You must show your work in order to receive credit. Calculators may be used, but are not necessary. Graphing calculators may not be used. Total points: 200. This exam has 8 pages and problems numbered 1 through 24.

1. (6 pts.) Solve for $n$: \[
\frac{3}{4}n - 8 = \frac{2}{3}n + 5
\]

2. a. (4 pts.) Solve for $d$: \[
-\frac{d}{5} + 3 \geq 2
\]

   b. (2 pts.) Graph the solution set on the number line.

3. a. (6 pts.) Solve for $x$: \[
|x + 4| > 7
\]

   b. (2 pts.) Express the solution set in interval notation.
4. Evaluate the function \( g(x) = x - 2x^2 \)

   a. (3 pts.) \( g(-1) = \)

   b. (3 pts.) \( g(3) = \)

5. (2 pts.) Find the domain of the function \( f(x) = \frac{3}{2 - x} \)

6. (8 pts.) For the following problem, write the appropriate equation(s) and solve the problem. No credit for guessing.

   The perimeter of a rectangle is 146 inches. The length is 17 inches greater than three times the width. Find the dimensions of the rectangle.

7. Perform the indicated operations and simplify.

   a. (8 pts.) \( \frac{3x}{x^2 - 9} - \frac{2}{x + 3} \)
8. (6 pts.) Solve for $x$: $ax + q = at + vx$

9. (8 pts.) For the following problem, write the appropriate equation(s) and solve the problem. Show your work.

Find two integers whose sum is 20 and whose product is 84.

10. (8 pts.) Solve for $x$: $\frac{2x + 1}{3x^2 - 10x - 8} = \frac{6}{3x + 2} - \frac{3}{x - 4}$
11. (4 pts.) Simplify: $\sqrt{24x^2y^2}$

12. (6 pts.) Rationalize the denominator and simplify: $\frac{14}{3\sqrt{2} - 5}$

13. (8 pts.) For the following problem, write the appropriate equation(s) and solve the problem. No credit for guessing.

Rodolfo has $2.55 in dimes and quarters. He has eight more dimes than quarters. How many quarters does he have?

14. (8 pts.) Divide: $(3x^3 + 8x^2 + x - 7) \div (x + 2)$
15. Simplify the following problems. Write your answers using positive exponents only.

a. (6 pts.) \((12x^2y^3)(\sqrt{-12x^{-4}y^3})\)

b. (6 pts.) \(\frac{5x^\frac{1}{3}}{-125x^\frac{1}{3}}\)

c. (6 pts.) \(\left(\frac{7x^3y}{-21x^{-3}y^2}\right)^{-2}\)

16. (8 pts.) Solve for \(x\): \(\sqrt{2x - 1} = x - 2\)

17. (2 pts.) Rewrite using positive rational exponents: \(\sqrt[3]{xy^2}\)
18. (6 pts.) Find the indicated quotient: \( \frac{5i}{2 + 3i} \)

19. (8 pts.) For the following problem, write the appropriate equation(s) and solve the problem. No credit for guessing.

Joe and Janna leave home at the same time traveling in opposite directions. Joe drives 45 MPH and Janna drives 40 MPH. In how many hours will they be 510 miles apart?

<table>
<thead>
<tr>
<th>Joe</th>
<th>D</th>
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<tr>
<td></td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Janna</td>
<td>510</td>
<td>90</td>
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Joe: \( \text{Distance} = \text{Speed} \times \text{Time} \)

Janna: \( \text{Distance} = \text{Speed} \times \text{Time} \)

510 = 45t + 40t

\( t = \frac{510}{85} \)

\( t = 6 \frac{6}{13} \) hours

20. Solve for \( x \):

a. (6 pts.) \((x + 4)^2 - 5 = 0\)

b. (6 pts.) \(2x^2 - 3x + 4 = 0\)

c. (6 pts.) \(2x^2 - 5x = 3\)
21. (8 pts.) Solve for \( x \) by completing the square. \( x^2 - 8x + 4 = 0 \)

22. (6 pts.) For the following problem, write the appropriate equation(s) and solve the problem. No credit for guessing.

The length of a rectangle is three feet more than its width. The diagonal of the rectangle measures 15 feet. Find the dimensions of the rectangle.

23. a. (4 pts.) Sketch a graph of the function
\[
f(x) = \frac{2}{3}x - 2
\]

b. (2 pts.) Label (with coordinates) 3 points on the graph.

c. (4 pts.) What is the \( x \)-intercept? \( \underline{\hspace{2cm}} \) The \( y \)-intercept? \( \underline{\hspace{2cm}} \)
24. Use the points (2,7) and (-5,2) to answer the following questions.
   
a. (6 pts.) Find the distance between the points.

b. (6 pts.) Find the slope of the line.

c. (6 pts.) Find an equation for the line that passes through the two points.