4.4 Parametrically Defined Circles and Lines

AP Precalculus

4.4 Practice

1. Find the parametric equations for the linear path of a particle that travels from the point $(0,3)$ to the point $(-1,5)$.

$(0,3)$ when $t=0$

$(-1,5)$ when $t=1$

$\frac{\Delta x}{\Delta t} = \frac{-1}{1} = -1$

$\frac{\Delta y}{\Delta t} = \frac{5-3}{1} = 2$

$x(t) = -t$

$y(t) = 3+2t$

2. If a particle traveling on a linear path has a starting point of $(3,6)$ and a slope of $\frac{1}{3}$, find the parametric equations that represent the linear path.

Slope $= \frac{1}{3} \rightarrow \frac{\Delta y}{\Delta t} = 1$, $\frac{\Delta x}{\Delta t} = 3$

$x(t) = 3+3t$

$y(t) = 6+t$

3. If the parametric equations for the linear path a particle travels are given by $(-1+7t, 5+4t)$, what is the slope of the path of the particle?

$\frac{\Delta y}{\Delta t} = 4$

$\frac{\Delta x}{\Delta t} = 7$

Slope $= \frac{4}{7}$

4. If the average rate of change of x is -2 and of y is 1, what are the parametric equations of a particle traveling on a linear path that starts at the origin?

$x(t) = -2t$

$y(t) = t$

5. Which of the following give the parametric equations for a particle traveling on a linear path that passes through the point $(1,3)$ and then the point $(-2,8)$?

√ i. $x(t) = 1-3t$ and $y(t) = 3+5t$

ii. $x(t) = 1+3t$ and $y(t) = 3-5t$

√ iii. $x(t) = -2-3t$ and $y(t) = 8+5t$

iv. $x(t) = -2+3t$ and $y(t) = 8-5t$

$(1,3)$ when $t=0$

$(-2,8)$ when $t=1$

$\frac{\Delta x}{\Delta t} = \frac{-2-1}{1} = -3$

$\frac{\Delta y}{\Delta x} = \frac{8-3}{1} = 5$

$x(t) = 1-3t$

$y(t) = 3+5t$

use $(-2,8)$ as well

$x(t) = -2-3t$

$y(t) = 8+5t$

B

(A) *i* only

(B) *i* and *iii*

(C) *iii* only

(D) *i* and *iv*

6. Find the parametric equations for the circle with the center at $(-2, -1)$ and a radius of 6.

$x(t) = 6\cos t - 2$

$y(t) = 6\sin t - 1$

7. If a particle is traveling on a circular path and its distance from the origin at any moment of time is $\sqrt{2}$ units, find the parametric equations for this situation.

center at $(0,0)$

$r = \sqrt{2}$

$x(t) = \sqrt{2}\cos t$

$y(t) = \sqrt{2}\sin t$

8. Find the parametric equations for a particle traveling on the path modeled by $(x + 2)^2 + (y - 6)^2 = 5$.

Center at $(-2, 6)$

$r = \sqrt{5}$

$x(t) = \sqrt{5}\cos t - 2$

$y(t) = \sqrt{5}\sin t + 6$

9. If a unit circle centered at the origin has a transformation of 3 units to the left and 5 units down, find the parameterization of the circle in the new location.

Center at $(-3, -5)$

$r = 1$

$x(t) = \cos t - 3$

$y(t) = \sin t - 5$

10. If the parametric equations $x(t) = 1 + 5\cos t$ and $y(t) = 2 + 5\sin t$ are used to describe the path a particle is traveling, find the rectangular form equation of the graph it creates.

Center at $(1, 2)$

$r = 5$

$(x-1)^2 + (y-2)^2 = 25$