

Section 5.4 - Subtracting Polynomials

Recall: the term "**opposite.**" Opposite numbers have a sum of zero.

Example 1 What is the opposite of:

(a) 2.4

(b) -10

The same idea applies to polynomials.
Opposite polynomials will have a sum of zero.

What is the opposite of:

(c) $2x$

(d) $-x^2$

Your Turn: What is the opposite of each polynomial listed below?

(a) 11

(b) $-5x$

(c) $-24x^4$

Getting the opposite of a monomial is just like getting the opposite of a number.

Think About This

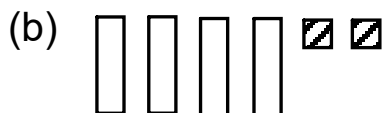
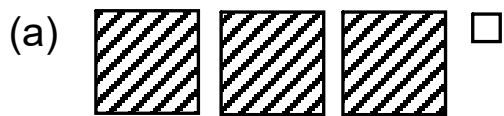
How do you get the opposite of a binomial or trinomial?

(a) $2x+3$

(b) $4x^2 - 7x + 3$

(c) $-2xy - 2y^2 + 3x^2$

Example 2 Sketch the opposite of the polynomial using algebra tiles.



When subtracting polynomials remember to **ADD THE OPPOSITE** of every term in the second polynomial, then combine like terms.

We will be subtracting polynomials symbolically and using algebra tiles.

Example 3 Subtract using algebra, then simplify.

(a) $(3x^2 - 6x + 4) - (7x^2 + 3x - 2)$

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

Example 4 Subtract using algebra tiles, then simplify.

(a) $\left(\begin{array}{c} \text{2 shaded squares} \\ \text{1 vertical rectangle} \\ \text{2 small squares} \end{array} \right) - \left(\begin{array}{c} \text{1 white square} \\ \text{4 shaded vertical rectangles} \\ \text{1 small square} \end{array} \right)$

(b) $\left(\begin{array}{c} \text{2 white squares} \\ \text{1 vertical rectangle} \\ \text{3 shaded small squares} \end{array} \right) - \left(\begin{array}{c} \text{1 shaded square} \\ \text{2 vertical rectangles} \\ \text{1 small square} \end{array} \right)$

Just like adding, we can subtract polynomials horizontally and vertically.

Example 5 Subtract vertically.

(a)
$$\begin{array}{r} (3x^2 + 4x - 1) \\ - (2x^2 - 3x + 2) \end{array}$$

(b)
$$\begin{array}{r} (5x^2 - 3xy + 2y^2) \\ - (8x^2 - 7xy - 4y^2) \end{array}$$

Example 6 Subtract using algebra tiles and algebra.

$$(3x^2 - 4x) - (2x^2 - x)$$

Algebra Tiles

Algebra



Example 7

On a test a student completed a subtraction question as shown below.

(a) Explain why this solution is incorrect.

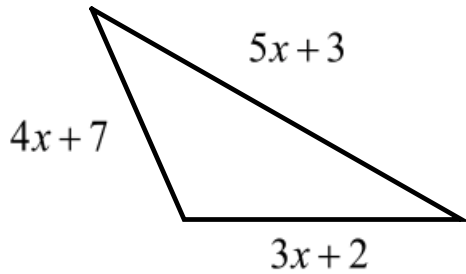
$$\begin{aligned} & (2y^2 - 3y + 5) - (y^2 + 5y - 2) \\ &= 2y^2 - 3y + 5 - y^2 + 5y - 2 \\ &= 2y^2 - y^2 - 3y + 5y + 5 - 2 \\ &= y^2 + 2y + 3 \end{aligned}$$

(b) What is the correct answer? Show your work.

Application of Adding and Subtracting

Example 8

- a) Write a simplified expression for the perimeter of the triangle.



- b) If the value of $x = 4$ cm, what is the perimeter of the triangle?

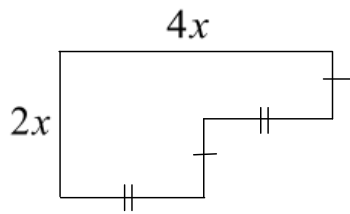
Example 9

Subtract $2x^2 + 2x + 5$ from $5x^2 - 7x + 4$.

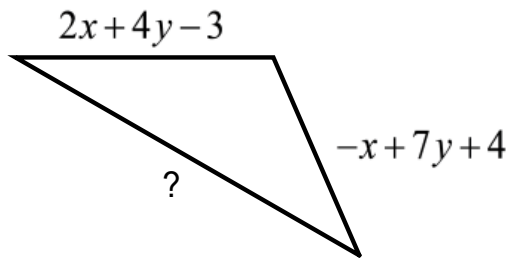
Example 10

Subtract the sum of $(a + b)$ and $(2a - b)$ from $(4a - 4b)$.

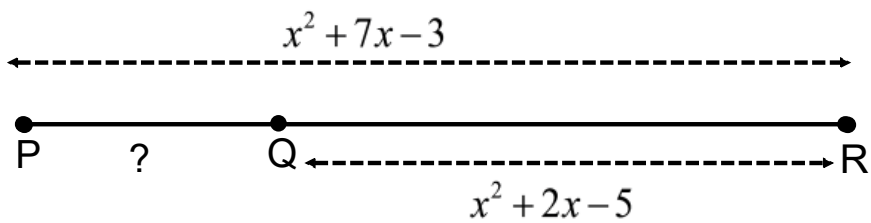
Example 11 Write a monomial that describes the perimeter.



Example 12 Find the missing side if the perimeter is $5x + 3y - 2$.

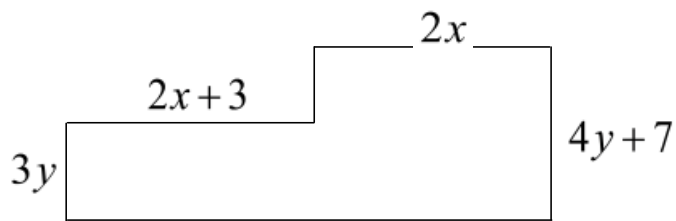


Example 13 Find the length of PQ.



Example 14

- (a). Write a simplified expression for the perimeter.



Hint: How many sides does this shape have?

- (b). What is the perimeter if $x = 1$ cm and $y = 2$ cm ?

Work Book Questions

p.234 - 236 #6ac, 7ac, 8aceg, 10b,
12ab, 13ac, 15ace, 17, 18

Extra Practice Questions

p.234 - 236 #5, 6bd, 7bd,
8bdfh, 10a, 13c, 15bd, 16