03-13-26 MTH 111

Wednesday, March 11, 2026 7:46 PM

5. Trigonometry
5.1 Use Properties of Angles, Triangles, and the Pythagorean and Theorem
5.1 Exercise Set, page 612 (594): 1, 5, 7, 9, 13, 15, 22
5.2 Applications: Sine, Cosine and Tangent Ratios
5.2 Exercise Set, page 640 (622): 1, 5, 7, 11, 15, 16, 19, 26

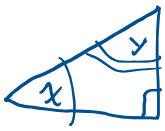
I will supply supplementary material about converting between decimal degrees and DMS notation.

Took exam 2

5.1

In the following exercises, use the properties of angles to solve.

6. Two angles are complementary. The smaller angle is 34° less than the larger angle. Find the measures of both angles.



Let x = smaller angle
let y = larger angle
Find x, y

$x + y = 90^\circ$
$x = y - 34^\circ$ substitute x into 1st equation

$(y - 34^\circ) + y = 90^\circ$

$y + y - 34^\circ = 90^\circ$

$2y = 90^\circ + 34^\circ$

$2y = 124^\circ$

$y = \frac{124^\circ}{2}$

$y = 62^\circ$

$x = 62^\circ - 34^\circ$

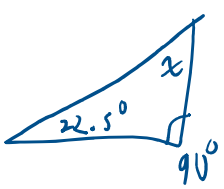
$x = 28^\circ$

The angles are 28° and 62°

5.1

In the following exercises, solve using properties of triangles.

10. One angle of a right triangle measures 22.5°. What is the measure of the other angle?



Let x be the other non-right angle

$x + 22.5^\circ = 90^\circ$

$x = 90.0^\circ$

$x = 90.0^\circ$

$-\ 22.5^\circ$

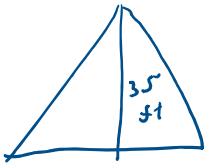
$67.5^\circ = x$

The third angle is 67.5°

or 3rd angle $= 90^\circ - 22.5^\circ = 67.5^\circ$

5.1

23. Building a scale model Joe wants to build a doll house for his daughter. He wants the doll house to look just like his house. His house is 30 feet wide and 35 feet tall at the highest point of the roof. If the dollhouse will be 2.5 feet wide, how tall will its highest point be?



30 ft

2.5 ft

similar △s

$\frac{h}{35\text{ ft}} = \frac{2.5\text{ ft}}{30\text{ ft}}$

$h = \frac{(35\text{ ft})(2.5\text{ ft})}{30\text{ ft}}$

$\frac{h}{2.5\text{ ft}} = \frac{35\text{ ft}}{30\text{ ft}}$

$h = \left(\frac{35}{30}\right)(2.5)\text{ ft}$

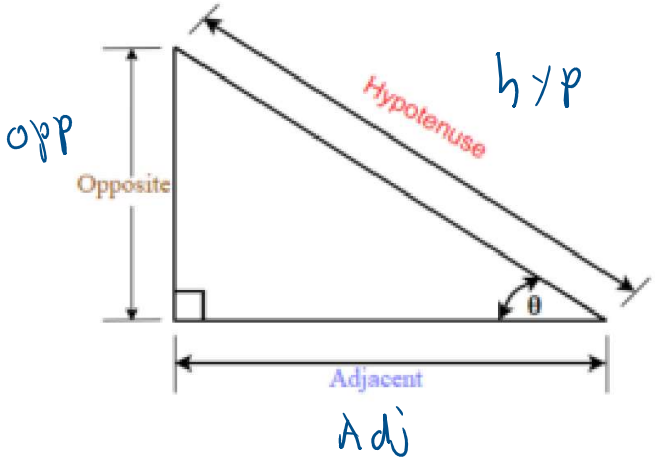
$h = \left(\frac{7}{6}\right)(2.5)\text{ ft}$

$h = \frac{17.5}{6}\text{ ft}$

17.5/6=2.9167

$h \approx 2.9\text{ ft}$

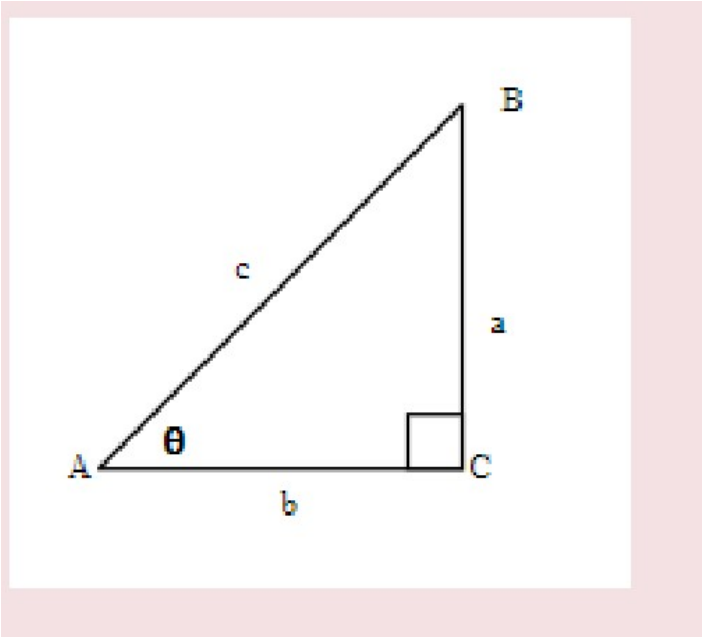
5.2
Memorize



hyp

opp

Adj



Memorize

Three Basic Trigonometric Ratios

- sine $\theta = \dfrac{\text{the length of the opposite side}}{\text{the length of the hypotenuse side}}$
- cosine $\theta = \dfrac{\text{the length of the adjacent side}}{\text{the length of the hypotenuse side}}$
- tangent $\theta = \dfrac{\text{the length of the opposite side}}{\text{the length of the adjacent side}}$

Where θ is the measure of a reference angle measured in degrees.

Very often we use the abbreviations for sine, cosine, and tangent ratios.

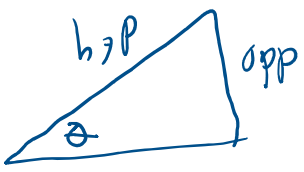
- $\sin\theta = \dfrac{\text{opp}}{\text{hyp}}$
- $\cos\theta = \dfrac{\text{adj}}{\text{hyp}}$
- $\tan\theta = \dfrac{\text{opp}}{\text{adj}}$

Some people remember the definition of the trigonometric ratios as SOH CAH TOA.

Not required in MTH 111

π radians $= 180°$

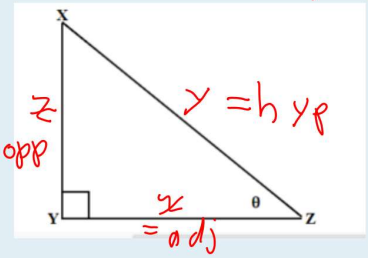
$\sin \pi = 0$



To eat a whole cake would be to commit the sin of gluttony. But to eat a whole pie is okay, as the sin of pi is zero.

TRY IT 2

For the given triangle find the sine, cosine and tangent ratio.



Show answer

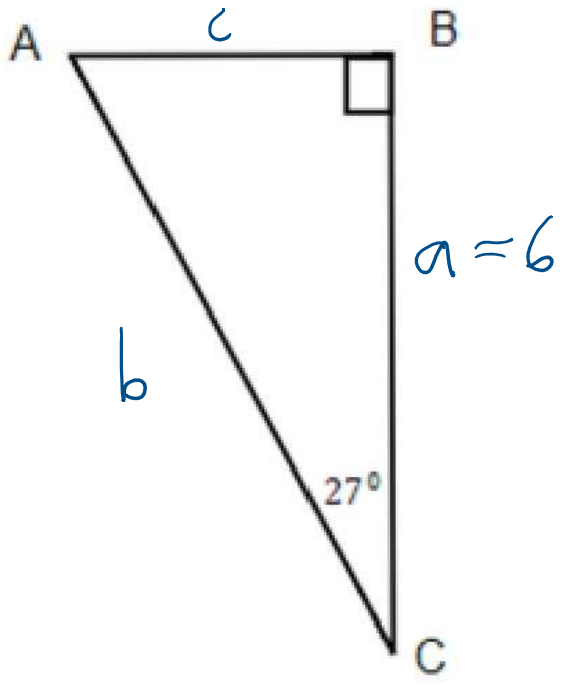
$\sin\theta = \frac{z}{y}$

$\cos\theta = \frac{x}{y}$

$\tan\theta = \frac{z}{x}$

5.2

16. Find b if a = 6.



$\sin 27^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{6}{b}$

$\cos 27^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{6}{b}$

$\tan 27^\circ = \frac{\text{opp}}{\text{adj}} = \frac{c}{6}$

$b \cos 27^\circ = 6$

$b = \frac{6}{\cos 27^\circ} = 6.7$