Summer Packet in Preparation for Integrated Math 2 Honors

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

$(a^{2+x})^3 = a^{18}$

$a^{6+3x} = a^{18}$

$6+3x = 18$

$3x = 12$

$x = 4$

2. The sum of 4, a, and b is represented by the expression $4+a+b$. If the sum is negative, which of the following statements must be true?

a. $a+b$ is greater than 0.
b. $a+b$ must equal 0.
c. $a+b$ is less than negative 4.
d. $a+b$ is greater than 4.

$4+a+b < 0$

$a+b < -4$

3. 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. $\sqrt{6}$

4. For each of the following, simplify completely. Remember, it is easier to break down radicals first before combining.

a. $\sqrt{48}-2\sqrt{2}+6\sqrt{3}$

$4\sqrt{3}-2\sqrt{2}+6\sqrt{3}$

$10\sqrt{3}+6\sqrt{3}$

b. $3\sqrt{12}+4\sqrt{3}-\sqrt{4}$

$3\cdot 2\sqrt{3}+4\sqrt{3}-2$

$10\sqrt{3}-2$

5. 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. $3\sqrt{5}\cdot 2\sqrt{10}$

$6\sqrt{50}$

$30\sqrt{2}$

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

$6\sqrt{7a}=42$

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

$7a=49$

$\boxed{a=7}$

7. Evaluate the following:

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

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 $-1\frac{1}{12}$

8. Find the paired factors of the following numbers that meet the criteria given.

a. Two numbers that multiply to 36 whose sum is 15.

b. Two numbers that multiply to -21 whose sum is -4.

c. Two numbers that multiply to 60 whose sum is -17

a.) 36

$6\cdot 6$

$9\cdot 4$

$3\cdot 12$

$\boxed{3,12}$

b) -21

$\boxed{-7,3}$

$7\ -3$

c.) 60

$-6\ -10$

$\boxed{-5,-12}$

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 $= \frac{3}{5}$

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

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

$y=3/5\,x-34/5$

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. through $(-4,2)$

Not enough information.

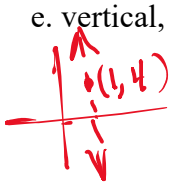
d. x-intercept -4, y-intercept 6

$(-4,0)$ $\quad (0,6)$

$m=\frac{6-0}{0+4}=\frac{3}{2}$

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

e. vertical, through (1, 4)



$x=1$

e. horizontal, through (8, 2)

$y=2$

2. Find the equation of the linear function that is perpendicular to $f(x)=\frac{2}{3}x+5$ and passing through the point $(3,2)$.

$m_1=-\frac{3}{2}$

$y=mx+b$

$2=-\frac{3}{2}(3)+b$

$\frac{4}{2}+\frac{9}{2}=b \quad b=\frac{13}{2}$

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

$y=-\frac{3}{2}x+\frac{9}{2}+\frac{4}{2}$

$y=-\frac{3}{2}x+\frac{13}{2}$

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

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

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

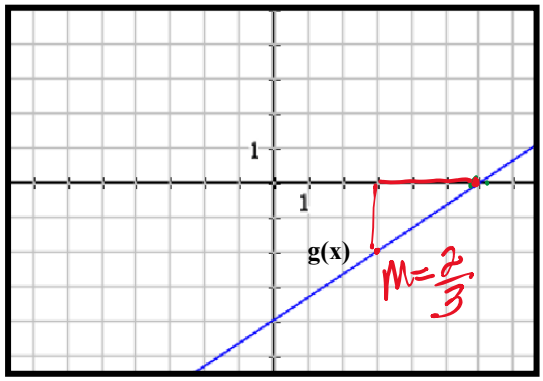
$-3y=-2x+6$

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

$m=2/3$

4. Given the table and the graph below, which of the following statements is true about the linear functions $f(x)$ and $g(x)$?

x	$f(x)$
−9	−10
−6	−6
−3	−2
0	2



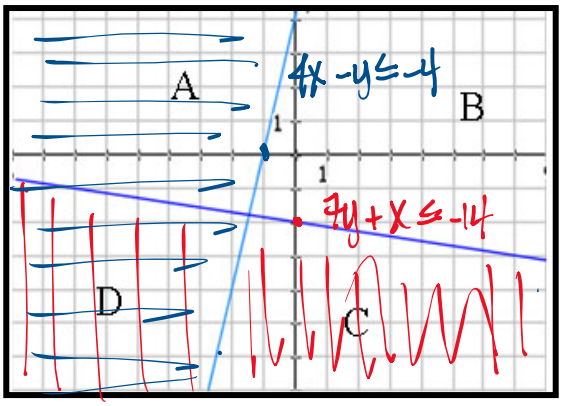
(slope)

a. The function $f(x)$ has a greater rate of change than the function $g(x)$.
b. The function $g(x)$ has a greater rate of change than the function $f(x)$.
c. The rates of change for both $g(x)$ and $f(x)$ are equal.
d. The rates of change cannot be determined.

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

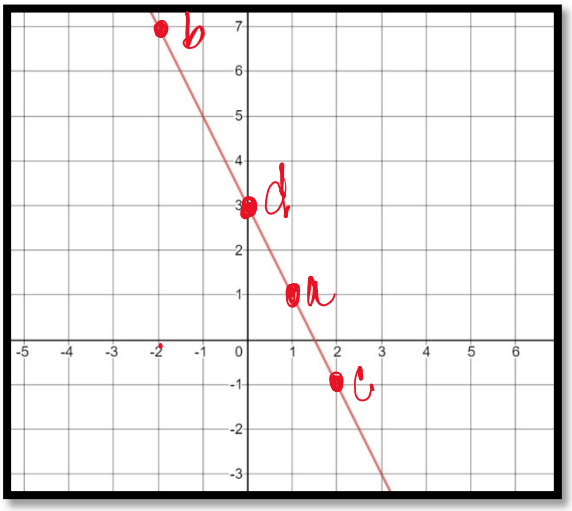
$$\begin{cases} 7y + x \le -14 \\ 4x - y \le -4 \end{cases}$$

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)

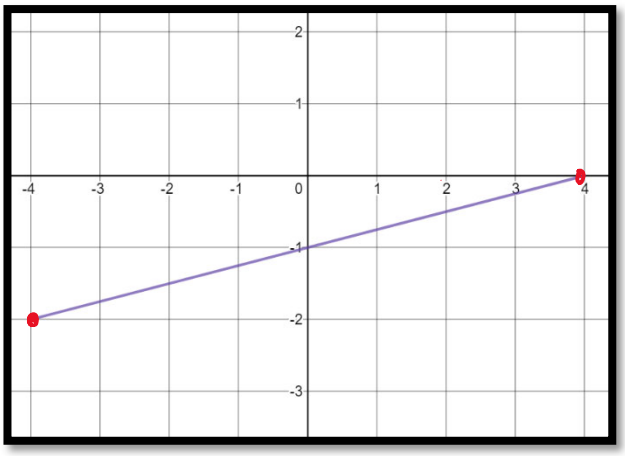
b. Identify the y-intercept: (0, −1)

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. If $f(x) = -3x + 2$ and the domain of f is $\{3, 4, 5\}$, what is the range of $f(x)$?

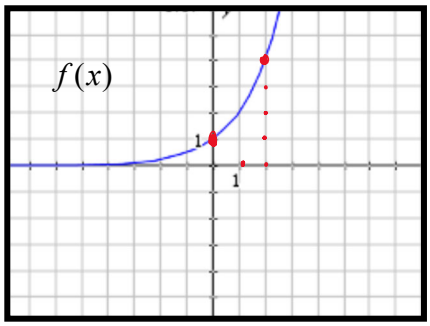
$f(3) = -9 + 2 = -7$

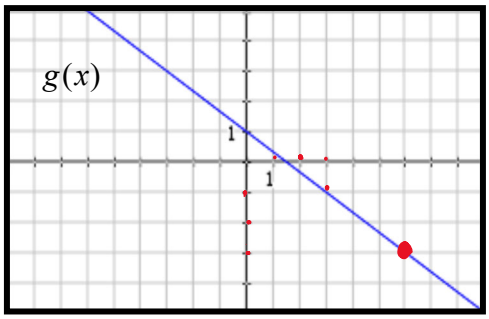
$f(4) = -12 + 2 = -10$

$f(5) = -15 + 2 = -13$

range of $f(x) = \{-13, -10, -7\}$

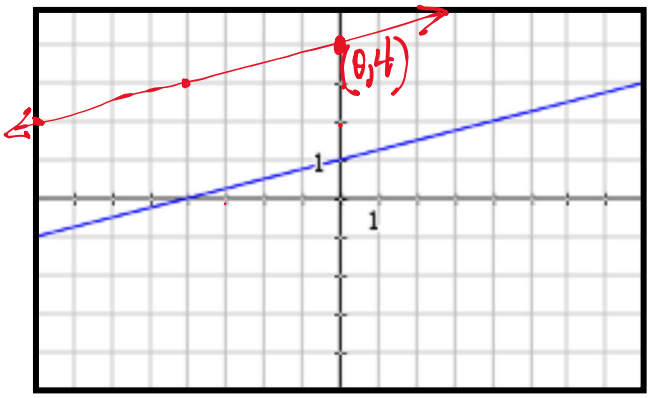
4. Answer the following questions for the graph of $f(x)$ and $g(x)$ to the below:





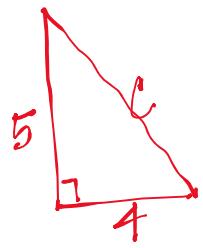
a. $f(2) = 4$ b. $g(3) = -1$ c. $g(-3) = 6$ d. $f(0) = 1$

5. Given the graph of $f(x)$, create $g(x) = f(x) + 3$.



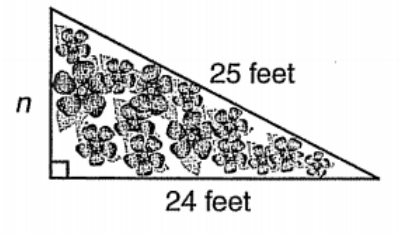
Section 4. Geometry Connections

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



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

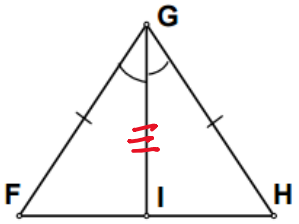
2. Julie is planning a right triangular garden. She marked two sides that measure 24feet and 25feet. What is the length of side labelled n?



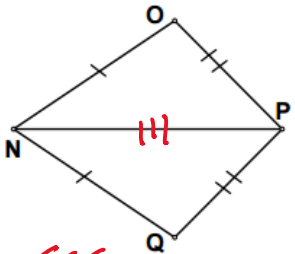
$n^2 + 24^2 = 25^2$
$n^2 = 25^2 - 24^2$
$n = \sqrt{625 - 576}$
$n = \sqrt{49}$
$n = 7$ feet

Pythagorean Triples
3 - 4 - 5
5 - 12 - 13
* 7 - 24 - 25
8 - 15 - 16
9 - 40 - 41

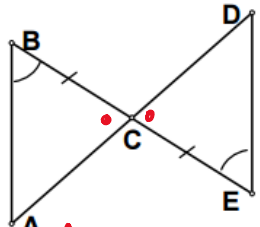
4. In each of the figures below, write a congruence statement for the figures AND the postulate that proves that the triangles are congruent.



a. SAS

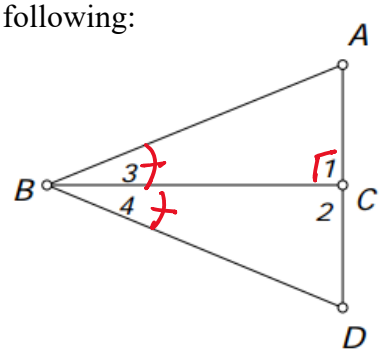


b. SSS



c. ASA

5. 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 $\overline{AC} \cong \overline{DC}$.

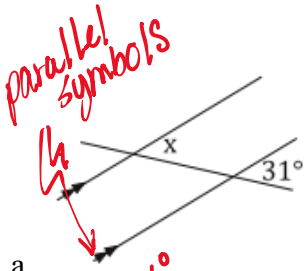
7. In a triangle, one angle measures 46° while another measures 108°. What is the measure of the remaining angle?



180
−46
−108
26°

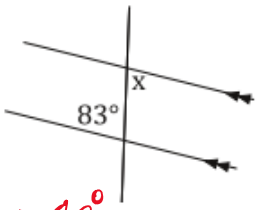
8. Solve for x in each figure below:

a.



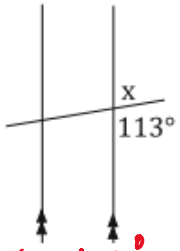
$x = 31°$

b.



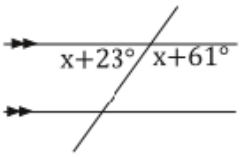
$x = 83°$

c.



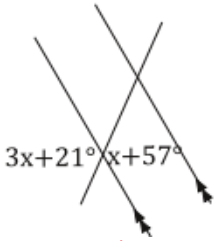
$x = 67°$

d.



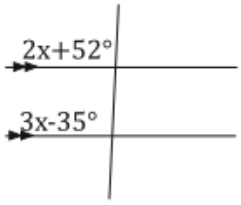
$x + 23 + x + 61 = 180$
$2x + 84 = 180$
$2x = 96$
$x = 38$

e.



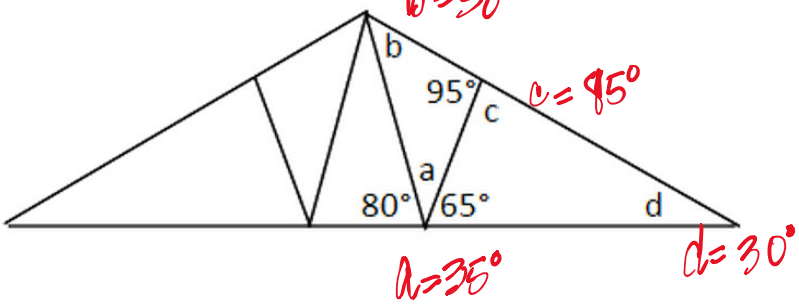
$3x + 21 = x + 57$
$2x = 36$
$x = 18$

f.



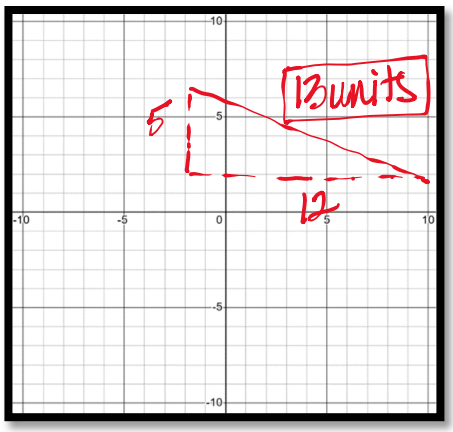
$2x + 52 = 3x - 35$
$87 = x$

9. Use what know about the sum of the angles in a triangle together with the properties of supplementary angles to calculate the missing angles in the figure below.



$b = 50°$
$c = 95°$
$a = 35°$
$d = 30°$

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



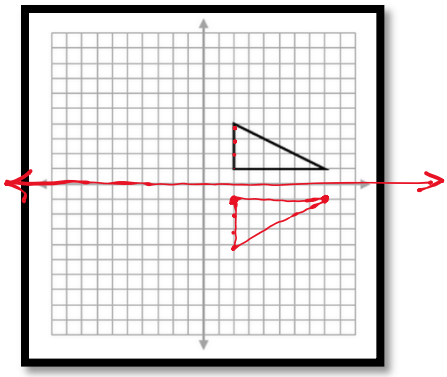
11. Find the equation of the perpendicular bisector of $\overline{PQ}$ for the given endpoints: $P(5,2), Q(7,4)$

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

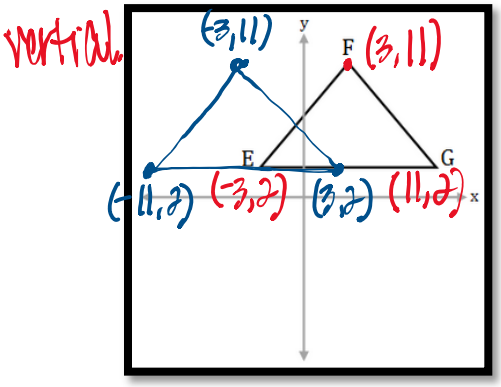
$m_{\perp} = -1$ $(6,3)$ $y = -x + 6 + 3$

$y = -x + 9$

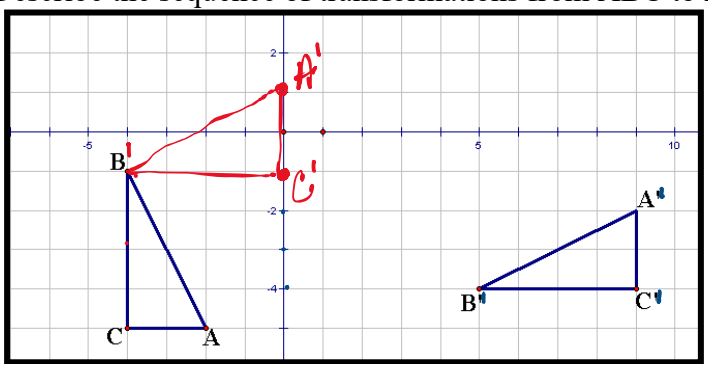
12. Draw a reflection of the figure shown over the x-axis.



13. The coordinates of $\triangle EFG$ $(-3,2)$ $(3,11)$ $(11,2)$. What are the coordinates of $\triangle E'F'G'$ after vertical reflection over the y-axis?



14. Describe the sequence of transformations from ABC to A'B'C'.



A) 90° Rotation
B) Translation: x+1, y-3

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

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

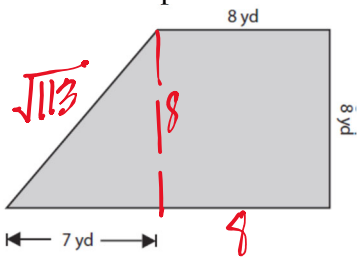
16. The perimeter of a rectangle is 66. The length is twice the width. Find the length and width of the rectangle.



$2w + 4w = 66$
$6w = 66$
$w = 11$

11 feet x 22 feet

17. Find the perimeter of the shape shown below.

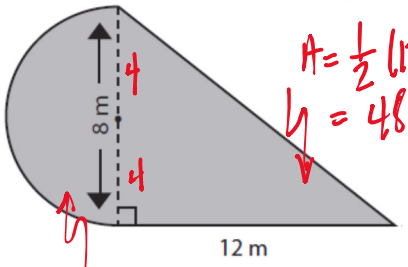


$31 + \sqrt{113}$ yds

or

41.63 yds

18. Find the area of the shape shown below.



$A = \frac{1}{2}(12)(8)$
$A = 48$

$A = \frac{1}{2}\pi(4)^2$
$= 8\pi$

$A_{total} = (48 + 8\pi)\ m^2$

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

3. 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)

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

$\frac{30}{45}$ → $\frac{2}{3}$

5. 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

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

6. 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. A total of $25,000 is invested in two funds paying 8% and 8.5% simple interest. If the yearly interest earned is $2060, how much of the $25,000 is invested at the 8% rate?

$.08X + .085(25{,}000 - X) = 2060$

$.08X + 2125 - .085X = 2060$

$-.005X = -65$

$X = \$13{,}000$

2. You find that you have a clogged drain and need to have a plumber come out to fix it. You check with two different companies and find that Perfect Plumbing charges $50 for a visit, plus $10 per hour. Drain Demons charges $25 for a visit, plus $20 per hour.

a. After how many hours would it not matter which company you chose?

$50 + 10h = 25 + 20h$

$25 = 10h$ → 2.5 hours

b. If you estimate that it will take 2 hours to fix, which company should you go with?

$50 + 10(2) = 50 + 20 =$ $70 @ Perfect Plumbing.

$25 + 20(2) = 25 + 40 =$ $65 @ Drain Demons.

3. 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

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

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

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

4 shelves

5. 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:

$8t = 4(3-t)$

$8t = 12 - 4t$

$12t = 12$

$t = 1$

$8t = 8(1)$

$= 8mi$

6. 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.

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

$16x = 68$

$x = 4.25$ oz oil

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

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

8. As the owner of a local bakery, you bake fresh bagels every morning. You charge $0.50 for one bagel, but when a customer orders more than one bagel each additional one costs $0.45. Demonstrate how to find find the cost of one dozen bagels.

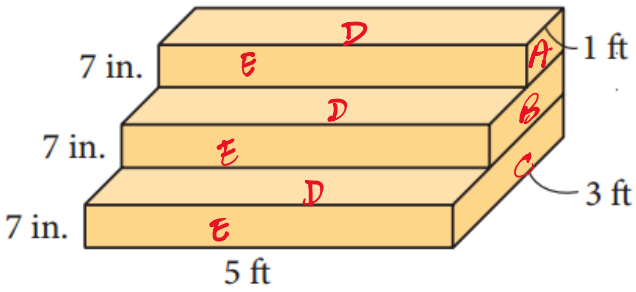
$C(b) = .50 + .45(b-1)$

$C(12) = .50 + .45(11)$

$= .50 + 4.95$

$= \$5.45$

9. This set of stairs is positioned on a garage floor, against a wall.



a. The stairs are to be painted. Find the area that needs to be painted.

b. If 1L of paint covers 11.2ft^2, how many liters of paint are needed to paint the stairs?

7in/12 ft. or .583 ft.

$2A = 2 \cdot \frac{7}{12}(1) = 2 \cdot \frac{7}{12}\,ft^2 = \frac{7}{6}\,ft^2$

$2B = 2 \cdot \frac{7}{12}(2) = 2 \cdot \frac{7}{6}\,ft^2 = \frac{7}{3}\,ft^2$

$2C = 2 \cdot \frac{7}{12}(3) = 2 \cdot \frac{7}{4}\,ft^2 = \frac{7}{2}\,ft^2$

$3D = 3 \cdot 1(5) = 15\,ft^2$

$3E = 3 \cdot \frac{7}{12}(5) = \frac{35}{4}\,ft^2$

a.) Total: $30\frac{3}{4}\,ft^2$ or $30.75\,ft^2$

b.) 1L covers $11.2\,ft^2$ $\quad 30.75\,ft^2 \times \frac{1L}{11.2\,ft^2} \approx 2.745$

Round up to 3L