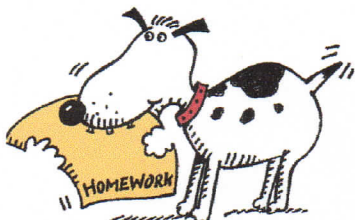


HOMEWORK TAKE-UP

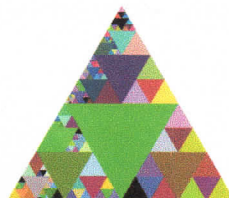
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UNIT #5: Trigonometry
Sine and Cosine Laws

Learning Goal:

I will learn how to find the sides and angles of non right angle triangles using the sine and cosine laws.



Lesson Part A: Sine Law

When a triangle does not have a right angle, we can use the Sine Law to solve it, providing we have one of the following:

Case 1: Angle-Angle-Side (AAS)



Case 2: Side-Side-Angle (SSA)



Case 3: Angle-Side-Angle (ASA)



Sine Law Formulas

The Sine Law
In any oblique $\triangle ABC$:

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

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

Acute $\triangle ABC$ Obtuse $\triangle ABC$

solving for a side

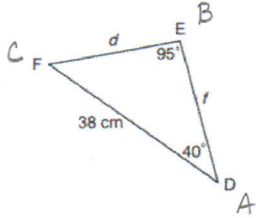
solving for an angle

Remember!

Upper case letters are for angles, lower case for sides

Sine and Cosine Laws (Lesson).notebook

Example 1: Angle-Angle-Side (AAS)



Solve for d.

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

$$\frac{d}{\sin 40^\circ} = \frac{38}{\sin 95^\circ} = \frac{r}{\sin F}$$

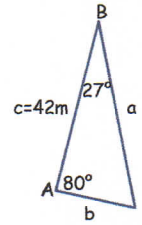
$$\frac{d}{\sin 40^\circ} = \frac{38}{\sin 95^\circ} \left. \begin{array}{l} \text{need one complete} \\ \text{ratio to solve} \\ \text{another} \end{array} \right\}$$

$$\frac{d \sin 95^\circ}{\sin 95^\circ} = \frac{38 \sin 40^\circ}{\sin 95^\circ}$$

$$\boxed{d = 24.5 \text{ cm}}$$

∴ dis 24.5 cm.

Example 2: Angle-Side-Angle (ASA)



Solve for a

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

$$\frac{a}{\sin 80^\circ} = \frac{b}{\sin 27^\circ} = \frac{42}{\sin C} \rightarrow 180^\circ - 27^\circ - 80^\circ = 73^\circ$$

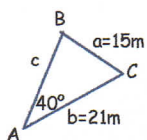
$$\frac{a}{\sin 80^\circ} = \frac{42}{\sin 73^\circ}$$

$$\frac{a \sin 73^\circ}{\sin 73^\circ} = \frac{42 \sin 80^\circ}{\sin 73^\circ}$$

$$\boxed{a = 43.3 \text{ m}}$$

∴ a is 43.3m.

Example 3: Side-Side-Angle (SSA)



Solve for ∠C.

+ Need to solve ∠B first!

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

$$\frac{\sin 40^\circ}{15} = \frac{\sin B}{21} = \frac{\sin C}{c}$$

$$\frac{21 \sin 40^\circ}{15} = \frac{15 \sin B}{15} \quad \angle C = 180^\circ - 64^\circ - 40^\circ$$

$$\boxed{\angle C = 76^\circ}$$

$$0.8999 = \sin B$$

$$\sin^{-1}(0.8999) = \angle B$$

$$\boxed{64^\circ = \angle B}$$

∴ ∠C is 76°.

Lesson Part B: Cosine Law

The Cosine Law allows us to solve a non-right triangle in the following two cases when the Sine Law does not work:

Case 1: Side-Angle-Side (SAS)



Case 2: Side-Side-Side (SSS)



Sine and Cosine Laws (Lesson).notebook

Cosine Formulas

To find the measure of side a

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

To find the measure of angle A :

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

UNIT 5: Trigonometry Sine and Cosine Laws

Learning Goal:

I will learn how to find the sides and angles of non right angle triangles using the sine and cosine laws.

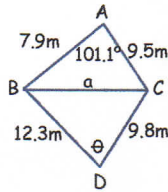
Success Criteria:

To be successful, I must be able to...

- Identify which law to use (Sine or Cosine) based on the information provided
- Solve for the unknown side or angle using the appropriate law

Practice Work
p. 290 #1, #2a,b,d,e #3a,c,f

Example: Find a and θ (SAS) Find a and θ



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

$$a^2 = (9.5)^2 + (7.9)^2 - 2(9.5)(7.9) \cos 101.1^\circ$$

$$a^2 = 152.66 - (-28.8975)$$

$$a^2 = 181.5575$$

$$a = 13.5 \text{ m} \quad \therefore \text{side } a \text{ is } 13.5 \text{ m}$$

Find θ

$$\cos \theta = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos \theta = \frac{(9.8)^2 + (12.3)^2 - (13.5)^2}{2(9.8)(12.3)}$$

$$\cos \theta = 0.26995$$

$$\theta = \cos^{-1}(0.26995)$$

$$\theta = 74^\circ \quad \therefore \theta \text{ is } 74^\circ$$