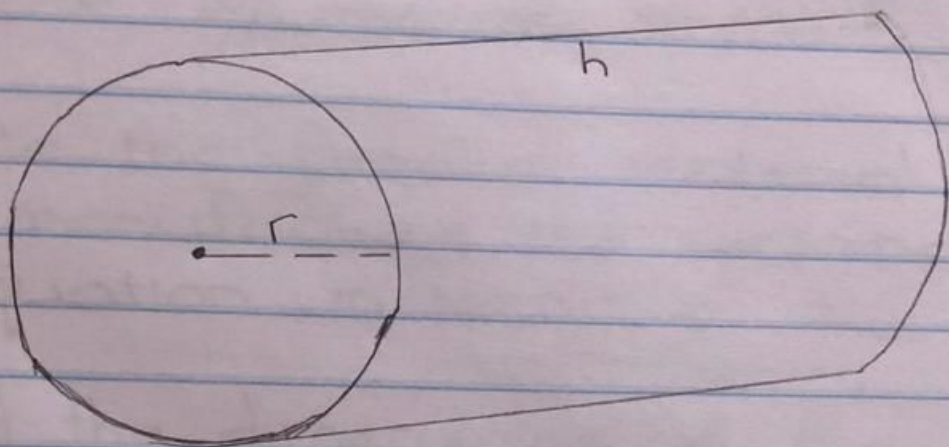


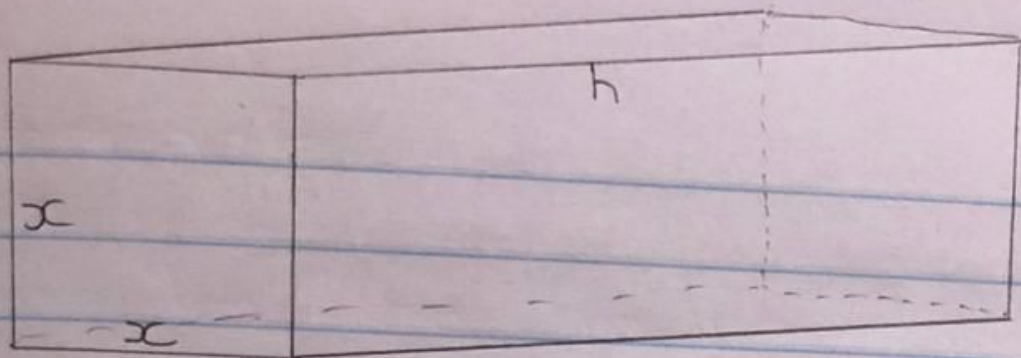
Examples:

- 1) Consider the figure, which represents a milk tank with total surface area of $10\,000\text{ m}^2$.



- Write an expression for h in terms of r
- Write down a formula for the Volume in terms of r
- What should radius of tank be in order for it to hold maximum milk.

2)



The diagram represents a container with Volume of 50 000 l

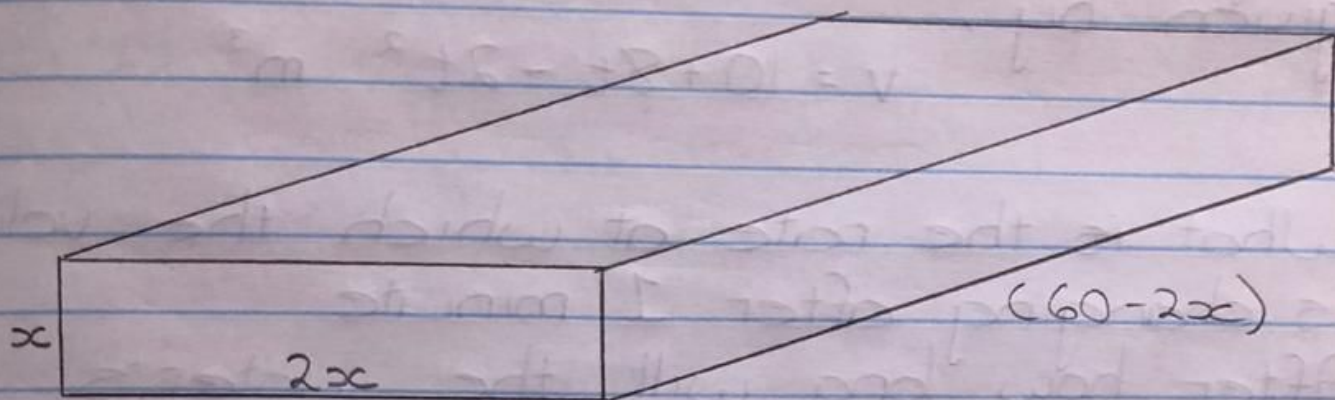
- a) Write the Area of material needed to manufacture the container as an equation, in terms of x .
- b) Find the dimensions of the container that will ensure that the minimum amount of material is used.

- 3) The number of bacteria is represented by the following equation, where t is the time in hours and $s(t)$ the number of bacteria.

$$s(t) = 2t^2 - 12t + 20\,000$$

- find the average rate at which the bacteria decrease during first 2 hours.
- calculate the rate at which the bacteria increase / decrease at the 8th hour.
- When is the number of the bacteria the smallest.
- What is the minimum number of bacteria that can be found?

- 4) A rectangular box has dimensions $x \times 2x \times (60-2x)$ cm



- Determine an expression for the Volume of the box i.t.o x
- Determine dimensions of box that will give a maximum Volume.
- What is the max Volume?

5) The volume of a tank of water at a given time (t in minutes) is given by;

$$V = 10 + 8t - 2t^2 \text{ m}^3$$

- What is the rate at which the volume is changing after 1 minute.
- After how long will the water's Volume be a maximum?
- When will the tank be empty?

6) The displacement of a projectile is given by ;

$$s = 5t^2 - 20t$$

with s in meters and t in seconds.

- What is the time when the displacement is a maximum?
- What is the velocity of the projectile after 5 seconds?
- What is the acceleration of the projectile?