Note: For all questions, answer "(E) NOTA" means none of the above answers is correct.

1. What is the length of the side of a square that has the same number of units in its perimeter as square units in its area?

   (A) 2 (B) 4 (C) 8 (D) 16 (E) NOTA

2. Find the volume of a sphere with a diameter of 12.

   (A) 36π (B) 144π (C) 288π (D) 864π (E) NOTA

3. Find the area of a regular hexagon with a side length of 8.

   (A) $24\sqrt{3}$ (B) $48\sqrt{3}$ (C) $64\sqrt{3}$ (D) $96\sqrt{3}$ (E) NOTA

4. How much grass is needed to cover a rectangular yard that is 40 feet long and 30 feet wide?

   (A) $120\,ft^2$ (B) $300\,ft^2$ (C) $600\,ft^2$ (D) $1200\,ft^2$ (E) NOTA

5. Find the area of a $100°$ sector of a circle with a radius of 8.

   (A) $\frac{80\pi}{3}$ (B) $\frac{160\pi}{9}$ (C) $\frac{64\pi}{3}$ (D) 64π (E) NOTA

6. Find the surface area of a sphere with a volume of 288π.

   (A) 24π (B) 36π (C) 144π (D) 216π (E) NOTA

7. If the length of a rectangle is decreased by 20%, by what percent must the width be increased for the area to remain the same?

   (A) 20% (B) 25% (C) 40% (D) 45% (E) NOTA

8. A school cafeteria makes 300 pancakes for breakfast each day. Each pancake is a perfect circle 5 inches across and $\frac{1}{4}$ inch thick. It takes 3 cups of flour, 1 cup of milk, 2 eggs, and $\frac{1}{4}$ cup of oil to make 10 pancakes. How many eggs do they need to make pancakes for the whole school week (Monday to Friday)?

   (A) 30 (B) 60 (C) 300 (D) 600 (E) NOTA

9. What is the area of a rectangular yard enclosed by a fence that is 30 feet long and 20 feet wide?

(A) 60 ft (B) 600 ft (C) 60 ft^2 (D) 600 ft^2 (E) NOTA

10. Find the volume of a cube if the diagonal of one face has a length of 4.

(A) 8 (B) $8\sqrt{2}$ (C) 16 (D) $16\sqrt{2}$ (E) NOTA

11. Find the surface area of a cube if the diagonal of the cube has a length of 12.

(A) 96 (B) 124 (C) 296 (D) 432 (E) NOTA

12. Find the volume of a sphere with a surface area of 400π.

(A) $\frac{40\pi}{3}$ (B) $\frac{400\pi}{3}$ (C) $\frac{4000\pi}{3}$ (D) 4000π (E) NOTA

13. What is the area of a trapezoid with bases of 12 and 28 and legs of length 10?

(A) 120 (B) 170 (C) 200 (D) 400 (E) NOTA

14. What is the surface area of a cylinder with a radius of 4 inches and a height of 1 foot?

(A) 36π in^2 (B) 40π in^2 (C) 64π in^2 (D) 128π in^2 (E) NOTA

15. A cone has a radius and height that are both 10 inches. What is the volume, in cubic inches, of a frustum formed by passing a plane through the cone parallel to and 5 inches from the base?

(A) $\frac{250\pi}{3}$ (B) $\frac{500\pi}{3}$ (C) $\frac{875\pi}{3}$ (D) $\frac{1000\pi}{3}$ (E) NOTA

16. What is the area of a triangle with vertices at $(2,3)$, $(6,6)$, and $(2,9)$?

(A) 24 (B) $12\sqrt{3}$ (C) $9\sqrt{3}$ (D) 12 (E) NOTA

17. What is the surface area of an a ice cream cone (sugar cone) that has a height of 7 and an opening that is 2 across?

(A) $10\pi\sqrt{2}$ (B) 10π (C) $5\pi\sqrt{2}$ (D) 5π (E) NOTA

18. A circle with its center at the origin is tangent to the line $3x+4y=15$. What is the volume of a sphere whose radius is equal to the radius of the circle?

(A) 125π (B) 108π (C) 36π (D) 24π (E) NOTA

19. What is the volume of a sphere contained inside and tangent to all faces of cube with a volume of 512?

(A) 512π (B) 256π (C) $\frac{512\pi}{3}$ (D) $\frac{256\pi}{3}$ (E) NOTA

20. Find the volume of a rectangular solid with a length of 16, a height of 10, and a surface area of 840.

(A) 1600 (B) 1200 (C) 840 (D) 800 (E) NOTA

21. Zelda is knitting a blanket for her granddaughter. She wants the blanket to cover the bottom of the crib. The crib is in the shape of an ellipse 4 feet long and 2 feet across. What is the area that must be covered? Express your answer in square feet.

(A) 16π (B) 12π (C) 8π (D) 2π (E) NOTA

22. In rectangle RECT, M is the midpoint of segment RE, N is the midpoint of segment CT, and P and Q trisect the segment RT such that P is between R and Q. Let O be a point on the segment MN . If RE=30 inches and EC=9 inches, what is the number of square inches in the area of the triangle ROQ?

(A) 180 in^2 (B) 135 in^2 (C) 90 in^2 (D) 45 in^2 (E) NOTA

23. Let S_1 be a square. Let S_2 be a square inscribed inside S_1 so that the vertices of S_2 bisect the sides of S_1 and so on, let S_n be a square inscribed inside S_{n-1} so that the vertices of S_n bisect the sides of S_{n-1}. What fraction of the area of square S_1 is the area of square S_{10}?

(A) $\frac{1}{128}$ (B) $\frac{1}{256}$ (C) $\frac{1}{512}$ (D) $\frac{1}{1024}$ (E) NOTA

24. A rectangle with vertices A(0,0), B(6,0), C(6,3) and D=(0,3) is graphed in a coordinate plane. The rectangular region determined by these points is rotated 360 degrees about the y-axis forming a geometric solid. The same rectangular region is then rotated 360 degrees about the x-axis forming another geometric solid. How many square units are in the positive difference between the total surface areas of these two geometric solids?

(A) 56π (B) 55π (C) 54π (D) 53π (E) NOTA

25. A right triangle and a square have areas with a ratio of 1:4 respectively. The triangle has one leg of length 8 and the hypotenuse is 17. What is the length of the diagonal of the square?

(A) 240 (B) $4\sqrt{30}$ (C) $4\sqrt{15}$ (D) 15 (E) NOTA

26. A kiddie pool in the shape of a rectangle with uniform depth has a length of 15 feet, a width of 8 feet, and a depth of 1.5 feet. Water is being pumped in at a rate of 10 cubic feet per minute. At what rate is the water level rising?

(A) 1 inch/min (B) 1 foot/min (C) 1 inch/sec (D) 1 foot/sec (E) NOTA

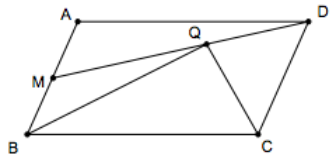
27. The school cafeteria is now making 500 pancakes for breakfast each day. Each pancake is a perfect circle 5 inches across and $\frac{1}{4}$ inch thick. How much pancake batter do they need to make per day?

(A) 1875π in^3 (B) 781.25π in^3 (C) 375π in^3 (D) 6.25π in^3 (E) NOTA

28. Hilda wants to paint her living room walls. The ceiling is 9 feet tall. Two of the walls are rectangles measuring 40 feet long and the other two are 20 feet wide. If a quart of paint will cover 100 square feet and she must buy the paint by full quarts, how many cans will she need to paint all four walls?

(A) 11 (B) 10 (C) 6 (D) 5 (E) NOTA

29. Refer to the diagram below. In parallelogram *ABCD*, CD = 12, AM = 6, and ΔQMB and ΔDQC each have an area of 60. Find the area of ΔQBC.



(A) 270 (B) 150 (C) 120 (D) 60 (E) NOTA

30. A tanker truck's tank is in the shape of a right circular cylinder whose axis (line through centers of the bases) is parallel to the ground. The radius of a base of the cylinder is 6 feet and the cylinder's length is 30 feet. If the tank has $\left(720\pi + 270\sqrt{3}\right)$ cubic feet of liquid in it, and the top of the liquid creates a chord of length $6\sqrt{3}$ feet at the top of the tanker, how deep is the liquid? Express your answer in feet.

(A) 9 (B) 8 (C) 7 (D) 6 (E) NOTA