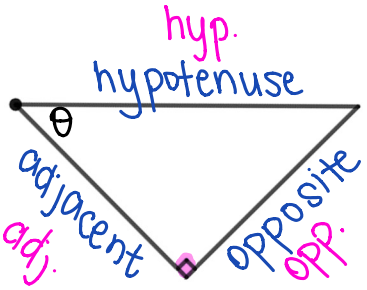
Name: _____ Date: _____

Learning Goal 2.1	Apply the trigonometric ratios to calculate unknown lengths and angles in a right triangle.

Recap: In the following triangle label the Hypotenuse, Opposite and Adjacent sides, from the point of view of angle θ.



$\sin\theta = \frac{opp}{hyp}$ $\cos\theta = \frac{adj}{hyp}$ $\tan\theta = \frac{opp}{adj}$

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first letter : function
second letter : numerator
third letter : denominator

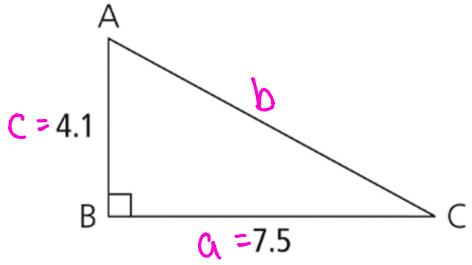
Standard for rounding, unless otherwise stated:

Lengths 2 decimal places Angles no decimals / nearest whole #

Example Solve each triangle. Express your answer to one decimal place.

↳ Find all lengths and angles

a.

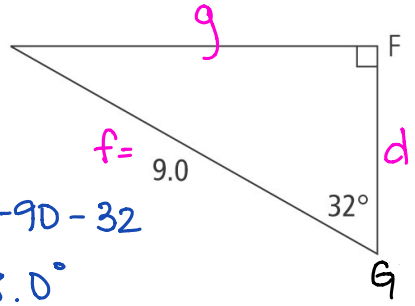


1. $a^2 + c^2 = b^2$
$4.1^2 + 7.5^2 = b^2$
$16.81 + 52.25 = b^2$
$\sqrt{73.06} = \sqrt{b^2}$
$b = \pm 8.5$

2. $\tan A = \frac{a}{c}$
$\tan A = \frac{7.5}{4.1}$
$\tan^{-1}(\tan A) = (1.8293)^{\tan^{-1}}$
$\angle A = 61.3°$

3. $\angle C = 180 - 90 - 61.3$
$= 28.7°$

b. D F G



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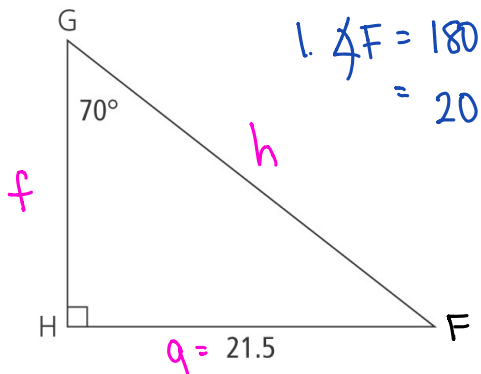
1. $\angle D = 180 - 90 - 32$
$\angle D = 58.0°$

2. $(\cos 32)^{x9} = \left(\frac{d}{9}\right)^{x9}$
$d = 9 \times \cos 32$
$= 9 \times 0.848$
$= 7.6$

3. $^{9x}(\sin 32) = \left(\frac{g}{9}\right)^{x9}$
$g = 9 \times \sin 32$
$= 9 \times 0.5299$
$g = 4.8$

Assignment pg. 111 #1-8, 10, 15 Quiz: Next Day!

c.



1. $\angle F = 180 - 90 - 70$
$= 20°$

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2. $\tan G = \frac{g}{f}$

$f \times (\tan 70) = \left(\frac{21.5}{f}\right) \times f$

$\frac{f \times \tan 70}{\tan 70} = \frac{21.5}{\tan 70}$

$f = \frac{21.5}{\tan 70}$

$= \frac{21.5}{0.839}$

$= 25.6$

3. $\sin G = \frac{g}{h}$

$h \times (\sin 70) = \left(\frac{21.5}{h}\right) \times h$

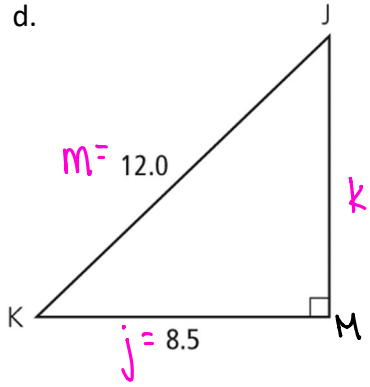
$\frac{h \times \sin 70}{\sin 70} = \frac{21.5}{\sin 70}$

$h = \frac{21.5}{\sin 70}$

$= \frac{21.5}{0.9397}$

$= 22.9$

d.



1. $j^2 + k^2 = m^2$

$8.5^2 + k^2 = 12.0^2$

$72.25 + k^2 = 144$

$-72.25 \quad -72.25$

$\sqrt{k^2} = \sqrt{71.75}$

$k = 8.5$

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2. $\cos K = \frac{j}{m}$

$\cos K = \frac{8.5}{12.0}$

$\cos^{-1}(\cos K) = (0.708)^{\cos^{-1}}$

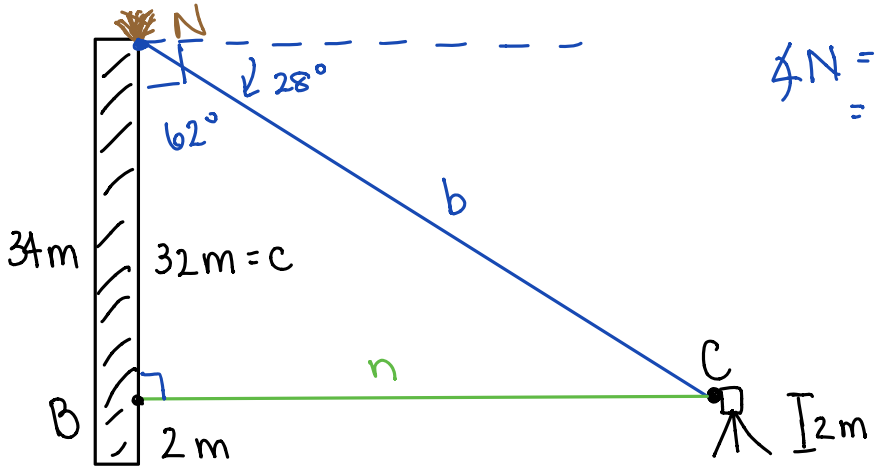
$\angle K = 44.9°$

3. $\angle J = 180 - 90 - 44.9$

$= 45.1°$

Example A peregrine falcon has built a nest on a ledge of a building in Calgary, AB. The ledge is 34 m from the ground. Alain wants to take a photograph of the bird with his telephoto lens. He has set his camera up, waiting for the bird to return to the nest. His camera, sitting on a tripod, is 2 m from the ground. The angle of depression from the nest to Alain's camera is 28°

a. Sketch a diagram reflecting the information given above.



$\angle N = 90 - 28$
$= 62°$

b. How far is the tripod and camera from the building, to the nearest tenth of a metre?

$\tan N = \frac{n}{c}$

$32 \times (\tan 62) = \left(\frac{n}{32}\right) \times 32$

$n = 32 \times \tan 62$

$= 60.2$

The camera is 60.2m away from the building.

c. At what angle does Alain have to set the tripod to take a picture of the nest?

$\angle C = 180 - 90 - 62$

$= 28°$

The angle of the tripod will be 28°

d. If Alain's lens can focus on objects up to 75 m away, can he focus on the falcon's nest? Justify your answer.

$\cos N = \frac{c}{b}$

$b \times (\cos 62) = \left(\frac{32}{b}\right) \times b$

$\frac{b \times \cos 62}{\cos 62} = \frac{32}{\cos 62}$

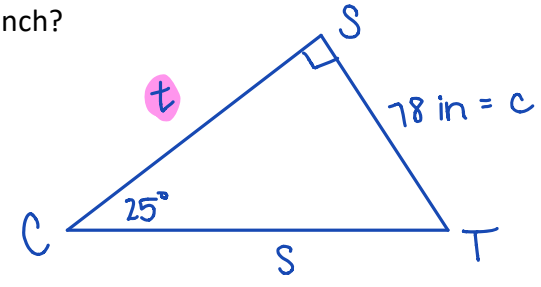
$b = \frac{32}{\cos 62}$

$= \frac{32}{0.469}$

$= 68.2$

Yes he can see the falcon's nest because it is only 68.2m from his camera.

Example An auger is used to move grain from a combine to a truck that will transport the grain to a bin for storage. The angle of elevation of the auger is 25° and the spout makes a right angle with the falling grain. If the top of the spout of the auger is 78 in. above the truck box, what is the length of the auger, to the nearest inch?



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$\tan C = \frac{c}{t}$

$t \times (\tan 25°) = \left(\frac{78}{t}\right) \times t$

$\frac{t \times \tan 25°}{\tan 25} = \frac{78}{\tan 25}$

$t = \frac{78}{0.466}$

$t = 167.3$

The length of the auger is 167 inches