

Algebra 1 – Unit 9 Guide

Adding, Subtracting, Multiplying, Dividing Polynomials

Adding Polynomials

When adding polynomials, add coefficients and add like terms:

$$\begin{aligned} &(3x^2 - 5x + 7) + (x^2 + 2x - 1) \\ &= (3x^2 + x^2) + (-5x + 2x) + (7 - 1) \\ &= 4x^2 - 3x + 6 \end{aligned}$$

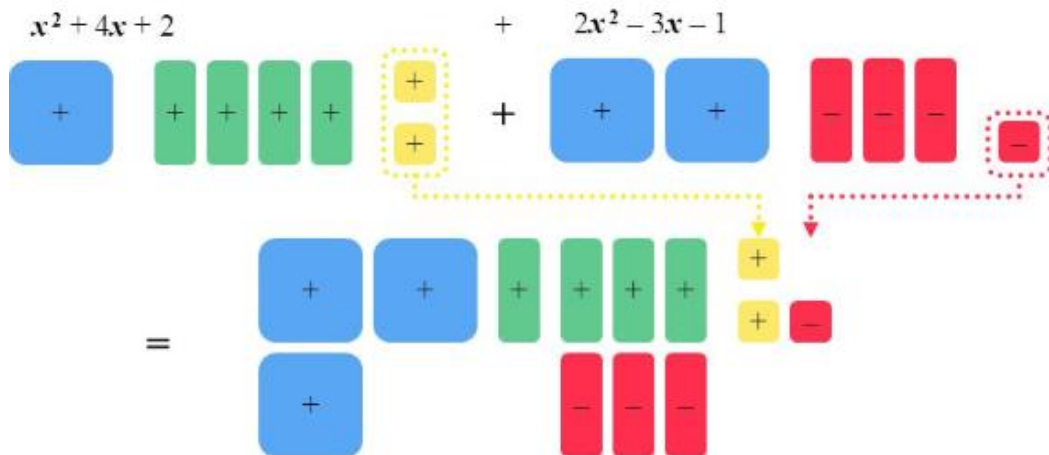
Subtracting Polynomials

When subtracting polynomials, combine like terms, but distribute the subtraction to all terms in the second set of parentheses:

$$\begin{aligned} &(5x^2 + 3x - 6) - (3x^2 - x + 5) \\ &\quad \quad \quad \uparrow \quad \quad \uparrow \quad \uparrow \quad \uparrow \\ &\quad \quad \quad \text{This guy distributes into these!} \\ &= 5x^2 + 3x - 6 - 3x^2 + x - 5 \\ &= (5x^2 - 3x^2) + (3x + x) + (-6 - 5) \\ &= 2x^2 + 4x - 11 \end{aligned}$$

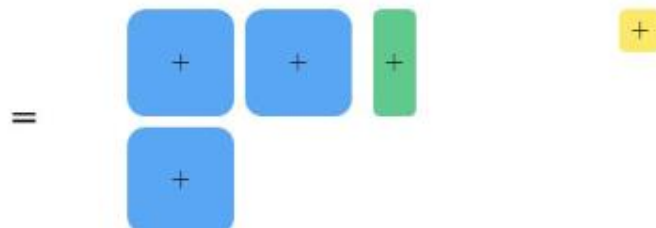
Modeling:

To add the polynomials, combine like terms. Group the x^2 -tiles, the x -tiles, and the 1-tiles.



Find and remove the zero pairs.

The sum is $3x^2 + x + 1$.



Multiplying Polynomials

$3x(4x+2y)$ 1 term \times 2 terms

$$\begin{array}{l} 3x(4x+2y) \\ \hline 3x \cdot 4x + 3x \cdot 2y \\ \hline 12x^2 + 6xy \end{array}$$

$(x+2)(x+1)$ 2 terms \times 2 terms

$$\begin{array}{l} (x+2)(x+1) \\ \hline \text{First Outer Inner Last} \\ \hline x^2 + x + 2x + 2 \end{array}$$

$(x^2+5)(x^2-11x+6)$ 2 terms \times 3 terms

$$\begin{array}{l} (x^2+5)(x^2-11x+6) \\ \hline x^4 - 11x^3 + 6x^2 + 5x^2 - 55x + 30 \\ \hline \text{Combine like terms:} \\ \hline x^4 - 11x^3 + 11x^2 - 55x + 30 \end{array}$$

Modeling:

		x + 2		
		x	1	1
x + 3	x	x ²	x	x
	1	x	1	1
	1	x	1	1

= x² + 3x + 2x + 6

= x² + 5x + 6

Dividing Polynomials

When dividing by a monomial, divide each term and then reduce each part.

$$\frac{18x^4 - 10x^2 + 6x^7}{2x^2} = \frac{18x^4}{2x^2} - \frac{10x^2}{2x^2} + \frac{6x^7}{2x^2}$$

Now, we just reduce each term!

$$= 9x^2 - 5 + 3x^5$$

When dividing by a polynomial, use long division method to divide.

$$\begin{array}{r} 7x^3 + x^2 - 5x - 8 \\ 2x - 1 \overline{) 14x^4 - 5x^3 - 11x^2 - 11x + 8} \\ \underline{-(14x^4 - 7x^3)} \\ 2x^3 - 11x^2 \\ \underline{-(2x^3 - x^2)} \\ -10x^2 - 11x \\ \underline{-(-10x^2 + 5x)} \\ -16x + 8 \\ \underline{-(-16x + 8)} \\ \hline \end{array}$$

😊

Algebra 1 – Unit 8 Study Packet

Adding, Subtracting, Multiplying, Dividing Polynomials

Skill #1 – Adding Polynomials

1. What is the solution to the following expression?
 $(4x^2 - 8) + (6x^2 + 5)$

2. Which expression represents the sum of
 $(5x^2 - 7x + 4) + (x^2 + 8x - 10)$

3. Which expression represents the sum of
 $(8x - 2x^2 - 5) + (3x^2 + x + 9)$

4. What is the solution to the following expression?
 $(4y^2 + 10y - 1) + (8y^2 + 11)$

Skill #1 Determine sum of polynomials.
 Need more practice (IXL – Z.4)

Skill #2 – Subtracting Polynomials

5. What is equivalent to
 $(8x^2 - 2x + 4) - (9x^2 - 6x + 1)$

6. Which expression represents the difference of
 $(6x - 9x^2 + 12) - (7x - 1)$?

7. What expression represents the difference of
 $(10x^2 + 8) - (-4x^2 + 11x)$?

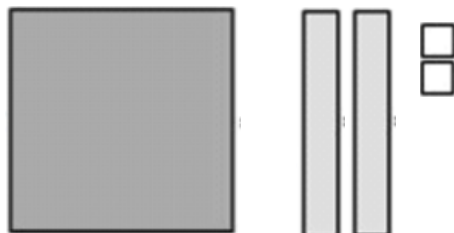
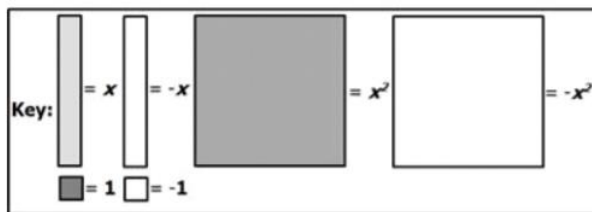
8. What is equivalent to
 $(y^2 + 3y - 8) - (6y^2 + 8y + 14)$

Skill #2 Determine differences of polynomials.
 Need more practice (IXL – Z.4)

Skill #3 – Modeling Polynomials

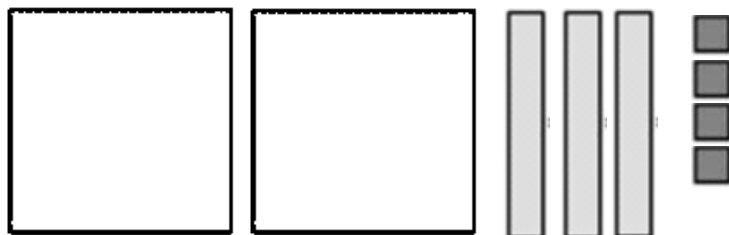
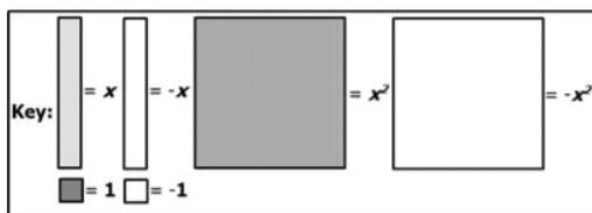
9. What polynomial is shown in the following model?

Look at model.



10. What polynomial is shown in the following model?

Look at model.



- Skill #3 Model sums and differences polynomials with concrete objects and their related pictorial and symbolic representations.
 Need more practice (IXL – Z.2, Z.3)

Skill #4 – Multiplying Polynomials

11. What is equivalent to the following expression?

$$4x(x^2 + 9)$$

12. What is equivalent to the following expression?

$$-8x(2x^2 - 3x)$$

13. What is equivalent to the following expression?

$$(6x - 2)(3x - 1)$$

14. What is equivalent to the following expression?

$$(x - 7)(6x^2 + x - 10)$$

15. What is equivalent to the following expression?

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

16. What is equivalent to the following expression?

$$(y + 4)(4y - 9)$$

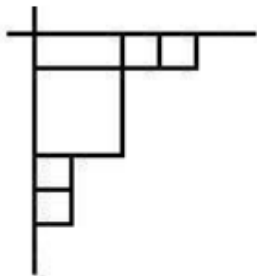
- Skill #4 Determine products of polynomials. The factors should be limited to five or fewer terms (i.e., $(4x + 2)(3x + 5)$ represents four terms and $(x + 1)(2x^2 + x + 3)$ represents five terms).
 Need more practice (IXL – Z.6, Z.8, Z.9, Z.10)

Skill #5 – Modeling Polynomial Multiplication and Division

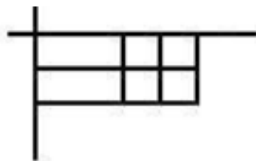
17. Given the models below, which figure represents $(x+2)(x+2)$?

$$\square = x^2 \quad \text{rectangle} = x \quad \text{square} = 1$$

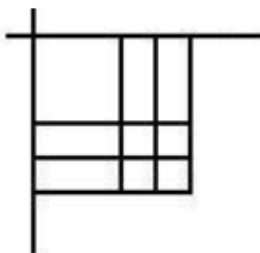
A



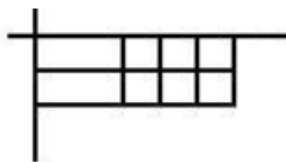
B



C



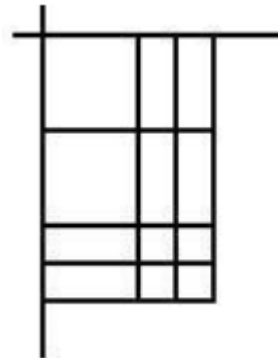
D



18. Given the models

$$\square = x^2 \quad \text{rectangle} = x \quad \text{square} = 1$$

what factors are represented by the following figure?



A $(2x + 2)(2x + 2)$

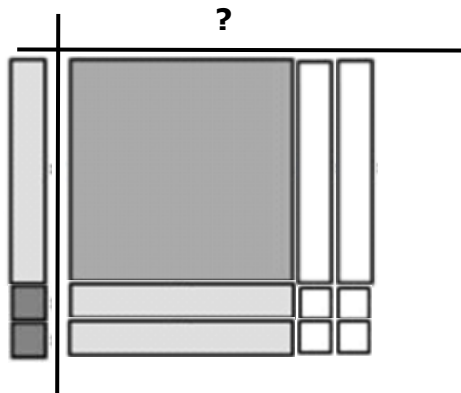
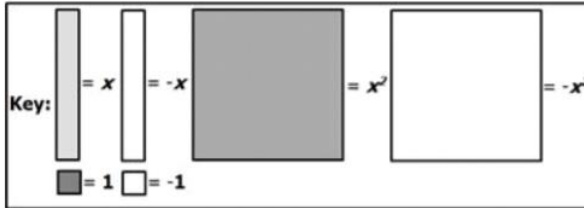
B $(2x - 2)(2x - 2)$

C $(2x + 2)(x + 2)$

D $(2x - 2)(x - 2)$

19.

Look at model.

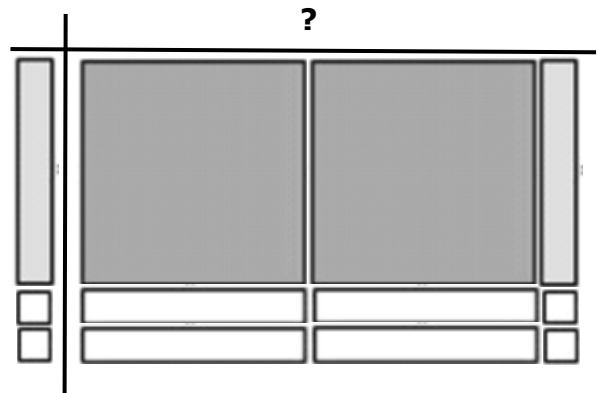
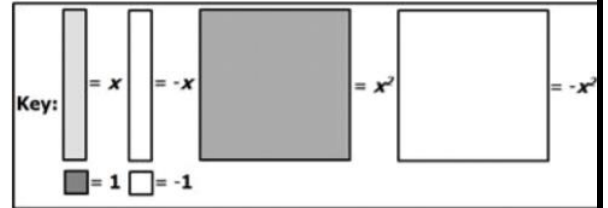


Which expression completes the model?

- A $2x + 2$
- B $x^2 - 4$
- C $x^2 - 2$
- D $x - 2$

20.

Look at model.



Which expression completes the model?

- A $2x + 1$
- B $2x^2 - 3x - 2$
- C $2x^2 - 4x - 2$
- D $2x - 1$

- Skill #5 Model products and quotients of polynomials with concrete objects and their related pictorial and symbolic representations.
 Need more practice (IXL -Z.7)

Skill #6 – Dividing Polynomials

21. If $x \neq 0$, which is equivalent to the following expression?

$$\frac{-6x^6 - 3x^3 + 9x}{3x}$$

22. . If $y \neq 0$, what is the quotient when the following division is preformed?

$$5y \overline{) 15y^4 + 20y^3 - 10y}$$

23. What equals

$$(n^4 - 17n^3 + 81n^2 - 65n - 56) \div (n - 8)?$$

24. Look at the expression. What is the solution?

$$\frac{10p^3 + 27p^2 - 6p + 9}{p + 3}$$

25. Solve, if $a \neq 2$:

$$(a^3 + 8a - 24) \div (a - 2)$$

26. What equals

$$(2x^4 - 22x^3 + 12x + 5) \div (2x + 2)?$$

Skill #6

- Determine the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor.
- Need more practice (IXL – GG.5)

