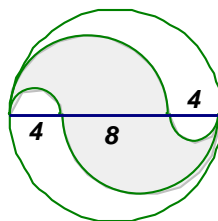


1. If all the curves shown are circles or semicircles, find the shaded area.



- A.  $40\pi$       B.  $24\pi$       C.  $16\pi$       D.  $32\pi$       E. NOTA

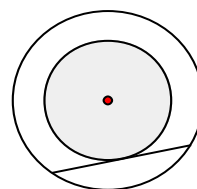
2.  $3(122^\circ 26' 18'') - 4(91^\circ 12' 14'') = ?$

- A.  $124^\circ 29' 58''$     B.  $122^\circ 30' 24''$     C.  $2^\circ 30' 24''$     D.  $2^\circ 29' 58''$     E. NOTA

3. The sum of two angles is  $110^\circ$  while the difference of their complements is  $30^\circ$ . Find measure of the larger  $\square$ .

- A.  $100^\circ$       B.  $40^\circ$       C.  $70^\circ$       D.  $80^\circ$       E. NOTA

4. A 10 inch chord of the larger of two concentric circles is tangent to the smaller circle. Find the square of the area of the region that is not shaded.



- A.  $25\pi^2$       B.  $225\pi^2$       C.  $625\pi^2$       D. can't be determined      E. NOTA

5. Four points, no three of which are collinear, determine \_\_\_\_ line segments  
A. eight      B. six      C. five      D. four      E. NOTA

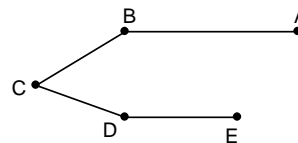
6. Assuming that it always rains when the wind comes from the east, tell which of the following statements is always false.

- |  |  |  |  |         |
|--|--|--|--|---------|
| A. The wind is in the east; therefore it is raining. | B. It is raining; therefore the wind is in the east. | C. It is not raining; therefore the wind is not in the east. | D. The wind is not in the east; therefore it is not raining. | E. NOTA |
|--|--|--|--|---------|

7. Altitude  $\overline{CD}$  is drawn in  $\triangle ABC$ . If  $\overline{CD}$  bisects the base and  $CA = 10$  find  $CB$ .  
A. 20      B. 15      C. 10      D. 5      E. NOTA

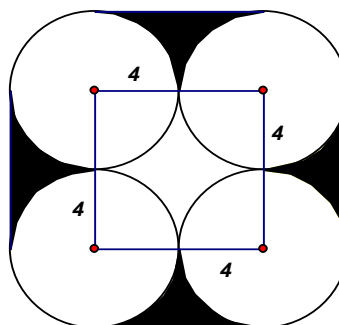
8. If you are asked to construct  $\triangle ABC$  given  $m\angle A = 90^\circ$ ,  $a = 5$ , and  $b = 10$  you will have...
- A. no solution    B. one solution    C. two solutions    D. infinite solutions    E. NOTA

9. Given  $\overline{BA} \parallel \overline{DE}$ . The  
 $m\angle ABC + m\angle BCD + m\angle CDE = ?$



- A.  $360^\circ$     B.  $160^\circ$     C.  $180^\circ$     D.  $90^\circ$     E. NOTA

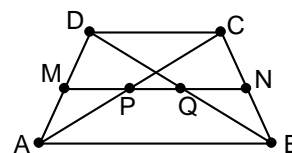
10. Find the area of the shaded region. The segments that appear to be tangent to the circles are.



- A.  $32 - 8\pi$     B.  $128 - 32\pi$     C.  $131 - 20\pi$     D.  $192 - 48\pi$     E. NOTA

11. Find the resultant of this pair of forces: 30 lbs and 15 pounds acting at  $120^\circ$
- A.  $\frac{15\sqrt{7}}{3}$  lbs    B.  $\frac{15\sqrt{3}}{2}$  lbs    C.  $15\sqrt{7}$  lbs    D.  $15\sqrt{3}$  lbs    E. NOTA

12. Given isosceles trapezoid ABCD with median  $\overline{MN}$  that intersects a diagonal in point Q. If  $AB = 15$ , and  $DC = 7$ ,  $QN = ?$



- A. 3.5    B. 4    C. 7.5    D. 11    E. NOTA

13. If  $\overline{XA}$  and  $\overline{XB}$  are two adjacent sides of a regular polygon, and  $m\angle ABX$  is one third as large as  $m\angle AXB$ , how many sides does the polygon have?
- A. 5    B. 7    C. 8    D. 10    E. NOTA

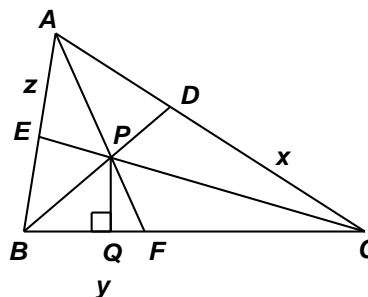
14. What is the final column of the truth table for

$$[(p \rightarrow q) \vee (\neg q \rightarrow p)] \wedge [\neg (p \vee \neg q) \rightarrow (\neg p \wedge \neg q)]$$

- A. T T T T      B. T F T T      C. T T F T      D. T T T F      E. NOT A

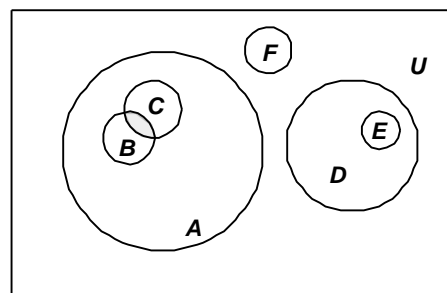
15. Angle bisectors  $\overline{AF}$  and  $\overline{BD}$  are

concurrent with  $\overline{EC}$  at point P. If  $AE = z$ ,  
 $DC = x$ ,  $BF = y$ ,  $BE = 2$ ,  $AD = 3$ , and  
 $FC = 7$ , the area of  $\triangle ABC$  is 18 and  
 $PQ = \frac{4}{3}$ , find  $x + y + z$ .



- A. 12      B. 24      C.  $6\frac{1}{3}$       D. 15      E. NOT A

16. In the Venn diagram shown to the right,  
the universal set U represents  
Quadrilaterals. What would circle F  
represent?

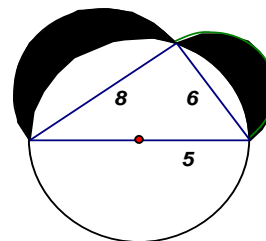


- A. kites      B. rhombi      C. squares      D. trapezoids      E. NOT A

17. The set of numbers between 0 and 180 inclusive is in one-to-one correspondence with the set of rays, in the union of a half-plane and its edge, with end point A in the edge of the half-plane.  $\overline{AJ}$  Corresponds to 30 and  $\overline{AM}$  corresponds to 70.  $\overline{AK}$ , which bisects  $\angle JAM$ , corresponds to \_\_\_\_?

- A. 20      B. 30      C. 40      D. 50      E. NOT A

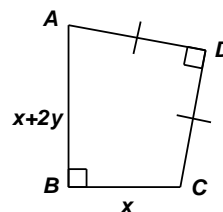
18. If the chords with measures 6 and 8 are diameters, find the area of the shaded region.



- A. 24      B.  $\frac{25\pi}{2}$       C.  $\frac{41\pi}{4}$       D.  $\frac{59\pi}{2}$       E. NOT A

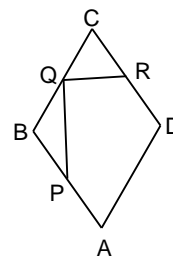
19. Two distinct lines perpendicular to a third line must be\_\_\_\_\_?  
 A. skew      B. intersecting      C. parallel      D. perpendicular      E. NOTA

20. Find the area of quadrilateral ABCD if  $\overline{AD} \cong \overline{DC}$ ,  
 $\overline{AB} \perp \overline{BC}$ ,  $\overline{AD} \perp \overline{DC}$ , and diagonal  $\overline{BD}$  has length 2.



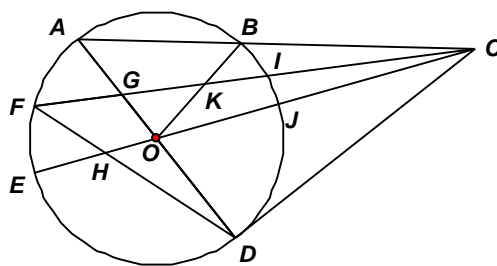
- A. 2      B. 8      C.  $2\sqrt{2}$       D.  $\sqrt{2}$       E. NOTA

21. Given rhombus ABCD with P, Q, and R the midpoints of  $\overline{AB}$ ,  $\overline{BC}$ , and  $\overline{CD}$  respectively. If the perimeter of ABCD is 40 and  $m\angle B = 120^\circ$  what is PD?



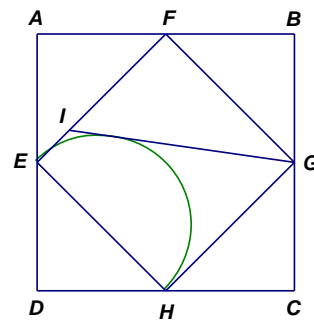
- A.  $10\sqrt{3}$       B.  $5\sqrt{3}$       C. 10      D.  $5\sqrt{6}$       E. NOTA

22. Given: Circle O,  $m\angle A = 60^\circ$ ,  
 $m\angle ECF = 10^\circ$ ,  $m\angle AF = m\angle FE = 40^\circ$ . What is the  $m\angle IKO$ ?



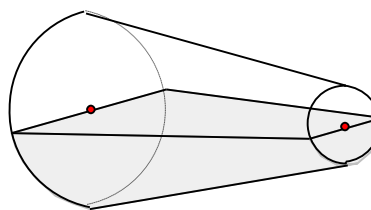
- A.  $110^\circ$       B.  $170^\circ$       C.  $150^\circ$       D.  $130^\circ$       E. NOTA

23. ABCD is a square; Points E, F, G, and H are midpoints; Arc EH is a semicircle and segment GI is a tangent.  $DH = 2$   $EI = ?$



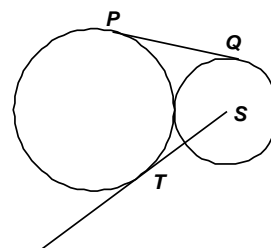
- A.  $\frac{\sqrt{2}}{2}$       B.  $\frac{\sqrt{6}}{3}$       C.  $\frac{\sqrt{3}}{3}$       D.  $\frac{\sqrt{5}}{2}$       E. NOTA

24. A fuel tank is in the shape of a right frustum as shown. Its parallel circular bases have area  $36\pi$  square feet and  $9\pi$  square feet respectively. When the fuel tank is half filled as shown, the area of the surface of the fuel (i.e. surface not touching tank) is 108 square feet. What is the volume, in cubic feet, of the fuel in the tank?



- A.  $320\pi$       B.  $189\pi$       C.  $126\pi$       D.  $118\pi$       E. NOTA

25. These two circles are externally tangent to each other and have a common external tangent line with points of tangency P and Q. Point S is the center of the smaller circle and ray ST is tangent to the larger circle. The radii of the circles are R and R-1. If  $ST = 2\sqrt{19}$ , find the length of the larger radius.



- A.  $\frac{-1+\sqrt{229}}{3}$       B.  $\frac{2+\sqrt{229}}{3}$       C.  $\frac{4+\sqrt{241}}{6}$       D.  $\frac{-2+\sqrt{241}}{6}$       E. NOTA

TB1 The radius of circle P is 5. Point A lies in the interior of circle P.  $AB = 11$ . Point B must lie\_\_\_\_\_

TB2 If  $\overline{JK}$  is a chord of  $\odot O$ , then  $\overline{JK}$  is a \_\_\_\_\_ of  $\odot O$ . (Must be spelled correctly)

TB3 What is the final column of a tautology truth table?