

Trig Graph Tracks

Find the features, then plot one cycle.

HIGH SCHOOL • MA.912.T.3.2

MA.912.T.3.2 "Given a table, equation or written description of a trigonometric function, graph that function and determine key features."

NAME _____

DATE _____

BUILD A CYCLE

For $y = a \sin(b(x-c)) + d$ or $y = a \cos(b(x-c)) + d$, the amplitude is $|a|$, the period is $2\pi/|b|$, and the midline is $y = d$. Plot five points one quarter-period apart, then connect them with a smooth curve.

WORKED EXAMPLE

Graph one cycle of $y = 9\sin(\pi x/11) - 4$.

1. Amplitude = 9, period = $2\pi/(\pi/11) = 22$, and midline is $y = -4$.
2. One quarter-period is $22/4 = 11/2$.
3. Plot $(0, -4)$, $(11/2, 5)$, $(11, -4)$, $(33/2, -13)$, and $(22, -4)$.

**Answer: Amplitude 9; period 22;
midline $y = -4$; key points $(0, -4)$,
 $(11/2, 5)$, $(11, -4)$, $(33/2, -13)$, $(22, -4)$.**

PRACTICE 5 problems

- 1** Graph one cycle of $y = -6\sin(\pi x/5) + 7$. State the amplitude, period, midline, and five key points.

ANSWER _____

- 2** Graph one cycle of $y = 5\cos(\pi(x-3)/6) - 8$. State the amplitude, period, midline, and five key points.

ANSWER _____

- 3** A table shows x : 2, 6, 10, 14, 18 and y : 7, 13, 7, 1, 7. Write a sine equation, then graph the cycle.

ANSWER _____

- 4** A cosine graph has amplitude 8, midline $y = -3$, period 14, and a minimum at $x = 1$. Write an equation and graph one cycle.

ANSWER _____

- 5** Graph one cycle of $y = 3\cos(2\pi x/7) + 5$. State the amplitude, period, midline, and five key points.

ANSWER _____

APPLY IT Show your work

- 1** At a school concert, a spotlight is 13 feet high at $t = 0$ seconds. It reaches its lowest height of 1 foot at $t = 5$ and repeats every 10 seconds. Write a cosine model h , then graph one cycle.

WORK SPACE

ANSWER _____

- 2** In a game-design project, a moving platform is 8 units high at $t = 0$ and moving up. It reaches 14 units at $t = 3$, returns to 8 at $t = 6$, reaches 2 at $t = 9$, and repeats. Write a sine model p , then graph one cycle.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Graph $y = -8\sin(2\pi(x+3)/7) + 2$ for $-3 \leq x \leq 4$. State the amplitude, period, midline, and five key points. Explain why the first point after $x = -3$ is below the midline.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Graph one cycle of $y = -6\sin(\pi x/5) + 7$. State the amplitude, period, midline, and five key points.	Amplitude 6; period 10; midline $y = 7$; points $(0,7)$, $(5/2,1)$, $(5,7)$, $(15/2,13)$, $(10,7)$.
2	Graph one cycle of $y = 5\cos(\pi(x-3)/6) - 8$. State the amplitude, period, midline, and five key points.	Amplitude 5; period 12; midline $y = -8$; points $(3,-3)$, $(6,-8)$, $(9,-13)$, $(12,-8)$, $(15,-3)$.
3	A table shows x : 2, 6, 10, 14, 18 and y : 7, 13, 7, 1, 7. Write a sine equation, then graph the cycle.	$y = 6\sin(\pi(x-2)/8) + 7$; amplitude 6; period 16; midline $y = 7$; points $(2,7)$, $(6,13)$, $(10,7)$, $(14,1)$, $(18,7)$.
4	A cosine graph has amplitude 8, midline $y = -3$, period 14, and a minimum at $x = 1$. Write an equation and graph one cycle.	$y = -8\cos(\pi(x-1)/7) - 3$; points $(1,-11)$, $(9/2,-3)$, $(8,5)$, $(23/2,-3)$, $(15,-11)$.
5	Graph one cycle of $y = 3\cos(2\pi x/7) + 5$. State the amplitude, period, midline, and five key points.	Amplitude 3; period 7; midline $y = 5$; points $(0,8)$, $(7/4,5)$, $(7/2,2)$, $(21/4,5)$, $(7,8)$.

PART 2 • APPLY IT

- $h = 6\cos(\pi t/5) + 7$; points $(0,13)$, $(5/2,7)$, $(5,1)$, $(15/2,7)$, $(10,13)$.** The amplitude is $(13-1)/2 = 6$ and the midline is 7. The period is 10, so $b = \pi/5$.
- $p = 6\sin(\pi t/6) + 8$; points $(0,8)$, $(3,14)$, $(6,8)$, $(9,2)$, $(12,8)$.** The maximum and minimum give amplitude 6 and midline 8. A full cycle takes 12 seconds, so $b = \pi/6$.

CHALLENGE

Amplitude 8; period 7; midline $y = 2$; points $(-3,2)$, $(-5/4,-6)$, $(1/2,2)$, $(9/4,10)$, $(4,2)$. The negative coefficient reflects the sine graph, so it moves down first.

Accept equivalent sine or cosine equations and any correct set of five consecutive quarter-period points. Accept graphs with accurate features and a smooth sinusoidal curve through the key points.