Solutions

Page 82 #s 1ace, 2ace, 3ace, 4ace, 5ac, 6acegik, 7, 8bdfh, 10, 12a

Page 84 #s 14, 15a, 18a, 20b, 21c

1. State the operation that would be applied to both sides of the equation to solve for the unknown.

a) $x+5=12$ b) $y-4=5$ c) $10+x=14$ d) $t+(-2)=6$ e) $-8=x-6$

-5 -10 $+6$

2. State the operation that would be applied to both sides of the equation to solve for the unknown.

a) $2x = 16$ b) $3y = 27$ c) $-5x = 20$ d) $-9n = -45$ e) $32 = 8x$ f) $-10 = -15k$

$\div 2$ $\div -5$ $\div 8$

3. Solve (determine the value of the unknown).

a) $x + 6 = 10$ b) $y - 7 = 8$ c) $x - 7 = -7$ d) $5 + m = -6$ e) $-9 + t = -15$

$x + 6 - 6 = 10 - 6$

$x = 4$

$x - 7 + 7 = -7 + 7$

$x = 0$

$-9 + t + 9 = -15 + 9$

$t = -6$

4. Solve.

a) $2x=14$ b) $3x=18$ c) $5n=-20$ d) $-2p=10$ e) $-10x=-80$

$\frac{2x}{2}=\frac{14}{2}$ $\frac{5n}{5}=\frac{-20}{5}$ $\frac{-10x}{-10}=\frac{-80}{-10}$

$x=7$ $n=-4$ $x=8$

5. Simplify each equation to an equivalent one-step equation. You do not need to solve the equation.

a) $2x=10+8$ b) $4y=-12+4$ c) $2x+3x=20$ d) $8x-5x=-15+3$

$2x=18$ $5x=20$

6. Solve.

a) $x+9=15$

$x+9-9=15-9$

$x=6$

c) $8x=24$

$\frac{8x}{8}=\frac{24}{8}$

$x=3$

e) $-9=k+7$

$-9-7=k+7-7$

$-16=k$

g) $x+(-3)=9$

$x-3+3=9+3$

$x=12$

i) $-8+x=-17$

$-8+x+8=-17+8$

$x=-9$

k) $16=2x$

$\frac{16}{2}=\frac{2x}{2}$

$8=x$

7. Match each equation on the left with its equivalent equation on the right.

a) $8x=-5+21$

b) $15x-7x=32$

c) $25-39=7x$

d) $-21=15x-8x$

e) $5x+3x=-12-4$

i) $7x=-14$

ii) $8x=32$

iii) $7x=-21$

iv) $8x=16$

v) $8x=-16$

a) and iv)

b) and ii)

c) and i)

d) and iii)

e) and v)

8. Solve.

b) $9x - 4x = 20$

$\frac{5x}{5} = \frac{20}{5}$

$x = 4$

d) $-5x + 3x = 18$

$\frac{-2x}{-2} = \frac{18}{-2}$

$x = -9$

f) $3x - 7x = 0$

$\frac{-4x}{-4} = \frac{0}{-4}$

$x = 0$

h) $6x - 4x = -25 + 13$

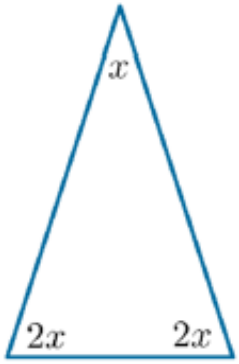
$\frac{2x}{2} = \frac{-12}{2}$

$x = -6$

10. A triangle has angles of x, $2x$ and $2x$, as shown on the right.

a) Create an equation that could be used to determine the value of x.

b) Solve your equation to find the value of x.



a) angles in a triangle total 180°

$\Rightarrow x + 2x + 2x = 180$

$5x = 180$

b) $\frac{5x}{5} = \frac{180}{5}$

$x = 36°$

12. After solving an equation, we can check our solution by comparing the left and right sides of the original equation with the solution value substituted for the variable. Consider the following example:

Solve $3x - x = -19 + 11$

Solution:

$$3x - x = -19 + 11$$
$$2x = -8$$
$$x = \frac{-8}{2}$$
$$x = -4$$

Check:

Left Side	Right Side
$3x - x$	$-19 + 11$
$= 3(-4) - (-4)$	$= -8$
$= -12 - (-4)$	
$= -8$	

$\therefore$ left side = right side
$\therefore$ the solution $x = -4$ is correct

Solve each of the following equations and check your answers.

a) $8x + 2x = 65 - 35$

$\frac{10x}{10} = \frac{30}{10}$

$x = 3$

LS

$8(3) + 2(3)$

$= 24 + 6$

$= 30$

RS

$65 - 35$

$= 30$

LS = RS ✓

14. At his summer job, Alan earns x dollars per hour. Rawan earns double Alan's hourly wage and Mikayla earns double Rawan's hourly wage. If all three students work one hour, their combined earnings equal \$99.75.

a) Create an equation that could be used to determine the value of x.

b) Solve your equation to find the value of x.

c) Determine each student's hourly wage.

a) Alan = \$x/h

Rawan = \$2x/h

Mikayla = \$4x/h

Each work 1 hour

$\Rightarrow x + 2x + 4x = 99.75$

$7x = 99.75$

b) $\frac{7x}{7} = \frac{99.75}{7}$

$x = 14.25$

c) $\Rightarrow$ Alan earns \$14.25/hour

Rowan earns \$28.50/hour

Mikayla earns \$57/hour

15. Root of an Equation: A solution of an equation is commonly referred to as a **root** of the equation. Find the root of each of the following equations. Express each answer as a fraction in simplest (reduced) form.

a) $9x = 6$

$\frac{9x}{9} = \frac{6}{9}$

$x = \frac{6}{9}$

Divide top and bottom by 3

$\Rightarrow x = \frac{2}{3}$

18. Solve.

a) $3x-3x=15+13$

$\frac{0x}{0} = \frac{28}{0}$

x = undefined

There is no Solution!

20. Solve.

b) $\sqrt{y}=3$

$(\sqrt{y})^2 = 3^2$

$y = 9$

21. Solve.

c) $x^2=-25$

$\sqrt{x^2} = \sqrt{-25}$

$x = ?$

There is no (real) solution!