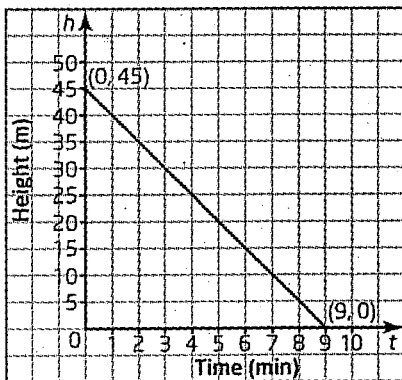


5.4 Slope as a Rate of Change
Principles of Mathematics 9, pages 264–271

Day 4

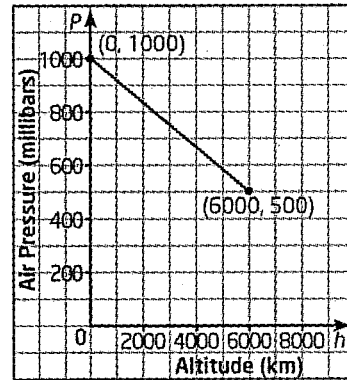
A

1. A heron can travel an average of 400 km in 10 h. What is the rate of change of distance?
2. A small bird can flap its wings 120 times in 30 s. What is the rate of change of wing flaps?
3. The average resting adult heart beats 720 times in 10 min. What is the rate of change of heart beats?
4. This graph shows the height above ground of a skier over time.
 - a) Calculate the slope of the graph.



- b) Interpret the slope as a rate of change.

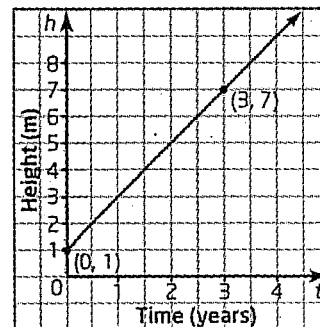
5. This graph shows the relationship between atmospheric pressure and altitude.



- a) Calculate the slope of the graph.
- b) Interpret the slope as a rate of change.

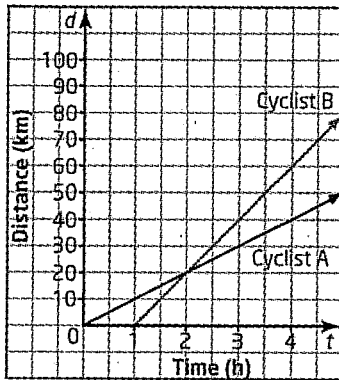
B

6. The price of a litre of milk increased from \$1.25 in 2004 to \$1.35 in 2006. What is the average price increase per year?
7. This graph shows the height of a tree over a 5-year growing period. Calculate the rate of change of height per year.



Day 4

8. This distance-time graph shows two cyclists that are travelling at the same time.



- Which cyclist has the greater speed, and by how much?
 - What does the point of intersection of the two lines represent?
9. This table shows the average undergraduate tuition fees for full-time students in Ontario in engineering by year. Is the rate of change constant over the 5-year period?

Year	Tuition (\$)
1999–2000	4456
2000–2001	4742
2001–2002	5011
2002–2003	5302
2003–2004	5968

Source: Statistics Canada, Centre for Education Statistics. Last modified: 2004-09-01.

10. A water tank is being filled with water at a constant rate. After 20 s, the tank contains 200 L of water.

- Graph this relation.
- The water tank will overflow if it contains more than 300 L of water. How long will it take to fill the water tank? Mark this point on your graph.

11. Selam is on the track team at school. He runs every day after school. One day he ran 6 km in 30 min.

- Calculate the rate of change of Selam's distance from his starting point.
- Graph Selam's distance as it relates to time.
- Explain the meaning of the rate of change and how it relates to the graph.

C

12. A music store is holding a special clearance sale on a \$1500 piano. Initially there is a discount of 10%. Every 4 h, an additional 10% is taken off the latest price.

- Make a table showing the price over the 12 h the sale is in effect.
- Graph the price over the 12 h of the sale.
- Explain the shape of the graph.

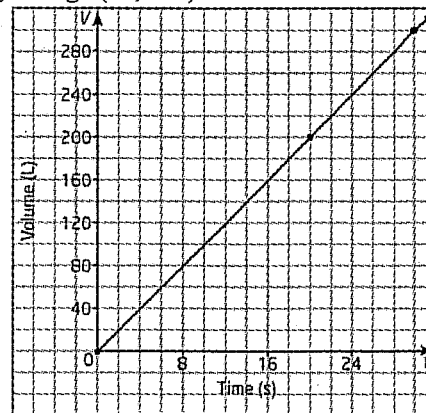
Solutions for "Slope as a Rate of Change"

b) It is the time at which they have travelled the same distance. If they are travelling in the same direction, it is the time at which cyclist A passes cyclist B.

9. No.

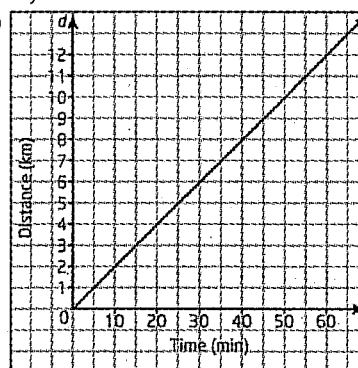
10. a) The graph is a line starting at (0, 0) and passing through (20, 200).

b) 30 s



11. a) 0.2 km/min

b)



c) The rate of change is Selam's average running speed. It is also the slope of the graph.

12. a)

Time (h)	Price of Piano (\$)
0	1350.00
4	1215.00
8	1093.50
12	984.15

b) Graphs may vary depending on scales chosen.

c) The graph is decreasing and it is curved because the rate of change changes at each interval.

13. a)

Time (h)	Cost of Membership (\$)
0	570
2	540
4	510
6	480
8	450

b) Graphs may vary depending on scales chosen.

c) The graph is decreasing and it is linear because the rate of change is constant.

14. a) 40π cm b) $C = 2\pi r$ c) 2π cm/cm

5.4 Slope as a Rate of Change, pages 87–89

1. 40 km/h

2. 4 flaps/s

3. 72 beats/min

4. a) -5 b) The height decreases by 5 m/min.

5. a) -0.083

b) The atmospheric pressure decreases by 0.083 mbar/m.

6. 5¢/year

7. 2 m/year

8. a) Cyclist B, by 10 km/h