Year 8 two-step equations worksheet

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Name: _____ Date: _____

Question 1

Solve 3x + 7 = 22.

Answer: _____

Question 2

Solve 5x - 8 = 17 and check your answer.

Answer: _____

Question 3

Solve:

(a) x - 9 = -4

(b) 7x = -56

(c) 4x + 11 = 3

Answer: _____

Question 4

Solve 12 - 3x = 21.

Answer: _____

Question 5

Solve 5x - 4 = 31.

Answer: _____

Question 6

Show that the equations 2x + 6 = 14 and x + 3 = 7 are equivalent, and state their solution.

Answer: _____

Question 7

Solve:

(a) x - 12 = -5

(b) -4x = 36

Answer: _____

Question 8

(a) Start with the equation x = 3. Multiply both sides by 4, then subtract 5 from both sides. Write the equation you get.

(b) Solve the equation from (a) by undoing the steps, and show that you get back to x = 3.

(c) Is 2x + 1 = 9 equivalent to x = 3? Explain.

Answer: _____

Question 9

Solve:

(a) x + 7 = 12

(b) 3x = 21

(c) x/4 = 5

(d) 2x - 3 = 11

Answer: _____

Question 10

Solve 8 - 5x = 23.

Answer: _____

Year 8 two-step equations: answers and worked solutions

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Question 1

Key idea: Use inverse operations to isolate x, undoing addition before division.

1. Subtract 7 from both sides: 3x + 7 - 7 = 22 - 7 implies 3x = 15 2. Divide both sides by 3: x = 15/3 = 5 3. Check by substituting back: 3(5) + 7 = 15 + 7 = 22 ✓

Answer: x = 5

Question 2

Key idea: Form equivalent equations by doing the same operation to both sides.

1. Add 8 to both sides: 5x = 25 2. Divide both sides by 5: x = 5 3. Check: 5 × 5 - 8 = 17 ✓

Answer: x = 5

Question 3

Key idea: Undo each operation by doing the opposite operation to both sides.

1. (a) Add 9 to both sides: x = -4 + 9 = 5 2. (b) Divide both sides by 7: x = -56 ÷ 7 = -8 3. (c) Subtract 11: 4x = -8; divide by 4: x = -2

Answer: (a) x = 5 (b) x = -8 (c) x = -2

Question 4

Key idea: Keep the sign with each term: -3x means -3 times x.

1. Subtract 12 from both sides: -3x = 9 2. Divide both sides by -3: x = -3 3. Check: 12 - 3 × (-3) = 12 + 9 = 21 ✓

Answer: x = -3

Question 5

Key idea: Undo the operations in reverse order, doing the same thing to both sides.

1. Add 4 to both sides: 5x = 35. 2. Divide both sides by 5: x = 7.

Answer: x = 7

Question 6

Key idea: Equivalent equations have the same solution, and can be made from each other by doing the same operation to both sides.

1. Divide every term of $2x + 6 = 14$ by 2: $x + 3 = 7$ 2. Subtract 3: $x = 4$ 3. Check in the first equation: $2 \times 4 + 6 = 14$ ✓

Answer: Dividing both sides of $2x + 6 = 14$ by 2 gives $x + 3 = 7$; the solution of both is $x = 4$

Question 7

Key idea: Use inverse operations to get x on its own.

1. (a) Add 12 to both sides: $x = -5 + 12 = 7$. 2. (b) Divide both sides by -4: $x = 36 \div (-4) = -9$.

Answer: (a) $x = 7$ (b) $x = -9$

Question 8

Key idea: Doing the same operation to both sides of an equation gives an equivalent equation with the same solution.

1. (a) $x = 3 \rightarrow 4x = 12 \rightarrow 4x - 5 = 7$ 2. (b) Add 5 to both sides: $4x = 12$; divide by 4: $x = 3$ 3. (c) $2x + 1 = 9$ gives $2x = 8$, so $x = 4$ 4. (c) The solution is not 3, so the equations are not equivalent

Answer: (a) $4x - 5 = 7$ (b) $4x = 12$, so $x = 3$ (c) No, the solution of $2x + 1 = 9$ is $x = 4$

Question 9

Answer: (a) $x = 5$ (b) $x = 7$ (c) $x = 20$ (d) $x = 7$

Question 10

Key idea: Perform the same operation on both sides to produce simpler equivalent equations.

1. Subtract 8 from both sides: $-5x = 15$. 2. Divide both sides by -5: $x = -3$.

Answer: $x = -3$