Test Instructions: Take this test closed-book, closed-notes, and with no assistance. Time and score yourself. The maximum score is 25 points. A score of 20 or above shows readiness. A score below 20 may be of concern. For those with a Saxon curriculum background, a comparable Saxon readiness test is Test III at https://www.sonlight.com/uploads/saxon_upper_placement.pdf for their Advanced Mathematics level.

Special binomial factors:

\[ a^2 - b^2 = (a-b)(a+b) \qquad a^2 + b^2 = (a+b)(a^2 - ab + b^2) \]

1. Simplify.
   a. \( \left( \frac{3x^2}{y} \right)^{-2} \)
   b. \( \sqrt{75x^3} \)
   c. \( 2\sqrt{48} - 3\sqrt{27} \)
   d. \( (-32)^{-4/5} \)

2. Factor.
   a. \( -4x^2 + 12x + 16 \)
   b. \( 2x(x-2) + 3(x-2) \)
   c. \( (x+2)^2 - y^2 \)

3. Perform the operation, simplify, and state domain of \( x \).
   a. \( \frac{x^3-8}{x^2-4} \div \frac{x^2+2x+4}{x^3+8} \)
   b. \( \frac{x}{x-3} - \frac{2}{3x+4} \)

4. Solve \( 2x^2 + 9x + 7 = 3 \) by factoring. Then, check your solution using the quadratic formula.

5. Solve \( x^2 + 2x - 6 = 0 \) by completing the square. Check your solution by substituting back in the original equation.

6. Solve \( -3 \leq 6x - 1 < 3 \). Graph the solution set on a number line.

7. Solve \( |x - 5| < 2 \). Graph the solution set on a number line.

8. Find the equation of the line with the properties.
   a. Passes through point \( (1, -2) \) and has a slope of \( 3 \)
   b. Passes through the point \( (2, -1) \) and is perpendicular to the line \( 2x - 3y = 5 \)

9. Solve the system of equations for \( x \) and \( y \). Graph both equations and show the solution points.
   \[
   \begin{cases}
   x^2 - y = 1 \\
   -x + y = 1
   \end{cases}
   \]

10. Given that the two right triangles, \( \triangle ABC \) and \( \triangle DEF \), are similar triangles, find the quantities:
   a. length of side \( x \)
   b. length of side \( y \)
   c. angle \( A \)
   d. angle \( \theta \)
Test Answers

4 pts
1. a. $\frac{y^2}{9x^4}$  b. $5x\sqrt{3}x$  c. $-\sqrt{3}$  d. $\frac{1}{16}$

3 pts
2. a. $-4(x + 1)(x - 4)$  b. $(x - 2)(2x + 3)$  c. $(x + 2 + y)(x + 2 - y)$

2 pts
3. a. $x^2 - 2x + 4$, $x \neq \pm 2$  b. $\frac{3x^2 + 2x + 6}{(x - 3)(3x + 4)}$, $x \neq 3, -\frac{4}{3}$

2 pts
4. $x = -\frac{1}{2}, -4$

2 pts
5. $x = -1 \pm \sqrt{7}$

2 pts
6. $-\frac{1}{3} \leq x < \frac{2}{3}$

2 pts
7. $3 < x < 7$

2 pts
8. a. $y = 3x - 5$  b. $y = -\frac{3}{2}x + 2$

2 pts
9. $(-1, 0), (2, 3)$

4 pts
10. a. $\sqrt{3}$  b. $\frac{1}{2}$  c. $30^\circ$  d. $120^\circ$