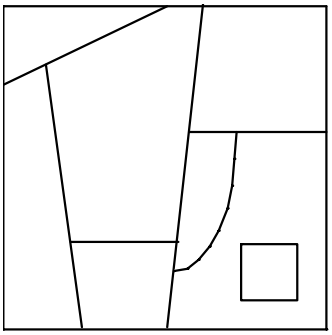
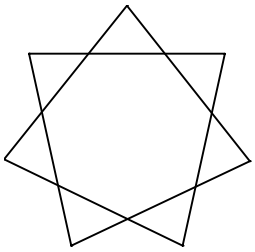
SOML MEET 3 **NAME: _____**
EVENT 3 **TEAM: _____**
Applications of Geometry **SCHOOL: _____**

1. [2 Points] A problem that challenged mathematicians for many years concerns the coloring of maps. That is, what is the minimum number of colors necessary to color *any* map. Just recently it was finally proved with the aid of a computer that no map requires more than 4 colors. Some maps, however, can be colored with fewer than 4 colors. Determine the smallest number of colors necessary to color the map shown. Note: Two countries that share only one point can be colored the same color; however, if they have more than one point in common, they must be colored differently.



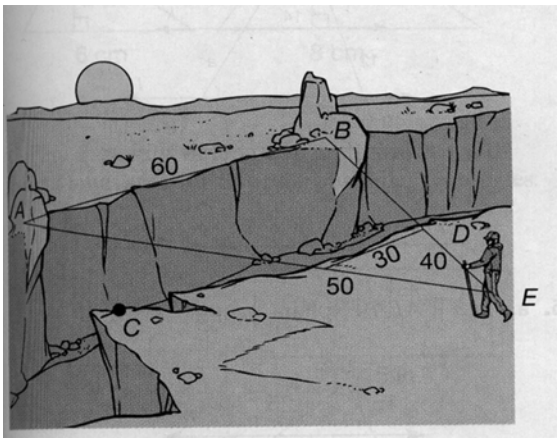
ANS: _____ colors

2. [3 Points] The seven-pointed star shown will be inlaid in the top of a wooden box. The star has a regular heptagon at its center. In order to cut the star, the woodworker needs to know the measure of each angle at the tips of the star. Find this angle measure to the nearest 0.1.



ANS: _____ degrees

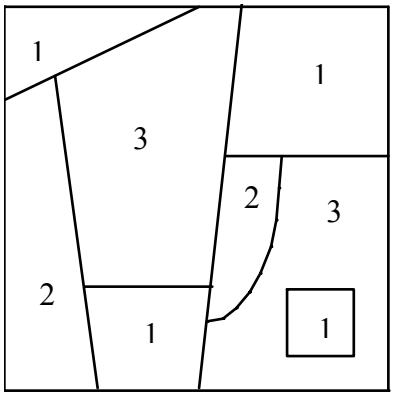
3. [5 Points] Some hikers want to measure the distance across a canyon. They sighted two boulders, A and B on the opposite side. Measuring between C and D (points across the canyon from A and B), they found AB = 60 meters. Find the distance across the canyon, BD, to nearest meter, using the distances in the diagram. Assume AB || CD for this section of the canyon.



ANS: _____ meters

SOML MEET 3 **NAME: KEY**
EVENT 3 **TEAM: _____**
Applications of Geometry **SCHOOL: _____**

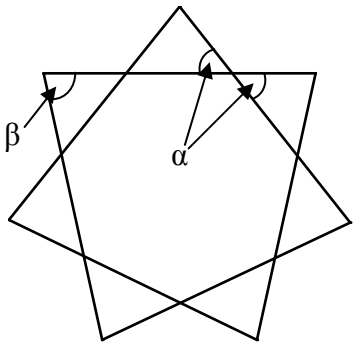
1. [2 Points] A problem that challenged mathematicians for many years concerns the coloring of maps. That is, what is the minimum number of colors necessary to color *any* map. Just recently it was finally proved with the aid of a computer that no map requires more than 4 colors. Some maps, however, can be colored with fewer than 4 colors. Determine the smallest number of colors necessary to color the map shown. Note: Two countries that share only one point can be colored the same color; however, if they have more than one point in common, they must be colored differently.



Solution:

ANS: 3 colors

2. [3 Points] The seven-pointed star shown will be inlaid in the top of a wooden box. The star has a regular heptagon at its center. In order to cut the star, the woodworker needs to know the measure of each angle at the tips of the star. Find this angle measure to the nearest 0.1.

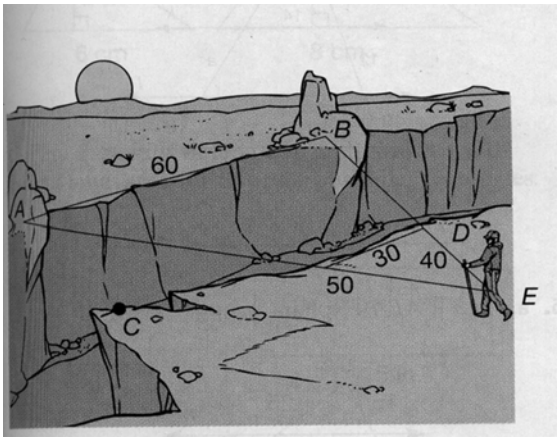


Solution: Exterior angle of a heptagon: $\alpha = \frac{360}{7}$

Tip of star: $\beta = 180 - \frac{2 \cdot 360}{7} \approx 77.14$

ANS: 77.1 (degrees)

3. [5 Points] Some hikers want to measure the distance across a canyon. They sighted two boulders, A and B on the opposite side. Measuring between C and D (points across the canyon from A and B), they found AB = 60 meters. Find the distance across the canyon, BD, to nearest meter, using the distances in the diagram. Assume AB || CD for this section of the canyon.



Solution: Let BD = x, so $\frac{40}{30} = \frac{40 + x}{60}$

Then, $1200 + 30x = 2400$

$30x = 1200$

$x = 40$

ANS: 40 meters