

FEBRUARY 26, 2000

GEOMETRY TEAM

**Question #1**

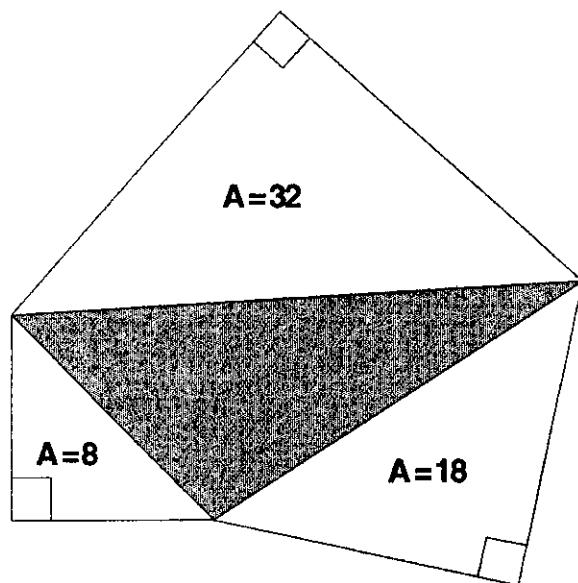
Find the area of the locus of all points in a plane that are less than 5 units away from the point  $(-3,-7)$ .

**Question #2**

The measure of the supplement of an angle is 60 less than 3 times the measure of its complement. Find the measure of the supplement.

**Question #3**

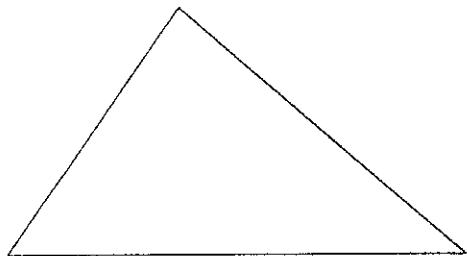
Three right isosceles  $\Delta$ 's have hypotenuses which are connected as shown. Find the area of the new  $\Delta$  formed, if the three right isosceles  $\Delta$ 's have areas of  $32\text{m}^2$ ,  $18\text{m}^2$  and  $8\text{m}^2$ .

**Question #4**

The bisectors of two angles of a triangle form a  $123^\circ$  angle. What is the measure of the third angle of the triangle?

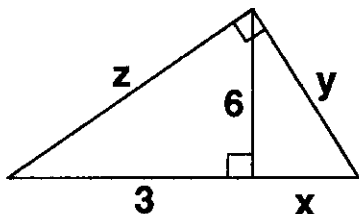
**Question #5**

The lengths of the sides of a triangle are 4, 5, and 6. Each side is trisected and the points of division are joined to form a hexagon. What is the perimeter of the hexagon?



**Question #6**

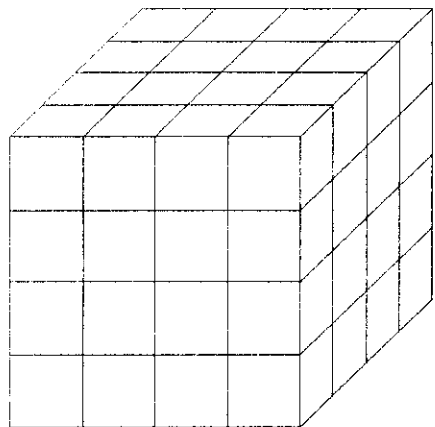
Given the figure as marked, solve for  $x + y + z$ .



**Question #7**

Find the number of pairs of vertical angles determined by eight distinct, concurrent lines.

**Question #8**



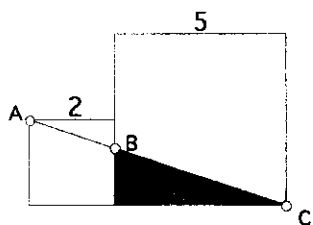
Assuming that you are permitted to rearrange the parts in any way after each cutting, what is the fewest number of cuts needed to cut this one cube into 64 smaller cubes?

**Question #9**

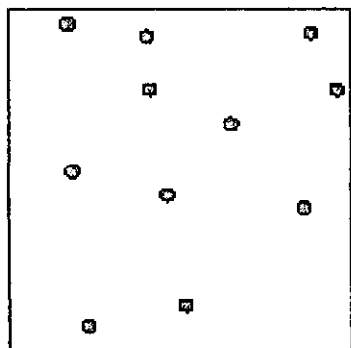
A solid metal cylinder with radius 6 cm and height of 18 cm is melted down and recast as a solid cone with radius 9 cm. Find the height of the cone.

**Question #10**

The two squares have sides of length 2 and 5. Assume that points A, B, and C are collinear. Find the area of the shaded region.

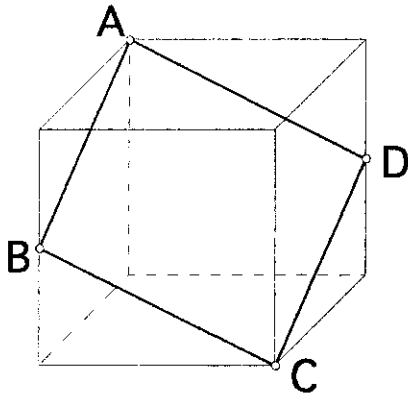


**Question #11**



Eleven Bulldogs are in a fenced in yard as shown. What is the minimum number of lines needed to separate the ferrous man eating animals from each other?

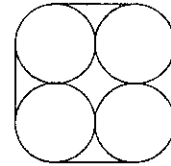
**Question #12**



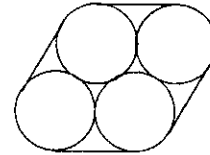
A cube with edge 5 is cut by a plane to create quadrilateral ABCD. Points B and D are midpoints of their respective edges. Find the area of ABCD.

**Question #13**

The centers of four congruent circles form a square. A belt surrounds the circles with no slack as shown. The length of the belt is  $2\pi + 8$ .

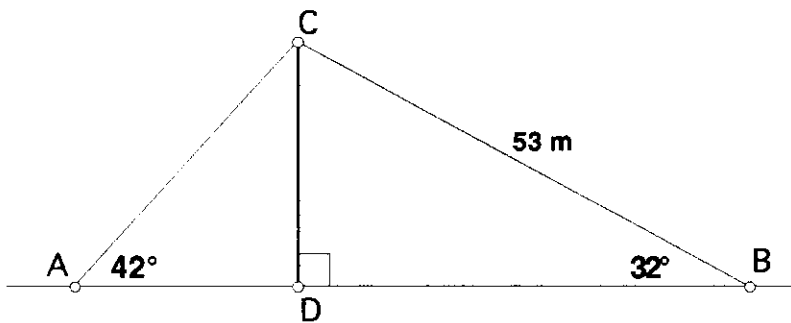


If these tangent circles are then rearranged to form a "parallelogram" as shown, what is the length of the new belt (assume again that the belt has no slack!)?



**Question #14**

Two support wires are attached to tower  $\overline{CD}$  as shown. Find the distance AD. Round your answer to the nearest whole meter.



**Question #15**

The base angles of an isosceles triangle have measures  $2x^2 - 5$  and  $5x + 7$ . What is the measure of the vertex angle?