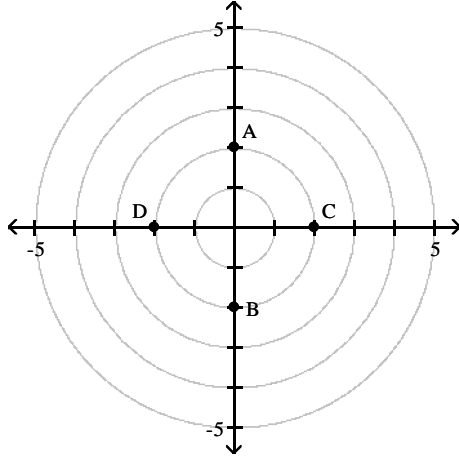Name_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Match the point in polar coordinates with either A, B, C, or D on the graph.

1) (2, 0)   1) _____

Find another representation, (r, θ), for the point under the given conditions.

2) $\left(1, \dfrac{\pi}{4}\right)$, r < 0 and 0 < θ < 2π   2) _____

3) $\left(3, \dfrac{\pi}{3}\right)$, r > 0 and –2π < θ < 0   3) _____

Polar coordinates of a point are given. Find the rectangular coordinates of the point.

4) (–9, 120°)   4) _____

5) $\left(7, \dfrac{3\pi}{4}\right)$ 5) _____

The rectangular coordinates of a point are given. Find polar coordinates of the point. Express θ in radians.

6) $(3, -3\sqrt{3})$ 6) _____

7) (–5, 0)   7) _____

Convert the rectangular equation to a polar equation that expresses r in terms of θ.

8) x = 9   8) _____

9) 6x – 9y + 10 = 0   9) _____

Convert the polar equation to a rectangular equation.

10) r = 8 csc θ   10) _____

11) $r = 5 \cos \theta + 2 \sin \theta$ 11) _____

Find the absolute value of the complex number.

   12) $z = 4 + 10i$ 12) _____

Write the complex number in polar form. Express the argument in degrees.

   13) $-2i$ 13) _____

Write the complex number in polar form. Express the argument in radians.

   14) $-4\sqrt{3} - 4i$ 14) _____

Write the complex number in rectangular form.

   15) $-3(\cos 225° + i \sin 225°)$ 15) _____

   16) $-3(\cos \dfrac{2\pi}{3} + i \sin \dfrac{2\pi}{3})$ 16) _____

Find the product of the complex numbers. Leave answer in polar form.

   17) $z_1 = 5(\cos 20° + i \sin 20°)$ 17) _____
   $z_2 = 4(\cos 10° + i \sin 10°)$

   18) $z_1 = 4i$ 18) _____
   $z_2 = -6 + 6i$

Find the quotient $\dfrac{z_1}{z_2}$ of the complex numbers. Leave answer in polar form.

   19) $z_1 = 8\left(\cos \dfrac{\pi}{2} + i \sin \dfrac{\pi}{2}\right)$ 19) _____

   $z_2 = 3\left(\cos \dfrac{\pi}{6} + i \sin \dfrac{\pi}{6}\right)$

   20) $z_1 = 4i$ 20) _____
   $z_2 = -6 + 6i$

Use DeMoivre's Theorem to find the indicated power of the complex number. Write the answer in rectangular form.

   21) $\left[2(\cos 15° + i \sin 15°)\right]^4$ 21) _____

   22) $(-\sqrt{3} + i)^6$ 22) _____

Find all the complex roots. Write the answer in the indicated form.

   23) The complex square roots of $4(\cos 120° + i \sin 120°)$ (polar form)   23) _____

Find the specified vector or scalar.

   24) $\mathbf{u} = -6\mathbf{i} - 2\mathbf{j}$, $\mathbf{v} = 8\mathbf{i} + 7\mathbf{j}$; Find $\mathbf{u} - \mathbf{v}$.   24) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

25) Let vector **u** have initial point $P_1 = (0, 2)$ and terminal point $P_2 = (4, 0)$. Let vector **v** have initial point $Q_1 = (3, 0)$ and terminal point $Q_2 = (7, -2)$. **u** and **v** have the same direction. Find $\|\mathbf{u}\|$ and $\|\mathbf{v}\|$. Is **u** = **v**?

25) _____

    A) $\|\mathbf{u}\| = \sqrt{6}, \|\mathbf{v}\| = \sqrt{6}$; yes   B) $\|\mathbf{u}\| = 2\sqrt{5}, \|\mathbf{v}\| = 2\sqrt{5}$; no

    C) $\|\mathbf{u}\| = 6, \|\mathbf{v}\| = 6$; no   D) $\|\mathbf{u}\| = 2\sqrt{5}, \|\mathbf{v}\| = 2\sqrt{5}$; yes

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the unit vector that has the same direction as the vector v.

26) $\mathbf{v} = 12\mathbf{i} + 5\mathbf{j}$

26) _____

Let v be the vector from initial point P_1 to terminal point P_2. Write v in terms of i and j.

27) $P_1 = (6, 4)$; $P_2 = (-4, -5)$

27) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the angle between the given vectors. Round to the nearest tenth of a degree.

28) $\mathbf{u} = -2\mathbf{i} + 5\mathbf{j}, \mathbf{v} = 4\mathbf{i} - 6\mathbf{j}$

28) _____

    A) 84.1°   B) 178.1°   C) 168.1°   D) 74.1°

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Write the vector v in terms of i and j whose magnitude $\|\mathbf{v}\|$ and direction angle θ are given.

29) $\|\mathbf{v}\| = 10, \ \theta = 120°$

29) _____

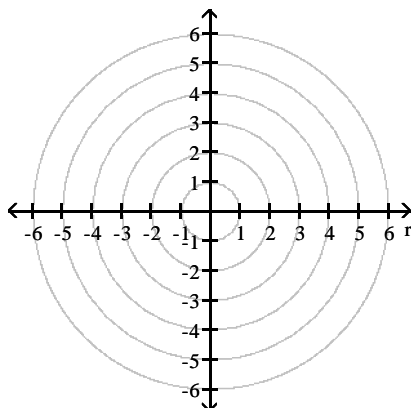**Find all the complex roots. Write the answer in the indicated form.**

30) The complex square roots of $2 \left(\cos \dfrac{2\pi}{3} + i \sin \dfrac{2\pi}{3}\right)$ (rectangular form)

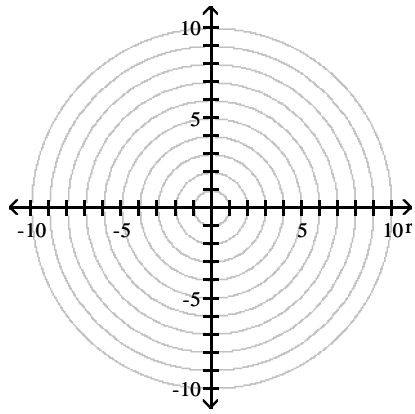30) _____

Use the given vectors to find the specified scalar.

31) $\mathbf{u} = -14\mathbf{i} + 10\mathbf{j}$ and $\mathbf{v} = 13\mathbf{i} + 10\mathbf{j}$; Find $\mathbf{u} \cdot \mathbf{v}$.

31) _____

Graph the polar equation.

32) $r = 6 \sin \theta$

32) _____

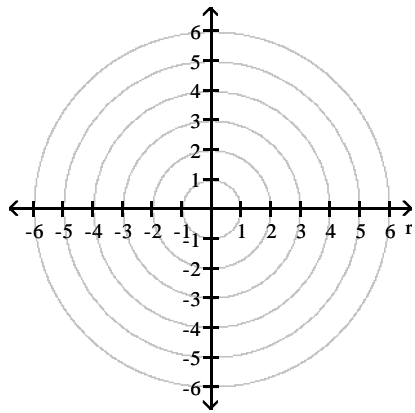33) $r = 6 - \cos\theta$

33) _____
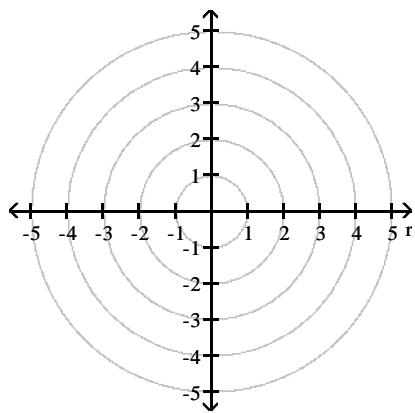
34) $r = 1 + \sin\theta$

34) _____

35) $r^2 = 16\cos(2\theta)$

35) _____