

Integrated Math 1 Honors

Midterm Review

Answer all of the questions on a separate sheet of paper.

Name: Key

Module 1 Review

Solve the following equations for the unknown variable.

1. $3|2x+1| = 6$
 $\frac{3|2x+1|}{3} = \frac{6}{3}$
 $|2x+1| = 2$
 $2x+1 = 2$ $2x+1 = -2$
 $2x = 1$ $2x = -3$
 $x = \frac{1}{2}$ $x = -\frac{3}{2}$

Graph.

2. $y - 4 = 2(x + 3)$
 $y - 4 = 2x + 6$
 $y = 2x + 10$

Point Slope:
 Slope = 2 Point = (-3, 4)

Solve each inequality. Graph the solutions on the number line AND write your solution using interval notation. Show all your work!

3. $|2x+7| > 17$
 $2x+7 > 17$ $2x+7 < -17$
 $2x > 10$ $2x < -24$
 $x > 5$ $x < -12$

4. $30 > |4z+2|$
 $30 > 4z+2$ $-30 < 4z+2$
 $7 > z$ $-8 < z$

5. $9 < -w+5 < 12$
 $9 < -w+5$ $-w+5 < 12$
 $4 < -w$ $-w < 7$
 $-4 > w$ $w > -7$

6. A business makes toy buses and toy trucks. The following table is used in calculating the cost of manufacturing each toy.

	Labor (Hours)	Wood (Blocks)	Paint (Tins)
Bus	6	4	3
Truck	3	4	2

Labor costs \$8 per hour, wood costs \$1 per block and paint costs \$2 per tin.

1st \rightarrow $A = \begin{bmatrix} 6 & 4 & 3 \\ 3 & 4 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 8 \\ 1 \\ 2 \end{bmatrix}$
 2nd \rightarrow $2 \times 3 = 3 \times 1$ and $C = AB$.

a) Evaluate C

$$\begin{bmatrix} 48+4+6 \\ 24+4+4 \end{bmatrix} = \begin{bmatrix} 58 \\ 32 \end{bmatrix}$$

b) Explain what the numbers in your answer represent.

The cost for manufacturing a bus is \$58, and a truck is \$32.

Write an equation and solve.

7. You have \$60 and your sister has \$120. You are saving \$7 per week and your sister is saving \$5 per week. How long will it be before you and your sister have the same amount of money?

You: $60 + 7x$ (x = # of weeks)
 Sister: $120 + 5x$

$$60 + 7x = 120 + 5x$$

$$2x = 60$$

$$x = 30$$

at 30 weeks my sister & I will have the same amount.

Module 2 Review

Solve the system of equation using matrix row reduction:

8. $2x - y + 2z = 15$
 $-x + y + z = 3$
 $3x - y + 2z = 18$

$$\begin{bmatrix} 2 & -1 & 2 & 15 \\ -1 & 1 & 1 & 3 \\ 3 & -1 & 2 & 18 \end{bmatrix}$$

$R_1 + 2R_2 \rightarrow R_2$

$$\begin{bmatrix} 2 & -1 & 2 & 15 \\ 0 & 1 & 4 & 21 \\ 3 & -1 & 2 & 18 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -1 & 2 & 15 \\ 0 & 1 & 4 & 21 \\ 0 & -1 & 2 & 9 \end{bmatrix}$$

$R_1 + R_2 \rightarrow R_1$
 $R_2 + R_3 \rightarrow R_3$

$$\begin{bmatrix} 2 & 0 & 6 & 36 \\ 0 & 1 & 4 & 21 \\ 0 & 0 & 6 & 30 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 & 6 & 36 \\ 0 & 1 & 4 & 21 \\ 0 & 0 & 6 & 30 \end{bmatrix}$$

$\frac{1}{6}R_3 \rightarrow R_3$
 $R_2 - 4R_3 \rightarrow R_2$

$$\begin{bmatrix} 2 & 0 & 6 & 36 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 5 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 0 & 6 & 36 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 5 \end{bmatrix}$$

$R_1 - 6R_3 \rightarrow R_1$
 $\frac{1}{2}R_1 \rightarrow R_1$

$$\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 5 \end{bmatrix}$$

$$\begin{cases} x = 3 \\ y = 1 \\ z = 5 \end{cases}$$

9. Disaster Relief

Food and clothing are shipped to victims of a natural disaster in an airplane that can hold 7200 pounds and has space for 1000 cubic feet. Each box of food will feed 12 people, while each box of clothing will help 5 people. Each 50-cubic-foot box of food weighs 200 pounds and each 10-cubic-foot box of clothing weighs 360 pounds. In addition, the relief team wants a minimum of 5 boxes of food shipped. How many boxes of food and clothing should be shipped to maximize the number of people that can be helped?

- A. Write down and organize the key information. Define the variables.

food = x
 clothing = y

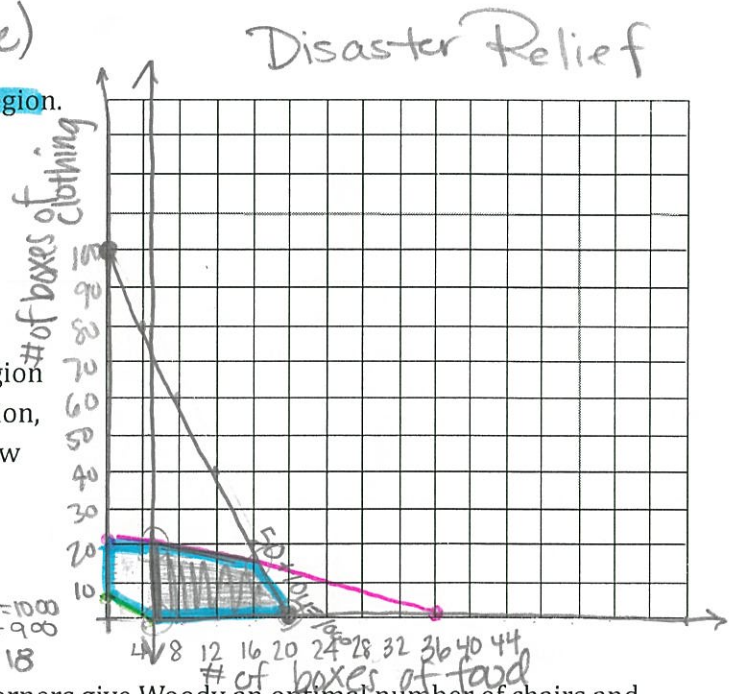
- B. Write the constraints. Include a brief description of each. In addition, write an expression using your variables to show how many people will be helped by shipping food and clothing.

$50x + 10y \leq 1000$ (space plane can hold)
 $200x + 360y \leq 7200$ (weight plane can hold)
 $x + y \geq 5$ (min. of 5 boxes total shipped)

$x \geq 0$ (Both have to be positive)
 $y \geq 0$

- C. Graph the constraints and clearly label the solution region.

Shaded region



- D. Find the coordinates of the corners of the solution region by writing and solving systems of equations. In addition, write each system as a matrix and the solution as a row reduced matrix.

$\begin{pmatrix} 50x + 10y = 1000 \\ 200x + 360y = 7200 \end{pmatrix}$
 $\begin{matrix} 4(50x + 10y = 1000) \\ - (200x + 360y = 7200) \\ \hline -320y = -3200 \\ y = 10 \end{matrix}$

$(20, 0)$
 $(5, 0)$ $(18, 10)$

- E. Use the profit expression to determine which of the corners give Woody an optimal number of chairs and tables in order for Woody to earn the most profit. Write your solution in context of the problem and state the profit.

$P = 12x + 5y$

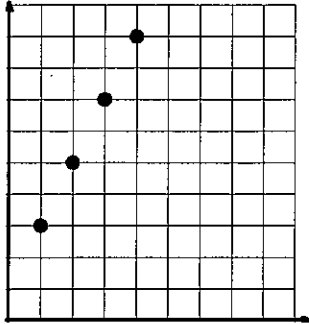
$12(\cdot) + 5(\cdot) = \cdot$
 $12(0) + 5(5) = 25$
 $12(20) + 5(0) = 240$
 $12(5) + 5(10) = 60$
 $12(18) + 5(10) = 270$

18 boxes of food and 10 boxes of clothing will be the optimal amount within the constraints.

Module 3 Review

Write the explicit and recursive equations for the two problems below.

10. Given the graph:



$$f(1) = 3$$

$$f(x) = f(x-1) + 2$$

$$y = 2x + 1$$

11. Given $f(2) = 20$, the common ratio = $\frac{1}{2}$

$$y = 20(.5)^{x-2}$$

12. Evaluate: $\sum_{i=1}^{20} (2i + 4)$

$$S_{20} = \frac{20(6 + 44)}{2} = \frac{20(50)}{2} = \boxed{500}$$

13. Find the sum of the first 100 odd numbers and write in summation notation. $S_n = \frac{n(a_1 + a_n)}{2}$

$$\sum_{x=1}^{100} 2x - 1$$

$$S_{100} = \frac{100(1 + 199)}{2} = \frac{100(200)}{2} = \frac{20000}{2}$$

Module 4

$$\boxed{10,000}$$

14. A new candle stands 10 inches tall. It loses 1.5 inches every hour it burns.

a. Write an equation to model the height of the candle after x hours. _____

$$\boxed{y = 10 - 1.5x}$$

b. Use the equation to find the height of the candle after 3.2 hours.

$$10 - 1.5(3.2) = 10 - 4.8 = \boxed{5.2 \text{ inches}}$$

15. A person starts a running program by running 3 miles. They plan to increase the distance they run each day by 10%.

c. Write an equation to model the distance the person ran on day x . _____

$$\boxed{y = 3(1.1)^x}$$

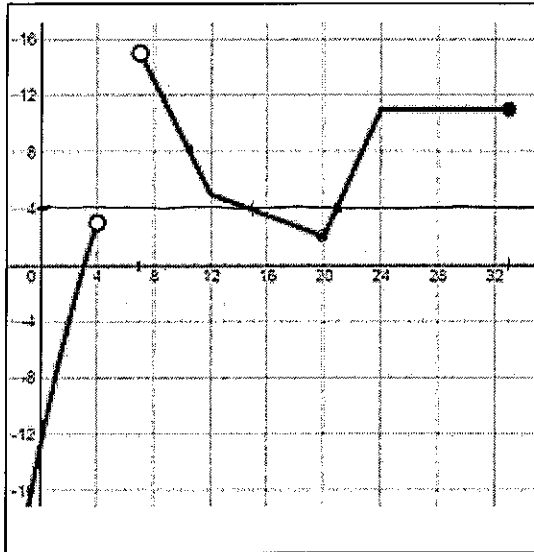
d. Use the equation to find the distance the person ran on the 20th day.

$$y = 3(1.1)^{20} = 20.182$$

$$\boxed{20.2 \text{ miles}}$$

x	y
0	3.2 × 1.1
1	3.3
2	3.63

Module 5



16. Domain: $(-\infty, 4) \cup [7, 33]$

17. Range: $(-\infty, 15)$

18. Intervals of Increasing: $(-\infty, 4) \cup (20, 24)$

19. Intervals of Decreasing: $(7, 20)$

20. Maximum: none

21. Minimum: none

22. x-intercept: $(3, 0)$
 23. y-intercept: $(0, -12)$

24. What does the open circle at the point (4, -1) mean?

there's no solution at that
 25. Calculate: x value

$f(20) = 2$

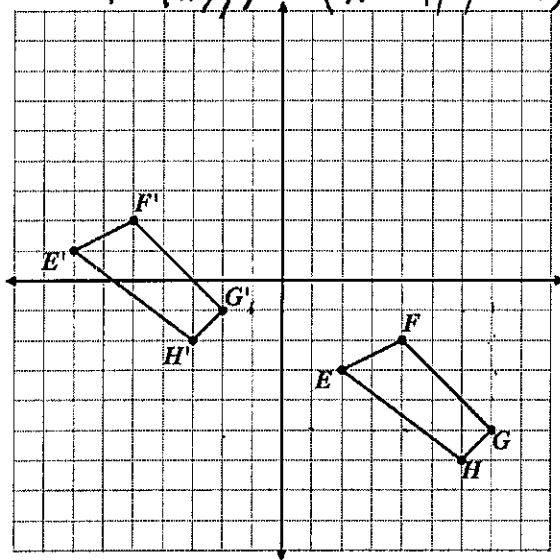
If $f(x) = 8$, then $x = 10$

26. Where is $f(x) \geq 4$?
 $[7, 15] \cup [21, 33]$

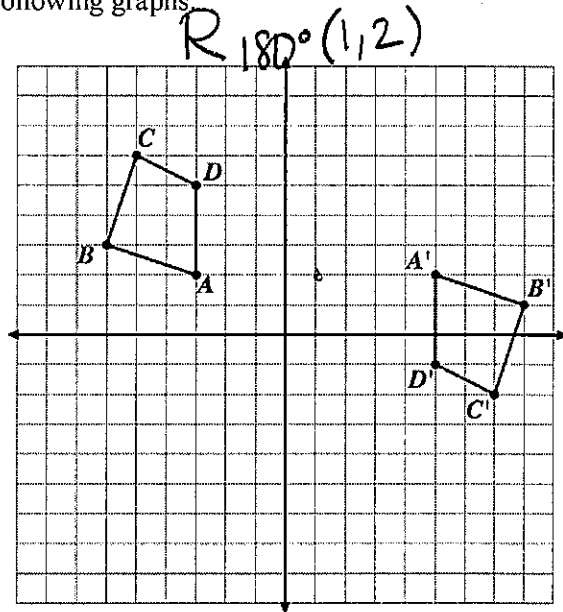
Module 6 Review Describe the transformation(s) for the following graphs

$T(x, y) \rightarrow (x-9, y+4)$

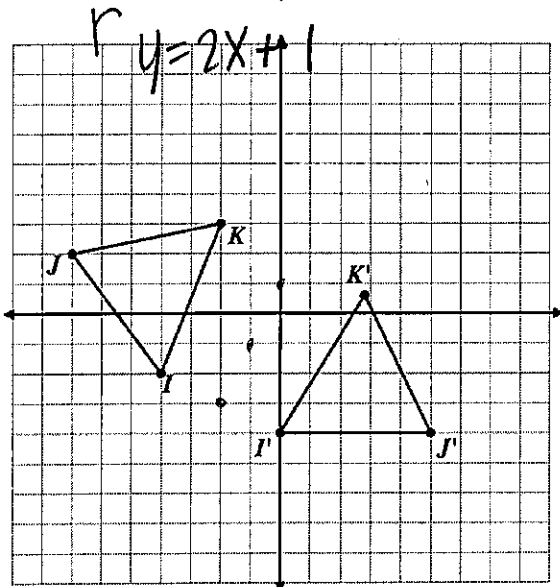
27.



28.



29.



30. Reflect \overline{AB} over the line $y = -x + 2$ then rotate 90° around origin

