

Solving Multi-Step Linear Equations

Grade 8 math · Test Answer Key · Standards: 8.EE.C.7a, 8.EE.C.7b

Use the scoring lines below each solution. Award partial credit for correct distribution or for correctly collecting variable terms even when a final arithmetic slip occurs.

Standards: 8.EE.C.7a, 8.EE.C.7b · **Level:** Grade 8

Question 1 Variables on both sides (2 points)

Subtract $3x$: $4x - 12 = 20$. Add 12: $4x = 32$. Divide by 4: $x = 8$.

$x = 8$

Scoring: 1 point for collecting variables, 1 point for $x = 8$.

Question 2 Parentheses (3 points)

Distribute: $8x - 12 = 3x + 18$. Subtract $3x$: $5x - 12 = 18$. Add 12: $5x = 30$. So $x = 6$.

$x = 6$

Scoring: 1 point for distributing correctly, 1 point for collecting terms, 1 point for $x = 6$.

Question 3 Fractions (3 points)

Subtract $\frac{1}{5}x$: $\frac{1}{5}x + 3 = 7$. Subtract 3: $\frac{1}{5}x = 4$. Multiply by 5: $x = 20$.

$x = 20$

Scoring: 1 point for each of the three steps.

Question 4 Match the picture (3 points)

- Distribute: $6x + 9 = 6x + 9$, always true: panel B, infinitely many solutions.
- Subtract $8x$: $-5 = 1$, false: panel A, no solution.
- $12 = 3x$, so $x = 4$: panel C, one solution.



A: none



B: infinite



C: one

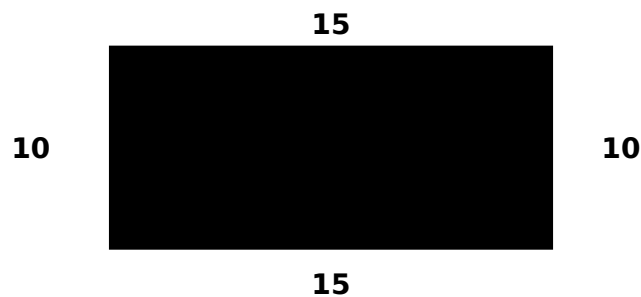
Matched panels.

(a) B, infinitely many (b) A, none (c) C, $x = 4$

Scoring: 1 point per part.

Question 5 Frame perimeter (3 points)

$2[(2x + 1) + (x + 3)] = 50$, so $2(3x + 4) = 50$ and $3x + 4 = 25$. Then $3x = 21$ and $x = 7$. Length = 15 and width = 10.



Dimensions.

$x = 7$; length 15 in; width 10 in

Scoring: 1 point per part.

Question 6 Streaming plans (3 points)

$30 + 12m = 6 + 15m$. Subtract $12m$: $30 = 6 + 3m$. Subtract 6: $24 = 3m$, so $m = 8$. Total: $30 + 12 \cdot 8 = 126$ and $6 + 15 \cdot 8 = 126$.

8 months; \$126

Scoring: 1 point for the equation, 1 point for $m = 8$, 1 point for \$126.

Question 7 Find Dev's error (2 points)

Dev did not multiply the 4 by 3. Correct: $3x + 12 = 2x + 20$. Subtract $2x$: $x + 12 = 20$. So $x = 8$.

Error: $3 \cdot 4 = 12$, not 4. Correct answer: $x = 8$.

Scoring: 1 point for the error, 1 point for $x = 8$.

Question 8 Choosing k (1 point)

If $k = 5$, the x terms cancel and leave $2 = 9$, which is false.

$k = 5$

Scoring: 1 point.