Grade 7 Algebra Worksheet

Section A: Basic Expressions and Equations (Grade 7)

1. Simplify the following expressions:

   (a) $3x + 5x =$ _____

   (b) $7y - 2y =$ _____

   (c) $4(2a + 1) =$ _____

   (d) $9 - 2(3 + b) =$ _____

2. Evaluate each expression when $x = 3$:

   (a) $2x + 5 =$ _____

   (b) $3x - 7 =$ _____

   (c) $x^2 + 4 =$ _____

   (d) $\frac{12}{x} =$ _____

3. Solve for the variable:

   (a) $n + 6 = 14$

   (b) $y - 5 = 8$

   (c) $3m = 24$

   (d) $\frac{p}{4} = 7$

Section B: Two-Step Equations (Grade 7)

4. Solve the following two-step equations:

   (a) $3x + 5 = 20$

   (b) $2y - 7 = 13$

   (c) $5z + 3 = 18$

   (d) $4a - 10 = 10$

5. Solve these equations with variables on both sides:

   (a) $3x = x + 12$

   (b) $5y - 3 = 2y + 9$

   (c) $7m - 2 = 3m + 10$

   (d) $6p + 1 = 2p + 17$

Section C: Word Problems (Grade 7)

6. The sum of three consecutive integers is 51. What are the integers?

7. A rectangle has a perimeter of 42 cm. If its length is 5 cm more than its width, find the dimensions.

8. The cost of renting a bike is \$5 plus \$2 per hour.

   (a) Write an equation to find the total cost (C) for h hours.

   (b) What is the cost of renting the bike for 4 hours?

   (c) If you paid \$21, how many hours did you rent the bike?

Section D: Patterns and Relationships (Grade 7)

9. For the pattern 4, 7, 10, 13, 16, ...

   (a) What is the next term?

   (b) Write an equation to represent the nth term.

   (c) Find the 15th term.

10. If 3 books cost \$24, how much would 7 books cost? Write and solve an equation.

Section E: Grade 8 Extension Problems (Increasing Difficulty)

11. Solve the following equations:

    (a) $2(x + 3) = 5x - 4$

    (b) $3(y - 1) - 2(y + 4) = 7$

    (c) $4(z + 2) - 2z = 3(z - 1) + 9$

12. Solve for the variable:

    (a) $\frac{2x}{3} + 1 = 7$

    (b) $\frac{y-4}{5} = 3$

    (c) $\frac{3(m+2)}{4} = 9$

13. Two trains leave stations that are 450 km apart, traveling towards each other. One train travels at 70 km/h and the other at 80 km/h. How long will it take for the trains to meet?

14. Expand and simplify:

    (a) $3(x + 4) - 2(x - 5)$

    (b) $5(2a - 1) + 2(a + 3)$

    (c) $(x + 3)(x + 2)$

    (d) $(2y - 1)(y + 4)$

15. Solve the following system of equations:

    (a) $x + y = 5$ and $x - y = 1$

    (b) $2a + b = 7$ and $a - b = 2$

16. A rectangular pool has a length that is 3 m more than its width. If 10 m of fencing is needed to enclose one length and one width of the pool, find the dimensions of the pool.

17. The sum of the squares of two consecutive integers is 85. Find these integers.

18. If $f(x) = 2x^2 - 3x + 1$, find:

    (a) $f(0)$

    (b) $f(1)$

    (c) $f(-2)$