Honors Algebra 1
Summer Review Problems

In response to many requests and questions from parents of rising ninth grade honors math students, we have created a packet of problems that represent the skills we expect our honor students to have when they arrive at Pope.

Students, please use the packets as a review to help you identify the areas where you may need some extra practice. On one of the first three days of school next year, you will take a prerequisite skills test. This test will identify the areas that you will need to review in order to be successful in Honors Algebra 1 and it comes directly from the material covered in the review packet. Some of these topics will also be reviewed in the Honors Algebra 1 course.

While the packet is not required, it is expected that the entire packet can be completed in less than 2 hours, unless you need some remediation. Use your summer wisely, so that you have every chance of success in your Freshman year!

Looking forward to meeting you.

This assignment provides a review of mathematical and algebraic skills that are required for success in Honors Algebra 1. You are expected to be fluent with these skills, showing complete algebraic work where appropriate, so this assignment has been provided for your practice toward mastery.

SETS OF NUMBERS:

1. –2 is a rational number. _____(true or false)

2. 5 is a natural number and a whole number. _____ (true or false)

3. A number can be rational and irrational. _____ (true or false)

4. Give one number that is real and rational, but NOT an integer. _____

5. Give an example of an irrational number. _____

REAL NUMBERS & THE NUMBER LINE:

6. Graph the real numbers on the number line: -3, 0.8, $\frac{7}{2}$.

7. Put the numbers in order: $\sqrt{3}$, -0.4, $\frac{4}{3}$, -5.

FRACTIONS:

Simplify:

8. $\frac{2}{5}\cdot\frac{10}{3}$ 9. $\frac{4}{5}\div 2$ 10. $4\div\frac{1}{2}$ 11. $\frac{3}{5}\cdot 15$

12. $\frac{2}{5}+\frac{3}{4}$ 13. $\frac{3}{8}+\frac{1}{6}$ 14. $\frac{2}{5}-\frac{3}{4}$ 15. $\frac{2}{9}-\frac{1}{3}$

INTEGERS:

Simplify.

16. $-3 + 5$ 17. $2 + (-8)$ 18. $-14 + (-21)$

19. $-15 - (-2)$ 20. $-1 - 8$ 21. $9 - 10$

22. $-20 + 20$ 23. $2 + (-3) + (-5) + 6$ 24. $-3 + 7 - (-4)$

ORDER OF OPERATIONS:

Evaluate.

25. $(3\cdot 5)+4$ 26. $12\div 3+2\cdot 8$ 27. $\left[(9-7)^2+5\right]+26$ 28. $\frac{8\cdot 2+5}{12+2^2-9}$

29. $d-e^2$ when $d = 16$ and $e = 3$ 30. $\frac{7}{8}y-\frac{1}{4}$ when $y=\frac{1}{2}$

SIMPLIFYING ALGEBRAIC EXPRESSIONS:

Simplify each expression.

31. $4x + 3 + 2x + 1$ 32. $4x + 5(x + 3)$ 33. $-(2x - 5)$

34. ½ (10x – 4) 35. $3x + 5(x - 2) + 8$ 36. $2x + 3(x + 2) - (2x + 5) - 1$

PROPERTIES OF REAL NUMBERS:

Match.

_____ 37. 4x + 0 = 4x	a. inverse property
_____ 38. 26 + (–26) = 0	b. commutative property
_____ 39. 2a + (3b + 4c) = (2a + 3b) + 4c	c. zero property
_____ 40. –12(0) = 0	d. associative property
_____ 41. 5(3x) = (3x)5	e. identity property

SOLVING LINEAR EQUATIONS:

Solve each equation.

42. $5x + 2 = 3x + 24$ 43. $3(5x - 1) = 3x + 3$ 44. $-x + 3 = 7x + 8$

45. Jeff earns $4 an hour baby-sitting. He is saving to buy a pair of in-line skates that costs $116. If Jeff already has $60 saved, how many hours must he baby-sit in order to buy the skates?

46. An awards dinner costs $225 plus $5 per person. The total bill is $735. How many people attended the dinner?

SOLVING LINEAR INEQUALITIES:

Solve and graph on a number line.

47. $11y - 9 > 13$ 48. $7x + 9 \geq 10x - 12$ 49. $3(1 + x) > 1 + 5x$

GRAPHING LINEAR EQUATIONS & INEQUALITIES:

Graph (on graph paper).

50. $y = -\frac{2}{3}x + 2$

51. $x - 3y = -3$

52. $y = -3$

53. $y < 2x - 3$

54. $x > 2$

55. $3x - 2y \leq 6$

SLOPE:

Find the slope of the line passing through the given pairs of points.

56. (2, –5), (–1, 3)

57. (4, 2), (–1, 2)

58. (–7, 0), (2, 5)

59. (3, –1), (3, 0)

Tell whether the lines are *parallel*, *perpendicular*, or *neither*.

60. Line 1: through (1, -2) and (3,-2)
Line 2: through (-5,4) and (0,4)

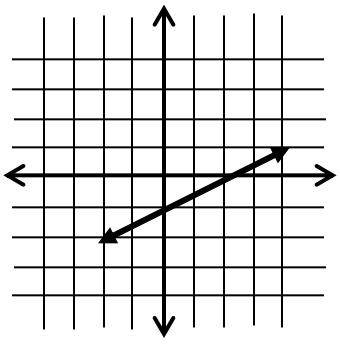
61. Line 1: through (-2, -2) and (4,1)
Line 2: through (-3, -3) and (1,5)

EQUATIONS OF LINES:

Write the equation of each line described in slope-intercept form and standard form.

62. slope 5 and y-intercept -3

63. Write the equation of the line graphed to the right.



64. passes through (2, 6) and has slope ½

65. passes through (2, 4) and (1, –2)

66. passes through (1, 3) and is parallel to $y = x + 5$

67. passes through (2, -1) and is perpendicular to the line $x = 3$

SYSTEMS OF LINEAR EQUATIONS:

Solve each system of equations algebraically.

68. $y = x + 4$
$3x - 2y = -7$

69. $2x - y = 2$
$3x + y = 13$

70. $5x + 4y = -10$
$3x + 6y = -6$

SIMPLIFYING RADICALS:

Simplify each radical**.** (No decimal answers!)

71. $\sqrt{12}$ 72. $\sqrt{54}$ 73. $-\sqrt{200}$

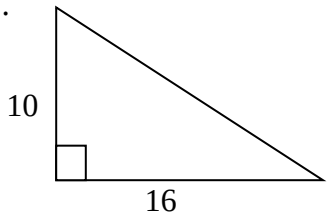
Simplify and rationalize each expression. (No radicals in the denominator!)

74. $\sqrt{\frac{4}{9}}$ 75. $\sqrt{\frac{3}{4}}$ 76. $\sqrt{\frac{20}{45}}$

THE PYTHAGOREAN THEOREM:

Use the Pythagorean Theorem to answer each question..

77. Given the right triangle to the right, what is the length of the hypotenuse?

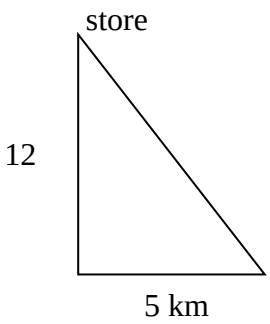


78. Given a right triangle, a = 4 and c = 7. Find the length of side b.

79. Is a triangle with sides of length 10 cm, 24 cm, and 26 cm a right triangle?

80. A 12-foot ladder is leaning against the side of a house. The base of the ladder is 5 feet from the side of the house. How far up the side of the house does the ladder reach?

81. To get to the store from his house, Ralph biked 5 km due west and then 12 km due north. On the way back he cut across a field, taking the shortest possible route home. How far did Ralph bike on the round trip?



PARALLEL, PERPENDICULAR, AND SKEW LINES:

82. Write a definition of parallel lines. What is the symbol we use to say that the lines are parallel? Draw a pair of parallel lines and use the correct notation to say the lines are parallel.

83. Write a definition of perpendicular lines. What is the symbol we use to say that the lines are perpendicular? Draw a pair of perpendicular lines and use the correct notation to say the lines are perpendicular.

84. Write a definition of skew lines. Draw a pair of lines that would classify as "skew".

Create a table of values for the given functions:

85. $f(x) = 4x - 1$

86. $f(x) = \frac{4}{5}x + 2$

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

88. $f(x) = 3^x + 1$

Main topics that will be covered next school year:

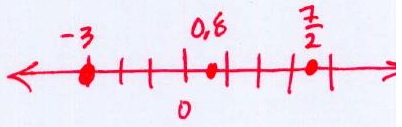
- Unit conversion
- Writing equations of lines given slope and point(s)
- Writing equations of lines parallel and perpendicular
- Graphing exponential functions
- Evaluating various functions
- Characteristics of functions (domain, range, x and y-intercepts, interval increase/decrease, end behavior)
- Transformation of functions
- Composition of functions
- Sequences (arithmetic/geometric, explicit/recursive)
- Rate of change

SETS OF NUMBERS:

1. –2 is a rational number. TRUE (true or false)
2. 5 is a natural number and a whole number. TRUE (true or false)
3. A number can be rational and irrational. FALSE (true or false)
4. Give one number that is real and rational, but NOT an integer. ex: 1/2
5. Give an example of an irrational number. ex: $\sqrt{3}$ OR π

REAL NUMBERS & THE NUMBER LINE:

6. Graph the real numbers on the number line: $-3,\ 0.8,\ \frac{7}{2}$.



7. Put the numbers in order: $\sqrt{3}$, -0.4, $\frac{4}{3}$, -5. $-5, -0.4, \frac{4}{3}, \sqrt{3}$

FRACTIONS:

Simplify:

8. $\frac{2}{5}\cdot\frac{10}{3}$ $\frac{4}{3}$

9. $\frac{4}{5}\div 2$ $\frac{2}{5}$

10. $4\div\frac{1}{2}$ 8

11. $\frac{3}{5}\cdot 15$ 9

12. $\frac{2}{5}+\frac{3}{4}$ $\frac{23}{20}$

13. $\frac{3}{8}+\frac{1}{6}$ $\frac{13}{24}$

14. $\frac{2}{5}-\frac{3}{4}$ $-\frac{7}{20}$

15. $\frac{2}{9}-\frac{1}{3}$ $-\frac{1}{9}$

INTEGERS:

Simplify.

16. $-3+5$ 2

17. $2+(-8)$ -6

18. $-14+(-21)$ -35

19. $-15-(-2)$ -13

20. $-1-8$ -9

21. $9-10$ -1

22. $-20+20$ 0

23. $2+(-3)+(-5)+6$ 0

24. $-3+7-(-4)$ 8

ORDER OF OPERATIONS:

Evaluate.

25. $(3\cdot 5)+4$ 19

26. $12\div 3+2\cdot 8$ 20

27. $\left[(9-7)^2+5\right]+26$ 35

28. $\frac{8\cdot 2+5}{12+2^2-9}$ 3

29. $d-e^2$ when $d=16$ and $e=3$ 7

30. $\frac{7}{8}y-\frac{1}{4}$ when $y=\frac{1}{2}$ $\frac{3}{16}$

SIMPLIFYING ALGEBRAIC EXPRESSIONS:

Simplify each expression.

31. $4x + 3 + 2x + 1$ — $6x + 4$

32. $4x + 5(x + 3)$ — $9x + 15$

33. $-(2x - 5)$ — $-2x + 5$

34. $\frac{1}{2}(10x - 4)$ — $5x - 2$

35. $3x + 5(x - 2) + 8$ — $8x - 2$

36. $2x + 3(x + 2) - (2x + 5) - 1$ — $3x$

PROPERTIES OF REAL NUMBERS:

Match.

e	37. $4x + 0 = 4x$	a. inverse property
a	38. $26 + (-26) = 0$	b. commutative property
d	39. $2a + (3b + 4c) = (2a + 3b) + 4c$	c. zero property
c	40. $-12(0) = 0$	d. associative property
b	41. $5(3x) = (3x)5$	e. identity property

SOLVING LINEAR EQUATIONS:

Solve each equation.

42. $5x + 2 = 3x + 24$ — $x = 11$

43. $3(5x - 1) = 3x + 3$ — $x = \frac{1}{2}$

44. $-x + 3 = 7x + 8$ — $x = -\frac{5}{8}$

45. Jeff earns \$4 an hour baby-sitting. He is saving to buy a pair of in-line skates that costs \$116. If Jeff already has \$60 saved, how many hours must he baby-sit in order to buy the skates? $4x + 60 = 116$ 14 hours

46. An awards dinner costs \$225 plus \$5 per person. The total bill is \$735. How many people attended the dinner? $5x + 225 = 735$ 102 people

SOLVING LINEAR INEQUALITIES:

Solve and graph on a number line.

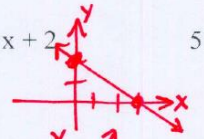
47. $11y - 9 > 13$ — $y > 2$

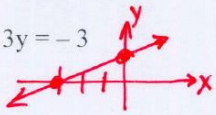
48. $7x + 9 \geq 10x - 12$ — $x \leq 7$

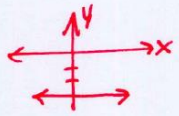
49. $3(1 + x) > 1 + 5x$ — $x < 1$

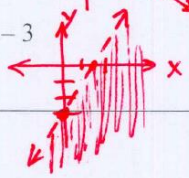
GRAPHING LINEAR EQUATIONS & INEQUALITIES:

Graph (on graph paper).

50. $y = -\frac{2}{3}x + 2$ 

51. $x - 3y = -3$ 

52. $y = -3$ 

53. $y < 2x - 3$ 

54. $x > 2$ 

55. $3x - 2y \leq 6$ 

SLOPE:

Find the slope of the line passing through the given pairs of points.

56. (2, –5), (–1, 3) -8/3

57. (4, 2), (–1, 2) 0

58. (–7, 0), (2, 5) 5/9

59. (3, –1), (3, 0) undefined

Tell whether the lines are *parallel*, *perpendicular*, or *neither*.

60. Line 1: through (1, -2) and (3,-2)
Line 2: through (-5,4) and (0,4)
parallel

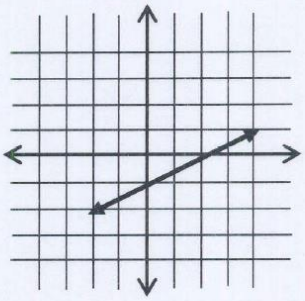
61. Line 1: through (-2, -2) and (4,1)
Line 2: through (-3, -3) and (1,5)
neither

EQUATIONS OF LINES:

Write the equation of each line described in slope-intercept form and standard form.

62. slope 5 and y-intercept -3
$y = 5x - 3$ $5x - y = 3$

63. Write the equation of the line graphed to the right.
$y = \frac{1}{2}x - 1$ $x - 2y = 2$



64. passes through (2, 6) and has slope ½
$y = \frac{1}{2}x + 5$ $x - 2y = -10$

65. passes through (2, 4) and (1, –2)
$y = 6x - 8$ $6x - y = 8$

66. passes through (1, 3) and is parallel to $y = x + 5$
$y = x + 2$ $x - y = -2$

67. passes through (2, -1) and is perpendicular to the line $x = 3$
$y = -1$

SYSTEMS OF LINEAR EQUATIONS:

Solve each system of equations algebraically.

68. $y = x + 4$
$3x - 2y = -7$ (1, 5)

69. $2x - y = 2$
$3x + y = 13$ (3, 4)

70. $5x + 4y = -10$
$3x + 6y = -6$ (-2, 0)

SIMPLIFYING RADICALS:

Simplify each radical. (No decimal answers!)

71. $\sqrt{12}$ $2\sqrt{3}$ 72. $\sqrt{54}$ $3\sqrt{6}$ 73. $-\sqrt{200}$ $-10\sqrt{2}$

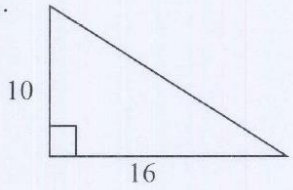
Simplify and rationalize each expression. (No radicals in the denominator!)

74. $\sqrt{\frac{4}{9}}$ $\frac{2}{3}$ 75. $\sqrt{\frac{3}{4}}$ $\frac{\sqrt{3}}{2}$ 76. $\sqrt{\frac{20}{45}}$ $\frac{2}{3}$

THE PYTHAGOREAN THEOREM:

Use the Pythagorean Theorem to answer each question..

77. Given the right triangle to the right, what is the length of the hypotenuse?



$2\sqrt{89} \approx 18.87$

78. Given a right triangle, a = 4 and c = 7. Find the length of side b.

$\sqrt{33} \approx 5.74$

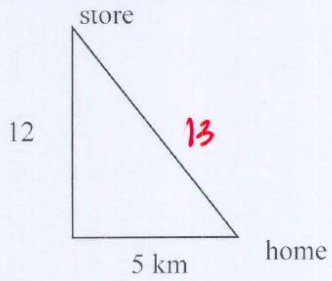
79. Is a triangle with sides of length 10 cm, 24 cm, and 26 cm a right triangle?

yes

80. A 12-foot ladder is leaning against the side of a house. The base of the ladder is 5 feet from the side of the house. How far up the side of the house does the ladder reach?

$\sqrt{119} \approx 10.91$

81. To get to the store from his house, Ralph biked 5 km due west and then 12 km due north. On the way back he cut across a field, taking the shortest possible route home. How far did Ralph bike on the round trip?



30 km