SKILL 14: Solving 2-Step Equations

In some equations, more than one operation is used. To undo the operations, you reverse the original order of operations.

Example

Solve: $3x - 1 = -7$.

In the equation, x was first multiplied by 3 and then 1 was subtracted. To undo the operations, you work backward by first adding 1 and then dividing by 3.

$$3x - 1 = -7$$

Step 1 *Add 1* to each side.

$$3x - 1 + 1 = -7 + 1$$
$$3x = -6$$

Step 2 *Divide by 3* on each side.

$$\frac{3x}{3} = \frac{-6}{3}$$

Check: $3(-2) - 1 \stackrel{?}{=} -7$

$$x = -2$$

$$-6 - 1 \stackrel{?}{=} -7$$
$$-7 = -7$$

So, the solution is -2.

Guided Practice

Solve each equation.

1.
$$\frac{x}{-3} + 5 = 9$$
$$\frac{x}{-3} + 5 - \underline{\hspace{1cm}} = 9 - \underline{\hspace{1cm}}$$
$$\frac{x}{-3} = \underline{\hspace{1cm}}$$
$$\frac{x}{-3} \cdot (\underline{\hspace{1cm}}) = 4 \cdot (\underline{\hspace{1cm}})$$
$$x = \underline{\hspace{1cm}}$$

2.
$$5x - 7 = 3$$
$$5x - 7 + \underline{\hspace{1cm}} = 3 + \underline{\hspace{1cm}}$$
$$5x = \underline{\hspace{1cm}}$$
$$\frac{5x}{\square} = \frac{10}{\square}$$
$$x = \underline{\hspace{1cm}}$$

3.
$$2x + 1 = 13$$
$$2x + 1 - \underline{\hspace{1cm}} = 13 - \underline{\hspace{1cm}}$$
$$2x = \underline{\hspace{1cm}}$$
$$\frac{2x}{\square} = \frac{12}{\square}$$
$$x = \underline{\hspace{1cm}}$$

4.
$$\frac{x}{4} - 6 = 3$$
$$\frac{x}{4} - 6 + \underline{\hspace{1cm}} = 3 + \underline{\hspace{1cm}}$$
$$\frac{x}{4} = \underline{\hspace{1cm}}$$
$$\frac{x}{4} \cdot \underline{\hspace{1cm}} = 9 \cdot \underline{\hspace{1cm}}$$
$$x = \underline{\hspace{1cm}}$$

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SKILL 14: Practice

To solve each equation, tell what you will do first to both sides.

1. $2x + 7 = 13$

_____

2. $-3n - 8 = 7$

_____

3. $2x - 9 = 11$

_____

4. $-5x + 6 = 36$

_____

5. $10x + (-9) = 21$

_____

6. $4x - 13 = 3$

_____

7. $-5m + 12 = -9$

_____

8. $8k - 11 = 13$

_____

9. $-6n - (-2) = 8$

_____

Solve each equation. Check your solutions.

10. $3b + (-7) = -25$

$b =$ _____

11. $\frac{n}{-4} + (-3) = 8$

$n =$ _____

12. $16 = 4h - 12$

$h =$ _____

13. $\frac{x}{6} - (-10) = 3$

$x =$ _____

14. $8w - 17 = -89$

$w =$ _____

15. $\frac{c}{7} - 12 = -4$

$c =$ _____

16. $\frac{p}{-5} + 12 = 20$

$p =$ _____

17. $5j + (-16) = -76$

$j =$ _____

18. $\frac{k}{-3} + (-8) = -8$

$k =$ _____

For each problem, write an equation. Then solve.

19. Linda had $15 in her coin bank. On her birthday, 5 relatives sent her money as a birthday gift. Each relative sent the same amount. She then had $115. How much money did Linda receive from each relative?

_____

20. Gorillas and chimpanzees can learn sign language to communicate with humans. By 1982, a gorilla named Koko had learned 700 words. This is 50 fewer than 5 times as many words as a chimpanzee named Washoe knew 10 years earlier. How many words did Washoe know?

_____

TEST PREP

21. Solve: $4x - 8 = 32$.

Skill 14

A 10   C 6

B 8   D −6

22. Solve: $n + 15 = 22$.

Skill 13

F −8   H 7

G −7   J 17