MTH – 4109 Functions Word Problems Quiz

1. A participant in a javelin-throwing competition throws his javelin from a height of 4 metres. The javelin's trajectory describes a parabola, and the javelin reaches a maximum height of 23 metres. Upon reaching this height, the javelin has travelled a distance of 14 metres from the starting point. Determine the length of the throw. Round off your answer to the nearest hundredth. Clearly show all your work.
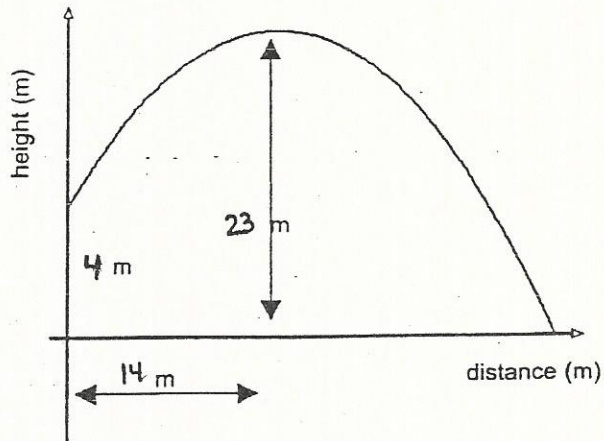
2. A baseball is thrown over a 6m high fence. The fence is 6m from the origin of the throw. The ball lands 18m away. If the path of the ball describes a parabola, what is the maximum height reached by the ball?
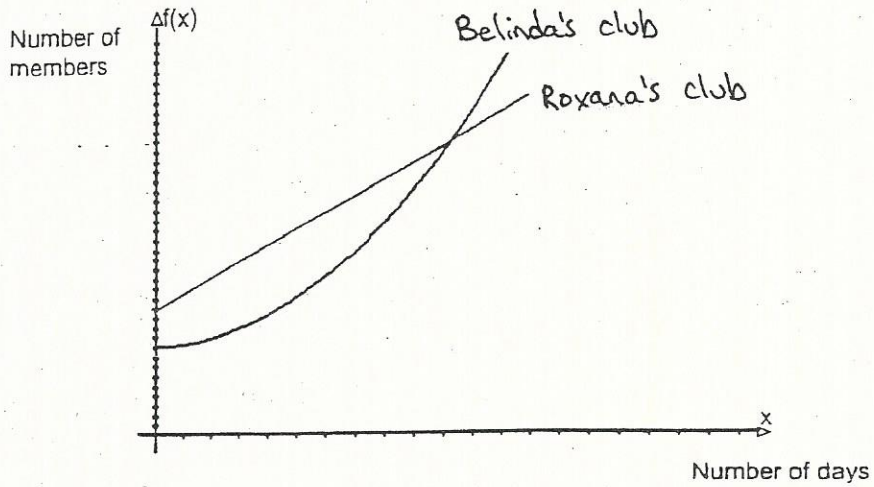
Height
(metres)

6 m

← 6 m →

18 m

Distance
(metres)
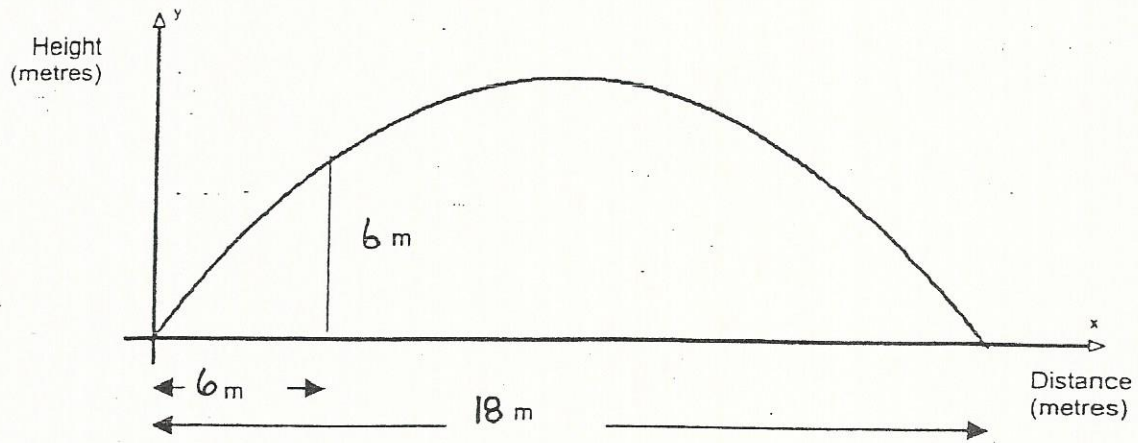
3. Three accountants received a bonus that was added to their salary. In the graph below,
   - line ℓ_1 represents Alka's salary (including the bonus)
   - line ℓ_2 represents Michele's salary (including the bonus)
   - line ℓ_3 represents Melissa's salary (including the bonus)
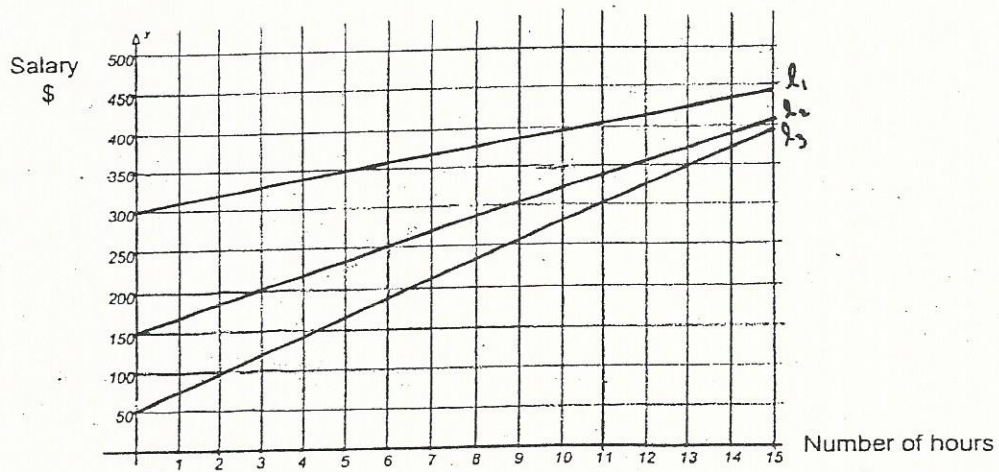
If all three accountants worked 45 hours this week, which one received the highest weekly salary?

Clearly show all your work.

4. Belinda's fitness club and Roxana's fitness club are competing to attract new members. Belinda's club calculates the number of members using the rule $f(x) = 0.5x^2 + 92$, where x represents the number of days. On opening day, Roxana's club has 80 members. On the 12th day the two clubs have the same number of members. The following graphs show the change in the number of members over a one-month period.

Calculate the number of members in Roxana's club on the 28th day.
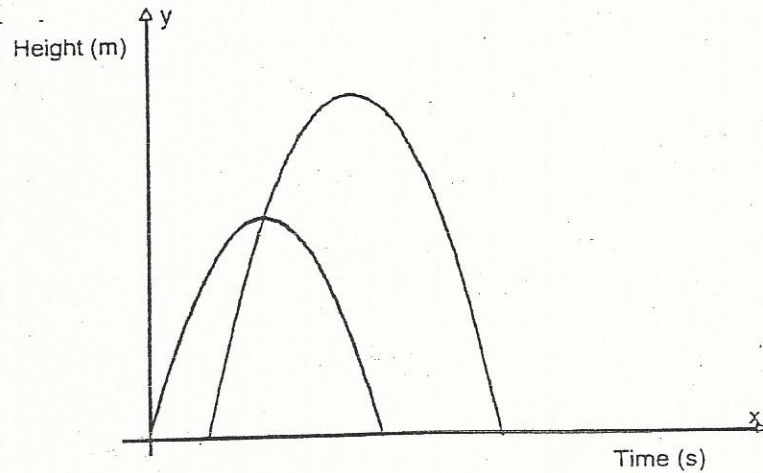Clearly show all your work.

5.

Two shells were launched during a fireworks display. The height in metres reached by the shells is defined by the following rules:

$$h_{1(t)} = -t^2 + 10t$$
$$h_{2(t)} = -t^2 + 16t - 20$$

where t represents the time elapsed, in seconds, since the launch.

The situation is described by the following graph:

Height (m)

Time (s)

Calculate the difference between the maximum heights reached by the two shells. Clearly show all your work.

6. Two companies issued their shares at the same time. The fluctuations in the value of the shares were studied over a 30-day period. First, it was established that the value of the shares of Company A varied according to the rule $V(x) = -0.05x^2 + 2.1x + 11$. Then, the fluctuations in the value of each company's shares were represented in the following graph.

Value of shares ($)

Company B

Company A

(12, 20)

Number of days
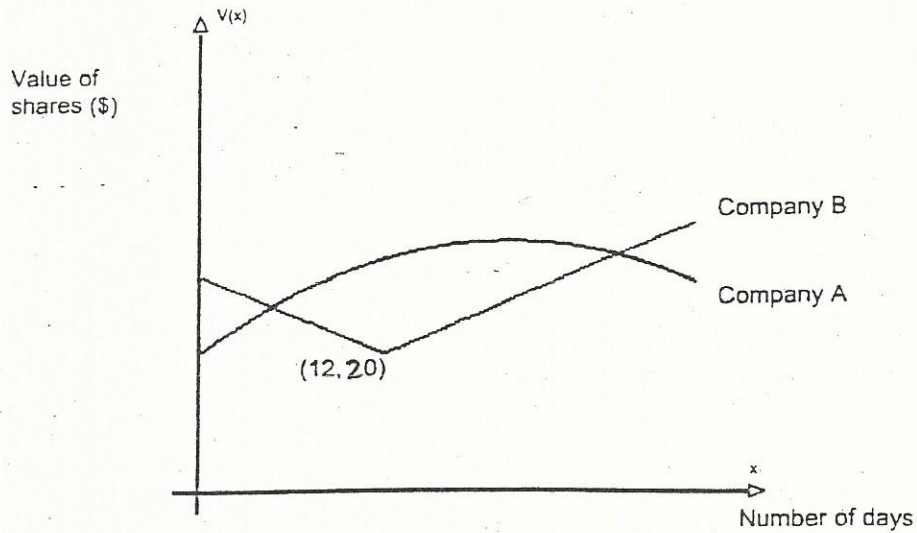
Which company experienced the longest period of growth during this time?

Clearly show all your work.

7. In a laboratory, a biologist is studying a new type of bacterium. For his study, he places 20 thousand bacteria on a plate and notes that their number doubles every hour.

a) Complete the following table of values:

X (hours)	0	1	2	3	4	5	6
f(x) (thousands of bacteria)							

b) Graph this functional situation.
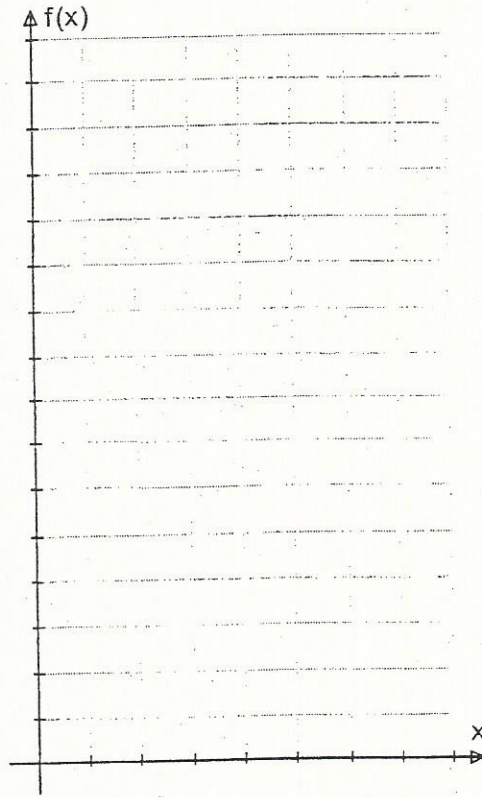
c) Is the function decreasing or increasing?   Answer:_____

Explain your answer by giving two ordered pairs. _____
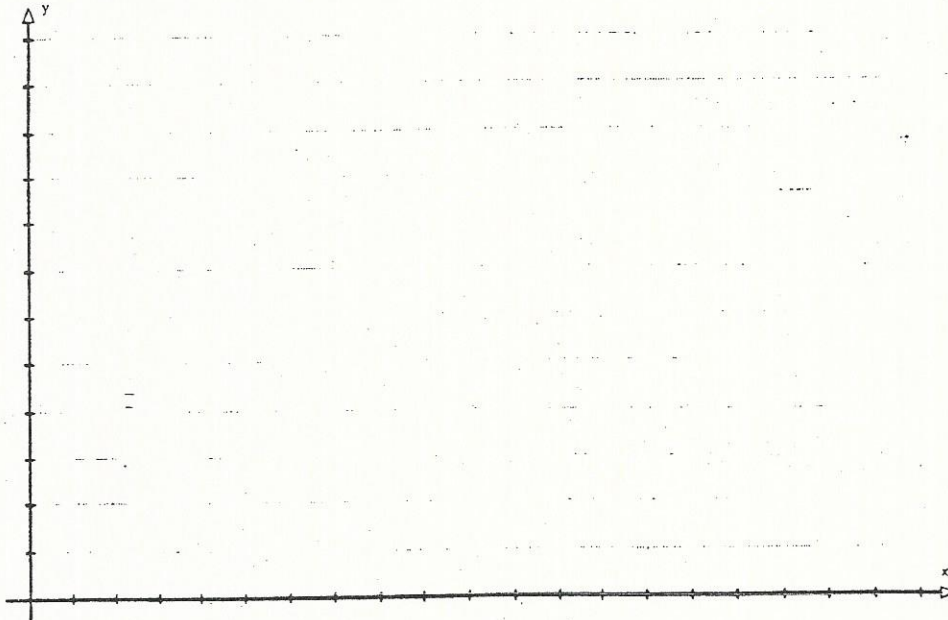
d) What is the range of this function?

Answer:_____

8. An elementary school is holding a comedy festival in order to raise $10 000 for new playground equipment. The organizing committee is not sure how much to sell the tickets for. They want to ask at least $2 per ticket, but no more than $40 per ticket. The committee considers different prices for a ticket and, for each price, the number of tickets they expect to sell.

a) Complete the following table of values:

x (price per ticket)	2	4	5	10	20	25	40
y (number of tickets)							

b) Graph this functional situation.

c) What is the domain of this function?

Answer:_____

d) Is this function decreasing or increasing?

Answer:_____

Explain your answer by giving two ordered pairs:_____