# Solutions

**1.** Explain why multiplication and division are considered opposite operations. How does applying the opposite operation help you solve an equation?

If you multiply by a number and then divide by it you end up with the same value you started with.
We can use this to isolate and then solve for a variable.

**2.** Describe a situation that can be modelled with each equation.

**a)** $7y = 28$ **b)** $z + 5 = 18$

a) A number multiplied by 7 equals 28.

b) Smudger has some marbles. He buys 5 more and now has 18. How many did he originally have?

**3.** Barbara is solving the equation $k + 19 = 36$.

**a)** Barbara realizes that she subtracted the wrong number. What operation did she mean to perform on both sides of the equal sign?

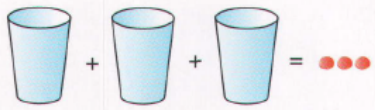
**b)** Does she have to start her solution over? Explain.

$$k + 19 = 36$$
$$k + 19 - 36 = 36 - 36$$
$$k - 17 = 0$$

a) She meant to subtract 19 instead of 36 from both sides.

b) No. She can add 17 to both sides to isolate "k".

**4.** What equation is modelled by the diagram?



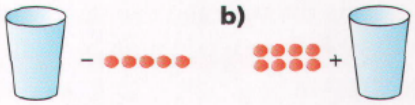
Let x = a cup

$x + x + x = 3$

$3x = 3$

**5.** What operation needs to be undone to get the cup by itself in each diagram?

**a)** **b)**

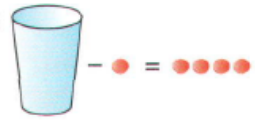


a) Add 5

b) Subtract 8

**6.** Solve the equation modelled by each diagram.

**a)**

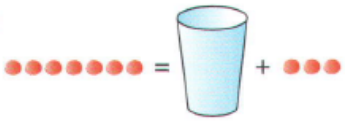


$x - 1 = 4$

$x - 1 + 1 = 4 + 1$

$x = 5$

**b)**

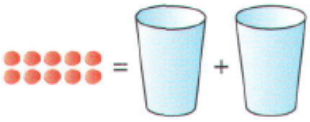


$7 = x + 3$

$7 - 3 = x + 3 - 3$

$4 = x$

**c)**



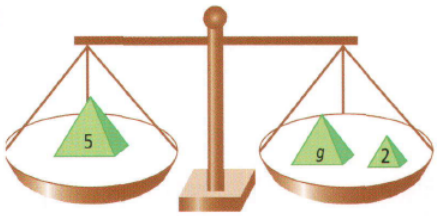
$8 = x + x$

$\frac{8}{2} = \frac{2x}{2}$

$4 = x$

**8.** Find the value of each unknown mass.

**a)**

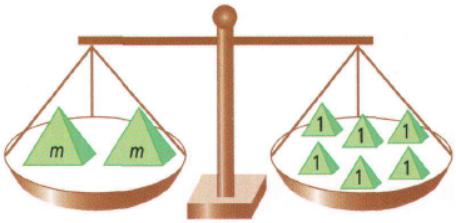



$5 = g + 2$

$5 - 2 = g + 2 - 2$

$3 = g$

**b)**




$m + m = 6$

$\frac{2m}{2} = \frac{6}{2}$

$m = 3$

**9.** Oscar gave $15 toward a school trip. Sandra also gave money toward the trip. Together, they gave $35.

**a)** Model this situation using cups and counters.

**b)** What do the cups and counters represent?

**c)** Write a balanced equation to model this situation.

**d)** What step would you perform to solve the equation?

Let $m$ = money Sandra gave

$15 + m = 35$

Subtract 15 from both sides to solve the equation.

**10.** Bill charges $14 to shovel one driveway. He earned $112 in February.

**a)** Model this situation using an equation.

**b)** Solve your equation to find how many driveways Bill shovels in February.

Let $n$ = # of driveways shovelled

$\frac{14n}{14} = \frac{112}{14}$

$n = 8$

$\Rightarrow$ Bill shovelled 8 driveways in February.

**11.** For each expression, write the operation that is performed on the variable. Then, write the opposite operation.

**a)** $15 + s$ **b)** $p - 100$
**c)** $z \div 54$ **d)** $17 \times k$

a) $+15 \rightarrow -15$
b) $-100 \rightarrow +100$
c) $\div 54 \rightarrow \times 54$
d) $\times 17 \rightarrow \div 17$

**12.** Solve each equation by inspection. Verify your answer.

**a)** $5c = 20$ **b)** $16 = 8n$
**c)** $5 = w + 5$ **d)** $p - 10 = 6$

a) 4 $[5(4) = 20]$
b) 2 $[16 = 8(2)]$
c) 0 $[5 = 0 + 5]$
d) 16 $[16 - 10 = 6]$

**13.** Solve each equation using the opposite operation. Check your answer.

**a)** $g + 7 = 13$ **b)** $27 = 9m$
**c)** $6 = j \div 4$ **d)** $q - 4 = 1$

a) $g + 7 = 13$
$g + 7 - 7 = 13 - 7$
$g = 6$

b) $\frac{27}{9} = \frac{9m}{9}$
$3 = m$

c) $6 = j \div 4$
$6 \times 4 = j \div 4 \times 4$
$24 = j$

d) $q - 4 = 1$
$q - 4 + 4 = 1 + 4$
$q = 5$

**14.** Solve each equation. Verify your solution.

**a)** $j \div 10 = 12$ **b)** $h \div 3 = -6$
**c)** $7x = 21$ **d)** $18 = f - 2$

a) $j \div 10 = 12$
$j \div 10 \times 10 = 12 \times 10$
$j = 120$

b) $h \div 3 = -6$
$h \div 3 \times 3 = -6 \times 3$
$h = -18$

c) $\frac{7x}{7} = \frac{21}{7}$
$x = 3$

d) $18 = f - 2$
$18 + 2 = f - 2 + 2$
$20 = f$

**15.** Solve each equation. Verify your solution.

**a)** $y + 4.9 = 20$ **b)** $x + 7.9 = 10.3$

**c)** $-2 = y - 8$ **d)** $5.7 = b + 3.7$

a) $y + 4.9 = 20$

$y + 4.9 - 4.9 = 20 - 4.9$

$y = 15.1$

b) $x + 7.9 = 10.3$

$x + 7.9 - 7.9 = 10.3 - 7.9$

$x = 2.4$

c) $-2 = y - 8$

$-2 + 8 = y - 8 + 8$

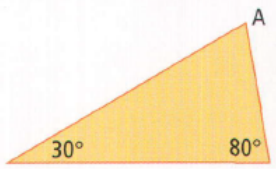
$6 = y$

d) $5.7 = b + 3.7$

$5.7 - 3.7 = b + 3.7 - 3.7$

$2 = b$

**16.** The equation $\angle A + 30° + 80° = 180°$ models the sum of the angles in this triangle. What is the missing angle measure?




$A + 30 + 80 = 180$

$A + 110 = 180$

$A + 110 - 110 = 180 - 110$

$A = 70°$

**17.** A speed skater travels 800 m/min. This can be modelled with the formula $d = 800t$.

**a)** What do the variables represent?

**b)** How long will it take the skater to travel 5000 m?

a) $d$ = distance in m

$t$ = time in minutes

b) $d = 800t$

$\frac{5000}{800} = \frac{800t}{800}$

$6.25 = t$

$\Rightarrow$ It will take 6.25 mins [or 6 mins 15 secs]