

Student Workbook

Parametric Equations: Graphs

Name: _____

Date: _____

Period: _____

Learning Target: I can graph parametric equations, describe the resulting curve, and determine its orientation (direction of tracing).

Vocabulary

Term	Meaning
Orientation	The direction the curve is traced as t increases.
Parameter Interval	The range of t -values used; restricting it can trace only part of a curve.

Key Concept: Graphing a Parametric Curve

METHOD Plot (x,y) points for increasing t -values, connect them in order, and mark an arrow to show the direction of motion (orientation).

EXAMPLE 1

Graph $x=t, y=t^2$ for t in $[-2,2]$. Describe the shape and direction.

Shape: _____ Direction: _____

Key Concept: Restricted Domains on Circles

A FULL CIRCLE NEEDS A FULL 2π INTERVAL Restricting t to a smaller interval (like $[0,\pi]$) traces only an ARC — not the whole circle.

EXAMPLE 2

Graph $x=3\cos(t), y=3\sin(t)$ for t in $[0, \pi]$. Describe the resulting curve.

At $t=0$: (_____, _____) At $t=\pi$: (_____, _____) $\rightarrow$ _____

COMMON MISTAKE

Don't forget to indicate ORIENTATION when describing a parametric graph! The shape alone isn't the complete answer — direction of motion matters too.

Key Concept: Shifted Circles & Ellipses

EXAMPLE 3

Identify the curve traced by $x=2+3\cos(t)$, $y=1+3\sin(t)$ for t in $[0,2\pi]$.

Circle centered at (_____, _____), radius _____

Key Concept: Determining Orientation

EXAMPLE 4

For $x=\cos(t)$, $y=\sin(t)$, t in $[0,2\pi]$, find the starting point and direction of motion.

Start ($t=0$): (_____, _____) Direction: _____

Guided Practice — Part A: Basic Curves

A1 Graph $x=t-1$, $y=2t$ for t in $[0,3]$. Describe the shape and starting/ending points.

A2 Graph $x=t$, $y=t^2-1$ for t in $[-2,2]$. Describe the shape.

Guided Practice — Part B: Circles with Restricted Domains

B1 Graph $x=2\cos(t)$, $y=2\sin(t)$ for t in $[0,\pi]$. Describe the resulting curve.

B2 Graph $x=4\cos(t)$, $y=4\sin(t)$ for t in $[\pi/2, 3\pi/2]$. Describe the resulting curve.

Guided Practice — Part C: Shifted Circles & Ellipses

- C1** Identify the curve traced by $x=1+2\cos(t)$, $y=-3+2\sin(t)$ for t in $[0,2\pi]$.

- C2** Identify the curve traced by $x=-2+4\cos(t)$, $y=3\sin(t)$ for t in $[0,2\pi]$.

Guided Practice — Part D: Orientation

- D1** For $x=\cos(t)$, $y=\sin(t)$, t in $[0,2\pi]$, find the starting point and direction of motion.

- D2** For $x=5\cos(t)$, $y=-5\sin(t)$, t in $[0,2\pi]$, find the starting point and direction of motion.

BEFORE YOU MOVE ON

Check with a partner: did you note whether a negative sign on the sine term reverses the usual counterclockwise direction?