Polynomials and Algebra Tiles

This booklet belongs to:_____

LESSON #	DATE	QUESTIONS FROM NOTES	Questions that I find difficult
1.		Pg.	
2.		Pg.	
3.		Pg.	
4.		Pg.	
5.		Pg.	
6.		Pg.	
7.		Pg.	
8.		Pg.	
9.		Pg.	
10.		Pg.	
11.		REVIEW	
12.		**TEST**	

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Your teacher has important instructions for you to write down below.

Polynomials.

Objective	No	Daily Topic	Key Ideas
P&R5 demonstrate an understanding of polynomials (limited to polynomials of degree less than or equal to 2) [C, CN, R, V]	1.	Introduction to Modeling Polynomials • Write the expression for a given model of a polynomial • Describe a situation for a given first degree polynomial expression	Write an expression to represent any number in the following pattern, 2,4,6,8,…
	2.	The language of Polynomials • Create a concrete model or a pictorial representation for a given polynomial expression • Write the expression for a given model of a polynomial • Identify the variables, degree, number of terms, and coefficients, including the constant term, of a given simplified polynomial expression	Given $5x^2 + 3x - 4$ name the variable(s), constant(s), coefficient(s), terms, type of polynomial and degree of the polynomial. Model $-2x^2 + x - 5$ using algebra tiles
	3.	Extra Day to Practice	
	4.	Collecting Like Terms • Match equivalent polynomial expressions given in simplified form (e.g., $4x - 3x^2 + 2$ is equivalent to $-3x^2 + 4x + 2$)	Which polynomials can be represented by the same set of algebra tiles? A. $7x - 4 + 3x^2$ B. $-7x + 4 + 3x^2$ C. $3y^2 - 7y + 4$ D. $3x^2 - 7x + 4$
	5.	**Extra Day to Practice**	
P&R6 model, record, and explain the operations of addition and subtraction of polynomial expressions, concretely, pictorially, and symbolically (limited to polynomials of degree less than or equal to 2) [C, CN, PS, R, V]	6.	Adding and subtracting Polynomials • Model addition of two given polynomial expressions concretely or pictorially and record the process symbolically • Model subtraction of two given polynomial expressions concretely or pictorially and record the process symbolically • Apply a personal strategy for addition and subtraction of given polynomial expressions, and record the process symbolically • Identify equivalent polynomial expressions from a given set of polynomial expressions, including pictorial and symbolic representations • Identify the error(s) in a given simplification of a given polynomial expression	Simplify: $\left(-x^2 + 7x + 9\right) + \left(6x^2 - 5\right)$ Simplify $\left(3x^2 - 5x + 1\right) - \left(x^2 - x + 3\right)$ using algebra tiles.
P&R7 model, record, and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially, and symbolically [C, CN, R, V]	7.	Multiplying Polynomials by Constants or Monomials • Model multiplication of a given polynomial expression by a given monomial concretely or pictorially and record the process symbolically • Apply a personal strategy for multiplication and division of a given polynomial expression by a given monomial • Provide examples of equivalent polynomial expressions • Identify the error(s) in a given simplification of a given polynomial expression	Use algebra tiles to complete the multiplication $3\left(2x + 3\right) =$ Correct any errors if applicable. $-2x\left(-4x + 2 - 11z\right)$ $=8x^2+4x+22z$
	8.	Dividing Polynomials by Constants or Monomials • Model division of a given polynomial expression by a given monomial concretely or pictorially and record the process symbolically • Apply a personal strategy for multiplication and division of a given polynomial expression by a given monomial • Provide examples of equivalent polynomial expressions • Identify the error(s) in a given simplification of a given polynomial expression	Simplify. $\frac{4x^2 - 16x}{x} =$
	9.	Chapter Review and Practice Test • Help students develop sound study habits. • Many students will graduate high school saying they do not know how to study for math tests.	
	10.	Go over Practice Test	
	11.	Unit Evaluation	

Key Terms

	Definition	Example
Binomial	A polynomial consisting of two terms.	$2b^3+5$
Coefficient	A number in front of a variable.	$2b^3+5$ The 2 is the coefficient.
Constant	A number that does not change.	$2b^3+5$ The 5 is the constant.
Distribution Property	A direction to multiply the term in front of the brackets by each of the terms inside the brackets.	$2m(3m-5n)=6m^2-10mn$
Equation	A statement where two expressions are equal.	$2b^3+5=2b+1$ is an equation. $A=\pi r^2$ Is an equation.
Evaluate	Determine the answer.	Evaluate 2+3→5
Expand	Same meaning as distribution property	$2m(3m-5n)=6m^2-10mn$
Exponent	A raised number that tells you how many times to multiply the base by itself.	$2b^3+5$ The 3 is the exponent.
Expression	A collection of variables and/or numbers that represents a quantity.	$2b^3+5$ or πr^2
Inequality	A statement where two expressions are not equal.	$6>1$, $2x+3<5$ And $x\neq 4$ are examples of inequalities.
Inverse operation	Inverse operations have opposite effects.	$(+,-)$ are inverse operations.
Like Term	Terms that have the same variables to the same exponents.	5m,3m and m are like terms. 2n & 5m are not like terms.
Monomial	An algebraic expression consisting of one term.	$2b^3$ or 5
Polynomial	An algebraic expression made up of one or more monomials.	
Simplify	A direction to combine or reduce terms.	$4m+5m-3m$ can be simplified to 6m.
Solve	A direction to determine the value of a variable.	The solution to $x+8=18$ is x=10.
Substitute	A direction to replace the variable(s) with specific values.	If 3 were substituted for x in $2x+1$, the value of the expression would be 7.
Term	A quantity. A constant, a variable or the product of a constant and a variable could represent this quantity.	Given $2b^3+5$, the terms are $2b^3$ and 5
Trinomial	A polynomial consisting of three terms.	$2b^3+2m+5$
Variable	A letter that is used to represent a number.	$2b^3+5$ The b is the variable.

Introduction Polynomials by Modeling Patterns

This opening exercise is designed to challenge your ability to see and explain patterns. Explain each pattern in the most efficient way possible.

1. Pattern #1:

1st box	2nd box	3rd box	4th box	…8th box	…100th box

Explain how to find the number of apples in **any box**.

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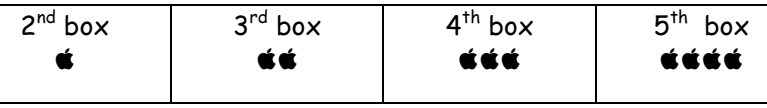
2. Pattern #2:

1st box	2nd box	3rd box	4th box	5th box	…100th box



Explain how to find the number of apples in **any box**.

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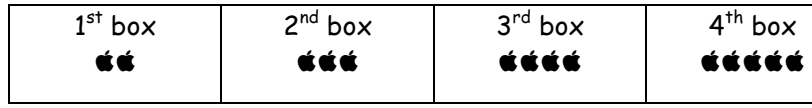
3. Pattern #3:

1st box	2nd box	3rd box	4th box	…8th box	…100th box



Explain how to find the number of apples in **any box**.

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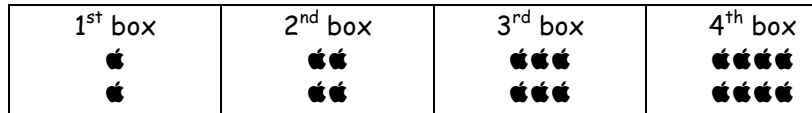
4. Pattern #4:

1st box	2nd box	3rd box	4th box	…8th box	…100th box



Explain how to find the number of apples in **any box**.

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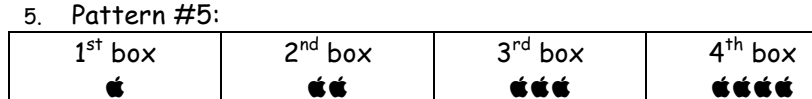
5. Pattern #5:

1st box	2nd box	3rd box	4th box	…8th box	…100th box



Explain how to find the number of apples in **any box**.

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6. Pattern #6:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

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7. Pattern #7:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

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8. Pattern #8:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

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9. Pattern #9:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

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10. Pattern #10:

1st box	2nd box	3rd box	4th box	…8th box	…100th box

Explain how to find the number of apples in **any box**.

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11. Pattern #11:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

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12. Pattern #12:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

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13. Pattern #13:

1st box	2nd box	3rd box	4th box	…8th box	…100th box
					

Explain how to find the number of apples in **any box**.

Challenge #: One of the primary aims of Mathematics is to increase efficiency in the world. Read each statement below and write an efficient expression to represent the number of apples in each box. Use "n" instead of "box #".

14. Five more than the box number.	15. Ten more than the box number.	16. Six less than the box number.
17. Double the box number.	18. The quotient of the box number and 3.	19. The product of the box number and 6.
20. 4 times the box number, decreased by 2.	21. 3 more than double the box number.	22. 5 less than 3 times the box number.

What operation $(+,-,\times,\div)$ should be used to represent the following words.

23. More than…	24. Double a number.	25. The sum of…	26. The difference of…	27. A multiple of…
28. Decreased by…	29. Increased by…	30. Less than…	31. The quotient of…	32. The product of…

Write an expression.

33. Mikkidee makes $8 an hour working at McDonalds. How much will he be paid for the following number of hours?
   A. 11 h/week?
   B. 20 h/week?
   C. 30 h/week?
   D. Write an expression to represent his earnings after **any number** of hours.

34. Feeshalut likes fishing. He sells every fish that he catches for $30. How much will he make after selling the following number of fish?
   A. 7 fish?
   B. 10 fish?
   C. Write an expression to represent how much he gets paid selling salmon.

35. Judy sells a cob of corn for 50 cents. How much would she make after selling the following number of cobs of corn?
   A. 17 cobs?
   B. 50 cobs?
   C. Write an expression to represent how much she makes selling cobs of corn.

36. Challenge #1: Tspray sells funny books for $20 and batty books for $30.
   A. **Write an expression** to represent how much money he makes after selling f funny books and b batty books.
   B. How much does he make if he sells 5 funny books and 7 batty books?

37. Challenge #2: A final mark in Math 9 can be found by taking 80% of a student's class mark and adding it to 20% of their final exam mark.
   A. **Write an expression** using c for class mark and e for exam mark to represent a math final mark.
   B. Determine Billywanna's final mark if his class mark was 70% and his exam mark was 80%.

Write an expression and evaluate each expression.

38. Tspray sells funny books for $20 and batty books for $30.

A. **Write an expression** to represent how much money he makes selling books.

20f + 30b

B. How much does he make if he sells 5 funny books and 7 batty books?

20(5) +30(7)=$310

C. How much does he make if he sells 1 funny book and 6 batty books?

20(1) +30(6)=$200

39. Whydee sells softball bats for $50 and softballs for $4.

A. **Write an expression** for how much she makes selling softball equipment.

B. How much does she make if she sells 3 bats and 12 softballs?

C. How much does she make if she sells 5 bats and 8 softballs?

40. Jayloo sells crabs for $5 and shrimp for $2.

A. **Write an expression** to represent how much he makes selling seafood.

B. How much does he make if he sells 22 crabs and 31 shrimp?

C. How much does he make if he sells 8 crabs and 8 shrimp?

Calculating final grades

41. A math 9 final grade can be found by taking 80% of a student's class mark and adding it to 20% of their final exam mark.

A. **Write an expression** using c for class mark and e for exam mark to represent a student's final mark.

0.80c + 0.2e=final mark

B. Determine Billywanna's final mark if his class mark was 70% and his exam mark was 80%.

0.80c + 0.2e=final mark
0.80(70) + 0.2(80)=72%

C. Determine Purdy Close's final mark if her class mark was 40% and his exam mark was 90%.

0.80c + 0.2e=final mark
0.80(40) + 0.2(90)=50%

42. A math 11 final grade can be found by taking 70% of a student's class mark and adding it to 30% of their final exam mark.

A. **Write an expression** using c for class mark and e for exam mark to represent a student's final mark.

B. Determine Normital's final mark if his class mark was 60% and his exam mark was 40%.

C. Determine Beerent's final mark if his class mark was 40% and his exam mark was 90%.

43. A math 12 final grade can be found by taking 60% of a student's class mark and adding it to 40% of their final exam mark.

A. **Write an expression** using c for class mark and e for exam mark to represent a student's final mark.

B. Determine Numeralia's final mark if his class mark was 90% and his exam mark was 70%.

C. Determine Billywanna's final mark if his class mark was 40% and his exam mark was 90%.

Think of a real life scenario that could be explained by

44. **$4x**

45. **(x+42) lbs**

46. **$(x+2)m^2$**

Challenge #3: Mark Randilyn's Quiz. Give him a mark out of 15 and correct his errors. **Do not look at the answer key until you have marked his quiz and given him a score out of 15.**

Name: **Randilyn Monteif**

Expressions Quiz

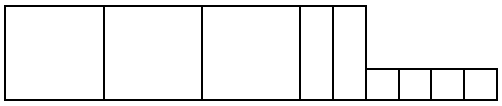
47. Ten less than a number. **10-n**	48. A number divided by four. **4/n**	49. The difference of a number and 12. **n-12**
50. Three more than twice a number is 15. **2n+3**	51. Nine more than twice a number. **2(n+9)**	52. The sum of a number and 3 times that number. **n+3n**
53. Four less than three times a number. **4-3n**	54. Six less than five times a number is 12. **5n-6=12**	55. The product of a number and 3 times that number. **n3**
56. The sum of a number and 4. **n+4**	57. One-fifth of a number. **n/5**	58. One half of a number. $\frac{1}{2n}$
59. The product of a number and 7. **7n**	60. The quotient of a number and 5. **n/5**	61. Two-fifths of a number. $\frac{2n}{5}$

62. What is Randilyn's score out of 15?_____

The Language of Polynomials

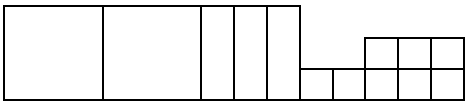
Why are letters and numbers helpful in mathematics?

63. Describe in words the shapes below.



Your explanation:

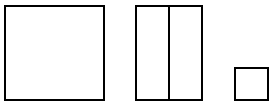
64. Describe in words the shapes below.



Your explanation:

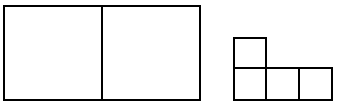
Wouldn't be great if there was a faster way to explain the above pictures.

65. Use x^2, x, numbers & the + sign to represent the shapes below.



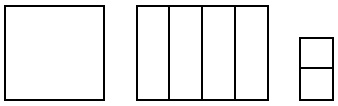
Explanation:

66. Use n^2, n, numbers & the + sign to represent the shapes below.



Explanation:

67. Use y^2, y , numbers & the + sign to represent the shapes below.



Explanation:

68. Go back to the first two pictures and write a mathematical expression for them. Which method do you prefer; words or numbers and letters? Why?

Draw a picture to represent each group of letters and numbers.

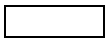
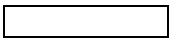
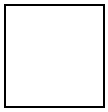
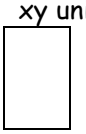
69. $4x^2 + x$

70. $2x^2 + 3$

71. How could you draw a picture to represent negative numbers? $2x^2 - 3$

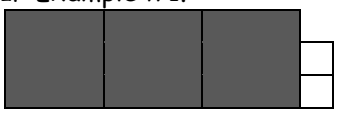
Introduction to Algebra Tiles

Algebra tiles can be used to model or represent variables and integers.

Positive Terms	Negative Terms	Other Shapes
1 unit  • Constant • 1 single unit	-1 unit  • Constant • 1 single unit	y units  • Variable • Any letter, Not x
x units  • Variable • Unknown quantity	-x units  • Variable • Unknown quantity	z units  • Variable • Any letter, Not x or y
x^2 units  • Variable • Unknown quantity • x by x units	$-x^2$units  • Variable • Unknown quantity • x by x units	xy units  • Variable • X high and y wide • Any single letter

Write an expression for each of the following

72. Example #1.



Remember, that any letter could be used. Any of the following are possibilities

$$-3x^2+2,$$
$$-3m^2+2,$$
$$-3d^2+2\ldots$$

The letter x is commonly used and will be used in this chapter.

73. Example #2.

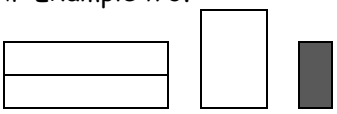
Answers will vary:

Possible solutions:

$$x^2-4x+6,$$
$$n^2-4n+6,$$
$$r^2-4r+6\ldots$$

x^2 -4<u>y</u>+6 is not a solution unless x=y.

74. Example #3.



Answers will vary:

Possible solutions:

$$2z+xy-h,$$
$$2g+xy-f,$$

<u>z^2</u> +xy-y is not a solution because there is no picture of a square.

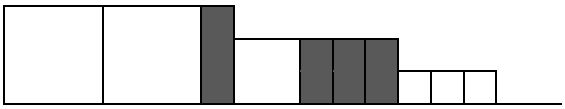
75. Important: Any letters can be used to represent the above shapes. There is only one rule to remember:

- Do not use the same letter to represent two different shapes.
- Why is this a good idea?

Write an expression that could be represented by each set of algebra tiles?

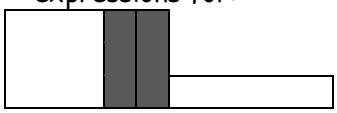
76. Expression:

77. Expression:

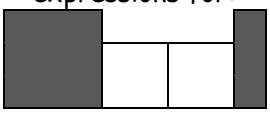


Write an expression to explain each set of algebra tiles?

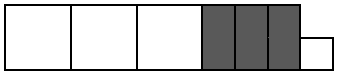
78. Write two possible expressions for:



79. Write two possible expressions for:



80. Write two possible expressions for:



Model each expression using algebra tiles. (Draw each expression with algebra tiles.)

81. $-2x^2 + x - 5$

82. $x + y + z + m$

83. $x^2 + y^2$

New Terms Challenge #4: The terms that follow are important to being able to communicate in mathematics. The English-speaking world has agreed to these words. Can you match these new words before we discuss them? Match the letter to the appropriate number.

84. ____What is the 3 called in $3x^4 + 5$
85. ____What is the x called in $3x^4 + 5$
86. ____What is the 5 called in $3x^4 + 5$
87. ____What is $3x^4$ called in $3x^4 + 5$
88. ____$2y$ is an example.
89. ____$3x^4 + 5$ is an example.
90. ____$x + y + z$ is an example
91. ____$3x^4 + 5$ & $x + y + z$ are examples.

A. Variable: An unknown quantity represented by a letter.
B. Term: A product of letters and/or numbers including single variables or constants.
C. Binomial: An expression with two terms
D. Monomial: An expression with one term
E. Constant: A number on its own that does not change
F. Trinomial: An expression with three terms
G. Polynomial: An expression made up of one or more monomials.
H. Coefficient: A number in front of a variable that does not change

Polynomial Language

Using numbers and letters makes explaining mathematical situations in life more convenient. For this reason, it is important that everyone calls the letters and numbers the same names. This allows scientists all over the world to be able to understand each other when they talk about common problems.

Fill in the following definitions

92. Variable: $3\underline{x}+2$	
93. Coefficient: $\underline{3}x+2$	
94. Constant: $3x+\underline{2}$	
95. Term: $\underline{3x}+\underline{2}$	Term: A product of letters and/or numbers including single variables or constants. Terms are separated by + or – signs. • 3x and 2 are both terms as is $4x^2y$ and $4(a+b)$. • $3x+2$ has two terms but $2(x+3)$ is just one term since 2 and (x+3) are being multiplied.
96. Polynomial: See 97,98,99 below.	
97. Monomial: $\underline{2a}$	
98. Binomial: $\underline{2a+b}$	
99. Trinomial: $\underline{2a+b+c}$	
100. Degree of a term	The sum of the exponents in a single term. • $3x^2$, $4x^1y^1$, 3xy Each has degree 2. • $5x^4$, $7x^2y^2$, $5x^3y$ Each has degree 4.
101. Degree of a polynomial	The highest sum of the exponents in a single term • Determined by the term with the highest degree. • $5x^4+3x^2+1$ And $5x^2+3x^4+1$ both have degree 4. • $5x^4y^4+3^{20}$ Has degree 8.

Determine the selected number(s) or letter(s).

102. Name the variable(s) in the expression, 3m+2n+5.	103. Name the constant(s) in the expression, 5m+n+2.	104. Name the coefficient(s) in the expression, 4x+n+2.	105. Name the variable(s) in the expression, 2m+2-ab.
106. Name the coefficient(s) in the expression, 2x-n+2.	107. Name the variable(s) in the expression, $2m^3+5-b$.	108. Name the constant(s) in the expression, $-4+n^2+x$.	109. Name the constant(s) in the expression, $3m^5+2n+5$.

Determine the number of terms in each expression.

110. 2m+4ab+8	111. 4(a+b)+c	112. 2a+b+c	113. 2ab+5abcd
114. 5a+b	115. 8a -5(b+c)	116. 2(m+4ab)+8	117. 5(a+b+c)

What kind of polynomials are these?

118. 2a+2b	119. 2xy+6x-4	120. 2x+y	121. 2x+y+4
122. 5x	123. 8y+5x-4	124. 2a+c+b	125. 2ab+3b+abc

126. **Challenge #5:** Write two different polynomial expressions that have the same degree as $-5x^2 + x$ with coefficients 7 and -2 and constant 5.

127. **Challenge #6:** Which of the following is equivalent to $4x - 5x^2 + 3$:

A. $5x^2 - 4x + 3$

B. $-5x^2 + 4x + 3$

C. $-5x^2 + 4x - 3$

Create a polynomial.

128. Write two different polynomial expressions that have the same degree as $-5x^2 + x$ with coefficients 7 and -2 and constant 5.

Possible solution:

$7x^2$-2x+5 (Degree is 2)

-$2x^2$+7x+5 (Degree is 2)

129. Write two different first-degree binomials with a negative coefficient and a negative constant.

130. Write two different trinomials with 4 different variables where every term is of degree 2.

Write a polynomial to match to each description.

131. Write two different binomial expressions where the constant is bigger than the coefficient.

132. Write a binomial expression where the coefficient of the term with the largest degree is negative and the coefficient of the other term is smaller than the first.

133. Write a polynomial expression with 4 different variables where every term is of degree 1.

Equivalent polynomials.

134. Which of the following is equivalent to $4x - 5x^2 + 3$:

Possible Strategy Solution

Rearrange $4x - 5x^2 + 3 \rightarrow -5x^2 + 4x + 3$

A. $5x^2 - 4x + 3$

B. $-5x^2 + 4x + 3$

C. $-5x^2 + 4x - 3$

By observation B is the only equivalent trinomial.

135. Which of the following is equivalent to $-1y + 1x^2$:

A. $x^2 - y$

B. $-1x^2 + 1y$

C. $-x^2 + y$

136. Which of the following is/are equivalent to $-xy + \left(-2y^2\right)$:

A. $2y^2 - xy$

B. $-2y^2 - xy$

C. $-2xy - y^2$

Equivalent polynomials.

137. Which polynomials can be represented by the same set of algebra tiles?

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

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

C. $3y^2 - 7y + 4$

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

138. Which polynomials can be represented by the same set of algebra tiles?

A. $-x^2 - y + x$

B. $-m^2 - m + n$

C. $-x^2 - x + y$

D. $-z + y - z^2$

139. Which polynomials can be represented by the same set of algebra tiles?

A. $z^2 - w - 2$

B. $-y - 2 + x^2$

C. $x^2 - y - 2$

D. $w^2 - w - 2$

140. For each polynomial represented by the algebra tiles state the following:

A. Degree:

B. Constant:

C. Type of polynomial:

141. For each polynomial represented by the algebra tiles state the following:

A. Degree:

B. Coefficient(s):

C. Number of terms:

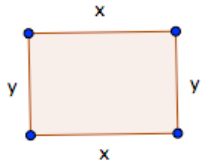
142. For each polynomial represented by the algebra tiles state the following:

A. Degree:

B. Constant:

C. Type of polynomial:

143. **Challenge #7**: Write an expression to represent the perimeter.



A. P=

B. Determine the perimeter if x=4cm and y=3cm.

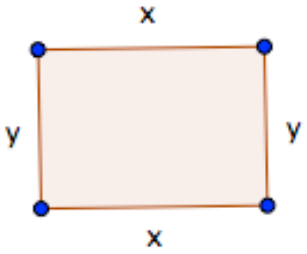
144. **Challenge #8**: Evaluate $-5m^2 + 4m - 4n$, if m=2 and n=-1.

Write a polynomial to represent each area or perimeter.

145. Write an expression to represent the perimeter.

Solution:

A. P=2x+2y



B. Determine the perimeter if x=4cm and y=3cm.

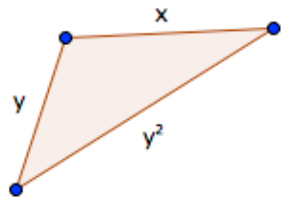
P=2(4)+2(3)=14cm

C. Determine the perimeter if x=10cm and y=8cm.

P=2(10)+2(8)=36cm

146. Write an expression to represent the perimeter.

A. P=

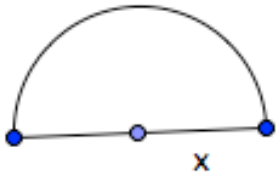


B. Determine the perimeter if x=1cm and y=1.2cm.

C. Determine the perimeter if x=10cm and y=9cm.

147. Write an expression to represent the perimeter if the perimeter of a complete circle is $2\pi r$.

A. P=



B. Determine the perimeter if x=5. (Use pi=3.14)

Write an expression and evaluate.

148. Many bank machines only distribute $20 bills. If you do not have an account at the bank there will be $1.50 charge.

A. Write an expression to represent how much money will be debited from any person's account if they have to pay the $1.50.

B. How many twenty-dollar bills does the computer need to know to give out if $241.50 will be removed from Sally's account?

149. Manny works at Donnie's Donuts and earns $9 per hour. He gets $13.50 for every hour he works above his regular eight hour shift.

A. Write an expression to represent how much money Manny could make on any given day.

B. How much money will Manny make if he works 10 hours?

C. How much will he make if he works 12.5 hours?

Evaluate each polynomial.

150. Evaluate $-5m^2 + 4m - 4n$,if m=2 and n=-1.

Solution:

$-5m^2 + 4m - 4n$

$= -5(2)^2 + 4(2) - 4(-1)$

$= -20 + 8 - (-4)$

$= -8$

151. Evaluate $3m^2 + 4m - 4n$, if m=-2 and n=1.

152. Evaluate $3m^2 - n^2$, if m=10 and n=-1.

153. Evaluate $-m^2 + m - 4n$, if m=2 and n=-1.

154. Evaluate if m=10.

$\frac{2}{5}m - \frac{1}{4}m =$

Solution:

Substitute m=10 for m in the $\frac{2}{5}m - \frac{1}{4}m =$

$\frac{2}{5}\left(\frac{10}{1}\right) - \frac{1}{4}\left(\frac{10}{1}\right) =$

$\frac{20}{5} - \frac{10}{4} =$

$4 - 2.5 = 1.5$

155. Evaluate if m=-40.

$\frac{2m}{5} - \frac{m}{4} =$

156. Evaluate if m=-20.

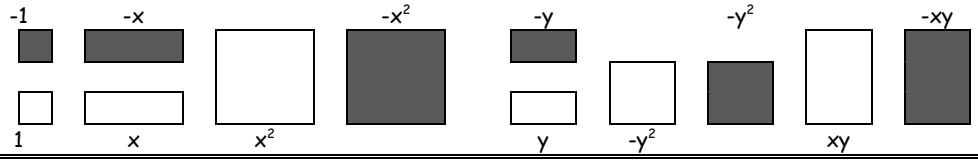
$\frac{3}{5}m - \frac{3}{8}m =$

157. Evaluate if m=-1.

$\frac{5}{m} - \frac{3}{8m} =$

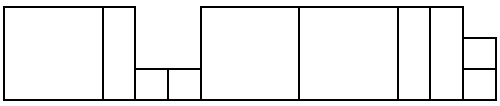
Collecting Like Terms

Algebra Tiles Review



Simplify.

158. Write a polynomial to represent the algebra tiles.



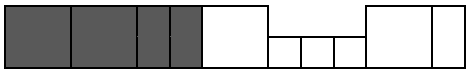
Expression: $x^2+x+2+2x^2+2x+2$

160. How many terms?_____

161. Simplify it:_____

162. What kind of polynomial is it?_____

159. Write a polynomial to represent the algebra tiles.



Expression: $-2y^2-2y+y^2+3+y^2+y$

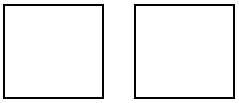
163. How many terms?_____

164. Simplify it:_____

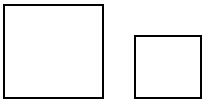
165. What kind of polynomial is it?_____

Write a polynomial expression. Simplify where possible.

166.



167.



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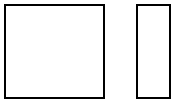

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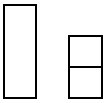
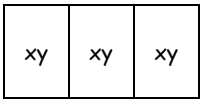
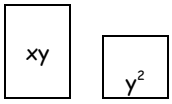


Write a polynomial expression. Simplify where possible.

170.

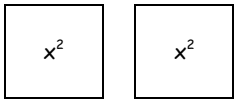


171.



172.

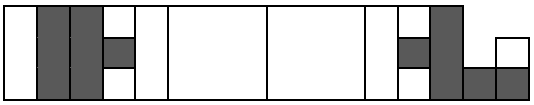
173.



174. Make a rule: When can polynomial expressions be combined?

Write a polynomial expression. Simplify where possible.

175. Challenge #9: Simplify.



Write down the steps to simplify the set of algebra tiles.

176. Challenge #10: Which of the following can be combined. How do you know?

A. 5
B. x^2
C. -7x
D. 3xy
E. -5yx
F. $0.2x^2$

Terms that can be combined are called like terms.

What must be true of each term to combine them?

177. Challenge #11: Simplify by combining.

$5x^2 + 4x - 3 - x + 2 - 3x^2$

Draw a picture or write down the steps to simplify this polynomial.

Definition: Like Terms→ Use the examples to create a definition

Like Terms	Unlike terms
• 3,6,7.2 & 0.5 • $3m, -1.3m, m$ & $0.75m$, • $x^2, 4x^2, -2x^2, 0.2x^2$ • $3xy, -5yx, \ldots$	• $3m$ & $2n$ • $2m$ & 5 • $5x^2$ & $4x$ • $3xy, 5xz, \ldots$

178. Like Terms: Terms are like terms if they have the _____variables and each corresponding variable is raised to the _____exponent.

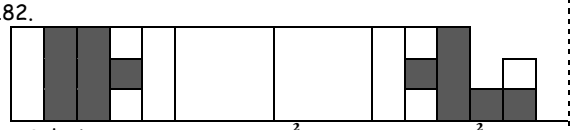
179. yx is the same as _____ so always write yx as_____

180. $y + z + x$ is the same as _____ so always write $y + z + x$ as_____

181. $x + 5 + x^2$ is the same as _____ so always write $x + 5 + x^2$ as_____

Write a polynomial expression. Simplify where possible.

182.



Solution: $x-2x+2-1++x+2x^2+x+2-1-x-2+1=2x^2+1$

Or in total $3x$, $-3x$, $+5$, -4 & $2x^2=2x^2+1$

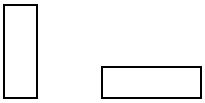
183.

184.

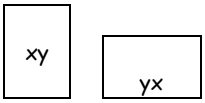
185.

Are the following like terms?

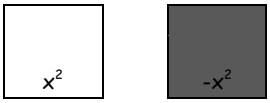
186. Are these like terms?



187. Are these like terms?



188. Are these like terms?



State whether each pair of monomials are like terms. (Yes or No?)

189. $5m$, $4m$	190. $5m$, $4n$	191. 5, $3m$	192. 7, 2.5	193. $5mn$, $4nm$
194. 5, $3x$	195. $5xn$, $4xm$	196. $5x$, $4xy$	197. $5n$, $4n$	198. x, $0.002x$
199. $5m^2$, $4m$	200. $5m^2n$, $4nm$	201. $5m^2n$, $4nm^2$	202. $7b$, $-0.5b$	203. $5m^3n^2$, $4n^3m^2$
204. $x5$, $3x$	205. $5x^2n$, $4x^2n$	206. yx, $4xy$	207. $5nx^2$, $4n^2x$	208. $-7n^2$, $2.5nn$

Collect like terms.

209. $5x^2+4x-3-x+2-3x^2$

Possible solution Strategy:

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

$4x-x=3x$

$-3+2=-1$

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

210. $9x^2+5+7x+2+3x$

211. $11x+3x^2-7x+2x^2+x$

Simplify by collecting like terms.

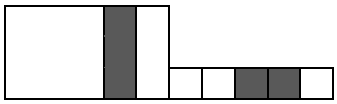
212. $-4x^2 + x + 6x^2 - 2x + 5x - 3x^2$

213. $-x + 2 + 4x - 7 - x^2 + 2x^2$

214. $-5x - 7x - 9 - 2 - 3x$

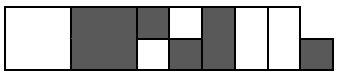
Write an expression to explain each set of algebra tiles? Simplify if possible.

215. Write a polynomial to represent the algebra tiles.



216. Write a polynomial to represent the algebra tiles.

217. Write a polynomial to represent the algebra tiles.



Mark the following right or wrong. Circle the errors and correct them.

218. $-4m + 10m^2 + 5m^2 - 5m$

Answer:

$15m^2 + 9m$

219. $3m^2 + 9m - 5m^2 - 5m$

Answer:

$2m^2 + 4m$

220. $2m^2 + 4n^3 - 2m^2 - 5n^3$

Answer:

$-n^3$

Find the missing values.

221. What would have to be true if $x + y + 9$ is equivalent to $y + z + 9$?

222. Determine the value for a if $5x - 7y + 3x + ay$ is equivalent to $8x + 4y$.

223. What would have to be true if $5x + 3y + 2z$ is equivalent to $5x + 6m + 2z$?

224. Determine the value for a if $-3x^2 - 7x + ax^2 - 4x$ is equivalent to $9x^2 - 11x$.

225. Determine the value for a if $3x^2 - ax - 8x^2 - 2x$ is equivalent to $-4x^2 + 5x - x^2 - 3x$.

226. What would have to be true if $15x + 30y + 12z$ is equivalent to $15x + 30y + 4n$?

Simplify by collecting like terms.

227. $3m^2 - m^2 + 7nm - 5m^2 - mn$

228. $7n + 4 - n - 5 - 5n$

229. $2n - m^2 - 3n - 2m^2 + 5n$

230. $n - 7mn - 3mn + mn + 5n$

231. $1 - 6m - 2n - \left(-5m\right) - n - 3$

232. $nm^2 - n + 3m^2n - n^2m + n$

(Answers will vary)

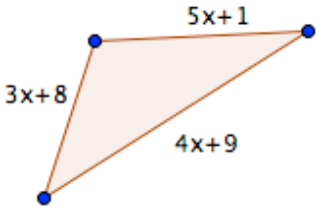
233. Write a polynomial that simplifies to $2m^2 - n + 4m$.

234. Write a polynomial of degree two that simplifies to $2n$.

235. Write a polynomial that has the coefficients 6, -5, -4, 3 & 2 that simplifies to $2n$.

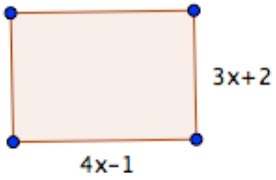
Write a simplified polynomial expression for the perimeter of each polygon.

236.



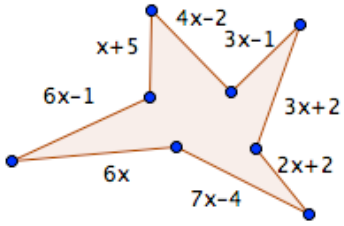
Expression:

237.



Expression:

238.



Expression:

239. Determine the perimeter if x=5cm.

240. Determine the perimeter if x=11cm.

241. Determine the perimeter if x=3cm.

Simplify each polynomial.

242. $4m + 3n + 5m - 5n$

243. $4 - 3n + 15 - 5n$

244. $m + 3n - 2m - 5n$

245. $4m - 3n + m + 5n$

246. $14n + 7n + 5m - 2n$

247. $3nm + 2n + 5mn - 8nm$

248. $4m + 3m^2 + 5m^2 - 5m$

249. $4n^3 - m^2n + 5m^2n - 5n^3$

250. $4m - m^2 - n + 3m^2$

Mark the following right or wrong. Circle the errors and correct them.

251. $4mn - 4n + 2m + 5nm$

Answer:
Already simplified

252. $mn^2 + 7n + 5n - 2mn^2$

Answer:
$12n - 1mn^2$

253. $3m^3 - 2n + 5n - 8n$

Answer:
$3m^3 + 5n$

Evaluate.

254. Evaluate if m=10.

$\frac{2}{5}m - \frac{1}{4}m =$

Possible Solution:

Substitute m=10 for m

$\frac{2}{5}\left(\frac{10}{1}\right) - \frac{1}{4}\left(\frac{10}{1}\right) =$

$\frac{20}{5} - \frac{10}{4} =$

$4 - 2.5 = 1.5$

255. Evaluate if m=-40.

$\frac{2m}{5} - \frac{m}{4} =$

256. Evaluate if m=-20.

$\frac{3}{5}m - \frac{3}{8}m =$

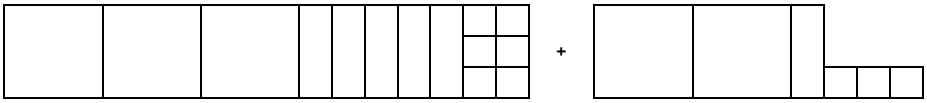
257. Evaluate if m=-1

$\frac{5}{m} - \frac{3}{8m} =$

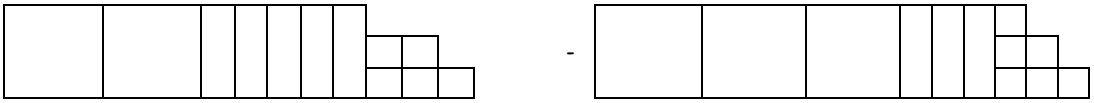
Adding and Subtracting Polynomials

Challenge #12: Write a polynomial expression and simplify each polynomial.

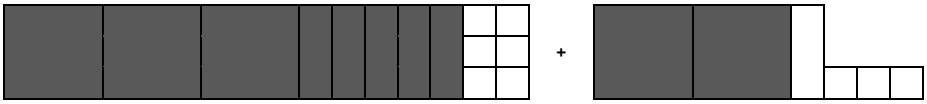
258. Simplify $\left(3x^2+5x+6\right)+\left(2x^2+x+3\right)$



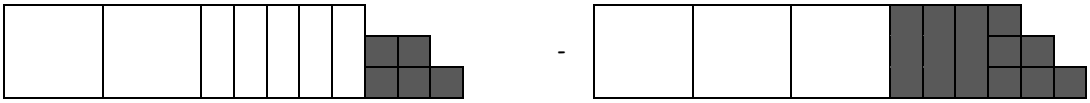
259. Simplify. $\left(2x^2+5x+5\right)-\left(3x^2+3x+6\right)$



260. Simplify. $\left(-3x^2-5x+6\right)+\left(-2x^2+x+3\right)$

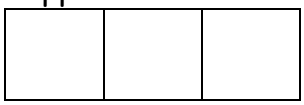


261. Simplify $\left(2x^2+5x-5\right)-\left(3x^2-3x-6\right)$



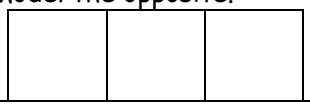
Definition: Opposite Polynomials

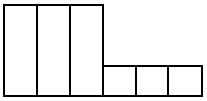
- Polynomials are opposites if both numbers are equal distances from zero without being the same number. 5 and -5 are opposites. 5 and 5 are not opposites



262. The opposite of $3x^2$ is:

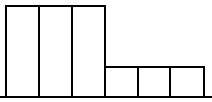
Model the opposite.

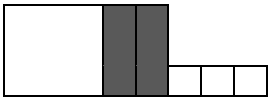




263. The opposite of $3x+3$ is:

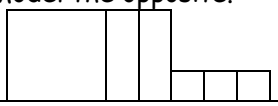
Model the opposite.





264. The opposite of x^2-2x+3 is:

Model the opposite.



Read each method and tick the strategy you like best.

	Method #1	Method #2
265. $\left(3x^2+5x+6\right)+\left(2x^2+x+3\right)$	$\underline{3x^2+5x+6}+2x^2+x+3$ Collect like terms. $5x^2+6x+9$	$3x^2+5x+6$ $+\ \underline{2x^2+x+3}$ $5x^2+6x+9$
266. $\left(2x^2+5x+5\right)-\left(3x^2+3x+6\right)$	$\left(2x^2+5x+5\right)-\left(3x^2+3x+6\right)$ Add the opposite $\left(2x^2+5x+5\right)+\left(-3x^2-3x-6\right)$ $2x^2+5x+5\underline{-3x^2-3x-6}$ Collect like terms. $-x^2+2x-1$	$2x^2+5x+5$ $-\ \underline{3x^2+3x+6}$ $-x^2+2x-1$
267. $\left(-3x^2-5x+6\right)+\left(-2x^2+x+3\right)$	$\underline{-3x^2-5x+6}-2x^2+x+3$ Collect like terms. $-5x^2-4x+9$	$-3x^2-5x+6$ $+\ \underline{-2x^2+x+3}$ $-5x^2-4x+9$
268. $\left(2x^2+5x-5\right)-\left(3x^2-3x-6\right)$	$\left(2x^2+5x-5\right)-\left(3x^2-3x-6\right)$ Add the opposite $\left(2x^2+5x-5\right)+\left(-3x^2+3x+6\right)$ $\underline{2x^2+5x-5}-3x^2+3x+6$ Collect like terms. $-x^2+8x+1$	$2x^2+5x-5$ $-\ \underline{3x^2-3x-6}$ $-x^2+8x+1$

Perform the indicated operation.

269. $\left(-x^2+7x+9\right)-\left(6x^2-5\right)$

270. $\left(x^2+3x\right)+\left(-2x^2+3x-4\right)$

271. $\left(-21x^2+9\right)-\left(-11x^2-3x\right)$

272. $\left(-2x^2+5\right)+\left(-3x^2+1\right)$

273. $\left(x^2+3x+1\right)-\left(-2x^2-3x\right)$

274. Right or wrong? Fix it.

$\left(-x^2-4x+3\right)+\left(-5x+3\right)$

$=-x^2-4x+3-5x+3$

$=-x^2-1x+6$

Perform the indicated operation.

275.
$$\begin{array}{r} 3x^2-5x+6 \\ +\ -2x^2+x-3 \\ \hline \end{array}$$

276.
$$\begin{array}{r} 2x^2-5x+7 \\ -\ -3x^2+3x-6 \\ \hline \end{array}$$

277.
$$\begin{array}{r} 13x^2-5x+6 \\ +\ 2x^2-9x+3 \\ \hline \end{array}$$

278.
$$\begin{array}{r} 5x^2-9x+4 \\ -\ -7x^2-6 \\ \hline \end{array}$$

279.
$$\begin{array}{r} x^2+60 \\ +\ -20x^2+5x-3 \\ \hline \end{array}$$

280. Right or wrong? Fix it.

$$\begin{array}{r} -11x+10 \\ -\ -8x^2-3x-6 \\ \hline \end{array}$$

$-8x2-8x+16$

281. Challenge #13: Simplify using any strategy. $(3x^2 + 5x + 6) - (-2x^2 + x - 9) =$

Explain your method.

Combine like terms using any strategy

282. $(3x^2 + 5x - 6) - (-2x^2 + x - 9)$

Possible Solution Strategy:
$=3x^2 + 5x - 6 + 2x^2 - x + 9$
$=5x^2+4x+3$

283. $(c + 5) + (11 + 8c) =$

284. $(-9 + q) - (1 - 9q) =$

285. $(5x^2 - 3x) - (-3x + 5x^2) =$

286. $(6v^2 + 2v) - (7v - v^2) =$

287. $(8j^2 - 4j) + (-9j - 23j^2) =$

State the opposite of each polynomial.

288. $\left(-2x^2 + 3x\right)$

289. $-x^2 + 3x - 1$

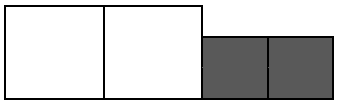
290. $-\left(2x^2 - 3x\right)$

Draw the opposite of each set of algebra tiles and write a polynomial expression for each.

291.

292.

293.



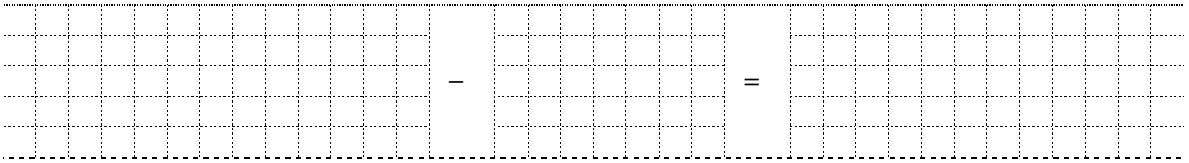
294. Challenge #14: Simplify.

$-4x + 7 - \left[\left(-3x + 1\right) - \left(-2x - 4\right)\right]$

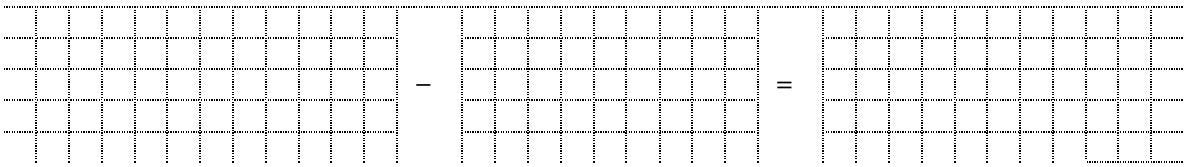
Explain your method.

Express your answer using both algebra tiles and polynomials.

295. Simplify $\left(3x^2-2x+1\right)-\left(x^2-x+3\right)$ using algebra tiles.



296. Simplify $\left(-2x^2-3x+1\right)-\left(-2x^2-x+1\right)$ using algebra tiles.



Simplify.

297. $-4x+7-\left[\left(-3x+1\right)-\left(-2x-4\right)\right]$

Possible solution Strategy:
Begin in the brackets and the opposite.

$-4x+7-\left[-3x+1+2x+4\right]$

Collect like terms in the brackets.

$-4x+7-\left[-x+5\right]$

Add the opposite.

$-4x+7+x-5 \rightarrow -3x+2$

298. $\left(-2xy+5\right)-\left(-5xy+4\right)+\left(5yx-3\right)$

299. $\left(4x^2+11x\right)-\left[\left(8x-x\right)-\left(-3x^2+x\right)\right]$

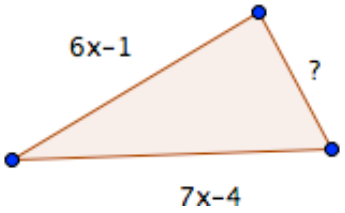
300. $\left(-2x^2+7\right)+\left[-9x-\left(5x^2-1\right)\right]$

301. $\left(-2x^2+7\right)+\left(-9x+1\right)-\left(5x^2-1\right)$

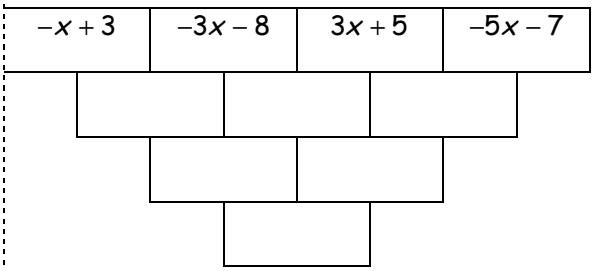
302. $-\left[\left(-2y+5x\right)-\left(-5x+4y\right)+\left(5x-3y\right)\right]$

Simplify.

303. The perimeter of the triangle is 17x-3. Find an expression for the unknown side.



304. Complete the addition funnel. Each box is the sum of the two boxes immediately above it.



Evaluate each situation.

305. Sally works for Kabooki Cabs in the summer to earn money. She rents the pedal bike on Thursdays for $75 and on Fridays for $125. She charges people $1/min on Thursdays and $1.50/min on Fridays for bike tours around her city.

The expression $\left(x-75\right)+\left(1.5y-125\right)$ represents her earnings for any given Thursday and Friday.

306. What does x represent?

307. What does y represent?

308. Calculate her earnings last weekend if she billed 220 minutes on Thursday and 178 minutes on Friday.

309. Next week she is going to charge $1.25/min on both Thursday and Friday. Write a new expression to represent her new billing idea.

310. Calculate her new earnings if she billed 398 minutes on Thursday and Friday.

311. Jason and Timothy both work for Mathbeacon Plumbing. They each charge $65 for service calls. Jason charges $80/hr and Timothy charges $70/hr.

312. Write an expression to represent Jason's earnings on any given day.

313. Write an expression to represent Timothy's earnings on any given day.

314. Write an expression to represent the possible revenue for the company on any given day.

315. Calculate the total revenue if Jason made 3 service calls and worked 7 hours and timothy made 4 service calls and worked 6 hours.

Multiplying Polynomials by Constants or Monomials

Challenge #15:

316. What does $3(2x+3)$ equal?

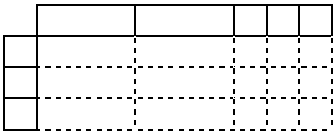
Consider this interpretation:
(2x+3)+(2x+3)+(2x+3)

Is it true? Can it be simplified?

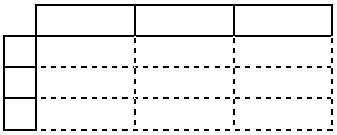
317. Can you think of another way of coming to the same equivalent expression without repetitive adding?

Use the algebra tiles and complete the multiplication.

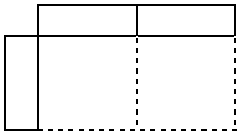
318. $3(2x+3) =$



319. $3(3x) =$

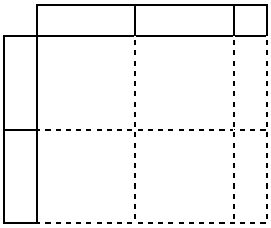


320. $x(2x) =$

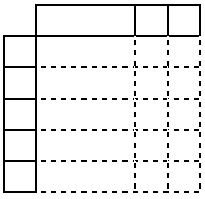


Use algebra tiles to find the product.

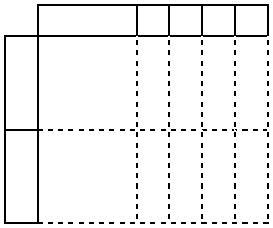
321. What multiplication is being modeled?



322. What multiplication is being modeled?



323. What multiplication is being modeled?



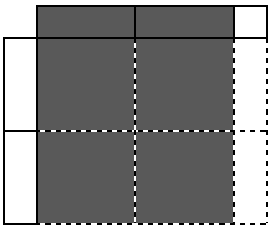
324. What is the product of the above multiplication?

325. What is the product of the above multiplication?

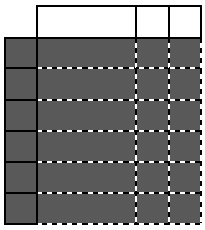
326. What is the product of the above multiplication?

Write a multiplication statement and answer the question.

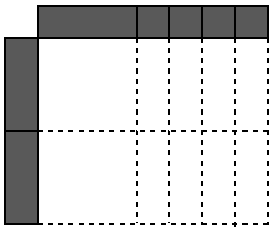
327. What multiplication is being modeled?



328. What multiplication is being modeled?

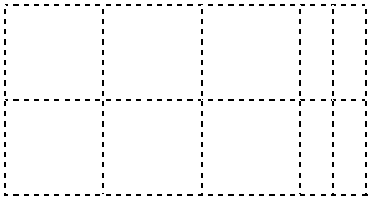


329. What multiplication is being modeled?

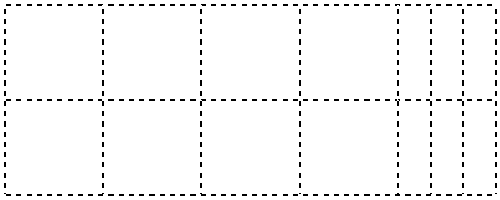


What multiplication is being modeled?

330. What two polynomials multiply to give $6x^2 + 4x$?

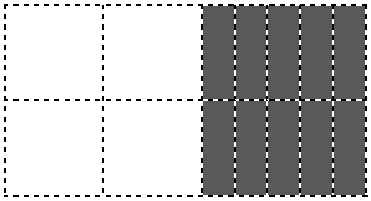


331. What two polynomials multiply to give $8x^2 + 6x$?

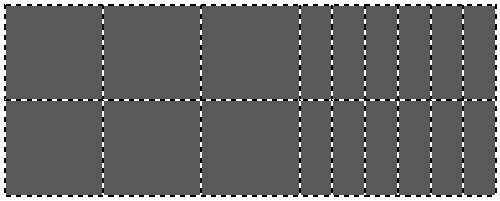


Write a multiplication statement to represent the algebra tiles.

332.



333.



The Distributive Property

334. Challenge #16: Expand.

$$-2\left(-3x+1\right)$$

Write down the steps to complete the problem.

Model each polynomial.

335. Model $-2(-3x+1)$ and complete the multiplication.

336. Model $3(-4x+2)$ and complete the multiplication.

Multiply two monomials.

337. $2(5x)$

338. $-3(2x)$

339. $8y(2x)$

340. $-2x(-9y)$

Correct any errors if applicable.

341. $-1.9x(-2x)$

$-3.8x^2$

342. $3xy(-2x)$

343. $-xz(-5x)$

344. $0x(-2x)$

Correct any errors if applicable.

345. $-5xy(-3xy)$

$15x^2+15y^2$

Multiply a binomial or a trinomial by a monomial.

346. $-2(-3x+1)$

Possible solution strategy:

-2 (-3x+1)
Distribute
=-2(-3x)+(-2)(1)
=6x-2

347. $-5(2x-4)$

348. $2y(7x-6)$

349. $-4(-9x+3)$

Correct any errors if applicable.

350. $-8x(x-3)$

$-8x^2-24x$

351. $3x(7x-2y)$

352. $7x\left(5x+\frac{4y}{7}-3\right)$

353. $\frac{1}{2}x(16x-4y-z)$

Correct any errors if applicable.

354. $-2x(-4x+2-11z)$

$8x^2+4x+22z$

Equivalent expansions

355. Which of the following are equivalent to $3(5x+1)$?

A. $(5x+1)+(5x+1)+(5x+1)$
B. $15x+1$
C. $2(5x+1)+(5x+1)$
D. $15x+3$

356. Which of the following are equivalent to $-2(-x+4)$?

A. $2x+8$
B. $2(x-4)$
C. $2x-4$
D. $2x-8$
E. $-(-x+4)-(-x+4)$

357. Which of the following are equivalent to $-5(x-2)$?

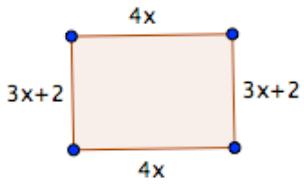
A. $-5x+10$
B. $-5x-2$
C. $-5x-10$
D. $-3(x-2)-2(x-2)$
E. $2(x-2)-7(x-2)-5(x-2)$

Perimeter and Area Reminder

Rectangle	Triangle	Circle
$P = 2l + 2w$	$P = a + b + c$	$P = 2\pi r$
$A = lw$	$A = \frac{bh}{2}$	$A = \pi r^2$

Write an expression for the perimeter and area.

358. Write an expression for the perimeter and area of the rectangle.

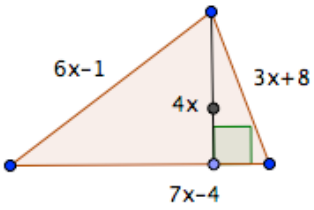


Perimeter:

Area:

359. Calculate the area if the longest side is equal to 12cm.

360. Write an expression for the perimeter and area of the triangle.



Perimeter:

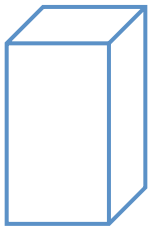
Area:

361. Calculate the area if x=2.

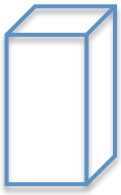
362. Write an expression for the area of the shaded region if the radius of the large circle is 5x cm wide and the radius of the small circle 3x cm wide.

Write a polynomial expression.

363. A rectangular prism has the following dimensions; $w = x$, $l = 2$, $h = 3x$. Determine an expression for the total surface area of the rectangular prism.



364. A rectangular prism has the following dimensions; $w = x + 1$, $l = 3$, $h = 2x$. Determine an expression for the total surface area of the rectangular prism.



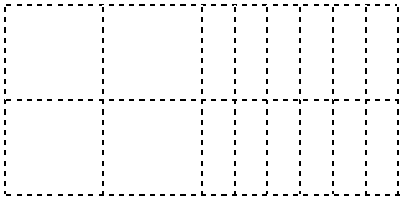
Challenge #17: Dividing Polynomials

365. Simplify. $\frac{4x^2 + 12x}{2}$

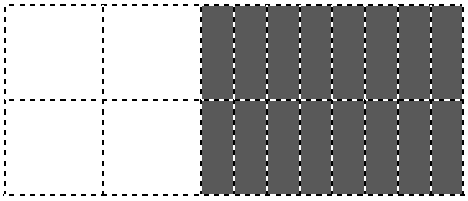
366. Simplify. $\frac{4x^2 - 16x}{2x} =$

Challenge #18:

367. Use the tiles to simplify $\frac{4x^2 + 12x}{2} =$



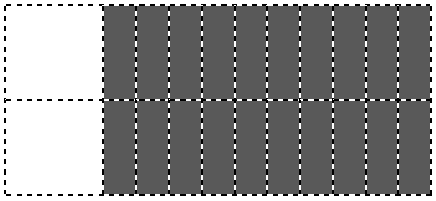
368. Use the tiles to simplify $\frac{4x^2 - 16x}{2x} =$



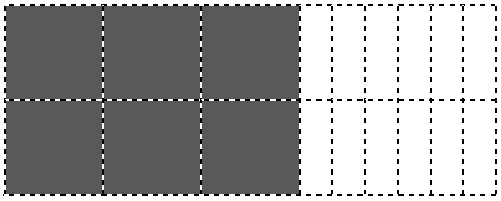
Dividing Polynomials by Constants and Monomials

Use algebra tiles to simplify the polynomial.

369. Use the tiles to show $\frac{2x^2-20x}{2x}=$



370. Use the tiles to show $\frac{-6x^2+12x}{-3x+6}=$



Simplify or write "AR"(already reduced).

371. $-\frac{35x^2}{5}$

372. $\frac{14x^2}{x}$

373. $\frac{-34x}{7}$

374. $\frac{55x^2}{-11x}$

375. $\frac{4x^2z}{xz}$

376. $\frac{24y^2z}{-4y^2z}$

377. $\frac{4}{3}x^2 \div 2x$

378. $1.44x^2 \div \left(-1.2x\right)$

379. $\frac{256x^2}{-49} \div \frac{-16x}{7}$

380. Challenge #19: Which division statements are true?

a. $\frac{12x}{6x}=2$

b. $\frac{x+2}{x+2}=1$

c. $\frac{2\left(x+2\right)}{2}=x+2$

d. $\frac{2x+4}{2}=x+2$

e. $\frac{2x+4}{2}=x+4$

381. Challenge #20: Simplify

$\left(5x^2-15xy-20x\right) \div 5x$

Explain how to simplify the challenge.

Simplify.

382. $\left(5x^2 - 15xy - 20x\right) \div 5x$

Possible solution Strategy:
Divide each term by 5x.

$= \frac{5x^2}{5x} - \frac{15xy}{5x} - \frac{20x}{5x}$

Reduce each term

$= x - 3y - 4$

383. $\left(16x^2 - 24x - 8\right) \div 8$

384. $\left(-6x^2 - 4x + 14\right) \div \left(-2\right)$

385. $\left(x^2 + 5xy - xz\right) \div x$

Correct any errors if applicable.

386. $\left(y^2 - y + yz\right) \div y$

y+z

387. $\left(4y^2 - 6y + 10y\right) \div \left(-y\right)$

388. $\left(15x^2 + 25x - 10\right) \div 5$

389. $\left(-35y^2 - 21y + 14y\right) \div \left(-7y\right)$

Correct any errors if applicable.

390. $\left(-40y^2 + 60y\right) \div \left(-10y\right)$

4y+6

Simplify or write "AR"(already reduced).

391. $-5\sqrt{15x - 10}$

392. $2y\sqrt{8y^2 - 4xy + 20y}$

393. $-8y\sqrt{8y^2 - 40xy - 16y}$

394. $\frac{5x^2 + 10xy - 25x}{5x}$

395. $\frac{12x^2 + 10}{x}$

396. $\frac{-14y^2 - 49xy + 28yz}{-7y}$

Correct any errors if applicable.

397. $\frac{5x^2 - 2}{5}$

$x^2 - \frac{2}{5}$

Correct any errors if applicable.

398. $\frac{4x^2 - 12y + 10x}{x}$

4X-12Y+10

Correct any errors if applicable.

399. $\frac{-14y^2 - 40xy + 28yz}{-4y}$

3.5y+10x-7z

400. Soh Rong is convinced that $2x = x^2$. You want to help him understand. Explain the truth in two different ways.

Challenge #21:

401. The area of a rectangle is $24w^2$ and has a width of 6w. Write an expression to represent the length.

402. A rectangle has an area of 8x+16 and a perimeter of 2x+20. Determine the dimensions.

Use any strategy to solve these problems.

403. State the dimensions of two possible rectangles that could have an area of $4x^2 + 12\ \text{cm}^2$.

A.

B.

404. The area of a square is $16x^2\ \text{cm}^2$.

A. What is the length of one of the sides?

B. If the area is multiplied by 100 how big are the new side lengths?

405. The area of a rectangle is $2x + 10\ \text{cm}^2$. If one of the side lengths is increased by 7, the new area would be $2x + 24\ \text{cm}^2$. Find the original dimensions.

406. The area of a rectangle is $24w^2$ and has a width of 6w. Write an expression to represent the length.

Solution:

$A=lw$

$24w^2=l(6w)$

$\frac{24w^2}{6w} = l \rightarrow 4w\ \text{cm}$

407. The perimeter of a rectangle is 20x+8 with a width of 5x+2. Determine the length.

408. The area of a rectangle is $50x^2 + 5x$ and has a width of 5x. Determine the perimeter.

Solve the problems.

409. A rectangle has an area of $8x+16$ and a perimeter of $2x+20$. Determine the dimensions.

Solution:
Guess and Check:
2x comes from x + x so the lengths must have an x and the width can not have an x. To have an area of 8x +16, the width must be 8. Guess and check to finish.
L=x+2 & L=x+2
W=8 & W=8

410. The area of a rectangle is $56x^2$ and has a width of $28x$. Determine the perimeter.

411. A rectangle has an area of $30x+10$ and a perimeter of $6x+22$. Determine the dimensions.

Simplify or write "AR"(already reduced).

Correct any errors if applicable.

412. $12x\left(x+\frac{3y}{4x}\right)$

Multiply. $12x^2+\frac{12xy}{16x^2}$

Reduce. $12x^2+\frac{3y}{4x}$

413. $\frac{3x}{4}\left(8x-\frac{4y}{3x}\right)$

414. $-\frac{7x^2}{5}\left(10-\frac{15y}{7x}\right)$

Determine the greatest common factor.

415. $8x^2, 10xy, 4x$

416. $24x, 12x, 36xz$

417. $20y^2, 5y, 4yz$

Extension: Reducing Polynomial Fractions

Challenge #22: Simplify if possible.

418. Simplify: $\frac{5x^2 - 10x}{5} =$

419. Simplify: $\frac{10x^3 + 20x}{15x^2}$

420. Simplify: $\frac{4x + 5}{4} =$

Simplify if possible.

421. $\frac{5x^2 - 10x}{5} =$

A possible solution strategy:

$\frac{5x^2 - 10x}{5} =$

$\frac{5x^2}{5} - \frac{10x}{5} = x^2 - 2x$

422. $\frac{5w^5 + 30w^3}{5w^2}$

423. $\frac{2b^7 + 8b^{11}}{2b^5}$

424. $\frac{3x^2 - 6x^5}{-3x^2}$

425. $\frac{121y^3 + 66y^6}{-11y^2}$

426. $\frac{36m^4 + 24}{7m^2}$

427. $\frac{10x^3 + 20x}{15x^2}$

A possible solution strategy:

Divide 5 out of every term.

$\frac{2x^3 + 4x}{3x^2} =$

Divide x out of every term.

$\frac{2x^2 + 4}{3x} =$

428. $\frac{10x^3 + 2x^4}{12x^2}$

429. $\frac{-6x^3m + 2x^4m}{8x^2m}$

430. $\frac{10x^3m + 2x}{5m}$

431. $\frac{4x^3m^5 + 2x^4m}{2x^2m^2}$

432. $\frac{-6x^3m^5 + 12x^4m^3}{4x^2m^2}$

Extension: Binomial by a Binomial

Question: What is a binomial?

Explain #4: What do you think (x+2)(x+4) expands to?

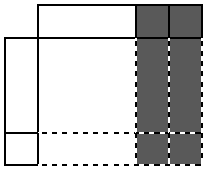
Challenge #23:

433. Expand: x(x+4)=

434. Expand: 2(x + 4) =

435. Show why (x+2)(x+4) = x^2+6x+8

436. Expand (a + 1)(a – 2).



Write down the steps to solve the challenge to the left.

Expand:

437. (a + 1)(a – 2) =

Solution:

Multiply.

$=a(a)+a(-2)+1(a)+1(-2)$

$=a^2-2a+a-2$

Simplify.

$= a^2-a-2$

438. (b + 4)(b + 5) =

439. (c - 11)(c – 3) =

440. (d + 10)(d + 5) =

441. (6 + h)(h - 6) =

442. (i + j)(j – 2) =

443. (k - 3m)(m + 5) =

444. (3n + 2m)(7n + 4) =

Review Check List

I don't know how to study for math tests

In general, "A" students are not smarter than "C" students, they just study smarter! ○ Make sure you know how to do all the questions on the quizzes and practice tests. ○ "A" students ask for more help before tests than "C-" students do!	Studying is about finding out what you don't know and doing something about it. ○ Redo every question that is on your tough questions list.	Studying math is not rereading your notes! It is redoing and mastering each type of question prior to the test. ○ Go through each page of the guidebook and redo one question from each section.

Definitions:		Pg #	Face it ☺☹*
Go to page 3 and write down any definitions that you are unsure of.	Define each word and be able to show your understanding with examples.	3	

Learning Target	Example	Pg #	Face it ☺☹
Create a concrete model or a pictorial representation for a given polynomial expression.	Model $-2x^2 + x - 5$ using algebra tiles.	12	
Write the expression for a given model of a polynomial.	Given algebra tiles, write a polynomial expression.	11,21,22	
Describe a situation for a given first degree polynomial expression.	Think of a real life situation that can be explained by $4x	9,30	
Identify the variables, degree, number of terms, and coefficients, including the constant term, of a given simplified polynomial expression.	Given $5x^2 + 3x - 4$, name the variable(s), constant(s), coefficient(s), terms, type of polynomial and degree of the polynomial.	13-15	
Match equivalent polynomial expressions given in simplified form (e.g., $4x - 3x2 + 2$ is equivalent to $-3x2 + 4x + 2$).	Which of the following is equivalent to $4x - 5x^2 + 3$: $5x^2 - 4x + 3$, $-5x^2 + 4x + 3$, $-5x^2 + 4x - 3$	14-16	
Model addition of two given polynomial expressions concretely or pictorially and record the process symbolically.	Simplify $(3x^2 + 5x + 6) + (2x^2 + x + 3)$ using algebra tiles	25-28	
Model subtraction of two given polynomial expressions concretely or pictorially and record the process symbolically.	Simplify $(3x^2 - 2x + 1) - (x^2 - x + 3)$ using algebra tiles.	25-28	
Apply a personal strategy for addition, subtraction, multiplication and division of given polynomial expressions, and record the process symbolically.	Perform the indicated operation. $(-x^2 + 7x + 9) - (6x^2 - 5)$	27	
Identify the error(s) in a given simplification of a given polynomial expression.	Correct any errors if applicable. $-5xy(-3xy) = 15x^2 + 15y^2$	9,22,27, 33,37,39	
Model multiplication of a given polynomial expression by a given monomial concretely or pictorially and record the process symbolically	Model $-2(-3x + 1)$ and complete the multiplication. Use the tiles to show $\frac{2x^2 - 20x}{2x} =$	31-33, 35-36	
Provide examples of equivalent polynomial expressions	Write two different polynomial expressions that have the same degree as $-5x^2 + x$ that has coefficients 7 and -2 and constant 5.	14-15	

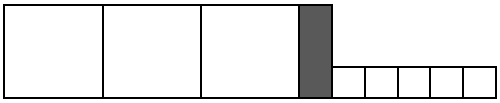
*Face it. When you have mastered the content draw a ☺ OR if you are unsure, draw a ☹ and ask for help.

Score:_____27

Practice Test

- Write this test and do not look at the answers until you have completed the entire test.
- Mark the test and decide whether or not you are happy with the result. FACE IT!
- Successful students will go back in the guidebook and review any questions they got wrong on this test.

Write a simplified polynomial expression.

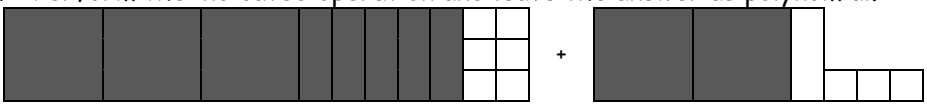


1. Simplified expression:
2. Degree of the polynomial:
3. Coefficient(s):

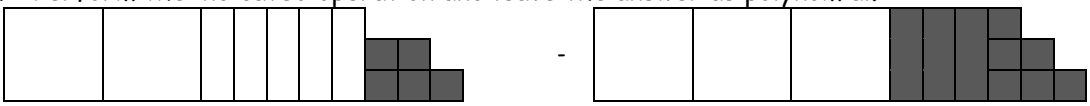
Write a simplified polynomial expression.

4. Simplified expression:
5. Type of polynomial:
6. Constant(s):

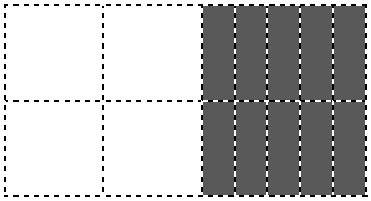
7. Perform the indicated operation and leave the answer as polynomial.



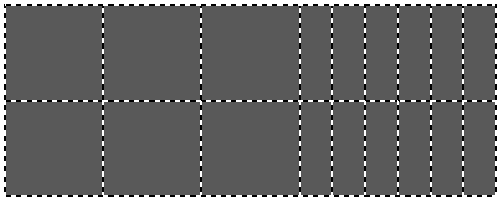
8. Perform the indicated operation and leave the answer as polynomial.



9. Write a multiplication statement to represent the algebra tiles.



10. If the tiles below are divided by 2x, what is the quotient?



Perform the indicated operation.

11. $2m^2 - 9m^2 + 7nm - 5m^2 - 4mn$

12. $\left(-7x^2 + 7x + 1\right) + \left(2x^2 - 7x\right)$

13. $\left(x^2 + 3x + 1\right) - \left(-2x^2 - 3x\right)$

14. $\left(-35y^2 - 21y + 14y\right) \div \left(-7y\right)$

15. $7x\left(5x + \frac{4y}{7} - 3\right)$

16. $\left(-2x^2 + 7\right) + \left[-9x - \left(5x^2 - 1\right)\right]$

17. Write a polynomial expression that has the same degree as $-5x^2 + x$ with coefficients 7 and -2 and constant 5.

18. Which of the following is equivalent to $4x - 5x^2 + 3$:

A. $5x^2 - 4x + 3$

B. $-5x^2 + 4x + 3$

C. $-5x^2 + 4x - 3$

19. What would have to be true if $15x + 30y + 12z$ is equivalent to $15x + 30y + 4n$?

20. What is the opposite of $-x + 3$

21. Write a polynomial that has the coefficients 6, -5, -4, 3 & 2 that simplifies to $2n$.

22. Which of the following are equivalent to $-5\left(x - 2\right)$?

A. $-5x + 10$

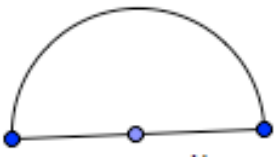
B. $-5x - 2$

C. $-5x - 10$

D. $-3\left(x - 2\right) - 2\left(x - 2\right)$

E. $3\left(-x + 2\right) + 2\left(-x + 2\right)$

23. Write an expression to represent the perimeter if the perimeter of a complete circle is $2\pi r$.



Perimeter=

24. Peeyurp works for a clay excavation company. She charges $70 for each visit plus $65/hr.

Write an expression to represent the possible cost of hiring Peeyurp.

25. The area of a rectangle is $24w^2$ and has a width of 8w. Write an expression to represent the length.

26. A rectangular prism has the following dimensions; $w = x + 1$, $l = 3$, $h = 2x$. Determine an expression for the total surface area of the rectangular prism.

27. A rectangle has an area of 9x+27 and a perimeter of 2x+24. Determine the dimensions.

Polynomials Answer Key

*AOP=Answered On Page******AMV=Answers May Vary*

1. 8,100, Apples=box #
2. 99, apples=box #-1
3. 9,101, box #+1
4. 16,200, 2(box #)
5. 24,300, 3(box #)
6. 17,201, 2(box #)+1
7. 18,202, 2(box #)+2
8. 28, 304, 3(box #)+4
9. 64, 10 000, (box #)^2
10. 65, 10 001, (box #)^2+1
11. 72,10100, (box #)^2+box #
12. 56, 9900, (box #)^2-box #
13. 63, 9999, (box #)^2-1
14. $n+5$
15. $n+10$
16. $n-6$
17. $2n$
18. $\frac{n}{3}$
19. $6n$
20. $4n-2$
21. $2n+3$
22. $3n-5$
23. $+$
24. $\times$
25. $+$
26. -
27. $\times$
28. -
29. $+$
30. -
31. $\div$
32. $\times$
33. \$88,\$160,\$240, 8*h*
34. \$210,\$300, 30*f*
35. \$8.50, \$25, 0.50*x*
36. 20f + 30b, \$310
37. Final Mark=0.8c + 0.2e, 72%
38. 20f + 30b, \$310, \$200
39. 50b + 4s,\$198, \$282
40. 5c + 2s, \$172, \$56
41. 0.80c + 0.20e, 72%, 50%
42. 0.70c + 0.30e, 54%, 55%
43. 0.60c + 0.40e, 82%, 60%
44. Answers will vary (ie, a business might multiply expenses by 4 to determine pricing)
45. Answers will vary (i.e. A forest fighter's total weight including a 42 lb pack)
46. Answers will vary (i.e. The area of a patio that must include a 2m^2 fire pit)

Do not read the answers until you have given Randilyn a mark

47. $n-10$
48. $\frac{n}{4}$
49. Correct
50. $2n+3=15$
51. $2n+9$
52. Correct
53. $3n-4$
54. Correct
55. $n(3n)$
56. Correct
57. Correct or $\frac{1}{5}x$
58. $\frac{1}{2}n$ or $\frac{n}{2}$
59. Correct
60. Correct
61. Correct or $\frac{2}{5}n$
62. 8/15
63. 3 squares, 2 bars and 4 little squares
64. 2 big squares, 3 bars and 8 little squares.
65. x^2+2x+1
66. $2n^2+4$
67. y^2+4y+2
68. $3x^2+2x+4$, $2x^2+3x+8$
69. Draw 4 squares and 1 bar
70. Draw 2 squares and 3 little squares
71. 2 squares and 3 dark little squares
72. AOP
73. AOP
74. AOP
75. Cuts down confusion.
76. $-4x^2+x+5$ (AMV*)
77. $2x^2-x+y^2-3y+3$ (AMV*)
78. x^2-2x+z, y^2-2y+m (AMV*)
79. $-x^2+2y^2-x$, $-z^2+2n^2-2$ (AMV*)
80. $3x^2-3x+1$, $3y^2-3y+1$
81. 2 big dark squares, 1 bar, 5 dark little squares
82. 4 different bars
83. 2 different squares.
84. H
85. A
86. E
87. B
88. D
89. C
90. F
91. G
92. See Page 3.
93. See Page 3.
94. See Page 3.
95. See Page 3.
96. See Page 3.
97. See Page 3.
98. See Page 3.
99. See Page 3.
100. See Page 3.
101. See Page 3.
102. m, n
103. 2
104. 4, 1
105. m, a, b
106. 2, -1
107. m, b
108. -4
109. 5
110. 3
111. 2
112. 3
113. 2
114. 2
115. 2
116. 2
117. 1
118. binomial
119. trinomial
120. binomial
121. trinomial
122. monomial
123. trinomial
124. trinomial
125. trinomial
126. $7x^2-2x+5$, $-2x^2+7x+5$ (AMV*)
127. B
128. A.O.P.
129. -5x-4, -99x-100 (AMV*)
130. xy+mn+5x^2, x^2+mn+3y^2 (AMV*)
131. $2x^2+100$, $3x+2000$ (AMV*)

132. $-5x^2-100x$
133. $x+y+z+n$
134. B
135. A
136. B
137. bcd
138. BCD
139. ABC
140. 2,-1, binomial
141. 1,-8,2
142. 2,0, monomial
143. 2x+2y, 14cm
144. -8
145. 2x+2y, 14cm, 36cm
146. $x+y+y^2$, 3.64cm, 100cm
147. $\pi x+2x$, 25.7cm
148. 20n+1.5, 12
149. 9m+13.5n, $99, $132.75
150. -8
151. 0
152. 299
153. 2
154. $\frac{3}{2}$
155. -6
156. $-\frac{9}{2}$
157. $-\frac{37}{8}$
158. AOP
159. AOP
160. 6
161. $3x^2+3x+4$
162. trinomial
163. 6
164. -y+3
165. binomial
166. $2x^2$ (AMV*)
167. x^2+y^2 (AMV*)
168. x^2+x (AMV*)
169. x+2 (AMV*)
170. 3xy
171. $xy+y^2$
172. x+1
173. $2x^2$
174. Must have the same variable and the same exponents.
175. $2x^2+1$
176. B&F, D&E
177. $2x^2+3x-1$
178. same, same
179. xy, xy
180. x+y+z, x+y+z
181. x^2+x+5, x^2+x+5
182. AOP
183. x+4
184. x^2+x-1
185. x^2
186. Yes
187. Yes
188. Yes
189. yes
190. no
191. no
192. yes
193. yes
194. no
195. no
196. no
197. yes
198. yes
199. no
200. no
201. yes
202. yes
203. no
204. yes
205. yes
206. yes
207. no
208. yes
209. AOP
210. $9x^2+10x+7$
211. $5x^2+5x$
212. $-x^2+4x$
213. x^2+3x-5
214. -15x-11
215. x^2+1
216. $-x^2+1$
217. x-1
218. Incorrect $15m^2-9m$
219. Incorrect $-2m^2+4m$
220. $-n^3$
221. x = z
222. a=11
223. 3y=6m or y=2m
224. a=12
225. a=-4
226. 12z=4n or n=3z
227. $-3m^2+6mn$
228. n-1
229. $-3m^2+4n$
230. -9mn+6n
231. -m-3n-2
232. $4m^2n-n^2m$
233. $10m^2-8m^2-8n+7n+4m$
234. $5n^2+7n-5n-5n^2$
235. 6n+3n-5n-4n+2n
236. 12x+18
237. 14x+2
238. 32x+1
239. 78cm
240. 156cm
241. 97cm
242. $9m-2n$
243. $-8n+19$
244. $-m-2n$
245. $5m+2n$
246. $5m+19n$
247. $2n$
248. $8m^2-m$
249. $-n^3+4m^2n$
250. $2m^2+4m-n$
251. Incorrect $9mn+2m-4n$
252. correct $-mn^2+12n$
253. Incorrect $3m^3-5n$
254. $\frac{3}{2}$
255. -6
256. $-\frac{9}{2}$
257. $-\frac{37}{8}$
258. $5x^2+6x+9$
259. $-x^2+2x-1$
260. $-5x^2-4x+9$
261. $-x^2+8x+1$
262. $-3x^2$, 3 dark squares
263. -3x-3, 3 dark bars and 3 dark units
264. $-x^2+2x-3$, 1 dark square, 2 bars and 3 dark units
265. AOP
266. AOP
267. AOP
268. AOP
269. $-7x^2+7x+14$
270. $-x^2+6x-4$
271. $-10x^2+3x+9$
272. $-5x^2+6$
273. $3x^2+6x+1$
274. $-x^2-9x+6$
275. x^2-4x+3
276. $5x^2-8x+13$
277. $15x^2-14x+9$
278. $12x^2-9x+10$
279. $-19x^2+5x+57$
280. $8x^2-8x+16$
281. $5x^2+4x+15$
282. $5x^2+4x+3$
283. 9c+16
284. 10q-10

285. 0
286. $7v^2-5v$
287. $-15j^2-13j$
288. $2x^2-3x$
289. x^2-3x+1
290. $2x^2-3x$
291. $-2x^2+4$, 2 white squares, 4 dark units $2x^2-4$
292. $-3x-3$, 3 white bars and 3 white units. $3x+3$
293. $2x^2-2y^2$, 2 dark squares & 2 white smaller squares, $-2x^2+2y^2$
294. $-3x+2$
295. $2x^2-x-2$, 2 squares, 1 dark bar and 2 dark units
296. $-2x$, 2 dark bars
297. $-3x+2$
298. $8xy-2$
299. x^2+5x
300. $-7x^2-9x+8$
301. $-7x^2-9x+9$
302. $-15x+9y$
303. $4x+2$
304. $-6x-13$
305.
306. \$/min on Thursday,
307. \$/min on Friday
308. \$287
309. $1.25x-75-125$
310. \$297.50
311.
312. $80h+65s$
313. $70h+65s$
314. $80h+65s+70m+65n$ (AMV*)
315. \$1435
316. YES, 6X+9
317. Multiply
318. $6x+9$
319. $9x$
320. $2x^2$
321. $2x(2x+1)$
322. $5(x+2)$
323. $2x(x+4)$
324. $4x^2+2x$
325. $5x+10$
326. $2x^2+8x$
327. $2x(-2x+1)$, $-4x^2+2x$
328. $-6(x+2)$, $-6x-12$
329. $-2x(-x-4)$, $2x^2+8x$
330. $2x(3x+2)$
331. $2x(4x+3)$
332. $2x(2x-5)$
333. $-2x(3x+6)$ or $2x(-3x-6)$
334. $6x-2$
335. $6x-2$
336. $-12x+6$
337. $10x$
338. $-6x$
339. $16xy$
340. $18xy$
341. $3.8x^2$
342. $-6x^2y$
343. $5x^2z$
344. 0
345. $15x^2y^2$
346. $6x-2$
347. $-10x+20$
348. $14xy-12y$
349. $36x-12$
350. $-8x^2+24x$
351. $21x^2-6xy$
352. $35x^2+4xy-21x$
353. $8x^2-2xy-0.5xz$
354. $8x^2-4x+22xz$
355. ACD
356. BDE
357. AD
358. $14x+4$, $12x^2+8x$
359. 132
360. $16x+3$, $14x^2-8x$
361. 40
362. $16\pi x^2$
363. $6x^2+16x$
364. $4x^2+22x+6$
365. $2x^2+6x$
366. $2x-8$
367. $2x^2+6x$
368. $2x-8$
369. $x-10$
370. $2x$
371. $-7x^2$
372. $14x$
373. Already reduced
374. $-5x$
375. $4x$
376. -6
377. $\frac{2}{3}x$
378. $-1.2x$
379. $\frac{16}{7}x$
380. ABCD
381. $x-3y-4$
382. AOP
383. $2x^2-3x-1$
384. $3x^2+2x-7$
385. $x+5y-z$
386. $y-1+z$
387. $-4y-4$
388. $3x^2+5x-2$
389. $5y+1$
390. $4y-6$
391. $-3x+2$
392. $4y-2x+10$
393. $-y+5x+2$
394. $x+2y-5$
395. Already reduced
396. $2y+7x-4z$
397. correct
398. Already reduced
399. correct
400. $x+x$ does not equal xx as $5+5$ does not equal 5 times 5.
401. $4w$
402. 8 by $x+2$
403. 4 by x^2+3, 2 by $2x^2+6$
404. $4x$, $40x$ by $40x$
405. $x+5$ by 2
406. AOP
407. $5x+2$
408. $30x+2$
409. AOP
410. $60x$
411. 10 by $3x+1$
412. $12x^2 + 9y$
413. $6x^2-y$
414. $-14x^2+3xy$
415. $2x$
416. $12x$
417. y
418. $x^2 - 2x$
419. $\frac{2x^2 + 4}{3x}$
420. Already reduced
421. $x^2 - 2x$
422. $w^3 + 6w$
423. $b^2 + 4b^6$
424. $2x^3 - 1$
425. $-11y - 6y^4$
426. Cannot be reduced.
427. $\frac{2x^2 + 4}{3x}$
428. $\frac{5x + x^2}{6}$
429. $\frac{-3x + x^2}{4}$
430. Cannot be reduced.
431. $\frac{2xm^3 + x^2}{m}$
432. $\frac{-3xm^3 + 6x^2m}{2}$
433. x^2+4x

434. $2x+8$
435. x^2+6x+8
436. a^2-a-2
437. a^2-a-2
438. $b^2+9b+20$
439. $c^2-14c+33$
440. $d^2+15d+50$
441. h^2-36
442. $ij-2i+j^2-2j$
443. $km+5k-3m^2-15m$
444. $21n^2+12n+14mn+8m$

Practice Test Answers

1. $3x^2-x+5$
2. 2
3. 3,-1
4. $-x+2$
5. Binomial
6. 2
7. $-5x^2-4x+9$
8. $-x^2+8x+1$
9. $2x(2x-5)$
10. $-3x-6$
11. $-12m^2+3mn$
12. $-5x^2+1$
13. $3x^2+6x+1$
14. $5y+1$
15. $35x^2+4xy-21x$
16. $-7x^2-9x+8$
17. $7x^2-2x+5$ or $-2x^2+7x+5$
18. B
19. $12z=4n$ or $n=3z$
20. $x-3$
21. (AWV*) $6n+3n-5n-4n+2n$
22. ADE
23. $\pi r+2r$
24. $65h+70$
25. $3w$
26. $4x^2+22x+6$
27. 9 by x+3

