

13. The number of square feet in the total surface of a right circular cylinder is equal to the number of cubic feet in its volume. If the radius of its base is five times its altitude, what is its volume?

- a. $\frac{1728\pi}{5}$ ft³ b. 1728π ft³ c. $\frac{1128\pi}{5}$ ft³
d. $\frac{2126\pi}{5}$ ft³ e. $\frac{1528\pi}{5}$ ft³

14. A rectangular box measures 4 by 5 by 2 meters. What is the length of the longest broomstick that can fit into the box?

- a. $\sqrt{5}$ m b. $2\sqrt{5}$ m c. $3\sqrt{5}$ m
d. $5\sqrt{2}$ m e. $5\sqrt{3}$ m

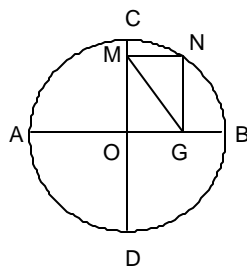
15. Two poles, p feet and q feet in length are placed x feet apart. Lines are drawn from the top of each pole to the bottom of the other. The two lines will intersect at how many feet above the ground. Assume the poles are perpendicular to the ground.

- a. $\frac{pq}{p-q}$ b. $\frac{pq}{q-p}$ c. $\frac{2pq}{p-q}$
d. $\frac{pq}{p+q}$ e. $\frac{2pq}{p+q}$

16. The area of a circular arena is $872\frac{2}{3}$ square feet. If a pole placed at the center of the arena is 37.5 feet high, approximately how many feet long is a rope which will just extend from the top of this pole to the edge of the arena?

- a. 64.4 ft. b. 50.4 ft. c. 49.4 ft.
d. 55.6 ft. e. 41.0 ft.

17. A circle has radius r. \overline{AB} and \overline{CD} are diameters that are perpendicular to each other with $CM = 0.2$. If $\overline{MN} \parallel \overline{AB}$ and $\overline{NG} \parallel \overline{CD}$, how long is \overline{MG} ?

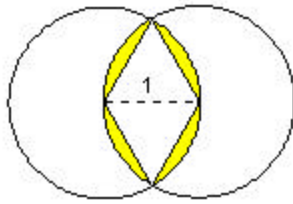


- a. $.8r$
b. $.4r$
c. $.2r$
d. $.r + .2$
e. r

18. A point (x,y) is the circumcenter of the triangle with vertices $A(-5,-1)$, $B(3,3)$, and $C(5,-5)$. The sum of x and y is :

- a. $-\frac{21}{9}$ b. $-\frac{13}{9}$ c. $\frac{13}{9}$
d. $-\frac{9}{13}$ e. $\frac{9}{13}$

24. Given two overlapping unit circles. Find the area of the shaded region.



- a. $\frac{2\pi + 3\sqrt{3}}{3}$
 b. $\frac{2\pi - 3\sqrt{3}}{3}$
 c. $\frac{2\pi + \sqrt{3}}{3}$
 d. $\frac{\pi + 3\sqrt{3}}{3}$
 e. $\frac{2\pi - \sqrt{3}}{3}$

25. If the area of a square inscribed in a circle is 15 cm^2 , what is the area of the square inscribed in a semicircle of the same circle?

- a. 3 cm^2 b. 2 cm^2 c. 6 cm^2
 d. 4 cm^2 e. 5 cm^2

26. The area of a base of a prism is 24 sq. in. and the volume is $72\sqrt{2} \text{ cu. in.}$ If the lateral edge intersects the base at an angle of 45° , the length of a lateral edge is

- a. 6 in. b. $.6\sqrt{2} \text{ in.}$ c. $2\sqrt{6} \text{ in.}$
 d. $\sqrt{6} \text{ in.}$ e. None of these

27. A figure is called a rep-tile if copies of the figure fit together to form a larger similar figure. Consider a right triangle with legs of lengths 1 and N , where N is a positive integer. What is the minimum number of copies of this triangle that can be fitted together to form a larger similar triangle?

- a. 2 b. 4 c. 3
 d. 5 e. None of these

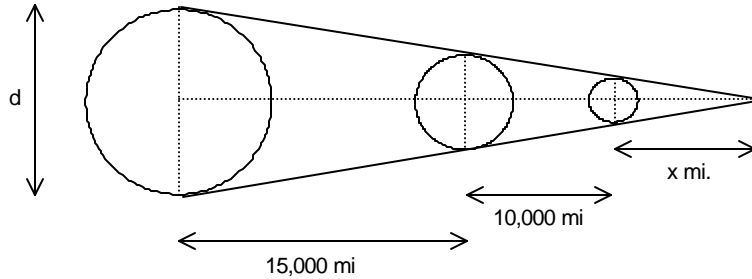
28. If the diagonals of a rhombus are x and y units long, find the area of the rhombus in terms of x and y .

- a. $2xy$ b. $\frac{x^2y^2}{2}$ c. $\frac{x+y}{2}$
 d. $\frac{xy}{2}$ e. $\frac{x-y}{2}$

29. Find the area of the triangle having sides of length 5, 10, and 13.

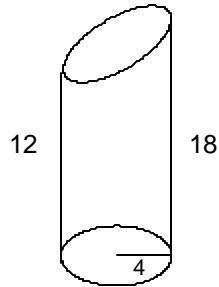
- a. $2\sqrt{14}$ b. $6\sqrt{14}$ c. $18\sqrt{14}$
 d. $36\sqrt{14}$ e. $3\sqrt{14}$

30. Three planets are aligned as shown. The diameter of the smallest planet is 3000 miles and the diameter of the planet in the middle is 8000 miles. Given the other dimensions in the figure, what is the diameter of the largest planet?



- a. 12,500 miles b. 12,800 miles c. 15,100 miles
d. 15,500 miles e. None of these
31. The sides of a triangle are 10, 10, and 12. Find the radius of the circumscribed circle.
a. $4\sqrt{3}$ b. 5.75 c. 6
d. 6.25 e. $5\sqrt{3}$
32. The base of a triangular sheet of paper is 12 inches long. The paper is folded down over the base, the crease being parallel to the base. The area of the part of the triangle that projects below the base of the triangular sheet of paper is 0.36 of the total area. Find the length of the crease.
a. $4\sqrt{5}$ b. 9.6 c. 9
d. 8.4 e. $5\sqrt{2}$
33. From a vertex of a regular hexagon of side k inches, two diagonals of unequal length are drawn. Find the ratio of the area included between these diagonals to the area of the hexagon.
a. 1:3 b. 1:4 c. 2:5
d. 2:2 e. 2:7
34. Two circles of radii 3" and 9" are externally tangent. \overline{AB} is the common external tangent. Find the length of \overline{AB} .
a. $6\sqrt{3}$ in. b. 10 in. c. $6\sqrt{5}$ in.
d. $3\sqrt{5}$ in. e. None of these

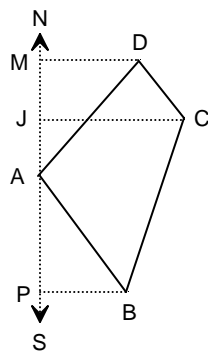
35. If the radius of a sphere is doubled, the volume is made
- a. 16 times as great b. 8 times as great c. 4 times as great
- d. 2 times as great e. None of these
36. A cylinder is cut on a slant as shown. The height goes from 12 cm to 18 cm and the radius is 4 cm. Find the volume.



- a. $260 \pi \text{ cm}^3$
- b. $156 \pi \text{ cm}^3$
- c. $240 \pi \text{ cm}^3$
- d. $250 \pi \text{ cm}^3$
- e. None of these

37. A sphere of radius r is cut by a horizontal plane at a distance k from the center of the sphere. Find the area of the cross section.
- a. $\pi(r^2 + k^2)$ b. $\pi(k^2 - r^2)$ c. $2\pi(k^2 + r^2)$
- d. $2\pi(r^2 - k^2)$ e. $\pi(r^2 - k^2)$

38. In surveying the field here shown a surveyor laid a north-and-south line NS through A and then found that $PB = 6 \text{ rd.}$, $JC = 10 \text{ rd.}$, $MD = 7 \text{ rd.}$, $PA = 8 \text{ rd.}$, $PJ = 12 \text{ rd.}$, and $MJ = 4 \text{ rd.}$ Find the area of the field.

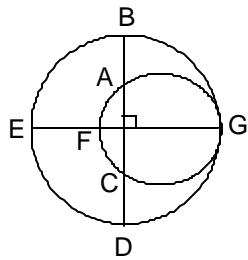


- a. 24 sq. rd.
- b. 50 sq. rd.
- c. 78 sq. rd.
- d. 82 sq. rd.
- e. Not enough information

39. The bases of a trapezoid are 7 cm and 13 cm. A line which is twice as far from the shorter base as from the longer base divides the figure into two parts. If the line is parallel to the bases and the area of the smaller part is 16 sq. cm, find the area of the larger part.

- a. 55 sq. cm
- b. 60 sq. cm
- c. 70 sq. cm
- d. 75 sq. cm
- e. None of these

40. Two circles are internally tangent at point G as indicated in the diagram below. If $AB = 6$, $EF = 8$, and $CD = 6$, find the sum of the radii of the two circles. \overline{BD} passes through the center of the larger circle.



- a. 11
- b. 12
- c. 13
- d. 14
- e. 15

1999 Geometry Exam: Key

1.	c	11.	b	21.	e	31.	d
2.	b	12.	c	22.	a	32.	b
3.	b	13.	a	23.	b	33.	a
4.	e	14.	c	24.	b	34.	a
5.	d	15.	d	25.	c	35.	b
6.	d	16.	e	26.	a	36.	c
7.	a	17.	e	27.	b	37.	e
8.	e	18.	b	28.	d	38.	c
9.	c	19.	b	29.	b	39.	e
10.	d	20.	a	30.	d	40.	d

Tie Breakers

Best of Three:	11	21	18		
Sudden Death:	10	15	38	22	40