

ANSWERS => Rate of Change Review #2

1. At 5 am Mr. Bishop's odometer read 44 520 km.

↳ (5, 44 520)

At 11 am Mr. Bishop's odometer read 45 000 km.

↳ (11, 45 000)

$$\begin{aligned} \text{AROC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{45\,000 - 44\,520}{11 - 5} \\ &= \frac{480}{6} \\ &= 80 \text{ km/h} \end{aligned}$$

Mr. Bishop's average speed for the trip was 80 km/h.

$$d) \quad h = -4.9t^2 + 29.4t + 1$$

a)

$$① \quad h - 1 = -4.9t^2 + 29.4t$$

$$② \quad h - 1 = -4.9(t^2 - 6t)$$

$$③ \quad h - 1 - 44.1 = -4.9(t^2 - 6t + 9)$$

$$h - 45.1 = -4.9(t - 3)^2$$

$$h = -4.9(t - 3)^2 + 45.1$$

Vertex (3, 45.1)

The ball reaches a maximum height of 45.1 m after 3 seconds.

$$b) h = -4.9t^2 + 29.4t + 1$$

$$\text{When } t = 2$$

$$\begin{aligned} h &= -4.9(2)^2 + 29.4(2) + 1 \\ &= -4.9(4) + 58.8 + 1 \\ &= -19.6 + 58.8 + 1 \\ &= 40.2 \text{ m} \end{aligned}$$

$$\text{When } t = 5$$

$$\begin{aligned} h &= -4.9(5)^2 + 29.4(5) + 1 \\ &= -4.9(25) + 147 + 1 \\ &= -122.5 + 147 + 1 \\ &= 25.5 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{AROC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{25.5 - 40.2}{5 - 2} \\ &= \frac{-14.7}{3} \\ &= -4.9 \text{ m/s} \end{aligned}$$

$$c) h = -4.9t^2 + 29.4t + 1$$

$$\text{When } t = 2.9$$

$$\begin{aligned} h &= -4.9(2.9)^2 + 29.4(2.9) + 1 \\ &= -4.9(8.41) + 85.26 + 1 \\ &= -41.209 + 85.26 + 1 \\ &= 45.051 \text{ m} \end{aligned}$$

$$\text{When } t = 3.1$$

$$\begin{aligned} h &= -4.9(3.1)^2 + 29.4(3.1) + 1 \\ &= -4.9(9.61) + 91.14 + 1 \\ &= -47.089 + 91.14 + 1 \\ &= 45.051 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{IROC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{45.051 - 45.051}{3.1 - 2.9} \\ &= \frac{0}{0.2} \\ &= 0 \text{ m/s} \end{aligned}$$

3.* All trips begin at $(0, 0)$
Trip finished at $(4, 295)$

$$\begin{aligned} \text{AROC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{295 - 0}{4 - 0} \\ &= \frac{295}{4} \\ &= 73.75 \text{ Km/h.} \end{aligned}$$

b) At $t=2$, $(2, 155)$
At $t=4$, $(4, 295)$

$$\begin{aligned} \text{AROC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{295 - 155}{4 - 2} \\ &= \frac{140}{2} \\ &= 70 \text{ km/h} \end{aligned}$$

$$\begin{aligned} \text{c) At } t=0, & (0,0) \\ \text{At } t=3, & (3,235) \end{aligned}$$

$$\begin{aligned} \text{AROC} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{235 - 0}{3 - 0} \\ &= \frac{235}{3} \\ &= 78.\bar{3} \text{ km/h} \end{aligned}$$

4. The graph is increasing from:

1961 - 1968

1972 - 1975

1978 - 1980

1985 - 1990

The graph is decreasing from:

1960 - 1961

1968 - 1972

1975 - 1978

1980 - 1985