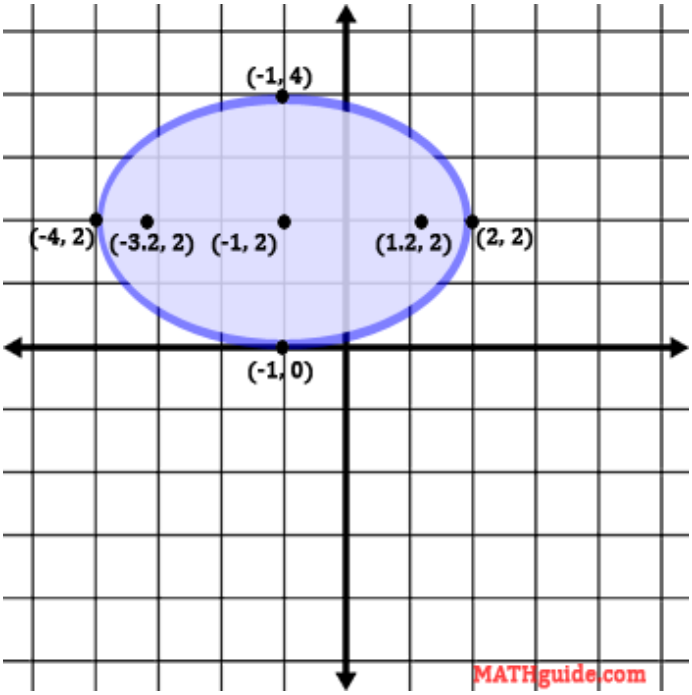
1. Convert the polar coordinates $(-2, \frac{\pi}{3})$ to rectangular coordinates.

A. $(1, -\sqrt{3})$
B. $(-1, -\sqrt{3})$
C. $(-1, \sqrt{3})$
D. $(1, \sqrt{3})$
E. NOTA

2. Identify the graph with equation: $x^2 - 2xy + y^2 = 4$.

A. Ellipse
B. Circle
C. 2 Parallel Lines
D. 2 Intersecting Lines
E. NOTA

3. Find a possible equation for the following ellipse:



A. $\frac{(x+1)^2}{9} + \frac{(y-2)^2}{4} = 1$
B. $\frac{(x-1)^2}{9} + \frac{(y+2)^2}{4} = 1$
C. $\frac{(x+1)^2}{36} + \frac{(y-2)^2}{64} = 1$
D. $\frac{(x-1)^2}{36} + \frac{(y+2)^2}{64} = 1$
E. NOTA

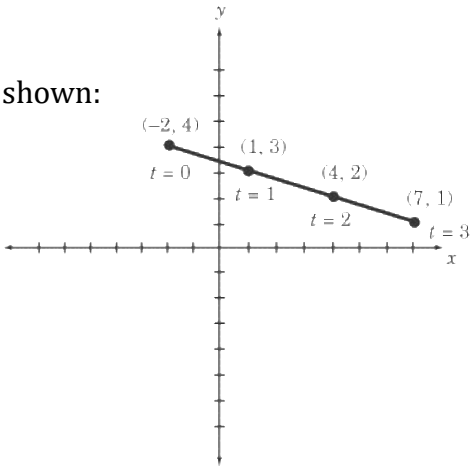
4. Find the eccentricity for the graph in Question 3.

A. $\frac{\sqrt{5}}{2}$
B. $\frac{\sqrt{13}}{2}$
C. $\frac{3}{2}$
D. $\frac{2\sqrt{5}}{5}$
E. NOTA

5. Find the area contained within the graph in Question 3.

A. 18π
B. 12π
C. 6π
D. 2π
E. NOTA

6. Find a set of parametric equations for the graph shown:



A. $x = -2 - 3t \quad y = 4 + t \quad t \mid 0 \le t \le 3$
B. $x = 3 - 2t \quad y = -1 + 4t \quad t \mid 0 \le t \le 3$
C. $x = -2 + 3t \quad y = 4 - t \quad t \mid 0 \le t \le 3$
D. $x = -2 + 3t \quad y = 4 - t \quad t \mid 0 < t < 3$
E. NOTA

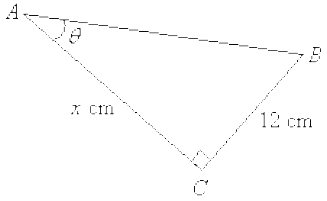
7. Using the given projectile motion equations, find the maximum height in meters of a baseball tossed at an initial angle of 60 degrees and speed of 5 meters per second. Assume the ball is traveling as a projectile and that gravity is 10 meters per square second.

Time of flight	$= \frac{2v_0 \sin\theta}{g}$
Maximum height reached	$= \frac{v_0^2 \sin^2\theta}{2g}$
Horizontal range	$= \frac{v_0^2 \sin 2\theta}{g}$

A. $\frac{5}{48}$
B. $\frac{15}{16}$
C. $\frac{5\sqrt{3}}{4}$
D. $\frac{15\sqrt{3}}{16}$
E. NOTA

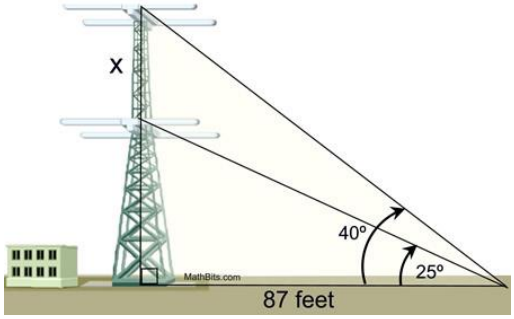
8. Find the horizontal range of the baseball from Question 7:
A. $\frac{5}{48}$
B. $\frac{15}{16}$
C. $\frac{5\sqrt{3}}{4}$
D. $\frac{15\sqrt{3}}{16}$
E. NOTA

9. What is the value of x if $\theta = \frac{\pi}{3}$ in Triangle ABC?



A. $2\sqrt{3}$
B. $4\sqrt{3}$
C. 6
D. 9
E. NOTA

10. Solve for x in feet on the tower diagram. Use the approximations:
$tan40° \approx 0.84$ *and* $tan25° \approx 0.47$



A. 54.12
B. 45.67
C. 34.87
D. 32.19
E. NOTA

11. Find the height of the tower from Question 10.
A. 67.91
B. 73.08
C. 92.34
D. 100.45
E. NOTA

12. Simplify: $\frac{\cot(x)\sin(x)}{\cos(x)}$
A. $\cos^2 x$
B. $\sin^2 x$
C. $\cot^2 x$
D. $\sin^3 x$
E. NOTA

13. Find the area of the polar graph of $r = 4sin\theta$
A. 12π
B. 8π
C. 4π
D. 2π
E. NOTA

14. Find the center of the graph in polar coordinates for Question 13.

A. $(-4, {}^{-\pi}/_{2})$
B. $(2, {}^{-\pi}/_{2})$
C. $(-2, {}^{\pi}/_{2})$
D. $(2, {}^{\pi}/_{2})$
E. NOTA

15. Find the circumference of the graph for Question 13.

A. 12π
B. 8π
C. 4π
D. 2π
E. NOTA

16. Solve $\tan\left(\frac{\theta}{2}\right) = \sqrt{3}$ on the interval $0 < \theta < 4\pi$. Find the sum of all values of θ.

A. $\frac{11\pi}{3}$
B. $\frac{10\pi}{3}$
C. 3π
D. 2π
E. NOTA

17. Solve for x on $[-2\pi, 0)$ for $2\sin^2 x - 3sinx = 2$.

A. $x = -\frac{5\pi}{6}, -\frac{11\pi}{6}$
B. $x = -\frac{7\pi}{6}, -\frac{11\pi}{6}$
C. $x = -\frac{5\pi}{6}, -\frac{7\pi}{6}$
D. $x = -\frac{5\pi}{6}, -\frac{13\pi}{6}$
E. NOTA

18. Solve: $\begin{vmatrix} -3 & 0 & 1 \\ -2 & 10 & 4 \\ 6 & -1 & 0 \end{vmatrix}$.

A. -50
B. -60
C. -70
D. -80
E. NOTA

19. Solve: $\begin{vmatrix} e^0 & \frac{0}{4} & \tan 0 \\ \sqrt[3]{-8} & \sec\pi & log_2 128 \\ 3! & cot\frac{\pi}{2} & \left(\frac{1}{2}\right)^{-3} \end{vmatrix}$.

A. -1
B. -4
C. -8
D. -16
E. NOTA

20. Simplify to solve the equation: $4log_9 x + 8 = 12$

A. $x = 9$
B. $x = 81$
C. $x = 3$
D. $x = 4$
E. NOTA

21. Out of forty-five students, 14 are taking English and 29 are taking Physics. 8 students are taking both. What is the probability that a randomly-chosen student from this group is taking only the Physics class?

A. $\frac{2}{15}$
B. $\frac{4}{15}$
C. $\frac{7}{15}$
D. $\frac{11}{15}$
E. NOTA

22. Find $P(student\ taking\ English|student\ taking\ Physics)$ for Question 21.

A. $\frac{8}{45}$
B. $\frac{8}{29}$
C. $\frac{2}{15}$
D. $\frac{8}{15}$
E. NOTA

23. MU University wants to make student ID badges with a code consisting of 2 different letters followed by 4 different digits. How many possible ID codes could the university have?

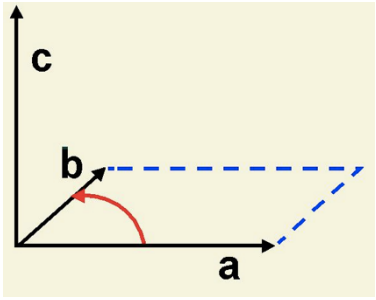
A. (7)(8)(9)(10)(25)(26)
B. (7)(8)(9)(10)(26)(26)
C. (10)(10)(10)(10)(25)(26)
D. (26)(26)(10)(10)(10)(10)
E. NOTA

24. What is the probability that an ID code from Question 23 would have two traditional vowels?

A. $\frac{10}{13}$
B. $\frac{9}{65}$
C. $\frac{1}{26}$
D. $\frac{2}{65}$
E. NOTA

25. Vector c is perpendicular to the two given vectors $\boldsymbol{a}$ and $\boldsymbol{b}$. What expression could equal c?

A. $a \cdot b$
B. $a \times b$
C. ab
D. $a + b$
E. NOTA



26. Find the absolute value of the triple scalar product of the vectors: $< 2,3,4 >$, $< -1,1,-1 >$ and $< -1,-3,-5 >$.

A. 1
B. 2
C. 3
D. 4
E. NOTA

27. Find the equation of the directrix of the graph of the equation in polar: $r = \frac{12}{4-4cos\theta}$.

A. $r = -3sec\theta$
B. $r = 3sec\theta$
C. $r = -3csc\theta$
D. $r = 3csc\theta$
E. NOTA

28. Given the function: $f(x) = \begin{cases} x-2 & x < -3 \\ x^2 & x \geq -3 \end{cases}$, find $\lim_{x \to -3^+} f(x)$.

A. 1
B. -5
C. 9
D. Does Not Exist
E. NOTA

29. An angle of $^{5\pi}/_{12}$ lies at the center of a circle and subtends an arc of the circle. If the diameter of the circle is 8 units, find the arc length.

A. $^{10\pi}/_{3}$
B. $^{5\pi}/_{3}$
C. $^{2\pi}/_{3}$
D. $^{\pi}/_{3}$
E. NOTA

30. Give the number of distinct permutations of the letters in the word BASEBALL.

A. 2520
B. 5040
C. 10080
D. Cannot be determined
E. NOTA