MU ALPHA THETA - MAINE '95 TOPIC TEST
THETA - PERIMETERS, AREAS, VOLUMES, CIRCUMFERENCES...

1. Find the longer base, in feet, of a trapezoid whose area is 88 square ft, altitude of 8 feet, and shorter baseof 10 feet.

a. $9\frac{8}{9}$ b. 12 c. 18 d. 22 e. not given

2. Find the volume, in cubic cm, of a right circular cone with base radius 6 cm and slant height 10 cm.

a. 96π b. 120π c. 288π d. 360π e. not given

3. Find the area of a circle formed when a plane passes two cm from the center of a sphere with radius five cm.

a. 21π b. 25π c. 29π d. 42π e. not given

4. The volume of a sphere is twice its surface area (diesregarding units). Find the radius of the sphere.

a. 4 b. 6 c. 8 d. 10 e. not given

5. Given circle P with triangle ABC inscribed. The area of triangle ABC is 24 square inches. If AC = 6, then the area of circle P is. State your answer rounded to the nearest tenth.

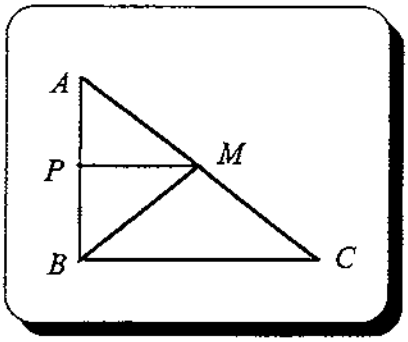
a. 31.4 b. 40.8 c. 78.5 d. 314.2 e. not given

6. The product of the lengths of the diagonals of a rhombus is 12. The sum of the squares of the lengths of the diagonals is 25. Find the area of the rhombus.

a. $3\sqrt{2}$ b. 5 c. 6 d. 12.5 e. not given

7. A sector of a circle has a 45°arc and an area of 8π. Find the radius, in units, of the sector.

a. 4 b. 6 c. 8 d. 12 e. not given



8. Given: $\angle ABC$ is a right angle. BM is a median. MP $\perp$ AB. BM = 10. MP = 8
Find the perimeter of trapezoid PMCB.

a. 38 b. 40 c. 46 d. 48 e. not given

9. The ratio of the sides of two cubes is 3 : 4. The difference of their volumes is 296. The side of the smaller cube is

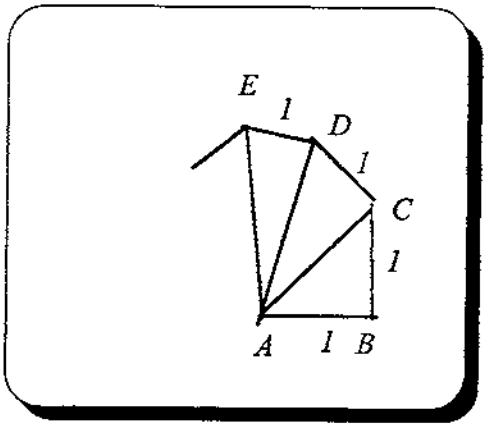
a. 8 b. 9 c. 3 d. 4 e. not given

10. Given the sides of Triangle ABC are 2x, 3x and 10. If the perimeter of the triangle in the figure is at most 60, then which of the following is true about the value of x?

a. $x < 10$ b. $x > 2$ c. $2 < x \leq 10$ d. $x \leq 10$ e. not given

11. A right circular cylinder of height h is inscribed in a cube of height h so that the bases of hte cylinder are inscribed in the upper and lower faces of the cube. The ratio of the volume of the cylinder to that of the cube is

a. $\pi : 4$ b. $4 : \pi$ c. 3 : 4 d. 2 : 3 e. not given

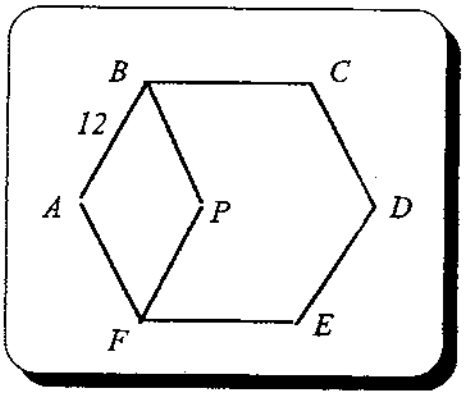


12. What is the area of the sixth triangle of the "Wheel of Theodorus" with Triangle ABC being the first triangle. All triangles formed are right triangles.

a. $\frac{\sqrt{7}}{2}$ b. 1 c. $\frac{\sqrt{3}}{2}$ d. $\frac{1}{2}$ e. not given

13. The circumference of a circle is 25,000 feet. If the circumference is increased by three feet, which one of the following most closely approximates the increase in the radius of the circle?

a. 0.5 feet b. 1.0 feet c. 1.5 feet d. 1.8 feet e. not given



14. Given Regular Hexagon ABCDEF with an edge of 12 units. P is located inside the hexagon so that AB = BP = PF. Find the area of the newly formed Hexagon BCDEFP.

a. $144\sqrt{3}$ b. $148\sqrt{3}$ c. $152\sqrt{3}$ d. $156\sqrt{3}$ e. not given

15. The base of a triangle is 16 inches and its altitude is 10 inches. The area of the trapezoid cut off by a line 4 inches from the vertex is.

a. 134.4 b. 67.2 c. 38.6 d. 72 e. not given

16. A square and an equilateral triangle have the same perimeters. If the area of the triangle is $32\sqrt{3}\ cm^2$, find the length of the diagonal of the square.

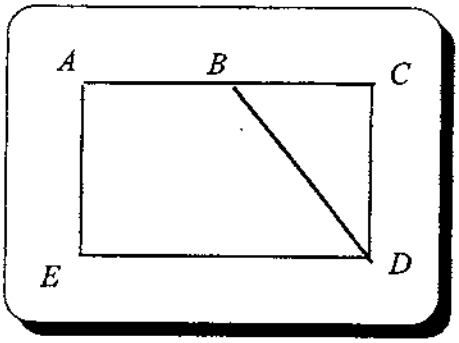
a. 8 b. 12 c. 14 d. 16 e. not given

17. If the radius of a right circular cylinder is doubled, then to keep the volume the same the altitude must be

a. doubled b. divided by 2 c. divided by 2π d. increased by 4
e. not given

18. PQRS is a square whose side length is 4 units. A circle is circumscribed about the square. Find the ratio of the area of the circumscribed circle to the area of the inscribed circle.

a. $\frac{1}{2}$ b. $\frac{\sqrt{2}}{1}$ c. $\frac{2}{1}$ d. $\frac{4}{1}$ e. not given



19. Given: DE = 13, AB = 4, AE = 6. AC ⊥ CD ,CD ⊥ ED. Find the area of Triangle DCB.

a. 24 b. 27 c. 36 d. 48 e. not given

20. The apothem of a regular hexagon having its area numerically equal to its perimeter is compared to the apothem of a square having its area numerially equal to its perimeter. The first apothem will be

a. four-thirds times the second
b. equal to the second
c. $\frac{\sqrt{3}}{2}$ times the second
d. $\frac{2\sqrt{3}}{3}$ times the second
e. not given

21. A drinking cup in the form of a right circular cone (apex down) has the radius of its base equal to 2 in. and altitude 6 in. The cup is filled with water, which is poured into a cylindrical container of radius 1 in. and height 15 in. How many inches will the water rise in the cylindrical container?

a. 6 b. 7 c. 8 d. 10 e. not given

22. The length of a picture without its border is twice its width. If the border is 2 inches wide and its area is 160 square inches. Find the dimensions of the picture alone. (NOTE: The given area of the border is the area of the border alone.)

a. 18 by 24 b. 16 by 20 c. 12 by 24 d. 12 by 20 e. not given

23. Find the volume, in cubic inches, of the parallelpiped that has the largest volume and is inscribed within a sphere of radius 16 inches.

a. $8192\sqrt{3}$ b. 9280 c. 10.25 d. $6.75\sqrt{2}$ e. not given

24. Two similar triangles have area 81 square feet and 50 square feet. The perimeter of the larger triangle is 36 feet. Find the perimeter, in feet, of the smaller triangle.

a. $22\frac{2}{9}$ b. $20\sqrt{2}$ c. $33\frac{1}{3}$ d. 75 e. not given

25. Two circles are concentric. A tangent to the inner circle forms a chord 12 inches long in the larger circle. Find the area of the ring between the circles.

a. 36π b. 40π c. 44π d. 48π e. not given

26. A right circular cone has its vertex on the surface of a sphere and its base is a section of the sphere made by a plane passing through the center. Find the ratio of the volume of the cone to the volume of the sphere.

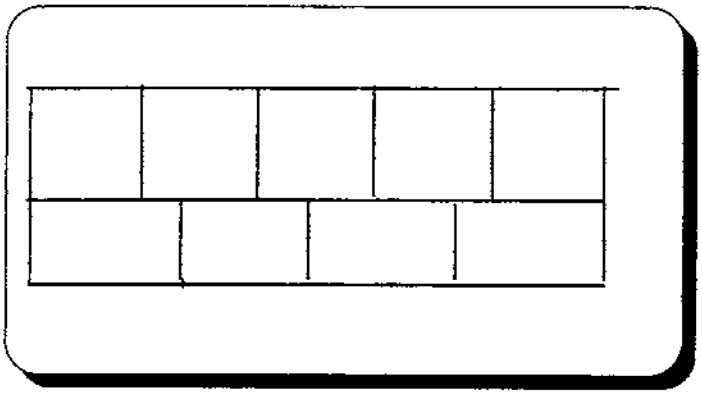
a. 4 : 1 b. 3 : 1 c. 1 : 3 d. 1 : 4 e. not given

27. A thin band passes over two pulleys on the same plane. One pulley has a diameter of 18 cm and the other pulley has a diameter of 12 cm. The distance between the centers of the pulleys is 30 cm. Find the length of the belt if the pulleys turn in opposite directions.

a. $15\pi+60$ b. $20\pi+30\sqrt{3}$ c. 60π d. $32\pi+63$ e. not given

28. Given a triangle with sides of lengths 4, 4, and 7, find the area of the circumscribed circle.

a. $\frac{7\pi\sqrt{15}}{15}$ b. $\frac{64\pi}{15}$ c. $\frac{128\pi}{15}$ d. $\frac{256\pi}{15}$ e. not given



29. Nine playing cards from the same deck are placed as shown above to form a large rectangle of area 180 square inches. How many inches are there in the perimeter of this large rectangle?

a. 52 b. 54 c. 56 d. 58 e. not given

30. Find the lateral area of an octahedron with side (edge) length 8 cm.

a. $96\sqrt{3}$ b. 192 c. $128\sqrt{3}$ d. $64\sqrt{2}$ e. not given