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] Find the area and perimeter of a rectangle whose length is 12 miles and whose width is 6 miles. Be sure to include the correct unit in your answer.

2. [5 points] Simplify $-3\{x^2 - 4[x - (x - 2x^2)]\}$.

3. [5 points] Solve for m. Simplify answers.

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

4. [5 points] Solve the following equation for y.

$$\frac{1}{4}y + 5 = \frac{2}{3}y$$

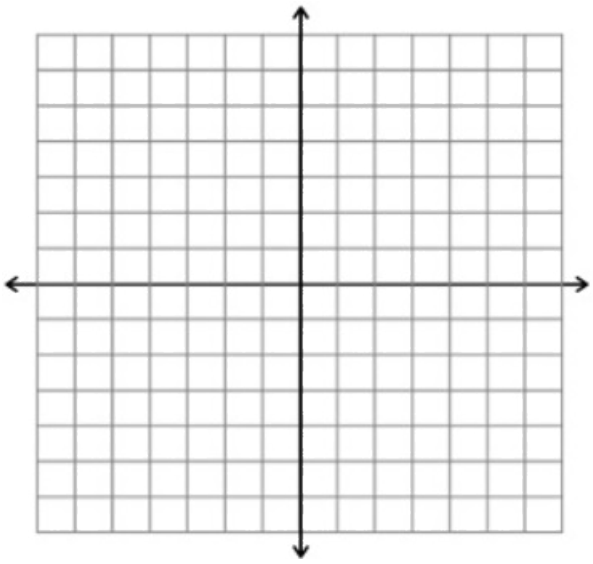
5. [5 points] Write the following verbal statement in algebraic form. "x minus 47 equals three times the quantity of six times x plus 5"

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 the inequality for y.

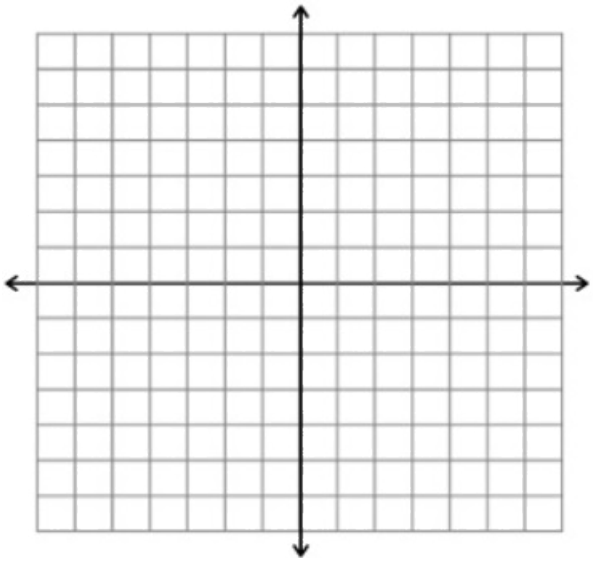
$$-7y - 19 \leq -3y - 11$$

8. [5 points] Graph the line with slope $\frac{-2}{3}$ that passes through the point $(-4, 1)$. Label your axes and put number values on them. 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 $y = 8x + 2$.

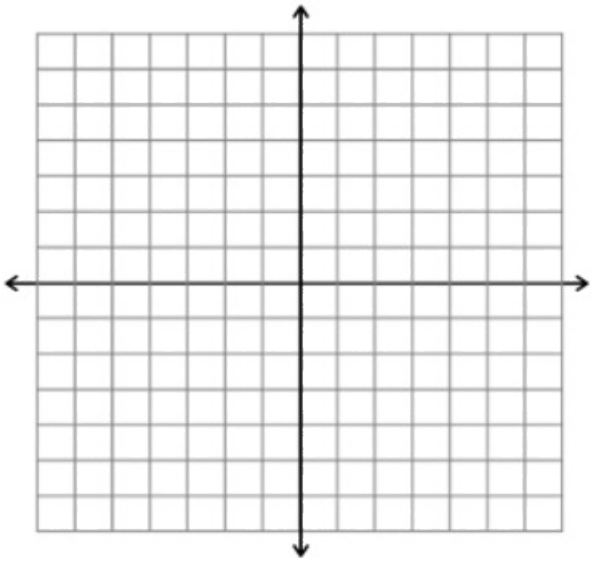
10. [5 points] Solve by graphing the given system of equations. Be sure to label axis with x, y, and with numbers. Identify and label the intersection point.



$$\begin{cases} 3x - y = 5 \\ 2x - 3y = -6 \end{cases}$$

11. [5 points] An employment agency specializing in temporary construction help pays heavy equipment operators \$140 per day and general laborers \$90 per day. If thirty-five people were hired and the payroll was \$3950, how many heavy equipment operators were employed? How many laborers?

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



$$\begin{cases} y \geq -2x - 5 \\ y \geq 3x + 5 \end{cases}$$

13. [5 points] Multiply and simplify your answer.

$$10x^{-6}y^{9}z^{-4} \cdot 4x^{10}y^{-4}z^{9} \cdot 3x^{8}$$

14. [5 points]

(a) Rewrite without an exponent: $(-11)^{-2}$

(b) Rewrite without using a negative exponent: $-17y^{-5}$

15. [5 points]

    (a) Write 8,540,200,000 in scientific notation.

    (b) Write 0.000016403 in scientific notation.

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

$$5 + 6x^9 + 4x^8 + 3x^7 - 2x$$

    Degree:_____
    Leading Coefficient: _____

17. [5 points] Simplify $(-10u^2 + 4u + 5) - (-12u - 3u^2 - 13) + (6 - 3u - 2u^2)$.

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

19. [5 points] Simpify $(-4x^3y^7z^4)(-3x^3y^4z^2)^2$.

20. [5 points] Divide. Write your answer in standard form, $Q(x) + \dfrac{R}{3x}$.

$$(18x^3 - 9x^2 + 3x + 5) \div (3x)$$

Solutions

1. Find the area and perimeter of a rectangle whose length is 12 miles and whose width is 6 miles. Be sure to include the correct unit in your answer.

Area $= 6 \times 12 = 72\ mi^2$	2.5 pts
If missing units take off 0.5 pt	
Perimeter $= 2(6 + 12) = 36$ miles	2.5 pts
If missing units take off 0.5 pt	

2. Simplify $-3\{x^2 - 4[x - (x - 2x^2)]\}$.

$-3\{x^2 - 4[x - x + 2x^2]\}$	1 pt
$-3\{x^2 - 4[2x^2]\}$	2 pts to here
$-3\{x^2 - 8x^2\}$	3 pts to here
$-3\{-7x^2\}$	4 pts to here
$21x^2$	5 pts to here

3. Solve for m. Simplify answers.

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

$20m + 28 = 10 - 14m$	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.

$$\frac{1}{4}y + 5 = \frac{2}{3}y$$

$12(\frac{1}{4}y + 5) = 12(\frac{2}{3}y)$	1 pt to here
$3y + 60 = 8y$	2 pts to here
$60 = 5y$	3 pts to here
$y = 12$	4 pts total

5. Write the following verbal statement in algebraic form. "x minus 47 equals three times the quantity of six times x plus 5"

$x - 47 = 3(6x + 5)$	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?

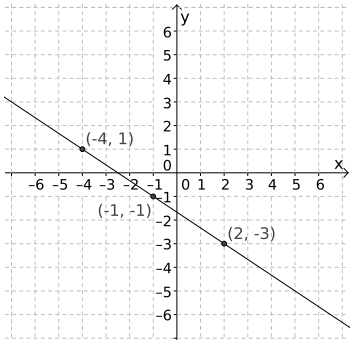
$\frac{75+78+84+87+x}{5} = 83$	2 pts to here
$324 + x = 415$	3 pts to here
$x = 415 - 324 = 91$	4 pts to here
It was 91° on Friday.	5 pts total

7. Solve the inequality for y.

$$-7y - 19 \leq -3y - 11$$

$-7y + 3y \leq -11 + 19$	2 pts to here
$-4y \leq 8$	4 pts to here
$y \geq -2$	5 pts total.

8. Graph the line with slope $\dfrac{-2}{3}$ that passes through the point $(-4, 1)$. Label your axes and put number values on them. Identify at least three points on your line.

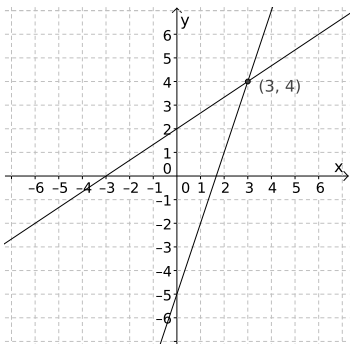


1 point for correct labeling of axes and number on them.
3 points for correctly identifying 3 pts.
1 points for the correct line.

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
$-7 = -8(-1/8) + b$	3 pts to here
$-7 = 1 + b$ so $b = -8$	4 pts to here
$y = \dfrac{-1}{8}x - 8$	5 pts total

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



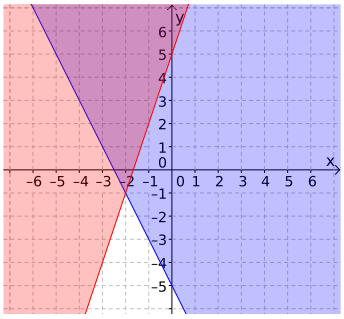
$$\begin{cases} 3x - y = 5 \\ 2x - 3y = -6 \end{cases}$$

Correct system is graphed	award 2 pts
Axes are labeled	award 2 pts
Intersection point $(3, 4)$	award 1 pt

11. An employment agency specializing in temporary construction help pays heavy equipment operators \$140 per day and general laborers \$90 per day. If thirty-five people were hired and the payroll was \$3950, how many heavy equipment operators were employed? How many laborers?

Let $x =$ the number of heavy equipment operators	
and $y =$ the number of laborers	1 pt to here
$x + y = 35$ and $140x + 90y = 3950$	2 pts to here
$x = 35 - y$ and $140(35 - y) + 90y = 3950$	3 pts to here
$4900 - 140y + 90y = 3950$	
$4900 - 50y = 3950$	4 pts up to here
$-50y = -950$	
$y = 19$ so $x = 35 - 19 = 16$	5 pts to here
There were 19 laborers	
and 16 heavy equipment operators.	6 pts total

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



$$\begin{cases} y \geq -2x - 5 \\ y \geq 3x + 5 \end{cases}$$

1 pt for each correct inequality (2 pts total) 1 pt for correct intersection 2 pts for the x and y axis labels

13. Multiply and simplify your answer.

$$10x^{-6}y^{9}z^{-4} \cdot 4x^{10}y^{-4}z^{9} \cdot 3x^{8}$$

$120x^{12}y^{5}z^{5}$	1 pt for each variable with correct exponent and 2 pts for the number 120

14. (a) Rewrite without an exponent: $(-11)^{-2}$

    (b) Rewrite without using a negative exponent: $-17y^{-5}$

(a) $\dfrac{1}{121}$	2.5 pts
	No partial credit.
(b) $\dfrac{-17}{y^5}$	2.5 pts
	No partial credit.

15. (a) Write 8,540,200,000 in scientific notation.

    (b) Write 0.000016403 in scientific notation.

(a) 8.540210^{9}	2.5 pts
	No partial credit.
(b) 1.6403×10^{-5}	2.5 pts
	No partial credit.

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

$$5 + 6x^{9} + 4x^{8} + 3x^{7} - 2x$$

Degree:_____
Leading Coefficient: _____

Degree: 9	2.5 pts
Leading Coefficient: 6	2.5 pts
No partial credit.	

17. Simplify $(-10u^2 + 4u + 5) - (-12u - 3u^2 - 13) + (6 - 3u - 2u^2)$.

$-10u^2 + 4u + 5 + 12u + 3u^2 + 13 + 6 - 3u - 2u^2$	2 pts to here
$= -9u^2 + 13u + 24$	5 pts total
Partial credit: 1.5 pt for each correct term	

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

$3x^3+3x^2-2x+15x^2+15x-10$	3 pts to here
$3x^3+18x^2+13x-10$	5 pts total

19. Simpify $(-4x^3y^7z^4)(-3x^3y^4z^2)^2$.

$-36x^9y^{15}z^8$	1 pt for each variable with correct exponent and 2 pts for the number -36

20. Divide. Write your answer in standard form, $Q(x)+\dfrac{R}{3x}$.

$$(18x^3-9x^2+3x+5)\div(3x)$$

$\dfrac{18x^3}{3x}-\dfrac{9x^2}{3x}-\dfrac{3x}{3x}+\dfrac{5}{3x}$	3 pts to here
$6x^2-3x+1+\dfrac{5}{3x}$	5 pts total