

Lecture 1 (5/11/2024)

Course name: Trigonometry and Analytic Geometry

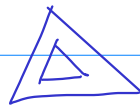
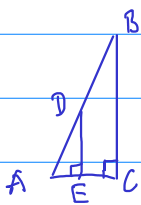
Textbook: Precalculus: Mathematics for Calculus, Edition 7, by Stewart, Redlin, Watson.

We will only cover Chapters 5, 6, 7, 8, 11.

trig geometry

Trigonometry = trigonon + metron : measure on triangles
triangle measure

What are the measures on triangles that we need to know?



The angles of a triangle are determined only by the ratio of the side lengths, not the side length themselves.

If we know the length ratios, we should be able to, at least in theory, find the angles of the triangle.

Another observation: if we know the length of two sides of a triangle as well as the angle between them, we should be able to determine the other side length and the other two angles.

Another observation: if we know the length of one side of a triangle and the two angles adjacent to that side, we should be able to determine the other two side lengths and the other angle.

Trigonometry will help quantify those observations. Finding measures of a triangle is an important task when you learn dynamics in physics.

You need to project vectors on certain directions.



That is why Math 111 is a prerequisite of Physics 205 (calc-based physics).
The ladder problem....

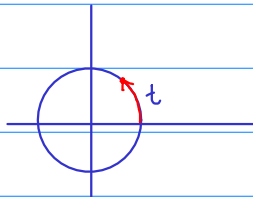
Analytic geometry: we use algebra and trigonometry to study geometry.

warm up:

- Round numbers: 3.3, 3.5, -5.3, -5.7, 3.8
- Simplify: $\frac{a}{b} + \frac{c}{d}$, $\frac{a}{b} \times \frac{c}{d}$, $\frac{a}{b} : \frac{c}{d}$
- Simplify: $\frac{a}{a^3}$, $\frac{ab^2c}{a^3c^3}$, $(a+b)^2$, $(a+2b)^2$
- Factor x^3+2x^2 , x^2+3x+2 , $-2x^2+3x-1$
- Simplify $|-x^3|$, $|-x^2|$
- Complete the square, such as x^2+3x+5

Trigonometry on the unit circle (Chapter 5)

Trigonometry can be expressed/explained using the unit circle or the right triangles. Each method has its own advantages and disadvantages. We will explore both.



Each real number t determines a unique point $P(x, y)$ on the unit circle. We don't need two numbers to determine a point on unit circle. Note that we can find y if we know x .

Constraint: $x^2 + y^2 = 1$

Periphery of the unit circle is 2π

Ex locate the terminal points corresponding to $t = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi, \frac{\pi}{6}, \frac{\pi}{3}, \frac{\pi}{4}$.

How to find the reference number?

$$\bar{t} = \left| \text{round}\left(\frac{t}{\pi}\right) - \frac{t}{\pi} \right| \pi$$