No calculator. SHOW ALL YOUR WORK. Indicate clearly the methods you use to solve each problem because you will be graded on the correctness of your methods as well as the accuracy of your final answers.

1. Write the equation of the conic figure at right in standard form.
   \[(x-1)^2 + (y+3)^2 = 25\]

2. Write the equation of a circle with center (-3, 4) and radius 4 in standard form.
   \[(x+3)^2 + (y-4)^2 = 16\]

3. Write the equation of an ellipse in Standard Form. Ellipse has center (-4, 2), major axis is vertical with a length of 6 and minor axis has a length of 4.
   \[\left(\frac{x+4}{2}\right)^2 + \left(\frac{y-2}{3}\right)^2 = 1\]

4. Graph and identify things you know about this:
   \[\left(\frac{x+2}{2}\right)^2 + \left(\frac{y-3}{3}\right)^2 = 1\]
   Center: \((-2, 3)\)
   Major Axis: (circle one) horizontal or vertical
   Horizontal Dilation: 2
   Vertical Dilation: 3
5. Graph and find the features of this equation:
\[ \frac{x - 3}{2} = \left( \frac{y + 2}{4} \right)^2 \]

- Focus: \( (3, -2) \)
- Directrix: \( x = 1 \)
- Vertex: \( (3, -2) \)
- Line of Symmetry: \( y = -2 \)

6. Write the equation of a parabola with the focus \((3, 4)\) and directrix \(y = 6\)

\[ f = 1 \quad \text{opens down} \]
\[ -4(y - 5) = (x - 3)^2 \]
\[ 4f = 4 \]

7. Write the equation of a parabola with the vertex \((2, 1)\) and focus \((2, 3)\)

\[ f = 2 \quad \text{opens up} \]
\[ 8(y - 1) = (x - 2)^2 \]
\[ 4f = 8 \]

8. Write the equation of a parabola with the vertex \((-2, 3)\) and directrix \(y = 0\)

\[ f = 3 \quad \text{opens right} \]
\[ 12(y - 3) = (x + 2)^2 \]
\[ 4f = 12 \]

9. Write the equation of a parabola in standard form. Transformations are vertical dilation of 5, horizontal dilation of 7, vertical translation of -2, horizontal translation of -5, opens to the right.

\[ \frac{x + 5}{7} = \left( \frac{y + 2}{5} \right)^2 \]

10. Write equation of parabola in the graph in standard form.

\[ \left( \frac{x + 2}{2} \right)^2 = (y - 3) \]
11. Graph the equation and identify the vertex, dilations, and opening direction of the parabola. 

\[ 2(y + 2) = -4(x + 3)^2 \]

Vertex: \((-3, -2)\)

Vertical Dilation: \(2\)

Horizontal Dilation: \(1\)

Opens (circle one): left right up down

12. Convert to standard form and identify the shape. Shape (circle one): Circle Ellipse Parabola

\[ y = 2x^2 - 4x - 3 \] 

\[ y + 3 = 2x^2 - 4x \]

\[ y + 3 = 2(x^2 - 2x + 1) - 2 \]

\[ y + 5 = 2(x - 1)^2 - 2 \]

\[ \frac{y+5}{2} = (x-1)^2 \]

13. Convert to standard form and identify the shape. Shape (circle one): Circle Ellipse Parabola

\[ x^2 + y^2 - 16x + 2y + 12 = 0 \]

\[ x^2 - 16x + y^2 + 2y + 12 = 0 \]

\[ (x^2 - 16x + 64) - 64 + (y^2 + 2y + 1) - 1 + 12 = 0 \]

\[ (x - 8)^2 + (y + 1)^2 = 53 \]

14. Convert to standard form and identify the shape. Shape (circle one): Circle Ellipse Parabola

\[ x^2 + 4y^2 - 14x + 33 = 0 \]

\[ x^2 - 14x + \frac{49}{4} + 4y^2 + 33 = 0 \]

\[ (x - 7)^2 + 4y^2 = 16 \]

15. Convert to general quadratic form. \((x+6)^2 + \left(\frac{y-1}{4}\right)^2 = 1\)

\[ \frac{(x+6)^2}{4} + \frac{(y-1)^2}{16} = 1 \]

Multiply by 16

\[ 4(x+6)^2 + (y-1)^2 = 16 \]

\[ 4(x^2 + 12x + 36) + y^2 - 2y + 1 = 16 \]

\[ 4x^2 + 48x + 144 + y^2 - 2y + 1 = 16 \]