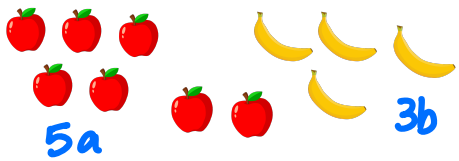
Simplifying Polynomials

Adding and Subtracting

$(2x^2+x-5)+(3x^2-4x-1)$
or
$(2x^2+x-5)-(3x^2-4x-1)$

ADDING POLYNOMIALS

Rose has:
5 apples and 3 bananas



Noah has:
2 apples and 1 banana

All together, what do they have?

Let a represent 1 🍎
Let b represent 1 🍌

$1b = b$

R
Rose has: $5a + 3b$

$R = 5a + 3b$

N
Noah has: $2a + 1b$

$N = 2a + 1b$

Together they have: $+(5a+3b)+(2a+1b)$

$= 5a + 3b + 2a + 1b$

$= 5a + 2a + 3b + 1b$

$= 7a + 4b$

Let's use x's and y's: Simplify

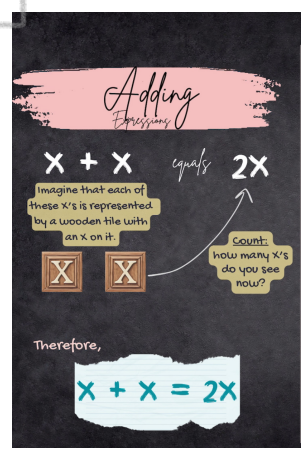
$+(4x + 1y) + (1x + 3y)$

$= 4x + 1y + 1x + 3y$

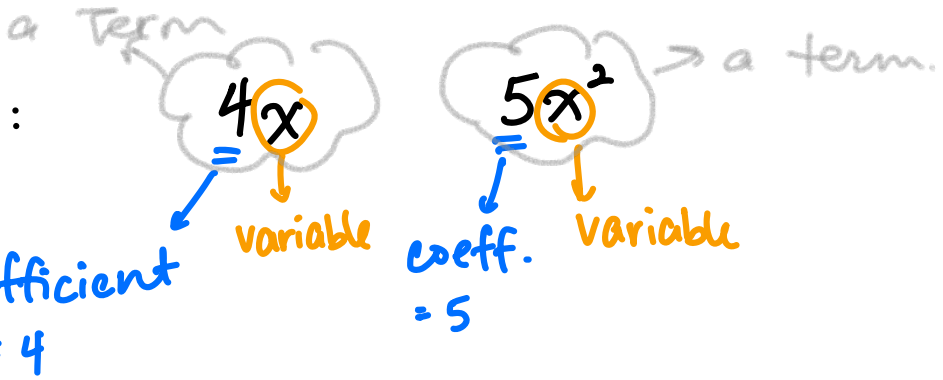
$= 4x + 1x + 1y + 3y$

$= 5x + 4y$

Grouping Like terms



Term:



YOU TRY: Simplify $(x^2+3x-2)+(3x^2-5x+1)$

$= 1x^2+3x-2+3x^2-5x+1$

$= 1x^2+3x^2+3x-5x-2+1$

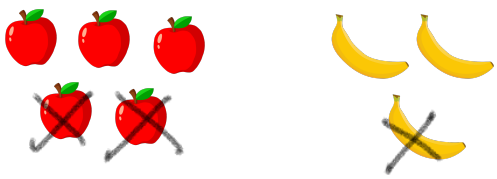
$= 4x^2-2x-1$

SUBTRACTING POLYNOMIALS

25
− 3

Rose has:
$R = 5a + 3b$

Noah
$N = 2a + 1b$



$(5a + 3b) - (+2a + 1b)$

$= 5a + 3b - (+2a) - (+1b)$

$= 5a + 3b - 2a - 1b$

$= 5a - 2a + 3b - 1b$

$= 3a + 2b$ unlike terms

$5a + 3b$
$-(2a + 1b)$

$5a - 2a + 3b - b$

$= \boxed{3a + 2b}$

NOTE:
You must get rid of brackets before grouping like terms (using correct rules)

KEY POINTS

- If a bracket has a positive sign in front:
  ⇒ you can just drop the brackets.
- If a bracket has a negative sign in front:
  ⇒ It applies to each term within the bracket.
  ⇒ check: the original signs of each term will get 'flipped'.

Ex. Simplify:

a) $(3x^2+4x-7) + (6x^2-8x+1)$

$= 3x^2+4x-7+6x^2-8x+1$

$= 3x^2+6x^2+4x-8x-7+1$

$= 9x^2-4x-6$

b) $(3x^2-5xy+y) - (2x^2-6xy+1)$

$= 3x^2-5xy+y-(+2x^2)-(-6xy)-(+1)$

$= 3x^2-5xy+y-2x^2+6xy-1$

$= 3x^2-2x^2-5xy+6xy+y-1$

$= x^2+xy+y-1$

$-5+6 = 1$

YOU TRY: Simplify

a) $(3x^2 - 1) + (4x^2 - 8)$ ans:

b) $(x + 4) - (6x - 1)$ ans:

c) $(2x^2 - 8x + 1) - (x^2 + 3x - 7)$ ans:

d) $-(4x - 3) - (7 - x)$ ans:

e) $(6y^2 + 5y - 1) - (2y^2 - 7y - 4)$ ans:

f) $(3a^2 - 4a - 7) + (-5a^2 - 2a + 2)$

ans:

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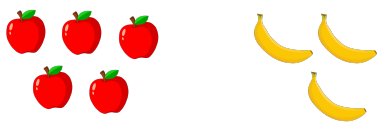


Noah has:
2 apples and 1 banana

All together, what do they have?

Let a represent 1 🍎
Let b represent 1 🍌

R
Rose has: (expression)
$R = 5a + 3b$

N
Noah has:
$N = 2a + 1b$

Together they have:

$$(5a + 3b) + (2a + 1b)$$
$$= 5a + 3b + 2a + 1b$$
$$= 5a + 2a + 3b + 1b$$
$$= 7a + 4b$$

Let's use x's and y's: Simplify

$$(4x + 1y) + (x + 3y)$$

$$= 4x + y + x + 3y$$
$$= 4x + 1x + 1y + 3y$$
$$= 5x + 4y$$

YOU TRY: Simplify $(x^2+3x-2)+(3x^2-5x+1)$

$= x^2+3x-2+3x^2-5x+1$

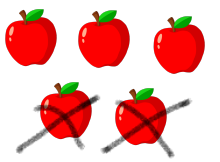
$= 1x^2+3x^2+3x-5x-2+1$

$= 4x^2-2x-1$

SUBTRACTING POLYNOMIALS

Rose has:

$R = 5a+3b$



Noah has:

$N = 2a+1b$

$(5a+3b)-(2a+1b)$

$= 5a+3b-(+2a)-(+1b)$

$= 5a+3b-2a-1b$

$= 5a-2a+3b-b$

$\therefore 3a+2b$

NOTE: You must "get rid of" brackets (using correct rules) before collecting like terms.

KEY POINTS

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Ex. Simplify:

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$= 3x^2+4x-7+6x^2-8x+1$

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$= 9x^2-4x-6$ ←

b) $(3x^2-5xy+y) - (+2x^2-6xy+1)$

$= 3x^2-5xy+y-(+2x^2)-(-6xy)-(+1)$

$= 3x^2-5xy+y-2x^2+6xy-1$

$= 3x^2-2x^2-5xy+6xy+y-1$

$= x^2+xy+y-1$

YOU TRY: Simplify

a) $(3x^2-1)+(4x^2-8)$ ans: $7x^2-9$

b) $(x+4)-(6x-1)$ ans: $-5x+5$

c) $(2x^2-8x+1)-(x^2+3x-7)$ ans: $x^2-11x+8$

d) $-(4x-3)-(7-x)$ ans: $-3x-4$

e) $(6y^2+5y-1)-(2y^2-7y-4)$ ans: $4y^2+12y+3$

f) $(3a^2-4a-7)+(-5a^2-2a+2)$

ans: $-2a^2-6a-5$