**Exponential Applications**

Ex.1 A cup of hot cocoa left on a desk in a classroom had its temperature measured once every minute. The graph shows the relationship between the temperature of the cocoa, in degrees Celsius, and time, in minutes. A graph that represents data or a relationship is often referred to a *graphical model*.

Cooling Curve for Cocoa

(graph: Temperature (degrees Celsius) vs. Time (min))
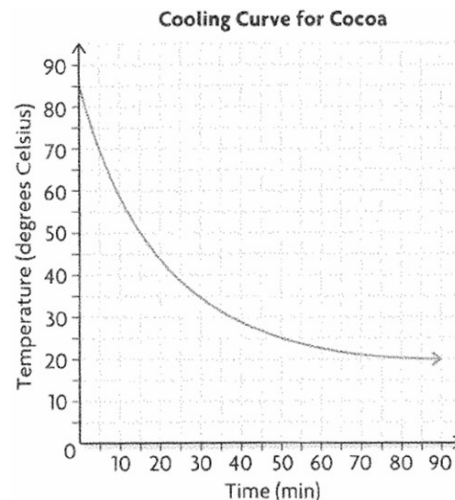
a) What was the temperature of the cocoa at the start of the experiment? _ _ _ _ _ _ _ _ _ _ _ _

b) What was the temperature after one hour? _ _ _ _ _ _ _ _ _ _ _ _

c) What was the temperature of the classroom? _ _ _ _ _ _ _ _ _ _ _ _

d) At what time was the cocoa at a temperature of 35°C? _ _ _ _ _ _ _ _ _ _ _ _

e) Determine an algebraic model for this graph using *hours* as the unit of time.

f) Modify your model to use *minutes* as a reference of time.

Ex.2 A tennis ball is dropped from a height of 10 m. Each time the ball touches the ground, it bounces up to 45% of the maximum height of the previous bounce.

a) Create a table of values to determine the height of the ball for the first 4 bounces. Use this table to graph the height of the ball versus the number of bounces.

Number of Bounces	Height of Ball (m)
0	
1	
2	
3	
4	
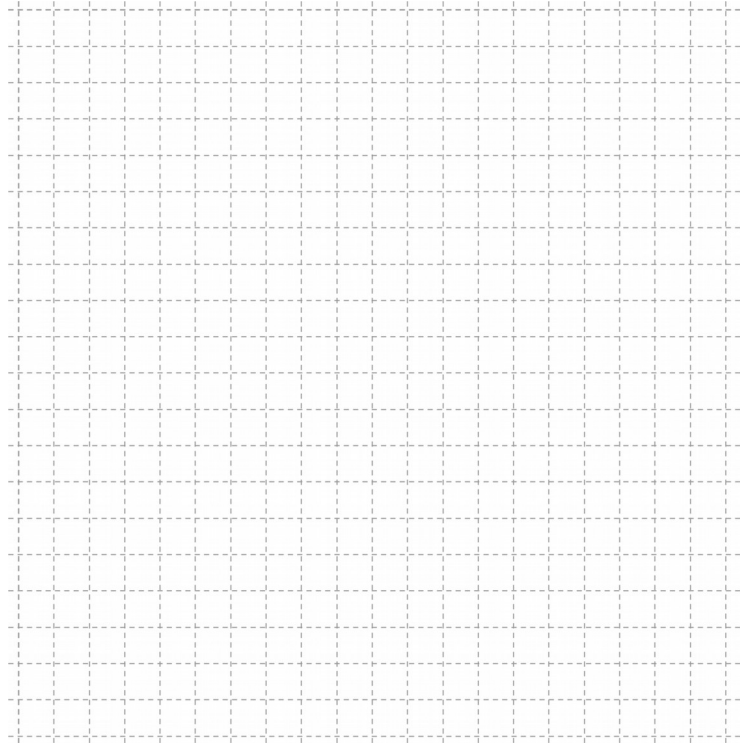
b) Determine the equation that models the maximum height of the bounce after n bounces. The equation is often referred to as an *algebraic model*.

c) Estimate the number of bounces required for the bounce height to be 10% or less of the starting height.

Assigned Work:

1. The table shows Alex's weekly earnings over a 5-year period.

Year	Earnings ($)
2004	550.00
2005	566.50
2006	583.50
2007	601.00
2008	619.03

   a) Use the table to construct a graphical model for the data.
   b) Determine an algebraic model for the data.
   c) Predict Alex's weekly earnings in the year 2012.
   d) Predict when Alex might expect to earn more than $850 per week.

2. The table gives the value of Ian's car x years after she purchased it.

Year	Value of the Car ($)
1	12000
2	9600
3	7680
4	6140
5	4920

   a) Use the table to construct a graphical model of the data.
   b) What number is the value of the car approaching (getting closer to)?
   c) Determine the most likely purchase price of the car.
   d) Determine an algebraic model for the data.
   e) Determine the approximate value of the car in 2010, if year 1 represents 2003.

3. The population of a small town appears to be increasing exponentially. Town planners need a model for predicting the future population. In 1980, the population was 35 000, and in 1990, the population was 57 010.

   a) Create an algebraic model for the town's population growth; use a graph if you find it helpful.
   b) Check your model by using the fact that the population in 1995 was 72 800.
   c) What will the population be in 2010?

4. Text: p.25 # 16