

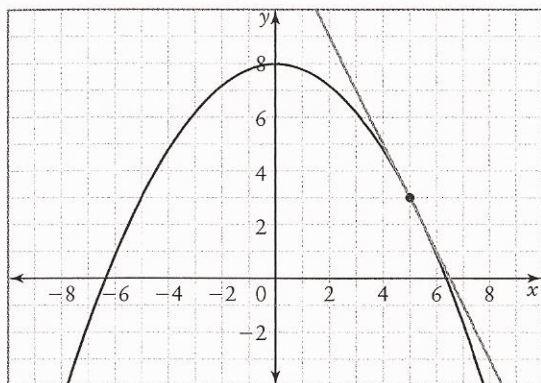
Complete Questions

1 - 6

A Practise

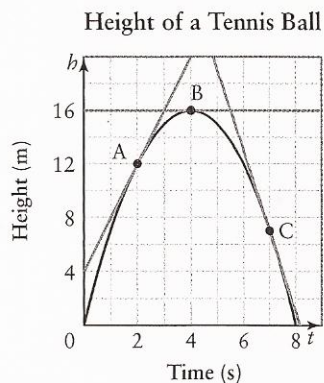
For help with question 1, refer to Example 1.

1. Consider the graph shown.



- State the coordinates of the tangent point.
- State the coordinates of another point on the tangent line.
- Use the points you found in parts a) and b) to determine the slope of the tangent line.
- What does the value you found in part c) represent?

2. a) At each of the indicated points on the graph, is the instantaneous rate of change positive, negative, or zero? Explain.



- Estimate the instantaneous rate of change at points A and C.
- Interpret the values in part b) for the situation represented by the graph.

B Connect and Apply

For help with question 3, refer to Example 3.

3. A firework is shot into the air such that its height, h , in metres, after t seconds can be modelled by the function $h(t) = -4.9t^2 + 27t + 2$.

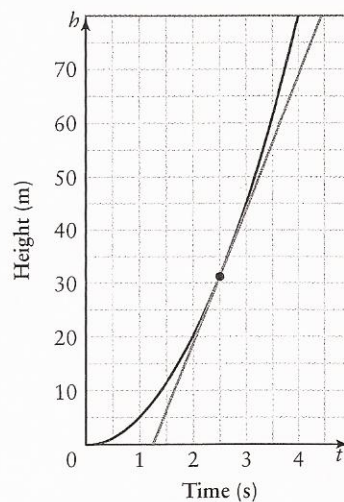
- a) Copy and complete the table.

Interval	Δh	Δt	$\frac{\Delta h}{\Delta t}$
$3 \leq t \leq 3.1$			
$3 \leq t \leq 3.01$			
$3 \leq t \leq 3.001$			

- b) Use the table to estimate the velocity of the firework after 3 s.

4. Use two different methods to estimate the slope of the tangent at the point indicated on the graph.

Distance Travelled by a Bungee Jumper



5. The data show the percent of households that play games over the Internet.

Year	% Households
1999	12.3
2000	18.2
2001	24.4
2002	25.7
2003	27.9

Source: Statistics Canada, Canada at a Glance 2006, page 9, Household Internet use at home by Internet activity.

- Determine the average rate of change, in percent, of households that played games over the Internet from 1999 to 2003.
 - Estimate the instantaneous rate of change in percent of households that played games over the Internet
 - in 2000
 - in 2002
 - Compare the values found in parts a) and b). Explain any similarities and differences.
6. The table shows the consumer price index (CPI) every 5 years from 1955 to 2005.

Year	CPI
1955	16.8
1960	18.5
1965	20.0
1970	24.2
1975	34.5
1980	52.4
1985	75.0
1990	93.3
1995	104.2
2000	113.5
2005	127.3

Source: Statistics Canada, CANSIM Table 326-0002.

- Determine the average rate of change in the CPI from 1955 to 2005.
- Estimate the instantaneous rate of change in the CPI for
 - 1965
 - 1985
 - 2000
- Compare the values found in parts a) and b). Explain any similarities and differences.

7. A soccer ball is kicked into the air such that its height, h , in metres, after t seconds can be modelled by the function
- $$h(t) = -4.9t^2 + 12t + 0.5.$$



- Determine the average rate of change of the height of the ball from 1 s to 3 s.
 - Estimate the instantaneous rate of change of the height of the ball after 1 s.
 - Sketch the curve and the tangent.
 - Interpret the average rate of change and the instantaneous rate of change for this situation.
8. On Earth, the height, h , in metres, of a free-falling object after t seconds can be modelled by the function $h(t) = -4.9t^2 + k$, while on Venus, the height can be modelled by $h(t) = -4.45t^2 + k$, where $t \geq 0$ and k is the height, in metres, from which the object is dropped. Suppose a rock is dropped from a height of 60 m on each planet.
- Determine the average rate of change of the height of the rock in the first 3 s after it is dropped.
 - Estimate the instantaneous rate of change of the height of the rock 3 s after it is dropped.
 - Interpret the values in parts a) and b) for this situation.
9. A manufacturer estimates that the cost, C , in dollars, of producing x MP3 players can be modelled by $C(x) = 0.00015x^3 + 100x$.
- Determine the average rate of change of the cost of producing from 100 to 200 MP3 players.
 - Estimate the instantaneous rate of change of the cost of producing 200 MP3 players.
 - Interpret the values found in parts a) and b) for this situation.
 - Does the cost ever decrease? Explain.

CONNECTIONS

The CPI measures the average price of consumer goods and services purchased by households. The percent change in the CPI is one measure of inflation.