25. $J\left(\frac{1}{3}, 1\frac{1}{2}\right)$ $K\left(2, 3\frac{1}{2}\right)$

x_1 y_1 x_2 y_2

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - \frac{3}{2}}{2 - \frac{1}{3}} = \frac{\frac{4}{2}}{\frac{6}{3} - \frac{1}{3}} = \frac{2}{\frac{5}{3}} = \frac{2}{1} \div \frac{5}{3} = \frac{2}{1} \times \frac{3}{5} = \frac{6}{5}$$

$2 \times 1 = 2$

$1 \times 3 = 3$

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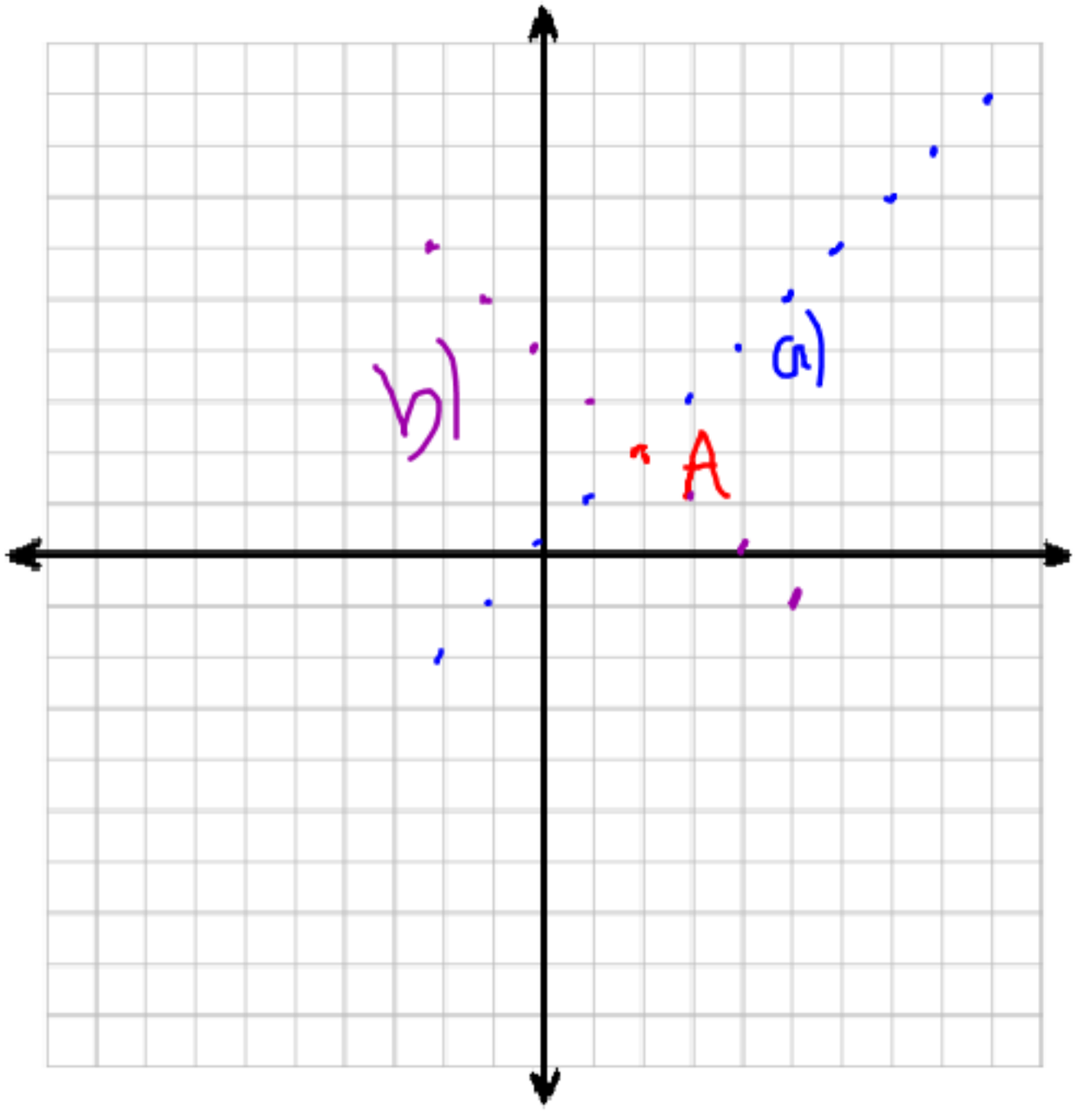


A(2, 2)

$m = \frac{1}{1} \frac{\text{Rise}}{\text{Run}}$

$b = -\frac{1}{1}$

May 16 Slope as Rate of Change

page 407 ① Given

At birth → $x_1 = 0$, $y_1 = 7m$

At 7 months → $x_2 = 7$ months, $y_2 = 15m$

Find Rate of change in m/months

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15 - 7}{7 - 0} = \frac{8}{7} = 1.14$$

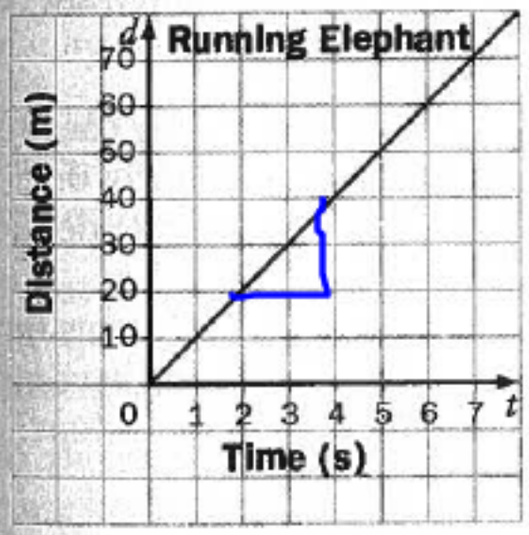
∴ our baby blue whale grows 1.14m per month

For each graph,

a) *determine the rate of change*

b) *explain the meaning of the rate of change*

4.

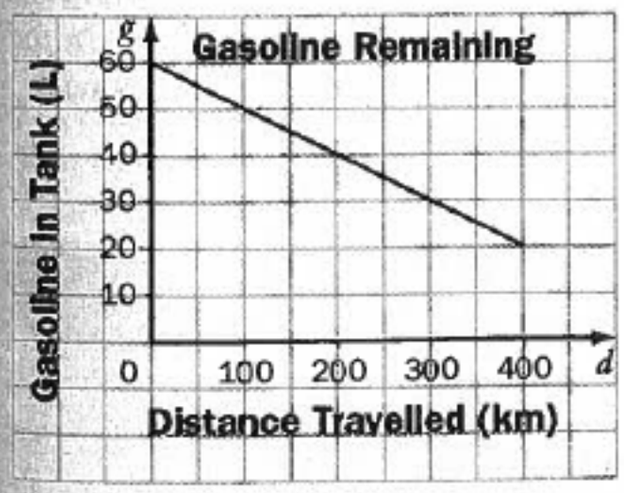


$m = \frac{\text{rise}}{\text{run}}$

$m = \frac{20}{2}$

$m = 10 \text{ m/s}$

5.



6. Video recording The length of tape in a T-120 videocassette is 246 m.

a) In the SP mode, the tape will record 120 min of programs. What is the rate of change, in metres per minute?

b) What does the rate of change mean?

8. Televisions In 1970, 12.1% of Canadian households had colour televisions. In 1997, the figure was 98.7%. Find the average rate of change, to the nearest tenth of a percent per year.

9. Railways In 1947, Canadian railways logged 9 570 000 000 passenger-kilometres. In 1996, they logged 1 520 000 000 passenger-kilometres. Find the average rate of change, to the nearest million passenger-kilometres per year.

10. LP record sales The table shows LP record sales in Canada, in millions of units, over a 20-year period.

Year	1971	1981	1991
Sales (millions)	26.4	54.4	0

a) Calculate the average rate of change from 1971 to 1981; from 1981 to 1991; from 1971 to 1991.

b) Does the average rate of change from 1971 to 1991 give a true picture of the changes in LP record sales over the 20-year period? Explain.

11. Running Bill jogged for 5 min, and then sprinted 400 m in 64 s.

a) At what rate did he sprint?

b) Can you use the rate from part a) to find how far Bill jogged? Explain and justify your reasoning.

(7) Given $x_1 = 1971$ $y_1 = 323000$ FTS

$x_2 = 1997$ $y_2 = 544000$ FTS

FTS / year

Find rate of change

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{544000 - 323000}{1997 - 1971}$$

$$= \frac{221000}{26} = 8500$$

∴ Every year there are 8500 more FT university students.

(10) Given

y	sales in millions	y_1 26.4	y_2 54.4	0
x	years	x_1 1971	x_2 1981	1991

Find rate of change for 71-81

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{54.4 - 26.4}{1981 - 1971} = \frac{28}{10} = 2.8$$

LP sales went up by 2.8 million

1981 - 1991 → -5.44 millions sales / year

1971 - 1991 → -1.32 millions sales / year

↑ +ve

↓ -ve

81-91 LP record sales dropped by 5.44 million

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$m = 3$

x_1, y_1

$(2, k)$

$(4, 1)$

$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

$3 = \frac{1-k}{4-2}$

$\frac{3}{1 \times 2} = \frac{1-k}{2 \times 1}$

$6 = 1 - k$

$5 = -1k$

$\frac{5}{-1} = \frac{-1k}{-1}$

$k = -5$

HOMEWORK

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