

Related Rates

1 mark for diagram, if appropriate - otherwise, mark gets lumped into rest

1 mark for variables

1 mark for equation

1 mark for derivative

1 mark for plugging in given values

1 mark for finding necessary values (otherwise, previous mark is worth 2)

1 mark for solving for desired rate

1 mark for final answer, including units and correct contextual interpretation

1. (8 points) A woman 1.5 m tall walks toward a lamppost whose light is 4 m above the ground. If she walks at a speed of 2 m/s, at what rate is the tip of the shadow moving when she is 10 m from the lamppost (in m/s, to 3 decimal places) and in which direction?

2. (8 points) A water trough is 10 m long and a cross-section has the shape of a triangle that is 4 m wide and 1 m tall, with the point towards the bottom. If water is being pumped in at a rate of $15 \text{ m}^3/\text{min}$, how fast is the water level changing when the water is 20 cm deep (in m/min , to 3 decimal places) and is it rising or lowering?
3. (8 points) Two cars start moving from the same point. One travels north at $80 \text{ km}/\text{h}$ and the other travels west at $60 \text{ km}/\text{h}$. At what rate is the distance between the cars changing 2 hours later (in km/h , to 3 decimal places) and are the cars getting closer together or further apart?