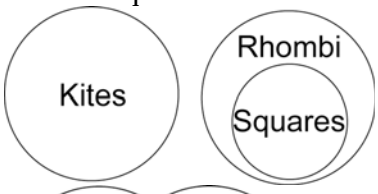
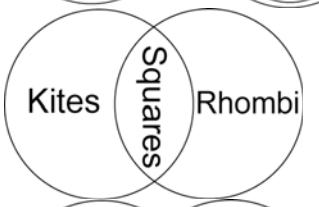
- For this test, the answer choice E) NOTA means none of the above answers is correct.
- For this test, a kite will be defined as a quadrilateral with two distinct pairs of adjacent congruent sides.
- Figures not drawn to scale

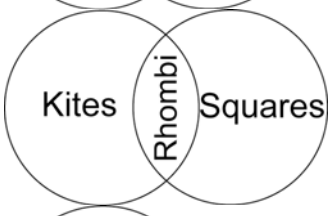
1. What is the side length of a square whose perimeter equals its area?
   A) 4
   B) 2
   C) $\sqrt{2}$
   D) There are multiple squares with this property
   E) NOTA

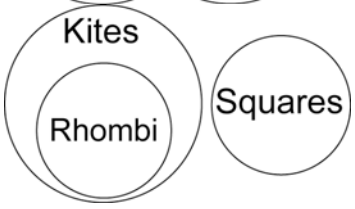
2. Find the ratio of the area of a square to the area of a rhombus with the same side length and an interior angle of θ.
   A) sinθ : 1
   B) 1 : cosθ
   C) 1 : tanθ
   D) 1: sinθ
   E) NOTA

3. Which of the following Venn diagrams correctly shows the relationship among kites, rhombi and squares?

   A)
   

   B)
   

   C)
   

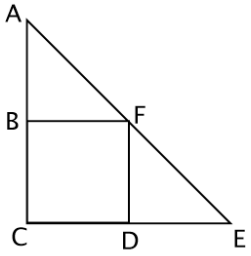
   D)
   

   E) NOTA

4. Find the area of the quadrilateral formed by connecting the points (0, 0); (1, 3); (6, 4) and (5, 1).
   A) 13
   B) 14
   C) $2\sqrt{65}$
   D) $\frac{7\sqrt{26}}{2}$
   E) NOTA

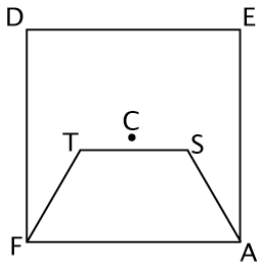
5. Which of the following statements are true?
   I. All kites have at least one pair of congruent angles.
   II. All kites can be inscribed in a circle.
   III. All kites can be circumscribed about a circle.
   IV. Opposite angles of a kite add up to 180^o.
   V. All rhombi are kites.
   A) I, II and V only
   B) I, III, IV and V only
   C) II, III and V only
   D) I, II, III, IV, and V
   E) NOTA

6. Triangle ACE is an isosceles right triangle with vertex C. F is the midpoint of AE, and AB + CD = CE. If AE = $10\sqrt{2}$ and BF = BC, find the area of quadrilateral BFDC.

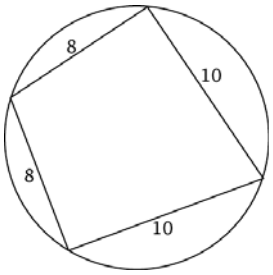
   

   A) 100
   B) 50
   C) $50\sqrt{2}$
   D) 25
   E) NOTA

7. Square DEAF has side length of 8. Isosceles trapezoid FAST, with ST || AF, has the following properties ST = FT = SA = x and the distance from point C, the center of the square, to TS is equal to $4-2\sqrt{3}$. Find the value of x.
   A) 4
   B) $2-\sqrt{3}$
   C) 2
   D) 8
   E) NOTA



Use the following quadrilateral for questions 8 and 9.



8. Find the radius of the circumscribed circle.
   A) 40/9
   B) 20/9
   C) $\sqrt{41}$
   D) $2\sqrt{41}$
   E) NOTA

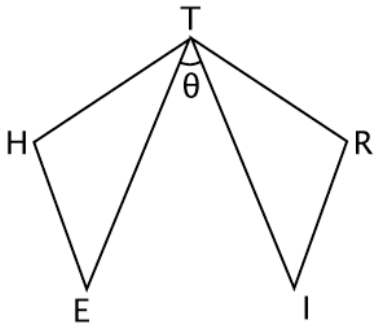
9. Find the radius of the inscribed circle.
   A) 40/9
   B) 20/9
   C) $\sqrt{41}$
   D) $2\sqrt{41}$
   E) NOTA

10. If all the angle bisectors of the interior angles of a convex quadrilateral intersect at the same point than the quadrilateral …
    A) …is a square.
    B) …can be inscribed in a circle.
    C) …can be circumscribed about a circle.
    D) …is a rhombus.
    E) NOTA

11. There are four points GCAT on a plane. Both, quadrilateral ACGT and quadrilateral AGCT, are non self-intersecting, meaning opposite sides do not intersect inside the quadrilateral. Therefore the points must be arranged so that both quadrilaterals are …
    A) …concentric.
    B) …cyclic.
    C) …convex.
    D) …non-convex.
    E) NOTA

12. Quadrilateral IRON has diagonal IO. If diagonal IO bisects angles NIR and RON, than the quadrilateral is a …
    A) …square.
    B) …rhombus.
    C) …parallelogram.
    D) …kite.
    E) NOTA

13. Triangle THE is congruent to triangle TRI. Regardless of what the measurement of angle θ is, the quadrilateral RIEH is always …

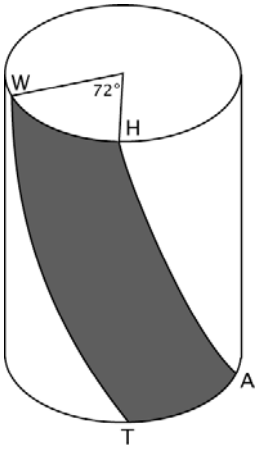


    A) …a rectangle.
    B) …a parallelogram.
    C) …a non-Isosceles trapezoid.
    D) …an Isosceles trapezoid.
    E) NOTA

14. A rectangle has length, *l*, and width, *w*. *w* is three less than four times *l*. If the perimeter is 44, find the area of the rectangle.
    A) 25
    B) 100
    C) 85
    D) 121
    E) NOTA

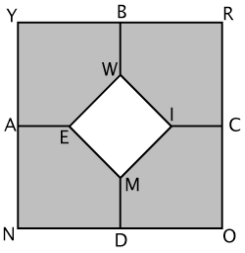
15. In kite DRUM, DR=RU. The lengths of the diagonals DU and RM are 24 an 14 respectively and the length of segment UM is 15. Find the perimeter of the kite DRUM.
    A) 60
    B) 56
    C) 64
    D) 52
    E) NOTA

16. Point W is on the edge of a circular cylinder. Point H is 72° away from point W along the arc of the edge. Point T is on the other edge of the cylinder directly below point H and point A is 72° away from T along that same edge. What is the area of the resulting quadrilateral WHAT on the surface of the cylinder given that the cylinder has a radius r and height h?

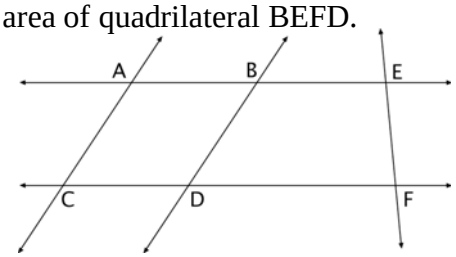


    A) $\frac{2rh}{5}$
    B) $\frac{4\pi rh}{5}$
    C) $\frac{2}{5}r\sqrt{h^2+\frac{4}{25}r^2\pi^2}$
    D) $\frac{4\pi^2r^2}{25}$
    E) NOTA

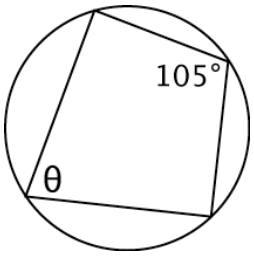
17. The quadrilateral YRON is a square of side length 4. BW = IC = MD = AE = 1. BW is the perpendicular bisector of YR. If squares YRON and WIME are concentric, find the area of the shaded region.
    A) 8
    B) 12
    C) 16
    D) 14
    E) NOTA



18. AE is parallel to CF, and CA is parallel to DB. BE = 3, DF = 5, CD = 4, angle ACD is equal to 30° and the area of quadrilateral ABDC is 10. Find the area of quadrilateral BEFD.
    A) $\frac{25}{2}$
    B) $\frac{9}{2}$
    C) 20
    D) 10
    E) NOTA



19. Find the measurement of angle θ.
    A) 105°
    B) 90°
    C) 75°
    D) 45°
    E) NOTA



20. How many of the following quadrilaterals may always have an inscribed circle?
    I. Kite
    II. Square
    III. Rectangle
    IV. Rhombus
    V. Trapezoid
    A) 3
    B) 4
    C) 5
    D) 2
    E) NOTA

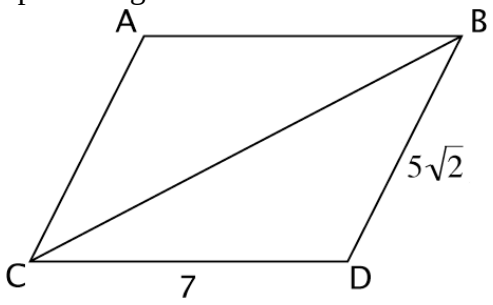
21. Given quadrilateral ABCD has perpendicular diagonals, and that AB = 7, BC = 4 and CD = 5, find the length of AD.
    A) $2\sqrt{2}$
    B) $2\sqrt{10}$
    C) $\sqrt{58}$
    D) 8
    E) NOTA

22. A figure is said to "tile a plane" if an infinite number of congruent figures can be arranged on the plane so that all the surface of that plane is covered by such figures with no overlapping of parts. Which of the following quadrilaterals cannot "tile a plane"?
    A) A kite
    B) A parallelogram
    C) A trapezoid
    D) A non-special quadrilateral
    E) NOTA

23. Find the area of a rhombus with side length of 25 and one diagonal of length 14.
    A) 336
    B) 672
    C) 350
    D) 700
    E) NOTA

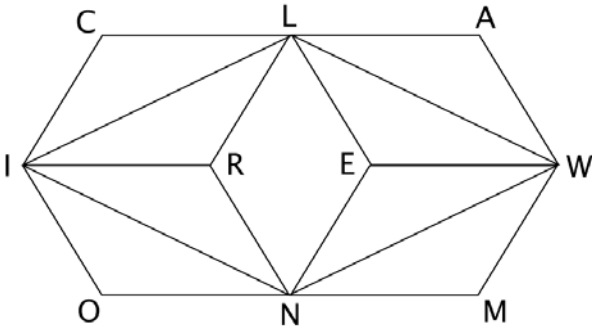
24. How many distinct parallelograms of length 7 and area of 35 exist?
    A) 1
    B) 2
    C) 4
    D) Infinitely many
    E) NOTA

25. Find the length of diagonal BC if the area of the parallelogram is 35.



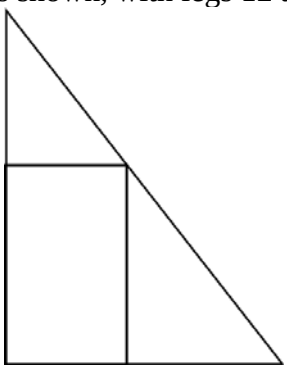
    A) 7
    B) $3\sqrt{11}$
    C) $\sqrt{74}$
    D) 13
    E) NOTA

26. Quadrilaterals CLRI, ALEW, MNEW and ONRI are all congruent parallelograms with an area of 100 cm^2. CI = 10cm and angle ICL = 135°. What is the area of quadrilateral LWNI?



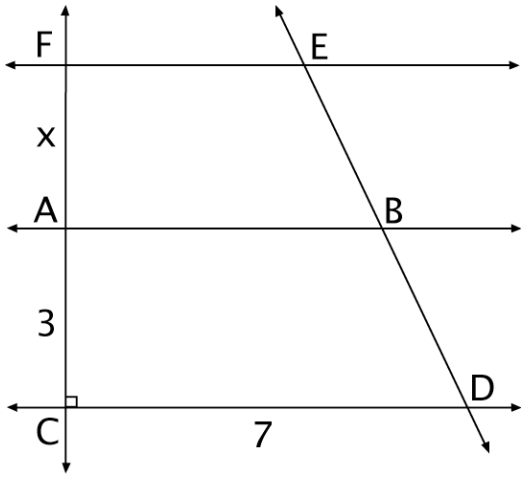
    A) 200 cm^2
    B) 400 cm^2
    C) 300 cm^2
    D) 500 cm^2
    E) NOTA

27. What is the area of the largest rectangle with a 2:1 height-width ratio that can fit inside a right triangle, as shown, with legs 12 and 24?



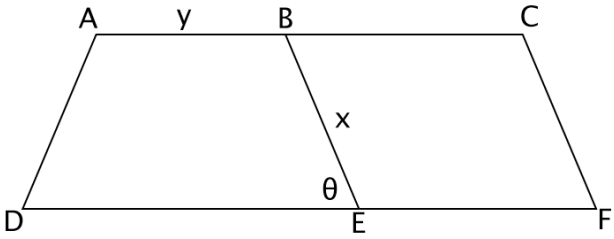
A) $640/9$
B) 72
C) $1152/25$
D) $320/9$
E) NOTA

28. CD is parallel to AB and to FE. CF is perpendicular to CD. The measurement of angle EDC is equal to 45°. Find x such that quadrilateral FABE is similar to quadrilateral ACDB.



A) 3
B) $3/2$
C) $16/7$
D) $12/7$
E) NOTA

29. In the diagram below, AC is parallel to DF. Rhombus BCFE has half the area of isosceles trapezoid ACFD. AB = y, BC = x and angle BED has a measurement of θ. $\cos\theta = 4/5$. Find y/x.



A) $1/5$
B) $3/5$
C) 5
D) $5/4$
E) NOTA

30. A diagonal in a parallelogram divides the quadrilateral into two triangles. What is the relationship between these two triangles?
A) Similar, but not congruent.
B) Reflections of each other over the diagonal.
C) Congruent, but not reflections of each other over the diagonal.
D) No relationship.
E) NOTA