Algebraic Equations

Solve each equation. Check your solution.

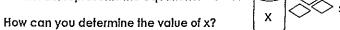$n + 6 = 8$ $7 = y + 2$ $m + 5 = 3$ $-2 = a + 6$ $r - 4 = -2$

Which one Doesn't Belong? Identify the equation that does not have the same solution as the other three. Explain your reasoning.

| $x - 1 = -3$ | $b + 5 = -7$ | $10 + y = 8$ | $-6 + a = -8$ |

The model represents the equation $x + 3 = 7$.

How can you determine the value of x?
A   Add three beans to each side.
B   Subtract seven beans from each side.
C   Subtract three beans from each side.
D   Add seven beans to each side.

1. $2w - 9 = 19$

2. $\dfrac{v}{7} + 5 = 8$

3. $9 + \dfrac{u}{6} = 39$

4. $19 = 6k - 23$

Solving Equations Mathematically

The goal for solving equations is to _find the value of the variable_

To do this we need to _isolate_ the variable.

To solve equations mathematically use **inverse operations**. Inverse operations "undo" each other. *opposite

Example: $x + 2 = 6$

The inverse operation of addition is subtraction. To isolate the variable we will need to subtract 2 from each side. **Remember you must do the same thing to BOTH sides of the equals sign.

$(4) + 2 = 6 ✓$

$x + 2 = 6$
$\quad -2 \quad -2$
$x = 4$

$x - 5 = 10 \qquad ✓ 15 - 5 = 10$
$ + 5 \quad +5$
$x = 15$

To solve two-step equations use **reverse order** of order of operations.

$2(3) + 3 = 9$
$6 + 3 = 9 ✓$

Example: $2x + 3 = 9$
$\qquad -3 \quad -3$
$2x = 6$
$\div 2 \quad \div 2$
$x = 3$

$4(5) + 4 = 24 ✓$
$4x + 4 = 24$
$ - 4 \quad -4$
$4x = 20$
$\dfrac{4x}{4} = \dfrac{20}{4} \quad (x = 5)$

Let's Practice!!!

$\dfrac{7a}{7} = \dfrac{49}{7}$
$(a = 7)$
$7(7) = 49 ✓$

$34 + m = 95$
$-34 \quad -34$
$(m = 61)$
$34 + 61 = 95 ✓$

$\dfrac{-6r}{-6} = \dfrac{-36}{-6}$
$(r = 6)$
$-6(6) = -36 ✓$

$\dfrac{28}{7} = \dfrac{7f}{7}$
$(4 = f)$
$28 = 7(4) ✓$

$-23 = x - 18$
$+18 \quad +18$
$(-5 = x)$
$-23 = -5 + 18 ✓$

$* \; 2x + 4 = 10 ✓$
$\qquad -4 \quad -4$
$\dfrac{2x}{2} = \dfrac{6}{2}$
$(x = 3)$

$-5 = 8 + 3x ✓$
$-2 \quad -2$
$\dfrac{3}{3} = \dfrac{8x}{8}$
$(1 = x)$

$4 + 5r = -11$
$-4 \quad +4$
$\dfrac{5r}{5} = \dfrac{-15}{5}$
$(r = -3)$

Write and Solve an equation for each situation.

Suppose you spend $6 to rent bowling shoes at the bowling alley. Each game costs $3.50. How many games can you bowl of you have a total of $20 to spend?

$20 = 6 + 3.50g$

A fitness club is having a special offer where you pay $22 to join the club plus a $16 monthly fee. You have a total of $150 to spend. How many months can you use the club?

$150 = 22 + 16m$

step 1: subtract 6 from each side.
step 2: Divide by 3.50 each side. ✓

step 1: subtract 22 from each side.
step 2: Divide both sides by 16.

Algebra
Set 4: Solving Equations

Station 1

At this station, you will find a set of cards with the following equations written on them:

$$x+8=5 \qquad -4x=24 \qquad \frac{x}{2}=-2 \qquad x-7=-4 \qquad 3=\frac{x}{2} \qquad -24=-6x$$

(handwritten: $2 \cdot \frac{x}{2}=-2 \cdot 2$, $\boxed{x=-4}$)

You will also find a set of cards with the following values of x written on them:

$$x=-6 \qquad x=-4 \qquad x=-3 \qquad x=3 \qquad x=4 \qquad x=6$$

Work with other students to match each equation with its solution.

Work together to check that each equation is paired with its correct solution. Write the pairs below.

(handwritten: $(-4) \div 2 = -2 \checkmark$, solve, match, check)

_____

_____

_____

_____

Explain the strategies you used to match up the cards. *(handwritten: * isolate * inverse)*

_____

_____

Station 4

At this station, you will match equations to real-life situations and then solve the equations.

Work with other students to match each situation to one of the following equations. When everyone agrees on the correct equation, write it on the line. Then work together to solve it.

$$2x-3=25 \qquad 2x+3=25 \qquad 3x+2=25 \qquad 3x-25=2$$

1. Rosa bought some notebooks that cost $2 each. She also bought a compass that cost $3. She spent a total of $25. How many notebooks did she buy?

   Equation: _____

   Solution: _____

2. Ms. Chen brought 3 packages of pencils for her class. Each package contained the same number of pencils. The 25 students in her class each took one pencil. There were 2 pencils left over. How many pencils were in each package?

   Equation: _____

   Solution: _____

3. Tyler bought two copies of a DVD to give as gifts. He had a coupon for $3 off his total purchase. The final cost of the DVDs was $25. How much did each DVD cost?

   Equation: _____

   Solution: _____

4. A bowl can hold 25 fluid ounces of liquid. Omar empties a full teacup of water into the bowl 3 times. Then he adds another 2 fluid ounces of water to fill the bowl. How many fluid ounces of liquid does the teacup hold?

   Equation: _____

   Solution: _____

Explain the strategies you used to match the equations to the situations. _____

_____

_____

_____