Finding Speed from a Graph ⤳ ANSWERS

a) A to B.

(0,0)   (8,10)

$$Speed_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{10 - 0}{8 - 0}$$

$$= \frac{10}{8}$$

$$= 1.25 \frac{Km}{min} \times \frac{60\,min}{1\,hr}$$

$$= 75\ Km/h$$

b) B to C

(8,10)   (18,35)

$$Speed_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{35 - 10}{18 - 8}$$

$$= \frac{25}{10}$$

$$= 2.5 \frac{Km}{min} \times \frac{60\,min}{1\,hr}$$

$$= 150\ Km/h.$$

c) C to D
(18,35) (28,45)

$$\text{Speed}_{CD} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{45 - 35}{28 - 18}$$

$$= \frac{10}{10}$$

$$= \frac{1 \text{ Km}}{\text{min}} \times \frac{60 \text{ min}}{1 \text{ hr}}$$

$$= 60 \text{ Km/h}$$

d) D to E
(28,45) (36,65)

$$\text{Speed}_{DE} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{65 - 45}{36 - 28}$$

$$= \frac{20}{8}$$

$$= \frac{2.5 \text{ Km}}{\text{min}} \times \frac{60 \text{ min}}{1 \text{ hr}}$$

$$= 150 \text{ Km/h}.$$

e) E to F

(36,65) (48,70)

$$\text{Speed}_{EF} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{70 - 65}{48 - 36}$$

$$= \frac{5}{12}$$

$$\frac{0.42 \text{ Km}}{\text{min}} \times \frac{60 \text{min.}}{1 \text{ hr}}$$

$$= 25.2 \text{ Km}/h$$

f) F to G

(48,70)   (56,70)

$$\text{Speed}_{FG} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{70 - 70}{56 - 48}$$

$$= \frac{0}{8}$$

$$= \frac{0 \text{ Km}}{\text{min}}$$

$$= 0 \text{ Km/h}$$

☆ Average Speed for entire trip.

$(A \rightarrow G)$

(0,0)   (56,70)

$$\text{Average Speed}_{AG} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{70 - 0}{56 - 0}$$

$$= \frac{70}{56}$$

$$= 1.25 \frac{\text{Km}}{\text{min}}$$

$$\Rightarrow 75 \text{ Km/h}$$

Average Rate of Change from Graphs.

① a) $x = 1$ to $x = 4$

$(1, 1)$ $\quad\quad\quad$ $(4, 7)$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{7 - 1}{4 - 1}$$

$$= \frac{6}{3}$$

$$= 2$$

b) $x = 2$ to $x = 5$

$(2, 3)$ $\quad\quad$ $(5, 9)$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{9 - 3}{5 - 2}$$

$$= \frac{6}{3}$$

$$= 2$$

The rate of change is CONSTANT!

↳ Linear Graph.

2a) $x=3$ to $x=5$

$(3,0)$ $(5,8)$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{8-0}{5-3}$$

$$= \frac{8}{2}$$

$$= 4$$

b) $x=2$ to $x=0$

$(2,-1)$ $(0,3)$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{3-(-1)}{0-2}$$

$$= \frac{4}{-2}$$

$$= -2$$

3a) x = -4 to x = -2

(-4, -4)   (-2, 1)

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{1 - (-4)}{-2 - (-4)}$$

$$= \frac{5}{2}$$

$$= 2.5$$

b) x = 0 to x = 4

(0, 4)   (4, 4)

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{4 - 4}{4 - 0}$$

$$= \frac{0}{4}$$

$$= 0$$

4. a) $x = 0$ to $x = 2$ b) $x = 1$ to $x = 3$
      $(0, 1)$ $(2, 4)$ $(1, 2)$ $(3, 8)$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{4 - 1}{2 - 0}$$

$$= \frac{3}{2}$$

$$= 1.5$$

$$AROC = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{8 - 2}{3 - 1}$$

$$= \frac{6}{2}$$

$$= 3$$

5. a) $x = 3$ to $x = 0$

$(3, -6)$ $\quad$ $(0, -3)$

$AROC = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-3 - (-6)}{0 - 3}$

$= \dfrac{3}{-3}$

$= -1$

b) $x = 2$ to $x = -2$

$(2, -5)$ $\quad$ $(-2, -1)$

$AROC = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-1 - (-5)}{-2 - 2}$

$= \dfrac{4}{-4}$

$= -1$

CONSTANT
⇓
LINEAR GRAPH

6. $x = -2$ to $x = 3$

$(-2, 2)$ $(3, 2)$

$AROC = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{2 - 2}{3 - (-2)}$

$= \dfrac{0}{5}$

$= 0$

(CONSTANT!)

7. $x = 2$ to $x = 2$

* Pick any 2 points.

Example: $(2, 0)$ and $(2, 2)$

$AROC = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{2 - 0}{2 - 2}$

$= \dfrac{2}{0}$

Undefined!

(cannot divide by 0)