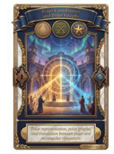
Polar Coordinates and Polar Graphs

Polar representation, polar graphs, and translation between polar and rectangular viewpoints.

Name ____________________ Date ________________

32 main | 2-up grid | 11 pages | visible side quests

Completion Reward



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1. What does a polar point (r, theta) describe?

A. An x-value and y-value
B. A distance from the pole and an angle from the polar axis
C. A slope and intercept
D. A length and an area

1.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

1.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

1.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

1.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

1.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

2. Which angle names the same direction as theta = pi / 3?

A. 2pi / 3
B. pi / 6
C. 7pi / 3
D. -pi / 6

2.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

2.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

2.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

2.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

2.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

3. What does a negative radius do in polar coordinates?

A. It points in the opposite direction of the angle
B. It reflects the point across the polar axis only
C. It makes the point undefined
D. It changes the angle by pi / 2

3.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

3.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

3.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

3.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

3.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

4. Which equations convert polar coordinates to rectangular coordinates?

A. x = rsin(theta), y = rcos(theta)
B. x = rcos(theta), y = rsin(theta)
C. x = cos(r), y = sin(theta)
D. x = r + theta, y = r - theta

4.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

4.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

4.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

4.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

4.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

5. Which equation is always true in polar coordinates?

A. r = x + y
B. theta = x^2 + y^2
C. r^2 = x^2 + y^2
D. x = y / r

5.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

5.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

5.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

5.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

5.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

6. What kind of graph is r = 4?

A. A line through the origin
B. A spiral
C. A parabola
D. A circle centered at the pole with radius 4

6.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

6.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

6.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

6.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

6.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

7. What kind of graph is theta = pi / 6?

A. A circle of radius pi / 6
B. A vertical line
C. A ray from the pole at angle pi / 6
D. A rose curve

7.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

7.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

7.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

7.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

7.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

8. Which type of graph commonly has petals?

A. A constant-radius circle
B. A ray
C. A linear function
D. A rose curve like r = 3cos(2theta)

8.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

8.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

8.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

8.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

8.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

9. Which equation is a cardioid-type graph?

A. r = 4
B. theta = pi / 3
C. r = theta
D. r = 2 + 2cos(theta)

9.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

9.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

9.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

9.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

9.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

10. To convert a rectangular point to polar form, what do you usually find first?

A. The slope-intercept form
B. r from x^2 + y^2
C. The tangent line at the point
D. The x-coordinate only

10.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

10.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

10.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

10.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

10.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

11. What is the best way to start understanding the graph of r = 2 + 2cos(theta)?

A. Convert immediately to slope-intercept form
B. Sample key angles and look for symmetry
C. Assume it is a line because of the plus sign
D. Differentiate it before graphing

11.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

11.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

11.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

11.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

11.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

12. A student converts (r, theta) to x = rsin(theta), y = rcos(theta). What is the mistake?

A. They swapped the cosine and sine roles for x and y
B. They forgot to square r
C. They should use tangent only
D. Nothing is wrong

12.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

12.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

12.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

12.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

12.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

13. A student says (3, pi / 4) and (-3, pi / 4) are the same point. What is wrong?

A. A negative radius points in the opposite direction
B. Negative radii are not allowed
C. The angle should be doubled
D. The radius should be squared

13.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

13.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

13.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

13.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

13.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

14. Convert (3, 4) to polar form. What is r? Answer with a number.

14.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

14.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

14.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

14.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

14.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

15. Convert (-5, 12) to polar form. What is r? Answer with a number.

15.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

15.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

15.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

15.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

15.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

16. Find x if (r, theta) = (6, pi / 3). Answer with a number.

16.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

16.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

16.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

16.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

16.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

17. Find y if (r, theta) = (6, pi / 3). Answer as an exact value.

17.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

17.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

17.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

17.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

17.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

18. For the point (1, sqrt(3)), find r. Answer with a number.

18.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

18.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

18.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

18.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

18.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

19. For the point (sqrt(3), 1), find a principal angle theta with 0 <= theta < 2pi. Answer as an exact value.

19.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

19.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

19.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

19.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

19.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

20. For the point (-1, sqrt(3)), find a principal angle theta with 0 <= theta < 2pi. Answer as an exact value.

20.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

20.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

20.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

20.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

20.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

21. For r = 4cos(theta), find r when theta = pi / 3. Answer with a number.

21.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

21.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

21.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

21.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

21.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

22. For r = 3 + 3sin(theta), find r when theta = pi / 2. Answer with a number.

22.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

22.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

22.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

22.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

22.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

23. For r = 2 + 2cos(theta), what is r when theta = pi? Answer with a number.

23.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

23.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

23.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

23.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

23.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

24. Find x if (r, theta) = (8, pi / 4). Answer as an exact value.

24.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

24.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

24.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

24.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

24.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

25. Find y if (r, theta) = (8, pi / 4). Answer as an exact value.

25.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

25.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

25.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

25.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

25.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

26. Write x in terms of r and theta. Answer as an equation.

26.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

26.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

26.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

26.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

26.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

27. Write y in terms of r and theta. Answer as an equation.

27.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

27.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

27.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
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A. the distance from the origin
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C. x and y are hidden
D. graphs are undefined

28. Write the relationship between r, x, and y. Answer as an equation.

28.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

28.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

28.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

28.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

28.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

29. Write a positive-radius point equivalent to (-4, pi / 3). Answer as an equation.

29.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

29.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

29.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

29.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

29.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph

30. Write the rectangular point equivalent to (2, pi / 2). Answer as an ordered pair.

30.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

30.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

30.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

30.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

30.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

31. Write the rectangular point equivalent to (2, pi). Answer as an ordered pair.

31.1. Which equations convert polar to rectangular coordinates?

A. x = r cos(theta), y = r sin(theta)
B. r = x + y, theta = xy
C. x = r + theta, y = r - theta
D. x = sin(r), y = cos(theta)

31.2. To convert a rectangular point to polar form, you need a radius and:

A. an intercept
B. an angle
C. a slope
D. a determinant

31.3. For the point (3, 4), the polar radius r is:

A. 4
B. 5
C. 7
D. 12

31.4. In polar coordinates, theta tells:

A. the distance from the origin
B. the direction from the positive x-axis
C. the y-intercept
D. the scale factor

31.5. Why can one polar point have many names?

A. angles can differ by full turns
B. radius is never fixed
C. x and y are hidden
D. graphs are undefined

32. Which point names the same location as (-2, pi / 6)?

A. (2, 7pi / 6)
B. (2, pi / 6)
C. (2, 5pi / 6)
D. (-2, 7pi / 6)

32.1. A polar point (r, theta) describes:

A. distance and direction from the pole
B. slope and intercept
C. two unrelated coordinates
D. a matrix entry

32.2. A negative radius in polar coordinates places the point:

A. on the same ray in the same direction
B. on the opposite ray
C. at the origin only
D. outside the plane

32.3. Which angle names the same direction as pi / 6?

A. 7pi / 6
B. 13pi / 6
C. -5pi / 6
D. 2pi / 3

32.4. A rose curve is recognized by:

A. repeating petal-like loops
B. a straight line only
C. a single parabola branch
D. a vertical asymptote

32.5. A cardioid is often recognized by its:

A. right-angle corners
B. heart-like single-loop shape
C. two asymptotes
D. straight-line graph