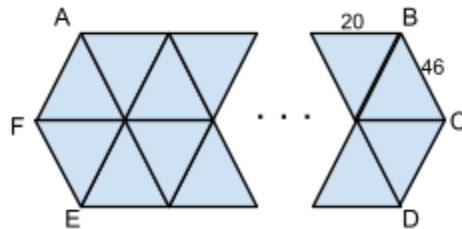
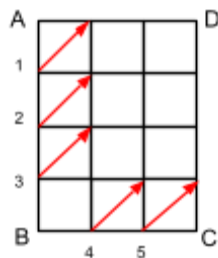


Geometry Test

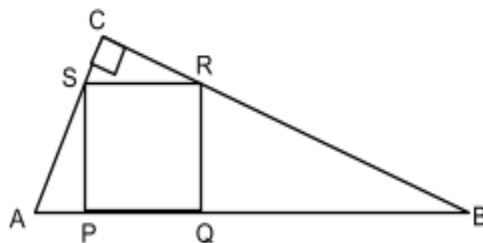
1. (3) A cone-shaped bucket is filled to 12.5% of its volume. If the height of the bucket is 6, what is the height of the water in the bucket?
2. (3) A right triangle has two sides of length 5 and 12. What is the shortest possible length of the remaining side of the triangle? This length can be expressed in the form \sqrt{a} ; what is a ?
3. (3) 42 congruent, isosceles triangles with congruent sides of length 46 and bases of length 20 are placed in the pattern forming hexagon ABCDEF, as shown. What is the perimeter of hexagon ABCDEF?



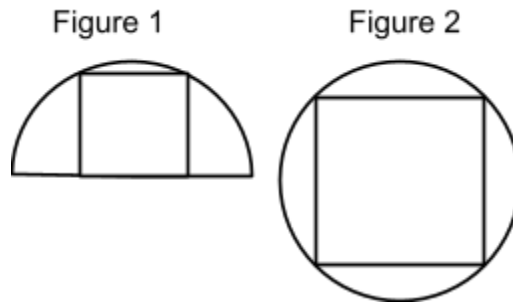
4. (4) In Knospe-Ball, a ball can be launched from points 1, 2, 3, 4, or 5 in the directions shown. When a ball hits a side of rectangle ABCD it bounces at a 90° angle back into the playing field. The path of the ball ends when it hits a corner point A, B, C, or D. Each of the gridded squares has a perimeter of 12. What is the length of the longest possible path for a ball launched from a starting point? This length can be expressed in the form $a\sqrt{b}$; what is $a + b$?



5. (4) Triangle ABC with vertices $A(-2,0)$, $B(1,4)$, and $C(-3,2)$ is reflected over the line $y = x$ to form triangle $A'B'C'$. What is the length of CC' ? This length can be expressed in the form \sqrt{a} ; what is a ?
6. (5) Square PQRS is inscribed in right triangle ABC, as shown. If $AP = 24$ and $QB = 60$, what is the area of square PQRS?

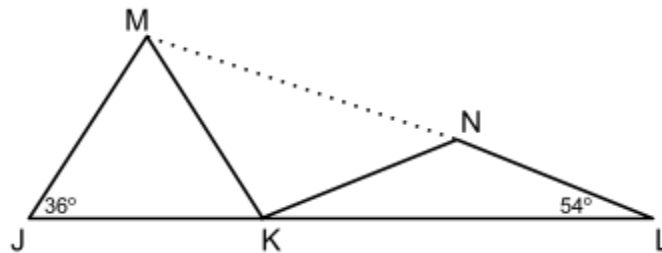


7. (5) The area of the semicircle in Figure 1 is half the area of the circle in Figure 2. A square is inscribed in the semicircle while another square is inscribed in the circle. If the area of the larger square is 160 square units, what is the area of the square inscribed in the semicircle?



8. (5) An isosceles trapezoid has legs of length 15, two diagonals of length 20, and the longer base has a length of 25. What is the trapezoid's area? This can be expressed in the form $a + b\sqrt{c}$; what is $a + b + c$?

9. (6) Coplanar points J, K, L, M, and N are arranged such that J, K, and L are collinear with K between J and L. Triangles JKM and KNL are both isosceles and have equal areas. JM and MK are the congruent legs of triangle JKM while KN and NL are the congruent legs of triangle KNL. $\angle MJK = 36^\circ$ while $\angle NLK = 54^\circ$. Points M and N are on the same side of JL. What is the degree measure of $\angle KMN$?



10. (6) The figure below contains a total of 2016 triangles and n points labeled as vertices on the horizontal base. What is the value of n ?

