

6.1: Right Triangle Trigonometry

“I WILL...

...convert DMS to decimal measure and vice-versa,

...identify and label all six trig functions”

I. Degrees Minutes Seconds (DMS)

- A. Written as: $D^{\circ} M' S''$
- B. It can also be written in decimal degree form or degree form
- C. Make sure it is in degree mode on the calculator

II. Steps in Writing in Decimal Form

- A. Keep the first digits in degree form
- B. Label the second number over 60 (how many minutes are there in a hour?) and convert the second number into a decimal form from a fraction form
- C. Label the third number over 3600 (how many seconds are there in a hour?)
- D. Add the digits together and label as degrees

Ex 1: Convert $36^{\circ} 14' 29''$ to decimal form. Round to 4 decimal places.	Ex 2: Convert $14^{\circ} 25''$ to decimal form. Round to 4 decimal places.
Your Turn: Convert $35^{\circ} 15' 27''$ to decimal form. Round to 4 decimal places.	

III. Steps in Writing in Degree Form

- A. Keep the first digits in degree form
- B. Multiply the last numbers with the decimal (behind the degrees) by 60
- C. Take the decimals from the previous answer in step 2 and multiply by 60 again
- D. Put them together and label accordingly

Ex 3: Convert 48.3625° to DMS form.	Ex 4: Convert 43.5525° to DMS form.
Your Turn: Convert 32.0047° to DMS form.	

IV. Background Information

A. Trigonometry

1. Comes from Greek word – Trigonon, which means 3 angles;
2. “Metry” means measure in Greek

B. Trigonometry Ratios

1. Main: Sine, Cosine, Tangent; Reciprocal: Secant, Cosecant, Cotangent

C. Types of angles

1. Acute: Less than 90°
2. Equilateral: 90°
3. Obtuse: More than 90° but less than 180°

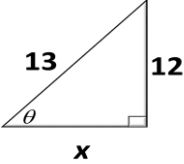
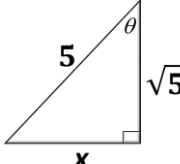
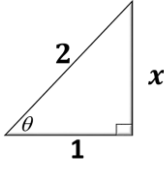
D. Consider a right triangle, one of whose acute angles is θ

E. The three sides of a triangle are *hypotenuse*, *opposite*, and *adjacent* side of θ

1. Hypotenuse side that is the longest side
2. Opposite side is opposite of the angle
3. Adjacent side is the side that is NEXT to the angle

F. To determine the opposite side, look at θ and extend a line to determine *opposite*

V. Trig Ratios

A. $\sin \theta = \underline{\hspace{2cm}}$	B. $\cos \theta = \underline{\hspace{2cm}}$	C. $\tan \theta = \underline{\hspace{2cm}}$
D. $\csc \theta = \underline{\hspace{2cm}}$	E. $\sec \theta = \underline{\hspace{2cm}}$	F. $\cot \theta = \underline{\hspace{2cm}}$
Ex 5: Solve for x and determine all trig functions of θ  $x = \underline{\hspace{2cm}}$ $\sin \theta = \underline{\hspace{1cm}}$ $\csc \theta = \underline{\hspace{1cm}}$ $\cos \theta = \underline{\hspace{1cm}}$ $\sec \theta = \underline{\hspace{1cm}}$ $\tan \theta = \underline{\hspace{1cm}}$ $\cot \theta = \underline{\hspace{1cm}}$		Ex 6: Solve for x and determine all trig functions of θ  $x = \underline{\hspace{2cm}}$ $\sin \theta = \underline{\hspace{1cm}}$ $\csc \theta = \underline{\hspace{1cm}}$ $\cos \theta = \underline{\hspace{1cm}}$ $\sec \theta = \underline{\hspace{1cm}}$ $\tan \theta = \underline{\hspace{1cm}}$ $\cot \theta = \underline{\hspace{1cm}}$
Your Turn: Solve for x and determine all trig functions of θ  $x = \underline{\hspace{2cm}}$ $\sin \theta = \underline{\hspace{1cm}}$ $\csc \theta = \underline{\hspace{1cm}}$ $\cos \theta = \underline{\hspace{1cm}}$ $\sec \theta = \underline{\hspace{1cm}}$ $\tan \theta = \underline{\hspace{1cm}}$ $\cot \theta = \underline{\hspace{1cm}}$		
Ex 7: Use a calculator to determine $\sin 20^\circ$ and round to 4 decimal places	Ex 8: Use a calculator to determine $\csc 20^\circ$ and round to 4 decimal places	Your Turn: Use a calculator to determine $\sec 20^\circ$ and round to 4 decimal places

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Exercises 6.1

In Exercises 1–4, write the DMS degree measurement in decimal form.

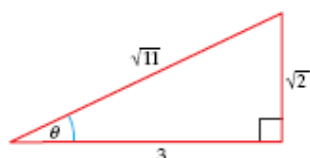
1. $47^\circ 15' 36''$ 2. $38^\circ 33' 9''$
3. $15^\circ 24' 45''$ 4. $20^\circ 51' 54''$

In Exercises 5–8, write the decimal degree measurement in DMS form.

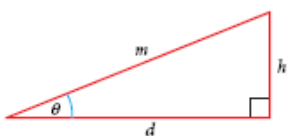
5. 23.16° 6. 50.3625°
7. 4.2075° 8. 85.655°

In Exercises 9–14, find the six trigonometric ratios for θ .

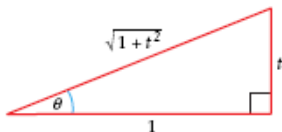
9.



13.



14.



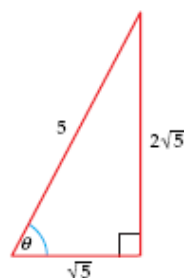
In Exercises 15–20, use a calculator in degree mode to find the following. Round your answers to four decimal places.

15. $\sin 32^\circ$ 16. $\cos 68^\circ$ 17. $\tan 6^\circ$
18. $\csc 25^\circ$ 19. $\sec 47^\circ$ 20. $\cot 39^\circ$

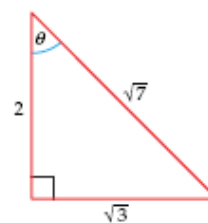
In Exercises 21–26, use the exact values of the trigonometric ratios for the special angles to find a value of θ that is a solution of the given equation. (See Example 5.)

21. $\sin \theta = \frac{1}{2}$ 22. $\tan \theta = 1$ 23. $\csc \theta = \sqrt{2}$
24. $\cot \theta = \sqrt{3}$ 25. $\cos \theta = \frac{1}{2}$ 26. $\sec \theta = 2$

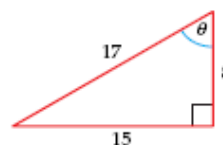
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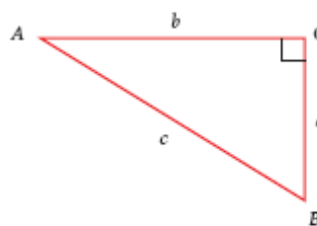
11.



12.



In Exercises 27–32, refer to the figure below. Find the exact value of the trigonometric ratio for the given values of a , b , and c .



27. $a = 4, b = 2, \tan B = \underline{\quad ? \quad}$
28. $a = 5, c = 7, \sin A = \underline{\quad ? \quad}$
29. $b = 3, c = 8, \cos A = \underline{\quad ? \quad}$
30. $a = 12, b = 15, \cot A = \underline{\quad ? \quad}$
31. $a = 7, c = 16, \sec B = \underline{\quad ? \quad}$
32. $b = 2, c = 3, \csc B = \underline{\quad ? \quad}$