

Right Triangle Trigonometry (Part 1)



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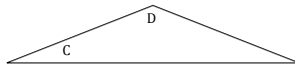
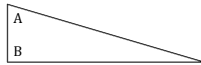
Objectives

- Types of Angles
- Converting Angle Units
- Adding/Subtracting Angle Units
- Arc Length and Sector Area
- Defining a Right Triangle
- Recall of Pythagorean Theorem
- Special Right Triangles

Types of Angles

- Recall from Geometry, and classify the types of angles:

- A is a(n) _____ angle
- B is a(n) _____ angle
- C is a(n) _____ angle
- D is a(n) _____ angle



Converting Angle Units

- Instead of using decimals of a degree, the remaining parts are often written as minutes or even seconds.
- This is similar to problems where we would change one unit to a mixed measurement:
ex: 3.12 ft to 3 ft, 1½ in.
- To convert, use: 60 minutes (60') = 1 degree (1°)
60 seconds (60'') = 1 minute (1')

Converting Angle Units

- Example: Convert $75^{\circ}15'$ to decimal form.
- Example: Convert $130^{\circ}50'$ to decimal form (round to hundredth).

Converting Angle Units

- Example: Convert to the nearest minute 24.5° .
- Example: Convert $15\frac{3}{4}^{\circ}$ to the nearest minute.
- Example: Convert to the nearest minute 42.36° .

Try Yourself

- Fill in the missing angle measurement

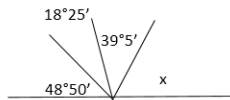
Angle in degrees (nearest hundredth)	Angle in degrees and minutes (nearest minute)
20.25°	
33 ½°	
	39°15'
	56°45'
60.2°	
	84°10'

Adding/Subtracting Angles

- Example: $12^{\circ}45' - 8^{\circ}15'$
- Example: $46^{\circ}30' + 18^{\circ}45'$
- Example: $40^{\circ}15' - 25^{\circ}45'$

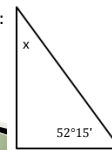
Adding/Subtracting Angles

- Find x:



Try Yourself

- 1) $35^{\circ}30' + 10^{\circ}45'$
- 2) $87^{\circ}30' - 6^{\circ}50'$
- 3) Find x:



Arc length and Sector Area

- In the picture, S is the arc length, a is the angle, and r is the radius
- Arc length: $S = \pi r \frac{a}{180}$ or $S = \pi d \frac{a}{360}$
- Area of the Sector: $A = \pi r^2 \frac{a}{360}$



Arc length and Sector Area

- You need to determine the arc length in order to cut a pipe. You know that the angle needs to be 135° and the diameter of the pipe is $8 \frac{1}{2}$ in. Also find the area of the sector created.

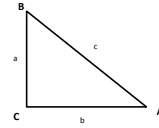
Try Yourself

- ▶ The sector below has a radius of $3\frac{5}{8}$ " and angle of 120° and is made of a sheet of steel that weighs 5.0939 lbs/sq ft. Determine the weight of the sector. Also, determine the amount of edging needed for the curved part of the sector.



Defining a Right Triangle

- ▶ A triangle has three sides and three angles.
- ▶ The three angles must add up to 180° so A and B must add up to 90° .



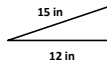
A, B, and C are angles
a, b, and c are lengths of the sides
 $C = 90^\circ$; c is the hypotenuse
a and b are called the legs

Notice, a is across from angle A, b is across from angle B, and c is across from angle C

- ▶ By the end of this unit we will know how to solve for each of these parts given any two of the five (excluding C as the sixth part since it is always 90°)

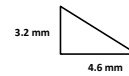
Recall Pythagorean Theorem

- ▶ Example: Find the missing side



Try Yourself

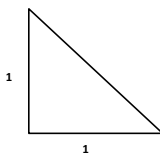
- ▶ 1) Find the missing side



- ▶ 2) You need to cut a bar to fit angled at a corner at a horizontal distance of $9\frac{1}{2}$ " and vertical distance of $2\frac{1}{4}$ ". What is the length of the bar needed to the nearest 16^{th} of an inch.

Special Triangles

- ▶ What can you assume or figure out from this triangle?

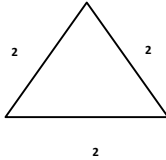


Special Triangles

- ▶ Using what you figured out in the last triangle, what is the hypotenuse of a right triangle with the two legs being 5.8 cm?

Special Triangles

- First, how could you make this triangle into two right triangles? Next, what can you assume or figure out from this triangle?



Special Triangles

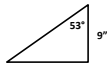
- Using what you figured out in the last triangle, what would be the missing parts of the triangle with $B = 60^\circ$ and $a = 3.5$ in.

Special Triangles

- 3-4-5 Triangle:

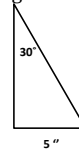


- Example: Find the missing sides and angles



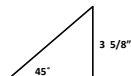
Try Yourself

- 1) Find the missing sides and angles:



Try Yourself

- 2) Find the missing sides:



Try Yourself

- 3) Find the missing parts:

