

Write your questions and thoughts here!

Name: _____

5.5 Law of Sines & Cosines Guided Notes

$$\sin \theta = \frac{\text{OPP}}{\text{HYP}}$$

Watch the video and pause frequently to fill in each step below.

Law of Sines Proof

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

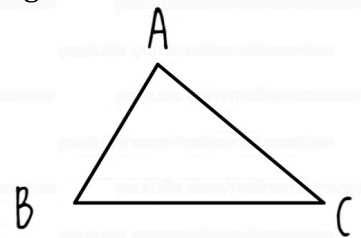
STEP 1: Label the sides opposite of each angle in the triangle to the left.

STEP 2: Draw in the altitude from angle A and label it h_1 .

STEP 3: Find the sine ratio for both angles B and C using the altitude h_1 .

$$\sin(B) =$$

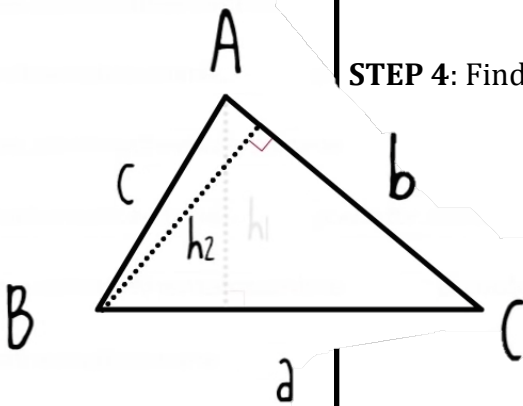
$$\sin(C) =$$



STEP 4: Find the sine ratio for both angles A and C using the altitude h_2 .

$$\sin(A) =$$

$$\sin(C) =$$



STEP 5: (a) Solve each equation above for h_2 .
(b) Then, use the transitive property.

STEP 6: (a) Solve each equation above for h_1 .
(b) Then, use the transitive property.

STEP 7: Use the transitive property to combine your two equations in STEP 5 & STEP 6 to derive the LAW OF SINES.

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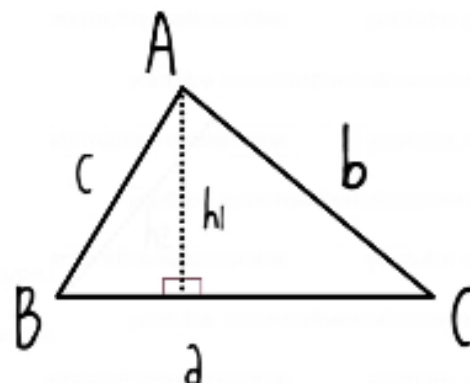
Law of Cosines Proof

Law of Cosines:

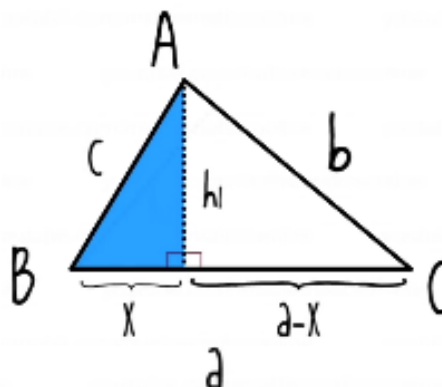
$$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos(A)$$

$$b^2 = a^2 + c^2 - 2 \cdot a \cdot c \cdot \cos(B)$$

$$c^2 = a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos(C)$$



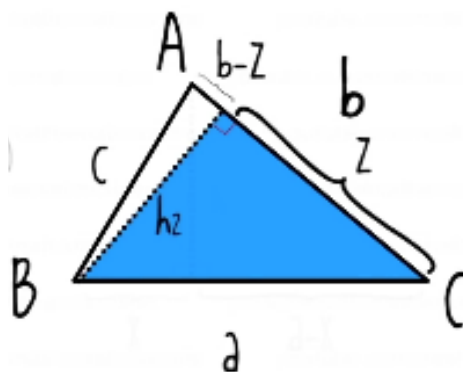
$$\cos \theta = \frac{\text{ADJ}}{\text{HYP}}$$



Pythagorean Theorem
Left triangle

Pythagorean Theorem
Right Triangle

$$\cos(B) =$$

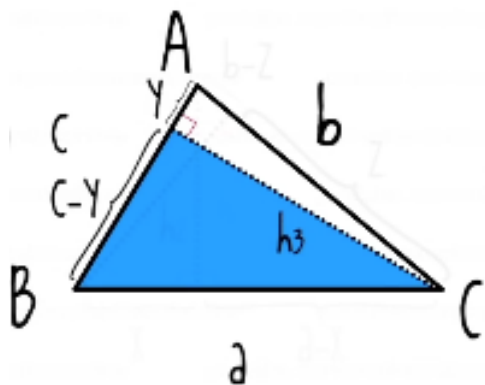


P.T. ▲ #1

P.T. ▲ #2

$$\cos(C) =$$

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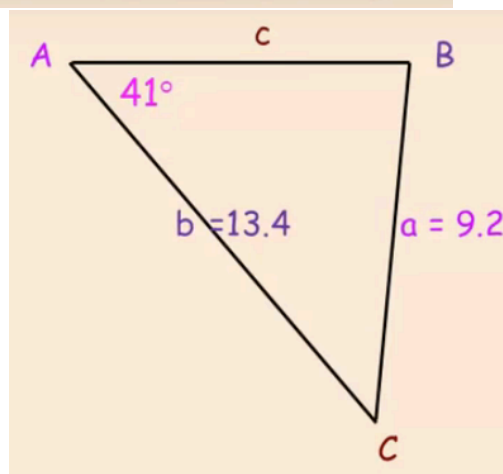
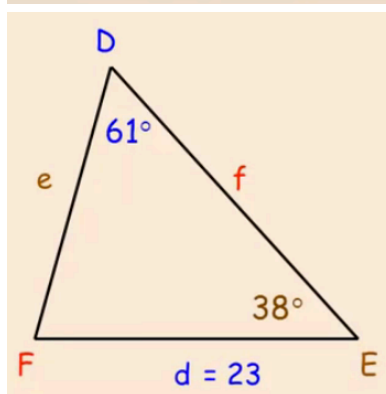
P.T. ▲ #1

P.T. ▲ #2

$\cos(A) =$

Examples of How to Use Law of Sines & Cosines.

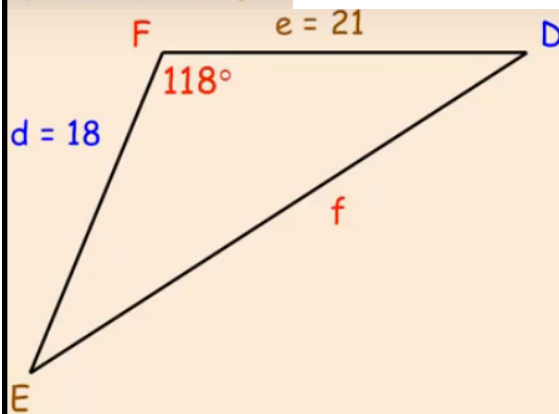
When can you use the Sine Law to find a side or an angle?



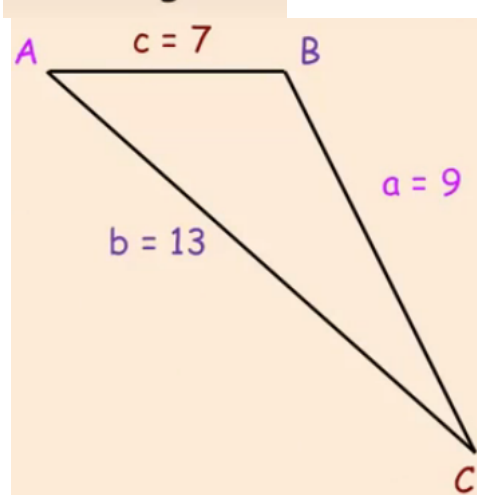
Write your questions and thoughts here!



Find side f .

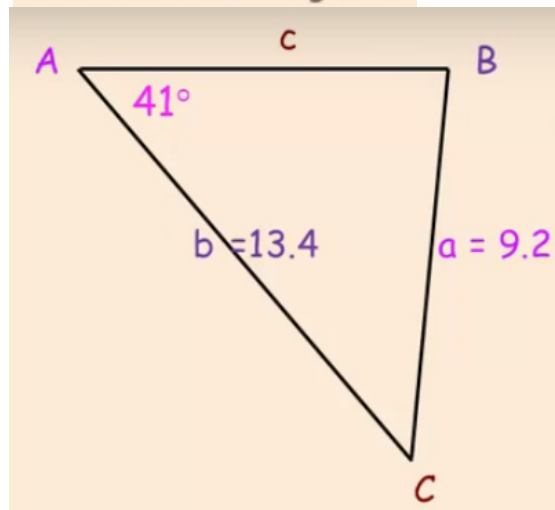


Find angle C .



When can you use the Cosine Law to find a side or an angle?

Find side c or angle C .

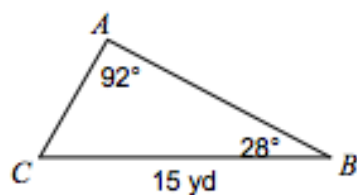


SUMMARY: _____

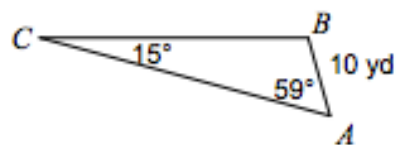
PROBLEM SET

Find each measurement indicated. Round your answers to the nearest tenth.

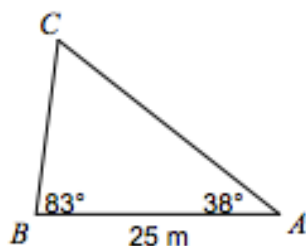
1) Find AC



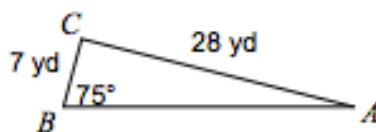
2) Find BC



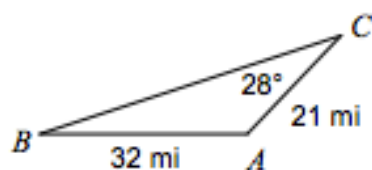
3) Find AC



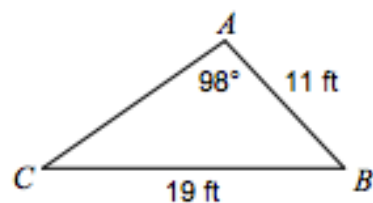
4) Find $m\angle A$



5) Find $m\angle B$

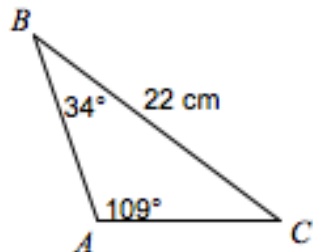


6) Find $m\angle C$

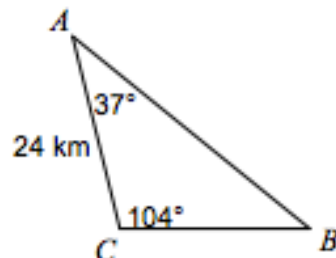


Solve each triangle. Round your answers to the nearest tenth.

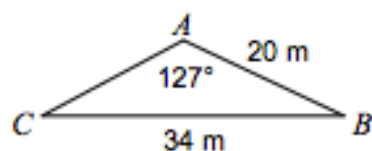
7)



8)

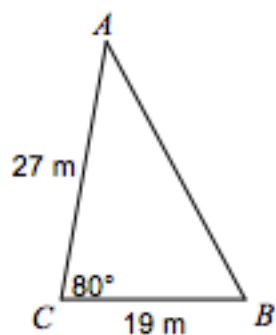


9)

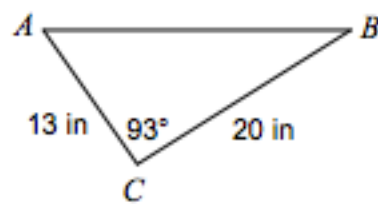


Find each measurement indicated. Round your answers to the nearest tenth.

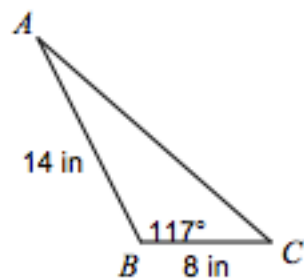
10) Find AB



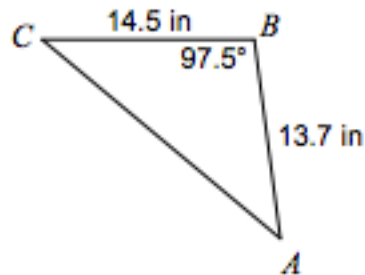
11) Find AB



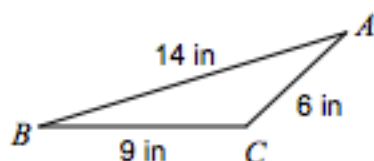
12) Find AC



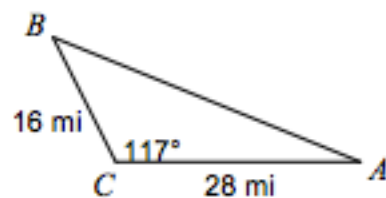
13) Find $m\angle C$



14) Find $m\angle C$



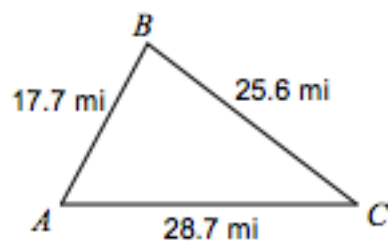
15) Find $m\angle A$



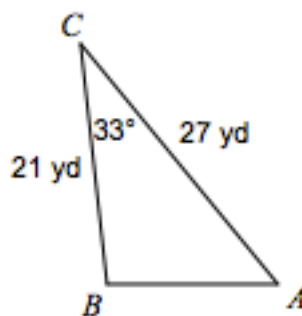
Solve each triangle. Round your answers to the nearest tenth.

To solve each triangle simply means to find all missing sides and angles.

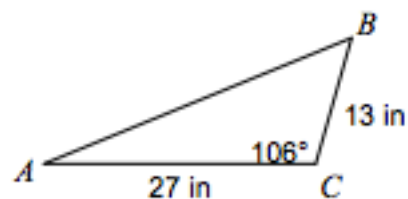
16)



17)



18)

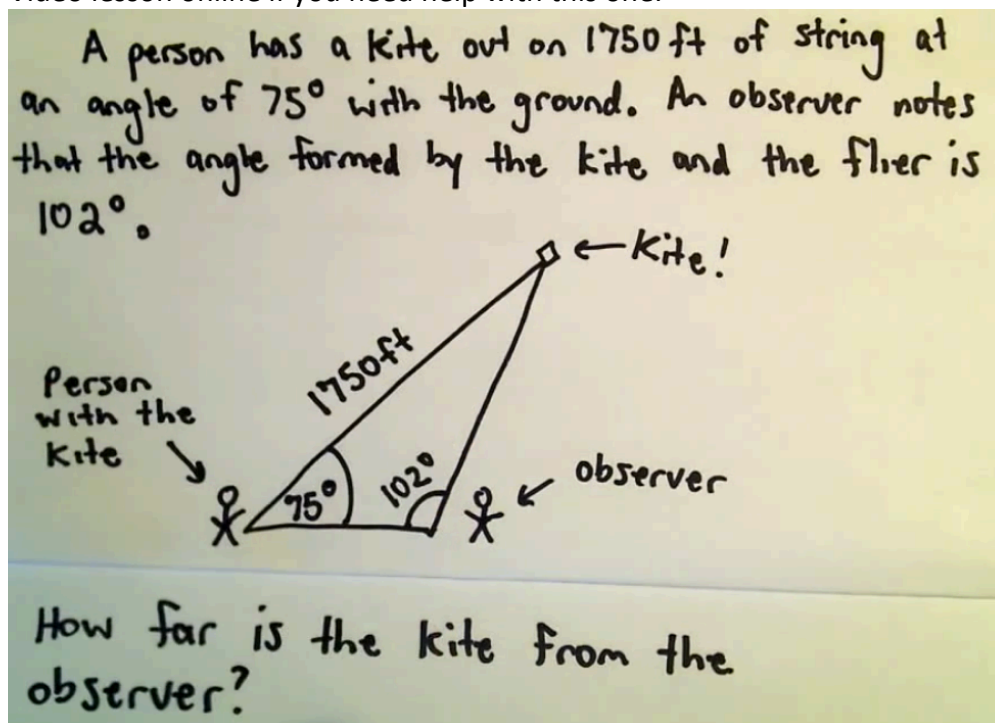


APPLICATIONS

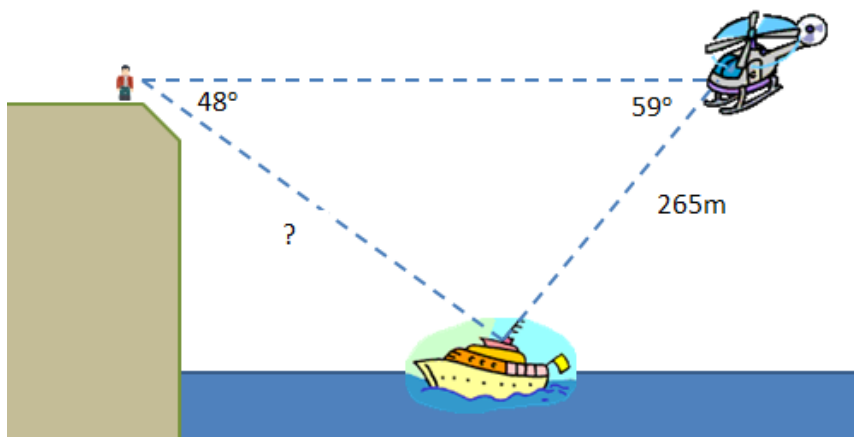
Applications for the law of sine, the law of cosine, and right triangle trig ratios.

- For each problem draw a picture first.
- Decide what type of information you are provided: AAS, ASA, SSA, SSS, SAS, or a right triangle.
- Then choose the most appropriate method.
- Remember if it is a right triangle do not use the law of sines or the law of cosines, they take too long, use SOH-CAH-TOA instead.
- Show all work neatly.

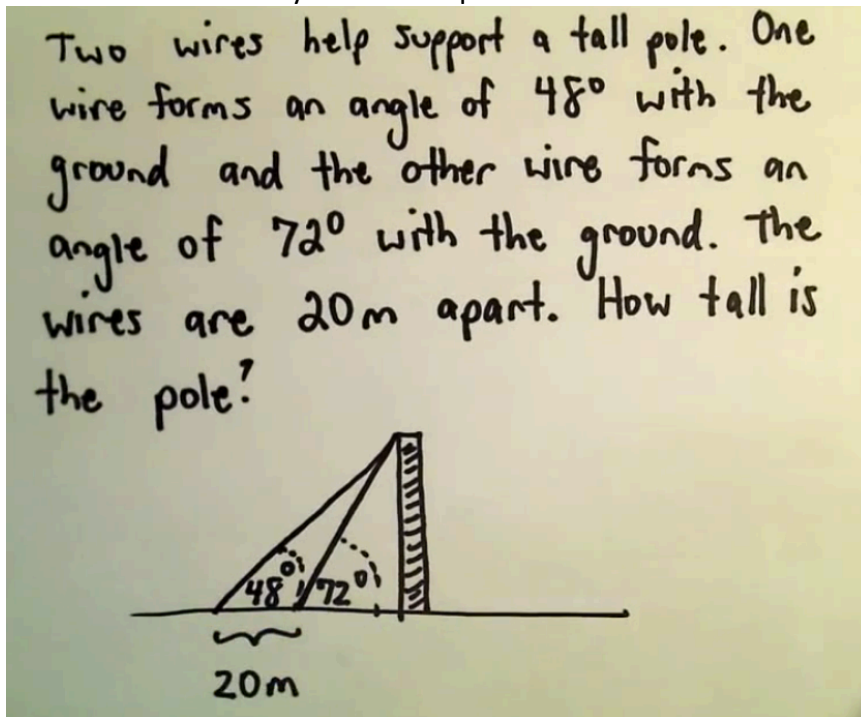
1. Video lesson online if you need help with this one.



2. A ship in trouble is sighted by a man on a cliff top and the coastguard helicopter. How far is the man on the cliff top from the ship to the nearest meter?



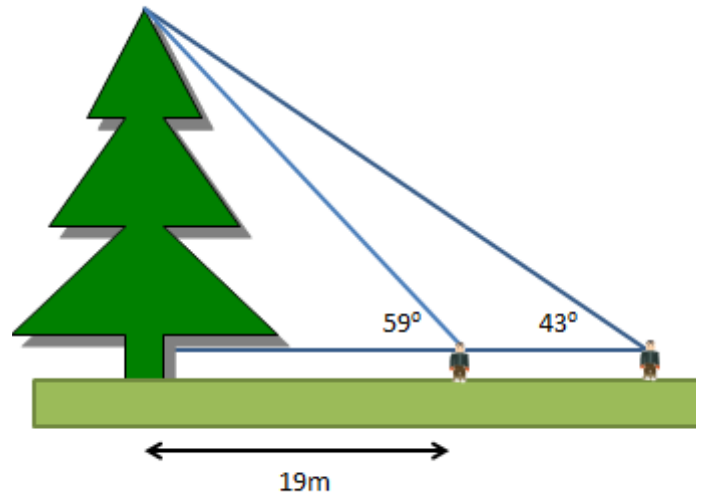
3. Video lesson online if you need help with this one.



4. A farmer has a triangular field with sides 120 yards, 170 yards, and 220 yards. Find the area of the field in square yards.
5. Two surveyors are determining the distance to a tower located between them but across the river. The first one determines that the line of sight to the tower makes an angle of 89° with the bank of the river. 495 m downstream another surveyor determines his line of sight to the tower is 55° to the tower with the river. How far is each surveyor to the tower?
6. Two hunters leave from the same parking lot tracking Elk. Hunter A hikes on a bearing of 30° for 10 miles and hunter B hikes on a bearing of 70° for 12 miles. How many miles apart were the hunters at this point?

7. An kite flyer lying on the ground is looking at her kite in the sky with an angle of elevation of 71° . If there is 1500 ft of kite string and it is taut, what is the height of the kite?
8. A ship sails due east for 24km for before changing direction to sail for 18km on a bearing of 162° . How far is the ship from it's starting point to the nearest kilometer?

9. Paul and Jose are trying to measure the height of a tree. Paul is standing 19m from the foot of the tree and measures the angle of elevation to the top of the tree to be 59° . Jose measures it to be 43° , how far is Jose from the base of the tree?



10. The courtyard for a building is in the shape of a triangle. An non-included angle measures 25° , the side opposite this angle is 14 meters and an adjacent side is 12 meters. Solve the triangle, then find the area of the triangle.
11. Two sides and a diagonal of a parallelogram are 7, 9, and 15 in respectively. Find the measures of the angles of the parallelogram.