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Algebraic Expressions 7th Grade Worksheets

1. Identify the algebraic expression among the following.

a) $2x + 3 = 0$

b) $2x - 3$

c) $\frac{1}{2}x = 3$

d) $2x = y$

2. Classify the following algebraic expressions into monomials, binomials, and trinomials.

a) $3x^2yz$

b) $x + y - z$

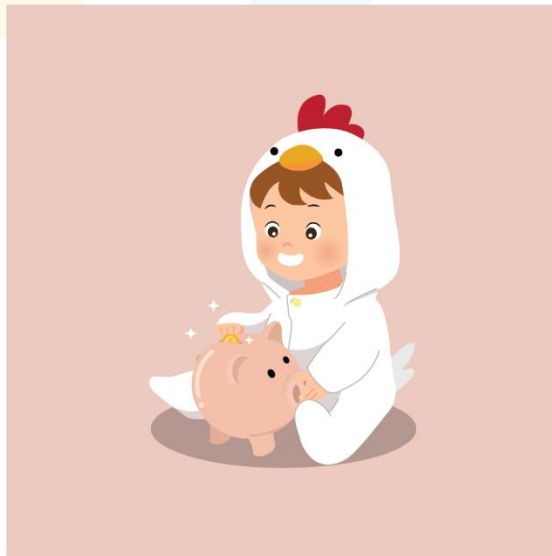
c) $x^2 - y^2$

3. Simplify the following algebraic expressions by combining like terms.

a) $3x + 5x - 7x$

b) $\frac{1}{2}x - 7 - 3x$

4. Mia's piggy bank has only dimes and quarters. Write an expression for the amount of money (in dollars) in her piggy bank if x is the number of dimes and y is the number of quarters.

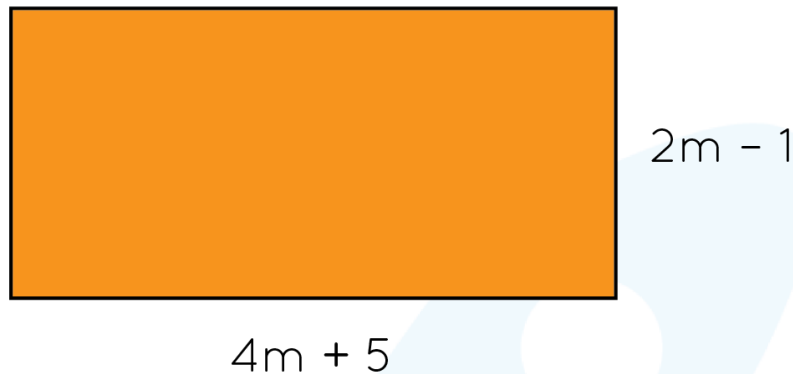


5. Find the sum.

a) $(3.2 - x) + (-10x + 2.5)$

b) $\left(\frac{1}{3}m - 5\right) + \left(\frac{1}{2}m + 7\right)$

6. Find the algebraic expression that corresponds to the perimeter of the following rectangle.



7. Find the difference.

a) $(-3g + 8) - (5g + 12)$

b) $\left(\frac{3}{4}x + 5\right) - \left(-\frac{5}{4}x + 12\right)$

8) Simplify the following using distributive property.

$$-\frac{7}{2}(3y - 6) + 2\left(5 - \frac{9}{2}y\right)$$

9) Subtract $5 - 4x + x^2$ from the sum of $2x^2 - 5x$ and $7x^2 - 2$.

10) What should be added to $3x^2 + xy + y^2$ to get $3x^2 - 3y^2$?

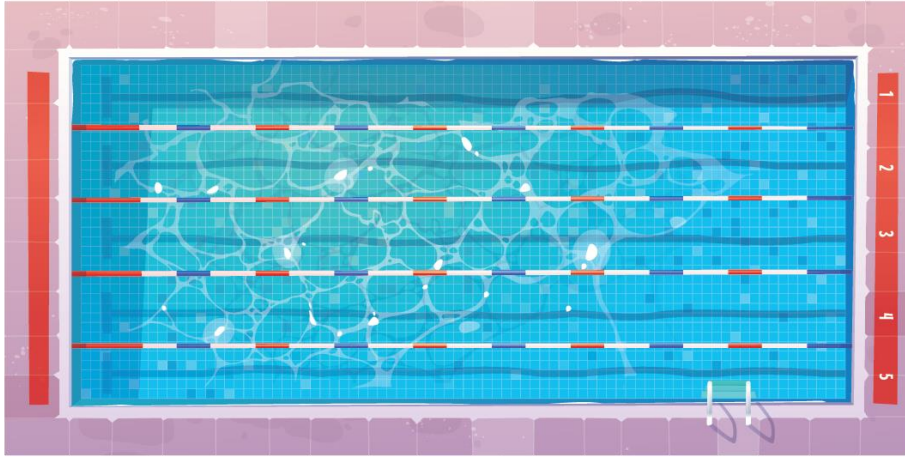
11) What should be subtracted from $3a - 5b + 10$ in order to get $-7a + 2b - 5$?

12) Factor out the GCF.

a) $16x - 20y$

b) $14 + 21m - 7n$

13) The area of a rectangular shaped swimming pool is $3x - 9$ square units. Find the possible dimensions of the rectangle as algebraic expressions.



14) Factor out the coefficient of the variable term.

a) $\frac{5}{8}k + \frac{5}{4}$

b) $\frac{7}{2}m + 14$

15) A square shaped door mat has a perimeter of $8x - 12$ units. Find an expression for the length of the mat.



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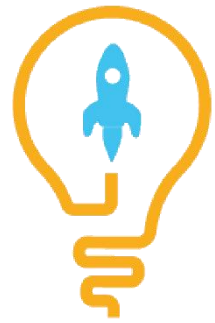
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ANSWERS

| | | |
|---------------------------------|---|---|
| 1) Option b | 2) a) Monomial b) Trinomial c) Binomial | 3) a) Monomial b) Trinomial c) Binomial |
| 4) $0.10x + 0.25y$ | 5) a) $5.7 - 11x$ b) $(5/6)m + 2$ | 6) $12m + 8$ |
| 7) a) $-8g - 4$ b) $2x - 7$ | 8) $-39y/2 + 31$ | 9) $8x^2 - x - 7$ |
| 10) $-4y^2 - xy$ | 11) $10a - 7b + 15$ | 12) a) $4(4x - 5y)$ |
| 13) 3 units and $(x - 3)$ units | 14) a) $5(k + 2)/8$ b) $7(m + 4)/2$ | 15) $2x - 3$ |

SOLUTIONS

Complete solution/explanation



1. Identify the algebraic expression among the following.

a) $2x + 3 = 0$

b) $2x - 3$

c) $\frac{1}{2}x = 3$

d) $2x = y$

Solution:

An algebraic expression is a combination of variables and constants without any “=” symbol. Hence the option is b).

Note: a), c), and d) are called the equations NOT the algebraic expressions.

2. Classify the following algebraic expressions into monomials, binomials, and trinomials.

a) $3x^2yz$

b) $x + y - z$

c) $x^2 - y^2$

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) $3x^2yz$ is a monomial.

b) $x + y - z$ is a trinomial.

c) $x^2 - y^2$ is a binomial.

3. Simplify the following algebraic expressions by combining like terms.

a) $3x + 5x - 7x$

b) $\frac{1}{2}x - 7 - 3x$

Solution:

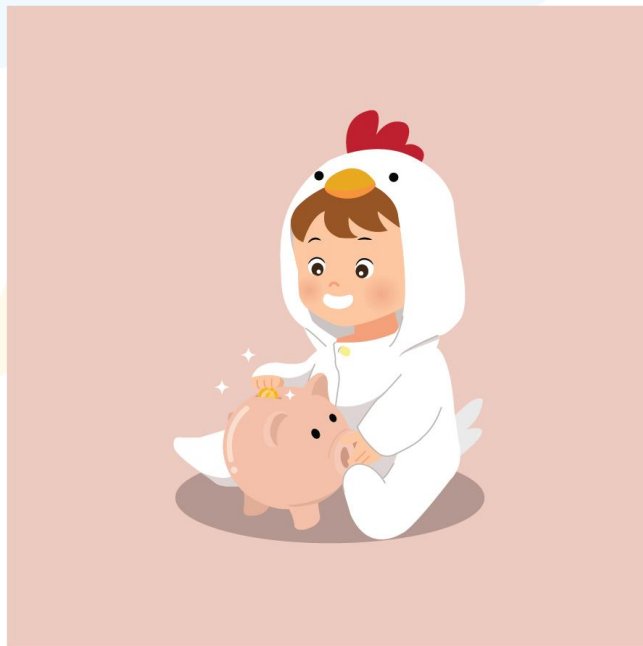
a) All terms in the given expression are like terms. We know that $3 + 5 - 7 = 1$.

Hence, $3x + 5x - 7x = (3 + 5 - 7)x = 1x$ (or) x .

b)

$$\frac{1}{2}x - 7 - 3x = \left(\frac{1}{2}x - 3x\right) - 7 = \frac{-5}{2}x - 7$$

4. Mia's piggy bank has only dimes and quarters. Write an expression for the amount of money (in dollars) in her piggy bank if x is the number of dimes and y is the number of quarters.



Solution:

The number of dimes is x and each dime is of worth \$0.10. So the total worth of dimes is $0.10x$.

The number of quarters is y and each quarter is of worth \$0.25. So the total worth of quarters is $0.25y$.

So the algebraic expression that represents the total money in the piggy bank is $0.10x + 0.25y$ dollars.

5. Find the sum.

a) $(3.2 - x) + (-10x + 2.5)$

b) $\left(\frac{1}{3}m - 5\right) + \left(\frac{1}{2}m + 7\right)$

Solution:

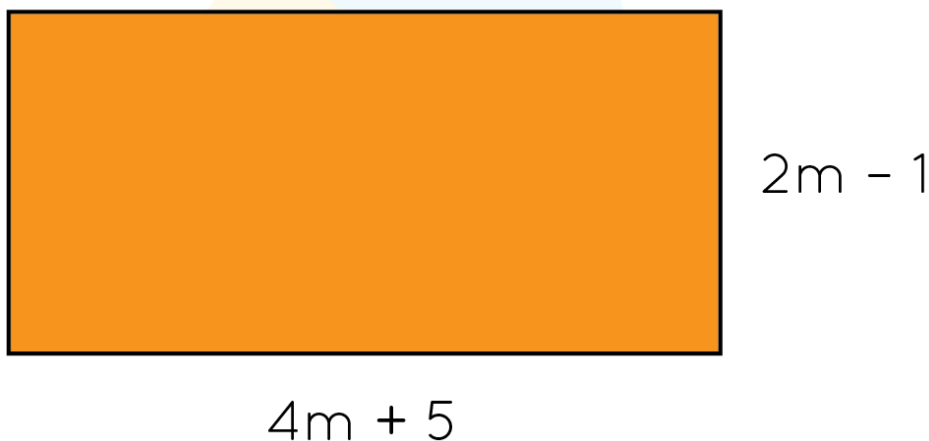
a) We will find the sum by combining the like terms.

$$\begin{aligned}(3.2 - x) + (-10x + 2.5) &= (3.2 + 2.5) + (-x - 10x) \\ &= 5.7 - 11x\end{aligned}$$

b) We will find the sum by combining the like terms.

$$\begin{aligned}\left(\frac{1}{3}m - 5\right) + \left(\frac{1}{2}m + 7\right) &= \left(\frac{1}{3}m + \frac{1}{2}m\right) + (-5 + 7) \\ &= \frac{5}{6}m + 2\end{aligned}$$

6. Find the algebraic expression that corresponds to the perimeter of the following rectangle.



Solution:

The length of the rectangle is $l = 4m + 5$

The width of the rectangle is $w = 2m - 1$

The perimeter is,

$$\begin{aligned}2(l + w) &= 2(4m + 5 + 2m - 1) \\ &= 2(6m + 4) \\ &= 12m + 8\end{aligned}$$

7. Find the difference.

a) $(-3g + 8) - (5g + 12)$

b) $\left(\frac{3}{4}x + 5\right) - \left(-\frac{5}{4}x + 12\right)$

Solution:

a) We will just distribute the minus sign and perform the usual addition.

$$\begin{aligned}(-3g + 8) - (5g + 12) &= -3g + 8 - 5g - 12 \\ &= (-3g - 5g) + (8 - 12) \\ &= -8g - 4\end{aligned}$$

b) Here also, we will just distribute the minus sign and perform the usual addition.

$$\begin{aligned}\left(\frac{3}{4}x + 5\right) - \left(-\frac{5}{4}x + 12\right) &= \frac{3}{4}x + 5 + \frac{5}{4}x - 12 \\ &= \left(\frac{3}{4}x + \frac{5}{4}x\right) + (5 - 12) \\ &= 2x - 7\end{aligned}$$

8) Simplify the following using distributive property.

$$-\frac{7}{2}(3y - 6) + 2\left(5 - \frac{9}{2}y\right)$$

Solution:

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

$$\begin{aligned}-\frac{7}{2}(3y - 6) + 2\left(5 - \frac{9}{2}y\right) &= -\frac{21y}{2} + 21 + 10 - 9y \\ &= \left(-\frac{21y}{2} - 9y\right) + (21 + 10) \\ &= -\frac{39y}{2} + 31\end{aligned}$$

9) Subtract $5 - 4x + x^2$ from the sum of $2x^2 - 5x$ and $7x^2 - 2$.

Solution:

Using the given instruction,

$$\begin{aligned} & [(2x^2 - 5x) + (7x^2 - 2)] - (5 - 4x + x^2) \\ &= (9x^2 - 5x - 2) - 5 + 4x - x^2 \\ &= 8x^2 - x - 7 \end{aligned}$$

10) What should be added to $3x^2 + xy + y^2$ to get $3x^2 - 3y^2$?
Solution:

Here, the sum is $3x^2 - 3y^2$ and one of the addends is $3x^2 + xy + y^2$.
To find the other addend, we have to subtract the given addend from the sum.

$$\begin{aligned} & (3x^2 - 3y^2) - (3x^2 + xy + y^2) \\ &= 3x^2 - 3y^2 - 3x^2 - xy - y^2 \\ &= -4y^2 - xy \end{aligned}$$

11) What should be subtracted from $3a - 5b + 10$ in order to get $-7a + 2b - 5$?

Solution:

Here the difference is $-7a + 2b - 5$ and the minuend is $3a - 5b + 10$.
To get the subtrahend, we subtract difference from the minuend.

$$\begin{aligned} & (3a - 5b + 10) - (-7a + 2b - 5) \\ &= 3a - 5b + 10 + 7a - 2b + 5 \\ &= 10a - 7b + 15 \end{aligned}$$

12) Factor out the GCF.

a) $16x - 20y$

b) $14 + 21m - 7n$

Solution:

a) The GCF of 16 and 20 is 4. So

$$16x - 20y = 4(4x - 5y)$$

b) The GCF of 14, 21, and -7 is 7. So

$$14 + 21m - 7n = 7(2 + 3m - n)$$

13) The area of a rectangular shaped swimming pool is $3x - 9$ square units. Find the possible dimensions of the rectangle as algebraic expressions.

Solution:

The area of the given swimming pool =

$$3x - 9 = 3(x - 3) = \text{Length} \times \text{Width}$$

So the possible dimensions are 3 units and $(x - 3)$ units.

14) Factor out the coefficient of the variable term.

a) $\frac{5}{8}k + \frac{5}{4}$

b) $\frac{7}{2}m + 14$

Solution:

a) Here, the variable is k and its coefficient is $\frac{5}{8}$.

$$\frac{5}{8}k + \frac{5}{4} = \frac{5}{8}(k + 2)$$

b) Here, the variable is m and its coefficient is $\frac{7}{2}$.

$$\frac{7}{2}m + 14 = \frac{7}{2}(m + 4)$$

15) A square shaped door mat has a perimeter of $8x - 12$ units. Find an expression for the length of the mat.

Solution:

$$\text{The perimeter of the mat} = 8x - 12 = 4(2x - 3).$$

If we divide it by 4, we get its length.

$$\text{So the length of the mat} = \frac{4(2x - 3)}{4} = (2x - 3) \text{ units.}$$