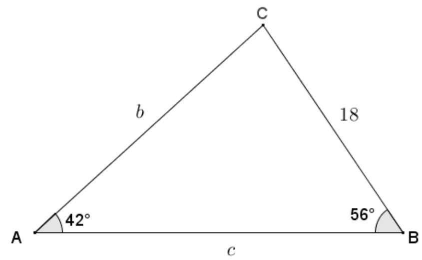
Exit Ticket Sample Solutions

1. **Use the law of sines to find lengths b and c in the triangle below. Round answers to the nearest tenth as necessary.**

$\angle C = 82°$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$
$$\frac{\sin 42}{18} = \frac{\sin 56}{b} = \frac{\sin 82}{c}$$

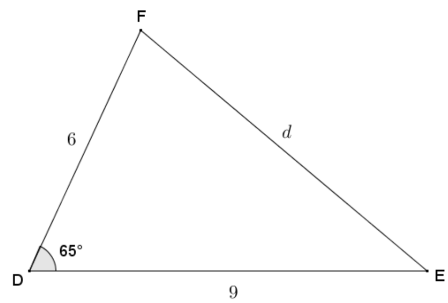


$$b = \frac{18(\sin 56)}{\sin 42} \approx 22.3$$

$$c = \frac{18(\sin 82)}{\sin 42} \approx 26.6$$

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

$$d^2 = 6^2 + 9^2 - 2(6)(9)(\cos 65)$$
$$d^2 = 36 + 81 - 108(\cos 65)$$
$$d^2 = 117 - 108(\cos 65)$$
$$d = \sqrt{117 - 108(\cos 65)}$$
$$d \approx 8.4$$

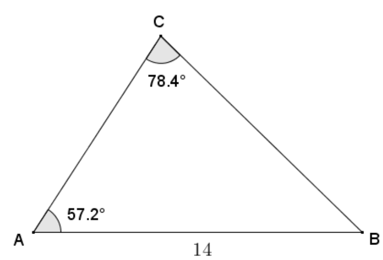


Problem Set Sample Solutions

1. **Given $\triangle ABC$, $AB = 14$, $\angle A = 57.2°$, and $\angle C = 78.4°$, calculate the measure of angle B to the nearest tenth of a degree, and use the law of sines to find the lengths of AC and BC to the nearest tenth.**

By the angle sum of a triangle, $\angle B = 44.4°$.

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$
$$\frac{\sin 57.2}{a} = \frac{\sin 44.4}{b} = \frac{\sin 78.4}{14}$$



$$a = \frac{14 \sin 57.2}{\sin 78.4} \approx 12.0$$

$$b = \frac{14 \sin 44.4}{\sin 78.4} \approx 10.0$$

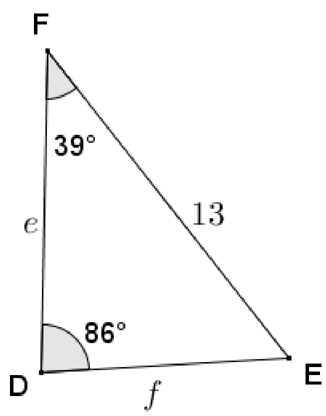
Calculate the area of $\triangle ABC$ to the nearest square unit.

$$Area = \frac{1}{2}bc\sin A$$

$$Area = \frac{1}{2}(10)(14)\sin 57.2$$

$$Area = 70\sin 57.2 \approx 59$$

2. Given $\triangle DEF$, $\angle F = 39°$, and $EF = 13$, calculate the measure of $\angle E$, and use the Law of Sines to find the lengths of $\overline{DF}$ and $\overline{DE}$ to the nearest hundredth.



By the angle sum of a triangle, $m\angle E = 55°$.

$$\frac{\sin D}{d} = \frac{\sin E}{e} = \frac{\sin F}{f}$$

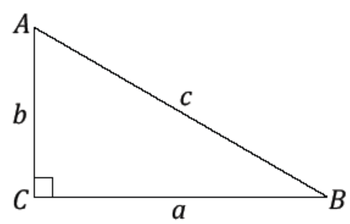
$$\frac{\sin 86}{13} = \frac{\sin 55}{e}$$

$$e = \frac{13\sin 55}{\sin 86} \approx 10.67$$

$$\frac{\sin 86}{13} = \frac{\sin 39}{f}$$

$$f = \frac{13\sin 39}{\sin 86} \approx 8.20$$

3. Does the law of sines apply to a right triangle? Based on $\triangle ABC$, the following ratios were set up according to the law of sines.



$$\frac{\sin\angle A}{a} = \frac{\sin\angle B}{b} = \frac{\sin 90}{c}$$

Fill in the partially completed work below:

$$\frac{\sin\angle A}{a} = \frac{\sin 90}{c} \qquad \frac{\sin\angle B}{b} = \frac{\sin 90}{c}$$

$$\frac{\sin\angle A}{a} = \frac{1}{c} \qquad \frac{\sin\angle B}{b} = \frac{1}{c}$$

$$\sin\angle A = \frac{a}{c} \qquad \sin\angle B = \frac{b}{c}$$

What conclusions can we draw?

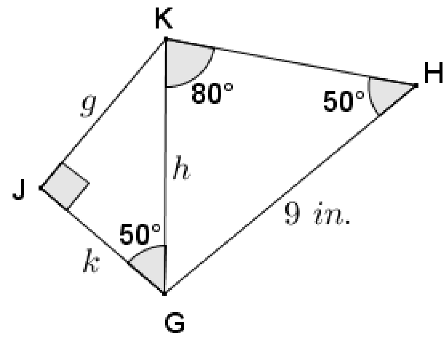
The law of sines does apply to a right triangle. We get the formulas that are equivalent to $\sin\angle A = \frac{opp}{hyp}$ and $\sin\angle B = \frac{opp}{hyp}$, where A and B are the measures of the acute angles of the right triangle.

4. Given quadrilateral $GHKJ$, $\angle H = 50°$, $\angle HKG = 80°$, $\angle KGJ = 50°$, $\angle J$ is a right angle and $GH = 9$ in., use the Law of Sines to find the length of GK, and then find the lengths of $\overline{GJ}$ and $\overline{JK}$ to the nearest tenth of an inch.

By the angle sum of a triangle, $\angle HGK = 50°$; therefore, $\triangle GHK$ is an isosceles triangle since its base $\angle$'s have equal measure.

$$\frac{\sin 50}{h} = \frac{\sin 80}{9}$$

$$h = \frac{9 \sin 50}{\sin 80} \approx 7.0$$



$k = 7 \cos 50 \approx 4.5$

$g = 7 \sin 50 \approx 5.4$

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

$l^2 = 10^2 + 15^2 - 2(10)(15)\cos 38$

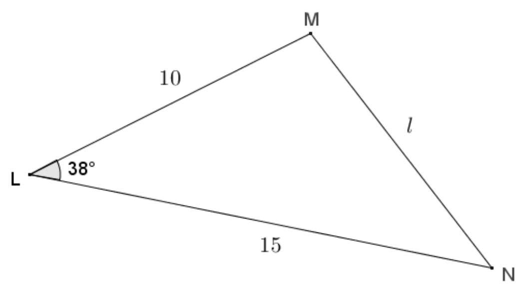
$l^2 = 100 + 225 - 300\cos 38$

$l^2 = 325 - 300\cos 38$

$l = \sqrt{325 - 300\cos 38}$

$l \approx 9.4$

$MN = 9.4$



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

$a^2 = 6^2 + 8^2 - 2(6)(8)(\cos 78)$

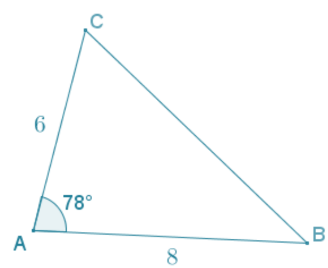
$a^2 = 36 + 64 - 96(\cos 78)$

$a^2 = 100 - 96\cos 78$

$a = \sqrt{100 - 96\cos 78}$

$a \approx 8.9$

The length of $\overline{BC}$ is approximately 8.9.



Calculate the area of triangle ABC.

$Area = \frac{1}{2}bc(\sin A)$

$Area = \frac{1}{2}(6)(8)(\sin 78)$

$Area = 23.5(\sin 78)$

$Area \approx 23.5$

The area of triangle ABC is approximately 23.5 square units.