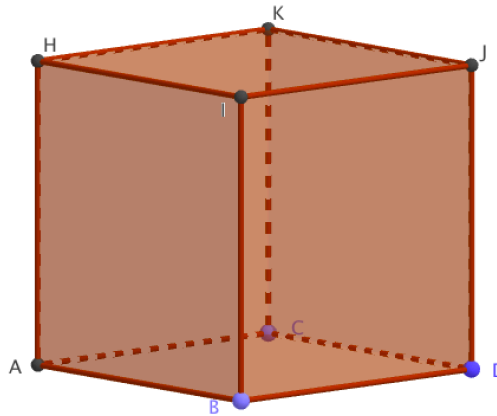




Optimisation

Name.....

- (1) A small business owner wishes to start manufacturing fish tanks. These glass tanks will have a square base and an **open lid**. The volume of each tank will be 4 litres. The business owner wishes to minimise the surface area so he can reduce his costs.



- (a) By taking length AB as x and AH as y , show that the surface area can be written as:

$$A = \frac{16,000}{x} + x^2$$

- (b) Find $\frac{dA}{dx}$
- (c) Hence find the value of x which minimises the surface area.
- (d) Write down the minimum surface area.
- (d) Given that glass costs \$0.032 per cm^2 , find the cost of the glass required for this design.
- (e) Find the value of x which minimises the surface area of a tank with volume n litres. Leave your answer in terms of n .



- (2) A project manager is given the task of investigating the optimum dimensions of a can of Coca Cola in order to minimise the surface area. The can is assumed to be a perfect cylinder with radius r and vertical height h and to have a volume of 330cm^3 .



- (a) Show that the surface area of the can can be written as:

$$A = \frac{660}{r} + 2\pi r^2$$

- (b) Find $\frac{dA}{dr}$
- (c) Hence find the value of r which minimises the surface area.
- (d) Write down the minimum surface area.
- (e) The dimensions of a Coca Cola can are approximately a height of 12.2cm and a radius of 3.25cm. What would the percentage reduction in surface area be if the new dimensions were used?