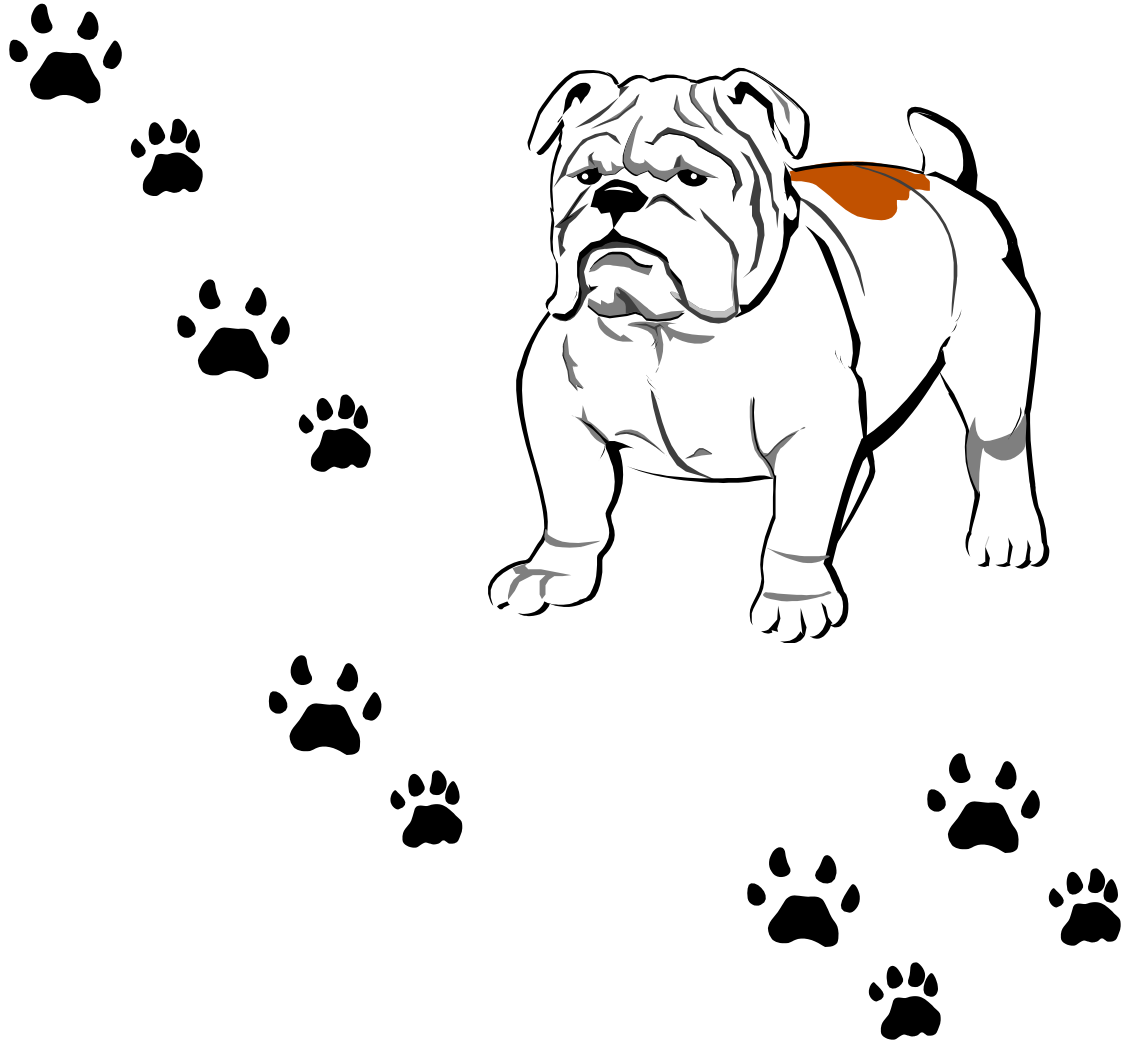


Baker Middle School

Summer Math Packet

Student Name: _____



Say Hello to Honors Geometry

For Students Entering Honors Geometry

This summer math booklet was developed to provide students in middle school an opportunity to review grade level math objectives and to improve math performance.

Say Hello to Honors Geometry

One goal of Baker Middle School is to promote increased math performance at all grade levels. Completing the summer math booklet allows each student and parent within the school to work together to achieve this goal. Students who complete the summer math booklet will be able to:

- Increase retention of math concepts,
- Increase the level of proficiency on the Maryland School Assessment,
- Work toward closing the gap in student performance.

Student Responsibilities

Students will be able to improve their math performance by:

- Completing the summer math booklet,
- Reviewing math skills throughout the summer.

Student Signature

Grade

Date

Parent Responsibilities

Parents will be able to promote student success in math by:

- Supporting the math goals of Baker Middle School,
- Monitoring student completion of the summer math booklet,
- Encouraging student use of math concepts in summer activities.

Parent Signature

Date

This summer math booklet was adapted by Missy Sigley, Math Resource Teacher at Baker Middle School from the "Sail into Summer with Math!" booklets and from *Introductory Algebra 6th Edition* by Keady/Bittinger, published Addison Wesley, 1991.

Baker Middle School

Order of Operations

Hints/Guide:

The rules for multiplying integers are:

$$\text{positive} \times \text{positive} = \text{positive}$$

$$\text{positive} \times \text{negative} = \text{negative}$$

$$\text{negative} \times \text{negative} = \text{positive}$$

$$\text{negative} \times \text{positive} = \text{negative}$$

The rules for dividing integers are the same as for multiplying integers.

REMEMBER: Order of Operations

(PEMDAS)

P - parenthesis

E - exponents

M/D - multiply/divide which comes first

A/S - add/subtract which comes first

Exercises: Solve the following problems. Show all work.

$$1. \quad \frac{100 - 15}{9 + 8}$$

$$2. \quad 3 + 4[13 - 2(6 - 3)]$$

$$3. \quad 5[2(8 + 5) - 15]$$

$$4. \quad 14 + 6 \cdot 2 - 8 \div 4$$

$$5. \quad \frac{7(14) - 3(6)}{2}$$

$$6. \quad 14 \div [3(8 - 2) - 11]$$

$$7. \quad 32 \div (-7 + 5)^3$$

$$8. \quad 4^3 - (2 - 5)^3$$

Use grouping symbols to make each equation true.

$$9. \quad 6 + 8 \div 4 \cdot 2 = 7$$

$$10. \quad 5 + 4 \cdot 3 - 1 = 18$$

Exponents

Hint/Guide:

Rules for Exponents		
	$a^1 = a$	$a^0 = 1$ when $a \neq 0$
<i>Negative Exponents:</i>	$a^{-n} = \frac{1}{a^n}$	when $a \neq 0$
<i>Product Rule:</i>	$a^m \cdot a^n = a^{m+n}$	<i>Quotient Rule:</i> $\frac{a^m}{a^n} = a^{m-n}$
<i>Power Rule:</i>	$(a^m)^n = a^{mn}$	<i>Product to Power:</i> $(ab)^n = a^n b^n$
<i>Quotient to a Power:</i>	$\frac{a}{b}^n = \frac{a^n}{b^n}$	

Exercises: Simplify using the Rules for Exponents.

1. $6^{-2} \cdot 6^{-3}$

2. $x^6 \cdot x^2 \cdot x$

3. $(4a)^3 \cdot (4a)^8$

4. $\frac{3^5}{3^2}$

5. $\frac{x^3}{x^8}$

6. $\frac{(2x)^5}{(2x)^5}$

7. $(x^3)^2$

8. $(-3y^2)^3$

9. $(2a^3b)^4$

10. $(3x^2)^3(-2x^5)^3$

11. $3(x^2)^3(-2x^5)^3$

12. $(2x)^2(-3x^2)^4$

13. Express using a positive exponent:

5^{-3}

14. Express using a negative exponent:

$\frac{1}{y^8}$

Multiplying Monomials

Hint/Guide:

- Multiply the coefficients (numbers in front of the variable (letter)).
- Use the rule of exponents for the variables.

Examples:

$$\begin{aligned} 1. (5x)(6x) \\ &= (5 \cdot 6)(x \cdot x) \\ &= 30x^2 \end{aligned}$$

$$\begin{aligned} 2. (3x)(-x) \\ &= (3 \cdot -1)(x \cdot x) \\ &= -3x^2 \end{aligned}$$

$$\begin{aligned} 3. (-7x^5)(4x^3) \\ &= (-7 \cdot 4)(x^5 \cdot x^3) \\ &= -28x^{(5+3)} \\ &= -28x^8 \end{aligned}$$

Exercises: Multiply the monomials. Show all work.

1. $(6x^2)(7)$

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

3. $(-x^3)(-x)$

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

5. $(7x^5)(4x^3)$

6. $(10a^2)(3a^2)$

7. $(0.1x^6)(0.2x^4)$

8. $(-1/5x^3)(-1/3x)$

9. $(-1/4x^4)(1/5x^8)$

9. $(-4x^2)(0)$

10. $(-4m^5)(-1)$

11. $(3x^2)(-4x^3)(2x^6)$

Multiply a Monomial with a Polynomial

Hint/Guide:

- Multiply the number in front of the parenthesis (coefficient) with each of the numbers in the parenthesis.
- Use the rules of exponents to multiply the variables.

Example:

$$\begin{aligned} 1. (2x)(5x+3) \\ &= (2x)(5x) + (2x)(3) \\ &= 10x^2 + 6x \end{aligned}$$

$$\begin{aligned} 2. (5x)(2x^2 - 3x + 4) \\ &= (5x)(2x^2) - (5x)(3x) + (5x)(4) \\ &= 10x^3 - 15x^2 + 20x \end{aligned}$$

Exercises: Multiply the monomials with the polynomials. Show all work.

1. $3x(-x+5)$

2. $2x(4x-6)$

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

4. $-5x(-x-1)$

5. $x^2(x^3+1)$

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

7. $3x(2x^2-6x+1)$

8. $-4x(2x^3-6x^2-5x+1)$

9. $(-6x^2)(x^2+x)$

10. $(-4x^2)(x^2-x)$

Multiplying Polynomials

Hint/Guide:

- Multiply the coefficients and use the rule of exponents for the variables.
- Remember: FOIL F - first O - outers I - inners L - last **OR** Box Method

Examples:

$$\begin{aligned}
 1. \quad & (x+5)(x+4) \\
 & = (x \cdot x) + (x \cdot 4) + (5 \cdot x) + (5 \cdot 4) \\
 & = x^2 + 4x + 5x + 20 \\
 & = x^2 + 9x + 20
 \end{aligned}$$

OR

$$\begin{array}{r}
 x \quad 5 \\
 4 \quad \begin{array}{|c|c|} \hline x^2 & 5x \\ \hline 4x & 20 \\ \hline \end{array} \\
 \hline
 = x^2 + 9x + 20
 \end{array}$$

Exercises: Multiply the polynomials. Show all work.

1. $(x+6)(x+3)$

2. $(x+5)(x+2)$

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

4. $(x+6)(x-2)$

5. $(x-4)(x-3)$

6. $(x-7)(x-3)$

7. $(x+3)(x-3)$

8. $(x+6)(x-6)$

9. $(5-x)(5-2x)$

10. $(3+x)(6+2x)$

11. $(2x+5)(2x+5)$

12. $(3x-4)(3x-4)$

Factor Polynomials I

Hint/Guide:

- Always look for a common factor first. Don't forget to include the variable in the common factor.
- Check your answer by multiplying.

Example: Factor $15x^5 - 12x^4 + 27x^3 - 3x^2$

Question: What number is common to the coefficients of 15, 12, 27, and 3?

Answer: 3

Question: What exponent is common to variables of x^5 , x^4 , x^3 , and x^2 ?

Answer: x^2

$$= (3x^2)(5x^3) - (3x^2)(4x^2) + (3x^2)(9x) - (3x^2)(1)$$

$$= 3x^2(5x^3 - 4x^2 + 9x - 1)$$

Exercises: Factor the polynomials. Show all work.

1. $x^2 - 4x$

2. $x^2 + 8x$

3. $2x^2 + 6x$

4. $3x^2 - 3x$

5. $x^3 + 6x^2$

6. $4x^4 + x^2$

7. $8x^4 - 24x^2$

8. $5x^5 + 10x^3$

9. $2x^2 + 2x - 8$

10. $6x^2 + 3x - 15$

11. $17x^5y^3 + 34x^3y^2 + 51xy$

Factor Polynomials II

Hints/Guide:

- Write the terms in descending order.
- List the factors for the constant term.
- Add those factors to find the match for the coefficient of the middle term.

Example: Factor $t^2 - 24 + 5t$.Write in descending order: $t^2 + 5t - 24$

List the factors:

Pairs of Factors	Sums of Factors
-1, 24	23
-2, 12	10
-3, 8	5
-4, 6	2

The factors are: $(t - 3)(t + 8)$

Exercises: Factor the polynomials. Show all work.

1. $x^2 + 5x + 6$

2. $y^2 + 11y + 28$

3. $x^2 - 8x + 15$

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

5. $-2x - 99 + x^2$

6. $x^2 - 72 + 6x$

7. $a^4 + 2a^2 - 35$

8. $2 - x^2 - x^4$

9. $x^2 + 20x + 100$

10. $x^2 - 25x + 144$

11. $a^2 - 2ab - 3b^2$

12. $m^2 + 5mn + 4n^2$

Factor Polynomials III

Hint/Guide:

To Factor Polynomials of the type $ax^2 + bx + c$, when $a \neq 1$:

- Write the terms in descending order.
- Factor all common factors.
- List the factors of the coefficient of the first term.
- List the factors for the constant term.
- Multiply a factor of 1st term with 3rd term. Multiply the other factor of 1st term with 3rd term. Add the two together, to find middle term. Continue this process until the correct factor combination is found.

Example: Factor $24x^2 - 76x + 40$.

Factor the common factor: $4(6x^2 - 19x + 10)$

Find the factors of the first and third terms:

Factors of 1 st Term	Factors of 3 rd Term	Middle Term
1, 6 OR -1, -6	1, 10 OR -1, -10	
2, 3 OR -2, -3	2, 5 OR -2, -5	

Try combinations of factors: a) $3 \cdot -1 + 10$
 $\cdot 2 = -23$ wrong

- b) $3 \cdot -10 + -1 \cdot -2 = -32$ wrong
 c) $3 \cdot -2 + -5 \cdot 2 = -16$ wrong
 d) $3 \cdot -5 + -2 \cdot 2 = -19$ correct

The factors are: $4(3x - 2)(2x - 5)$

Exercises: Factor the polynomials. Show all work.

1. $2x^2 - 7x - 4$

2. $3x^2 - 4x - 15$

3. $3x^2 + 4x + 1$

4. $9x^2 + 6x - 8$

5. $9x^2 + 18x - 16$

6. $18x^2 - 3x - 10$

7. $14x^2 + 19x - 3$

8. $6 - 13x + 6x^2$

9. $24x^2 + 47x - 2$

Solving Systems of Equations by Substitution

Hint/Guide:

- Solve one equation for a variable with a coefficient of 1.
- Substitute what the variable equals into the other equation of the original pair. (The new equation should have only one variable.)
- Solve for the variable.
- Use that answer to solve for the other variable.
- Answers are ordered pairs: (x, y)

Example: Solve $x - 2y = 6$
 $3x + 2y = 4.$

Solve the first equation for x : $x = 6 + 2y$
 Substitute your answer above into the second equation: $3(6 + 2y) + 2y = 4$
 Distribute: $18 + 6y + 2y = 4$
 Combine like terms: $18 + 8y = 4$
 Collect like terms to one side (subtract 18 both sides): $8y = -14$
 Isolate the variable (divide by 8 both sides): $y = \frac{-14}{8}$ OR $\frac{-7}{4}$

Substitute the y value into an original equation to solve for x : $x - 2(-7/4) = 6$
 $x - (-14/4) = 6$
 $x = 10/4$ or $5/2$

The solution to the system of equations: $(5/2, -7/4)$

Exercises: Solve the system of equations using the substitution method. Show all work.

1. $s + t = -4$
 $s - t = 2$

2. $x - y = 6$
 $x + y = -2$

3. $y - 2x = -6$
 $2y - x = 5$

4. $x - y = 5$
 $x + 2y = 7$

5. $2x + 3y = -2$
 $2x - y = 9$

6. $x + 2y = 10$
 $3x + 4y = 8$

Solving Systems of Equations by Elimination

Hint/Guide:

- Answers are ordered pairs (x, y) .
- Eliminate one variable by adding the two equations together.
- Sometimes, one equation must be multiplied by a number to have a variable with the same coefficient.

Examples:

1. Solve $2x + 3y = 8$
 $x + 3y = 7$

Multiply the equation by -1 to make the y coefficients opposite:
 Add the equations together:

$$\begin{array}{r} 2x + 3y = 8 \\ -x - 3y = -7 \\ \hline x + 0y = 1 \\ x = 1 \end{array}$$

Solve for y by substituting the value of x into the original equation:
 Solve the equation for y :

$$\begin{array}{r} 2(1) + 3y = 8 \\ 3y = 6 \\ y = 2. \end{array}$$

The solution for this system: **(1, 2)**

2. Solve $3x + 6y = -6$
 $5x - 2y = 14$

Multiply the second equation by 3 to get the y coefficients the same:
 Add the equations together:
 Solve for x :

$$\begin{array}{r} 3x + 6y = -6 \\ 15x - 6y = 42 \\ \hline 18x + 0y = 36 \\ x = 2 \end{array}$$

Solve for y by substituting the value of x into the original equation:
 Solve the equation for y :

$$\begin{array}{r} 3(2) + 6y = -6 \\ 6y = -12 \\ y = -2 \end{array}$$

The solution for this system: **(2, -2)**

Exercises: Solve the systems of equations by elimination. Show all work.

1. $x + y = 10$ 2. $x - y = 7$ 3. $3x - y = 9$ 4. $4x - y = 1$
 $x - y = 8$ $x + y = 3$ $2x + y = 6$ $3x + y = 13$

5. $-x - y = 8$ 6. $3x - y = 8$ 7. $2w - 3z = -1$ 8. $3x - 4y = 16$
 $2x - y = -1$ $x + 2y = 5$ $3w + 4z = 24$ $5x + 6y = 14$

Parent Packet

Answers to Order of Operations (page 3):

- 1) 5 2) 31 3) 45 4) 24 5) 40 6) 2 7) -4
 8) 91 9) $6 + [8 \div (4 \cdot 2)] = 7$ 10) $(5 + 4) \cdot (3 - 1) = 18$

Answers to Solving Equations (page 4):

- 1) -3 2) -12 3) 6 4) 7 5) -1.6452 6) 2

Answers to Multiplying Monomials (page 5):

- 1) $42x^2$ 2) $-10x^2$ 3) x^4 4) $-x^6$ 5) $28x^8$ 6) $30a^4$
 7) $-0.2x^{10}$ 8) $1/15x^4$ 9) $-1/20x^{12}$ 10) 0 11) $4m^5$ 12) $-24x^{11}$

Answers to Multiply a Monomial with a Polynomial (page 6):

- 1) $-3x^2 + 15x$ 2) $8x^2 - 12x$ 3) $-3x^2 + 3x$ 4) $5x^2 + 5x$ 5) $x^5 + x^2$
 6) $-2x^5 + 2x^3$ 7) $6x^3 - 18x^2 + 3x$ 8) $-8x^4 + 24x^3 + 20x^2 - 4x$
 9) $-6x^4 - 6x^3$ 10) $-4x^4 + 4x^3$

Answers to Multiplying Polynomials (page 7):

- 1) $x^2 + 9x + 18$ 2) $x^2 + 7x + 10$ 3) $x^2 + 3x - 10$ 4) $x^2 + 4x - 12$
 5) $x^2 - 7x + 12$ 6) $x^2 - 10x + 21$ 7) $x^2 - 9$ 8) $x^2 - 36$
 9) $25 - 15x + 2x^2$ 10) $18 + 12x + 2x^2$ 11) $4x^2 + 20x + 25$
 12) $9x^2 - 24x + 16$

Answers to Factor Polynomials I (page 8):

- 1) $x(x-4)$ 2) $x(x+8)$ 3) $2x(x+3)$ 4) $3x(x-1)$ 5) $x^2(x+6)$
 6) $x^2(4x^2+1)$ 7) $8x^2(x^2-3)$ 8) $5x^3(x^2+2)$ 9) $2(x^2+x-4)$
 10) $3(2x^2+x-5)$ 11) $17xy(x^4y^2+2x^2y+3)$

Answers to Factor Polynomials II (page 9):

- 1) $(x+2)(x+3)$ 2) $(y+4)(y+7)$ 3) $(x-3)(x-5)$ 4) $(x-3)(x+5)$
 5) $(x-11)(x+9)$ 6) $(x+12)(x-6)$ 7) $(d^2+7)(d^2-5)$ 8) $-(x^2+2)(x+1)(x-1)$
 9) $(x+10)^2$ 10) $(x-9)(x-16)$ 11) $(a-3b)(a+b)$ 12) $(m+4n)(m+n)$

Answers to Factor Polynomials III (page 10):

- 1) $(2x+1)(x-4)$ 2) $(3x+5)(x-3)$ 3) $(3x+1)(x+1)$ 4) $(3x-2)(3x+4)$
 5) $(3x-2)(3x+8)$ 6) $(3x+2)(6x-5)$ 7) $(7x-1)(2x+3)$ 8) $(2x-3)(3x-2)$
 9) $(24x-1)(x+2)$ 10) $3x(3x+1)(2x-3)$ 11) $6(3x-4y)(x+y)$
 12) $5(3a-4b)(a+b)$

Answers to Solving Equations by Substitution (page 11):

- 1) $(-1, -3)$ 2) $(2, -4)$ 3) $(17/3, 16/3)$ 4) $(17/3, 2/3)$
 5) $(25/8, -11/4)$ 6) $(-12, 11)$

Answers to Solving Equations by Elimination (page 12):

- 1) $(9, 1)$ 2) $(5, -2)$ 3) $(3, 0)$ 4) $(2, 7)$ 5) $(-3, -5)$
 6) $(3, 1)$ 7) $(4, 3)$ 8) $(4, -1)$