New 11.2 Vectors

The vector in component form is is the vector starting at and going through the point (a, b).

The magnitude of the vector is defined as

The vector can also be written with magnitude and direction angle like this:

 where is the magnitude of the vector and is the directional angle which is the smallest angle formed by the x-axis and the vector.

If the position at any time is , then

 the position vector is

 the velocity vector is

 the particle’s speed is the magnitude of v denoted by

 the particle’s acceleration vector is

If the particle is moving along a path so that its velocity is

 the displacement from is given by the vector

 if the particle’s original position is the new position would be

 the total distance traveled is

1. A particle moves in the xy-plane so that at any time t, the position of the particle is given by
2. Find the velocity vector when
3. Write the equation of the tangent line to the graph when
4. Find the acceleration vector when
5. A particle moves in the xy-plane so that at any time t, the position of the particle is given by . Find the magnitude of the velocity vector when (Find the speed of the particle.)
6. A particle moves in the xy-plane so that and , where . The path of the particle intersects the x-axis twice. Write an expression that represents the distance traveled by the particle between the two x-intercepts. Do not evaluate.
7. A particle moves in the xy-plane so that at any time t, the position of the particle is given by and , where For what value(s) of t is the particle at rest?
8. No Calculator

A particle moves in the xy-plane in such a way that its velocity vector is

. If the position vector at is , find the position of the particle at

1. Calculator

An object moving along a curve in the xy-plane has position at time

 with and . At time , the object is at the position (7, 4).

1. Write the equation of the tangent line to the curve at the point where
2. Find the speed of the vector at
3. For what value of t, , does the tangent line to the curve have a slope of 4? Find the acceleration vector at this time.
4. Find the position of the particle at time

1973 No calculator

1. A particle moves on the curve so that the x-component has velocity

 for . At time , the particle is at the point . At time the particle is what point?

1985

1. A particle moves in the xy-plane so that at any time t its coordinates are and . At , its acceleration vector is

1985

1. If the velocity of a particle moving along the x-axis is and if at

its position is 4, then at any time t its position is

1988

1. For any time , if the position of a particle in the xy-plane is given by and , then the acceleration vector is

1993

1. The position of the particle moving along the x-axis is for time . When , the acceleration of the particle is

1993

1. A particle moves along the x-axis so that at any time , the acceleration of the particle is . If at , the velocity of theparticle is and its position is

, then its position at any time is

1993

1. If a particle is moves in the xy-plane so that at any time , its position vector is

, then at time , its velocity vector is

1997

1. If and , then

1997

1. The length of the path described by the parametric equations and , for is given by what integral?

1997

1. For what values of does the curve given by parametric equations and have a vertical tangent?

1998

1. In the xy-plane, the graph of the parametric equations and , for , is a line segment with slope

1998

1. A particle moves on a plane curve so that at any time its x-coordinate is and its y-coordinate is . The acceleration vector of the particle at is

1998

1. The length of the path described by the parametric equations and , where , is given by the integral

1998

1. If is the vector-valued function defined by , then

2003 No Calculator

1. For , an object travels along an elliptical path given by the parametric equations and At the point where the object leaves that path and travels along the line tangent to the path at that point. What is the slope of the line on which the object travels?

2003

1. The position of a particle moving in the xy-plane is given by the parametric equations and . For what values of is the particle at rest?

2003

1. A curve C is defined by the parametric equations and . What is the equation of the line tangent to the graph of C at the point (-3, 8)?