ExamPath

CLASS 9 MATHEMATICS · FBISE · UNIT 5 · SECTIONS B AND C PRACTICE

Unit 5: Linear Equations and Inequalities: short and long questions

Write your working in the boxes. Model answers are on the last pages. These are practice questions written by ExamPath, not official FBISE questions or marking schemes.

Section B style: short questions (3 marks each)

B1 · 3 marks · Linear equations with fractions

Solve $\frac{2x - 1}{3} - \frac{x + 2}{4} = 1$.

B2 · 3 marks · Absolute value equations

Solve $|3x - 2| = 7$.

B3 · 3 marks · Inequalities on a number line

Solve $-1 < 2x + 3 \leq 9$ and show the solution on a number line.

B4 · 3 marks · Linear inequalities

Solve $5 - 3x \geq 2x - 10$.

B5 · 3 marks · Inequalities in real life

A taxi charges Rs 150 plus Rs 40 for every kilometre. Ali has Rs 750. Write an inequality and find the greatest whole number of kilometres he can travel.

B6 · 3 marks · Linear equations with decimals

Solve $0.3(x + 4) = 0.5x - 0.6$.

Section C style: long questions (6 marks each)

C1 · 6 marks · Absolute value equations and compound inequalities

(a) Solve $|2x - 5| = x + 1$ and check your answers. (3 marks)

(b) Solve $3(x - 2) < 5x + 4 \leq 2(x + 8)$. (3 marks)

C2 · 6 marks · Linear equations in real life

The length of a rectangle is 3 cm more than twice its width. Its perimeter is 54 cm.

(a) Write an equation using w for the width. (2 marks)

(b) Find the width and the length. (2 marks)

(c) Find the area of the rectangle. (2 marks)

C3 · 6 marks · Equations and inequalities in real life

Mobile plan A costs Rs 300 a month plus Rs 2 per minute. Plan B costs Rs 500 a month plus Rs 1 per minute.

(a) Write the monthly cost of each plan for m minutes. (2 marks)

(b) For how many minutes do the plans cost the same? (2 marks)

(c) For what numbers of minutes is plan A cheaper? (2 marks)

Model answers

B1.

1. Multiply every term by the LCM 12: $4(2x - 1) - 3(x + 2) = 12$
2. $8x - 4 - 3x - 6 = 12$
3. $5x - 10 = 12$, so $5x = 22$ and $x = 22/5 = 4.4$

Answer: $x = 4.4$

Watch out: The minus sign in front of the second fraction applies to both terms: $-3(x + 2) = -3x - 6$.

B2.

1. $|3x - 2| = 7$ means $3x - 2 = 7$ or $3x - 2 = -7$.
2. $3x - 2 = 7$ gives $3x = 9$, so $x = 3$.
3. $3x - 2 = -7$ gives $3x = -5$, so $x = -5/3$.

Answer: $x = 3$ or $x = -5/3$

Watch out: An absolute value equation usually has two solutions; do not forget the negative case.

B3.

1. Subtract 3 from all three parts: $-4 < 2x \leq 6$
2. Divide by 2: $-2 < x \leq 3$
3. On the number line, draw a hollow circle at -2 (not included), a filled circle at 3 (included), and shade between them.

Answer: $-2 < x \leq 3$

Watch out: "<" gives a hollow circle and "≤" gives a filled circle.

B4.

1. Add $3x$ to both sides: $5 \geq 5x - 10$
2. Add 10: $15 \geq 5x$
3. Divide by 5: $3 \geq x$, which is $x \leq 3$

Answer: $x \leq 3$

Watch out: If you divide by a negative number instead, remember to reverse the inequality sign.

B5.

1. Let k be the number of kilometres: $150 + 40k \leq 750$
2. $40k \leq 600$, so $k \leq 15$
3. The greatest whole number of kilometres is 15.

Answer: 15 km

Watch out: "Has Rs 750" means the fare must be at most 750, so use ≤.

B6.

1. Expand: $0.3x + 1.2 = 0.5x - 0.6$
2. Collect terms: $1.2 + 0.6 = 0.5x - 0.3x$, so $1.8 = 0.2x$
3. $x = 1.8 \div 0.2 = 9$

Answer: $x = 9$

Watch out: Multiplying every term by 10 first removes the decimals: $3(x + 4) = 5x - 6$.

C1.

1. (a) Case 1: $2x - 5 = x + 1$, so $x = 6$. Check: $|12 - 5| = 7$ and $6 + 1 = 7$. ✓
2. Case 2: $2x - 5 = -(x + 1)$, so $3x = 4$ and $x = 4/3$. Check: $|8/3 - 5| = 7/3$ and $4/3 + 1 = 7/3$. ✓
3. (b) Left part: $3x - 6 < 5x + 4$ gives $-10 < 2x$, so $x > -5$.
4. Right part: $5x + 4 \leq 2x + 16$ gives $3x \leq 12$, so $x \leq 4$.
5. Together: $-5 < x \leq 4$.

Answer: (a) $x = 6$ or $x = 4/3$ (b) $-5 < x \leq 4$

Watch out: With a variable on the right of an absolute value equation, always check each answer: $x + 1$ must not be negative.

C2.

1. (a) Length $= 2w + 3$, so $2(w + 2w + 3) = 54$.
2. (b) $2(3w + 3) = 54$, so $6w + 6 = 54$, $6w = 48$ and $w = 8$ cm. Length $= 2(8) + 3 = 19$ cm.
3. Check: $2(8 + 19) = 54$ ✓
4. (c) Area $= 8 \times 19 = 152$ cm^2.

Answer: (b) width 8 cm, length 19 cm (c) 152 cm^2

Watch out: Perimeter is 2 × (length + width); adding only one length and one width gives half of it.

C3.

1. (a) Plan A: $300 + 2m$. Plan B: $500 + m$.
2. (b) $300 + 2m = 500 + m$ gives $m = 200$ minutes. Both cost Rs 700.
3. (c) $300 + 2m < 500 + m$ gives $m < 200$.
4. Plan A is cheaper for fewer than 200 minutes a month; plan B is cheaper above 200.

Answer: (b) 200 minutes (c) $m < 200$

Watch out: Check with a value: at 100 minutes plan A costs Rs 500 and plan B Rs 600.

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