

## Solving Linear Equations

Answer key

HSA.REI.B.3

14 problems

1. Solve for  $x$ :

$$2x + 5 = 17$$

**Answer**  $x = 6$

Subtract 5:  $2x = 12$ . Divide by 2:  $x = 6$ . Check:  $2(6) + 5 = 17$ .

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2. Solve for  $y$ :

$$5y - 8 = 27$$

**Answer**  $y = 7$

Add 8:  $5y = 35$ . Divide by 5:  $y = 7$ . Check:  $5(7) - 8 = 27$ .

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3. Solve for  $n$ :

$$\frac{n}{3} + 4 = 10$$

**Answer**  $n = 18$

Subtract 4:  $\frac{n}{3} = 6$ . Multiply by 3:  $n = 18$ . Check:  $\frac{18}{3} + 4 = 10$ .

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4. Solve for  $x$ :

$$3x + 7 = 5x - 9$$

**Answer**  $x = 8$

Subtract  $3x$ :  $7 = 2x - 9$ . Add 9:  $16 = 2x$ , so  $x = 8$ . Check:  $3(8) + 7 = 31 = 5(8) - 9$ .

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5. Solve for  $w$ :

$$4(w - 3) = 20$$

**Answer**  $w = 8$

Distribute:  $4w - 12 = 20$ . Add 12:  $4w = 32$ , so  $w = 8$ . Check:  $4(8 - 3) = 20$ .

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6. Solve for  $a$ :

$$2(a + 5) = 3a - 1$$

**Answer**  $a = 11$

Distribute:  $2a + 10 = 3a - 1$ . Subtract  $2a$ , add 1:  $11 = a$ . Check:  $2(16) = 32 = 3(11) - 1$ .

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7. Solve for  $x$ :

$$\frac{2}{3}x - 1 = 7$$

**Answer**  $x = 12$

Add 1:  $\frac{2}{3}x = 8$ . Multiply by  $\frac{3}{2}$ :  $x = 12$ . Check:  $\frac{2}{3}(12) - 1 = 7$ .

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8. Solve for  $t$ :

$$6t - 4 = 2(t + 6)$$

**Answer**  $t = 4$

Distribute:  $6t - 4 = 2t + 12$ . Subtract  $2t$ , add 4:  $4t = 16$ , so  $t = 4$ . Check:  $6(4) - 4 = 20 = 2(10)$ .

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9. Solve for  $x$ :

$$3(2x - 1) = 4x + 9$$

**Answer**  $x = 6$

Distribute:  $6x - 3 = 4x + 9$ . Subtract  $4x$ , add 3:  $2x = 12$ , so  $x = 6$ . Check:  $3(11) = 33 = 4(6) + 9$ .

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10. Solve for  $x$ :

$$2(x + 4) = 2x + 4$$

If there is no solution, write **no solution**.

**Answer** **No solution**

Distribute:  $2x + 8 = 2x + 4$ . Subtract  $2x$ :  $8 = 4$ , which is false, so there is **no solution**.

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11. Solve for  $x$ :

$$3(x - 2) + 4 = 3x - 2$$

If it is true for all values, write **all real numbers**.

**Answer** **All real numbers**

Distribute:  $3x - 6 + 4 = 3x - 2$ , so  $3x - 2 = 3x - 2$ . This is always true, so the solution is **all real numbers**.

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12. Which equation has the solution  $x = 5$ ?

**Answer** **B)  $3x - 4 = 11$**

$3x - 4 = 11$  gives  $3x = 15$ , so  $x = 5$ . The others give 4, 4, and 6.

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13. A taxi charges a \$3 flat fee plus \$2 per mile. The total fare for a trip was \$19. Write and solve an equation to find the number of miles  $m$ .

**Answer**  $3 + 2m = 19$ ;  $m = 8$  miles

Fee plus per-mile cost equals total:  $3 + 2m = 19$ . Subtract 3:  $2m = 16$ , so  $m = 8$  miles.

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14. Two siblings save money. Maya has \$40 and saves \$6 per week. Liam has \$58 and saves \$3 per week. After how many weeks  $w$  will they have the same amount? How much will that be?

**Answer**  $40 + 6w = 58 + 3w$ ;  $w = 6$  **weeks, \$76**

Set the totals equal:  $40 + 6w = 58 + 3w$ . Subtract  $3w$  and 40:  $3w = 18$ , so  $w = 6$ . Each then has  $40 + 6(6) = \$76$ .