1. Taylor places a one inch frame around the picture taken of her competition win. The height of the picture, with the frame, is represented by $x + 4$, and the width is represented by $x + 2$.

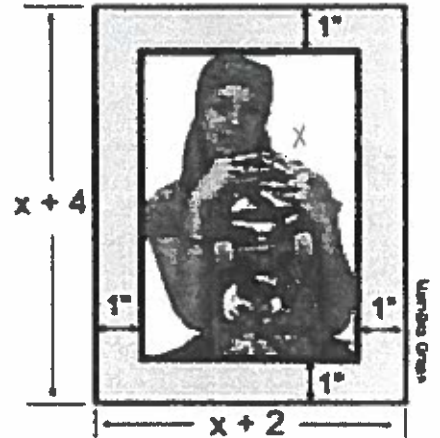a) Express, in terms of x, the height and width of the picture, without the frame, in inches. Label each answer.

Picture

$L = x + 4 - 2 \rightarrow \boxed{x + 2 = \text{height}}$

$W = x + 2 - 2 \rightarrow \boxed{x = \text{width}}$

b) Express, in terms of x, the area of the picture, without the frame, in square inches.

$$\text{Area} = x(x + 2)$$

c) Express, in terms of x, the area of the picture and the frame together, in square inches.

$$A = (x + 4)(x + 2)$$
$$A = x^2 + 6x + 8$$

2. Ke\$ha has a prepaid phone plan that charges 18 cents for each text message and 15 cents per minute for calls.

a) Write an equation for the cost, C, of sending *t* text messages and talking for *m* minutes.

$$C = .18t + .15m$$

b) Ke\$ha has \$10 left on her plan, and wants to send 30 text messages. How much money will remain, if any, on her plan after she sends the 30 texts?

$$10 - .18(30)$$
$$10 - 5.4$$
$$\$4.60$$

3. Average weekly temperatures in central New York were recorded beginning April 1, as shown.

a) Find a linear regression equation for this data. Round all coefficients to the *nearest hundredth.*

$$y = 3.86x + 45.00$$

| Number of Weeks Since April 1st	Average Weekly Temperatures
1	50 degrees
2	52 degrees
3	55 degrees
4	61 degrees
5	65 degrees
6	68 degrees

b) Based upon your regression equation, predict the average weekly temperature 10 weeks after April 1 (to the nearest degree).

$$y = 3.86(10) + 45$$
$$y = 83.6$$
$$\boxed{y = 84°}$$

c) The graph of the residuals for this data is shown below. What are the residuals telling you about your linear regression equation.
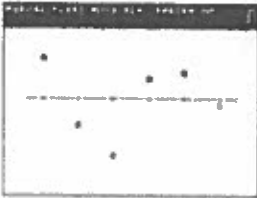

It was a good choice (lin. reg.)

4. While jogging, Kevin turns his head to see a friend waving from a passing car. Unfortunately, he did not notice that he was jogging directly into a 5 foot tall mailbox. After hitting the mailbox, Kevin falls to the ground where his front tooth is dislodged and flies upward into the air. The height attained by the tooth during its airborne journey is shown in the graph at the right. The x-axis represents the time, in seconds, and the y-axis the height, in feet.

a) The tooth's journey is a transformation of the function $y = x^2$. Write an equation to represent the tooth's journey.

$$y = -(x-2)^2 + 4$$

b) What was the maximum height reached by the tooth?

$$\boxed{4 \text{ ft.}}$$
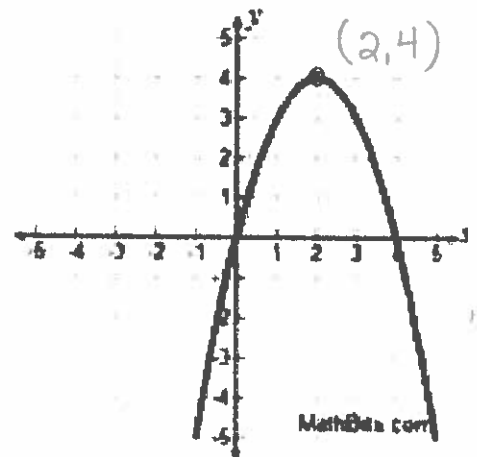
c) During what interval was the height of the tooth decreasing?

$$2 < x < 4$$