

Related Rates

Goal:

- Can create an equation to model problems based in geometry – Pythagoras and similar triangles are everything
- Can differentiate any equation and relate how the rates depend on each other and make a new differential equation.

Terminology:

- Related Rate

Reminder:

- Test at the end of the month Dec 18th

We are going to take all of the scenarios you made before and now work backwards. Here is a problem I want you to model, determine an equation that relates objects in it and take an appropriate derivative.

Example: A baseball diamond has 4 bases that make a diamond with edge lengths of 60 feet. There is a runner on first when the batter hits a fair ball. The batter runs to first at 15 feet/sec and the runner on first runs to second at 12 feet/sec. How fast is the distance between the batter and runner changing when the batter is 30 feet from first?

Example: A tightrope is stretched 30 feet above the ground between the two buildings, which are 50 feet apart. A tightrope walker, walking at a constant rate of 2 feet per second from point A to point B, is illuminated by a spotlight 70 feet above point A. How fast is the shadow of the tightrope walker's feet moving along the ground when she is midway between the building?

In Class Evidence

10. A man 2m tall walks away from a lamppost whose light is 5m above the ground. If he walks at 1.5m/s at what rate is his shadow growing when he is 10m from the lamppost?

11. A ladder 4m long rests against a vertical wall. If the bottom of the ladder slides away from the wall at 30cm/s, how quickly is the top of the ladder sliding down the wall when the bottom of the ladder is 2m from the wall.

13. At 1:00pm ship A was 80 km south of ship B. Ship A is sailing north at 30 km/h and ship B is sailing east 40 km/h. How fast is the distance between them changing at 3:00pm?

15. A plane flies horizontally with a speed of 600 km/h at an altitude of 10 km and passes directly over the town of Quinton. Find the rate at which the distance from the plane to Quinton is increasing when it is 20km from Quinton.