

of the muscle cells deep in the body will be high and they will produce lots of CO_2 . The distance between the cells where the O_2 is needed and the supply of oxygen is too far for effective diffusion to take place. What's more, the bigger the organism, the smaller the SA:V ratio. So gases can't be exchanged fast enough for the organism to survive.

Calculating SA:V ratios

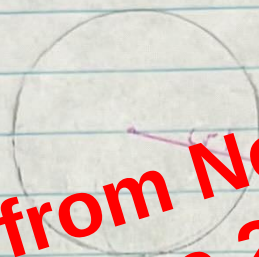
Sphere

SA:

$$4\pi r^2$$

VOL:

$$\frac{4}{3}\pi r^3$$



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Example 1: Radius = 1 cm

$$\text{SA is } 4\pi r^2 \therefore \text{SA} = (4 \times \pi \times 1^2) = 12.6 \quad (1.d.p.)$$

$$\text{VOL is } \frac{4}{3}\pi r^3 \therefore \text{VOL} = \left(\frac{4}{3} \times \pi \times 1^3\right) = 4.2 \quad (1.d.p.)$$

$$\text{SA : V ratio is } \frac{12.6}{4.2} = 3:1$$

Explanation

The bigger the organism, the smaller the SA:V ratio becomes, and the distance that substances need to travel from the outside to reach the cells at the centre of the body get longer. This makes it harder and ultimately impossible to absorb.