NOTA = None of these answers

1. Solve for y: $4y(2 + b) – b(3y - 1) = 5b$

A) $\frac{4b}{8+b}$ B) $\frac{1}{2}$ C) $\frac{6b}{8+b}$ D) $\frac{6}{5}$ E) NOTA

2. Give the value of the discriminant for $x^2 + 3x = 10$

A) 5 B) -5 C) 49 D) 7 E) NOTA

3. Determine the solution set of $| 2 – 3x | < 4$.

A) $(\frac{-2}{3},\infty)$ B) $(-\infty,\frac{-2}{3})$ C) $(\frac{-2}{3},2)$ D) $(-\infty,\frac{-2}{3})\cup(2,\infty)$ E) NOTA

4. A painting is twice as long as it is wide and it is held in a frame which has a uniform width of 2 inches. Find the length (in inches) of the picture, if the area of the frame is 86 square inches.

A) $10\frac{1}{3}$ in. B) $15\frac{1}{3}$ in. C) 5 in. D) 8 in. E) NOTA

5. Determine the sum, x + y, of the solution of the following system of equations:
$3x + y = 10$
$x – 3y – 10 = 0$

A) 1 B) 2 C) -2 D) 0 E) NOTA

6. If your grade was 90 and is now 75, find the percent of decrease.

A) $16\frac{2}{3}\%$ B) 18% C) 20% D) 22% E) NOTA

7. 40% of 10 inches is how many sixths of 2 feet?

A) $\frac{1}{3}$ B) 1 C) 2 D) 4 E) NOTA

8. If it takes 6 hours for 4 people to paint a room, how many hours will it take 5 people, working at the same rate, to paint a room that is the same size?

A) $3\frac{1}{3}$ B) $4\frac{4}{5}$ C) 5 D) $5\frac{1}{3}$ E) NOTA

9. If $a^3 = 7$, then what is the value of $4a^6$?

A) 28 B) 56 C) 196 D) 1372 E) NOTA

NOTA = None of these answers

10. Find the solution(s) to the following equation: $2x + 3 + \sqrt{29 - 4x} = 0$

A) 1 B) -5 C) -4 D) -5, 1 E) NOTA

11. If f(x) is a polynomial function and f(2) = f(3), which of the following statements must be true?

A) There are no real zeros between 2 and 3.
B) There is at least one real zero between 2 and 3.
C) 2.5 is a zero of f(x).
D) There may be a real zero between 2 and 3.
E) NOTA

12. The complex number $1 + i$ is a root of $2x^4 - x^3 - 4x^2 + 10x - 4 = 0$. Which of the following statements is true?

A) There are three remaining real roots of the equation.
B) Knowing one root of this equation is not sufficient information to find the other roots.
C) The equation has no rational roots.
D) There are two rational and two imaginary roots.
E) NOTA

13. In calculus, one often needs to simplify an expression of the form $\frac{f(x+h)-f(x)}{h}$.

If $f(x) = \frac{1}{x+1}$ then $\frac{f(x+h)-f(x)}{h}$ simplifies to which one of the following:

A) $\frac{1}{h(h+1)}$ B) $\frac{-1}{(x+1)(x+h+1)}$ C) $\frac{h+2}{h(x+1)(x+h+1)}$ D) $\frac{1}{h^2}$ E) NOTA

14. Find the vertical, horizontal, and slant asymptotes, if any, for $f(x) = \frac{2x^3 + 15x^2 + 34x + 18}{x^2 + 5x + 4}$

A) vertical: x = -4, x = -1
horizontal: y = 0

B) vertical: x = -4, x = -1
slant: y = 2x – 5

C) vertical: x = 4, x = 1
slant: y = 2x – 5

D) vertical: x = -4, x = -1
slant: y = 2x + 5

E) NOTA

NOTA = None of these answers

15. If the expression $px^3 + px + q$ is divided by $x - 1$, the remainder is 3. If it is divided by $x + 1$, the remainder is –7. What can be said about the coefficients of p and q?

A) they are positive and unequal numbers B) p = q C) p = 2.5 and q = 2
D) q = -2 and p can be any non-zero number E) NOTA

16. If r_1 and r_2 are the roots of the equation $ax^2 + bx + c = 0$, then $(r_1 - r_2)^2$ is equal to:

A) $\frac{b^2}{a^2}$ B) $\frac{b^2 - 4ac}{4a^2}$ C) $b^2 - 4ac$ D) $\frac{b^2 - 4ac}{a^2}$ E) NOTA

17. If $\frac{x^2}{9} - \frac{2}{3}x + 1 = 0$, then $\frac{x}{3}$ equals:

A) -3 B) 1 C) -2 D) 2 E) NOTA

18. If $y = \frac{\sqrt{(3x-5)(4x^2+12x+9)}}{6x^2 - x - 15}$ and x > 2, then y also equals:

A) $y = (3x-5)^{\frac{-1}{2}}$ B) $y = (3x-5)^{\frac{1}{2}}$ C) $y = \sqrt{\frac{1}{2x+3}}$ D) $y = \sqrt{\frac{2x+3}{3x-5}}$ E) NOTA

19. If $\log_8(\sqrt{a+x} + \sqrt{a-x}) + \log_8(\sqrt{a+x} - \sqrt{a-x}) = \frac{1}{3}$, find x.

A) -2 B) 2 C) 3 D) 8 E) NOTA

20. Find the sum of all of the real values of x for which $x^{\frac{2}{3}} - 3x^{\frac{1}{3}} = 4$

A) 7 B) 28 C) 53 D) 63 E) NOTA

21. Solve $\frac{a^x - a^{-x}}{2} = 3$ for all real numbers x where a > 0.

A) $\log_a(3 \pm \sqrt{10})$ B) $\log_a(3 + \sqrt{10})$ C) $\log_a(3 \pm 2\sqrt{2})$

NOTA = None of these answers

D) $\log_a \frac{1}{\sqrt{6}}$ E) NOTA

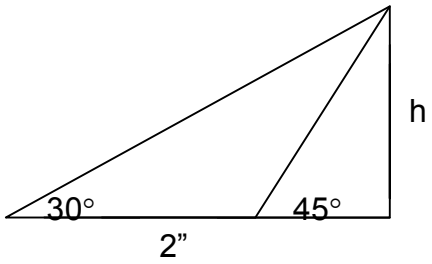
22. Given: x:y:z = 2:3:5, x + y + z = 100 and y = ax – 10
Find a.

A) 1.5 B) 2 C) 2.5 D) 3 E) NOTA

23. If $\frac{m}{n} = \frac{4}{3}$ and $\frac{r}{t} = \frac{9}{14}$ the value of $\frac{3mr-nt}{4nt-7mr}$ is:

A) -5.5 B) $\frac{-11}{14}$ C) -1.25 D) $\frac{11}{14}$ E) NOTA

24. A mathematical ant finds that by crawling back 2" more from a vertical blade of grass its angle of elevation decreases from 45° to 30°. How high is the blade of grass?



A) $\sqrt{3}$ " B) $3-\sqrt{3}$ C) $1+\sqrt{3}$

D) $2-\sqrt{3}$ E) NOTA

25. If $y = \frac{10^{\log x}}{x^3}$, for x > 0, then which statement is true?

A) y varies directly with x B) y varies directly as the cube root of x
C) y varies inversely with x^3 D) y varies inversely with x^2 E) NOTA

26. What is the circumference of the circle $x^2 + y^2 - 8x + 2y - 3 = 0$?

A) $2\pi\sqrt{5}$ B) $4\pi\sqrt{2}$ C) $4\pi\sqrt{5}$ D) 40π E) NOTA

27. What is the equation of the perpendicular bisector of the line segment whose endpoints are (3,5) and (-2,1)?

A) -10x – 8y + 29 = 0 B) 8x + 3y – 13 = 0 C) 4x – 3y + 7 = 0

D) -6x + 4y – 9 = 0 E) NOTA

NOTA = None of these answers

28. The longest chord possible to be drawn within $x^2 + 4y^2 - 2x - 24y - 19 = 0$ is what?

A) $6\sqrt{14}$ B) $14\sqrt{2}$ C) $4\sqrt{14}$ D) $2\sqrt{14}$ E) NOTA

29. What is the y-intercept of the equation of the line given by $\begin{vmatrix} 1 & x & -1 \\ 2 & y & 3 \\ 3 & 2 & 1 \end{vmatrix} = 10$?

A) (0, -6) B) (0, .5) C) (0, 5) D) $\left(0, \frac{-12}{11}\right)$ E. NOTA

30. Solve for x: $\begin{cases} xu = 400 \\ yv = 400 \\ x = 1.5y \\ v - u = 20 \end{cases}$

A) x = 10 B) x = 15 C) x = 20 D) x = 30 E) NOTA

31. Which of the following is the third term in the expansion of $\left(x^2 - 9\right)^{\frac{3}{2}}$?

A) $\frac{243}{8x}$ B) $\frac{-243}{8x}$ C) $\frac{-27x}{2}$ D) $\frac{27x}{2}$ E) NOTA

32. A boat takes two trips on a river. On the first trip, it travels upstream for 5 hours and returns in 2 hours. On the second trip it goes downstream for 3 hours, turns around and heads back upstream. After spending 7 hours on the return trip it is still 2 miles from its starting point. Which of the following is the speed of the current in miles per hours?

A) 3 B) 4 C) 6 D) 7 E) NOTA

33. If in ΔABC, $\angle C$ is a right angle, BC = 1 and $\tan \angle B = p$, find $\cos \angle A$.

A) $\frac{1}{\sqrt{p^2+1}}$ B) $\frac{p}{p+1}$ C) $\frac{p}{\sqrt{p^2+1}}$ D) $\frac{\sqrt{p^2+1}}{p}$ E) NOTA

34. If $x = \sqrt{yz}$, $x > 0$, $y > 0$ and $z > 0$, then log y = ?

A) $\frac{x^2}{z}$ B) $\frac{2\log x}{\log z}$ C) $2\log x - \log z$ D) $2(\log x - \log z)$ E) NOTA

NOTA = None of these answers

35. A teller totals his cash and finds q quarters, d dimes, n nickels, and p pennies. He later finds the x of his nickels were counted as quarters. Also, x of his dimes were counted as pennies. To correct his initial total he must:

A) subtract 11 cents B) subtract 11x cents C) add 11 cents

D) add 11x cents E) NOTA

36. If $(6x^2 + bx + 36) \div (2x + 7) = 3x + 5 + \frac{r}{2x+7}$ find r + b.

A) $\frac{-21}{2}$ B) 12 C) 31 D) 32 E) NOTA

37. If $6^{a+b} = 36$ and $6^{a+5b} = 216$ then a is equal to what?

A) $\frac{1}{4}$ B) $\frac{3}{4}$ C) $\frac{5}{4}$ D) $\frac{7}{4}$ E) NOTA

38. Given $A = \begin{bmatrix} x & 6 & 2 \\ 0 & 1 & -5 \\ -2 & 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 \\ 1 & 4 \end{bmatrix}$. If Q = the value of x for which A is singular and R = the sum of the entries in B^2, find the sum Q + R.

A) 19 B) 27 C) 45 D) 53 E) NOTA

39. How many of the following statements is/are always true about the function $f(x) = a^x$ where $a > 0$, and $a \neq 1$?

1) its domain is the positive real numbers

2) f(4) > f(-1)

3) its graph has a y-intercept at (0,1)

4) its graph is asymptotic to the line y = 0

5) If $g(x) = \log_a x$, the f(g(x)) = x

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

40. The altitude to the base of an isosceles triangle is 8, while the perimeter is 32. What is the area of the triangle?

NOTA = None of these answers

A) 24 B) 32 C) 40 D) 48 E) NOTA