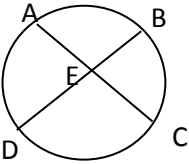


1. Solve for x : $\frac{(x^2+3x+2)(x-1)}{(x+2)} > 0$
 a. $X > 1$ b. $x > 1$ or $x < -1$ c. $x = 2$ d. $x > 3$ e. NOTA
2. Solve for x : $\log_2 x^4 + \log_4(16x) = 11$.
 a. 7 b. 4 c. 12 d. 6 e. NOTA
3. You have a goat that you want to let graze in a fenced-in rectangular field. You have 10 feet of fencing, and you will use one side of the barn as a side of the field - its dimensions are 25ft by 20ft. What is the greatest area that you can enclose (rounded to the nearest factor of 10 square feet)?
 a. 10 b. 20 c. 30 d. 40 e. NOTA
4. Katie and Zach are going on a hike, and they want to reach a waterfall by 2:00. If the trail has a total length of 4 miles, with 80% of it being easy trail and 20% of it being difficult trail, what is the latest time they should start their hike? They can travel the easy trail at 2 mph and the difficult trail at 1.5 mph.
 a. 11:50 b. 11:52 c. 11:56 d. 12:02 e. NOTA
5. An isosceles triangle has sides $2x$, $x+6$, and $x+1$. What are the possible values for x ?
 a. $X=3$ b. $x=1, x=6$ c. $x=6$ d. $x=8, x=2$ e. NOTA
6. $|3 - 4i| + |x - i| = 7$. What is x , if x is real and positive?
 a. $\sqrt{6}$ b. $3\sqrt{2}$ c. $2\sqrt{7}$ d. $\sqrt{3}$ e. NOTA
7. $(1 - i)^6 =$
 a. $7i$ b. 2^6 c. $2i$ d. $8i$ e. NOTA
8. What sort of conic is the following? $x^2 - 4x + 4y^2 + 24y + 36 = 0$
 a. circle b. hyperbola c. degenerate d. ellipse e. NOTA
9. What is the length of the major axis of the conic in the previous problem?
 a. 4 b. 8 c. 12 d. 2 e. NOTA
10. $\sum_1^{127} \log_2 \frac{n}{n+1} =$
 a. -5 b. -7 c. 5 d. -15 e. NOTA
11.  If $AE = x$, $BD = 2x+10$, $CE = 3x$, and $BE = x+6$, what is the length of AC ?
 a. 12 b. 16 c. 6 d. 8 e. NOTA

12. What is the length of the apothem of a regular hexagon with
 Area = $(\log_2 3)^2 + \log_2 243 + 4$ and
 Perimeter = $\log_2 9 + 2$?
- a. $\log_3 4$ b. $\log_2 3 + 1$ c. $\log_2 3 + 4$ d. $\log_2 6$ e. NOTA
13. What is the minimum y value of the following function? $y(x) = 3x^2 - 12x + 4$
- a. -6 d. 12 c. 8 d. -4 e. NOTA
14. What is the area of the region determined by the following inequalities?
- $$2 \leq y \leq 5$$
- $$x \geq 0$$
- $$x \leq 2y$$
- a. 39 b. 15 c. 27 d. 21 e. NOTA
15. Will starts out half a mile ahead of Ankie, and runs at a rate of $3x+2$ miles per hour, where x is a positive constant. If Ankie starts running at $4x+3$ miles per hour, how many hours will it take him to catch up to Will (in terms of x)?
- a. $\frac{1}{2x+1}$ b. $\frac{1}{x+2}$ c. $\frac{1}{2x-1}$ d. $\frac{1}{2x+2}$ e. NOTA
16. The perimeter of a rectangle is one more than four times its area, and the longer side is twice the shorter side. What is the longest possible length of the rectangle's longer side?
- a. 1 b. 2 c. $\frac{1}{2}$ d. $\frac{1}{4}$ e. NOTA
17. What is $\overline{.45}$ in fraction form?
- a. $\frac{2}{5}$ b. $\frac{5}{11}$ c. $\frac{6}{13}$ d. $\frac{21}{45}$ e. NOTA
18. $\ln(5x) - \ln(x + 1) - \ln(5) = 4$. What is x?
- a. $\frac{1}{1-e}$ b. $\frac{e^2}{4-e^4}$ c. $\frac{2}{1-e^2}$ d. $\frac{e^4}{1-e^4}$ e. NOTA
19. We want the root(s) of the denominator of the following function, once it is simplified, to be positive: $(s) = \frac{2s+1}{1+\frac{K}{2s+1}}$. For what values of K will this be true?
- a. $K > 1$ b. $K < -1$ c. $K < 2$ d. $1 < K < 5$ e. NOTA

20. If a population of bacteria begins with five members and doubles every thirty minutes, how many bacteria will the population have after three hours?
- a. 120 b. 320 c. 400 d. 160 e. NOTA
21. If A varies jointly with B and C, and A is 5 when B is 4 and C is 1. What is A when B is 2 and C is 8?
- a. 28 b. 32 c. 45 d. 20 e. NOTA
22. If we define the * operator as $A*B = (A+B)(A-B)$ for real values A and B, which of the following statements is true?
- I. * is commutative
II. * is associative
III. $(1*1)*2 = -4$
- a. I, II, and III b. I only c. II and III only d. III only e. NOTA
23. Solve the following matrix equation for x:
- $$\begin{bmatrix} 0 & 0 \\ x & 2 \end{bmatrix} \begin{bmatrix} x & 5x^2 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 3 & -5 \end{bmatrix}$$
- a. 5 b. 2 c. -2 d. 1 e. NOTA
24. What is the area of a regular hexagon with a side length of $2\sqrt{3}$?
- a. $2\sqrt{3}$ b. $4\sqrt{3}$ c. 12 d. 8 e. NOTA
25. What is the volume of the largest sphere that can fit into a cylinder with height of 5 and volume of 30π ?
- a. $8\pi\sqrt{6}$ b. $\pi\sqrt{3}$ c. $4\pi\sqrt{2}$ d. $2\pi\sqrt{6}$ e. NOTA
26. What is the volume in cubic inches of the (open) rectangular prism box formed if you cut 2 inch squares from the corners of a 12 by 16 inch sheet of paper and fold it into a box?
- a. 524 b. 192 c. 128 d. 620 e. NOTA
27. Simplify the following logical expression: $(A \cup \bar{A}) \cap ((\bar{B} \cap A) \cup (B \cap A))$, where \bar{X} represents the complement of X.
- a. $B \cup \bar{A}$ b. A c. B d. $A \cap \bar{A}$ e. NOTA

28. You are riding on a road at 5 mph, and your friend is riding on the same road in the same direction as you, in front of you, at 3 mph, with a head start of a half of a mile. How long will it take you to catch up to your friend?
- a. 20 minutes b. 10 minutes c. 15 minutes d. 45 minutes e. NOTA
29. What is the maximum y value attained by the following function: $y(x) = -2x^2 + 6x - 13$?
- a. 1.5 b. -2 c. -8.5 d. -12 e. NOTA
30. If the major axis of an ellipse is vertical with length 8, and its equation is $9a = by^2 + ax^2$, what is the value of a/b?
- a. $\frac{5}{9}$ b. $\frac{16}{9}$ c. $\frac{12}{17}$ d. $\frac{14}{3}$ e. NOTA