Name and section: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Instructor's name: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

- **Please do not open exam until instructed to begin.**

- This exam is to be completed in the allotted time period of 2 hours.

- There are 20 problems which appear on the fronts and backs of the pages of this exam.

- You may earn a total of 100 points.

- Read each question carefully.

- Credit may not be given without sufficient supporting work.

- Simplify answers when possible.

- The use of cell phones, books, or notes are not permitted while taking this exam.

- Approved calculators are allowed.

1. [5 points] A rectangle has a length of 18 inches and an area of 72 square inches. Find the **width** <u>and</u> the **perimeter** of the rectangle. Be sure to include the correct units in each answer.

2. [5 points] Simplify $-5[3x^2 - (8x^2 - 2y)]$.

3. [5 points] Solve for m. Simplify your answer.

$$32m + 28 - 12m = 10 - 14m$$

4. [4 points] Solve the following equation for y.

$$\frac{1}{3}(y - 12) = \frac{1}{6}y + 4$$

5. [5 points] Write the following verbal statement in algebraic form. "12 minus x equals two times the quantity of five minus two times x"

6. [5 points] The average weekday high temperature last week was 83°. The high temperatures on Monday through Thursday were 75°, 78°, 84°, and 87°. What was the high temperature on Friday?

7. [5 points] Solve and graph on the number line.

$$\frac{1}{3}x - 1 \geq \frac{5}{6}x$$

8. [5 points] Graph the line with a slope $\dfrac{-3}{4}$ that passes through the point $(-1, 2)$. Be sure to label axes with x, y, and with numbers. Identify at least three points on your line.
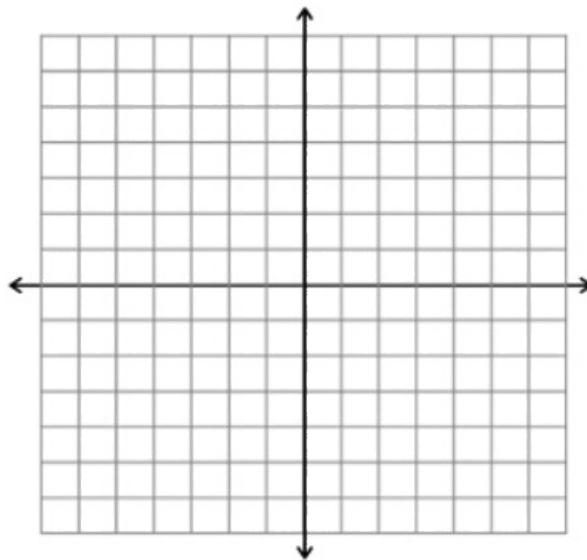
9. [5 points] Find the equation of the line that passes through $(-8, -7)$ and is perpendicular to the line $y = 8x + 2$.

10. [5 points] Solve by graphing the given system of equations. Be sure to label axes with x, y, and with numbers. Identify and label the intersection point.

$$\begin{cases} 3x - 2y = 6 \\ 4x + y = -3 \end{cases}$$
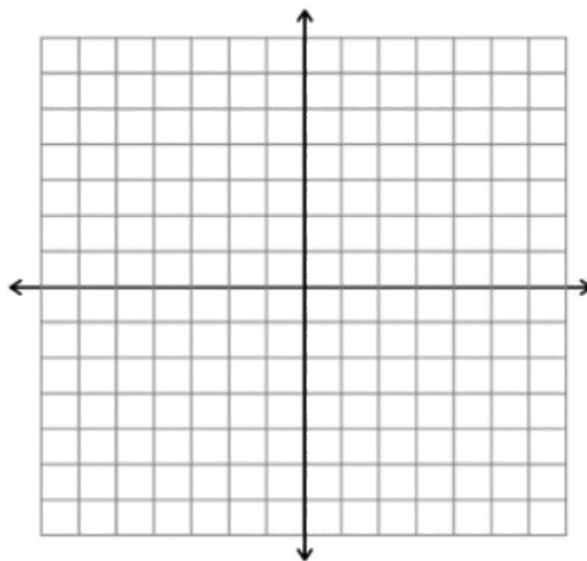
11. [6 points] On Wednesday, Gabriel picked up 10 cookies and 30 cups of hot cider for the office staff and paid a total of $56.60. On Tuesday, Gabriel picked up 9 cookies and 18 cups of hot cider (from the same coffee shop) and paid a total of $38.43. How much does the coffee shop charge for one cookie? How much do they charge for one cup of hot cider?

12. [5 points] Graph the solution to the system of inequalities. Be sure to label the x and y axes.

$$\begin{cases} y \geq -x - 3 \\ y < -5 \end{cases}$$
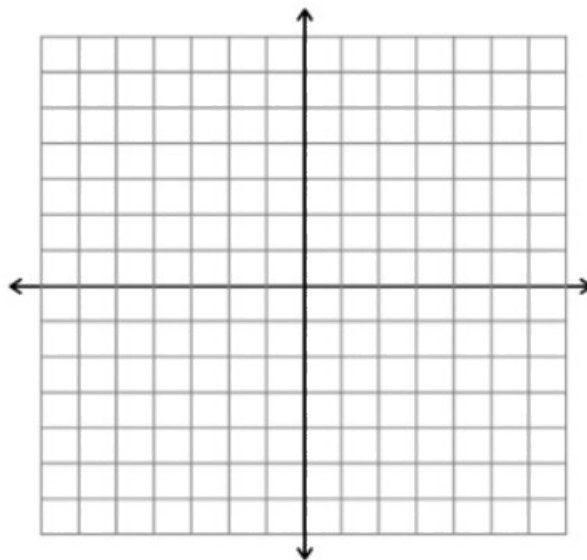
13. [5 points] Multiply and simplify your answer.

$$6x^3y^8z^4 \cdot 3x^7y^9z^{13} \cdot 5x^{10}$$

14. [5 points] Simplify. Express your answer with positive exponents. Assume that all variables are nonzero.

$$\frac{x^{-4}y^{-2}z^4}{z^{-5}}.$$

15. [5 points]

    (a) Write 2.4×10^{-5} in decimal notation.

    (b) Write 4.31×10^6 in decimal notation.

16. [5 points] Identify the degree and leading coefficient of the polynomial.

$$2x^2 - 10 + 2x^6 - 5x^4 + 3x$$

Degree:_____
Leading Coefficient: _____

17. [5 points] Simplify $(-8r^2 + 9r - 14) - 4(7r - 9r^2 - 6)$.

18. [5 points] Multiply and simplify $(5x + 3)(3x - 2)$.

19. [5 points] Simplify. Express your answer with only positive exponents.

$$\frac{20a^7b^6c^8}{15b^9c^2}$$

20. [5 points] Divide. Write your answer in standard form, $Q(x) + \dfrac{R}{2x}$.

$$(6x^3 - 8x^2 - 10x + 5) \div (2x)$$

Solutions

1. A rectangle has a length of 18 inches and an area of 72 square inches. Find the **width** <u>and</u> the **perimeter** of the rectangle. Be sure to include the correct units in each answer.

Area $= \ell \times w$	
$72 = 18w$	
Width $= \dfrac{72}{18} = 4$ inches	2.5 pts; if missing units, deduct 0.5 pt.
Perimeter $= 2(18 + 4) = 44$ inches	2.5 pts; if missing units, deduct 0.5 pt.

2. Simplify $-5[3x^2 - (8x^2 - 2y)]$.

$-5[3x^2 - 8x^2 + 2y]$	2 pts to here
$-5[-5x^2 + 2y]$	3 pts to here
$25x^2 - 10y$	5 pts to here

3. Solve for m. Simplify your answer.

   $$32m + 28 - 12m = 10 - 14m$$

$20m + 28 = 10 - 14m$	1 pt to here
$20m + 14m = 10 - 28$	2 pts to here
$34m = -18$	3 pts to here
$m = -18/34$	4 pts to here
$m = -9/17$	5 pts total

4. Solve the following equation for y.

   $$\frac{1}{3}(y - 12) = \frac{1}{6}y + 4$$

$\frac{1}{3}y - 4 = \frac{1}{6}y + 4$	1 pt to here
$6\left(\frac{1}{3}y - 4\right) = 6\left(\frac{1}{6}y + 4\right)$	2 pts to here
$2y - 24 = y + 24$	3 pts to here
$y = 48$	4 pts total

5. Write the following verbal statement in algebraic form. "12 minus x equals two times the quantity of five minus two times x"

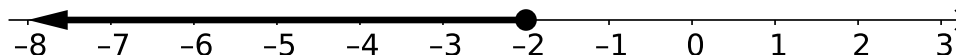 | | |
   |---|---|
   | $12 - x = 2(5 - 2x)$ | 5 pts |
   | No partial credit. | |

6. The average weekday high temperature last week was 83°. The high temperatures on Monday through Thursday were 75°, 78°, 84°, and 87°. What was the high temperature on Friday?

$$\frac{75+78+84+87+x}{5} = 83 \qquad \text{2 pts to here}$$
$$324 + x = 415 \qquad \text{3 pts to here}$$
$$x = 415 - 324 = 91 \qquad \text{4 pts to here}$$
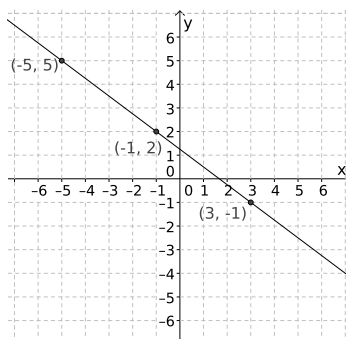It was $91°$ on Friday.   5 pts total

7. Solve and graph on the number line.

$$\frac{1}{3}x - 1 \geq \frac{5}{6}x$$

$$\frac{6}{1}\left(\frac{1}{3}x - 1\right) \geq \frac{6}{1}\left(\frac{5}{6}x\right) \qquad \text{1 pt to here}$$
$$2x - 6 \geq 5x \qquad \text{2 pts to here}$$
$$x \leq -2 \text{ OR } -2 \geq x \qquad \text{3 pts to here}$$
add 2 pts for correct number line.

8. Graph the line with a slope $\dfrac{-3}{4}$ that passes through the point $(-1, 2)$. Be sure to label axes with x, y, and with numbers. Identify at least three points on your line.


1 point for correct labeling of axes and numbers on them.
3 points for correctly identifying 3 pts.
1 pt for the correct line.

9. Find the equation of the line that passes through $(-8, -7)$ and is perpendicular to the line $y = 8x + 2$.

Slope of the line $y = 8x + 2$ is 8   1 pt to here
Perpendicular slope: $m = -1/8$ 2 pts to here
$$-7 = -\frac{1}{8}(-8) + b \qquad \text{3 pts to here}$$
$-7 = 1 + b$ so $b = -8$ 4 pts to here
$$y = \frac{-1}{8}x - 8 \qquad \text{5 pts total}$$

10. Solve by graphing the given system of equations. Be sure to label axes with x, y, and with numbers. Identify and label the intersection point.

$$\begin{cases} 3x - 2y = 6 \\ 4x + y = -3 \end{cases}$$
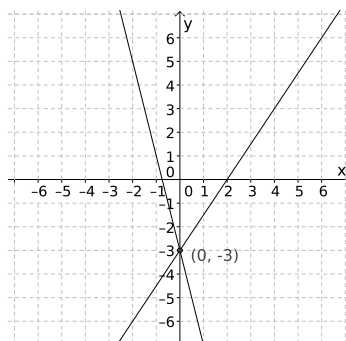
Correct system is graphed	award 2 pts
Axes are labeled	award 1 pt
Intersection point $(0, -3)$	award 2 pts

11. On Wednesday, Gabriel picked up 10 cookies and 30 cups of hot cider for the office staff and paid a total of $56.60. On Tuesday, Gabriel picked up 9 cookies and 18 cups of hot cider (from the same coffee shop) and paid a total of $38.43. How much does the coffee shop charge for one cookie? How much do they charge for one cup of hot cider?

Let $x =$ the price of a cookie (in dollars) and $y =$ the price of a cup of hot cider (in dollars)	1 pt to here
$10x + 30y = 56.60$ and $9x + 18y = 38.43$	3 pts to here
$x = 1.49$ and $y = 1.39$	5 pts to here
One cookie costs $1.49 and one cup of hot cider costs $1.39.	6 pts total

12. Graph the solution to the system of inequalities. Be sure to label the x and y axes.

$$\begin{cases} y \geq -x - 3 \\ y < -5 \end{cases}$$
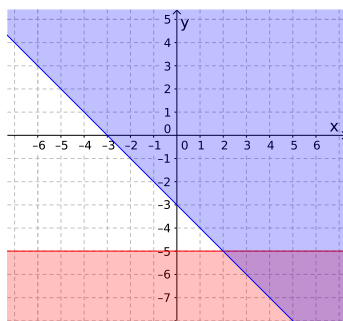
> 1 pt for each correct line
> 1 pt for each correct shading
> 1 pt for the x and y axis labels (5 pts total)

13. Multiply and simplify your answer.

$$6x^3y^8z^4 \cdot 3x^7y^9z^{13} \cdot 5x^{10}$$

> $90x^{20}y^{17}z^{17}$ 1 pt for each variable with correct exponent
> and 2 pts for the number 90

14. Simplify. Express your answer with positive exponents. Assume that all variables are nonzero.

$$\frac{x^{-4}y^{-2}z^4}{z^{-5}}.$$

> $\dfrac{z^5z^4}{x^4y^2}$ 1 pt each for variables x and y (with positive exponent)
>
> $\dfrac{z^9}{x^4y^2}$ 2 pts for getting exponent of z correct
> and 1 pt extra for getting it all correct.

15. (a) Write 2.4×10^{-5} in decimal notation.

    (b) Write 4.31×10^6 in decimal notation.

> (a) 0.000024   2.5 pts
> No partial credit.
> (b) 4,310,000   2.5 pts
> No partial credit.

16. Identify the degree and leading coefficient of the polynomial.

$$2x^2 - 10 + 2x^6 - 5x^4 + 3x$$

Degree:_____
Leading Coefficient: _____

> Degree: 6   2.5 pts
> Leading Coefficient: 2   2.5 pts
> No partial credit.

17. Simplify $(-8r^2 + 9r - 14) - 4(7r - 9r^2 - 6)$.

> $-8r^2 + 9r - 14 - 28r + 36r^2 + 24$ 3 pts to here
> $= 28r^2 - 19r + 10$ 5 pts total

18. Multiply and simplify $(5x + 3)(3x - 2)$.

$15x^2 - 10x + 9x - 6$ 3 pts to here
$15x^2 - x - 6$ 5 pts total

19. Simplify. Express your answer with only positive exponents.

$$\frac{20a^7b^6c^8}{15b^9c^2}$$

$\dfrac{4a^7c^6}{3b^3}$ 1 pt for each variable with correct exponent

2 pts for the number $\dfrac{4}{3}$

20. Divide. Write your answer in standard form, $Q(x) + \dfrac{R}{2x}$.

$$(6x^3 - 8x^2 - 10x + 5) \div (2x)$$

$\dfrac{6x^3}{2x} - \dfrac{8x^2}{2x} - \dfrac{10x}{2x} + \dfrac{5}{2x}$ 3 pts to here

$3x^2 - 4x - 5 + \dfrac{5}{2x}$ 5 pts total