Calculating the Measure of an Angle in Right Triangles

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PRE-CALCULUS 11
TRIGONOMETRY
CALCULATING THE MEASURE OF AN ANGLE IN RIGHT TRIANGLES

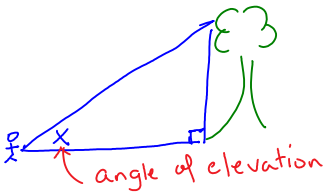
A. Definitions

1. **Trigonometry:** the branch of mathematics concerned with the properties of the trigonometric functions (Sine, Cosine & Tangent) and their application to the determination of the angles and sides of triangles.

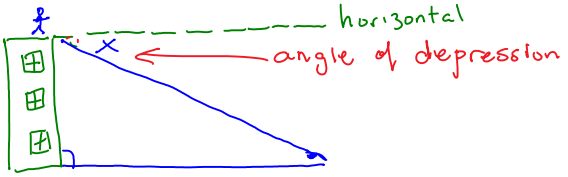
2. **Acute Angle:** an angle which measures less than 90 degrees.

3. **Theta:** a mathematical symbol, from the Greek alphabet, used to represent an angle. θ

4. **Angle of Elevation:** an angle created between the line of sight and a horizontal when an observer looks upward.



5. **Angle of Depression:** an angle created between the line of sight and a horizontal when an observer looks downward.



B. Examples

1. Find the measure of $\angle M$. Round to the nearest degree.

2nd | INV | Shift

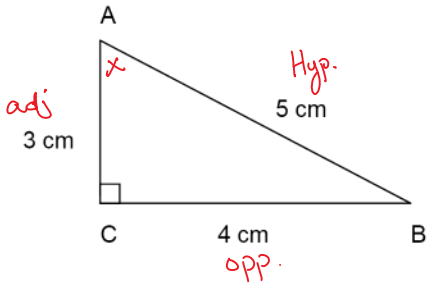
a) $TanM = 1.75$ b) $SinM = 0.435$ c) $CosM = \frac{4}{5}$

Inverse operation.

Tan^{-1} Sin^{-1} Cos^{-1}

$\angle M = 60°$ $\angle M = 26°$ $\angle M = 37°$

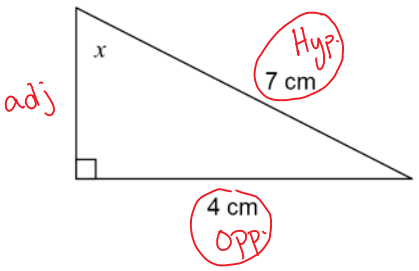
2. Calculate the $TanA$ and $\angle A$ for the following diagram. Round the angle to the nearest degree.



$\tan A = \frac{4}{3}$

$\angle A = 53°$

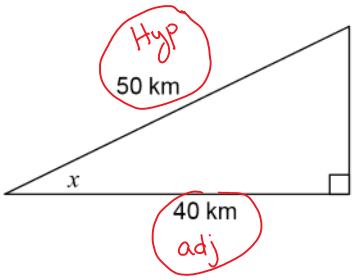
3. Calculate the measure of the indicated angle to the nearest tenth.



$\sin x = \frac{4}{7}$

$\angle x = 34.8°$

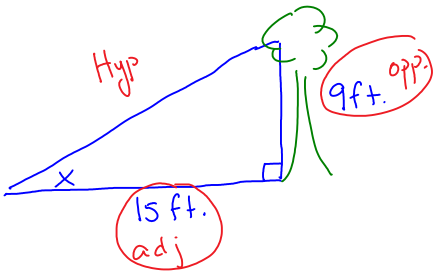
4. Calculate the measure of the indicated angle to the nearest degree.



$\cos x = \frac{40}{50}$

$\angle x = 37°$

5. A tree 9 feet high casts a shadow 15 feet long on the ground. Determine the angle of elevation to the nearest tenth of a degree.



$\tan x = \frac{9}{15}$

$\angle x = 31.0°$

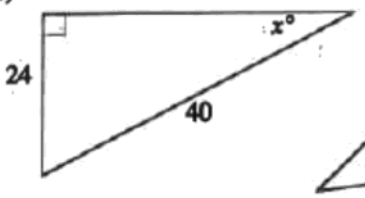
Assignment: Calculating the Measure of an Angle in Right Triangles Assignment #1 – 10

Assignment

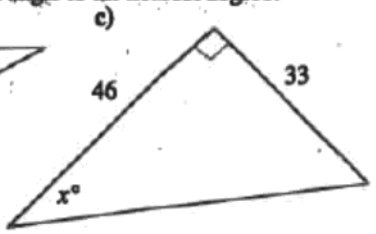
1. In each case, calculate the measure of the indicated angle to the nearest degree.

a)

b)

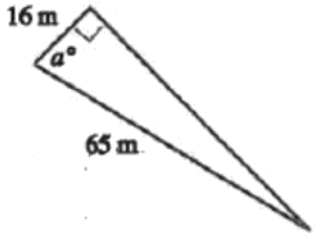


c)



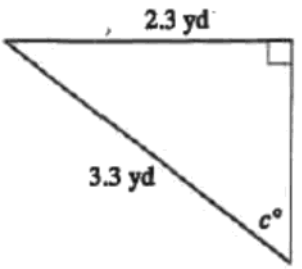
2. In each case, calculate the measure of the indicated angle to the nearest tenth.

a)



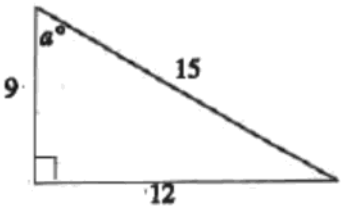
b)

c)

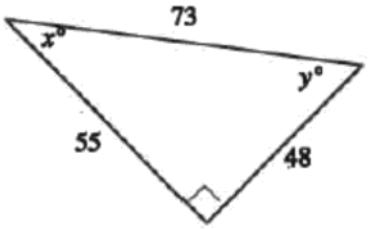


3. In each case, calculate the measure of the indicated angle to the nearest degree.

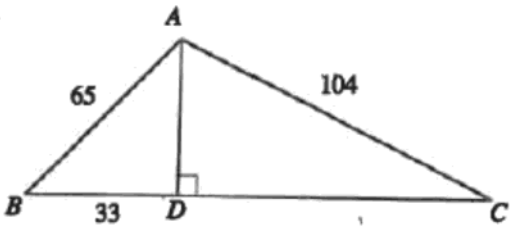
a)



b)



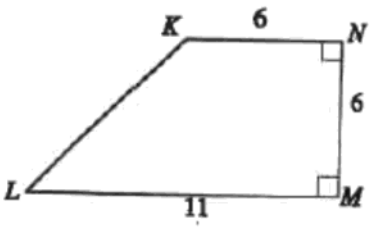
4. Consider the diagram consisting of two right triangles with a common side *AD*.



a) Use the Pythagorean Theorem to calculate the length of *AD*.

b) Determine, to the nearest degree, the measure of angle *BCA*.

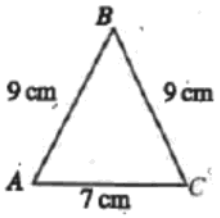
5. Determine the measure of angle *LKN* to the nearest degree.



6. An electricity pylon 23.7 m high casts a shadow 46.8 m long. Determine the angle of elevation of the sun to the nearest tenth of a degree.

7. In each case, calculate the size of $\angle BAC$ to the nearest degree.

a)



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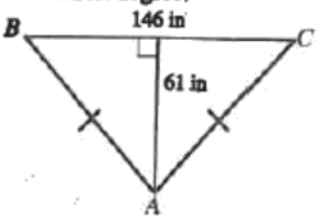
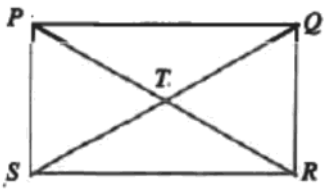
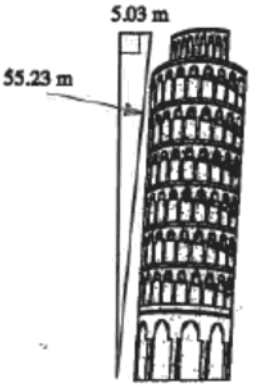


8. In the rectangle, $PQ = 12.8$ cm and $QR = 7.4$ cm. Determine the measure of angle PTQ to the nearest degree.



9. The term "% grade" is sometimes used to describe the slope of a road. For example, a road with a 7% grade has a vertical rise of 7 m for every horizontal distance of 100 m. Calculate, to the nearest degree, the angle a road with a 7% grade makes with the horizontal.

10. The Leaning Tower of Pisa is a building in Italy which leans due to the instability of the ground underneath it. At different points in history the tower has leaned at different angles.
Use the measurements in the sketch to determine the angle of lean from the vertical to the nearest hundredth of a degree.



Multiple Choice

11. A set of stairs has a vertical rise of 15 cm for every 28 cm horizontal run. To the nearest degree, the angle between the stairs and the floor is

A. 28°
B. 32°
C. 62°
D. 64°

Answer Key

1. a) 13° b) 37° c) 36° 2. a) 75.7° b) 49.8° c) 44.2°

3. a) 53° b) $x = 41°, y = 49°$ 4. a) 56 b) 33° 5. 130° 6. 26.9°

7. a) 67° b) 100° 8. 120° 9. 4° 10. 5.23° 11. A

12. | 3 | 5 | | | 13. | 3 | 0 | | | 14. | 3 | 3 | . | 1 |