



Problem of the Week

Problem B and Solution

What's Beneath the Surface?

Problem

In each problem below, use the information given about part of the object's mass to determine the unknown mass.

- (a) Contrary to what you may have heard, ostriches do not bury their heads in the sand. But, if one decided to do so just for fun, and its 2000 g head was 2% of its total body mass, then what would be the mass of its entire body, in kilograms?



- (b) Generally, about 90% of an iceberg's mass is below water level. If the mass of the visible portion of a certain iceberg is 50 000 tonnes, then what is the mass of the whole iceberg, in tonnes?



- (c) Only a small portion of a growing mushroom is visible; most of the fungus is below the ground. If 5% of a mushroom is above the ground, and this portion has a mass of 100 g, then what is the mass of the mushroom below the ground, in kilograms?



Solution

- (a) We're given that 2% of the ostrich's mass is 2000 g. Since $2\% \times 50 = 100\%$, the total mass of the ostrich must be $2000 \times 50 = 100\,000$ g, or 100 kg.
- (b) Given that 90% of an iceberg is hidden, the visible mass must be $100\% - 90\% = 10\%$ of its total mass. Thus, if the visible portion is 50 000 tonnes, and since $10\% \times 10 = 100\%$, the total mass must be $50\,000 \times 10 = 500\,000$ tonnes.
- (c) If 5% of the mushroom is above the ground, then $100\% - 5\% = 95\%$ of the mushroom is below the ground. Since $5\% \times 19 = 95\%$, the portion of the mushroom below the ground must have a mass of $100 \times 19 = 1900$ g, or 1.9 kg.

Alternatively, the visible portion of the mushroom has a mass of 100 g, which is 5% of its total mass. Since $5\% \times 20 = 100\%$, the total mass of the mushroom must be $100 \times 20 = 2000$ g. Then the portion of the mushroom below the ground must have a mass of $2000 - 100 = 1900$ g, or 1.9 kg.