

## Activity 1.1 – Average Rate of Change

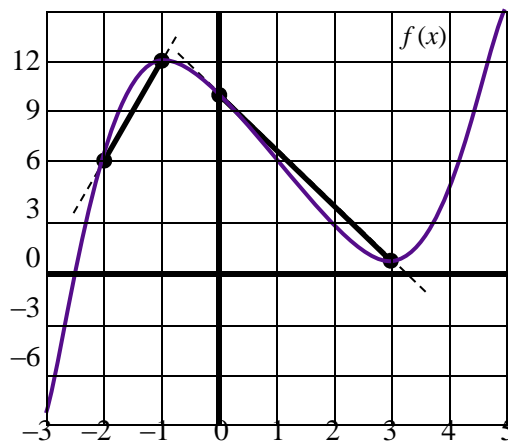
- Above zero on  $(-2.5, 3)$  and  $(3, 5)$ . Equal to or below zero on  $(-3, -2.5]$  and at  $x = 3$ .
  - Rising on  $(-3, -1)$  and  $(3, 5)$ . The average rate of change is positive.
  - Falling on  $(-1, 3)$ . The average rate of change is negative.
  - A peak at  $x = -1$  means that on December 31, the temperature was higher than that of surrounding days. A valley at  $x = 3$  means that on January 4, the temperature was lower than that of surrounding days.
  - The  $x$ -intercepts are at  $x = -2.5$  and at  $x = 3$ . These are the inputs at which the temp. was zero. The  $y$ -intercept is is at  $y = 10$ . This means that the temp. on January 1 was  $10^\circ\text{C}$ .

(f) (i)  $\frac{f(3) - f(0)}{3 - 0} = \frac{0 - 10}{3} = -10/3$ ;

Between January 1 and January 4, the daily high temperature decreased by about  $3.3^\circ\text{C}$  per day.

(ii)  $\frac{f(-1) - f(-2)}{(-1) - (-2)} = \frac{12 - 6}{1} = 6$ ;

Between December 30 and December 31, the daily high temperature increased by  $6^\circ\text{C}$  per day.



- $\frac{T(125) - T(25)}{125 - 25} = \frac{5.30 - 5.50}{125 - 25} = \frac{-0.2}{100} = -0.002^\circ\text{C per meter}$
  - $\frac{\Delta T}{\Delta d} = \frac{T(125) - T(50)}{125 - 50} = \frac{5.30 - 5.20}{125 - 50} = \frac{0.1}{75} \approx 0.001^\circ\text{C per meter}$
  - $\frac{T(200) - T(125)}{200 - 125} = \frac{6.00 - 5.30}{200 - 125} = \frac{0.70}{75} \approx 0.009^\circ\text{C per meter}$
  - The correct answers are (iii) and (v).

- The shape of the graph is linear.

(b)

Interval	$\Delta D$	$\Delta t$	$\Delta D/\Delta t$
$[1, 2.5]$	105	1.5	70
$[0, 2]$	140	2	70
$[0.5, 3]$	175	2.5	70

(c) 70 mi/hr

(d) The vehicle had a constant velocity of 70 mi/hr.