Name: _____

Directions: Write your answers in the provided space. To get full credit you *must* show all your work. Simplify your answers whenever possible. Be certain to indicate your final answer clearly. **Each problem is worth 5 points**

1. Subtract. Simplify your answer as much as possible: $\dfrac{2}{x-2} - \dfrac{7}{x^2+3x-10}$

2. Divide. Simplify your answer as much as possible: $\dfrac{7a}{a+5} \div \dfrac{a^2-5a}{a^2+2a-35}$

3. Solve: $\dfrac{5}{x-4} = \dfrac{77}{x^2-x-12} - \dfrac{11}{x+3}$

4. Solve: $\sqrt{x+20} - 2x = -5$

5. Simplify: $\dfrac{\dfrac{3}{y} - \dfrac{5}{y+2}}{\dfrac{2}{y^2 + 2y}}$

6. Graph the parabola $y = x^2 - 6x + 4$. Your graph should correctly indicate the vertex, the axis of symmetry, the x-intercepts, the y-intercept and the point symmetric to the y-intercept.
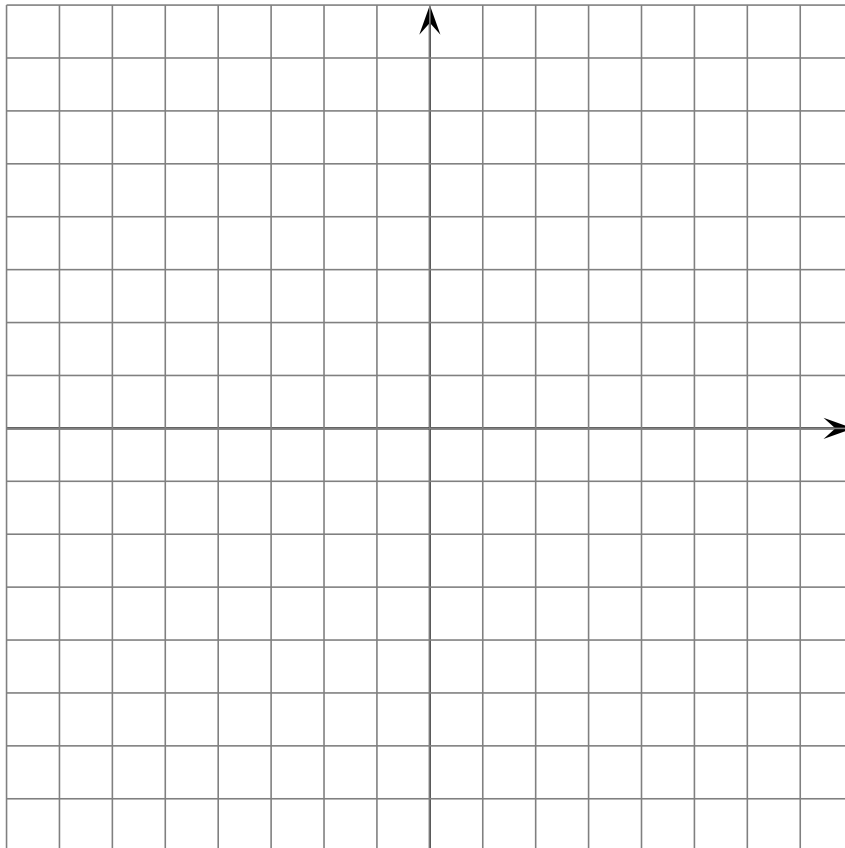
7. Solve: $3x^2 - 10 = 2x$

8. Find the center and radius of the circle with equation $x^2 + 6x + y^2 - 4y = -5$

9. Simplify: $\left(\dfrac{64x^{-13}y^{11}}{25x^3y^8} \right)^{-\frac{1}{2}}$. Assume all variables represent positive numbers. The answer should contain only positive integers as exponents.

10. Divide: $\dfrac{5i-1}{3i+2}$. Express your answer in the form $a + bi$ where a and b are real numbers.

11. Find an equation of the line tangent of the circle $(x + 2)^2 + (y - 3)^2 = 5$ at the point $(-4, 4)$.

12. Determine an equation of the locus of points whose distance from the point $(0, 4)$ is twice the distance from the line $y = 2$.

13. Graph the ellipse with equation $\dfrac{x^2}{9} + \dfrac{y^2}{25} = 1$. The graph should correctly indicate the center, the foci and the major and minor axes of the ellipse.
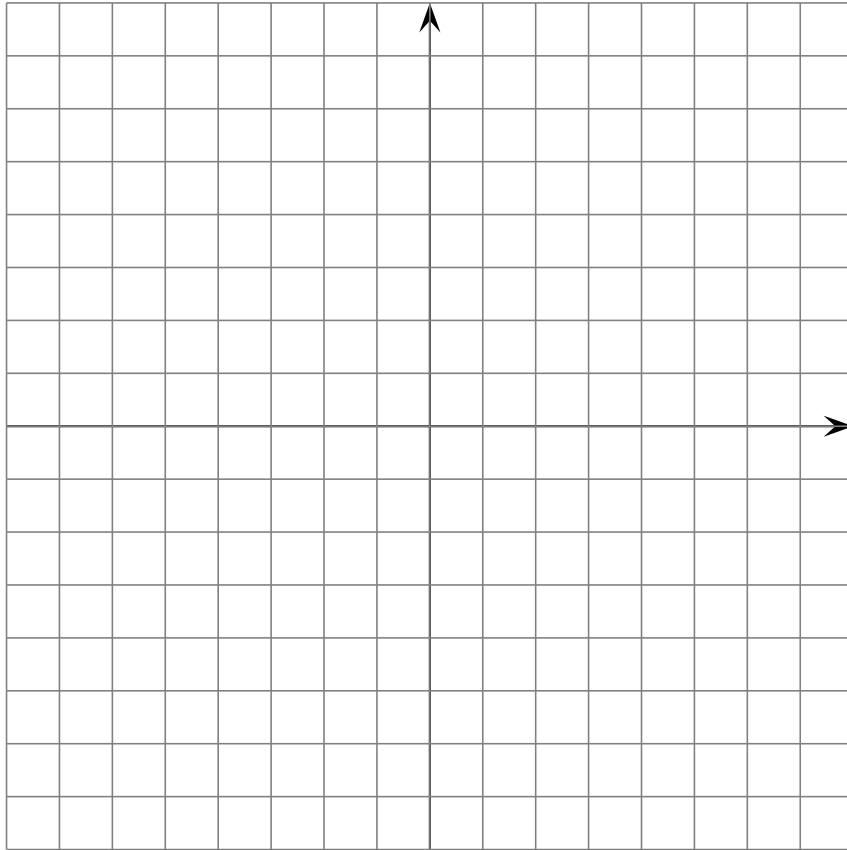
14. Find the common points of the line $y = 2x + 1$ and the conic section $2x^2 - 3x + y^2 + 2y = 14$.

15. Simplify:

    (a) $5\sqrt{50} - 2\sqrt{72} + 3\sqrt{12}$

    (b) $\left(2 + \sqrt{5}\right)^2$

16. In a right triangle ABC we have $B = 90°$, $a = 1$, and $b = 2$ inches. Solve the triangle.
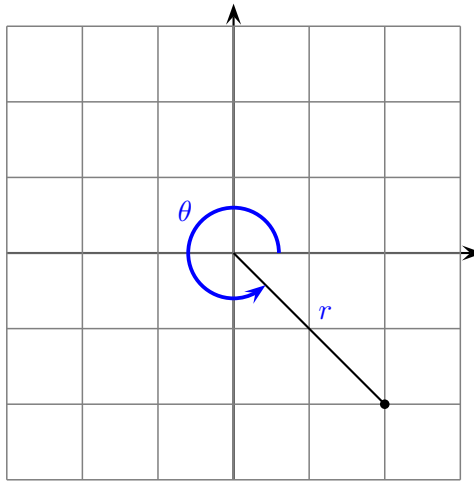
17. Find the exact value of each:

    (a) $\sin 960° \cdot \tan 315°$

    (b) $\cos 1920°$

18. Find all angles θ, between $0°$ and $360°$ with $\cos \theta = 0.62$. Round your answers to the nearest tenth of a degree.

19. An observer stands on level ground at a distance of 100 feet from the base of a building. How high, to the nearest foot, is the building if the angle of elevation is $25°$?

20. (a) Find r and θ.

(b) Find the coordinates of the point whose distance from $(0,0)$ is 6 and whose angle of reference is $150°$