

Workbook



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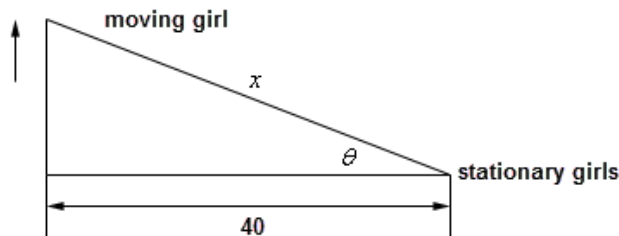
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Questions:

- 1) Determine the rate at which the radius of a spherical balloon is increasing when the diameter of the balloon is 40cm, if it is known that Air is being pumped into the balloon at a rate of $10\text{cm}^3/\text{min}$.
- 2) A 20-foot ladder is resting against the wall. The bottom is initially 15 ft. away from the wall and is being pushed towards the wall at a rate of $\frac{1}{2}$ ft/sec .
How fast is the top of the ladder moving up the wall 16 seconds after we start pushing?
- 3) Two girls are 40 ft apart, one of them starts walking north at a rate so that the angle shown in the diagram below is changing at a constant rate of 0.02 rad/min .
At what rate is the distance between the two girls changing when $\theta = 0.5$ radians?



- 4) A tank of **Gasoline** in the shape of a cone is leaking at a constant rate of $3\text{ft}^3/\text{hour}$. The base radius of the tank is 4 ft and the height of the tank is 13 ft.
 - a. At what rate is the depth of the gasoline in the tank changing when the depth of the gasoline is 5 ft ?
 - b. At what rate is the radius of the top of the water in the tank changing when the depth of the water is 5 ft ?

- 5) A trough of water is 9 meters deep and its ends are in the shape of isosceles triangles whose 6 meters width and 3 meters height. If water is being pumped in at a constant rate of $6 \text{ m}^3/\text{sec}$. At what rate is the height of the water changing when the water has a height of 110 cm?
- 6) A light is on top of a 13 ft. tall pole and a 5 ft. tall girl is running away from the pole at a rate of 3 ft/sec.
- At what rate is the tip of the shadow moving away from the pole when the girl is 30 ft. from the pole?
 - At what rate is the tip of the shadow moving away from the girl when the girl is 30ft. from the pole?
- 7) A spot light is on the ground 24 ft. away from a wall and a 4 ft. tall girl is walking towards the wall at a rate of 2 ft/sec.
How fast the height of the shadow change, when the person is 10 ft. from the wall? Is the shadow's height increasing or decreasing at this time?
- 8) Brad and Angelina are riding on bikes, separated by 500 meters. Brad starts riding north at a rate of 4 m/sec and 6 minutes later Angelina starts riding south at 4 m/sec.
At what rate the distance separating Brad and Angelina will change, 25 minutes after Brad starts riding?

Answer Key:

- 1) $\frac{1}{480\pi}$ cm/sec
- 2) $\frac{7}{2\sqrt{351}}$ ft/sec
- 3) 0.498 ft/sec
- 4) a. -0.403 ft/hour b. -0.124 ft/hour
- 5) 0.341 m/sec
- 6) a. 4.875 ft/sec b. 1.875 ft/sec
- 7) -0.98 ft/sec, The shadow is decreasing
- 8) 7.991 m/sec