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Algebraic Expressions 7th Grade Worksheets

1. Identify the algebraic expressions among the following.

a) $3a - b - \frac{1}{2} = 1$

b) $3a - 2b$

c) $(pqr)^2 + 2pq - 3$

d) $x = y$

2. Jim is asked to convert the following phrases into algebraic expressions. Can we help him?



a) sum of x and y is subtracted from their product.

b) 5 more than the sum of x and the reciprocal of y .

c) The difference of squares of m and n .

3) The number of terms in the expression $3x^y z - 2yz - \frac{3}{4}$ is

4) Classify the following as monomials, binomials, and trinomials.

a) $2x - yz$

b) $(pqr)^2 - \frac{1}{2}r + 3$

c) $\frac{3xy}{4}$

c) 4

5) Simplify the following expressions:

a) $3.5x - 2 + 5.2x - 3$

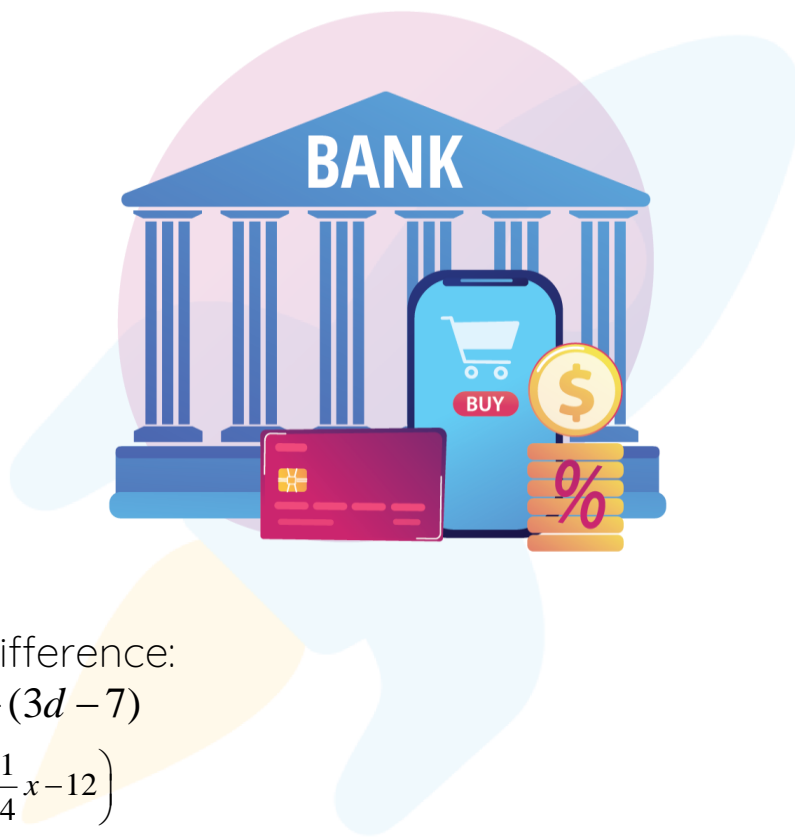
$$\frac{1}{3}x - 4 + \frac{1}{6}x + \frac{1}{8} - x^3$$

b) Find the sum:

a) $(3x + 8) + (-2x - 7)$

b) $\left(\frac{3}{5}x - 7\right) + (2x - 5) + \left(-\frac{2}{5}x - 7\right)$

7) Jonathan had $\$ 4x^2 - 7x + 8$ in his bank account. Now he deposited $\$ -3x^2 + 7x + 13$. What is his net balance?



8) Find the difference:

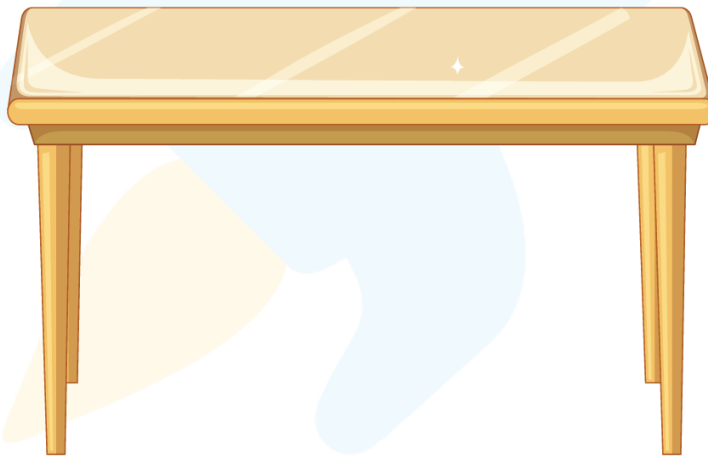
a) $(-2d - 5) - (3d - 7)$

b) $\left(\frac{3}{4}x - 2\right) - \left(-\frac{1}{4}x - 12\right)$

9) Joy is $(4x + 5)$ years old. Her brother Michael is $(3x - 2)$ years younger than her sister. Then write an expression that represents Michael's age.



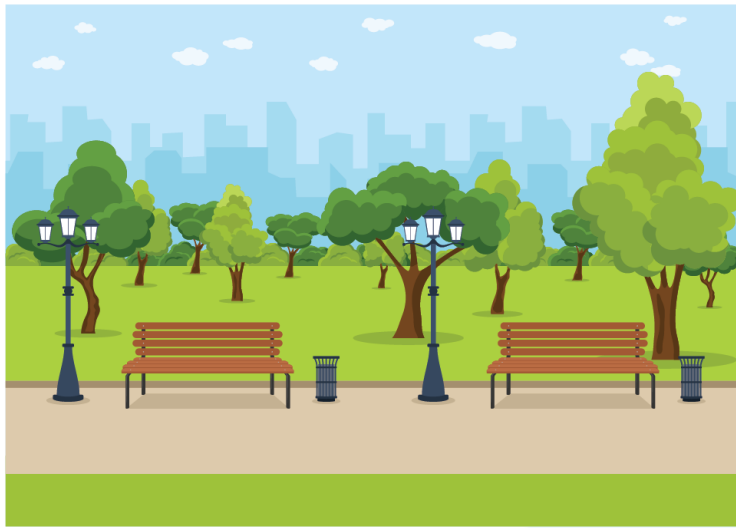
10) The width of a rectangular table top is 4 units less than thrice its length. Then what is its perimeter as an algebraic expression? Assume its length to be x .



11) Subtract $5m+8$ from the sum of $-3m^2-5m+7$ and $4m^2+5m-9$.

12) Using distributive property, $-\frac{2}{5}(10x-15) =$ _____

13) The area of a rectangular park is $28m-35p$ square units. Then what are its possible dimensions?



14) Evaluate the following algebraic expressions at the given values:

a) $\sqrt{x} + 3$, when $x = 16$

b) $\frac{8}{15}x + \frac{1}{5}$, when $x = 3$

15) Factor out the coefficient of the variable:

a) $\frac{17}{4} + \frac{5}{8}x$

b) $0.8k + 3.2$

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ANSWERS

1) a) Options b) and c)	2) a) $xy - (x+y)$ b) $x + 1/y + 5$ c) $m^2 - n^2$	3) 3
4) a) Binomial b) Trinomial c) Monomial	5) a) $8.7x - 5$ b) $-x^3 + 1x/2 - 31/8$	6) a) $x + 1$ b) $11/5x - 19$
7) $x^2 + 21$	8) a) $-5d + 2$ b) $x + 10$	9) $x + 7$ years
10) a) $(8x - 8)$ units	11) $m^2 - 5m - 10$	12) $-4x + 6$
13) 7 units $4m - 5p$ units	14) a) 7 b) $9/5$	15) a) $5/8(34/5 + x)$ b) $0.8(k + 4)$

SOLUTIONS

Complete solution/explanation



1. Identify the algebraic expressions among the following.

a) $3a - b - \frac{1}{2} = 1$

b) $3a - 2b$

c) $(pqr)^2 + 2pq - 3$

d) $x = y$

Solution:

Among the given options, the ones with “=” symbol are equations. The rest are expressions.

So the algebraic expressions are b) and c).

2. Jim is asked to convert the following phrases into algebraic expressions. Can we help him?

a) sum of x and y is subtracted from their product.

b) 5 more than the sum of x and the reciprocal of y .

c) The difference of squares of m and n .

Solution:

a) $xy - (x + y)$

b) $x + \frac{1}{y} + 5$

c) $m^2 - n^2$

3) The number of terms in the expression $3x^y z - 2yz - \frac{3}{4}$ is _____.

Solution:

The terms are separated by plus and minus symbols.

So the number of terms in the given expression is 3.

4) Classify the following as monomials, binomials, and trinomials.

a) $2x - yz$

b) $(pqr)^2 - \frac{1}{2}r + 3$

$\frac{3xy}{4}$

c) 4

Solution:

The algebraic expressions are called monomials if they have one term, binomials if they have two terms, and trinomials if they have three terms. Hence:

a) $2x - yz$ is a binomial.

b) $(pqr)^2 - \frac{1}{2}r + 3$ is a trinomial.

$\frac{3xy}{4}$

c) 4 is a monomial.

5) Simplify the following expressions:

a) $3.5x - 2 + 5.2x - 3$

b) $\frac{1}{3}x - 4 + \frac{1}{6}x + \frac{1}{8} - x^3$

Solution:

a) We just combine the like terms and simplify.

$$3.5x - 2 + 5.2x - 3 = (3.5x + 5.2x) + (-2 - 3) = 8.7x - 5$$

b) Same as the last one,

$$\begin{aligned} & \frac{1}{3}x - 4 + \frac{1}{6}x + \frac{1}{8} - x^3 \\ &= -x^3 + \left(\frac{1}{3}x + \frac{1}{6}x\right) + \left(-4 + \frac{1}{8}\right) \\ &= -x^3 + \frac{1}{2}x - \frac{31}{8} \end{aligned}$$

6) Find the sum:

a) $(3x + 8) + (-2x - 7)$

b) $\left(\frac{3}{5}x - 7\right) + (2x - 5) + \left(-\frac{2}{5}x - 7\right)$

Solution:

a) We will combine the like terms:

$$\begin{aligned}(3x+8)+(-2x-7) \\ &= 3x+8-2x-7 \\ &= (3x-2x)+(8-7) \\ &= x+1\end{aligned}$$

b) We will combine the like terms:

$$\begin{aligned}\left(\frac{3}{5}x-7\right)+(2x-5)+\left(-\frac{2}{5}x-7\right) \\ &= \left(\frac{3}{5}x+2x-\frac{2}{5}x\right)+(-7-5-7) \\ &= \frac{11}{5}x-19\end{aligned}$$

7) Jonathan had \$ $4x^2 - 7x + 8$ in his bank account. Now he deposited \$ $-3x^2 + 7x + 13$. What is his net balance?

Solution:

The net balance can be obtained by adding the given two algebraic expressions.

$$\begin{aligned}(4x^2 - 7x + 8) + (-3x^2 + 7x + 13) \\ &= (4x^2 - 3x^2) + (-7x + 7x) + (8 + 13) \\ &= x^2 + 0x + 21 \\ &= x^2 + 21\end{aligned}$$

8) Find the difference:

a) $(-2d - 5) - (3d - 7)$

b) $\left(\frac{3}{4}x - 2\right) - \left(-\frac{1}{4}x - 12\right)$

Solution:

a) We will distribute the minus sign to the second expression and simplify.

$$\begin{aligned}(-2d - 5) - (3d - 7) \\ &= -2d - 5 - 3d + 7 \\ &= (-2d - 3d) + (-5 + 7) \\ &= -5d + 2\end{aligned}$$

b) Same as the last one,

$$\begin{aligned} & \left(\frac{3}{4}x - 2\right) - \left(-\frac{1}{4}x - 12\right) \\ &= \frac{3}{4}x - 2 + \frac{1}{4}x + 12 \\ &= \left(\frac{3}{4}x + \frac{1}{4}x\right) + (-2 + 12) \\ &= x + 10 \end{aligned}$$

9) Joy is $(4x + 5)$ years old. Her brother Michael is $(3x - 2)$ years younger than her sister. Then write an expression that represents Michael's age.

Solution:

Joy's age = $(4x + 5)$ years.

Michael's age is obtained by subtracting $(3x - 2)$ from $(4x + 5)$.
 $(4x + 5) - (3x - 2) = 4x + 5 - 3x + 2 = x + 7$

So Michael's age = $(x + 7)$ years.

10) The width of a rectangular table top is 4 units less than thrice its length. Then what is its perimeter as an algebraic expression? Assume its length to be x .

Solution:

By given data, the width of the table top is, $w = 3x - 4$ units.

So the perimeter is,

$$\begin{aligned} & 2(\text{length} + \text{width}) \\ &= 2(x + (3x - 4)) \\ &= 2(4x - 4) \\ &= 8x - 8 \end{aligned}$$

So the perimeter of the table top = $(8x - 8)$ units.

11) Subtract $5m + 8$ from the sum of $-3m^2 - 5m + 7$ and $4m^2 + 5m - 9$.

Solution:

$$\begin{aligned} & \left[(-3m^2 - 5m + 7) + (4m^2 + 5m - 9)\right] - (5m + 8) \\ &= (m^2 - 2) - (5m + 8) \\ &= m^2 - 2 - 5m - 8 \\ &= m^2 - 5m - 10 \end{aligned}$$

12) Using distributive property, $-\frac{2}{5}(10x-15) =$ _____

Solution:

The distributive property is $a(b+c) = ab+ac$. Using this,

$$-\frac{2}{5}(10x-15) = -\frac{2}{5} \times 10x + \frac{2}{5} \times 15 = -4x + 6$$

13) The area of a rectangular park is $28m-35p$ square units. Then what are its possible dimensions?

Solution:

The area of the rectangular park is,

$$28m-35p = 7(4m-5p) = \text{Length} \times \text{Width}$$

So the possible dimensions are, 7 units and $(4m-5p)$ units.

14) Evaluate the following algebraic expressions at the given values:

a) $\sqrt{x}+3$, when $x=16$

b) $\frac{8}{15}x+\frac{1}{5}$, when $x=3$

Solution:

We just substitute the given values into the given expressions and simplify.

a) $\sqrt{x}+3 = \sqrt{16}+3 = 4+3 = 7$

b) $\frac{8}{15}x+\frac{1}{5} = \frac{8}{15}(3)+\frac{1}{5} = \frac{8}{5}+\frac{1}{5} = \frac{9}{5}$

15) Factor out the coefficient of the variable:

a) $\frac{17}{4}+\frac{5}{8}x$

b) $0.8k+3.2$

Solution:

a) The coefficient of x is $\frac{5}{8}$.

$$\frac{17}{4}+\frac{5}{8}x = \frac{5}{8}\left(\frac{34}{5}+x\right)$$

b) The coefficient of k is 0.8.

$$0.8k+3.2 = 0.8(k+4)$$