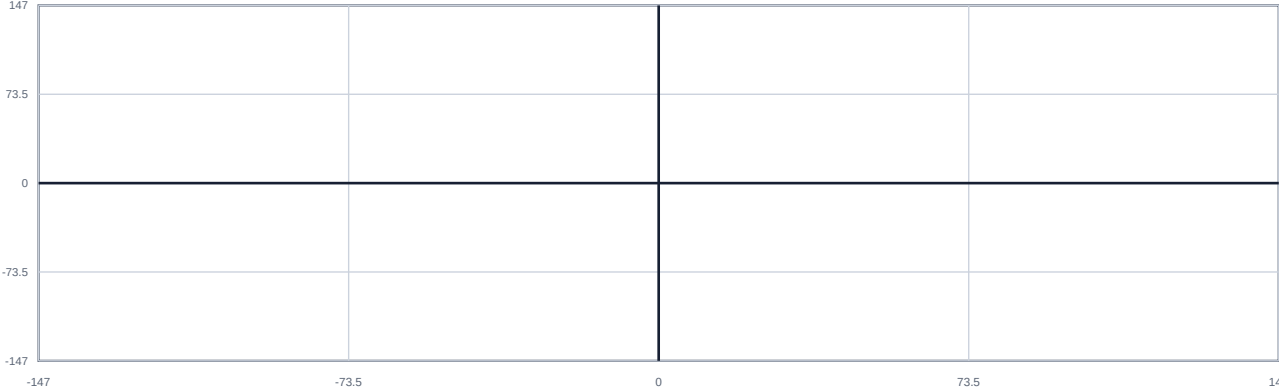


Polar Conic Sections

Normalize to $r = ed/(1 \text{ plus or minus } e \cos(\theta) \text{ or } e \sin(\theta))$, classify from e , and state the directrix and denominator restriction.

1. Graph $r = 20/(1 + 2 \sin(\theta))$ on the supplied window $-147 \leq x \leq 147$, $-147 \leq y \leq 147$ from its focus-at-pole, directrix, and eccentricity features.

Assumptions: The focus is at the pole, the directrix is parallel to a coordinate axis, and denominator-zero angles are excluded rather than assigned $r=0$.



2. Write the polar equation for a parabola with focus at the pole, $e=1$, and directrix $y = 5$.

Assumptions: The focus is at the pole, the directrix is parallel to a coordinate axis, and denominator-zero angles are excluded rather than assigned $r=0$.

Math Sheet

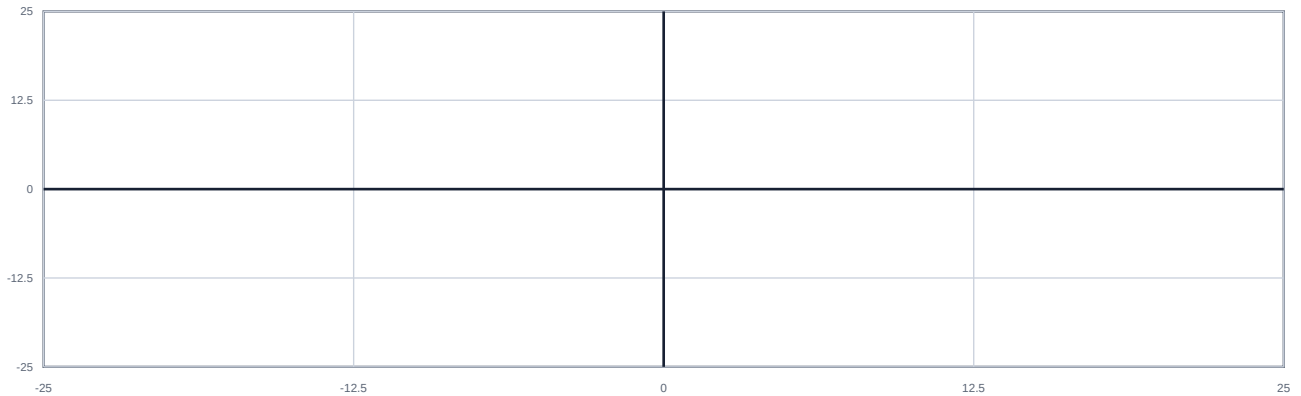
Name _____ Score _____ Teacher _____ Date _____

Polar Conic Sections

Normalize to $r = ed/(1 \pm e \cos(\theta))$ or $e \sin(\theta)$, classify from e , and state the directrix and denominator restriction.

3. Graph $r = 3/(1 + 1 \cos(\theta))$ on the supplied window $-25 \leq x \leq 25$, $-25 \leq y \leq 25$ from its focus-at-pole, directrix, and eccentricity features.

Assumptions: The focus is at the pole, the directrix is parallel to a coordinate axis, and denominator-zero angles are excluded rather than assigned $r=0$.



4. Write the polar equation for a hyperbola with focus at the pole, $e=5/2$, and directrix $y = 8$.

Assumptions: The focus is at the pole, the directrix is parallel to a coordinate axis, and denominator-zero angles are excluded rather than assigned $r=0$.

Polar Conic Sections

Normalize to $r = ed/(1 \text{ plus or minus } e \cos(\theta) \text{ or } e \sin(\theta))$, classify from e , and state the directrix and denominator restriction.

5. Write the polar equation for a parabola with focus at the pole, $e=1$, and directrix $x = 10$.

Assumptions: The focus is at the pole, the directrix is parallel to a coordinate axis, and denominator-zero angles are excluded rather than assigned $r=0$.

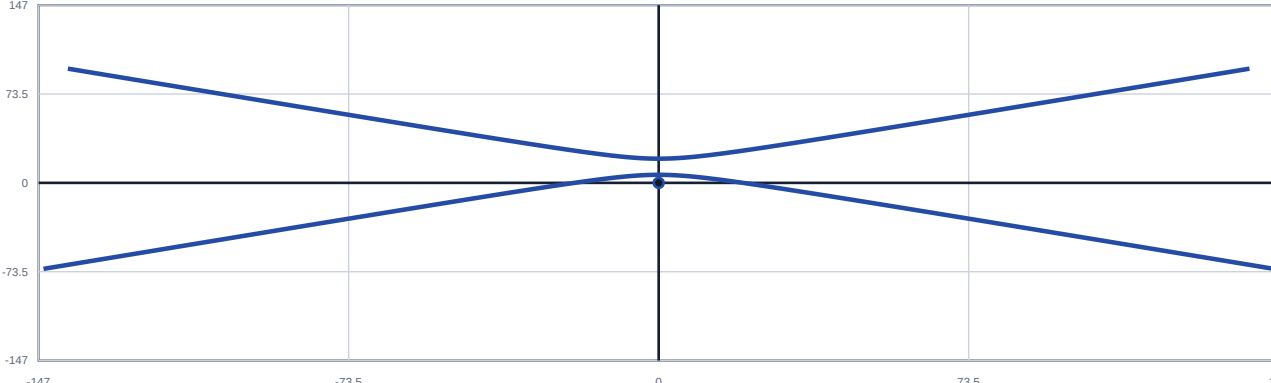
6. Write the polar equation for a ellipse with focus at the pole, $e=3/4$, and directrix $y = -4$.

Assumptions: The focus is at the pole, the directrix is parallel to a coordinate axis, and denominator-zero angles are excluded rather than assigned $r=0$.

Polar Conic Sections
Worked Answer Key

Normalize to $r = ed/(1 \text{ plus or minus } e \cos(\theta) \text{ or } e \sin(\theta))$, classify from e , and state the directrix and denominator restriction.

1. Graph $r = 20/(1 + 2 \sin(\theta))$ on the supplied window $-147 \leq x \leq 147$, $-147 \leq y \leq 147$ from its focus-at-pole, directrix, and eccentricity features.



Answer: $r = 20/(1 + 2 \sin(\theta))$; hyperbola; $e=2$; directrix $y = 10$

1. Compare $e=2$ with 1: $e<1$ ellipse, $e=1$ parabola, $e>1$ hyperbola.
2. A positive-axis directrix produces the displayed plus sign in the denominator.
3. Restriction: $1 + 2 \sin(\theta) \neq 0$.

2. Write the polar equation for a parabola with focus at the pole, $e=1$, and directrix $y = 5$.

Answer: $r = 5/(1 + 1 \sin(\theta))$; parabola; $e=1$; directrix $y = 5$

1. Compare $e=1$ with 1: $e<1$ ellipse, $e=1$ parabola, $e>1$ hyperbola.
2. A positive-axis directrix produces the displayed plus sign in the denominator.
3. Restriction: $1 + 1 \sin(\theta) \neq 0$.

Math Sheet

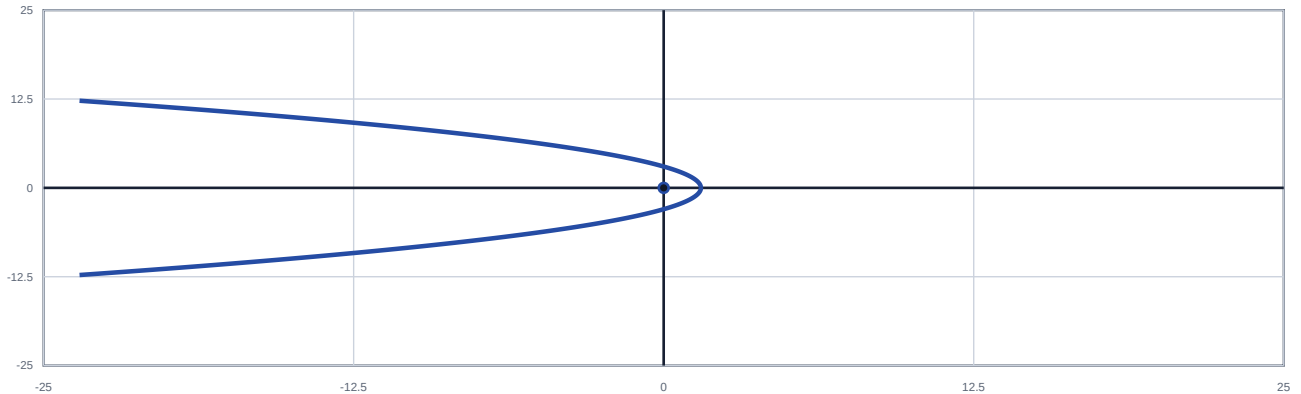
Name _____ Score _____ Teacher _____ Date _____

Polar Conic Sections

Worked Answer Key

Normalize to $r = ed/(1 \pm e \cos(\theta) \text{ or } e \sin(\theta))$, classify from e , and state the directrix and denominator restriction.

3. Graph $r = 3/(1 + 1 \cos(\theta))$ on the supplied window $-25 \leq x \leq 25$, $-25 \leq y \leq 25$ from its focus-at-pole, directrix, and eccentricity features.



Answer: $r = 3/(1 + 1 \cos(\theta))$; parabola; $e=1$; directrix $x = -3$

1. Compare $e=1$ with 1: $e < 1$ ellipse, $e = 1$ parabola, $e > 1$ hyperbola.
2. A positive-axis directrix produces the displayed plus sign in the denominator.
3. Restriction: $1 + 1 \cos(\theta) \neq 0$.

4. Write the polar equation for a hyperbola with focus at the pole, $e=5/2$, and directrix $y = 8$.

Answer: $r = 20/(1 + 5/2 \sin(\theta))$; hyperbola; $e=5/2$; directrix $y = 8$

1. Compare $e=5/2$ with 1: $e < 1$ ellipse, $e = 1$ parabola, $e > 1$ hyperbola.
2. A positive-axis directrix produces the displayed plus sign in the denominator.
3. Restriction: $1 + 5/2 \sin(\theta) \neq 0$.

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Polar Conic Sections

Worked Answer Key

Normalize to $r = ed/(1 \text{ plus or minus } e \cos(\theta) \text{ or } e \sin(\theta))$, classify from e , and state the directrix and denominator restriction.

5. Write the polar equation for a parabola with focus at the pole, $e=1$, and directrix $x = 10$.

Answer: $r = 10/(1 + 1 \cos(\theta))$; parabola; $e=1$; directrix $x = 10$

1. Compare $e=1$ with 1: $e<1$ ellipse, $e=1$ parabola, $e>1$ hyperbola.
2. A positive-axis directrix produces the displayed plus sign in the denominator.
3. Restriction: $1 + 1 \cos(\theta) \neq 0$.

6. Write the polar equation for an ellipse with focus at the pole, $e=3/4$, and directrix $y = -4$.

Answer: $r = 3/(1 - 3/4 \sin(\theta))$; ellipse; $e=3/4$; directrix $y = -4$

1. Compare $e=3/4$ with 1: $e<1$ ellipse, $e=1$ parabola, $e>1$ hyperbola.
2. A negative-axis directrix produces the displayed minus sign in the denominator.
3. Restriction: $1 - 3/4 \sin(\theta) \neq 0$.