

Honors Algebra I

Summer Assignment

Welcome to Honors Algebra I at Bishop Eustace Preparatory School! You will find the course to be fast-paced and challenging. You will learn the algebra skills that you need in later courses, as well as the underlying theory and the application of those skills. We will stretch your thinking!

This packet includes material that we expect you to know when you begin the course. It represents general math skills, pre-Algebra skills and some elementary algebra. This is not designed to be a practice sheet, but rather it highlights the concepts and techniques that you should already know.

Directions for completing:

1. Copy all problems onto loose leaf paper. Do not write on the packet since it will not be collected.
2. Make sure to **show all work** to arrive at the answer. No credit will be given for answers only since the answers are included at the end of the packet for you to use to check your work. You must attempt every problem.
3. Do not use a calculator for simple arithmetic and work with fractions.
4. Bring it with you **ALREADY STAPLED** on the first day of class.

There will be an assessment on the concepts reviewed in this packet early in September.

HONORS ALGEBRA I PRE-REQUISITE SKILLS

Order of Operations – PEMDAS (Very Important!)

- Use the proper order of operations when evaluating expressions
- Recognize proper use of parenthesis $3x^3 \neq (3x)^3$
- Identify the base and the exponent and the meaning of exponents ($5^4 = 5 \cdot 5 \cdot 5 \cdot 5$)
- Recognize $-4^2 = -16$ and $(-4)^2 = 16$; the placement of the parenthesis is critical!

Write Equations and Inequalities

- Know the difference between an expression, equation, and inequality
- Recognize and use proper symbols for inequalities ($<, >, \leq, \geq$)
- Be able to translate verbal expressions into algebraic expressions, equations and inequalities.
- Know how to check a solution to an equation or inequality

Solve Application Problems

- Solve simple one variable applications
- Know and be able to use formulas for the following:
 - ❖ Distance = Rate \cdot Time
 - ❖ Profit = Revenue – Expenses
 - ❖ Simple Interest: $I = Prt$
 - ❖ Area, perimeter and volume of triangles, squares, rectangles, circles

Real Numbers

- Be able to add, subtract, multiply and divide positive and negative real numbers, **including fractions**, without the use of a calculator
- Identify properties of addition and multiplication
- Understand the structure of the real number system and be able to classify numbers
- Be able to evaluate expressions involving absolute value
- Evaluate an expression by substituting for the variables

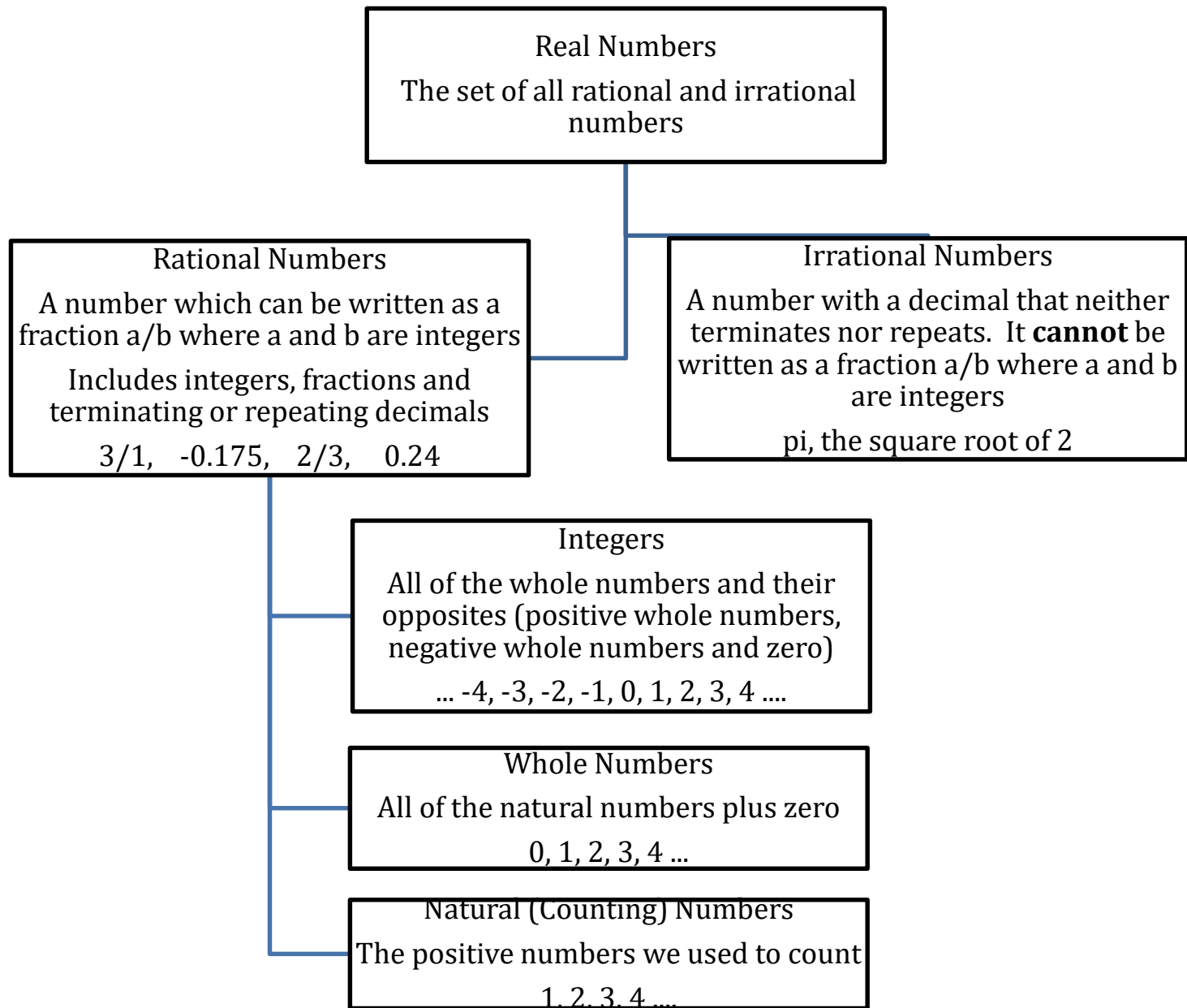
Distributive Property

- Understand the terms “coefficient” and “constant” and be able to identify and combine like terms
- Simplify algebraic expressions involving nested applications of the distributive property

Solve Basic Equations

- Use multiple steps to isolate a variable and solve an equation
- Simplify both sides of an equation by applying the distributive property and combining like terms before solving

THE REAL NUMBER SYSTEM



PROPERTIES OF REAL NUMBERS

Property	ADDITION	SUBTRACTION	MULTIPLICATION
Commutative Property	$a + b = b + a$	$a - b \neq b - a$ Not commutative!	$a \cdot b = b \cdot a$
Associative Property	$(a + b) + c = a + (b + c)$	$(a - b) - c \neq a - (b - c)$ Not associative!	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Identity Property	$a + 0 = a$ (zero is the additive identity)	$a - 0 = a$	$a \cdot 1 = a$ (one is the multiplicative identity)
Zero Property	$a + (-a) = 0$	$a + (-a) = 0$	$a \cdot 0 = 0$
Property of Opposites	——	——	$a \cdot (-1) = -a$

DISTRIBUTIVE PROPERTY: Left distributive: $a(b + c) = ab + ac$
Right distributive: $(a + b)c = ac + bc$

SUBTRACTION RULE: If a and b are real numbers, then $a - b = a + (-b)$
Subtraction is the same as adding the opposite

DIVISION RULE: If a and b are real numbers and $b \neq 0$, then $a \div b = a \cdot \frac{1}{b}$
Division is the same as multiplying by the reciprocal

MULTIPLICATIVE INVERSES (RECIPROCAL): Two numbers whose product is one

ABSOLUTE VALUE: the distance of a number from zero

$$\text{If } a > 0, \text{ then } |a| = a$$

$$\text{If } a = 0, \text{ then } |a| = 0$$

$$\text{If } a < 0, \text{ then } |a| = -a$$

REVIEW PROBLEMS

Identify the property or rule illustrated by the given example. Select from Commutative, Associative, Distributive, Identity, Zero, Subtraction Rule, Division Rule

1. $6 \div \frac{2}{3} = 6 \cdot \frac{3}{2}$

3. $2(3-x) = 6 - 2x$

5. $9 \cdot \frac{1}{9} = 1$

7. $-52 \cdot 1 = -52$

2. $3 \cdot 8 = 8 \cdot 3$

4. $-4x - 7 = -4x + (-7)$

6. $(3+7)+12 = 3+(7+12)$

8. $1432 + (-1432) = 0$

Identify all classifications that apply to the following numbers. Select from Real, Rational, Irrational, Integer, Whole number, Natural Number

9. $-\frac{1}{4}$

11. $-\sqrt{144}$

10. $\sqrt{90}$

12. 8.95

Perform all operations **WITHOUT THE USE OF A CALCULATOR!** Write all answers as fully-reduced improper fractions where appropriate. No decimals or mixed numbers in answers!!

13. $-\left|-\frac{3}{7}\right| + \frac{3}{4}$

15. $\frac{5}{6} + \frac{4}{15}$

17. $\frac{17}{4} \cdot \frac{2}{3}$

19. $-\frac{24x}{56y} \cdot \frac{7y}{12}$

21. $[49 \div (10-3)] \cdot (1+3 \cdot 2)$

23. $3^4 - 8 \div \frac{8}{3} + 6$

14. $\frac{5}{16} - \frac{11}{12}$

16. $\frac{5}{12} - \frac{1}{30}$

18. $-\frac{4}{7} \div \frac{18}{5}$

20. $\frac{(37-26)^2 - 6}{32 \div 2^2 - (4^2 - 13)}$

22. $\frac{k^2 - 1}{k + 3}$ when $k = -5$

24. $14 \div \left[\frac{3}{4}(17-9)^2\right]$

Simplify.

25. $4 + 3(x+4) - 5$

27. $3m - 2[3(m-2)] - 4$

26. $3a - 2[3(a+1)]$

28. $\frac{2}{5}a - \frac{1}{3}b - \left(\frac{1}{2}a + b\right)$

REVIEW PROBLEMS

$$29. -10 - 3[2(-1 + w) - 2w]$$

$$30. 12\left[\frac{1}{3}a - \frac{1}{2}b\right] + 21\left[\frac{1}{7}b + \frac{1}{3}a\right]$$

$$31. 3 - 2(x + y) - 4x - y$$

$$32. 4[-2(x - 30)] - x$$

$$33. 3a - 2[-3(a - 1)]$$

$$34. \frac{1}{2}(-x + 2) - \frac{1}{4}(2 - x)$$

$$35. -\frac{3}{5}f - \frac{1}{2}f + \frac{2}{3}f + f$$

$$36. -10 + -3(2(-1 + w) + (-2w + 3)6)$$

Solve the equation.

$$37. 46m + 11 - 33m = -28$$

$$38. -9 = 27 - 11p - 13p$$

$$39. 6(2d - 1) + 13 = 19$$

$$40. 5a - 4(3a + 7) = -21$$

$$41. \frac{3}{4}(x - 5) = 12$$

$$42. \frac{5}{8}(2p - 1) = 32$$

$$43. -\frac{7}{3}(3w - 2) = -21$$

$$44. \frac{3}{5}(5m + 15) = -12$$

$$45. 5.8 + 3.5(z - 4) = 9.3$$

$$46. 16 = 6.5n - 3.3(2n - 5)$$

Translate the following expressions, equations or inequalities:

47. The difference of a number and two, divided by five is fifteen

48. Eleven, increased by two-thirds of a number

49. The sum of five times a number and -2, added to seven times the number

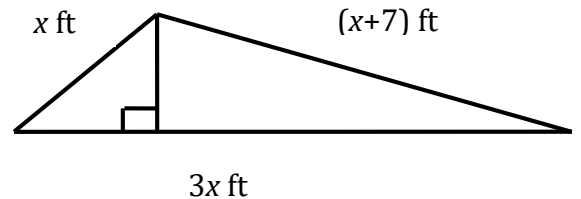
50. Six times the difference of a number and five is greater than twenty-two

51. The sum of three times a number and 10, subtracted from nine times the number

52. Double a number, minus the sum of the number and ten is less than thirty-seven

REVIEW PROBLEMS

53. Twice the difference of five and x , increased by the product of two and x
54. The product of -5 and the sum of x and 8 , decreased by the product of 3 and x
55. Find the value of x if the perimeter of the triangle is 32 feet.



56. You are using solid colored fabric that costs $\$.06$ per square and patterned fabric that costs $\$.10$ per square to make a quilt. You need 660 squares to complete the quilt. Write an equation that gives the total cost C as a function of the number n of solid squares used. Then find the total cost if you use 200 solid colored squares.
57. A local sports store is selling packs of 8 tennis balls for 25% off the regular price. You buy 3 packs of tennis balls. Write an equation that gives **your** total cost T as a function of the regular cost r of a pack of tennis balls. Then find the total cost if a pack of tennis balls regularly costs $\$20$.
58. You helped a friend move a short distance recently. The friend rented a truck for $\$15$ an hour and rented a dolly for $\$5$. Your friend paid a total of $\$80$ for the rental. Write and solve an equation to determine the number of hours your friend rented the truck?
59. You plan to work a total of 25 hours per week at two summer jobs. You will earn $\$8.75$ per hour working at a café and $\$10.50$ per hour working at an auto shop. Write an equation that gives your weekly pay P (in dollars) as a function of time t (in hours) spent working at the café. Find your weekly pay if you work 10 hours at the café.
60. Lana ordered concert tickets which cost $\$7.50$ for children and $\$12.00$ for adults. She ordered 8 more children's tickets than adults' tickets. Her total bill was $\$138$. How many of each type of ticket did she buy? Write and solve an equation using only one variable to get your answer.

SOLUTIONS

1. Division Rule
2. Commutative
3. Distributive
4. Subtraction Rule
5. Multiplicative Inverse
6. Associative
7. Identity
8. Zero Property
9. Real, Rational
10. Real, Irrational
11. Real, Rational, Integer
12. Real, Rational
13. $\frac{9}{28}$
14. $-\frac{29}{48}$
15. $\frac{11}{10}$
16. $\frac{23}{60}$
17. $\frac{17}{6}$
18. $-\frac{10}{63}$
19. $-\frac{1}{4}x$
20. 23
21. 49
22. -12
23. 84
24. $\frac{7}{24}$
25. $3x+11$
26. $-3a-6$
27. $-3m+8$
28. $-\frac{1}{10}a-\frac{4}{3}b$
29. -4
30. $11a-3b$
31. $-6x-3y+3$
32. $-9x+240$
33. $9a-6$
34. $-\frac{1}{4}x+\frac{1}{2}$
35. $\frac{17}{30}f$
36. $30w-58$
37. $m=-3$
38. $p=\frac{3}{2}$
39. $d=1$
40. $a=-1$
41. $x=21$
42. $p=\frac{261}{10}$
43. $w=\frac{11}{3}$
44. $m=-7$
45. $z=5$
46. $n=5$
47. $\frac{x-2}{5}=15$
48. $11+\frac{2}{3}n$
49. $(5a-2)+7a$
50. $6(p-5)>22$
51. $9y-(3y+10)$
52. $2x-(x+10)<37$
53. $2(5-x)+2x$
54. $-5(x+8)-3x$
55. $x=5$
56. $c=0.06n+0.1(660-n); \$58$
57. $t=3(0.75r); \$45$
58. $C=15h+5; 5$ hours
59. $P=8.75t+10.50(25-t); \$245$
60. $C=12x+7.50(x+8); x=4$
4 adults, 12 children