

SUBSTITUTION AND EVALUATION

#5

Substitution is replacing one symbol with another (a number, a variable, or an expression). One application of the substitution property is replacing a variable name with a number in any expression or equation. In general, if $a = b$, then a may replace b and b may replace a . A **variable** is a letter used to represent one or more numbers (or other algebraic expression). The numbers are the values of the variable. A variable expression has numbers and variables and operations performed on it.

Examples

Evaluate each variable expression for $x = 2$.

a) $5x \Rightarrow 5(2) \Rightarrow 10$

b) $x + 10 \Rightarrow (2) + 10 \Rightarrow 12$

c) $\frac{18}{x} \Rightarrow \frac{18}{(2)} \Rightarrow 9$

d) $\frac{x}{2} \Rightarrow \frac{2}{2} \Rightarrow 1$

e) $3x - 5 \Rightarrow 3(2) - 5 \Rightarrow 6 - 5 \Rightarrow 1$

f) $5x + 3x \Rightarrow 5(2) + 3(2) \Rightarrow 10 + 6 \Rightarrow 16$

Evaluate each of the variable expressions below for the values $x = -3$ and $y = 2$. Be sure to follow the order of operations as you simplify each expression.

1. $x + 3$

2. $x - 2$

3. $x + y + 4$

4. $y - 2 + x$

5. $x^2 - 7$

6. $-x^2 + 4$

7. $x^2 + 2x - 1$

8. $-2x^2 + 3x$

9. $x + 2 + 3y$

10. $y^2 + 2x - 1$

11. $x^2 + y^2 + 2^2$

12. $3^2 + y^2 - x^2$

Evaluate the expressions below using the values of the variables in each problem. These problems ask you to evaluate each expression twice, once with each of the values.

13. $2x^2 - 3x + 4$ for $x = -2$ and $x = 5$

14. $-4x^2 + 8$ for $x = -2$ and $x = 5$

15. $3x^2 - 2x + 8$ for $x = -3$ and $x = 3$

16. $-x^2 + 3$ for $x = -3$ and $x = 3$

Evaluate the variable expressions for $x = -4$ and $y = 5$.

17. $x(x + 3x)$

18. $2(x + 4x)$

19. $2(x + y) + 4\left(\frac{y+3}{x}\right)$

20. $4\left(y^2 + 2\left(\frac{x+9}{5}\right)\right)$

21. $3y(x + x^2 - y)$

22. $(x + y)(3x + 4y)$

Answers

1. 0

2. -5

3. 3

4. -3

5. 2

6. -5

7. 2

8. -27

9. 5

10. -3

11. 17

12. 4

13. a) 18 b) 39

14. a) -8 b) -92

15. a) 41 b) 29

16. a) -6 b) -6

17. 64

18. -40

19. -6

20. 108

21. 105

22. 8