

Solutions

2.1 A Link a named feature to a mechanism and then to the function. Increased area can support exchange, but membrane proteins, gradients and metabolic demand also matter. Stem cells retain different degrees of developmental potential.

2.2 $SA/V = 3/r = 3/6 = 0.5$ per unit length.

2.3 False. Specialization does not usually require a cell to lose most of its genes. The spherical calculation models geometry; it does not describe every actual cell shape.

2.4 differentiation. differentiation means Development of specialized cell structure and function.

3.1 $Area \times 4$, $volume \times 8$, $SA/V \times 1/2$. Exchange capacity per volume falls in the geometric model; actual cell specialization also involves shape, transport and demand.