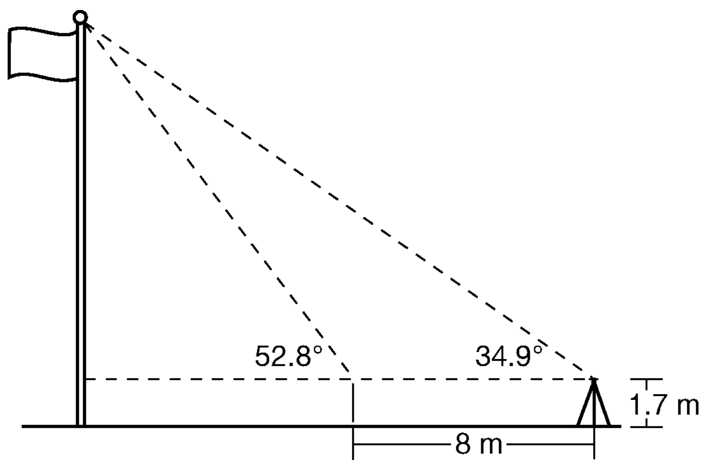
Name: ____
CC Geometry

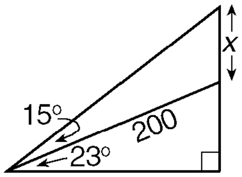
Law of Sines Practice

1) Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be $34.9°$. She walks 8 meters closer and determines the new measure of the angle of elevation to be $52.8°$. At each measurement, the survey instrument is 1.7 meters above the ground.

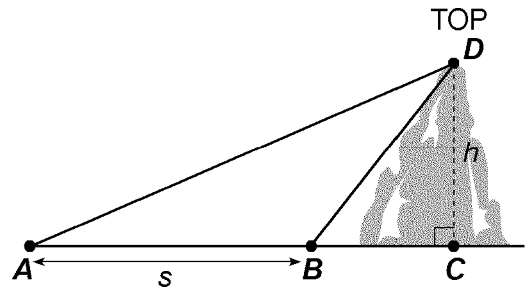


Determine and state, to the nearest tenth of a meter, the height of the flagpole. [*Show all work*.]

2) Find x to the nearest integer. [*Show all work*.]

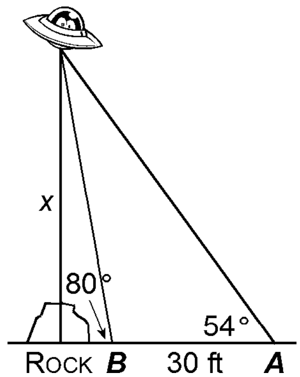


3) A ship at sea heads directly toward a cliff on the shoreline. The accompanying diagram shows the top of the cliff, D, sighted from two locations, A and B, separated by distance s. [*Show all work*.]



If $m\angle DAC = 30°$, $m\angle DBC = 45°$, and $s = 30$ feet, what is the height of the cliff to the nearest foot? [*Show all work*.]

4) Two observers, *A* and *B*, standing 30 feet apart, watch a flying saucer hover directly above a large rock.



Use the information shown in the diagram to find the distance (x) the flying saucer hovers above the ground to the nearest tenth of a foot. [*If performing multiple calculations, do not round until the last step.*] [*Show all work to justify your answer.*]

1) 13.6 m

WORK SHOWN: $\tan 52.8 = \frac{y}{x}$, $y = x \tan 52.8$; $\tan 34.9 = \frac{y}{x+8}$, $y = (x + 8) \tan 34.9$; $x \tan 52.8 = (x + 8) \tan 34.9$, $x \tan 52.5 = x \tan 34.9 + 8 \tan 34.9$, $x \tan 52.5 - x \tan 34.9 = 8 \tan 34.9$, $x (\tan 52.5 - \tan 34.9) = 8 \tan 34.9$, $x = \frac{8 \tan 34.9}{(\tan 52.5 - \tan 34.9)}$, $x = 9.0037$; $\tan 52.5 = \frac{y}{9.0037}$, $y = 9.0037 \tan 52.5$, $y = 11.8619$; height of flagpole (h) = $y + 1.7$, $h = 11.8619 + 1.7 = 13.56 \approx 13.6$

2) 66

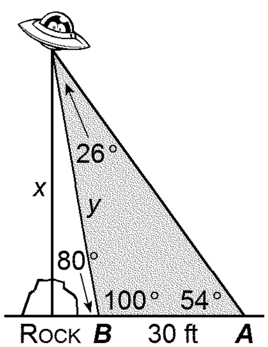
WORK SHOWN: $90° - (15° + 23°) = 52°$; $\frac{x}{\sin 15°} = \frac{200}{\sin 52°}$, $x = \frac{200 \sin 15°}{\sin 52°} = 65.689 \approx 66$

3) 41 feet

WORK SHOWN: $m\angle ADB = 180 - 30 - (180 - 45) = 15°$; $\frac{a}{\sin A} = \frac{s}{\sin D}$, $\frac{a}{\sin 30°} = \frac{30}{\sin 15°}$, $a = \frac{30 \cdot \sin 30°}{\sin 15°} = 57.956$; $h = a \cdot \sin 45° = 57.956 \cdot \sin 45° = 40.981 \approx 41$

4) 54.5 feet

WORK SHOWN:



<u>For the shaded triangle</u>: At Observer B is a linear pair of angles, so $180 - 80 = 100°$ for the inside angle.; $m\angle UFO = 180 - (54 + 100) = 26°$; $\frac{\sin 26}{30} = \frac{\sin 54}{y}$, $\sin 26 \cdot y = 30 \cdot \sin 54$, $0.438 \cdot y = 30 \cdot 0.809$, $y = \frac{24.271}{0.438} = 55.365$; <u>For the unshaded right triangle</u>: $\sin 80 = \frac{x}{55.365}$, $x = (0.985)(55.365) = 54.524 \approx 54.5$