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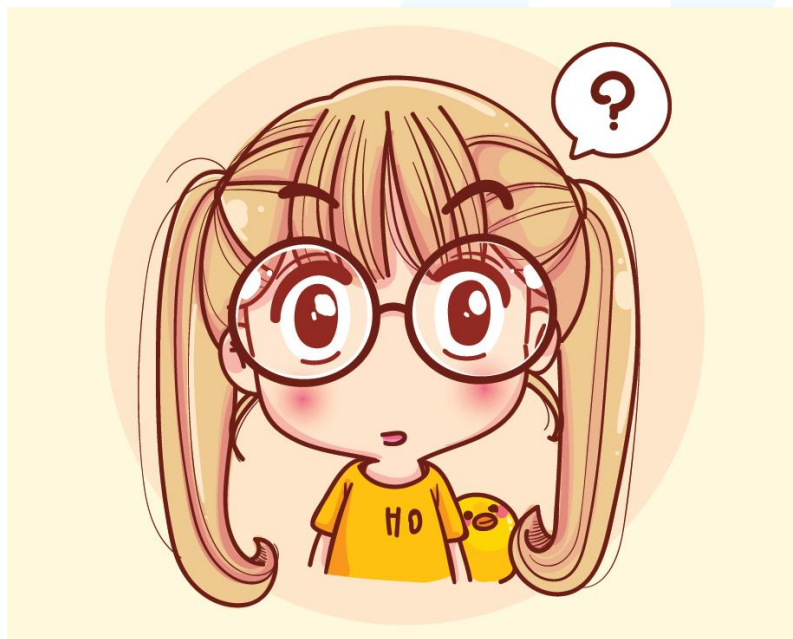
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Algebraic Expressions 7th Grade Worksheets

1) State whether the following are True/False.

- a) $x = 2$ is an algebraic expression.
- b) $x = 2$ is an equation.
- c) $x - 2$ is an algebraic expression.
- d) $x - 2$ is an equation.

2) Mia is thinking how to convert the following phrases into algebraic expressions. Can we help her?



- a) The sum of x and 2.
 - b) One-fourth of the sum of x and y .
 - c) Number 4 is added to the product of m and n .
 - d) The sum of the squares of the numbers x and y .
- 3) Identify the terms with x^3 and find the coefficient of x^3 in the following expressions:
- a) $x^3y^2 + 3$

b) $x^2 + x$

c) $3x^2y^2 - 2 + 5x^3y$

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

a) $3x + 4y - z$

b) $2y - \frac{1}{2} + x$

c) $3x + \frac{y}{4}$

5) The length of a cot is 2.5 ft more than twice its width. Find its perimeter in terms of its width. Assume that the width of the cot is w ft.



6) Simplify the following algebraic expressions by combining the like terms.

a) $\frac{2}{8}k - 8 + 9 - \frac{9}{16}k$

b) $5.3r - 5 - 2.5r$

7) Find the sum:

a) $(2x - 6) + (4x - 12)$

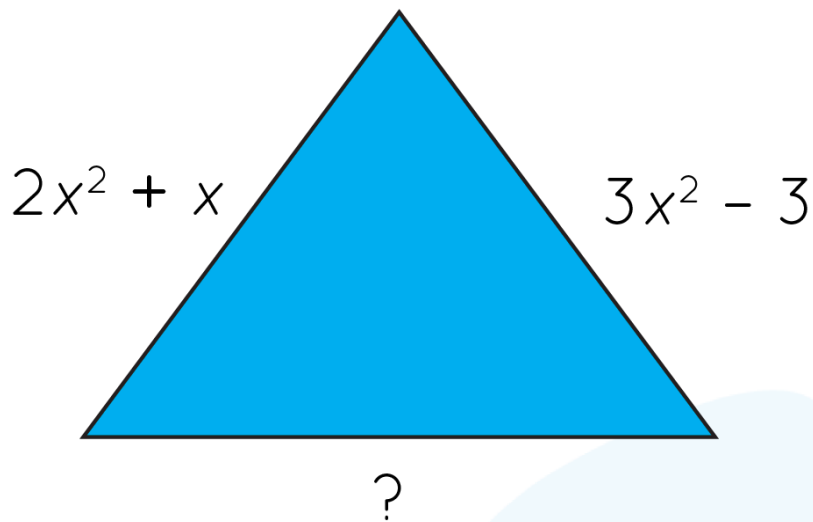
b) $\left(-\frac{5}{2}x + 4\right) + \left(\frac{1}{5}x + 17\right)$

8) Find the difference:

a) $(-5t + 3) - (7 - 2t)$

b) $\left(-\frac{1}{7}j + 15\right) - \left(\frac{3}{7} - 2j\right)$

9) The perimeter of a triangle is $3x^2 + 2$ units and its two sides are given in the following figure. Find its third side.

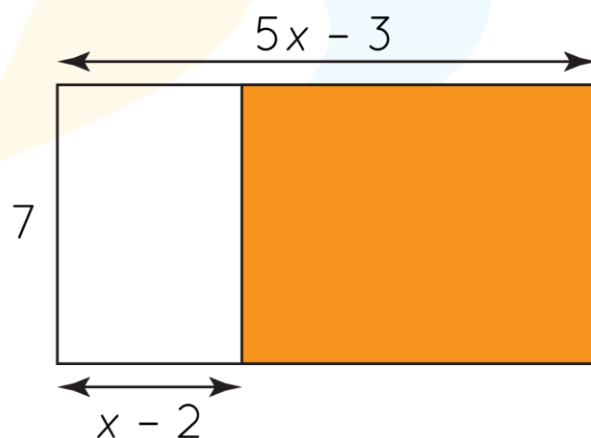


10) Simplify the following using distributive property.

a) $4(x - 8)$

b) $-\frac{3}{7}(21q - 14)$

11) Find the area of the following shaded rectangle.



12) Factor the following expressions using GCF.

a) $25m - 15$

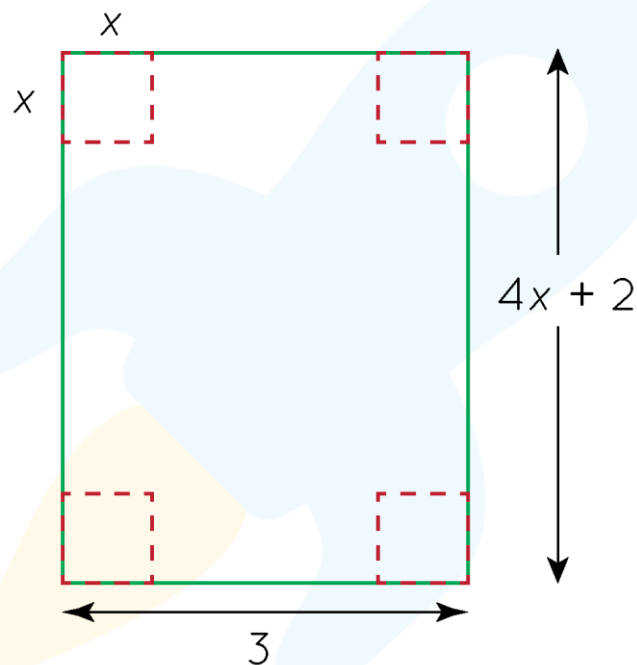
b) $6x^2y - 3xy - 12x$

13) Factor out the coefficient of the variable.

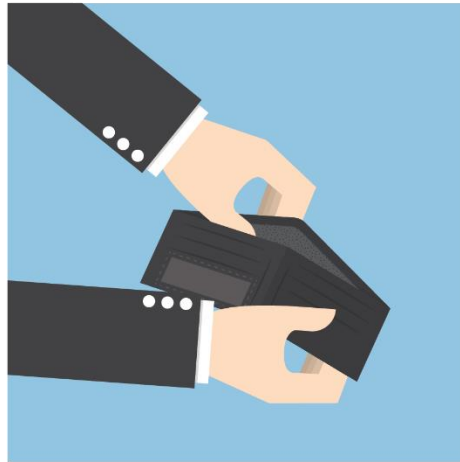
a) $0.13h - 1.17$

b) $\frac{13}{9} + \frac{4}{3}x$

14) Jay cuts identical squares from the corners of a rectangular sheet of paper as shown below. Find the area of the resultant paper.



15) James's wallet has dimes and nickels. Write an expression to represent the total amount of money in James's wallet (in dollars) if x is the number of dimes and y is the number of nickels.



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ANSWERS

1) a) False b) True c) True d) False	2) a) $x+2$ b) $0.25x+0.25y$ c) $mn+4$ d) $x^2 + y^2$	3) a) $x^3y^2 : y^2$ b) No x^3 term c) $5x^3y : 5y$
4) a) Trinomial b) Trinomial c) Binomial	5) $(6w+5)$ ft	6) a) $-(5/16)k+1$ b) $2.8r-5$
7) a) $6x - 18$ b) $-23x/10 + 21$	8) a) $-3t-4$ b) $13j/7+102/7$	9) $-2x^2 - x + 5$
10) a) $4x-32$ b) $-9q+6$	11) $28x-7$	12) a) $5(5m-3)$ b) $3x(2xy-y-4)$
13) a) $0.13(h-9)$	14) a) $5(k+2)/8$ b) $7(m+4)/2$	15) $2x-3$

SOLUTIONS

Complete solution/explanation



1. State whether the following are True/False.

- a) $x = 2$ is an algebraic expression.
- b) $x = 2$ is an equation.
- c) $x - 2$ is an algebraic expression.
- d) $x - 2$ is an equation.

Solution:

Among the given statements, the ones with “=” symbol are equations and the rest others are algebraic expressions. Hence

- a) False
- b) True
- c) True
- d) False

2) Mia is thinking how to convert the following phrases into algebraic expressions. Can we help her?

- a) The sum of x and 2 .
- b) One-fourth of the sum of x and y .
- c) Number 4 is added to the product of m and n .
- d) The sum of the squares of the numbers x and y .

Solution:

- a) $x + 2$
- b) $\frac{1}{4}(x + y)$

c) $mn + 4$

d) $x^2 + y^2$

3) Identify the terms with x^3 and find the coefficient of x^3 in the following expressions:

a) $x^3y^2 + 3$

b) $x^2 + x$

c) $3x^2y^2 - 2 + 5x^3y$

Solution:

a) The term with x^3 is x^3y^2 and the coefficient of x^3 in this term is y^2 .

b) There is no x^3 term in the given expression.

c) The term with x^3 is $5x^3y$ and the coefficient of x^3 in this term is $5y$.

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

a) $3x + 4y - z$

b) $2y - \frac{1}{2} + x$

c) $3x + \frac{y}{4}$

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) $3x + 4y - z$ is a trinomial.

b) $2y - \frac{1}{2} + x$ is a trinomial.

c) $3x + \frac{y}{4}$ is a binomial.

5) The length of a cot is 2.5 ft more than twice its width. Find its perimeter in terms of its width. Assume that the width of the cot is w ft.

Solution:

The width of the cot = w ft.

The length of the cot, $l = 2w + 2.5$ ft.

The perimeter is,

$$\begin{aligned} 2l + 2w &= 2(2w + 2.5) + 2w \\ &= 4w + 5 + 2w \\ &= (6w + 5) \text{ ft} \end{aligned}$$

Thus, the perimeter of the cot = $(6w + 5)$ ft.

6) Simplify the following algebraic expressions by combining the like terms.

a) $\frac{2}{8}k - 8 + 9 - \frac{9}{16}k$

b) $5.3r - 5 - 2.5r$

Solution:

a) We simplify the given expression by combining the like terms.

$$\begin{aligned} &\frac{2}{8}k - 8 + 9 - \frac{9}{16}k \\ &= \left(\frac{2}{8}k - \frac{9}{16}k\right)k + (-8 + 9) \\ &= -\frac{5}{16}k + 1 \end{aligned}$$

b) $5.3r - 5 - 2.5r = (5.3r - 2.5r) - 5 = 2.8r - 5$

7) Find the sum:

a) $(2x - 6) + (4x - 12)$

b) $\left(-\frac{5}{2}x + 4\right) + \left(\frac{1}{5}x + 17\right)$

Solution:

a) We just combine the like terms and add them.

$$\begin{aligned}(2x-6)+(4x-12) \\ &= (2x+4x)+(-6-12) \\ &= 6x-18\end{aligned}$$

b) We just combine the like terms and add them.

$$\begin{aligned}\left(-\frac{5}{2}x+4\right)+\left(\frac{1}{5}x+17\right) \\ &= \left(-\frac{5}{2}x+\frac{1}{5}x\right)+(4+17) \\ &= -\frac{23x}{10}+21\end{aligned}$$

8) Find the difference:

a) $(-5t+3)-(7-2t)$

b) $\left(-\frac{1}{7}j+15\right)-\left(\frac{3}{7}-2j\right)$

Solution:

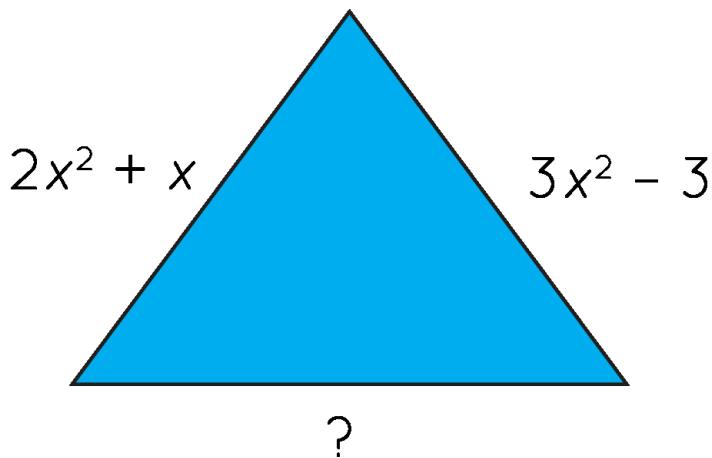
a) To subtract two algebraic expressions, we distribute the minus term to the second expression (subtrahend) and then we just add them.

$$\begin{aligned}(-5t+3)-(7-2t) \\ &= -5t+3-7+2t \\ &= (-5t+2t)+(3-7) \\ &= -3t-4\end{aligned}$$

b) To subtract two algebraic expressions, we distribute the minus term to the second expression (subtrahend) and then we just add them.

$$\begin{aligned}\left(-\frac{1}{7}j+15\right)-\left(\frac{3}{7}-2j\right) \\ &= -\frac{1}{7}j+15-\frac{3}{7}+2j \\ &= \left(-\frac{1}{7}j+2j\right)+\left(15-\frac{3}{7}\right) \\ &= \frac{13}{7}j+\frac{102}{7}\end{aligned}$$

9) The perimeter of a triangle is $3x^2 + 2$ units and its two sides are given in the following figure. Find its third side.



Solution:

To find the third side, it is sufficient to subtract the sum of the two given sides from the perimeter.

$$(3x^2 + 2) - [(2x^2 + x) + (3x^2 - 3)]$$

$$= (3x^2 + 2) - (5x^2 + x - 3)$$

$$= 3x^2 + 2 - 5x^2 - x + 3$$

$$= -2x^2 - x + 5$$

10) Simplify the following using distributive property.

a) $4(x - 8)$

b) $-\frac{3}{7}(21q - 14)$

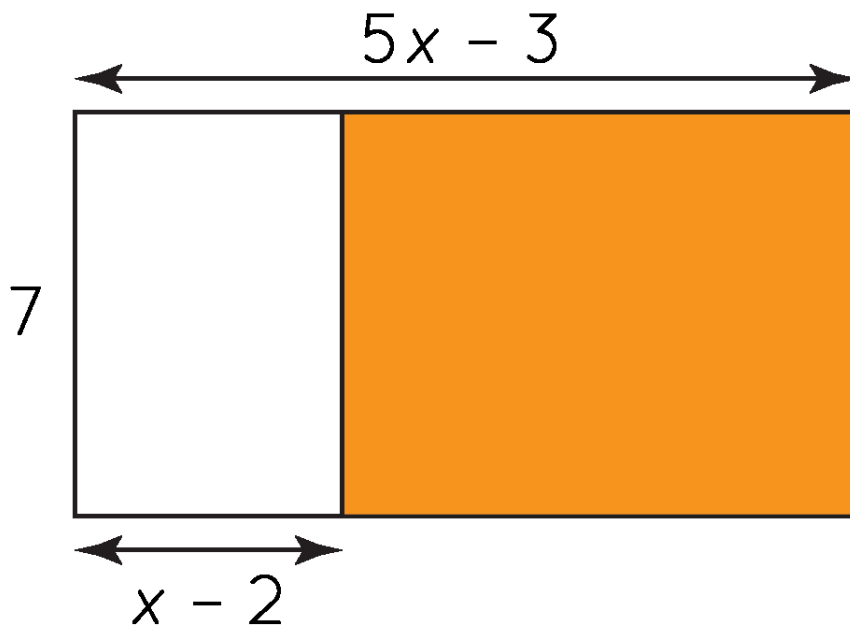
Solution:

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

a) $4(x - 8) = 4x - 32$

b) $-\frac{3}{7}(21q - 14) = -9q + 6$

11) Find the area of the following shaded rectangle.



Solution:

The area of the total rectangle = $7(5x - 3) = 35x - 21$ square units.

The area of the unshared rectangle = $7(x - 2) = 7x - 14$ square units.

The area of the shaded rectangle =

$(35x - 21) - (7x - 14) = 35x - 21 - 7x + 14 = 28x - 7$ square units.

12) Factor the following expressions using GCF.

a) $25m - 15$

b) $6x^2y - 3xy - 12x$

Solution:

a) Here, the GCF of the terms is 5.

$$25m - 15 = 5(5m - 3)$$

b) Here, the GCF of the terms is $3x$.

$$6x^2y - 3xy - 12x = 3x(2xy - y - 4)$$

13) Factor out the coefficient of the variable.

a) $0.13h - 1.17$

b) $\frac{13}{9} + \frac{4}{3}x$

Solution:

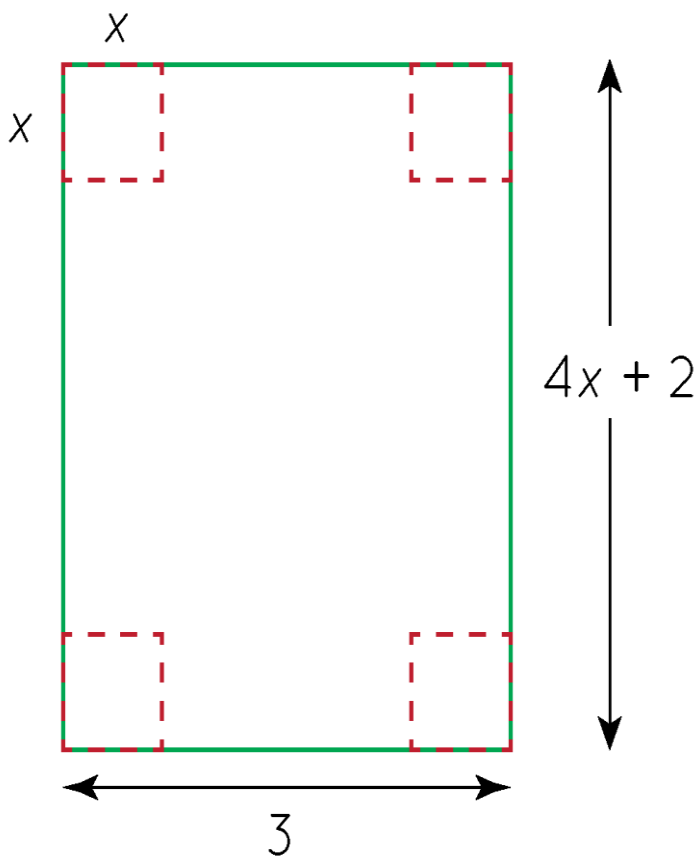
a) Here, the variable is h and its coefficient is 0.13.

$$0.13h - 1.17 = 0.13(h - 9)$$

b) Here, the variable is x and its coefficient is $\frac{4}{3}$.

$$\frac{13}{9} + \frac{4}{3}x = \frac{4}{3}\left(\frac{13}{12} + x\right)$$

14) Jay cuts identical squares from the corners of a rectangular sheet of paper as shown below. Find the area of the resultant paper.



Solution:

The area of each square = x^2 .

The area of 4 squares = $4x^2$.

The area of the whole paper = $3(4x + 2) = 12x + 6$.

The area of the remaining paper after 4 squares are cut =

$$(12x + 6) - 4x^2 \text{ (or) } -4x^2 + 12x + 6 \text{ (OR) } -4x^2 + 12x + 6$$

15) James's wallet has dimes and nickels. Write an expression to represent the total amount of money in James's wallet (in

dollars) of x is the number of dimes and y is the number of nickels.

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 nickels is y and each quarter is of worth \$0.05. So the total worth of quarters is $0.05y$.

So the algebraic expression that represents the total money in the piggy bank is $0.10x + 0.05y$ dollars.

