4.06 Law of Cosines HW

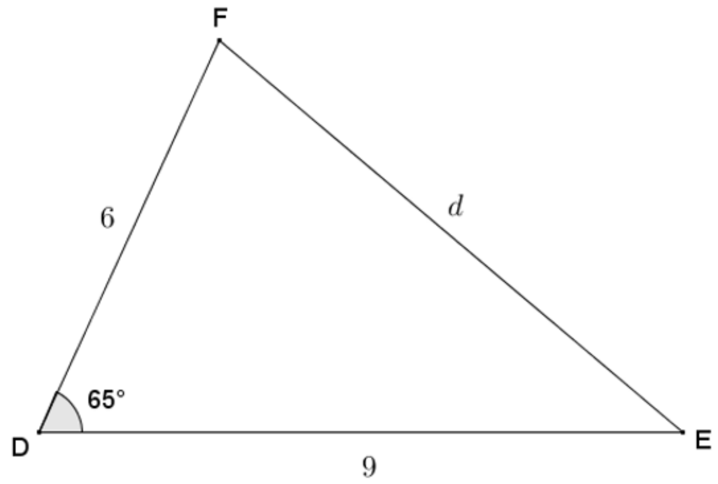
1.

Given $\triangle DEF$, use the law of cosines to find the length of the side marked d to the nearest tenth.

$d^2 = 6^2 + 9^2 - 2 \cdot 6 \cdot 9 \cdot \cos 65° \approx 71.4$

$d = \sqrt{71.4} \approx 8.4$

$\boxed{d = 8.4}$



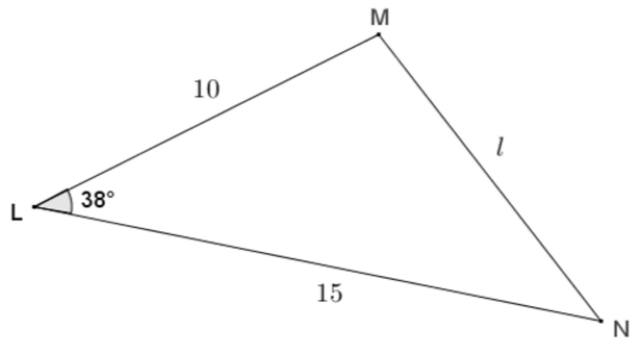
2.

Given triangle LMN, $LM = 10$, $LN = 15$, and $m\angle L = 38°$, use the law of cosines to find the length of $\overline{MN}$ to the nearest tenth.

$l^2 = 10^2 + 15^2 - 2 \cdot 10 \cdot 15 \cdot \cos 38° \approx 88.6$

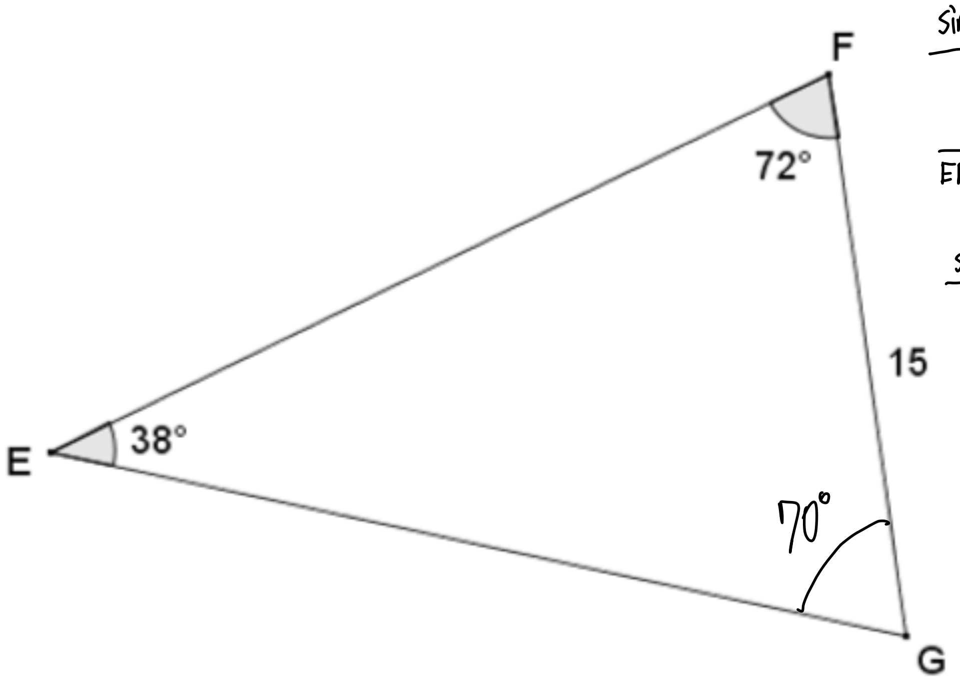
$l = \sqrt{88.6} \approx 9.4$

$\boxed{\overline{MN} = 9.4}$



3.

Given triangle EFG, $FG = 15$, angle E has a measure of $38°$, and angle F has a measure of $72°$, find the measures of the remaining sides and angle to the nearest tenth. Justify your method.



$$\frac{\sin 38^\circ}{15} = \frac{\sin 70^\circ}{\overline{EF}}$$

$$\overline{EF} = \frac{15\cdot\sin 70^\circ}{\sin 38^\circ} \approx 22.9$$

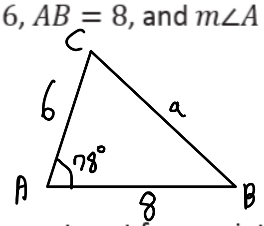
$$\frac{\sin 38^\circ}{15} = \frac{\sin 72^\circ}{\overline{EG}}$$

$$\overline{EG} = \frac{15\cdot\sin 72^\circ}{\sin 38^\circ} \approx 23.2$$

$$\boxed{\begin{array}{l}\overline{EF} = 22.9\\ \overline{EG} = 23.2\end{array}}$$

4.

Given triangle ABC, $AC = 6$, $AB = 8$, and $m\angle A = 78^\circ$, draw a diagram of triangle ABC, and use the law of cosines to find the length of $\overline{BC}$.



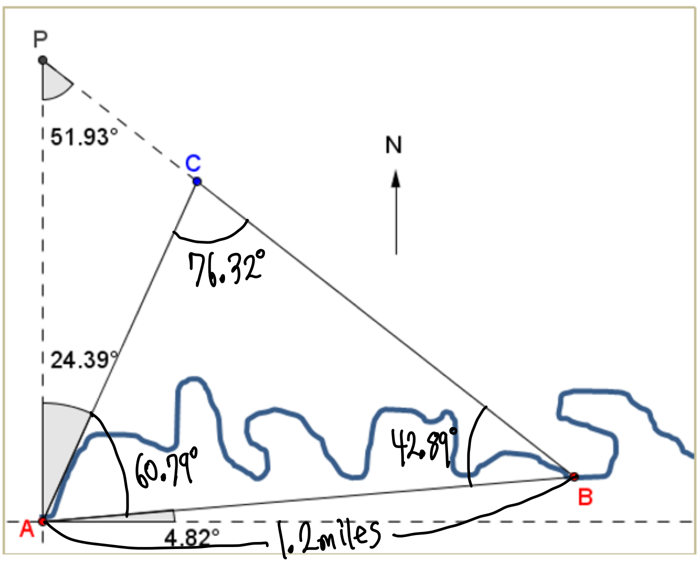
$$a^2 = 6^2 + 8^2 - 2\cdot 6\cdot 8\cdot\cos 78^\circ \approx 80$$

$$a = \sqrt{80} \approx 8.9$$

$$\boxed{\overline{BC} = 8.9}$$

5.

Mark is deciding on the best way to get from point A to point B as shown on the map of Crooked Creek to go fishing. He sees that if he stays on the north side of the creek, he would have to walk around a triangular piece of private property (bounded by $\overline{AC}$ and $\overline{BC}$). His other option is to cross the creek at A and take a straight path to B, which he knows to be a distance of 1.2 mi. The second option requires crossing the water, which is too deep for his boots and very cold. Find the difference in distances to help Mark decide which path is his better choice.



$$\frac{1.2}{\sin 76.32^\circ} = \frac{\overline{AC}}{\sin 42.89^\circ} = \frac{\overline{AB}}{\sin 60.79^\circ}$$

$$\overline{AB} = \frac{1.2\cdot\sin 60.79^\circ}{\sin 76.32^\circ} \approx 1.08$$

$$\overline{AC} = \frac{1.2\cdot\sin 42.89^\circ}{\sin 76.32^\circ} \approx 0.84$$

$$(1.08 + 0.84) - 1.2$$
$$= 0.72$$

$$\boxed{0.72 \text{ miles}}$$