 180^\circ = \mathbf{020}^\circ$.

Marking scheme

- $\angle ATB = 90^\circ$.
- The bearing of T from B is 020°.

c. **No.** The two ends of a line of three become opposite faces. So 3 is opposite 5, which add up to 8, and 2 is opposite 4, which add up to 6. Only 1 and 6 add up to 7. **[1]**

Marking scheme

- No, with the reason (3 and 5, or 2 and 4, are opposite and don't add up to 7).

Question 10

5 marks

a. Sketch $ABCD$ first, with the measures on it. Draw $AB = 6$ cm. With center A and radius 8 cm, and center B and radius 4 cm, draw arcs that meet at C. Join AC and BC. **[3]**

With center A and radius 4 cm, and center C and radius 6 cm, draw arcs that meet at D. Join AD and CD.

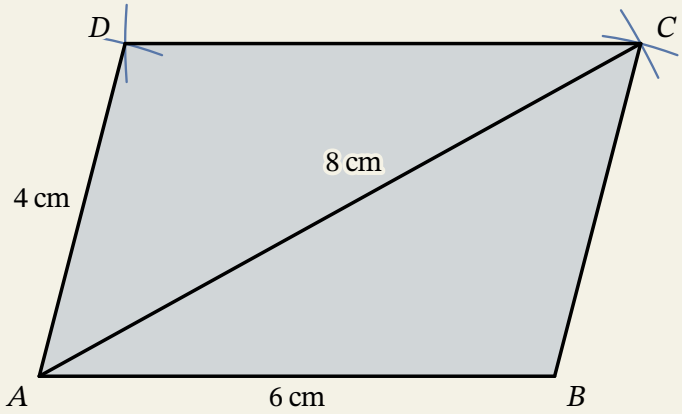


Figure 5 $ABCD$ with its arcs. See the steps in Construct it.

Marking scheme

- $AB = 6$ cm drawn, with a rough sketch.
- C found by arcs of 8 cm from A and 4 cm from B.
- D found by arcs of 4 cm from A and 6 cm from C, and the parallelogram completed.

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b. [2]

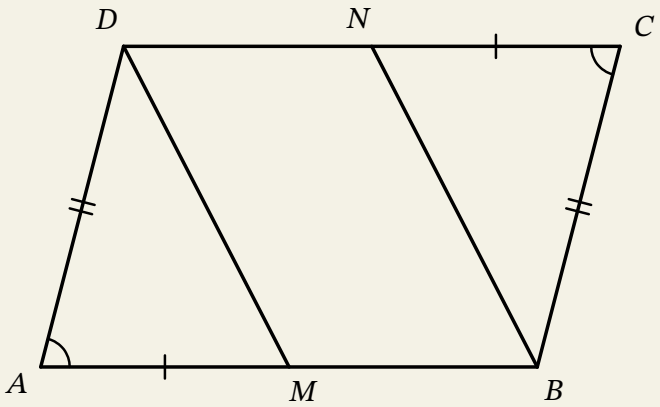


Figure 6 M and N are the midpoints of AB and DC.

	Statements	Reasons
1.	$AM = CN$ (S)	halves of the equal sides AB and DC
2.	$\angle MAD = \angle NCB$ (A)	opposite angles of a parallelogram
3.	$AD = CB$ (S)	opposite sides of a parallelogram
4.	$\triangle AMD \cong \triangle CNB$	SAS

Proved.

Marking scheme

- The three pairs (two sides and the angle between them), with their reasons.
- $\triangle AMD \cong \triangle CNB$ by SAS, with the letters in matching order.

Question 11 — 6 marks

a. **The second quadrant:** x is negative and y is positive. **[1]**

Marking scheme

- The second quadrant.

b. $\angle ABC$ and $\angle ADE$ are corresponding angles, so $\angle ABC = 65^\circ$. **[2]**

The angles of a triangle add up to 180°, so $\angle BAC = 180^\circ - 65^\circ - 55^\circ = \mathbf{60^\circ}$.

Marking scheme

- $\angle ABC = 65^\circ$, with the reason (corresponding angles).
- $\angle BAC = 60^\circ$.

c. Through +90°, $(x, y) \to (-y, x)$. So $A(-3, 2) \to A'(-2, -3)$, $B(-6, 2) \to B'(-2, -6)$ and $C(-5, 6) \to C'(-6, -5)$. **[3]**

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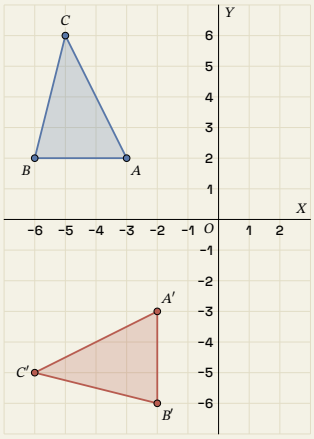


Figure 9 $\triangle ABC$ and its image.

$A'(-2,\ -3)$**,** $B'(-2,\ -6)$ **and** $C'(-6,\ -5)$**.**

Marking scheme

- The rule used, $(x,\ y) \to (-y,\ x)$, or the three vertices read correctly.
- $A'(-2,\ -3)$, $B'(-2,\ -6)$ and $C'(-6,\ -5)$.
- The image drawn and named on the graph.

Question 12

3 marks

a. **[1]**

$$\frac{21}{60} \times 100\% = 35\%$$

35%.

Marking scheme

- 35%.

b. 60 students stand for 360∘, so each student stands for 6∘. **[2]**

Place	Students	Angle
Pokhara	21	$21 \times 6^\circ = 126^\circ$
Lumbini	18	$18 \times 6^\circ = 108^\circ$
Chitwan	15	$15 \times 6^\circ = 90^\circ$
Janakpur	6	$6 \times 6^\circ = 36^\circ$

Check: $126^\circ + 108^\circ + 90^\circ + 36^\circ = 360^\circ$ ✓.

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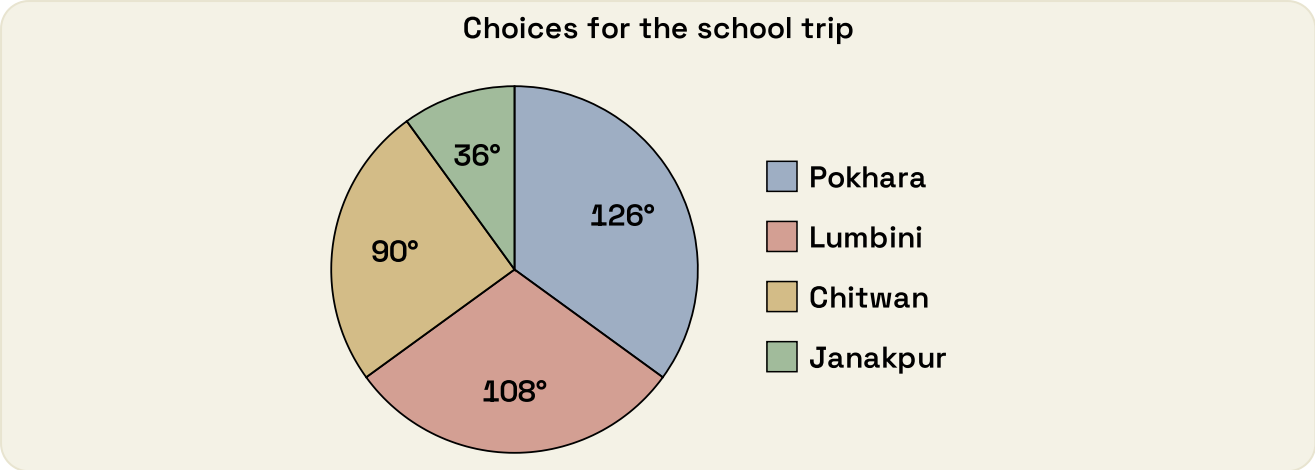


Figure 10 Drawn with a protractor, with a key and a title.

Marking scheme

- The four angles: 126°, 108°, 90° and 36°.
- The pie chart drawn with those angles, with a key and a title.

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