

Spring egg geometry for IGCSE and GCSE

IGCSE Math Revision · IGCSE and GCSE (Higher and Extended) · Student sheet

Name _____

Class _____

Date _____

The starter is non-calculator. A calculator is needed for the main activity.

Starter (5 minutes)

1. Find the volume of a sphere of radius 3 cm.
2. Find the volume of a hemisphere of radius 3 cm.
3. Find the volume of a cone with radius 3 cm and height 4 cm.
4. A shape is enlarged by scale factor 2. What happens to its volume?

Main activity (35 minutes)

Task A: A hemisphere-and-cone egg

A model egg is a hemisphere of radius 3 cm joined to a cone of radius 3 cm and height 5 cm.

- a. Find the volume of the egg, exactly and to 3 significant figures.
- b. Find the surface area of the egg, to 3 significant figures.
- c. A box holds 6 of these eggs made of solid chocolate. Find the total volume of chocolate, to 3 significant figures.

Task B: Ellipse eggs

An egg's outline is an ellipse with half-length a and half-width b . Its area is πab , and the egg-shaped solid has volume $\frac{4}{3}\pi ab^2$.

- a. Take $a = 3$ cm and $b = 2$ cm. Find the area of the outline, to 3 significant figures.
- b. The egg is enlarged so that $a = 4.5$ cm and $b = 3$ cm. Find the new area using the area scale factor, to 3 significant figures.
- c. Find the volume of the solid egg with $a = 3$ cm and $b = 2$ cm, to 3 significant figures.

Task C: Similar chocolate eggs

Two chocolate eggs are mathematically similar. The small one is 6 cm tall and the large one is 9 cm tall.

- a. Find the length scale factor and the volume scale factor.
- b. The small egg contains 40 g of chocolate. How much chocolate is in the large egg?
- c. The large egg's foil wrapper has area 90 cm^2 . What is the area of the small egg's wrapper?

Extension

1. An egg is a hemisphere of radius r on a cone of radius r and height $5r/3$. Its volume is 100 cm^3 . Find r , to 3 significant figures.
2. A large chocolate egg has 8 times the volume of a small similar egg. The small egg is 5 cm tall. How tall is the large one?