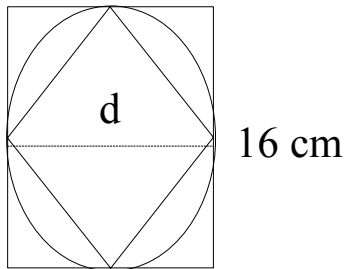


SOML MEET 4
EVENT I
APPLICATIONS OF GEOMETRY

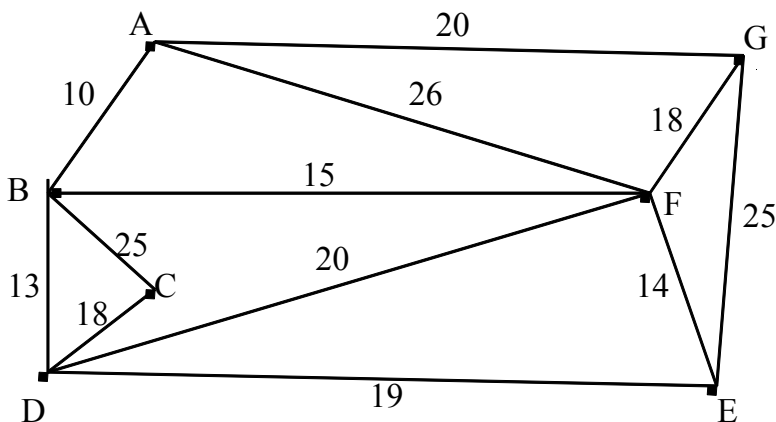
NAME:
TEAM:
SCHOOL:

1. [2 Points] A circle of greatest area is cut out of a square of material 16 cm on each side. A square of greatest area is then cut out of the circle. What percent of the area of the original square is the area of the final square?



ANS:

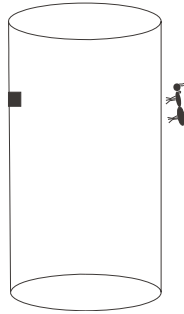
2. [3 Points] Seven small towns in Boone County are connected to one another by dirt roads. See the following diagram; only the beginnings, ends and lengths of the roads are shown. The roads may be straight or curved and that doesn't matter for this problem. The distances are given in kilometers. The county has a limited budget and wants to pave some roads so people can get from every town to every town on paved roads, either directly or indirectly. They want to minimize the total number of kilometers paved. What is the least number of kilometers that will fulfill these requirements?



ANS:

EVENT I (Continue)

3. [5 Points] An ant on the outside of a cylindrical drinking glass notices a bit of chocolate on the opposite inside of the glass. The ant and the chocolate are each 5 cm from the top of the glass. The glass is 20 cm tall and 10 cm in diameter. What is the length (to the nearest tenth cm) of the shortest path the ant can take to get to the chocolate?

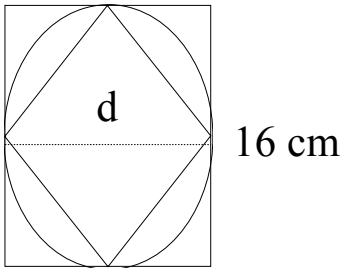


ANS:

EVENT I
APPLICATIONS OF GEOMETRY

TEAM:
SCHOOL:

1. [2 Points] A circle of greatest area is cut out of a square of material 16 cm on each side. A square of greatest area is then cut out of the circle. What percent of the area of the original square is the area of the final square?



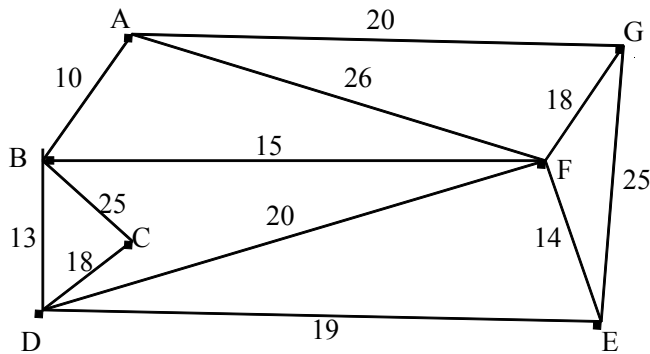
A original square = $s^2 = 16^2$

A final square = $\frac{1}{2}d^2 = \frac{1}{2}16^2$

Final square has 50% of the area of the original square.

ANS: 50%

2. [3 Points] Seven small towns in Boone County are connected to one another by dirt roads. See the following diagram; only the beginnings, ends and lengths of the roads are shown. The roads may be straight or curved and that doesn't matter for this problem. The distances are given in kilometers. The county has a limited budget and wants to pave some roads so people can get from every town to every town on paved roads, either directly or indirectly. They want to minimize the total number of kilometers paved. What is the least number of kilometers that will fulfill these requirements?

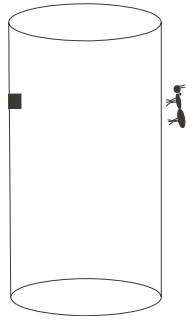


One way to make a minimal spanning tree is to choose the shortest distance, 10 between A and B, then 13 from B to D then 15 from B to F and 14 from F to E. Now all are connected except C and G. C to D is 18 and G to F is 18. Thus, 10+13+14+15+18+18=88km. for the shortest distance connecting all towns.

ANS: 88km

EVENT I (Continue)

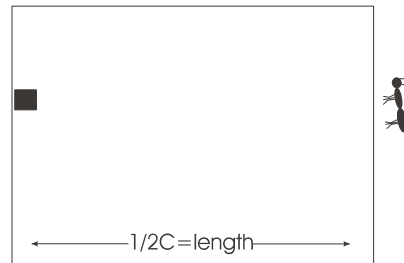
3. [5 Points] An ant on the outside of a cylindrical drinking glass notices a bit of chocolate on the opposite inside of the glass. The ant and the chocolate are each 5 cm from the top of the glass. The glass is 20 cm tall and 10 cm in diameter. What is the length (to the nearest tenth cm) of the shortest path the ant can take to get to the chocolate?



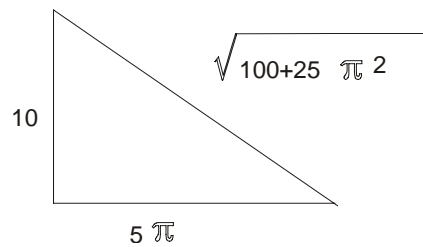
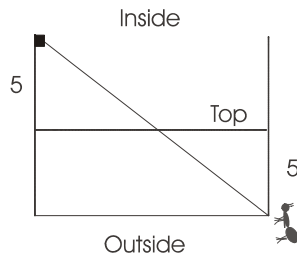
Think of the glass as cut and flattened out.

$$C = 10\pi$$

$$\frac{1}{2}C = 5\pi$$



Because the ant must get from the outside to the inside it will need to get to the top edge. So think of the inside and outside as unfolding along the top line.



Since the shortest distance is a straight line, the shortest distance from the ant to the chocolate is 18.6 cm

ANS: 18.6cm