

Lesson 2

Read Chapter 2

Coordinate systems

Distance formula

Rectilinear motion

Sarah can bicycle around a path, with constant speed, in two hours and 40 min. If she decreases her speed by 1 km/hr her time increases by 4 min. How long is the path?

$$d = vt$$



In order to set up a 1D coordinate system you need:

- ▶ Origin
- ▶ Unit

In order to set up a 2D coordinate system you need:

- ▶ Origin
- ▶ Axes
- ▶ Units on axes

Distance formula

The distance between $P(x_1, y_1)$ and $Q(x_2, y_2)$ is

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Suppose at time $t = 2$ an object starts moving from $P(100, 1)$ with velocity -30mph along the horizontal line $y = 1$; its x and y coordinate at time t are:

Suppose at time t_1 an object starts moving from $P(a, b)$ with velocity v_x along the horizontal line $y = b$; its x coordinate at time t is:

$$x = a + v_x(t - t_1)$$

Suppose at time t_1 an object starts moving from $P(a, b)$ with velocity v_y along a vertical line $x = a$; its y coordinate at time t is:

$$y = b + v_y(t - t_1)$$

Example

Ann and Bob start moving at the same time from the same location. Ann moves East at 6 feet/sec. Bob moves North at 5 feet/sec.

What is the distance between Ann and Bob 10 sec later ?

When is the distance between Ann and Bob 50 feet ?