Math 9 Notes - LG 4/5
Introducing Polynomials
WATCH: https://www.youtube.com/watch?v=pr2-5UDEW2k

Variable – a symbol for a value we don't know yet (usually a letter like x or y).

Term – an expression made by MULTIPLYING numbers or variables.

The term 6y means _____, where ____ is the variable.

The term $5x^2y$ means _____, where ____ and ____ are the variables.

Polynomial – an expression made up of 1 or more terms that are connected through addition or subtraction.

Number of terms	Name	Example
1	Monomial	
2	Binomial	
3	Trinomial	
4	Polynomial	

Ways we can describe polynomials:

Expression	# terms	Variable(s)	Constant (a number alone)	Degree of each term (sum of the variable's exponents in each term)	Degree of the polynomial (largest degree of the terms)
$7x^2y^3 - 2x^2 + 3$					
$7x^6 y^4 - 9z^2$					
$4x - 5x^4 + 3z - 6$					
$7a^2 - 2abc + b^2$					

Name: _____ Date: _____

Practise

monomial = 1 term
binomial = 2 terms
trinomial = 3 terms
polynomial = many terms

. Complete the table.

Expression	Number of Terms	Type of Expression (Monomial, Binomial, Trinomial, Polynomial)
a) $3x^2 - 5x - 7$		
b) 8		
c) $c^2 + cf + df - f^2$		
d) $-11a$		

highest degree

Complete the table.

Expression	Number of Terms	Degree of First Term	Degree of Second Term	Degree of Third Term	Degree of Polynomial
a) 6					
b) $3xy + 1$					
c) $11k^2 + 7k - 5$					
d) $4 - b$					

Use these polynomials to answer each question.

$3b^2$ $2 + p$

$4st + t - 1$ $2x^2 - y^2$

a) Which one is a monomial? _____

b) Which ones have a degree of 2? _____ and _____ and _____

c) Which ones are binomials? _____ and _____

d) Which ones have constant terms? _____ and _____

e) Which one is a trinomial? _____

Name: _____ Date: _____

a) Draw a box around each term: $6x^2 - 5$.

b) How many terms are in this polynomial? _____

c) What type of polynomial is this? _____

d) What is the degree of the polynomial? _____

e) What is the constant term? _____

Write an algebraic expression for each of the following:

a) the product of 6 and x

_____

Multiply to get the *product*.

b) the sum of $2x$ and 3

_____

Add to get the *sum*.

Write each statement as an algebraic expression. Write what the variable represents.

a) Eight and a number are added together.

Let n represent the number.

Expression: _____

b) Omar has some money in his wallet. How much money does he have after a friend gives him $5?

Let m represent _____.

Expression: _____

c) The length of a page is 4 cm longer than the width.

Let _____ represent _____.

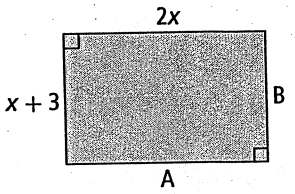
Expression: _____

d) The product of a number and 5 is increased by 2.

_____

Expression: _____

Ricardo draws a rectangle. The dimensions are in metres.



a) Write an expression for the length of side A: _____

b) Write an expression for the length of side B: _____

c) Write an equation using length (l) and width (w) for the perimeter of any rectangle:

_____

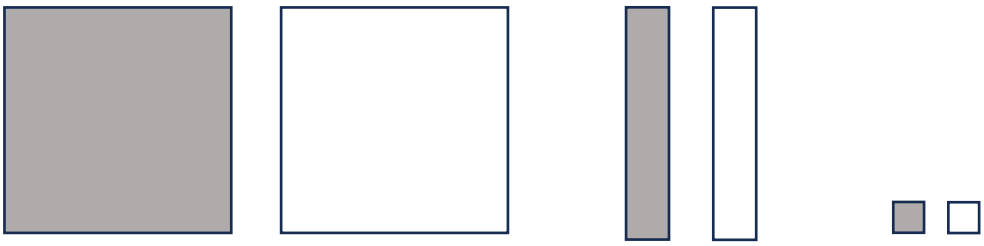
Perimeter is the distance around a shape.

d) Write an expression for the perimeter of Ricardo's rectangle:

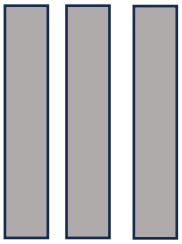
_____

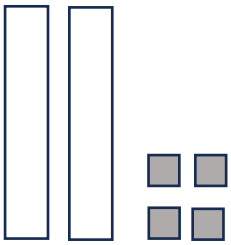
Math 9 Notes - LG 4/5
Modelling Polynomials with Algebra Tiles
Watch: https://youtu.be/B5_ME2Cx958

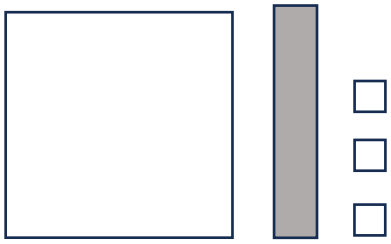
Algebra tile values:

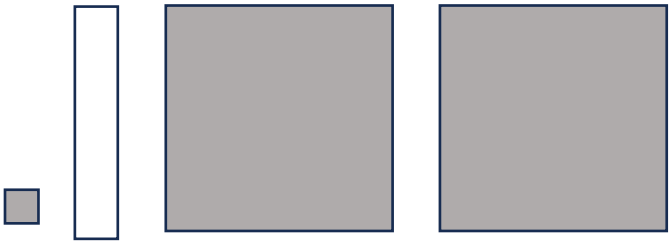


Write and expression for each of the following:

1. 

2. 

3. 

4. 

Model the following expressions using algebra tiles:

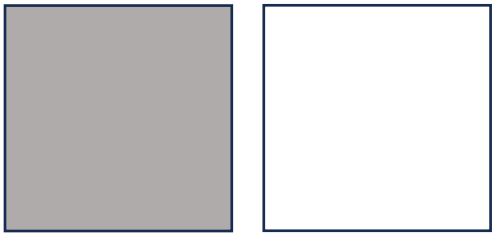
1. $1 - 3x$

2. $2x^2 + 4x - 2$

3. $5x - 5 + x^2$

4. $X^2 + x + 2x^2$

What happens if you have a negative and positive of the same tile?



They make a zero pair!

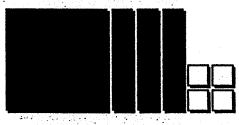
Model $3x + -x$

Name: _____ Date: _____

Show You Know

a) Model $-x^2 + 4x - 3$.

b) What expression does the model show?



_____

Check Your Understanding

Communicate the Ideas

1. Write a polynomial that is true for all of these statements:
- a trinomial
- a degree of 2
- 1 variable

_____

2. Sonja and Myron are discussing this algebra tile model.

Sonja says, "This model shows the expression $3x^2 + x + 2$."
Myron says, "It shows $3x^2 - x - 2$."

a) Who is correct? Circle SONJA or MYRON.

b) Give 1 reason for your answer. _____

_____

Name: _____ Date: _____

5.1 Warm Up

1. Circle the correct meaning of the expression $6y$.

$6 - y$ $6 + y$ $6 \times y$ $6 \div y$

2. Complete the table.

Expression	Base	Exponent	Repeated Multiplication
a) 3^2	3		
b) x^2		2	
c) y^2			$y \times y$
d) t			

3^2

base exponent: tells you how many times the base is multiplied by itself.

3. Write an expression for each algebra tile model.

positive 1-tile negative 1-tile

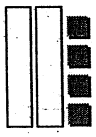
A 1-tile is 1 unit by 1 unit.

positive *x*-tile negative *x*-tile

An *x*-tile is 1 unit by *x* units.

a) 

_____

b) 

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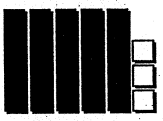
c) 

_____

4. Circle the variable(s).

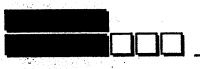
a) $9h$ **b)** $x^2 + 2y$

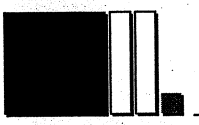
5. Circle the constant.

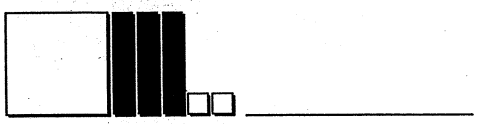
a) $p^2 + 2$ **b)** $3x^2 + 4x - 8$

Name: _____ Date: _____

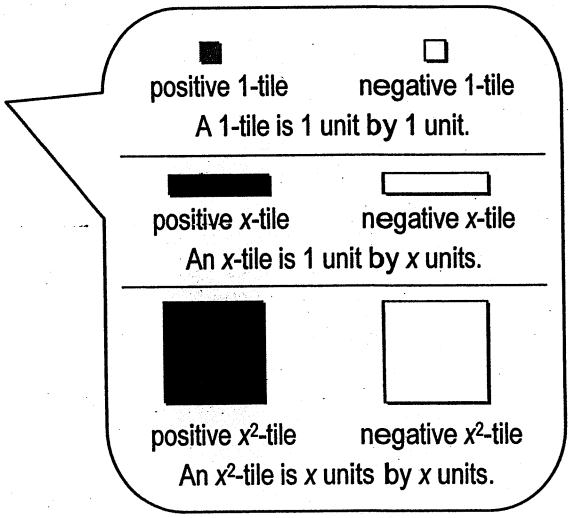
Write an expression for each polynomial.

a)  _____

b)  _____

c)  _____

d)  _____



Draw algebra tiles to model each polynomial.

a) $x^2 + x - 1$

b) $3x + 2$

Apply

a) Draw a model of an algebraic expression that includes all of the following:
- at least one x^2-tile
- at least two x-tiles
- two 1-tiles

b) An expression for this model is _____.

c) How many terms are in this model? _____

d) The type of polynomial this model represents is a _____.

Math 9 Notes - LG 4/5
Polynomials – combining like terms.
Watch https://youtu.be/UrBzs4j6qNc

Coefficient – the number that multiplies a variable.
Like terms – terms with the same variable and exponents (only different coefficients).

Examples of like terms:

x^2 $-5x^2$ $+3x^2$  the same variable with exponent (x^2)

xy^3 $+ 5xy^3$ $+ 2y^3x$ $- 3xy^3$  the same variable with exponent (y^3)(x), order doesn't matter!

Identify like terms in the expression below:

$2z^3 + 5xy - 4x - 5z^3 + 10yz + 14yx + 2yz + 2x^2$

Combining like terms using algebra tiles – remove zero pairs (ex. )

$5x + 2x - 3x$

$3x^2 - 2x^2 + x^2$

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

Name: _____ Date: _____

Practise

3. Complete the chart.

Expression	Coefficient(s)	Number of Variable(s)	Variable(s)	Exponent(s) of the Variable(s)
a) $4d$				
b) $-prt$				
c) $-8fg^2$				
d) k				

4. **a)** Draw algebra tiles to model the terms.

i) $2x^2$

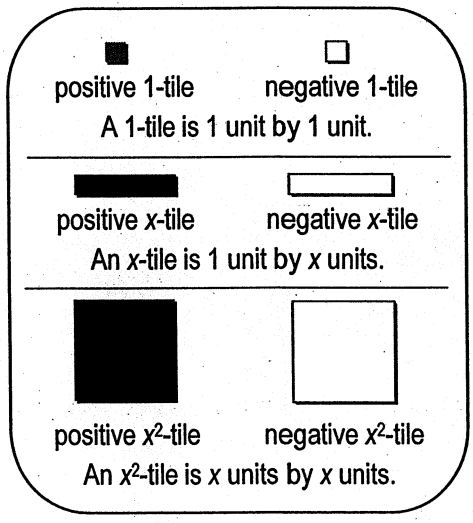
ii) $-3x^2$

iii) 2

iv) $-4x$

v) $2x$

vi) -5



b) Use the terms in part a). List the like pairs.

$2x^2$ and _____ 2 and _____ _____ and _____

5. Use coloured pencils. Circle groups of like terms with the same colour.

a) $2a$ 5 $-7.1a$ $9b$ $-c$

b) -1.9 $6p^2$ 5 $-2p$ p^2 $0.7p$

c) $3m$ $-2ab$ $-\frac{4}{3}m$ $3ab$ $-2ad$ m^2

Watch https://youtu.be/k65p0cD2TQA

Simplify by **collecting** like terms *remember to circle the sign in front!*

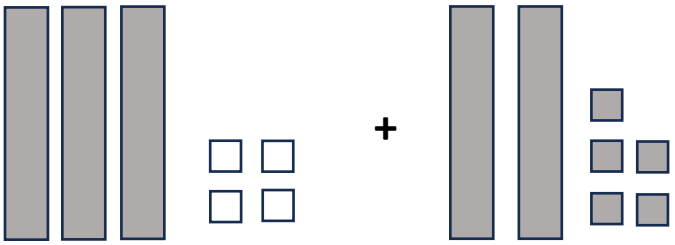
$5x^2 - 5 + 2x - 3x + x^2 + 10$

$3xy^3 + 2xy - 4xy^3 + yx + 8xy^2 - 2y^3x$

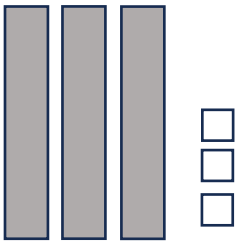
$4p + 2p^2 + 13 - 2p - 2p^2 + 2$

Adding and Subtracting Polynomials

$(3x - 4) + (2x + 5)$



$(3x - 3) - (x - 1)$



Rule for adding and subtracting polynomials

Adding – just drop the brackets & combine like terms.
Subtracting – change to opposite signs inside the 2nd bracket, drop brackets & combine like terms.

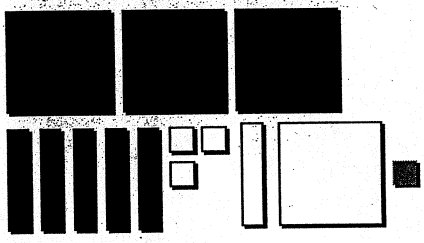
$(5xy + 2x) + (3yx + x)$

$(6x^2 - 4x + 2) - (2x^2 - 2x + 1)$

Name: _____ Date: _____

6. Complete the table. If there are like terms, simplify the expression.

Combine like terms.

Model	Expression	Simplified Expression
a) 		
b) 		
c)	$-4x^2 + 3x - 6 + 2x - x^2 - 3$	

7. Simplify by collecting like terms.

a) $3x - 2x^2 + x - 2x^2$

b) $-4 - 2n^2 - 3n + 3 + 2n^2$

8. Circle the expressions that are equal to $-3x^2 + x - 4$ when simplified. Show your work.

A $-4 + 3x^2 + x$

B $x - 4 - 3x^2$

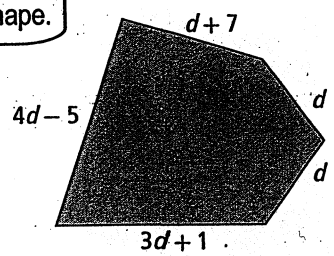
Rearrange the terms. Keep the + and − signs with the term that follows the sign.

C $x^2 + 2 - 4x^2 + 3x - 6 - 2x$

D $-4 - 3x - 3x^2 - 0 + 5x^2 + 4x - 6x^2$

Perimeter, P, is the distance around a shape.

10. a) Write an expression for the perimeter of the figure.



$P =$ _____

b) Simplify the expression by combining like terms.

8. Subtract. Combine like terms.

b) $(8c - 3) - (-5c)$

c) $(y^2 - 5y) - (2y - y^2)$

9. Subtract.

a) $(-3r^2 - 5r - 2) - (r^2 - 2r + 4)$

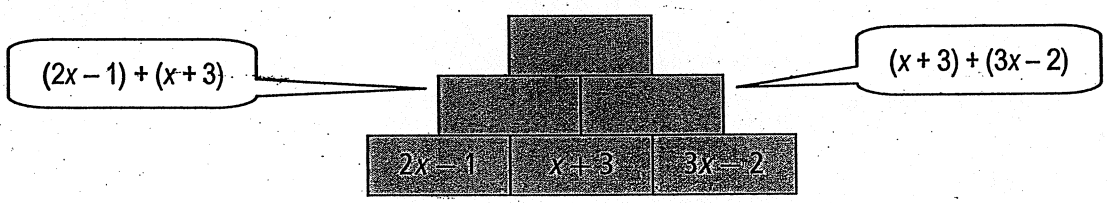
b) $(m + 7) - (m^2 + 7)$

c) $(3b^2 - 5b) - (2b^2 + 4b)$

d) $(6j^2 - 4j + 3) - (-2j^2 - 5)$

Apply

10. Complete the addition pyramid.
Find the value in any box by adding the expressions in the 2 boxes directly below it.



Name: _____ Date: _____

Chapter 5 Review

Key Words

For #1 to #6, write the letter that best matches each description. You may use each letter more than once or not at all.

1. $3w$ is a like term _____
2. has 3 terms _____
3. monomial _____
4. opposite polynomial to $3x - 1$ _____
5. polynomial with a degree of 2 _____
6. has the constant term 3 _____

A $-3x + 1$
B $-4d + 3$
C $1 - 3x^2$
D $-w$
E $x - 6y + 2$
F $-3x - 1$
G $3f - 1$

5.1 The Language of Mathematics, pages 242–250

7. Complete the table.

monomial, binomial, trinomial, or polynomial

Expression	Degree	Number of Terms	Type of Polynomial
a) $5 - p + px - p^2$			
b) $3f - 6$			
c) $-2a$			
d) $3y^2 + 5xy - 27x^2 + 2$			

8. **a)** What is the degree of the polynomial $ab - 7a + 3$? _____

   b) Explain how to find the degree of a term.

   _____

   c) Explain how to find the degree of a polynomial.

   _____

   _____

9. Draw algebra tiles to model the expression $3x^2 - 2x + 1$.

Name: _____ Date: _____

Check Your Understanding

Communicate the Ideas

1. What is the opposite of $-x^2 + 2x - 3$?

a) Use diagrams to show the answer.

b) Use symbols to show the answer.

_____

c) Which method do you prefer? Give 1 reason for your answer.

_____

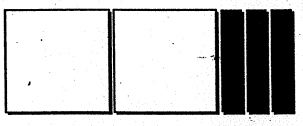
2. **a)** Circle the error in Mei's work.

$(-2x^2 + 7) - (3x^2 + x - 5)$
$= (-2x^2 + 7) + (-3x^2 - x + 5)$
$= -2x^2 - 3x^2 - x + 7 + 5$
$= 5x^2 - x + 12$

b) Correct the error.

Practise

3. **a)** Write the polynomial beside each diagram.



_____

_____

b) Write the addition statement for the diagrams.

_____

4. Add the polynomials. Draw algebra tiles or combine like terms.

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

b) $(-a^2 - 3a + 2) + (-4a^2 + 2a)$

c) $(2y^2 - 15) + (6y + 9)$

d) $(2b^2 - 3) + (-b^2 + 2)$

Name: _____ Date: _____

15. Combine like terms to simplify the expressions.

Draw tiles or use symbols.

a) $3 - 2x + 1 + 5x$

b) $1 - c + 4 + 2c - 3 + 6c$

16. The perimeter of a shape is $(4x) + (3x - 1) + (x + 3) + (x - 2)$.
Each part in brackets is the length of one side.

a) Draw and label a shape for this expression.

b) Simplify the expression for the perimeter.

5.3 Adding and Subtracting Polynomials, pages 263–273

17. What is the opposite of each polynomial?

a) $7 - a \rightarrow$ _____

b) $x^2 - 2x + 4 \rightarrow$ _____

18. $(3x^2 + 4x - 9) + (2 - 5x - x^2)$

a) Find the sum using algebra tiles.

b) Find the sum using symbols.

19. Combine like terms.

Add the opposite.

a) $(-p + 7) + (4p - 5)$

b) $(a^2 - a - 2) - (5 - 3a^2 + 6a)$