

10-6 The Law of Cosines

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CC # G23, G24

LOS

ASA

AAS

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



NEED 3 OF 4
TO KNOW
IN ONE PROPORTION
 $\frac{a}{b} = \frac{c}{d}$

LOC

SAS

SSS

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$



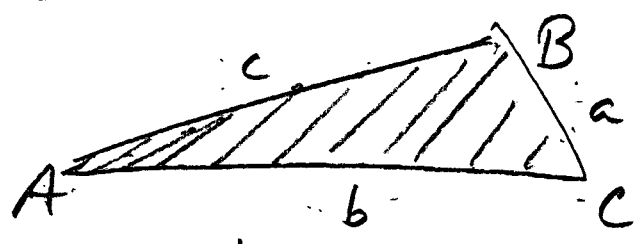
NEED TO KNOW 3/4
IN ONE EQUATION

AAA \Rightarrow ∞ Δ 's, can't solve

SSA \Rightarrow 0, 1, or 2 Δ 's LOS \Rightarrow memorize
LOC \Rightarrow quad. eq.

*WARNING: THE COSINE IS NEGATIVE IN QUAD II
 $\hookrightarrow \Rightarrow$ OBTUSE Δ ALERT! (90-180)

Area Formulas Related TO LOS / LOC



LOS ⇒ SAS

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

$$\text{Area} = \frac{1}{2} ac \sin B$$

$$\text{Area} = \frac{1}{2} ab \sin C$$

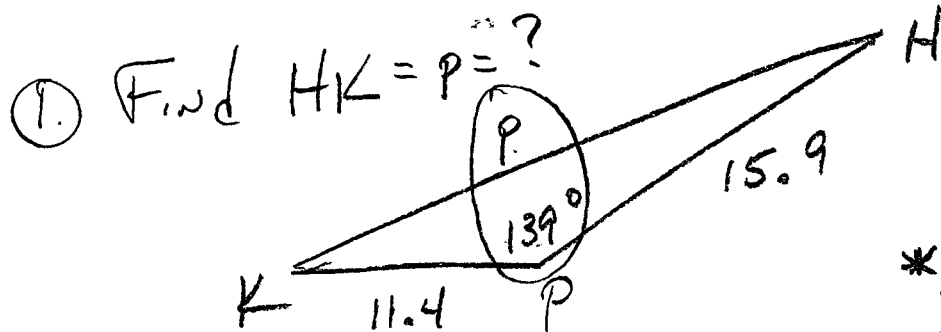
LOC ⇒ SSS

s = semi perimeter

$$s = \frac{1}{2} (a + b + c)$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

↗
Heron's Formula



$$* \cos 139 = -$$

$$\text{REFL} = 41^\circ$$

$$P^2 = 11.4^2 + 15.9^2 - 2(11.4)(15.9)\cos 139$$

$$P^2 = 129.96 + 252.81 + 362.52 (.7547)$$

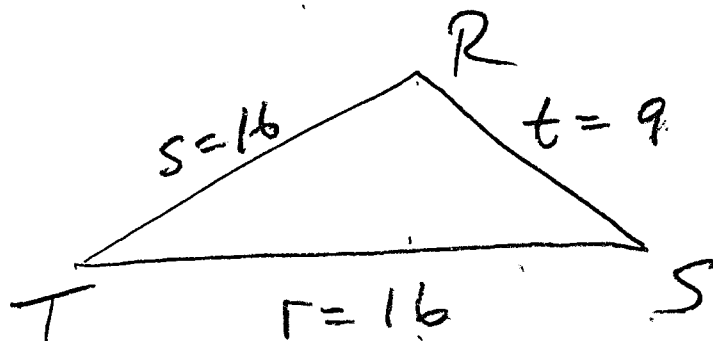
$$P^2 = 382.77 + 274.594$$

$$P^2 = 657.364$$

$$P = 25.639 \approx 25.6$$

②5 Find Area $\triangle TRS$

$$s=16 \quad t=9 \quad r=16$$



$$P = 16 + 9 + 16 = 41$$

$$s = \frac{41}{2}$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{\frac{41}{2} \left(\frac{41}{2} - \frac{32}{2} \right) \left(\frac{41}{2} - \frac{32}{2} \right) \left(\frac{41}{2} - \frac{18}{2} \right)}$$

$$= \sqrt{\frac{41}{2} \left(\frac{9}{2} \right) \left(\frac{9}{2} \right) \left(\frac{23}{2} \right)}$$

$$= \sqrt{\frac{81 \cdot 41 \cdot 23}{16}} = \sqrt{\frac{76383}{16}}$$

$$= \sqrt{76383}$$

$$= \frac{276.374}{4} = 69.0936$$

$$= \boxed{69.1 \text{ units}^2} \checkmark$$