

PICK (E) NOTA IF NONE OF THE ABOVE ANSWERS ARE CORRECT.

- Robert is 7 times as old as Ian. In twelve years, Ian will be  $\frac{1}{3}$  of Robert's age. What is Robert's age?  
 (A) 14 (B) 21 (C) 28 (D) 42 (E) NOTA
- Compute the discriminant of  $x^2 + 8x + 3 = 0$ .  
 (A) 52 (B) 64 (C)  $2\sqrt{13}$  (D)  $2\sqrt{19}$  (E) NOTA
- Josh's boat used 8 gallons of gas in 5 hours. At this rate, how many gallons of gas will the boat use in 16 hours?  
 (A) 10.0 (B) 12.2 (C) 16.0 (D) 25.6 (E) NOTA
- What is the vertex of the graph of  $y = 5x^2 - 4$ ?  
 (A)  $(\frac{4}{5}, -\frac{4}{5})$  (B)  $(-4, 5)$  (C)  $(0, -4)$  (D)  $(5, 4)$  (E) NOTA
- Find, in standard form, the equation of the line that passes through the points  $(-5, -2)$  and  $(3, -1)$ .  
 (A)  $x - 8y = 5$  (B)  $x + 8y = -5$  (C)  $x + 8y = -11$  (D)  $x - 8y = 11$  (E) NOTA
- Lily and Landon are trying out for the swim team. The probability that a girl and boy make the team is  $\frac{2}{3}$  and  $\frac{5}{7}$ , respectively. Assuming that the probability of making the swim team is independent between each individual person, what is the probability that Lily does not make the team and Landon does?  
 (A)  $\frac{4}{21}$  (B)  $\frac{5}{21}$  (C)  $\frac{8}{21}$  (D)  $\frac{20}{21}$  (E) NOTA
- Assume that  $x$  varies directly with  $y$  and inversely with  $z$ . Compute the constant of variation given that  $x = 6$  when  $y = 8$  and  $z = 12$ .  
 (A) 2 (B) 4 (C) 6 (D) 9 (E) NOTA
- What is the area of a circle with circumference of 16?  
 (A)  $\frac{16}{\pi^2}$  (B)  $\frac{64}{\pi}$  (C)  $64\pi$  (D)  $256\pi$  (E) NOTA
- Evaluate the expression  $\frac{\frac{1}{2} + \frac{4}{7}}{1 - \frac{5}{6} + \frac{2}{5}}$ .  
 (A)  $-\frac{450}{182}$  (B)  $-\frac{26}{15}$  (C)  $-\frac{13}{14}$  (D)  $\frac{13}{15}$  (E) NOTA
- Compute the distance between the points  $(\sqrt{6}, 4)$  and  $(0, 10)$ .  
 (A)  $\sqrt{6} - 14$  (B)  $\sqrt{42}$  (C)  $2\sqrt{6}$  (D)  $\sqrt{10}$  (E) NOTA
- Compute the sum  $x + y$  given the following systems of equations:  

$$\begin{aligned} 3y - 2x &= 13 \\ 6x - 4y &= -4 \end{aligned}$$
 (A)  $-\frac{43}{5}$  (B)  $-7$  (C) 11 (D) 13 (E) NOTA
- Convert  $427_5$  to base 10.  
 (A) 13 (B) 27 (C) 117 (D) 854 (E) NOTA
- What is the degree of the monomial  $7x^2y^3z$ ?  
 (A) 2 (B) 3 (C) 6 (D) 7 (E) NOTA

14. Which of the following numbers is/are rational?

(a)  $\frac{1}{3}$

(b)  $\sqrt{2}$

(c)  $\sqrt{4}$

(d) The area of a circle with radius 6.

(A) b,d only                      (B) a,c only                      (C) c only                      (D) a,c,d only                      (E) NOTA

15. Solve for  $x$  over the reals:  $16x^{-3} = x$ .

(A) 0                      (B) 2                      (C) 2, -2                      (D) -2, 0, 2                      (E) NOTA

16. Eli wants to solve the equation  $4x + 5 = 2(2x - 72)$ . Assuming Eli solves every math problem correctly, what is the answer he should end up with?

(A) 10                      (B) 11                      (C) 12                      (D) 13                      (E) NOTA

17. Jackson currently has 80 mL of a 60% diluted orange juice. How much pure orange juice (in mL) should Jackson add to his current mixture if he wishes to obtain a 75% diluted mixture?

(A) 15                      (B) 32                      (C) 48                      (D) 95                      (E) NOTA

18. Find the sum of the absolute values of the solutions to the equation  $|5x + 6| = 60$ .

(A)  $-\frac{12}{5}$                       (B)  $-\frac{16}{5}$                       (C) 18                      (D) 24                      (E) NOTA

19. In how many distinct ways can the letters in the word TOMATO be rearranged?

(A) 48                      (B) 96                      (C) 180                      (D) 720                      (E) NOTA

20. The basketball team at Orange County High would like to win at least 60% of their games during the 50-game season. If they lost 12 of their first 30 games, what is the greatest number of games they can lose in their last 20 games?

(A) 9                      (B) 12                      (C) 15                      (D) 18                      (E) NOTA

21. What property is illustrated by the following equation:

$$ab(c) = a(bc).$$

(A) Commutative                      (B) Distributive                      (C) Associative                      (D) Transitive                      (E) NOTA

22. Define a binary operator @ such that  $a@b = a^2 - 2ab$ . Compute  $5@4$ .

(A) -30                      (B) -25                      (C) -24                      (D) -15                      (E) NOTA

23. Evaluate  $3^{2^2}$ .

(A) 81                      (B) 243                      (C) 729                      (D) 6561                      (E) NOTA

24. Classify the following system of equations as either Dependent, Independent, Consistent, or Inconsistent:

$$2x + 8y = -6$$

$$x + 4y = -3$$

(A) Dependent                      (B) Independent                      (C) Consistent                      (D) Inconsistent                      (E) NOTA

25. What is the slope of the line perpendicular to the line  $4x - 3y = 8$ ?
- (A)  $\frac{3}{4}$                       (B)  $\frac{4}{3}$                       (C)  $-\frac{3}{4}$                       (D)  $-\frac{4}{3}$                       (E) NOTA
26. Find the product of all roots of the equation  $x^3 + 2x^2 - x + 2 = 0$ .
- (A) -4                      (B) -2                      (C) 2                      (D) 4                      (E) NOTA
27. Simplify the expression  $\frac{x^{-4}y^3z^5}{x^{-2}y^{-6}z^9}$  into the form  $x^a y^b z^c$  where  $a, b, c$  are integers.
- (A)  $x^2y^{-3}z^4$                       (B)  $x^{-2}y^9z^{-4}$                       (C)  $x^2y^9z^{-4}$                       (D)  $x^{-2}y^3z^4$                       (E) NOTA
28. If there are 8 people at a party and every person shakes the hand of everyone else, how many handshakes were exchanged?
- (A) 28                      (B) 35                      (C) 49                      (D) 56                      (E) NOTA
29. Given that  $x^2 + y^2 = 333$  and  $xy = 54$ , compute  $|x + y|$ .
- (A) 15                      (B) 21                      (C) 25                      (D) 55                      (E) NOTA
30.  $\triangle ABC$  has  $AB = 6$ ,  $BC = 8$  and altitude  $\overline{AD}$  to side  $AC$  equal to 4.7. Classify triangle  $ABC$  as either acute, obtuse, or right.
- (A) Acute                      (B) Obtuse                      (C) Right                      (D) NOTA