



Problem 1 – A general trigonometric function

Using the *Transformation Graphing* app, press $\boxed{Y=}$ and enter the general sine function in Y_1 ,

$$Y_1 = A * \sin(B * X + C) + D.$$

Complete the table.

A	B	C	D	zero1	zero2	min	max
1	1	0	0				
4	1/2	3	1				

Problem 2 – The effect of the coefficients A, B, C, and D

Examining A

- Set $B = 1$ and $C = D = 0$ and change the value of A . Try 4 different values of A .

A	B	C	D	zero1	zero2	min	max
	1	0	0				
	1	0	0				
	1	0	0				
	1	0	0				

- How did the appearance of the graph change?
- Which graph features changed? Which did not change?
- Write equations to describe the relationship between A and the features that did change.
- When $B = 1$ and $C = D = 0$, _____.

The value of A is the **amplitude**. It is equal to half of the difference between its maximum and minimum values.

- Calculate the amplitude from the minimum and maximum values in the table above.
- Compare the results to the values of A . What do you notice?



Examining B

A	B	C	D	zero1	zero2	min	max
1		0	0				
1		0	0				
1		0	0				
1		0	0				

- Try 4 different values of B . How did the appearance of the graph change?
- Which graph features changed? Which did not change?
- Describe the relationship between B and the features that did change.

Examining C

A	B	C	D	zero1	zero2	min	max
1	1		0				
1	1		0				
1	1		0				
1	1		0				

- Try 4 different values of C . How did the appearance of the graph change?
- Which graph features changed? Which did not change?
- What is the effect of an increasing sequence of values for C on the graph?
- What is the effect of a decreasing sequence of values for C on the graph?



Examining D

A	B	C	D	zero1	zero2	min	max
1	1	0					
1	1	0					
1	1	0					
1	1	0					

- Try 4 different values of D . How did the appearance of the graph change?

- Try an increasing sequence of values for D such as 0, 1, 2, 3, 4...
What is the effect on the graph?

- Try a decreasing sequence of values for D such as 0, -1, -2, -3, -4...
What is the effect on the graph?

- Describe the effect of the value of D on the graph. How does changing D change the graph features?

Problem 3 – A closer look at amplitude, period, and frequency

In Y_1 , enter the general cosine function, $A * \cos(B * X + C) + D$.

amplitude: half of the vertical distance from minimum value to maximum value

period: horizontal distance from one peak (maximum point) to the next

frequency: number of cycles per 2π interval

- Write a formula to find the frequency f given the period p .

- Use the formula to complete the table on the next page.



A	B	C	D	max point	min point	next max point	amplitude	period	frequency
1	1	0	0	(0, 1)	(3.14, -1)	(6.28, 1)	$\frac{1}{2} * (1 - (-1))$ 2	$\frac{6.28 - 0}{6.28}$ $\frac{6.28}{2\pi}$	
	1	0	0						
	1	0	0						
1		0	0						
1		0	0						
1	1		0						
1	1		0						
1	1	0							
1	1	0							
1	1	0							

- Based on the results in the table, determine and record each relationship:
 - A and the amplitude
 - B and the frequency
 - B and the period