

SOLVING ALGEBRAIC EQUATIONS – TEST REVIEW

1. Collect like terms and simplify.

a) $n - 10 + 9n - 3$
 $= 10n - 13$

b) $-5n + 3(6 + 7n)$
 $= -5n + 18 + 21n$
 $= 16n + 18$

c) $-7(a + 3) - 8(1 + 8a)$
 $= -7a - 21 - 8 - 64a$
 $= -71a - 29$

2. Solve the following equations using the given values.

a) $xy - 5$, when $x = 3$ and $y = 7$
 $= (3)(7) - 5$
 $= 21 - 5$
 $= \boxed{16}$

b) $4n - 6$, when $n = -2$
 $= 4(-2) - 6$
 $= -8 - 6$
 $= \boxed{-14}$

c) $\frac{x+y}{y-c}$ when $x = 4$, $y = 8$, $c = 2$
 $= \frac{(4) + (8)}{(8) - (2)}$
 $= \frac{12}{6}$
 $= \boxed{2}$

3. Solve the following equations by isolating the variable. CHECK your answers using LS = RS.

a) $x + 10 = -6$ LS RS
 $x = -6 - 10$ $-10 + 10 = -6$ ✓
 $x = -16$ $= -6$ ✓

b) $45 = y - 8$ LS RS
 $45 + 8 = y$ $= 45$ ✓ $= 53 - 8$
 $53 = y$ $= 45$ ✓

c) $-14 + a = 22$ LS RS
 $a = 22 + 14$ $-14 + 36 = 22$ ✓
 $a = 36$ $= 22$ ✓

4. Solve the following equations. * Use opposite operations *

a) $\frac{4x}{4} = \frac{12}{4}$
 $x = 3$

b) $\frac{-33}{-3} = \frac{-3y}{-3}$
 $11 = y$

c) $\frac{-6x}{-6} = \frac{24}{-6}$
 $x = -4$

d) $\frac{1}{2}x = \frac{5}{1}$ cross x
 $x = 10$

e) $\frac{1}{4}y = \frac{6}{1}$ cross x
 $y = 24$

f) $\frac{1}{3}x = \frac{2}{3}$ cross x
 $\frac{3x}{3} = \frac{6}{3}$
 $x = 2$

g) $4x - 5 = 7$
 $4x = 7 + 5$
 $4x = 12$
 $\frac{4x}{4} = \frac{12}{4}$
 $x = 3$

h) $11 = -5x + 6$
 $5x = 6 - 11$
 $5x = -5$
 $\frac{5x}{5} = \frac{-5}{5}$
 $x = -1$

i) $\frac{x}{6} - 3 = 8$
 $\frac{x}{6} = 8 + 3$
 $\frac{x}{6} = 11$ cross x
 $x = 66$

5. Solve the following equations. (Hint: Pick a letter side and a number side first)

$$\begin{aligned} \text{a) } 7m - 8 &= 5m + 2 \\ 7m - 5m &= 2 + 8 \\ \frac{2m}{2} &= \frac{10}{2} \\ \boxed{m = 5} \end{aligned}$$

$$\begin{aligned} \text{b) } 7x - 9x - 6 &= 21 - 5 \\ 7x - 9x &= 21 - 5 + 6 \\ \frac{-2x}{-2} &= \frac{22}{-2} \\ \boxed{x = -11} \end{aligned}$$

$$\begin{aligned} \text{c) } 22 - y + 5y - 3 &= 5 - 3y \\ -y + 5y + 3y &= 5 - 22 + 3 \\ \boxed{y = -14} \end{aligned}$$

$$\begin{aligned} \text{d) } 4(5n - 7) &= 10n + 2 \\ 20n - 28 &= 10n + 2 \\ 20n - 10n &= 2 + 28 \\ \frac{10n}{10} &= \frac{30}{10} \\ \boxed{n = 3} \end{aligned}$$

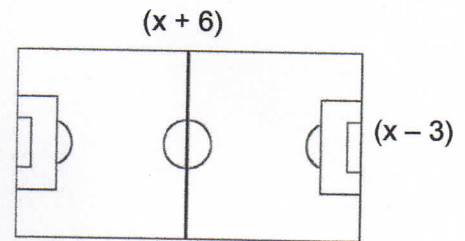
$$\begin{aligned} \text{e) } 2v + 18 &= 16 - 4(v + 7) \\ 2v + 18 &= 16 - 4v - 28 \\ 2v + 4v &= 16 - 28 - 18 \\ \frac{6v}{6} &= \frac{-30}{6} \\ \boxed{v = -5} \end{aligned}$$

$$\begin{aligned} \text{f) } 9(11 - k) &= 3(3k - 9) \\ 99 - 9k &= 9k - 27 \\ 99 + 27 &= 9k + 9k \\ \frac{126}{18} &= \frac{18k}{18} \\ \boxed{7 = k} \end{aligned}$$

6. Given the dimensions of the field,

a) Determine a simplified expression for the perimeter of the field.

$$\begin{aligned} P &= (x+6) + (x+6) + (x-3) + (x-3) \\ P &= \boxed{4x + 6} \end{aligned}$$



b) Determine the value of x if the actual perimeter of the field is 78 metres.

$$\begin{aligned} P &= 4x + 6 \\ 78 &= 4x + 6 \\ 78 - 6 &= 4x \\ \frac{72}{4} &= \frac{4x}{4} \\ \boxed{18 = x} & \quad \therefore x \text{ is } 18 \text{ metres.} \end{aligned}$$

7. Solve the following equations with fractions. *cross multiply!!*

$$\begin{aligned} \text{a) } 7 &= \frac{1+m}{-3} \\ -21 &= 1+m \\ -21-1 &= m \\ \boxed{-22 = m} \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{1(11+n)}{4} &= \frac{9}{1} \\ 1(11+n) &= 36 \\ 11+n &= 36 \\ n &= 36-11 \\ \boxed{n = 25} \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{m+1}{5} &= \frac{m}{6} \\ 6(m+1) &= 5m \\ 6m+6 &= 5m \\ 6m-5m &= -6 \\ \boxed{m = -6} \end{aligned}$$

8. Solve the following equations. (Hint: Find a common denominator!)

a) $\frac{x+3}{4} + \frac{x+1}{3} = 3$ LCD = 12

$$^3 \frac{(\cancel{12})x+3}{\cancel{4}} + (\cancel{12})\frac{x+1}{\cancel{3}} = (\cancel{12})(3)$$

$$3(x+3) + 4(x+1) = 36$$

$$3x+9 + 4x+4 = 36$$

$$7x = 36 - 9 - 4$$

$$\frac{7x}{7} = \frac{23}{7}$$

$x = \frac{23}{7}$

b) $\frac{2}{5} + \frac{4x}{3} = \frac{10x}{6} + \frac{11}{15}$ LCD = 30

$$^6 \frac{(\cancel{30})2}{\cancel{5}} + (\cancel{30})\frac{4x}{\cancel{3}} = (\cancel{30})\frac{10x}{\cancel{6}} + (\cancel{30})\frac{11}{\cancel{15}}$$

$$6(2) + 10(4x) = 5(10x) + 2(11)$$

$$12 + 40x = 50x + 22$$

$$12 - 22 = 50x - 40x$$

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

$-1 = x$

9. Rearrange each formula to isolate the indicated variable.

a) $y = mx + b$, solve for x

$$\frac{y-b}{m} = \frac{mx}{m}$$

$$\frac{y-b}{m} = x$$

b) $I = Prt$, solve for P

$$\frac{I}{rt} = \frac{Prt}{rt}$$

$$\frac{I}{rt} = P$$

c) $d = st$, solve for t

$$\frac{d}{s} = \frac{st}{s}$$

$$\frac{d}{s} = t$$

d) $A = \frac{bh}{2}$, solve for b

$$\frac{2A}{h} = \frac{bh}{h}$$

$$\frac{2A}{h} = b$$

10. Solve the following word problems by finding the value of the indicated variable.

a) The formula for finding the volume of a rectangle is $V = lwh$, where V is volume, l is length, w is width, and h is the height. If the ^{volume} area of a rectangle is 108 cm^3 , the length 4 cm , and the width is 3 cm , what is the height of the rectangle?

① Isolate h $\frac{V = lwh}{lw \cancel{w}} = h$ ② Sub in values - $\frac{V = h}{lw}$

$\frac{108}{(4)(3)} = h$

$\frac{108}{12} = h$

$\boxed{9 = h}$ \therefore height is 9 cm .

b) The formula $P = 2l + 2w$ is used to calculate the perimeter, P , of a rectangle. Length is represented by l and w represents the width. If the perimeter of a rectangle is 210 cm , and the length is 20 cm , calculate the width of the rectangle.

① Isolate w $P = 2l + 2w$ ② Sub in values - $\frac{P - 2l}{2} = w$

$\frac{P - 2l}{2} = \frac{2w}{2}$ $\frac{210 - 2(20)}{2} = w$

$\frac{P - 2l}{2} = w$ $\frac{210 - 40}{2} = w$

$\frac{170}{2} = w$

\therefore width is 85 cm . $\boxed{85 = w}$

c) Volcanoes and geysers illustrate that Earth's interior is very hot. The formula $T = 10d + 20$ is used to estimate the temperature, T degrees Celsius, at a depth of d kilometers.

- i. Determine the temperature in a mine shaft that is 0.5 km below the surface of the earth.
- ii. At what depth (d) is the temperature 100°C ?

i) $T = 10d + 20$
 $T = 10(0.5) + 20$
 $T = 5 + 20$
 $\boxed{T = 25}$
 \therefore temperature is 25°C .

ii) Isolate d first Sub $T = 100$

$T = 10d + 20$ $\frac{T - 20}{10} = d$

$\frac{T - 20}{10} = \frac{10d}{10}$ $\frac{100 - 20}{10} = d$

$\frac{T - 20}{10} = d$ $\frac{80}{10} = d$

$\boxed{8 = d}$
 \therefore depth is 8 km .