

Plumbing: extractor fans

Name _____ Date _____



Practical measurement task

Remember to:

- Read the problem carefully
- Identify the important information
- Write down the stages to work through
- Check calculations and results – (adding in a different order, using inverses and estimating)
- Write down units
- Write the final answer in sentences.

You have been asked to calculate and report back on the cost of suitable extractor fans.

1. Estimate size of the length, width and height of room.

(Height of the ceiling in this room varies, so estimate the mean height.)

2. Measure the size of the room.

In your group discuss the level of accuracy required.

3. Calculate the volume of the room in cubic metres.

4. Calculate the capacity of air in the room.

1000 litres per $1m^3$ ($m^3 \times 1000$)

5. Room ventilation requires 3 air changes every hour.

$(m^3 \times 1000 \times 3) = 3$ air changes per hour

= Total litres to be extracted every hour

(possibly for a small industrial kitchen)

6. Using the Internet find a company that manufactures extractor fans and obtain details of fans that will provide adequate air flow rates.

NB: This may require the total litres per hour recalculated to litres per second or some manufactures may specify litres per minutes. See page 2 for example.

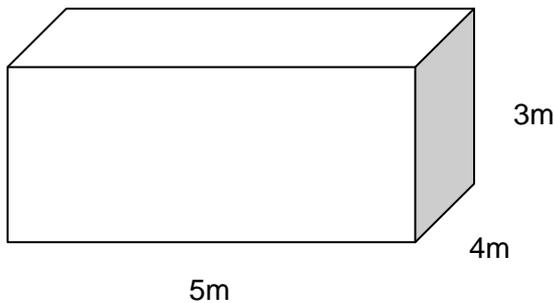
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EXAMPLE:

To change from litres per hour to litres per second and litres per minute

Dimensions of room



$$\begin{aligned}\text{Volume} &= 5 \times 4 \times 3 \\ &= 60\text{m}^3\end{aligned}$$

$$\begin{aligned}\text{Volume} &= 60\text{m}^3 \times 1000 \\ &= 60000 \text{ litres} \\ &= 60000 \times 3 \text{ air changes} \\ &= \mathbf{180,000 \text{ litres per hour}}\end{aligned}$$

To change this into litres per second
(3600 seconds in an hour)

$$180000 \text{ litres per hr} \div 3600 = \mathbf{50 \text{ litres per second}}$$

To change into litres per minute
(60 minutes in an hour)

$$180000 \text{ litres per hour} \div 60 = \mathbf{3000 \text{ litres per minute}}$$

Some manufacturers quote m^3 to be extracted every hour, so use:

number of air changes per hour \times volume of room

NB: Bathrooms require 15 litres / sec extract

Kitchens require 30 litres / sec extract.