

- Addition **can** be performed in any order without changing the result. This means that brackets don't matter! Therefore, to **add a polynomial** enclosed in brackets, **simply remove the brackets** and proceed.
- Subtraction **cannot** be performed in any order without changing the result. This means that brackets **DO** matter! To **subtract a polynomial** enclosed in brackets, remove the brackets by **adding the opposite of the polynomial**. This is based on the following property: $x - y = x + (-y)$

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1. Fully simplify each of the following expressions. (16/16)

(a) $(-5x + 4y) + (6y - 3x)$

$$= -5x + 4y + 6y - 3x$$

$$= -5x - 3x + 4y + 6y$$

$$= -8x + 10y$$

(or $10y - 8x$)

Brackets can be removed without making changes because "+" and "-" not affected by order.

(b) $(13xy - 3x^2y) - (5x^2y + 9xy)$

$$= 13xy - 3x^2y + (-5x^2y - 9xy)$$

$$= 13xy - 3x^2y + (-5x^2y) - 9xy$$

$$= 13xy - 9xy - 3x^2y - 5x^2y$$

$$= 4xy - 8x^2y$$

(or $-8x^2y + 4xy$)

(c) $+(8x^2y - 2xy) - (15x^2y - 11xy)$

$$= 8x^2y - 2xy + (-15x^2y + 11xy)$$

$$= 8x^2y - 2xy + (-15x^2y) + 11xy$$

$$= 8x^2y - 15x^2y - 2xy + 11xy$$

$$= -7x^2y + 9xy$$

(or $9xy - 7x^2y$)

(d) $-(-15ab^2 - 6a^2b) - (13ab^2 - 4a^2b - 10ab)$

$$= + (15ab^2 + 6a^2b) + (-13ab^2 + 4a^2b + 10ab)$$

$$= 15ab^2 + 6a^2b + (-13ab^2) + 4a^2b + 10ab$$

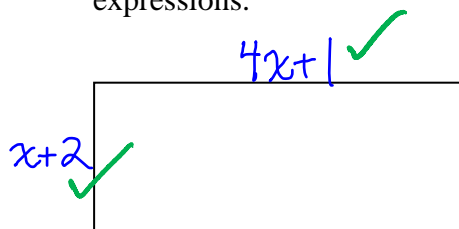
$$= 15ab^2 - 13ab^2 + 6a^2b + 4a^2b + 10ab$$

$$= 2ab^2 + 10a^2b + 10ab$$

(terms can be placed in any order as long as the operations are preserved)

2. A rectangle has length $4x + 1$ and width $x + 2$. (6/6)

(a) Label the width and length with the given algebraic expressions.


(b) Write a **simplified expression** for the perimeter of the rectangle.

$$P = x+2 + 4x+1 + x+2 + 4x+1$$

$$= 1x + 4x + 1x + 4x + 2 + 1 + 2 + 1$$

$$= 10x + 6$$

(c) Suppose that the perimeter of the rectangle is 46 cm. Find the value of x .

$$P = 46$$

$$\therefore 10x + 6 = 46$$

By trial and error,

$$x = 4$$

3. Three artists contributed to a coffee-table book. They each chose to be paid a different way. (5/5)

Artist	Fixed Rate (\$)	Royalty (\$ per n books sold)
Jensen	2000	$3n$
Sarah	-	$6n$
Udoy	7000	-

(a) Write an expression for the **total** earnings for **each** artist.

Jensen: $2000 + 3n$

Sarah: $6n$

Udoy: 7000

(b) Write a simplified expression for the total amount paid to Jensen, Sarah and Udoy.

$$2000 + 3n + 6n + 7000$$

$$= 2000 + 7000 + 3n + 6n$$

$$= 9000 + 9n$$