Year 7 Worksheet 4: Introduction of Algebra

Question 1: Introduction to algebraic expressions and equations.

1	If x represents the number of apples, and you have 5 apples, how would you write the expression for having x apples?
2	Mary has twice as many candies as John. If John has y candies, how many candies does Mary have in terms of y?
3	If a represents the price of a toy, and it's on sale for $10 off, how would you write the expression for the sale price?
4	David's age is 5 years less than twice of Sarah's age. If Sarah's age is s, how would you write the expression for David's age?
5	A rectangle's length is x meters, and its width is 3 meters less. Write an expression for its width.

6	If n represents a number, and the number is multiplied by 4 and then added to 7, what is the expression for this situation?
7	A teacher has t students in her class. She divides them into groups of 5. Write an expression for the number of groups.
8	The total cost of a book and a pen is $15. The cost of the book is b dollars. Write an equation for this situation.
9	A train travels at a speed of s km/h. It travels for t hours. Write an expression for the distance it travels.
10	The sum of three consecutive even integers is 66. Write an equation to represent this situation.

Question 2: Solving simple linear equations.

1	$3x + 5 = 17$
2	$2x - 7 = 11$
3	$4(x - 3) = 20$
4	$2(3x - 2) = 16$
5	$5x + 10 = 35$

6	$2x + 3 = 11$
7	$3(2x - 1) = 15$
8	$4x - 8 = 16$
9	$2(5x + 2) = 24$
10	$3x + 7 = 25$

Question 3: Using variables and formulas.

1	A rectangle has a length of l cm and a width of 10 cm. Write an expression for the perimeter of the rectangle.
2	The formula for the area of a rectangle is "Area = length × width." If the length of a rectangle is 8 cm and the width is 5 cm, what is its area using algebra expression?
3	Sarah wants to calculate her total earnings for a week. She earns h dollars per hour and works for t hours. Write an expression for her total earnings.
4	The formula for the volume of a cube is "Volume = side length × side length × side length." If the side length of a cube is 3 cm, what is its volume using algebra expression?

5	The formula for the area of a triangle is "Area = 1/2 × base × height." If the base is 10 cm and the height is 8 cm, what is the area using algebra expression?
6	A rectangular garden has a length of l meters and a width of w meters. Write a formula for its perimeter.
7	The formula for the circumference of a circle is "Circumference = 2 × π × radius." If the radius of a circle is 5 cm (use π ≈ 3.14), what is its circumference?
8	Lisa is three years older than twice John's age. Write an expression for Lisa's age in terms of John's age (j).

9	Tom's height is 15 cm less than double Mary's height. Write an expression for Tom's height in terms of Mary's height (m).
10	Emily is e years old. In 5 years, her age will be five times her current age. Write an expression to represent her age in 5 years.

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Answer Key

Question 1: Answer the following.

1	If x represents the number of apples, and you have 5 apples, how would you write the expression for having x apples? Answer: x=5
2	Mary has twice as many candies as John. If John has y candies, how many candies does Mary have in terms of y? Answer: Mary has 2y candies.
3	If a represents the price of a toy, and it's on sale for $10 off, how would you write the expression for the sale price? Answer: Sale price = a−10
4	David's age is 5 years less than twice of Sarah's age. If Sarah's age is s, how would you write the expression for David's age? Answer: David's age = 2s−5
5	A rectangle's length is x meters, and its width is 3 meters less. Write an expression for its width. Answer: Width = x−3 meters
6	If n represents a number, and the number is multiplied by 4 and then added to 7, what is the expression for this situation? Answer: 4n+7
7	A teacher has t students in her class. She divides them into groups of 5. Write an expression for the number of groups. Answer: Number of groups = t/5
8	The total cost of a book and a pen is $15. The cost of the book is b dollars. Write an equation for this situation. Answer: b+p=15 (where p represents the cost of the pen)
9	A train travels at a speed of s km/h. It travels for t hours. Write an expression for the distance it travels. Answer: Distance = sxt km

10	The sum of three consecutive even integers is 66. Write an equation to represent this situation. Answer: Let the first even integer be x, so the equation is x+(x+2)+(x+4)=66.

Question 2: Solve the equation

1	3x + 5 = 17 Answer: x = 4
2	2x - 7 = 11 Answer: x = 9
3	4(x - 3) = 20 Answer: x = 8
4	2(3x - 2) = 16 Answer: x = 10/3
5	5x + 10 = 35 Answer: x = 5
6	2x + 3 = 11 Answer: x = 4
7	3(2x - 1) = 15 Answer: x = 3
8	4x - 8 = 16 Answer: x = 6
9	2(5x + 2) = 24 Answer: x = 2
10	3x + 7 = 25 Answer: x = 6

Question 3: Answer the following.

1	A rectangle has a length of l cm and a width of 10 cm. Write an expression for the perimeter of the rectangle. Answer: Perimeter = 2l+2(10) = 2l+20
2	The formula for the area of a rectangle is "Area = length × width." If the length of a rectangle is 8 cm and the width is 5 cm, what is its area using algebra expression? Answer: Area = l x w = 8 x 5 = 40 square cm
3	Sarah wants to calculate her total earnings for a week. She earns h dollars per hour and works for t hours. Write an expression for her total earnings. Answer: Total earnings = $h \cdot t$
4	The formula for the volume of a cube is "Volume = side length × side length × side length." If the side length of a cube is 3 cm, what is its volume using algebra expression? Answer: Volume = 27 cubic cm
5	The formula for the area of a triangle is "Area = 1/2 × base × height." If the base is 10 cm and the height is 8 cm, what is the area using algebra expression? Answer: Area = 40 square cm
6	A rectangular garden has a length of l meters and a width of w meters. Write a formula for its perimeter. Answer: Perimeter = 2(l+w)
7	The formula for the circumference of a circle is "Circumference = 2 × π × radius." If the radius of a circle is 5 cm (use $\pi \approx 3.14$), what is its circumference? Answer: Circumference ≈ 31.5 cm
8	Lisa is three years older than twice John's age. Write an expression for Lisa's age in terms of John's age (j). Answer: Lisa's age = 2j+3
9	Tom's height is 15 cm less than double Mary's height. Write an expression for Tom's height in terms of Mary's height (m). Answer: Tom's height = 2m−15

10	Emily is e years old. In 5 years, her age will be five times her current age. Write an expression to represent her age in 5 years. Answer: Emily's age in 5 years = e+5