For all questions, answer E, "NOTA," means None Of The Above.

1. A petroleum tank in the shape of an inverted cone is being filled with petroleum at the rate of 16 cubic feet per minute. If the tank is full after 3 hours, and is twice as wide at its opening as it is tall, how tall is the tank, to the nearest inch?

   (A) 9 ft. 9 in. (B) 14 ft. 0 in. (C) 14 ft. 3 in. (D) 20 ft. 6 in. (E) NOTA

2. A pile of logs has 32 logs in the first layer, 31 logs in the second layer, 30 logs in the third layer, and so on through to the top layer, which contains just one log. How many logs are on the pile?

   (A) 2112 logs (B) 1056 logs (C) 528 logs (D) 264 logs (E) NOTA

3. A basketball player shoots a jump shot from a spot on the floor that goes through the basket on its downward arc. The ball's height above the floor at time t seconds is given by the quadratic function $h(t) = -16t^2 + v_0 \cdot t + h_0$, where v_0 is the initial upward velocity and h_0 is the initial height of the basketball. If the ball is released 7 feet above the floor with an initial upward velocity of 26 feet per second, and the basket is 10 feet above the floor, at what time t will the basketball pass through the hoop?

   (A) 0.125 sec (B) 0.8125 sec (C) 1.5 sec (D) 1.86 sec (E) NOTA

4. Find the area of the circle with equation $x^2 + y^2 - x + 3y - 6 = 0$.

   (A) $\frac{\sqrt{34}}{2}\pi$ units^2 (B) $\frac{17}{2}\pi$ units^2 (C) 34π units^2 (D) $\frac{289}{4}\pi$ units^2 (E) NOTA

5. Sylvester deposits his $12 monthly allowance in his savings account on the first day of each month beginning on January 1st. If the savings account earns an annual interest rate of 3.25%, and it is compounded monthly on the last day of each month, how much will he have in his account to the nearest cent following the December 31st compounding period of that same year (but prior to the next deposit)?

   (A) $190.80 (B) $178.36 (C) $158.56 (D) $146.56 (E) NOTA

6. A rabbit warren population is known to have tripled in 11 months. If after 2 years it has a population of 462 rabbits, what was its initial population?

   (A) 19 rabbits (B) 38 rabbits (C) 42 rabbits (D) 154 rabbits (E) NOTA

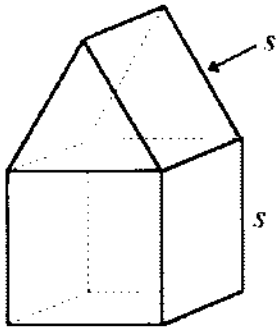
7. A silversmith has two alloys, the first containing 35% silver and the second containing 60% silver. If she has smelted and combined certain quantities of each alloy to obtain 100 g of an alloy containing 50% silver, how much of the 60% alloy did she use?

(A) 60 g (B) 40 g (C) 35 g (D) 15 g (E) NOTA

8. The effectiveness rating E of a certain cleanser at temperature T degrees Fahrenheit is given by the quadratic equation $E(T) = -\frac{25}{729} \cdot T^2 + \frac{4300}{729} \cdot T - \frac{112000}{729}$. If the effectiveness rating E ranges from 0 (least effective) to 100 (most effective), what is the temperature range over which this product is considered effective?

(A) $0^\circ < T < 100^\circ$ (B) $32^\circ < T < 212^\circ$ (C) $32^\circ < T < 108^\circ$ (D) $32^\circ < T < 140^\circ$ (E) NOTA

9. Alvaro plans to build a doghouse for his dog Oravla resembling the figure below. The base structure is a cube with dimension s, while the roof structure is a triangular prism with sloping edges that are the same as the length of the edge of the cube. If the volume of the entire structure is $5832 + 1458\sqrt{3}$ cubic inches, find the total length of wood necessary to build the structure's frame, as shown in the diagram by solid or dotted lines.



(A) 306" (B) 216" (C) 204" (D) 186" (E) NOTA

10. Jack is saving beans. He saves 1 bean on the first day, 4 beans on the second, 7 on the third, and so on. How many beans will he have saved after 25 days?

(A) 73 beans (B) 925 beans (C) 963 beans (D) 1850 beans (E) NOTA

11. Under certain conditions the atmospheric pressure p at altitude h is given by $p(h) = 29e^{kh}$. If the pressure at h=1000 is 28.0306, find the height h to the nearest ten when the atmospheric pressure is 27.

(A) 20 (B) 30 (C) 2,110 (D) 3,400 (E) NOTA

12. The electrical resistance of a wire varies directly as its length and inversely as the square of its diameter. If a wire 100 feet long of diameter 0.01 inches has a resistance of 25 ohms, find the resistance in a wire made of the same material which has a diameter of 0.015 inches and is 50 feet long.

(A) $5.\overline{5}$ ohms (B) $8.\overline{3}$ ohms (C) $55.\overline{5}$ ohms (D) $555.\overline{5}$ ohms (E) NOTA

13. A man wishes to put a fence around a rectangular field and then subdivide this field into three smaller rectangular plots by placing two fences parallel to one of the sides. If he can afford only 1000 yards of fencing, what is the maximum area possible?

(A) 125,000 yds^2 (B) 62,500 yds^2 (C) 31,250 yds^2 (D) 15,625 yds^2 (E) NOTA

14. Three particles have their movements restricted each to their own plane. These planes are non-parallel planes whose equations are as follows:

$$\begin{cases} 2x + 3y - z = -1 \\ -x + 5y + 3z = -10 \\ 3x - y - 6z = 5 \end{cases}$$

If (x, y, z) is the only point at which all three particles could simultaneously collide, what is $4x + 7y - 4z$?

(A) -6 (B) 0 (C) 4 (D) 6 (E) NOTA

15. Your family is planning to buy a new water heater. Brand A's water heater costs \$327 to buy and costs \$52 per month to operate. Brand B is a more expensive water heater that costs \$526 to buy, but is more efficient and only costs \$46 per month to operate. After how many months would the cost of buying and operating Brand B's water heater be a better investment?

(A) 8 months (B) 9 months (C) 33 months (D) 34 months (E) NOTA

16. Find the value of the following expression:

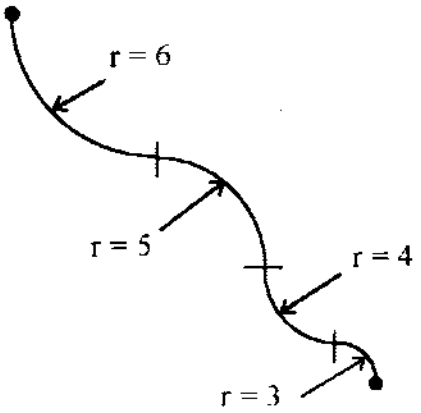
$$3 + \cfrac{1}{3 + \cfrac{1}{3 + \cfrac{1}{3 + \cfrac{1}{3 + \ldots}}}}$$

(A) $\frac{3}{2} - \frac{\sqrt{13}}{2}$ (B) $\frac{10}{3}$ (C) $\frac{3}{2} + \frac{\sqrt{13}}{2}$ (D) 4 (E) NOTA

17. In Physics applications, it is known that the period (the length of time it takes to make one complete swing) of a pendulum varies directly with the square root of the length of the pendulum. Through experimentation, it is observed that a pendulum 0.5 meters long swings with a period of 0.71 seconds. If a similar pendulum swings with a period of 7 seconds, how long is the pendulum?

(A) 3.8 m (B) 4.93 m (C) 45.8 m (D) 49.87 m (E) NOTA

18. A particle travels along a path made of four quarter-circles as shown below. The arcs are of circles of radius 6, 5, 4, and 3 inches, respectively. What is the straight line distance between the beginning and ending points of the path?



(A) 9 in. (B) $9\sqrt{2}$ in (C) 18 in. (D) 36 in. (E) NOTA

19. Using the same figure as in Question 18, what is the distance traveled along the path by the particle?

(A) 9π in. (B) 18π in. (C) 27π in. (D) 36π in. (E) NOTA

20. A typical boxing match lasts twelve rounds of 3 minutes each, and 1 minute between each round. How long would a boxing match last if it "went the distance" (lasted the full twelve rounds)?

(A) 35 minutes (B) 36 minutes (C) 47 minutes (D) 48 minutes (E) NOTA

21. Shaquille O'Neal and Muggsy Bogues are standing near each other on a bright sunny day. Muggsy, who is 5' 3" tall, casts a shadow that is 4' 1". Find the length of Shaquille's shadow to the nearest hundredth of an inch, given that he is 7' 3" tall.

(A) 4' 8.47" (B) 4' 8.62" (C) 5' 7.49" (D) 5' 7.67" (E) NOTA

22. If f is a linear function of x, and $f(3) = 11$ while $f(-7) = 31$, find the value of x such that $f(x) = 41$.

(A) -36 (B) -18 (C) -12 (D) 12 (E) NOTA

23. A rectangular room that measures 13 feet wide and 18 feet long is to have its floor completely tiled, and both short walls and one of the long walls is to be tiled from the floor up to a height of 4 feet. The tiles to be used measure 6" × 6". Disregarding the space between tiles, how many cases of tiles are necessary to complete the job if the tiles come 72 to a case and only whole cases may be purchased?

(A) 11 (B) 12 (C) 22 (D) 23 (E) NOTA

24. What is **the length to the nearest centimeter** of the diagonal of a rectangular solid that has dimensions 40 cm × 2 m × 5 m?

(A) 671 cm (B) 540 cm (C) 404 cm (D) 400 cm (E) NOTA

25. Find the probability of getting exactly two aces when five cards are drawn without replacement from a standard 52-card deck of playing cards.

(A) 3.99% (B) 0.399% (C) 0.0399% (D) 0.00399% (E) NOTA

26. How many permutations are possible of the letters in GRENELEFE?

(A) 362,900 (B) 60,480 (C) 36,290 (D) 15,120 (E) NOTA

27. Adriana has scored 98, 88, 89, 91, and 96 on five of seven tests in her Anatomy class. What must she average on the final two tests in order to achieve an average of 94 on all her tests?

(A) 94 (B) 95 (C) 96 (D) 97 (E) NOTA

28. A committee of six is selected at random from a group of 11 members of Congress (6 Democrats and 5 Republicans). What is the probability to the nearest tenth of a percent that it will have at least 3 Republicans?

(A) 2.2% (B) 39.2% (C) 43.3% (D) 60.8% (E) NOTA

29. If you are using a *theodolite*, what are you most likely measuring?

(A) luminosity of a celestial body (B) an angle in surveying (C) distance to a far-off object (D) temperature of a celestial body (E) NOTA

30. In how **many ways (combinations** of # right and # wrong) could you earn a score of 76 on this test?

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