

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.

$$6m + 8 - 3m = 11 - 12m - 13$$

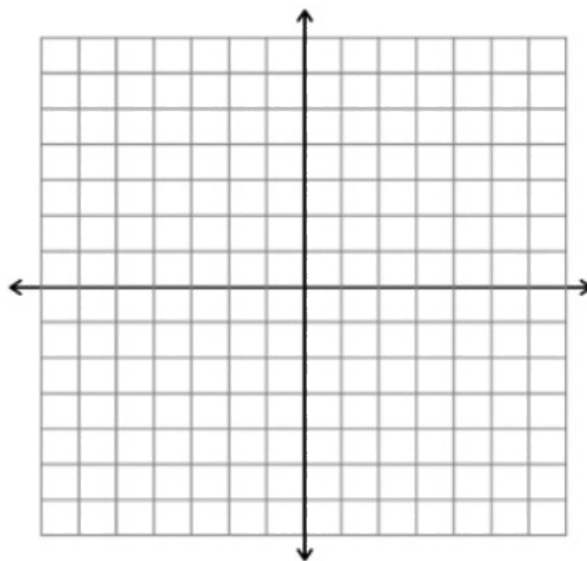
4. [5 points] Solve the following equation for y .

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

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] An athlete’s average time for all six track meets was 21.8 seconds. The athlete was unable to find their time in the last meet, but knew all of the other times: 21.7 seconds, 21.6 seconds, 22 seconds, 22.1 seconds, 21.9 seconds. What was her running time for her last meet?
7. [5 points] Solve the inequality for y .

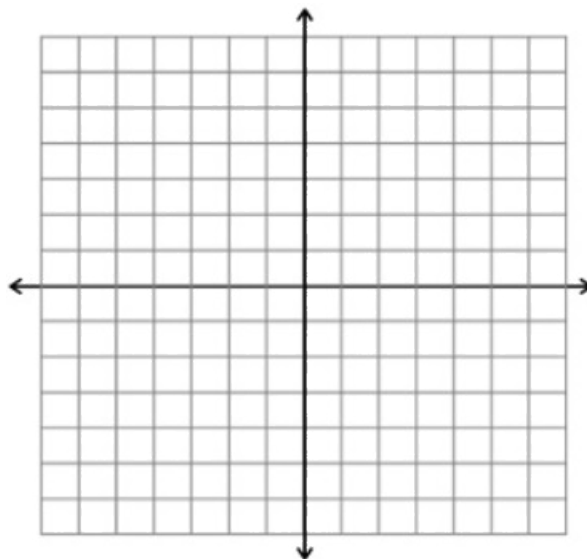
$$-7y - 19 \leq -3y - 11$$

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

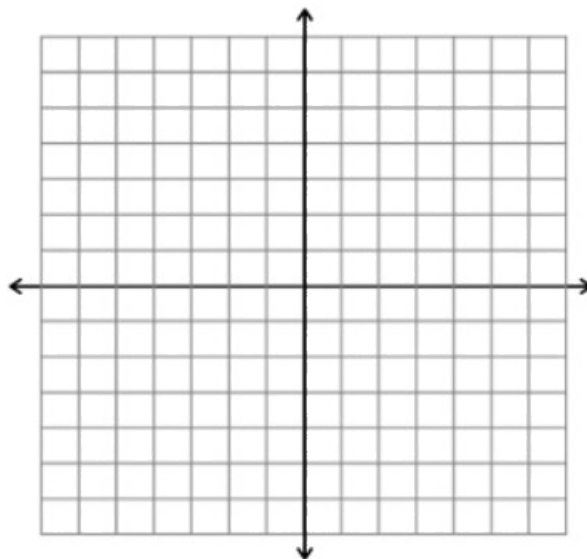
10. [5 points] Solve by graphing the given system of equations. Be sure to label axis with x , y , and with numbers. Identify and label the intersection point.



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

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.

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

14. [5 points]

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

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

15. [5 points]

(a) Write 1,037,000 in scientific notation.

(b) Write 0.000020134 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] Simplify $(-5x^6yz^2)(-2x^5y^3z^4)^2$.

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

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

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

$$6m + 8 - 3m = 11 - 12m - 13$$

| | |
|----------------------|---------------|
| $3m + 8 = -12m - 2$ | 1 pt |
| $3m + 12m = -2 - 8$ | 2 pts to here |
| $15m = -10$ | 3 pts to here |
| $m = -\frac{10}{15}$ | 4 pts to here |
| $m = -\frac{2}{3}$ | 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. An athlete's average time for all six track meets was 21.8 seconds. The athlete was unable to find their time in the last meet, but knew all of the other times: 21.7 seconds, 21.6 seconds, 22 seconds, 22.1 seconds, 21.9 seconds. What was her running time for her last meet?

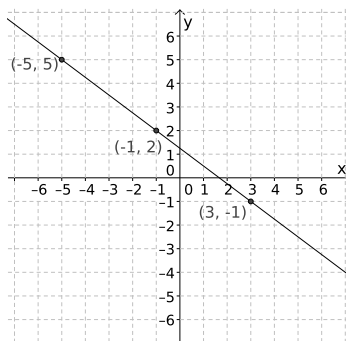
| | |
|---|---------------|
| $\frac{21.7+21.6+22+22.1+21.9+x}{6} = 21.8$ | 2 pts to here |
| $99.3 + x = 130.8$ | 3 pts to here |
| $x = 130.8 - 99.3 = 21.5$ | 4 pts to here |
| The athlete ran a 21.5 second race. | 5 pts total |

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

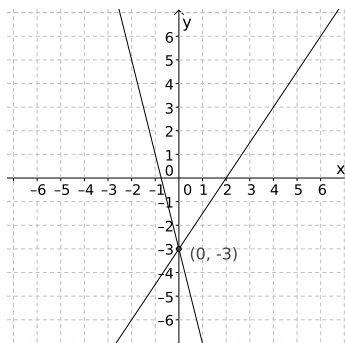


| |
|---|
| 1 point for correct labeling of axes and numbers on them. |
| 3 points for correctly identifying 3 pts. |
| 1 pt for the correct line. |

9. Find the equation of the line that passes through $(-8, -7)$ 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 |
| $y = \frac{-1}{8}x - 8$ | 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.



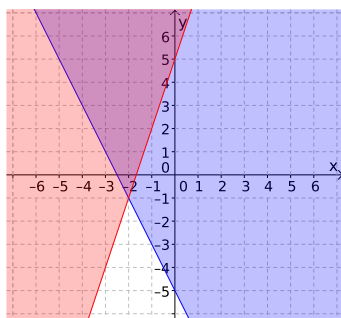
$$\begin{cases} 3x - 2y = 6 \\ 4x + y = -3 \end{cases}$$

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

11. 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.

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

$120x^{12}y^5z^5$ 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) $\frac{1}{121}$ 2.5 pts
 No partial credit.
 (b) $\frac{-17}{y^5}$ 2.5 pts
 No partial credit.

15. (a) Write 1,037,000 in scientific notation.
 (b) Write 0.000020134 in scientific notation.

(a) 1.037×10^6 2.5 pts
 No partial credit.
 (b) 2.0134×10^{-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. Simplify $(-5x^6yz^2)(-2x^5y^3z^4)^2$.

| | |
|----------------------|--|
| $-20x^{16}y^7z^{10}$ | 1 pt for each variable with correct exponent and 2 pts for the number -20 |
|----------------------|--|

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

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

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