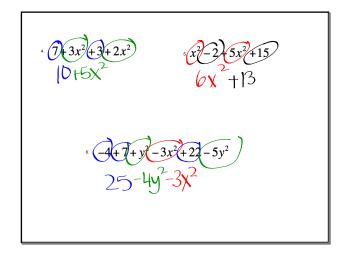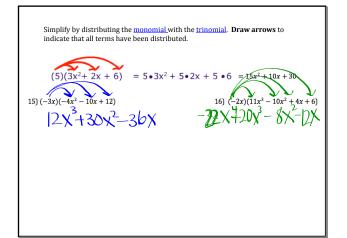Addition and Subtraction: Combine the terms that are alike in each expression (simplify).
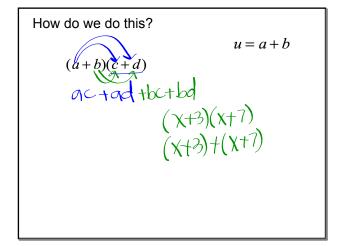
1. $2 + x + 5$

$x + 7$

2. $13 - 2y - 5 + 6y$

$8 + 4y$

3. $3x + 4y + 12 - 7y + 6 + 4x - 2 + 13y$

$7x + 10y + 16$

4. $7 + 3x^2 + 3 + 2x^2$

$10 + 5x^2$

5. $x^2 - 2 + 5x^2 + 15$

$6x^2 + 13$

6. $-4 + 7 + y^2 - 3x^2 + 22 - 5y^2$

$25 - 4y^2 - 3x^2$

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7) $2x^3 + x^3 + 5 + 3$

$3x^3 + 8$

8) $y^3 + x^3 + y^3 + x^3$

$2y^3 + 2x^3$

9) $(14x + 5) + (10x + 5)$

$24x + 10$

10) $(19x^2 + 2x + 12) + (7x^2 + 10x + 13)$

$26x^2 + 22x + 25$

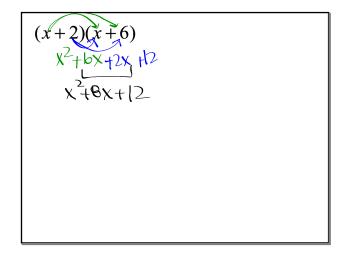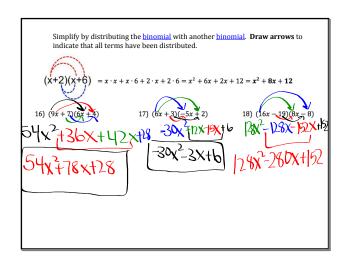11) $(6x + 14) - (9x + 5)$

$6x + 14 - 9x - 5$

$-3x + 9$

Multiplication: Simplify by distributing the monomial with the binomial. **Draw arrows** to indicate all terms have been distributed.

12) $3(x + 5)$

$3x + 15$

13) $2y(y - 2)$

$2y^2 - 4y$

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

$3x^2 - x^3$

$x^2 \cdot x^3 = x^5$

Simplify by distributing the <u>monomial</u> with the <u>trinomial</u>. **Draw arrows** to indicate that all terms have been distributed.

$(5)(3x^2 + 2x + 6) \quad = 5 \cdot 3x^2 + 5 \cdot 2x + 5 \cdot 6 \quad = 15x^2 + 10x + 30$

15) $(-3x)(-4x^2 - 10x + 12)$

$12x^3 + 30x^2 - 36x$

16) $(-2x)(11x^3 - 10x^2 + 4x + 6)$

$-22x^4 + 20x^3 - 8x^2 - 12x$

How do we do this?

$$u = a + b$$

$(a+b)(c+d)$

$ac + ad + bc + bd$

$(x+3)(x+7)$

$(x+3)+(x+7)$

$(x+2)(x+6)$

$x^2 + 6x + 2x + 12$

$x^2 + 8x + 12$

Simplify by distributing the <u>binomial</u> with another <u>binomial</u>. **Draw arrows** to indicate that all terms have been distributed.

$(x+2)(x+6) \quad = x \cdot x + x \cdot 6 + 2 \cdot x + 2 \cdot 6 = x^2 + 6x + 2x + 12 = x^2 + 8x + 12$

16) $(9x+7)(6x+4)$

$54x^2 + 36x + 42x + 28$

$54x^2 + 78x + 28$

17) $(6x+3)(-5x+2)$

$-30x^2 + 12x - 15x + 6$

$-30x^2 - 3x + 6$

18) $(16x-19)(8x-8)$

$128x^2 - 128x - 152x + 152$

$128x^2 - 280x + 152$

Based on what you know about multiplying polynomials using the distributive property. Discover on your own how to simplify by distributing the binomial with the trinomial. **Draw arrows** to indicate that all terms have been distributed.

19) $(2x - 3)(4x^2 + x - 6)$

$$8x^3 + 2x^2 - 12x - 12x^2 - 3x + 18$$
$$8x^3 - 10x^2 - 15x + 18$$

Write in your own words the definition or provide an example of the following terms based on the information from this task. Each vocabulary word can be found underlined throughout the task.

20) Term - Mathematical object seperated by an operation ie. 2x+4,

21) Polynomial - any mathematical statement w/ more than or equal to 1 term

22) Monomial - Polynomial w/one term

23) Binomial - Polynomial w/two terms

24) Trinomial - Polynomial w/three terms

A polynomial can have constants, variables and exponents, but never division by a variable.

constants (like **3**, **-20**, or ½)
variables (like x and y)
exponents (like the 2 in y^2), but only **0, 1, 2, 3, ...** etc are allowed
... **not** division by a variable (so something like **2/x** is right out)

Polynomial or Not?

exponents: 0,1,2,...

$5xy^2 - 3x + 5y^3 - 3$

terms

A Polynomial

$3xy^{-2}$

$\dfrac{2}{x+2}$

Not Polynomials

Expand

$$(x + 4)^2 \qquad (2x - 5)^2$$

Learning Check

Students can...

simplify the following expressions:

1. $(x+4)(x-2)$ 2. $(x+1)(2x^2+2x-1)$

3. $(2x+4)^2$