

MA 154 Common Core Final Exam Practice Problems

- Write an equation for the parabola with vertex at the origin and focus at (5, 0).
A. $x = 20y^2$ B. $y = 20x^2$ C. $x^2 = 20y$ D. $y^2 = 20x$
- Given that $\sin \theta = \frac{5}{7}$, and $\cos \theta = \frac{-2\sqrt{6}}{7}$, find $\csc \theta$.
A. $\frac{-7\sqrt{6}}{12}$ B. $\frac{7}{5}$ C. $\frac{5\sqrt{6}}{12}$ D. $\frac{-2\sqrt{6}}{5}$
- Rewrite the trigonometric function as an expression in u : $\cos(\sin^{-1} u)$
A. $\sqrt{1-u^2}$ B. $\frac{\sqrt{u^2+1}}{u}$ C. $\sqrt{u^2-1}$ D. $\sqrt{u^2+1}$
- A searchlight is shaped like a paraboloid of revolution. If the light source is located 3 feet from the base along the axis of symmetry and the opening is 12 feet across, how deep should the searchlight be?
A. 0.4 feet B. 9 feet C. 12 feet D. 3 feet
- Convert the following angle to degrees, minutes, and seconds: 86.78°
A. $86^\circ 46' 54''$ B. $86^\circ 46' 48''$ C. $86^\circ 46' 36''$ D. $86^\circ 46' 78''$
- Solve this equation on the interval $[0, 2\pi]$: $\sin^2 2\theta = 1$
A. $\left\{\frac{\pi}{8}, \frac{9\pi}{8}\right\}$ B. $\left\{0, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}\right\}$ C. $\left\{\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}\right\}$ D. No solution
- Find the exact value of this expression (Do not use a calculator.): $\csc 30^\circ - \cos 30^\circ$
A. $\frac{-\sqrt{3}}{6}$ B. $\frac{4-\sqrt{2}}{2}$ C. $\frac{4\sqrt{3}-3\sqrt{2}}{6}$ D. $\frac{4-\sqrt{3}}{2}$
- For what numbers x , $0 \leq x \leq 2\pi$, does $\sin x = 0$?
A. $\frac{\pi}{2}, \frac{3\pi}{2}$ B. $0, \pi, 2\pi$ C. $0, 1, 2$ D. $0, 1$

9. The letters r and θ represent polar coordinates. Write the equation using rectangular coordinates (x, y) : $r = 10\sin\theta$

A. $x^2 + y^2 = 10x$ B. $x^2 + y^2 = 10y$ C. $\sqrt{x^2 + y^2} = 10y$ D. $\sqrt{x^2 + y^2} = 10x$

10. Find the center, transverse axis, vertices, foci, and asymptotes of this hyperbola:

$$\frac{(x+3)^2}{25} - \frac{(y-1)^2}{36} = 1$$

- A. center at $(1, -3)$
 transverse axis is parallel to x-axis
 vertices at $(-4, -3)$ and $(6, -3)$
 foci at $(1 - \sqrt{61}, -3)$ and $(1 + \sqrt{61}, -3)$
 asymptotes of $y + 3 = -\frac{6}{5}(x - 1)$ and $y + 3 = \frac{6}{5}(x - 1)$
- B. center at $(-3, 1)$
 transverse axis is parallel to x-axis
 vertices at $(-9, 1)$ and $(3, 1)$
 foci at $(-3 - \sqrt{61}, 1)$ and $(-3 + \sqrt{61}, 1)$
 asymptotes of $y - 1 = -\frac{5}{6}(x + 3)$ and $y - 1 = \frac{5}{6}(x + 3)$
- C. center at $(-3, 1)$
 transverse axis is parallel to x-axis
 vertices at $(-8, 1)$ and $(2, 1)$
 foci at $(-3 - \sqrt{61}, 1)$ and $(-3 + \sqrt{61}, 1)$
 asymptotes of $y - 1 = -\frac{6}{5}(x + 3)$ and $y - 1 = \frac{6}{5}(x + 3)$
- D. center at $(-3, 1)$
 transverse axis is parallel to y-axis
 vertices at $(-3, -4)$ and $(-3, 6)$
 foci at $(-3, 1 - \sqrt{61})$ and $(-3, 1 + \sqrt{61})$
 asymptotes of $y + 1 = -\frac{5}{6}(x - 3)$ and $y + 1 = \frac{5}{6}(x - 3)$

11. Find the rectangular coordinates for the point whose polar coordinates are $\left(-5, \frac{3\pi}{4}\right)$.

A. $\left(\frac{-5\sqrt{2}}{2}, \frac{-5\sqrt{2}}{2}\right)$ B. $\left(\frac{5\sqrt{2}}{2}, \frac{-5\sqrt{2}}{2}\right)$ C. $\left(\frac{5\sqrt{2}}{2}, \frac{5\sqrt{2}}{2}\right)$ D. $\left(\frac{-5\sqrt{2}}{2}, \frac{5\sqrt{2}}{2}\right)$

12. Convert $\frac{4\pi}{5}$ radians to degrees.
 A. 143° B. 145° C. 146° D. 144°
13. Find the exact value of the expression $\sin(\tan^{-1} 2)$.
 A. $5\sqrt{2}$ B. $\frac{2\sqrt{5}}{5}$ C. $\frac{5\sqrt{2}}{2}$ D. $2\sqrt{5}$
14. Complete this identity: $\frac{1}{\cot^2 \theta} + \sec \theta \cos \theta = ?$
 A. $\csc^2 \theta$ B. $\tan^2 \theta$ C. 1 D. $\sec^2 \theta$
15. Find the exact value of $\cos \frac{\pi}{4}$.
 A. $\sqrt{2}$ B. $-\frac{\sqrt{2}}{2}$ C. $\frac{1}{2}$ D. $\frac{\sqrt{2}}{2}$
16. Solve the triangle using the information given. Round to two decimal places.
 $\alpha = 10^\circ, \beta = 80^\circ, a = 1$
 A. $\gamma = 90^\circ, b = 5.76, c = 5.67$ B. $\gamma = 90^\circ, b = 5.67, c = 5.76$
 C. $\gamma = 90^\circ, b = 5.76, c = 4.67$ D. $\gamma = 90^\circ, b = 6.67, c = 5.76$
17. Solve this equation on the interval $[0, 2\pi)$: $\cos^2 \theta + 2 \cos \theta + 1 = 0$
 A. $\left\{ \frac{\pi}{4}, \frac{7\pi}{4} \right\}$ B. $\{2\pi\}$ C. $\{\pi\}$ D. $\left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$
18. Find the period of $y = 5 \cos \frac{1}{2}x$.
 A. 5 B. 4π C. $\frac{\pi}{2}$ D. $\frac{5\pi}{2}$
19. The minute hand of a clock is 3 inches long. How far does the tip of the minute hand move in 30 minutes? Round your answer to two decimal places.
 A. 7.68 inches B. 10.65 inches C. 11.93 inches D. 9.42 inches

20. Solve this system using elimination.

$$\begin{cases} x^2 + y^2 = 49 \\ x^2 - y^2 = 49 \end{cases}$$

- A. (7, 0) (7, 7) B. (-7, 0) (-7, 7) C. (7, 0) (-7, 0) D. (7, 7) (-7, 7)

21. Find the exact value of: $\sin 20^\circ \cos 40^\circ + \cos 20^\circ \sin 40^\circ$.

- A. $\frac{\sqrt{3}}{3}$ B. $\frac{\sqrt{3}}{2}$ C. $\frac{1}{2}$ D. $\frac{1}{3}$

22. Solve this system of equations:

$$\begin{cases} 9x + 3y - z = 63 \\ x - 7y - 8z = -68 \\ 8x + y + z = 50 \end{cases}$$

- A. $x = -5, y = 7, z = 10$ B. $x = 5, y = 7, z = 3$
C. $x = 5, y = 3, z = 7$ D. inconsistent

23. Find the center, foci, and vertices of the ellipse whose equation is given:

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

- A. center at (0, 0)
foci at $(0, -2\sqrt{3})$ and $(0, 2\sqrt{3})$
vertices at (0, -4) and (0, 4)
- B. center at (0, 0)
foci at $(-2\sqrt{3}, 0)$ and $(2\sqrt{3}, 0)$
vertices at (-4, 0) and (4, 0)
- C. center at (0, 0)
foci at (0, -2) and (0, 2)
vertices at (0, -4) and (0, 4)
- D. center at (0, 0)
foci at (-4, 0) and (4, 0)
vertices at (-16, 0) and (16, 0)

24. Find polar coordinates for the point whose rectangular coordinates are: (0, 6).

- A. $(6, \pi)$ B. $\left(6, -\frac{\pi}{2}\right)$ C. $\left(6, \frac{\pi}{2}\right)$ D. (6, 0)

25. Solve this triangle. Round your answers to two decimal places.

$$a = 19, b = 16, c = 11$$

- A. $\alpha = 87.39^\circ, \beta = 57.27^\circ, \gamma = 35.33^\circ$ B. $\alpha = 53.33^\circ, \beta = 57.27^\circ, \gamma = 87.39^\circ$
C. $\alpha = 57.27^\circ, \beta = 87.39^\circ, \gamma = 35.33^\circ$ D. $\alpha = 87.39^\circ, \beta = 35.33^\circ, \gamma = 57.27^\circ$

26. If $\cos \theta = -0.3$, find the value of $\cos \theta + \cos(\theta + 2\pi) + \cos(\theta + 4\pi)$.
- A. 1.1 B. -0.3 C. -0.9 D. $-0.9 + 6\pi$
27. If $\sin \theta = \frac{2\sqrt{6}}{7}$ and $\tan \theta < 0$, find $\sin(2\theta)$.
- A. $-\frac{20\sqrt{6}}{49}$ B. $-\frac{1}{49}$ C. $\frac{1}{49}$ D. $\frac{20\sqrt{6}}{49}$
28. An arch in the form of half an ellipse is 40 feet wide and 15 feet high at the center. Find the height of the arch at 10 feet along its width.
- A. 13.79 feet B. 22.31 feet C. 5.00 feet D. 12.99 feet
29. A circle has a radius of 12 yards. Find the area of the sector of the circle formed by an angle of 40° . Round your answer to 2 decimal places.
- A. 50.27 sq. yds. B. 4.19 sq. yds. C. 16 sq. yds. D. 100.53 sq. yds.
30. Find the exact value of $\cot 30^\circ$.
- A. $\sqrt{3}$ B. $\frac{\sqrt{3}}{3}$ C. 1 D. $\frac{\sqrt{3}}{2}$
31. Which of the following trigonometric values are negative?
- I. $\sin(-292^\circ)$
 II. $\tan(-193^\circ)$
 III. $\cos(-207^\circ)$
 IV. $\cot(222^\circ)$
- A. II, III, and IV B. III only C. I and III D. II and III
32. Find the vertex, focus, and directrix of the parabola: $(y - 2)^2 = -12(x + 1)$
- A. vertex: (-1, 2) B. vertex: (2, -1) C. vertex: (1, -2) D. vertex: (-1, 2)
 focus: (2, 2) focus: (-1, -1) focus: (-2, -2) focus: (-4, 2)
 directrix: $x = -4$ directrix: $x = 5$ directrix: $x = 4$ directrix: $x = 2$
33. Write an equation for an ellipse with foci $(\pm 6, 0)$, and y-intercepts at ± 3 .

A. $\frac{x^2}{45} + \frac{y^2}{9} = 1$ B. $\frac{x^2}{45} + \frac{y^2}{9} = 6$ C. $\frac{x^2}{9} + \frac{y^2}{45} = 1$ D. $\frac{x^2}{9} + \frac{y^2}{45} = 6$

34. Solve this system of equations.

$$\begin{cases} x + y + z = -1 \\ x - y + 3z = 11 \\ 5x + 5y + 5z = -13 \end{cases}$$

A. $x = 4, y = -2, z = -3$

B. $x = 4, y = -3, z = -2$

C. $x = -3, y = -2, z = 4$

D. inconsistent

35. The coefficient of x^8 in the expansion of $(x^2 - 3)^7$ is:

A. -2835

B. 945

C. -945

D. 2835

Answers:

1. D 2. B 3. A 4. D 5. B 6. C 7. D 8. B 9. B 10. C 11. B 12. D
 13. B 14. D 15. D 16. B 17. C 18. B 19. D 20. C 21. B 22. B 23. B 24. C
 25. A 26. C 27. A 28. D 29. A 30. A 31. D 32. D 33. A 34. D 35. C