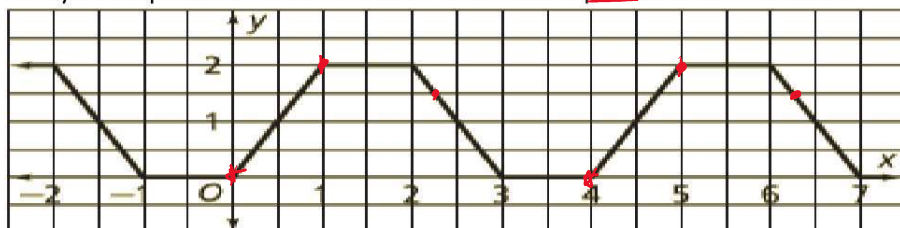


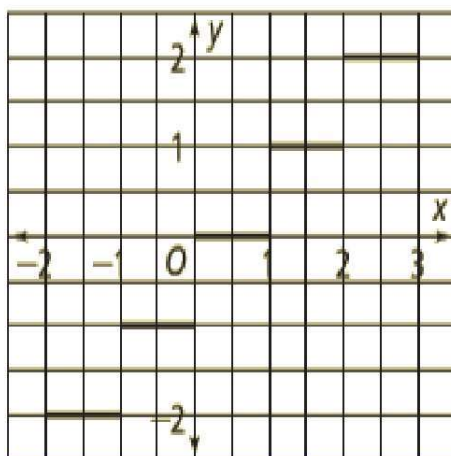
Trigonometry

- **Periodic Function:** A function that repeats a pattern of y-values at regular intervals.
 - **Cycle:** One complete pattern
 - **Period:** Horizontal length of one cycle
 - **Amplitude:** Half the difference between the maximum and minimum values of the function.
- Examples:
 - Analyze the periodic function below. What is the period of this function?



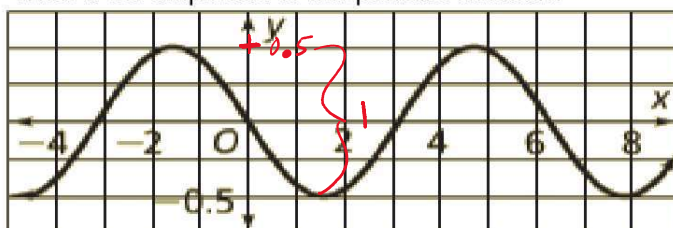
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- Is the function periodic? If it is periodic, what is its period?



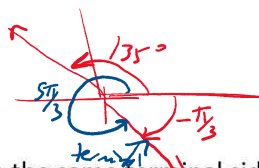
No

- What is the amplitude of this periodic function?



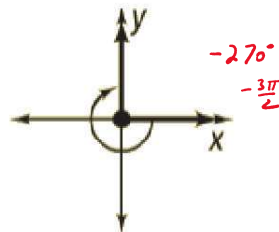
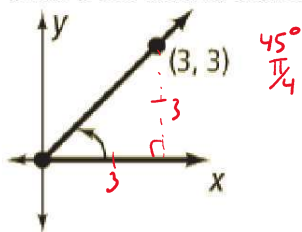
Amplitude = $\frac{1}{2}$

- **Angles and Unit Circle**
 - Standard Position
 - Initial/Terminal Side
 - Negative/Positive Measure
 - Coterminal Angles: Two angles that have the same terminal side
 - **Unit Circle:** Circle radius 1 and its center at the original of the coordinate plane.
 - **Theta (θ)** represents the measure of the angle in standard position.
 - **Cosine of θ ($\cos \theta$)** is the x coordinate of the point at which the terminal side of the angle intersects the unit circle. **Sine of θ ($\sin \theta$)** is the y coordinate.



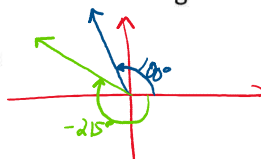
• Examples:

- What is the measure of each angle?



- What is the sketch of each angle in standard position?

- 100°
- -215°



- Which of the following angles is not coterminal with the other three?

- 750°
- -330°
- 30°
- -540°



- What are $\cos \theta$ and $\sin \theta$ for $\theta = -360^\circ, \theta = 180^\circ, \theta = 450^\circ$

$$\begin{array}{ll} \cos(-360^\circ) = 1 & \sin(-360^\circ) = 0 \\ \cos(180^\circ) = -1 & \sin(180^\circ) = 0 \\ \cos(450^\circ) = 0 & \sin(450^\circ) = 1 \end{array}$$

- What are the cosine and sine of the angle:

- 135° $\cos(135^\circ) = -\frac{\sqrt{2}}{2}$ $\sin(135^\circ) = \frac{\sqrt{2}}{2}$
- 300° $\cos(300^\circ) = \frac{1}{2}$ $\sin(300^\circ) = -\frac{\sqrt{3}}{2}$



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- **Radian Measure:** Measure of a central angle that intercepts an arc with length equal to the radius of the circle. An angle with a full circle rotation measures 2π radians. Semicircle: π radians.

- **Proportions:**

- $\frac{d^\circ}{180^\circ} = \frac{r \text{ radians}}{\pi \text{ radians}}$

- To convert between degrees and radians

- Degrees to Radians: Multiply by $\frac{2\pi \text{ radians}}{360^\circ}$
 - Radians to Degrees: Multiply by $\frac{360^\circ}{2\pi \text{ radians}}$

$$\frac{3\pi}{2} \text{ rad} \left(\frac{180^\circ}{\pi \text{ rad}} \right) = \frac{540^\circ}{2} = 270^\circ$$

- **Intercepted Arc Length:** For a circle of radius r and central angle of measure θ (in radians), the length s of the intercepted arc is $s = r\theta$.

- **Examples:**

- What is the degree measure of an angle of $-\frac{7\pi}{30}$ radians?

$$-\frac{7\pi}{30} \text{ rad} \left(\frac{180^\circ}{\pi \text{ rad}} \right) = \frac{-7(180^\circ)}{30} = -42^\circ$$

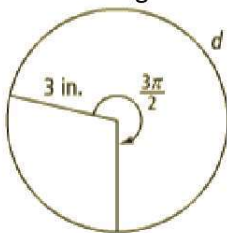
- What are the exact measures of $\sin\pi$ and $\cos\pi$?

$$\sin\pi = 0 \quad \cos\pi = -1$$

Convert 113° to radians

$$113^\circ \left(\frac{\pi \text{ rad}}{180^\circ} \right) = \frac{113\pi}{180} \text{ rad}$$

- What is length d to the nearest tenth?



- A satellite in geosynchronous orbit travels one Earth circumference in a full day. From a point on the ground, the satellite appears stationary overhead. The orbital height for a geosynchronous satellite is about 36,000 km. The radius of Earth is 6400 km. About how far does the satellite travel in 8 hours? Assume the length of an Earth day is exactly 24 hours.