

## 12 — Building Complete Trig Graphs

### Part I — Building a Graphing Strategy

For each function below, determine the amplitude, period, phase shift, vertical shift, and midline

1.  $y = 8\sin\left(\theta - \frac{\pi}{2}\right) + 4$       2.  $y = -5\cos\left(\theta - \frac{\pi}{4}\right) - 2$       3.  $y = 4\cos\left(\theta + \frac{\pi}{2}\right) - 3$

### Part II — Locating Key Points

4. For the function  $y = 8\sin\left(\theta - \frac{\pi}{2}\right) + 4$  determine:
- the first key x-value
  - the last key x-value
  - the quarter-period
  - the other 3 key x-values for one complete cycle
5. For the function  $y = -5\cos\left(\theta - \frac{\pi}{4}\right) - 2$  determine:
- the quarter-period
  - the five key x-values for one complete cycle
  - whether the graph begins at a maximum, minimum, or midline

### Part III — Choosing Graphing Increments

6. Suppose  $y = A\sin\left(\theta - \frac{\pi}{3}\right) + D$  has period  $2\pi$ . Determine an appropriate value for one increment on the x-axis. Explain your reasoning.
7. Suppose  $y = A\sin\left(\theta - \frac{\pi}{7}\right) + D$  has period  $2\pi$ . Determine an appropriate value for one increment on the x-axis. Explain your reasoning.
8. Determine an appropriate x-axis increment for each graph below.
- $y = 3\sin\left(x - \frac{\pi}{4}\right) + 2$
  - $y = 5\sin\left(x - \frac{\pi}{8}\right)$

### Part IV — Building Graphing Tables

9. Complete a graphing table for  $y = 8\sin\left(\theta - \frac{\pi}{2}\right) + 4$ .
10. Complete a graphing table for  $y = -5\cos\left(\theta - \frac{\pi}{4}\right) - 2$
11. Without constructing a table, determine the five key points for one complete cycle of  $y = 4\cos\left(\theta + \frac{\pi}{2}\right) - 3$

## Part V — Building Complete Graphs

For each function below:

- state the transformations of the parent function in the correct order
- identify the five key points
- graph one complete cycle
- label the midline
- label the maximum and minimum values

12.  $y = 8\sin\left(\theta - \frac{\pi}{2}\right) + 4$

13.  $y = -5\cos\left(\theta - \frac{\pi}{4}\right) - 2$

14. For the function  $y = 4\cos\left(\theta + \frac{\pi}{2}\right) - 3$ , determine:

- maximum value
- minimum value
- range
- midline
- whether x-intercepts exist

## Part VI — Interpreting Graphs

15. Determine whether  $y = 4\sin\left(x - \frac{\pi}{2}\right) + 7$  has any x-intercepts. Justify your answer using the graph's range.

16. Determine whether  $y = -6\cos\left(x + \frac{\pi}{4}\right) - 1$  has any x-intercepts. Justify your answer using the graph's range.

## Challenge Problem

17. A trigonometric graph has:

- amplitude 4
- midline  $y = 3$
- phase shift  $\frac{\pi}{2}$  right

Determine:

- a) the maximum value
- b) the minimum value
- c) the five key points for one complete cycle of a possible sine function
- d) sketch the graph