

Solutions

Page 28 #s 3bdf, 4, 5ace, 6bdf,
7aceg, 8ad, 9, 10, 11

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3. For each of the following, state the operations, in order, that are applied to the variable.

b) $t + 8$

d) $-2(m + 5)$

f) $-5x^2 + 10$

b) $t + 8$

\Rightarrow add 8

d) $-2(m + 5)$

\Rightarrow add 5, multiply by -2

f) $-5x^2 + 10$

\Rightarrow square x , multiply by -5 , add 10

4. Create an algebraic expression to represent each of the following.

- a) A number x is tripled and then 19 is subtracted from the result.
- b) The variable y is squared and then the result is increased by 10.
- c) The variable n is decreased by 6 and then the result is multiplied by -8 .
- d) A number p is increased by 70 and then the result is divided by 6.

$$a) \quad 3x - 19$$

$$b) \quad y^2 + 10$$

$$c) \quad -8(n - 6)$$

$$d) \quad \frac{p + 70}{6}$$

5. State the number of terms in each of the following algebraic expressions.

a) $4x + 3$

c) $6x^2 - 7x + 12$

e) $8x^2y^5z^3$

Terms are separated by a $+$ or a $-$

a) 2 terms

c) 3 terms

e) 1 term

6. Determine the value of each of the following for $x = 2$.

b) $8x$

d) $4 - 10x$

f) $-3(x - 4)$

Replace x with 2 and then evaluate using BEDMAS.

$$\begin{aligned} \text{b) } 8x \\ &= 8(2) \\ &= 16 \end{aligned}$$

$$\begin{aligned} \text{d) } 4 - 10x \\ &= 4 - 10(2) \\ &= 4 - 20 \\ &= -16 \end{aligned}$$

$$\begin{aligned} \text{f) } -3(x - 4) \\ &= -3(2 - 4) \\ &= -3(-2) \\ &= 6 \end{aligned}$$

7. Evaluate each expression for the given value of the variable.

a) $-5x + 12$ for $x = -3$

c) $7x^2 - 1$ for $x = 3$

e) $\frac{t - 24}{3}$ for $t = 6$

g) $(7u + 4)^2$ for $u = 1$

$$\begin{aligned} \text{a) } -5x + 12 \\ &= -5(-3) + 12 \\ &= 15 + 12 \\ &= 27 \end{aligned}$$

$$\begin{aligned} \text{c) } 7x^2 - 1 \\ &= 7(3)^2 - 1 \\ &= 7(9) - 1 \\ &= 63 - 1 \\ &= 62 \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{t - 24}{3} \\ &= \frac{6 - 24}{3} \\ &= \frac{-18}{3} \\ &= -6 \end{aligned}$$

$$\begin{aligned} \text{g) } (7u + 4)^2 \\ &= (7(1) + 4)^2 \\ &= (7 + 4)^2 \\ &= (11)^2 \\ &= 121 \end{aligned}$$

8. Evaluate each expression at the given variable values.

a) $2xy$ for $x = -2, y = 3$

$$\begin{aligned} \text{a) } & 2xy \\ & = 2(-2)(3) \\ & = -12 \end{aligned}$$

d) $\frac{4q-3p}{2r}$ for $p = 4, q = 2, r = -2$

$$\begin{aligned} \text{b) } & \frac{4q-3p}{2r} \\ & = \frac{4(2)-3(4)}{2(-2)} \\ & = \frac{8-12}{-4} \\ & = \frac{-4}{-4} \\ & = 1 \end{aligned}$$

9. A balloon starts at a height of 2 m and rises at a rate of 3 metres per second. Therefore, its height after t seconds is given by the equation $h = 2 + 3t$. Use this equation to determine the balloon's height after 10 seconds.

Sub in 10 for t

$$h = 2 + 3t$$

$$h = 2 + 3(10)$$

$$h = 2 + 30$$

$$h = 32$$

height of the balloon
after 10 seconds is 32 m

10. The formula for the area of a circle with radius r is $A = \pi r^2$. Determine, to one decimal place, the area of a circle that has a radius of 6 cm.

If you have a π button on your calculator use it. If you don't, then sub in 3.14 for π .

$$A = \pi r^2$$

$$A = \pi (6)^2$$

$$A = \pi (36)$$

$$A = 113.1$$

Area would be about 113.1 cm^2

11. The formula for the volume of a cube that has edge lengths of s is $V = s^3$. Determine the volume of a cube that has edge lengths of 8.3 cm.

Sub in 8.3 for s

$$V = s^3$$

$$V = (8.3)^3$$

$$V = 571.787$$

Volume is about 571.8 cm^3

8.3 x^y 3 =
 \wedge
 x

13. The height above the ground, in metres, of a ball that has been thrown into the air is modelled by the equation $h = -4.9t^2 + 22.5t + 1.6$, where t represents the number of seconds after the ball is thrown.

- Determine the height of the ball 3 seconds after it is thrown.
- For $t = 4.66$, the expression on the right side of the equation above works out to approximately 0. What does this result mean in the context of the given situation?

a) Sub in 3 for t

$$h = -4.9(3)^2 + 22.5(3) + 1.6$$

$$h = -4.9(9) + 67.5 + 1.6$$

$$h = -44.1 + 67.5 + 1.6$$

$$h = 25$$

Height is
25 m after
3 seconds

b) If the height is zero, then the ball is on the ground!

- For both $t = 1.06$ and $t = 3.53$, the expression $-4.9t^2 + 22.5t + 1.6$ works out to approximately 20. Interpret these results in the context of the given scenario.
- Explain why we would likely not use negative values for t .
- For values of t that are above 4.7, the expression $-4.9t^2 + 22.5t + 1.6$ works out to negative values. What do these results mean in the context of the given situation?

c) This means the ball is going up at $t = 1.06$ and it is going down at $t = 3.53$

d) t represents the time, so negative values don't make sense in this context.

e) When the height is negative, this would mean that the ball is underground (or underwater possibly)

14. Evaluate each expression at the given values.

a) $\frac{2}{3}x + \frac{1}{4}$ for $x = \frac{1}{2}$

Sub in $\frac{1}{2}$ for x

$$\begin{aligned} & \frac{2}{3}x + \frac{1}{4} \\ = & \frac{2}{3}\left(\frac{1}{2}\right) + \frac{1}{4} \\ = & \frac{2 \times 1}{3 \times 2} + \frac{1}{4} \\ = & \frac{2}{6} + \frac{1}{4} \\ = & \frac{1}{3} + \frac{1}{4} \end{aligned}$$

$$\begin{aligned} \frac{1}{3} & \xrightarrow{\times 4} \frac{4}{12} \\ \frac{1}{4} & \xrightarrow{\times 3} \frac{3}{12} \\ = & \frac{4}{12} + \frac{3}{12} \\ = & \frac{7}{12} \end{aligned}$$

15. The sum of the interior angles of a polygon can be found by subtracting 2 from the number of sides and multiplying the result by 180° .

- a) Determine an algebraic expression to represent the sum of the interior angles for a polygon with n sides.
- b) Use your expression from part (a) to determine the sum of the interior angles for an octagon.

a) $(n-2) \times 180$

b) octagon has 8 sides

$$\begin{aligned} & = (8-2) \times 180 \\ & = 6 \times 180 \\ & = 1080^\circ \end{aligned}$$

Sum of the interior angles in an octagon is 1080°

- c) A regular polygon has equal side lengths and equal interior angles. Determine the value of each interior angle in a regular hexagon.
- d) The sum of the interior angles for a particular polygon is 1440° . How many sides does this polygon have?

c) hexagon has 6 sides

$$\begin{aligned} \text{Sum of interior angles} &= (n-2) \times 180 \\ &= (6-2) \times 180 \\ &= 4 \times 180 \\ &= 720^\circ \end{aligned}$$

$$\Rightarrow \text{one interior angle} = 720 \div 6 = 120^\circ$$

$$\begin{aligned} \text{d) Sum} &= (n-2) \times 180 \\ \frac{1440}{180} &= \frac{(n-2) \times 180}{180} \end{aligned}$$

$$8 = n - 2$$

$$8 + 2 = n - 2 + 2 \Rightarrow 10 \text{ sides}$$

$$10 = n$$

- e) For a given regular polygon, each interior angle is 156° . How many sides does the polygon have?

$$\text{Sum} = (n-2) \times 180$$

$$\text{But Sum} = \text{one interior} \times n$$

$$\Rightarrow 156n = (n-2) \times 180$$

$$156n = 180n - 360$$

$$156n - 180n = 180n - 360 - 180n$$

$$-24n = -360$$

$$\frac{-24n}{-24} = \frac{-360}{-24} \Rightarrow 15 \text{ sides}$$

$$n = 15$$