Unit 17: Measure – volume and capacity

Lesson 1: What is volume?

➜ pages 143–145

1. a) 6
b) 6
c) 6
d) 20
e) 12
f) 9 (accept 10 or 11 as some cubes could be obscured)

2. Shapes matched to volume:
Top row left to right: 8 12 6
Bottom row left to right: 8 8 16 12

3. Richard is not correct. 6 unit cubes are visible but, in order for the tower of 2 cubes that can be seen to be attached to the shape, there must be another cube below them which cannot be seen. This means the shape has a volume of 7 unit cubes.

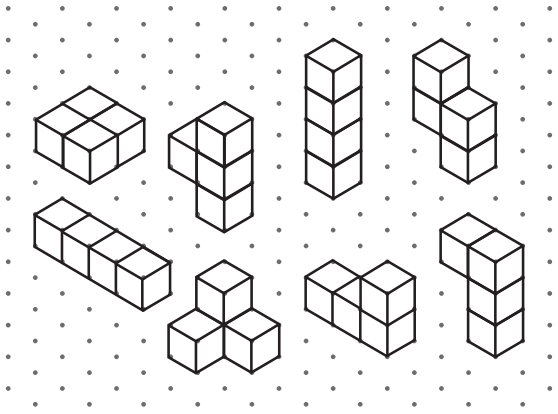
4.

Shape	Volume
Shape A	5 unit cubes
Shape B	14 unit cubes
Shape C	30 unit cubes

Explanations may vary; for example:
The shapes increase by a layer each time and each layer contains the next square number of cubes, i.e.
Shape A = $1^2 + 2^2 = 5$
Shape B = Shape A $(1^2 + 2^2) + 3^2 = 14$
Shape C = Shape B $(1^2 + 2^2 + 3^2) + 4^2 = 30$

5. Copies of cubes drawn accurately, i.e. 1 × 1 × 1 cube and 2 × 2 × 2 cube.

6. Answers will vary. Check each shaped drawn contains 4 unit cubes; for example:



Reflect

Explanations may vary; for example:

Volume is the amount of space that an object fills. It can be measured in unit cubes.

Lesson 2: Comparing volumes

➜ pages 146–148

1. a) Ticked: 2nd shape
b) Ticked: 2nd shape
c) Ticked: 1st shape
d) It is often not necessary to count all cubes as you can count the number in one row and use multiplication.

2. A, B, C, D

3. Bella, Max, Amelia

4. 2 cubes added to shape A.

5. I predict that Emma has made the shape with the greatest volume because 4 × 2 × 2 = 16.
Look for children making a tower 15 cubes tall and a cuboid with dimensions 4 × 2 × 2.

Reflect

Volume can be measured in unit cubes and so if two shapes are made from the same number of unit cubes then they have the same volume, however, the cubes can be arranged differently to make different shapes.

Lesson 3: Estimating volume

➜ pages 149–151

1. a) 14
b) 14

2. Answers will vary; look for children recognising that the pencil is circular in cross section and has a point, so using the cubes to estimate the volume is likely to produce an overestimate of the volume (assuming the diameter of the pencil is equal to the side of the cube).

3. a) Ticked: half sphere (hemisphere)
b) Ebo can use the estimate for the half sphere and double this to find an estimate for the sphere.

4. No; the orange is likely to have the greatest volume since it is wider and deeper than the carrot. This means it is likely to fill more space than the carrot so will have a larger volume.

5. Answers will vary greatly depending on sizes of objects, based on using 1 cm^3 cubes; for example:
Glue stick
28 unit cubes
Ball
100 unit cubes
Hockey stick
350 unit cubes

6. Answers will vary. Check suggestions are reasonable.

Reflect

Answers will vary; for example:

Build a rough model of hand using unit cubes or draw around it on squared centimetre paper, count the number of squares and then multiply this by the approximate depth of the hand.

Power puzzle

Answers will vary, depending on size of classroom.

Tip: encourage children to draw a plan of the classroom and calculate how many footballs will fit into the length, width and height, and then multiply the number of footballs in these dimensions together.

Lesson 4: Estimating capacity

➜ pages 152–154

1. a) 750 ml b) 70 l

2. Circled: watering can, pond/lake, bath tub

3. A, C, E, B, D (accept C, A, E, B, D as it not clear what sort of bottle is shown in A).

4. Answers will vary slightly; for example:
a) 3,000 ml
b) 1,300 ml
c) 2,500 ml

5. The water poured out is $\frac{1}{5}$ of a bottle which equals 400 ml. Thus the capacity of one full bottle is:
5 × 400 = 2,000 ml
The capacity of one full bottle is 2,000 ml.

6. Jug A contains 500 ml. $\frac{1}{4}$ of this is poured out, which is 125 ml. This is equal to $\frac{1}{10}$ of jug B, so jug B holds:
10 × 125 = 1,250 ml

Reflect

Explanations may vary; for example:

Volume is the amount of space that an object fills.
Capacity describes how much a container can hold.

End of unit check

➜ pages 155–156

My journal

1. Method 1: Count the cubes individually (18).
Method 2: Calculate the cubes in the different layers and then add these together:
3 × 3 = 9
2 × 3 = 6
1 × 3 = 3
9 + 6 + 3 = 18