

Section 9.1: Trigonometric FUNctions

Essential Question:

Trigonometric Functions

$$\sin \theta =$$

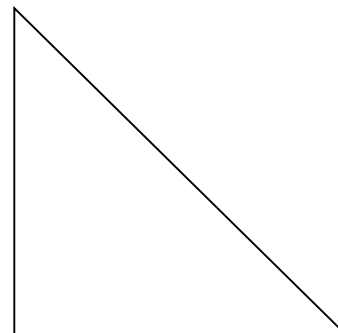
$$\cos \theta =$$

$$\tan \theta =$$

$$\csc \theta =$$

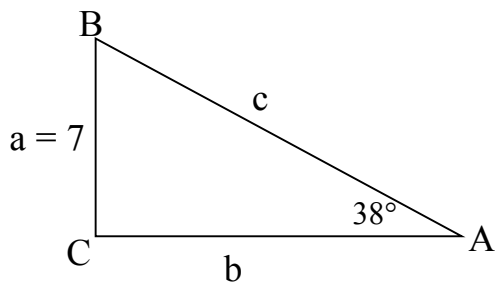
$$\sec \theta =$$

$$\cot \theta =$$



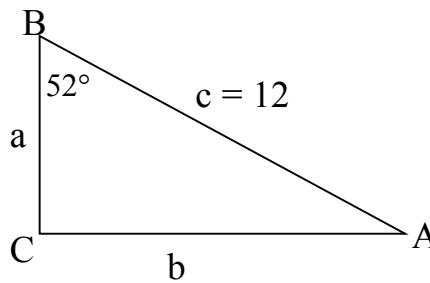
Example 1

Find b.



Example 2

Find a and b.



Example 3

Solve $\triangle PQR$, given $\angle P = 90^\circ$, $q = 4$ and $p = 13$.

Example 4

You are going to build a jump for your friend's bike. Using a 6-foot board you make a ramp 3 feet high. What angle are you taking off at?

Example 5

An airplane is at an elevation of 25,000 feet when it begins to approach an airport. Its angle of descent is 8° . What is the distance between the airport and the point on the ground directly below the airplane when it begins its descent?

Section 9.1 Summary:

Section 9.2: The Area of a Triangle

Essential Question:

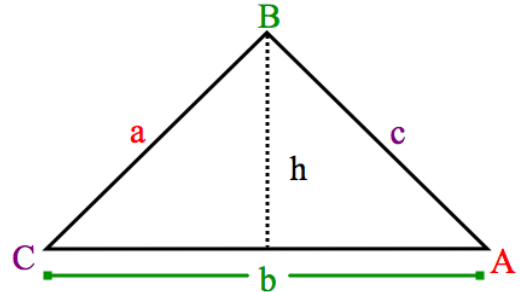
Area of a triangle, if the base and height are perpendicular:

$$A = \frac{1}{2} (\text{_____}) (\text{_____})$$

Area of a triangle, if the height is unknown:

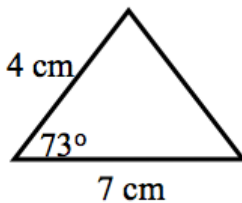
$$\text{Area} = K$$

$$K =$$

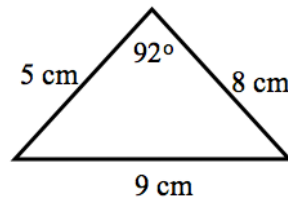


For the following examples find the area of the triangles:

Example 1



Example 2



Example 3

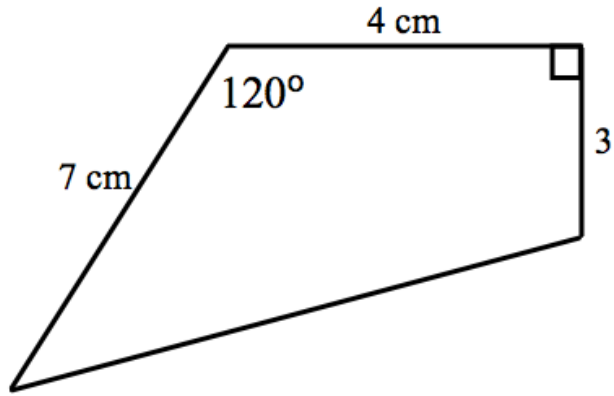
The area of a triangle is 42 cm^2 . The sides are $a=10$ and $b=12$ inches. Find all possible measures of angle C.

Example 4

The area of $\triangle PQR$ is 10 cm^2 and the sides are $q=10$ and $r=4$ cm. Find all possible measures of angle P.

Example 5

Find the area of the polygon.



Section 9.2 Summary:

Section 9.3: Law of Sines

Essential Question:

$$\text{Area of a triangle} = \frac{1}{2} (a)(b) \sin(C) = \frac{1}{2} (b)(c) \sin(A) = \frac{1}{2} (a)(c) \sin(B)$$

If you divide each by... $\frac{1}{2} (a)(b)(c)$ you get:

$$\text{Law of Sines} = \frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Step 1) set up a proportion (fraction = fraction)

Step 2) cross multiply

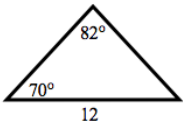
Step 3) divide (if solving for a side length this is your last step)

If solving for an angle one more step....

Step 4) take the sine inverse (\sin^{-1})

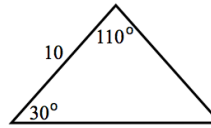
Example 1

Solve the triangle.



Example 2

Solve the triangle.



Test for number of possible triangles if given SSA:

Note: the value on the left side of the inequality is opposite of the given angle

1) $a < b \sin A$ then _____ triangle exist

3) $a > b \sin A$ and $a < b$ then _____ triangles exist

2) $a = b \sin A$ then _____ triangle exist

4) $a > b \sin A$ and $a \geq b$ then _____ triangle exist

Example 3

Given the measurements of $\triangle XYZ$, how many triangle(s) exist, if any?

$$m\angle X = 30^\circ$$

$$x = 3$$

$$y = 8$$

Example 4

How many triangles exist? If any triangle(s) exist find all sides and angles.

$\triangle RST$

$$m\angle S = 40^\circ$$

$$r = 30$$

$$s = 20$$

Section 9.3 Summary:

Section 9.4: Law of Cosines

Essential Question:

*Used for SAS

If finding a _____ ... $c^2 = a^2 + b^2 - 2(a)(b) \cos(C)$

*Used for SSS

If finding an _____ ... $\cos(C) = \frac{c^2 - a^2 - b^2}{-2(a)(b)}$

Step 1) calculate the numerator

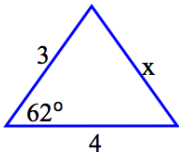
Step 2) calculate the denominator

Step 3) divide

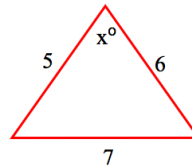
Step 4) cosine inverse

Find x in the following problems:

Example 1



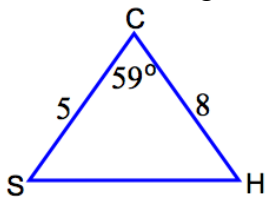
Example 2



Example 3

A triangle has sides of 5cm and 8cm and an included angle of 59°.

Find the missing side and angles.



Section 9.4 Summary:

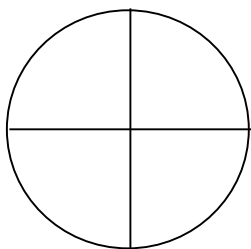
Section 9.5: Applications of Trigonometry to Navigation and Surveying

Essential Question:

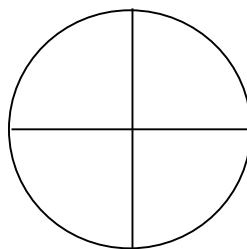
The course of a ship or plane can be measured clockwise from the North.

For example...

A ship heading 135°



A plane flying 270°



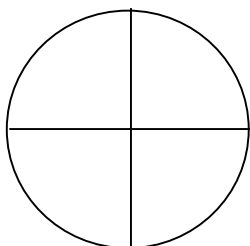
Example 1

A ship proceeds on a course of 300° for 2 hours at a speed of 15 knots. Then the ship changes course to 230° , continuing at 15 knots for 3 more hours. At that time, how far is the ship from its starting point?

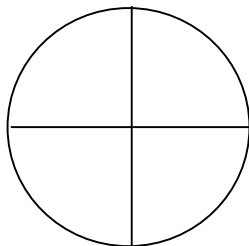
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Other Measurements

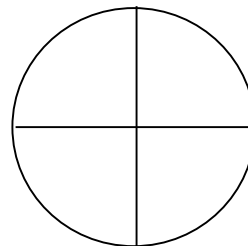
N 20° E
20° East of North



S 30° W
30° West of South



N 41° W
41° West of North



Example 2

Sketch the plot of land described, then find its area.

From a metal post, proceed 195 ft east, then along a bearing of $S32^\circ E$ for 260 ft, then along a bearing of $S68^\circ W$ for 385 ft, and finally along a line back to the metal post.

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Section 9.5 Summary:

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