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 14 inches and whose width is 8 inches. Be sure to include the correct unit in your answer.

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

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

$$4 - 7m - 13 = 8m - 3 - 5m$$

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

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

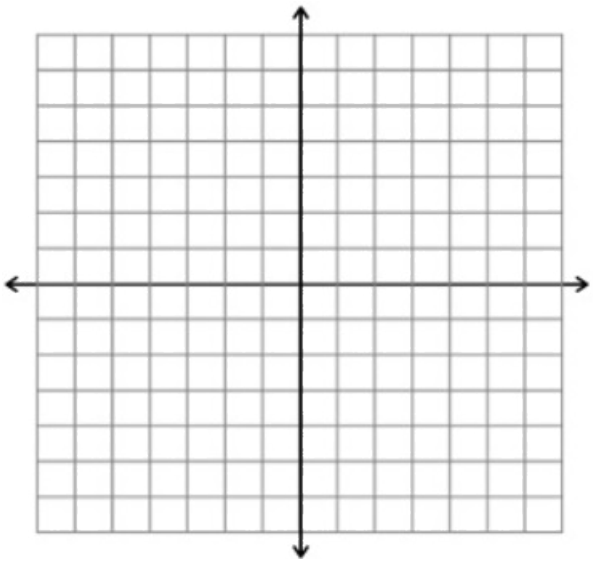
5. [5 points] Write the following verbal statement in algebraic form. "x minus 47 equals three times the quantity of six times x plus 5"

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.

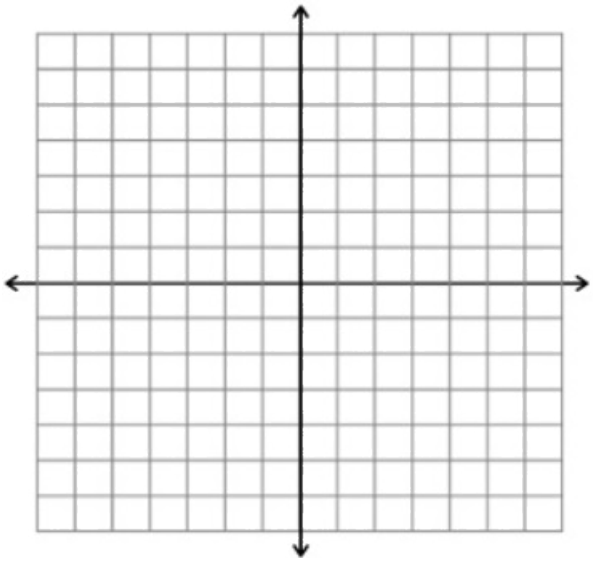
$$2y + 5 \leq 8y - 13$$

8. [5 points] Graph the line with slope $\frac{-2}{3}$ that passes through the point $(2, -1)$. 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 $(-8, 4)$ and is perpendicular to the line $y = 4x + 12$.

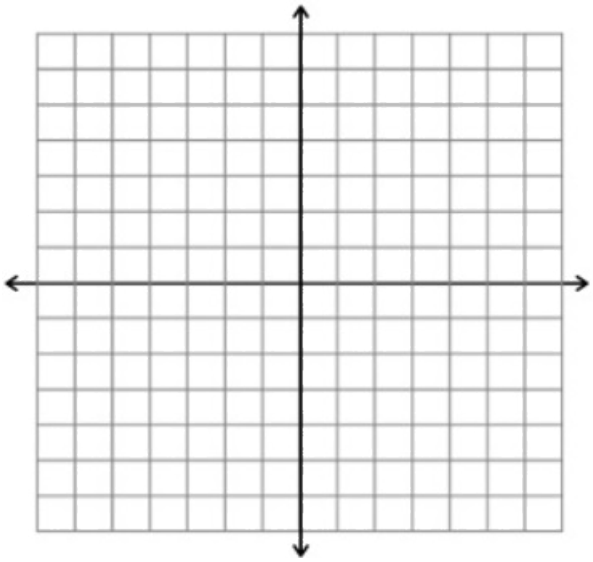
10. [5 points] Solve by graphing the given system of equations. Be sure to label axis with x, y, and with numbers. Identify and label the intersection point.



$$\begin{cases} 3x - 2y = 6 \\ 4x + y = -3 \end{cases}$$

11. [5 points] Ninety-eight passengers rode in an Amtrak train from Boston to Denver. Tickets for regular coach seats cost \$120. Tickets for sleeper car seats cost \$290. The receipts for the trip totaled $\$19,750$. How many passengers purchased regular coach seats? How many passengers purchased sleeper seats?

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.



$$\begin{cases} y \geq x - 4 \\ y \leq -x + 2 \end{cases}$$

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

$$5xy^{-4}z^{11} \cdot 6x^3y^8z^{-5} \cdot 5x^5$$

14. [5 points]

(a) Rewrite without an exponent: $(-15)^{-2}$

(b) Rewrite without using a negative exponent: $-16y^{-9}$

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.

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

    Degree:_____
    Leading Coefficient: _____

17. [5 points] Simplify $(-4x^2 + 7x - 2) + (-4x - 5 + 10x^2) - (2x - 3 - 4x^2)$.

18. [5 points] Multiply and simplify $(x - 6)(2x^2 - 5x + 4)$.

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

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

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

Solutions

1. Find the area and perimeter of a rectangle whose length is 14 inches and whose width is 8 inches. Be sure to include the correct unit in your answer.

Area $= 8 \times 14 = 112\ in^2$	2.5 pts
If missing units take off 0.5 pt	
Perimeter $= 2(8 + 14) = 44$ inches	2.5 pts
If missing units take off 0.5 pt	

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

$-5\{x^2 - 3[x - x + 2x^2]\}$	1 pt
$-5\{x^2 - 3[2x^2]\}$	2 pts to here
$-5\{x^2 - 6x^2\}$	3 pts to here
$-5\{-5x^2\}$	4 pts to here
$25x^2$	5 pts to here

3. Solve for m. Simplify answers.

$$4 - 7m - 13 = 8m - 3 - 5m$$

$7m - 9 = 3m - 3$	1 pt to here
$7m - 3m = -3 + 9$	2 pts to here
$4m = 6$	3 pts to here
$m = 6/4$	4 pts to here
$m = 3/2$ or $1\frac{1}{2}$	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?

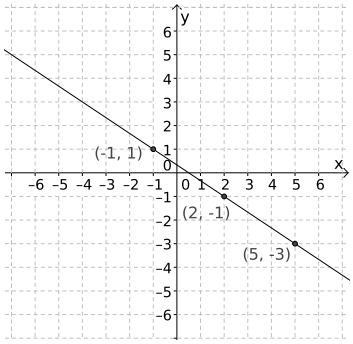
$\frac{75+78+84+87+x}{5} = 83$	2 pts to here
$324 + x = 415$	3 pts to here
$x = 415 - 324 = 91$	4 pts to here
It was 91° on Friday.	5 pts total

7. Solve the inequality for y.

$$2y + 5 \leq 8y - 13$$

$2y - 8y \leq -13 - 5$	2 pts to here
$-6y \leq -18$	4 pts to here
$y \geq 3$	5 pts total

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

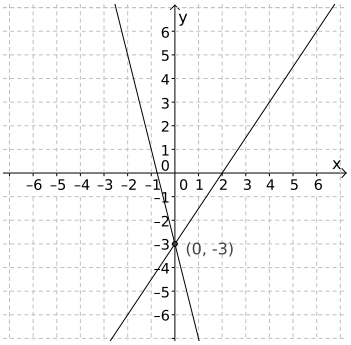


1 point for correct labeling of axes and numbers on them.
3 points for correctly identifying 3 pts.
1 pt for the correct line.

9. Find the equation of the line that passes through $(-8, 4)$ and is perpendicular to the line $y = 4x + 12$.

Slope of the line $y = 4x + 12$ is 4	1 pt to here
Perpendicular slope: $m = -1/4$	2 pts to here
$4 = -8(-1/4) + b$	3 pts to here
$4 = 2 + b$ so $b = 2$	4 pts to here
$y = \frac{-1}{4}x + 2$	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.



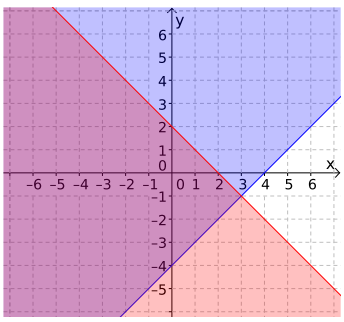
$$\begin{cases} 3x - 2y = 6 \\ 4x + y = -3 \end{cases}$$

Correct system is graphed	award 2 pts
Axes are labeled	award 2 pts
Intersection point $(0, -3)$	award 1 pt

11. Ninety-eight passengers rode in an Amtrak train from Boston to Denver. Tickets for regular coach seats cost \$120. Tickets for sleeper car seats cost \$290. The receipts for the trip totaled \$19,750. How many passengers purchased regular coach seats? How many passengers purchased sleeper seats?

Let $x =$ the number of regular coach seats	
and $y =$ the number of sleeper seats	1 pt to here
$x + y = 98$ and $120x + 290y = 19750$	2 pts to here
$x = 98 - y$ and $120(98 - y) + 290y = 19750$	3 pts to here
$11760 - 120y + 290y = 19750$	
$11760 + 170y = 19750$	4 pts up to here
$170y = 7990$	
$y = 47$ so $x = 98 - 47 = 51$	5 pts up to here
There were 47 sleeper seats sold	
and 51 regular coach seats sold.	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.



$$\begin{cases} y \geq x - 4 \\ y \leq -x + 2 \end{cases}$$

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.

$$5xy^{-4}z^{11} \cdot 6x^3y^8z^{-5} \cdot 5x^5$$

$150x^9y^4z^6$	1 pt for each variable with correct exponent and 2 pts for the number 150

14. (a) Rewrite without an exponent: $(-15)^{-2}$

    (b) Rewrite without using a negative exponent: $-16y^{-9}$

(a) $\frac{1}{225}$	2.5 pts
	No partial credit.
(b) $\frac{-16}{y^9}$	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.

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

Degree:_____
Leading Coefficient: _____

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

17. Simplify $(-4x^2 + 7x - 2) + (-4x - 5 + 10x^2) - (2x - 3 - 4x^2)$.

$7x - 2 - 4x^2 - 4x - 5 + 10x^2 - 2x + 3 + 4x^2$	3 pts to here
$= 10x^2 + x - 4$	5 pts total
Partial credit: 1.5 pt for each correct term	

18. Multiply and simplify $(x-6)(2x^2-5x+4)$.

$2x^3-5x^2+4x-12x^2+30x-24$	3 pts to here
$=2x^3-17x^2+34x-24$	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, $Q(x)+\dfrac{R}{2x}$.

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

$\dfrac{6x^3}{2x}-\dfrac{8x^2}{2x}-\dfrac{10x}{2x}+\dfrac{5}{2x}$	3 pts to here
$3x^2-4x-5+\dfrac{5}{2x}$	5 pts total