شرح الدرس الثالث Circular and Periodic Functions من الوحدة التاسعة

تاريخ نشر الملف على موقع المناهج: 04-11-2023 14:06:52 | اسم المدرس: محمد زياد

التواصل الاجتماعي بحسب الصف الحادي عشر المتقدم

روابط مواد الصف الحادي عشر المتقدم على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة رياضيات في الفصل الأول

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Lesson 9-3

Circular and Periodic Functions

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Math Garden
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Learn Circular Functions

A **unit circle** is a circle with a radius of 1 unit centered at the origin on the coordinate plane. Notice that on a unit circle, the radian measure of a central angle $\theta = \frac{s}{1}$ or s, so the radian measure of an angle is the length of the arc on the unit circle subtended by the angle.
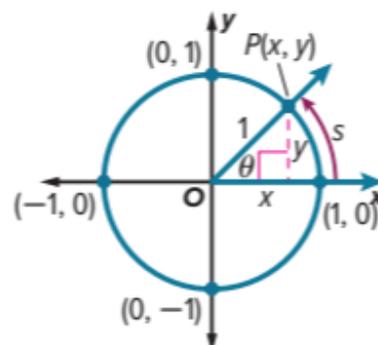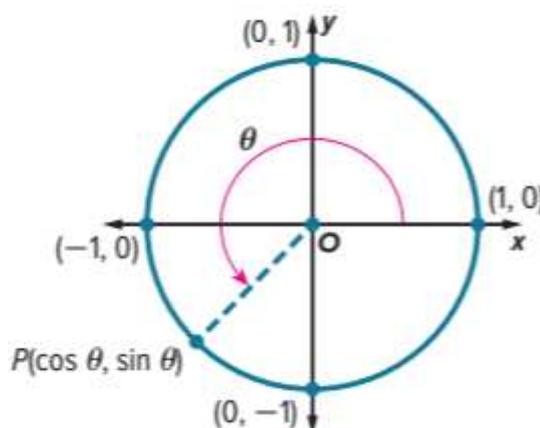
Key Concept • Functions on a Unit Circle

Words: If the terminal side of an angle θ in standard position intersects the unit circle at $P(x, y)$, then $\cos \theta = x$ and $\sin \theta = y$.

Symbols: $P(x, y) = P(\cos \theta, \sin \theta)$

Example:

If $\theta = \frac{5\pi}{4}$,

$P(x, y) = P\left(\cos \frac{5\pi}{4}, \sin \frac{5\pi}{4}\right)$.

Check

The terminal side of θ in standard position intersects the unit circle at $P\left(-\frac{4}{5}, -\frac{3}{5}\right)$. Find $\cos \theta$ and $\sin \theta$. Write the solutions as decimals.

$\cos \theta = $ ____?____ $\frac{-4}{5} = -0.8$ $\sin \theta = $ ____?____ $\frac{-3}{5} = -0.6$

Note (Important): Choose the suitable mode for trigonometric calculations using calculator when needed.

Degree	Shift + mode + 3	Shift + menu + 2 + 1
Radian	Shift + mode + 4	Shift + menu + 2 + 2

Find the exact values of the six trigonometric functions for an angle that measures $\frac{4\pi}{3}$ radians.

$\sin \theta =$ ___?___ $\dfrac{-\sqrt{3}}{2}$ $\cos \theta =$ ___?___ $-\dfrac{1}{2}$ $\tan \theta =$ ___?___ $\sqrt{3}$

$\csc \theta =$ ___?___ $\dfrac{1}{\sin\left(\frac{4\pi}{3}\right)} = \dfrac{-2\sqrt{3}}{3}$ $\sec \theta =$ ___?___ $\dfrac{1}{\cos\left(\frac{4\pi}{3}\right)} = -2$ $\cot \theta =$ ___?___ $\dfrac{\sqrt{3}}{3}$

Find the exact value of each expression.

$\sin \dfrac{8\pi}{3} =$ ___?___ $\dfrac{\sqrt{3}}{2}$ $\cos \dfrac{5\pi}{6} =$ ___?___ $\dfrac{-\sqrt{3}}{2}$

$\sin \dfrac{21\pi}{4} =$ ___?___ $\dfrac{-\sqrt{2}}{2}$ $\cos \dfrac{11\pi}{3} =$ ___?___ $\dfrac{1}{2}$

$\cos 60° =$ ___?___ $\dfrac{1}{2}$ $\sin 600° =$ ___?___ $\dfrac{-\sqrt{3}}{2}$
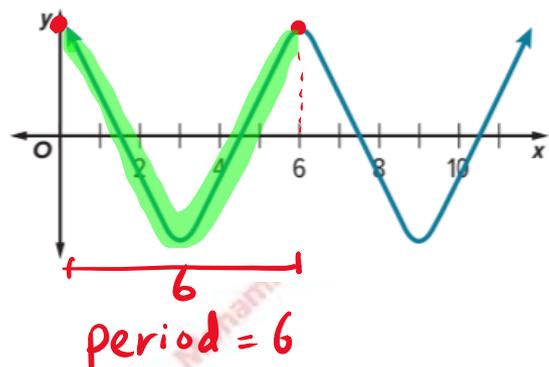
Periodic Functions

A periodic function has y-values that repeat at regular intervals. One complete pattern of a periodic function is called a cycle, and the horizontal length of one cycle is called the period.
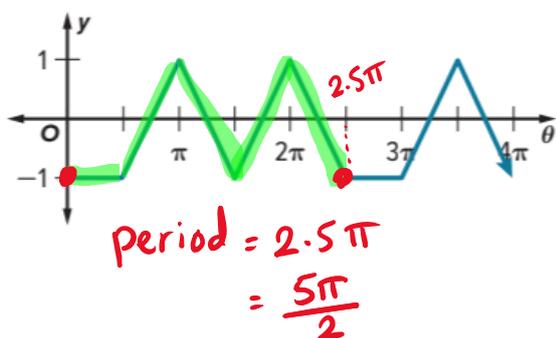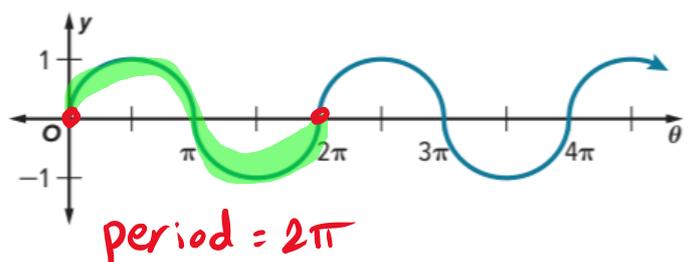
Determine the period of the function.

13.

period = 10

14.

period = 6

15.

period = 2.5π
= $\dfrac{5\pi}{2}$

16.
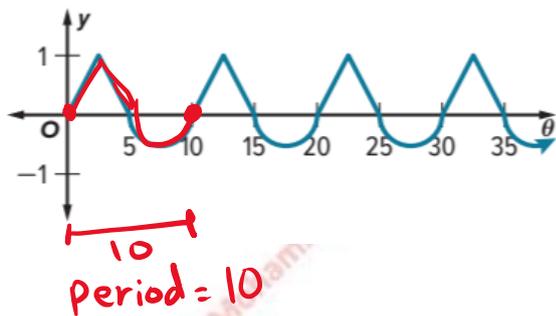
period = 2π

CAROUSELS New York's Eldridge Park Carousel is considered the fastest carousel in the world, taking riders for a spin at 18 miles per hour. The indoor carousel has a diameter of 50 feet and can complete about 10 rotations per minute. The distance of a rider *d* from the front wall of the building varies periodically as a function of time *t*. Identify the period of the function. Then graph the function. Assume that a rider begins at the point closest to the wall, 20 feet from the wall.
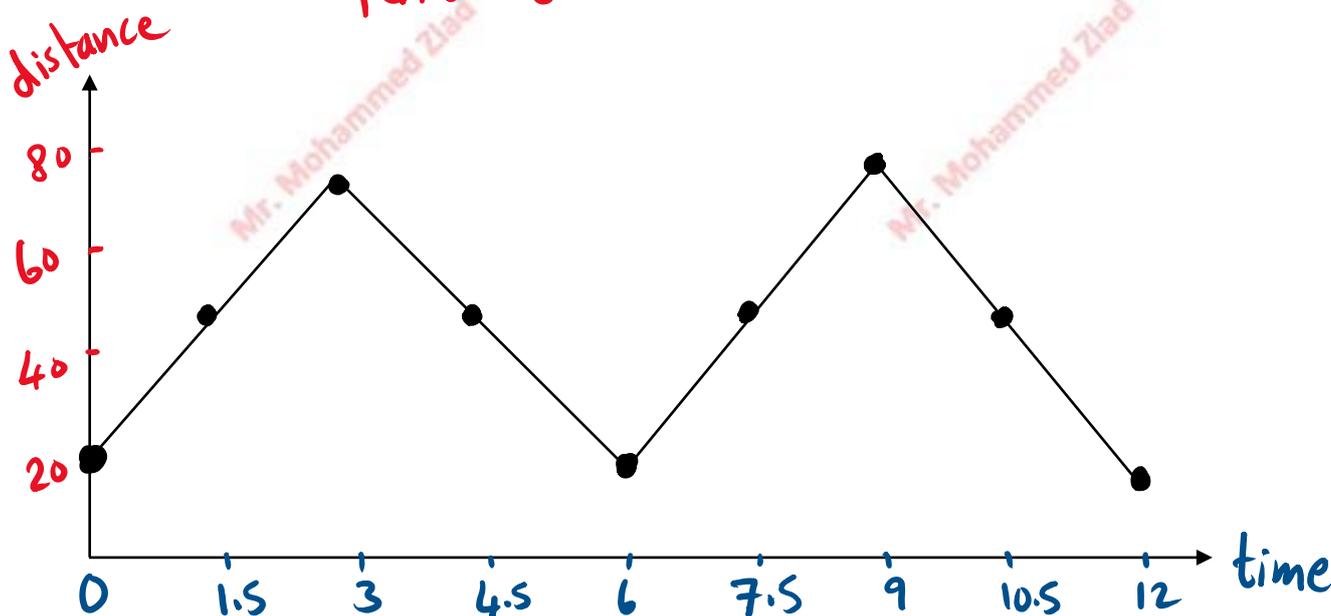
every one rotation needs

$$\frac{60s}{10} = 6s$$

3 s
25
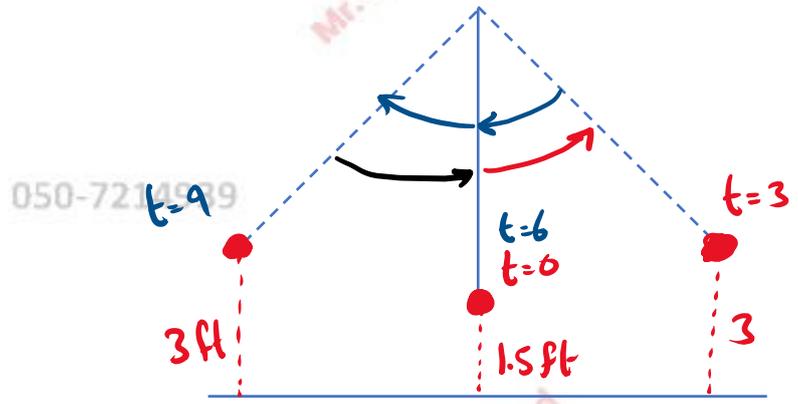1.5 s — 4.5 s
70 ft
45 ft — 25
0 s↑6 s
20 ft
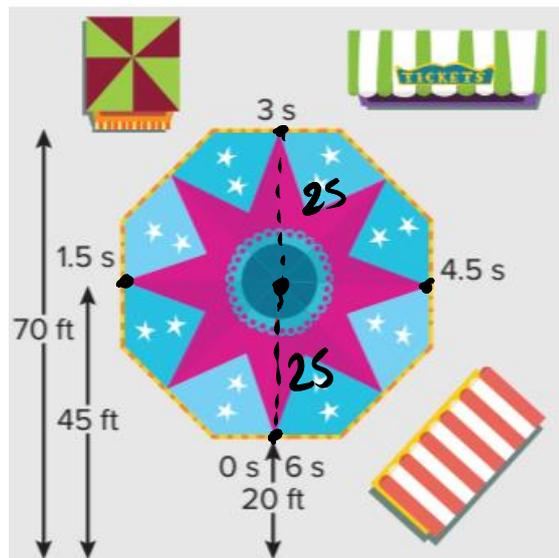
t	0	1.5	3	4.5	6	7.5	9	10.5	12
d	20	45	70	45	20	45	70	45	20

+25 +25 -25 -25

period = 6

distance

80
60
40
20

0 1.5 3 4.5 6 7.5 9 10.5 12 time

PENDULUM The height of a pendulum varies periodically as a function of time. The pendulum swings in one direction and reaches its high point of 3 feet. It then swings the opposite direction and reaches 3 feet again. Its lowest point is 1.5 feet. The time it takes for the pendulum to swing from its low point to one of its high points is 3 seconds. Identify the period of the function. Then graph the function. Assume that the pendulum begins at the low point, 1.5 feet above the ground.

t	0	3	6	9	12
d	1.5	3	1.5	3	1.5

period = 6