# Year 7 linear equations worksheet

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Name: _____ Date: _____

**Question 1**

Is x = 4 a solution of 3x + 5 = 17?

Answer: _____

**Question 2**

Solve by inspection:

(a) x + 9 = 23 (b) 7m = 63 (c) k/4 = 6 (d) 20 - p = 8

Answer: _____

**Question 3**

Write the equation that results when you add 5 to both sides of x - 5 = 12.

Answer: _____

**Question 4**

Solve 2x + 5 = 17, then verify your solution by substitution.

Answer: _____

**Question 5**

Solve:

(a) x/5 + 3 = 7 (b) (2m - 4)/(3) = 6 (c) 3k/4 = 12

Answer: _____

**Question 6**

Solve 3(x + 2) = 21.

Answer: _____

**Question 7**

Which of k = 1, 2, 3, 4, 5 is a solution of 2(k + 3) = 16?

Answer: _____

**Question 8**

Lena is y years old. Her brother is 3 years older than her. Their ages add to 27.

(a) Write an equation involving $y$.

(b) Use guess and check to solve it, showing at least two guesses.

(c) How old is Lena's brother?

Answer: _____

**Question 9**

Start with $x = 3$. Multiply both sides by 4, then add 7 to both sides. Write the new equation.

Answer: _____

**Question 10**

(a) A gym charges a $40 joining fee plus $12 per visit. Sam paid $148 in total. Write an equation and solve it to find how many times he visited.

(b) Solve $5x - 7 = 2x + 14$.

Answer: _____

# Year 7 linear equations: answers and worked solutions

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**Question 1**

**Key idea:** A value is a solution if substituting it makes both sides equal.

1. Left side: 3 × 4 + 5 = 12 + 5 = 17 2. Right side: 17 3. Both sides are equal, so x = 4 is a solution

**Answer:** Yes

**Question 2**

**Key idea:** Ask: what number makes the equation true?

1. (a) What plus 9 gives 23? 14, since 14 + 9 = 23 2. (b) 7 times what is 63? 9, since 7 × 9 = 63 3. (c) What divided by 4 is 6? 24, since 24 ÷ 4 = 6 4. (d) 20 minus what is 8? 12, since 20 - 12 = 8

**Answer:** (a) x = 14 (b) m = 9 (c) k = 24 (d) p = 12

**Question 3**

**Key idea:** Doing the same operation to both sides gives an equivalent equation.

1. Left: x - 5 + 5 = x 2. Right: 12 + 5 = 17 3. New equation: x = 17

**Answer:** x = 17

**Question 4**

**Key idea:** Undo the operations in reverse order, subtract first, then divide.

1. Subtract 5 from both sides:\ 2x + 5 - 5 = 17 - 5 implies 2x = 12 2. Divide both sides by 2:\ x = 12/2 = 6 3. **Verify** by substituting x = 6 back into the original equation:\ 2(6) + 5 = 12 + 5 = 17 checkmark

**Answer:** x = 6

**Question 5**

**Key idea:** Remove the fraction by multiplying both sides by the denominator at the right moment.

1. (a) Subtract 3: x/5 = 4; multiply by 5: x = 20 2. (b) Multiply by 3: 2m - 4 = 18; add 4: 2m = 22; divide by 2: m = 11 3. (c) Multiply by 4: 3k = 48; divide by 3: k = 16

**Answer:** (a) x = 20 (b) m = 11 (c) k = 16

**Question 6**

**Key idea:** Expand the brackets first, then solve the two-step equation.

1. Expand the brackets:\ $3(x + 2) = 3x + 6$ So the equation becomes $3x + 6 = 21$. 2. Subtract 6 from both sides:\ $3x = 21 - 6 = 15$ 3. Divide both sides by 3:\ $x = 15/3 = 5$ 4. **Verify** by substituting $x = 5$ into the original equation:\ $3(5 + 2) = 3 \times 7 = 21$ checkmark

**Answer:** $x = 5$

**Question 7**

**Key idea:** Substitute each value and see which makes the equation true.

1. $k = 1$: $2 \times 4 = 8$; $k = 2$: $2 \times 5 = 10$; $k = 3$: $2 \times 6 = 12$ 2. $k = 4$: $2 \times 7 = 14$; $k = 5$: $2 \times 8 = 16$ ✓

**Answer:** $k = 5$

**Question 8**

**Key idea:** Guess a value, test it, and adjust the next guess depending on whether the result was too big or too small.

1. (a) Brother's age is $y + 3$, so $y + (y + 3) = 27$ 2. (b) Guess $y = 10$: $10 + 13 = 23$, too small 3. (b) Guess $y = 12$: $12 + 15 = 27$ ✓ 4. (c) Brother: $12 + 3 = 15$

**Answer:** (a) $y + y + 3 = 27$ (b) $y = 12$ (c) 15

**Question 9**

**Key idea:** Build an equation by applying the same operations to both sides.

1. Multiply by 4: $4x = 12$ 2. Add 7: $4x + 7 = 19$

**Answer:** $4x + 7 = 19$

**Question 10**

**Key idea:** Undo operations in reverse order, doing the same thing to both sides each time. Collect pronumerals on one side first if they appear on both sides.

1. (a) Let $v$ be the number of visits: $40 + 12v = 148$ 2. (a) Subtract 40: $12v = 108$ 3. (a) Divide by 12: $v = 9$. Check: $40 + 108 = 148$ ✓ 4. (b) Subtract $2x$ from both sides: $3x - 7 = 14$ 5. (b) Add 7: $3x = 21$ 6. (b) Divide by 3: $x = 7$. Check: $35 - 7 = 28$ and $14 + 14 = 28$ ✓

**Answer:** (a) $40 + 12v = 148$, $v = 9$ visits (b) $x = 7$