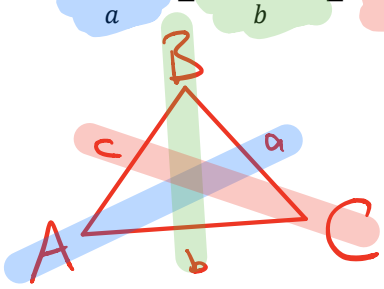
More Trig – Law of Sines

Notes Section 10.2 Name_____

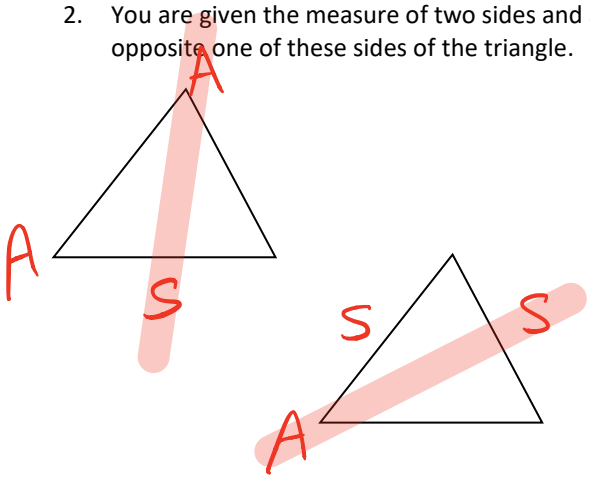
Law of Sines: Let ΔABC be any triangle with a, b, and c representing the measures of sides opposite angles with measures A, B, and C respectively. Then,

$$\frac{\sin(m\angle A)}{a} = \frac{\sin(m\angle B)}{b} = \frac{\sin(m\angle C)}{c}$$



The Law of Sines can be used to solve a triangle in the following cases:

1. You are given the measure of two angles and any side of a triangle.
2. You are given the measure of two sides and an angle opposite one of these sides of the triangle.



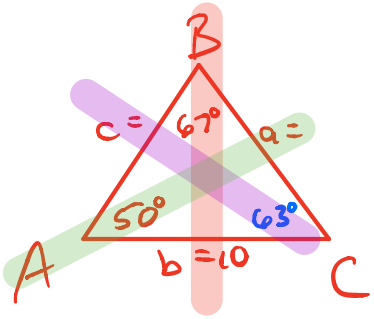
Solving the Triangle: Finding the measures of all the angles and sides of a triangle.

Ambiguous Case of Sines

ASS!

For the following examples, round the sides to the nearest tenth and the angles to the nearest whole number.

#1) Solve ΔABC if m∠A = 50°, m∠B = 67°, and b = 10.



$m\angle C + 67° + 50° = 180°$

$m\angle C + 117° = 180°$

$m\angle C = 63°$

$$\frac{\sin(67°)}{10} = \frac{\sin(63°)}{c}$$

$$c \cdot \sin(67°) = 10 \cdot \sin(63°)$$

$$c = \frac{10\sin(63°)}{\sin 67°}$$

$c \approx 9.7$

$$\frac{\sin(67°)}{10} = \frac{\sin(50°)}{a}$$

$$a \cdot \sin(67°) = 10\sin(50°)$$

$$a = \frac{10\sin(50°)}{\sin(67°)}$$

$a \approx 8.3$

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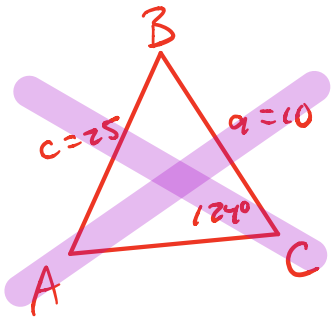
#2) If a = 10, m∠C = 124°, and c = 25, find m∠A.



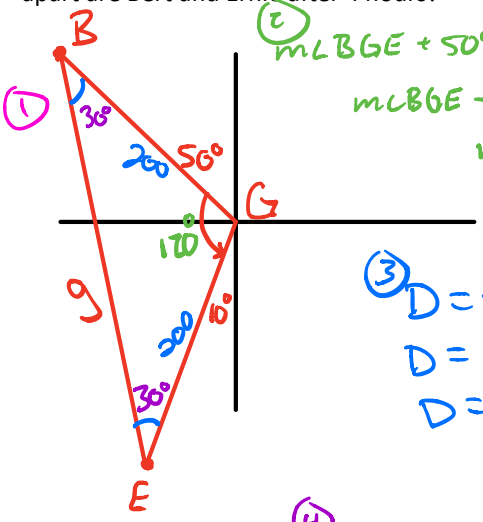
$$\frac{\sin(124^\circ)}{25} = \frac{\sin(m\angle A)}{10}$$

$$\frac{10\sin(124^\circ)}{25} = \sin(m\angle A)$$

$$\sin^{-1}\left(\frac{10\sin(124^\circ)}{25}\right) = m\angle A$$

$$19^\circ \approx m\angle A$$

#3) Two of George's paradoxasaurs, Bert and Ernie, fly away from George at the same time. Both paradoxasaurs travel at a speed of 50 miles per hour. Bert flies in the direction of 50° west of north while Ernie travels 10° west of south. How far apart are Bert and Ernie after 4 hours?



② $m\angle BGE + 50^\circ + 10^\circ = 180^\circ$

$m\angle BGE + 60^\circ = 180^\circ$

$m\angle BGE = 120^\circ$

③ $D = r \cdot t$

$D = 50(4)$

$D = 200$

④ $2m\angle E + 120^\circ = 180^\circ$

$2m\angle E = 60^\circ$

$m\angle E = 30^\circ$

⑤ $\frac{\sin(30^\circ)}{200} = \frac{\sin(120^\circ)}{g}$

$g\sin(30^\circ) = 200\sin(120^\circ)$

$g = \frac{200\sin(120^\circ)}{\sin(30^\circ)}$

$g \approx 346$

Bert and Ernie are about 346 miles apart.