Summer Packet in Preparation for Integrated Math 2

This outline serves as a guide for the development of a comprehensive summer packet designed to reinforce and build upon key concepts from Integrated Math I Honors, preparing students for the challenges of Integrated Math II Honors.

Section 1. Numeracy – Exponents, Radicals, Factoring

Section 2. Algebraic Foundations

- Linear Equations and Inequalities
- Systems of Equations

Section 3. Functions and Relations

- Understanding Functions
- Function Operations Addition, subtraction, multiplication

Section 4. Geometry Connections

- Pythagorean Theorem
- Triangle Congruence
- Measures of Angles
- Coordinate Geometry - Distance and midpoint formulas
- Transformations

Section 5. Statistics and Probability

- Data Analysis
- Probability Concepts

Section 6. Problem Solving Practice and Application

Section 1. Numeracy - Exponents, Radicals, Factoring

This material should be completed without a calculator.

1. What value can be placed in each box to create a true statement?

a. $\left(b^{\square}\right)^5 = b^{15}$ $\square = 3$

b. $g^{\square} \cdot g^6 = g^{11}$ $\square = 5$

c. $\left(a^2 \cdot a^{\square}\right)^3 = a^{18}$ $\square = 4$

$a^4 \cdot a^{3x} = a^{18}$

$4 + 3x = 18$

$3x = 12$

$x = 4$

2. The set of natural numbers are $\{0,1,2,3,...\}$. Which of these radicals have natural number solutions?

a. $\sqrt{50}$

b. $\sqrt{25}$ 5

c. $\sqrt{9}+\sqrt{4}$ $3+2$ 5

d. $\sqrt{6}$

3. For each of the following, simplify completely. Remember, when multiplying, you can multiply the outsides together and multiply the insides together before breaking down.

a. $\sqrt{18}\cdot\sqrt{6}$ $3\sqrt{2}\cdot\sqrt{6}$ $3\sqrt{12}$ $3\cdot 2\sqrt{3}$ $6\sqrt{3}$

b. $3\sqrt{5}\cdot 2\sqrt{10}$ $6\sqrt{50}$ $30\sqrt{2}$

4. What must be true about a for the statement $\sqrt{7a}\cdot\sqrt{36} = 7\cdot 6 = 42$ to be true?

$\left(\sqrt{7a}\right)^2 = (7)^2$

$7a = 49$

$a = 7$

5. Evaluate the following:

a. $\frac{1}{3}\cdot\frac{3}{7}\cdot\frac{8}{2}$ $\frac{4}{7}$

b. $\frac{2}{5}+\frac{4}{5}$ $\frac{6}{5}$ or $1\frac{1}{5}$

c. $\frac{2}{3}-\frac{7}{4}$ $\frac{8}{12}-\frac{21}{12}$ $-\frac{13}{12}$ or $-1\frac{1}{12}$

Section 2. Algebraic Foundations

1. Write the equation, in slope-intercept form (if possible), of the line described by each:

a. goes through $(-2,-8)$, slope $= \frac{3}{5}$

$y+8=\frac{3}{5}(x+2)$

$y=\frac{3}{5}x+\frac{6}{5}-\frac{40}{5}$

$y=\frac{3}{5}x-\frac{34}{5}$

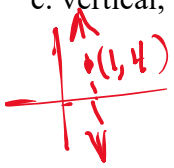
b. goes through $(1,5)$ and $(3,9)$

$m=\frac{9-5}{3-1}=\frac{4}{2}=2$ $\quad y-5=2(x-1)$

$y=2x-2+5$

$y=2x+3$

c. vertical, through (1, 4)



$x=1$

d. horizontal, through (8, 2)

$y=2$

2. Find the equation of the linear function that is parallel to $2x-3y=6$ and passing through the point $(0,3)$.

$y-3=\frac{2}{3}(x-0)$

$y=\frac{2}{3}x+3$

$-3y=-2x+6$

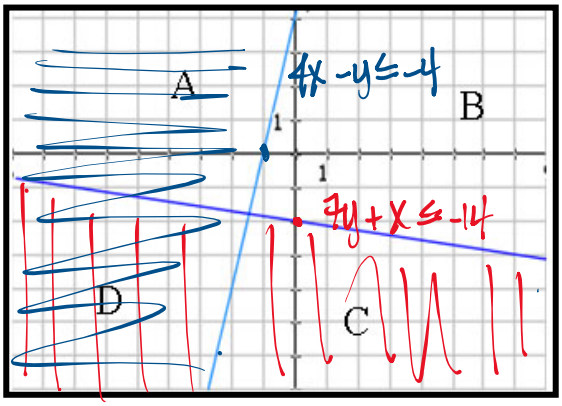
$y=\frac{2}{3}x+6$

$m=\frac{2}{3}$

3. Which region (A,B,C, or D) would be shaded to represent the correct solution to the system of linear inequalities

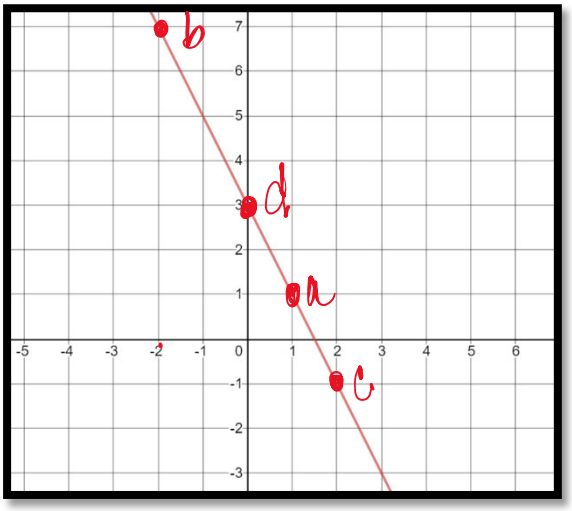
$$\begin{cases} 7y+x\le -14 \\ 4x-y\le -4 \end{cases}$$

Region D



Section 3. Functions and Relations

1. Given the graph of $f(x) = -2x + 3$, evaluate the function at the following:



a. $f(1) =$ 1

b. $f(-2) =$ 7

c. $f(2) =$ −1

d. $f(0) =$ 3

2. Use the graph to identify the following key features:

a. Identify the x-intercept: (4, 0)

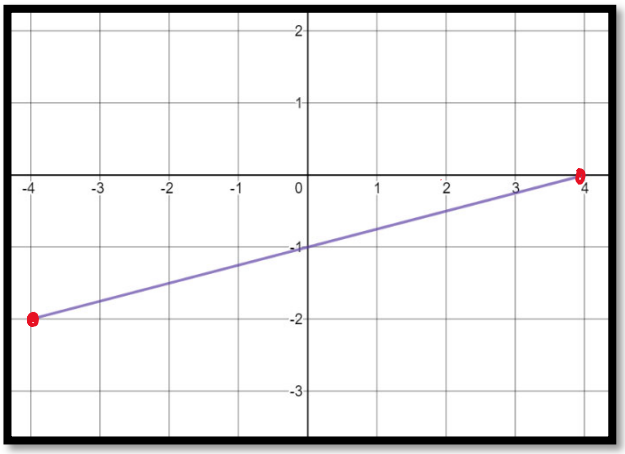
b. Identify the y-intercept: (0, −1)

c. Identify the rate of change: 1/4

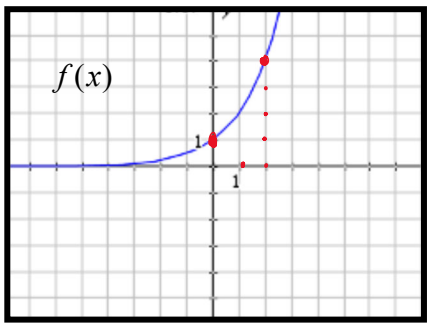
d. Identify the domain: $-4 \leq x \leq 4$

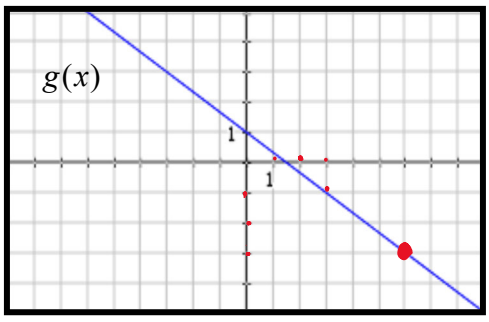
e. Identify the range: $-2 \leq y \leq 0$

f. Is the function increasing or decreasing?



3. Answer the following questions for the graph of $f(x)$ and $g(x)$ to the below:





a. $f(2) =$ 4

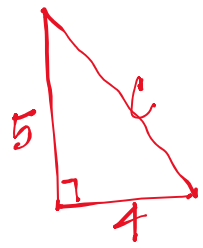
b. $g(3) =$ −1

c. $g(-3) =$ 6

d. $f(0) =$ 1

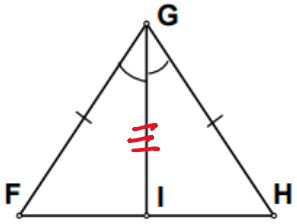
Section 4. Geometry Connections

1. If a right triangle has legs of 4in and 5in, use the Pythagorean Theorem to find the exact length of the hypotenuse.

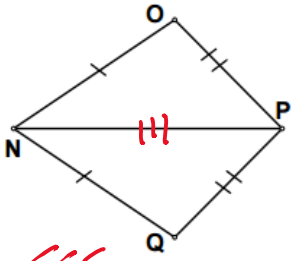


$4^2+5^2=c^2$
$16+25=c^2$
$41=c^2$
$\sqrt{41}\text{ in}=c$

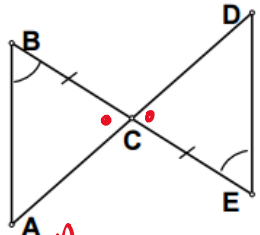
2. In each of the figures below, write a congruence statement for the figures AND the postulate that proves that the triangles are congruent.



a. SAS

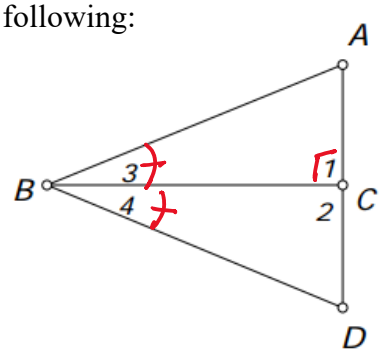


b. SSS



c. ASA

3. Use the following diagram to make conjectures when given the following:



a. If $BC \perp AD$, then $\angle 1$ and $\angle 2$ are rt. $\angle$'s.

b. If $\overrightarrow{BC}$ bisects $\angle ABD$, then $\angle 3 \cong \angle 4$.

c. If C is the midpoint of $\overline{AD}$, then $\overline{AC} \cong \overline{DC}$.

4. In a triangle, one angle measures 46° while another measures 108°. What is the measure of the remaining angle?



$180 - 46 - 108 = 26°$

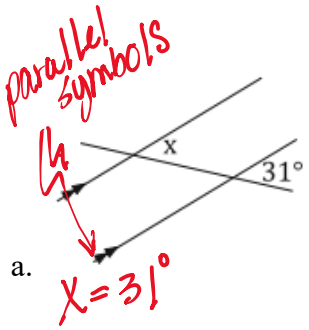
5. Find the equation of the perpendicular bisector of $\overline{PQ}$ for the given endpoints: $P(5,2), Q(7,4)$

$m = \frac{4-2}{7-5} = \frac{2}{2} = 1$ midpoint: $\left(\frac{7+5}{2}, \frac{2+4}{2}\right)$ $y-3=-1(x-6)$

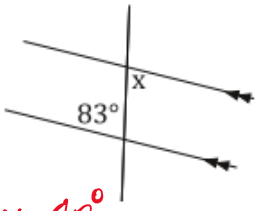
$m_\perp = -1$ $(6,3)$ $y=-x+6+3$

$y=-x+9$

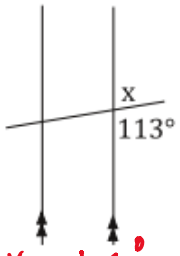
6. Solve for x in each figure below:



a. $x = 31°$

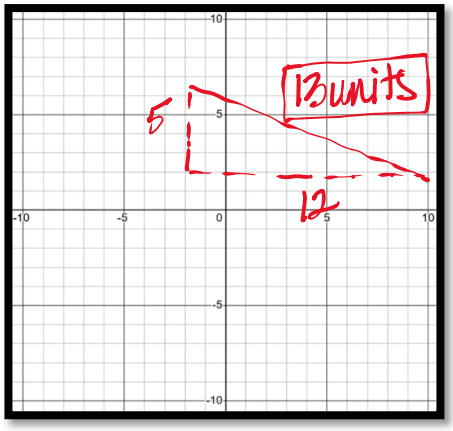


b. $x = 83°$

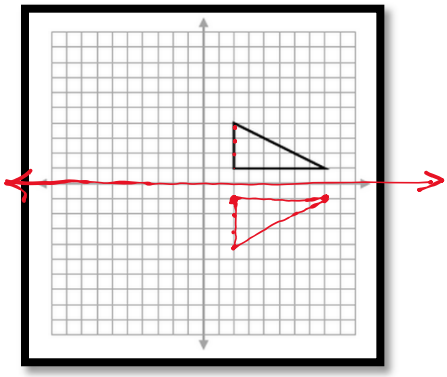


c. $x = 67°$

7. Use the Pythagorean Theorem or Distance Formula to determine the length of AB, given A = (-2,7) and B = (10, 2)



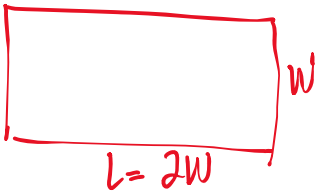
8. Draw a reflection of the figure shown over the x-axis.



9. Find the length of one side of a square whose perimeter is 52 feet.

$\frac{52}{4} = 13$ feet.

10. The perimeter of a rectangle is 66. The length is twice the width. Find the length and width of the rectangle.



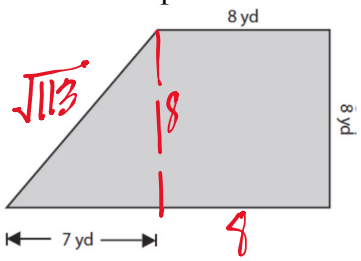
$2w + 4w = 66$

$6w = 66$

$w = 11$

11 feet x 22 feet

11. Find the perimeter of the shape shown below.



$31 + \sqrt{113}$ yds

or

41.63 yds

Section 5. Statistics and Probability

1. Angela asked 100 adults which type of music they enjoyed. They could choose Jazz, Rock, Classical or Folk music. The two-way table shows some information about their answers.

	Jazz	Rock	Classical	Folk	Total
Men	12	17	19	4	52
Women	9	23	9	7	48
Total	21	40	28	11	100

a. Complete the two-way table.

b. How many did not choose Classical music?

100 − 28

72 people

2. A bag contains 45 dyed eggs: 15 yellow, 12 green and 18 red. What is the probability of selecting a green or a red egg?

P(green) + P(red)

$\frac{12}{45} + \frac{18}{45}$

$\frac{30}{45}$ → $\frac{2}{3}$

3. A pair of dice is rolled. What is the probability that the sum is less than 4?

1, (1) (2), 3, 4, 5, 6
2, (1), 2, 3, 4, 5, 6
3 1, 2, 3, 4, 5, 6
4
5
6

$\frac{3}{36} = \frac{1}{12}$

4. Using theoretical probability of tossing a head when flipping a coin, how many times would you expect to get a head if you flipped the coin 200 times?

$\frac{1}{2}(200) =$ 100 times

Section 6. Problem Solving Practice and Application

1. Find three consecutive integers such that three times the first, added to the third, is 102.

$x, x+1, x+2$

$3x + (x+2) = 102$

$4x + 2 = 102$

$4x = 100$

$x = 25$

25, 26, 27

2. Scott has a board 7 yards long. He wants to cut it to make shelves 5 feet long. How many shelves can he make?

$7 \text{ yds} \times \frac{3 \text{ feet}}{1 \text{ yd}} = 21 \text{ feet}$

$\frac{21 \text{ feet}}{5 \text{ feet/shelves}} = 4\frac{1}{5}$

4 shelves

3. Sandra bicycled from her home to school at 8mph. She returned home at 4mph. If the round trip took 3 hours, how many miles is it from school to Sandra's house.

$d = rt$

	d = r	t
	8	t
	4	3 − t

since the distances are the same:

$8t = 4(3-t)$

$8t = 12 - 4t$

$12t = 12$

$t = 1$

$8t = 8(1)$

$= 8 \text{ mi}$

4. A jet ski uses a mixture of gasoline and oil. For each ounce of oil, the mixture contains 16ounces of gasoline. If the tank holds 68 ounces of gasoline, how mnay ounces of oil does it require.

$\frac{16 \text{ gas}}{1 \text{ oil}} = \frac{68 \text{ gas}}{x \text{ oil}}$

$16x = 68$

$x = 4.25 \text{ oz oil}$

5. A woman put $580 into a savings account for one year. The rate of interest on the account was 6½%. How much was the interest for the year in dollars and cents? (Round to the nearest cent)

$(580)(.0650) = \$37.70$