VOLUME

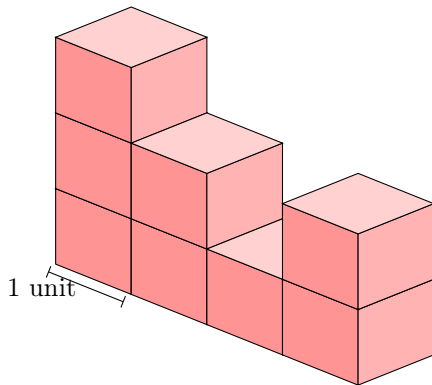## A DEFINITION

A.1 FINDING VOLUME OF A SHAPE

Ex 1: What is the volume of the red solid?
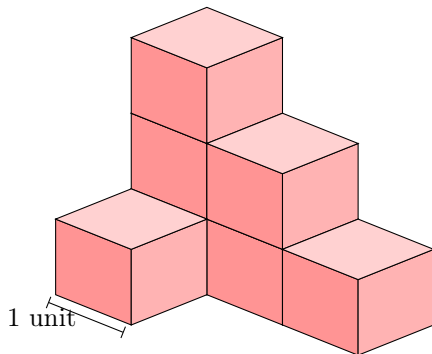
1 unit
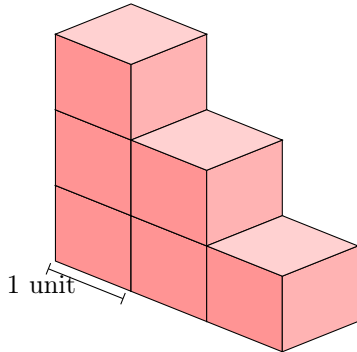
$V =$ ☐ cubic units

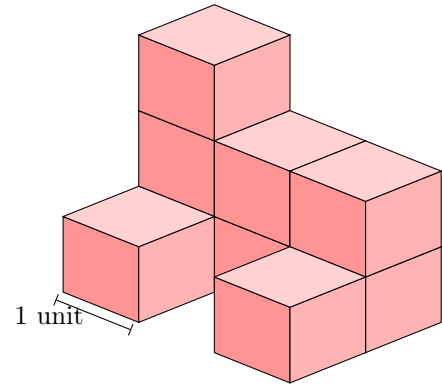**Ex 2:** What is the volume of the red solid?

1 unit

$V =$ ☐ cubic units

Ex 3: What is the volume of the red solid?

1 unit
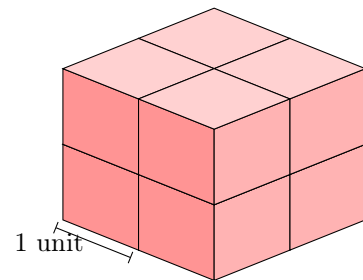
$V =$ ☐ cubic units

Ex 4: What is the volume of the red solid?
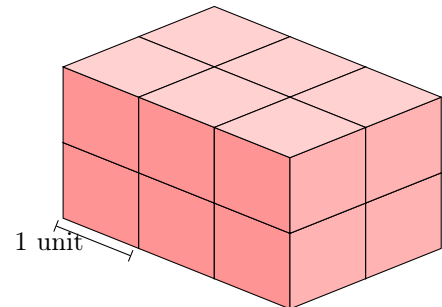
1 unit

$V =$ ☐ cubic units

A.2 FINDING VOLUME OF A RECTANGULAR CUBOID

Ex 5: What is the volume of the red solid?
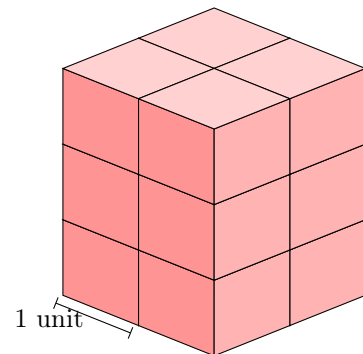
1 unit

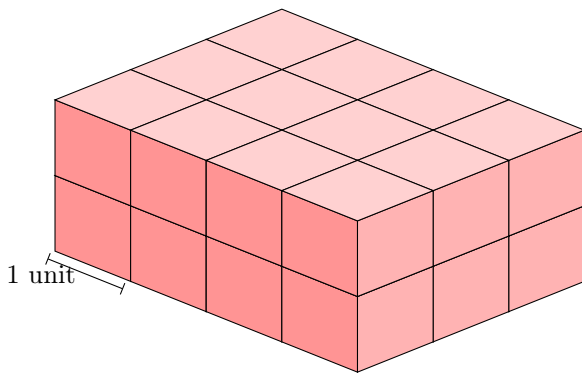$V =$ ☐ cubic units

Ex 6: What is the volume of the red solid?

1 unit

$V =$ ☐ cubic units

Ex 7: What is the volume of the red solid?

1 unit

$V =$ ☐ cubic units

Ex 8: What is the volume of the red solid?

$V = \boxed{}$ cubic units

B UNITS OF VOLUME

B.1 CHOOSING UNITS FOR VOLUME

MCQ 9: What unit will be used to measure the volume of your bedroom?
Choose 1 answer:

☐ Cubic millimeters

☐ Cubic centimeters

☐ Cubic meters

MCQ 10: What unit will be used to measure the volume of a small toy block?
Choose 1 answer:

☐ Cubic millimeters

☐ Cubic centimeters

☐ Cubic meters

MCQ 11: What unit will be used to measure the volume of a grain of rice?
Choose 1 answer:

☐ Cubic millimeters

☐ Cubic centimeters

☐ Cubic meters

MCQ 12: What unit will be used to measure the volume of a bottle of milk?
Choose 1 answer:

☐ Cubic millimeters
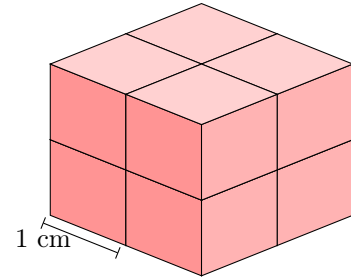
☐ Cubic centimeters

☐ Cubic meters

MCQ 13: What unit will be used to measure the volume of a swimming pool?
Choose 1 answer:

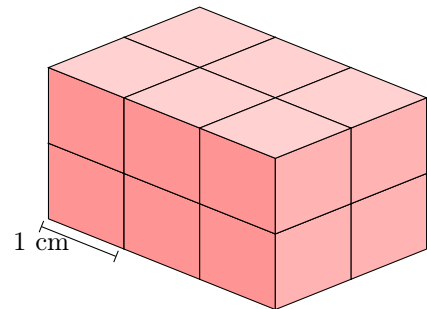☐ Cubic millimeters

☐ Cubic centimeters

☐ Cubic meters

B.2 FINDING VOLUME OF A RECTANGULAR CUBOID

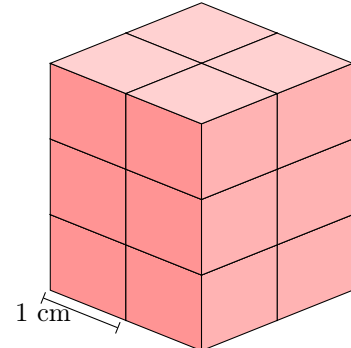**Ex 14:** What is the volume of the red figure?

$V = \boxed{}$ ☐ cm^3
  ☐ m^3

Ex 15: What is the volume of the red figure?

$V = \boxed{}$ ☐ cm^3
  ☐ m^3

Ex 16: What is the volume of the red figure?

$V = \boxed{}$ ☐ cm^3
  ☐ m^3

Ex 17: What is the volume of the red figure?

$V = \boxed{}$ ☐ cm^3
  ☐ m^3

C VOLUME OF A RECTANGULAR CUBOID

C.1 FINDING VOLUMES OF A RECTANGULAR CUBOIDS

Ex 18: What is the volume of the red figure?

1 cm

$V =$ ☐ cm³
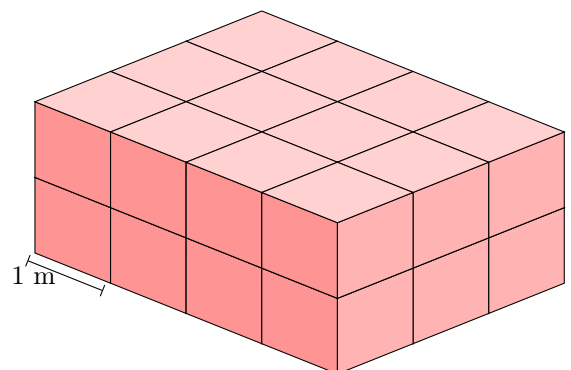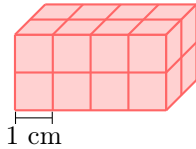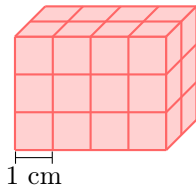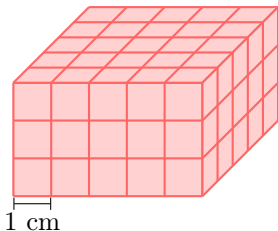
Ex 19: What is the volume of the red figure?

1 cm

$V =$ ☐ cm³

Ex 20: What is the volume of the red figure?

1 cm

$V =$ ☐ cm³

Ex 21: What is the volume of the red figure?

1 cm
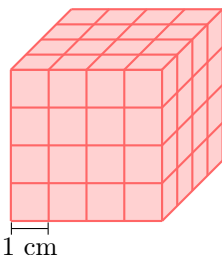
$V =$ ☐ cm³

Ex 22: What is the volume of the red figure?

1 cm
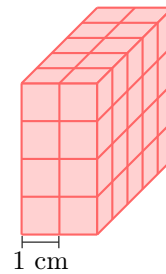
$V =$ ☐ cm³

Ex 23: What is the volume of the red figure?

1 cm
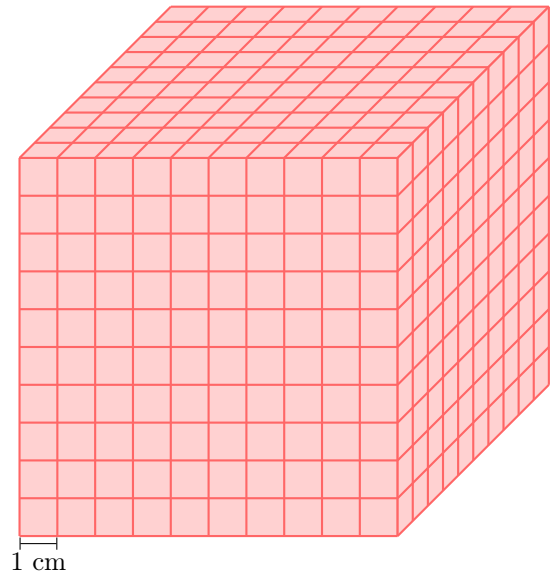
$V =$ ☐ cm³

C.2 SOLVING PROBLEMS

Ex 24: A rectangular swimming pool is 8 m long, 5 m wide, and 2 m deep. The water costs 10 dollars per cubic meter. What is the volume of the swimming pool?

$V =$ ☐ m³

What is the cost to fill the swimming pool with water?

☐ dollars

Ex 25: A container has a volume of 20 m³. A box is 2 m long, 1 m wide, and 0.5 m high. What is the volume of the box?

$V =$ ☐ m³

How many boxes can fit inside the container?

☐ boxes

Ex 26: A storage room has a volume of 150 m³. A water tank is 5 m long, 2 m wide, and 3 m high. What is the volume of the water tank?

$$V = \boxed{} \ \text{m}^3$$

How many water tanks can fit inside the storage room?

$$\boxed{} \ \text{water tanks}$$

Ex 27: [calc] A rectangular fish tank is $2\,\text{m}$ long, $1\,\text{m}$ wide, and $1\,\text{m}$ deep. The water costs 15 dollars per cubic meter. What is the volume of the fish tank?

$$V = \boxed{} \ \text{m}^3$$

What is the cost to fill the fish tank with water?

$$\boxed{} \ \text{dollars}$$

D CONVERSION OF VOLUME UNITS

D.1 CONVERTING VOLUME UNITS

Ex 28: Convert:

$$3\,\text{cm}^3 = \boxed{} \ \text{mm}^3.$$

Ex 29: Convert:

$$12\,000\,\text{mm}^3 = \boxed{} \ \text{cm}^3.$$

Ex 30: Convert:

$$4\,\text{m}^3 = \boxed{} \ \text{cm}^3.$$
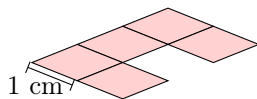
Ex 31: Convert:

$$15\,000\,000\,\text{cm}^3 = \boxed{} \ \text{m}^3.$$

E VOLUMES OF SOLIDS WITH UNIFORM CROSS-SECTION
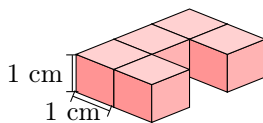
E.1 CALCULATING VOLUMES STEP-BY-STEP

Ex 32:
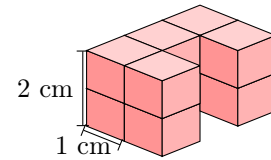
1. Calculate the area of this figure :

1 cm

$$\text{Area of base} = \boxed{} \ \text{cm}^2$$

2. Calculate the volume of this solid:

1 cm
1 cm

$$\text{Volume} = \boxed{} \ \text{cm}^3$$

3. Calculate the volume of this solid:

2 cm
1 cm

$$\text{Volume} = \boxed{} \ \text{cm}^3$$

4. Calculate the volume of this solid:

3 cm
1 cm

$$\text{Volume} = \boxed{} \ \text{cm}^3$$

Ex 33:

1. Calculate the area of this figure:

1 cm

$$\text{Area of base} = \boxed{} \ \text{cm}^2$$
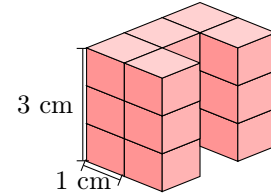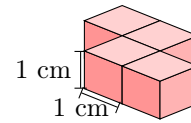
2. Calculate the volume of this solid:

1 cm
1 cm

$$\text{Volume} = \boxed{} \ \text{cm}^3$$

3. Calculate the volume of this solid:

2 cm
1 cm

$$\text{Volume} = \boxed{} \ \text{cm}^3$$

4. Calculate the volume of this solid:

3 cm
1 cm

$$\text{Volume} = \boxed{} \ \text{cm}^3$$

Ex 34:

1. Calculate the area of this figure:
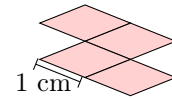
Area of base = ⬚ cm²

2. Calculate the volume of this solid:

Volume = ⬚ cm³

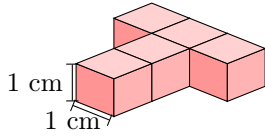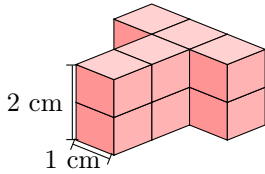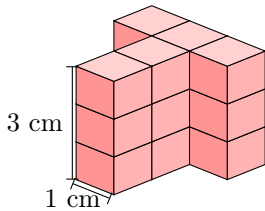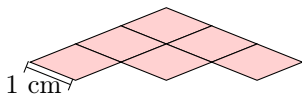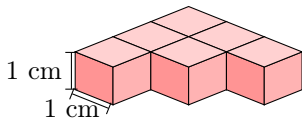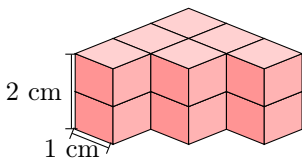3. Calculate the volume of this solid:

2 cm

1 cm

Volume = ⬚ cm³

4. Calculate the volume of this solid:

3 cm

1 cm

Volume = ⬚ cm³

Ex 35:

1. Calculate the area of this figure:
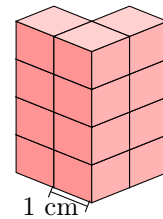

1 cm

Area of base = ⬚ cm²

2. Calculate the volume of this solid:

1 cm

1 cm

Volume = ⬚ cm³

3. Calculate the volume of this solid:

2 cm

1 cm

Volume = ⬚ cm³

4. Calculate the volume of this solid:
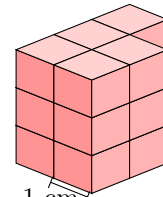

3 cm

1 cm
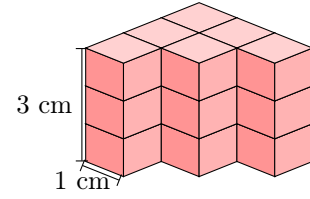
Volume = ⬚ cm³

E.2 CALCULATING VOLUMES OF SOLIDS MADE OF CUBES

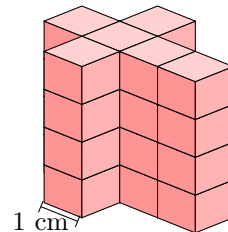**Ex 36:** Find the volume of the solid:

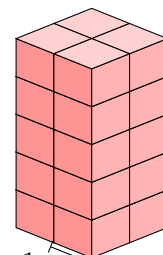1 cm

$V = $ ⬚ cm³

Ex 37: Find the volume of the solid:

1 cm

$V = $ ⬚ cm³

Ex 38: Find the volume of the solid:
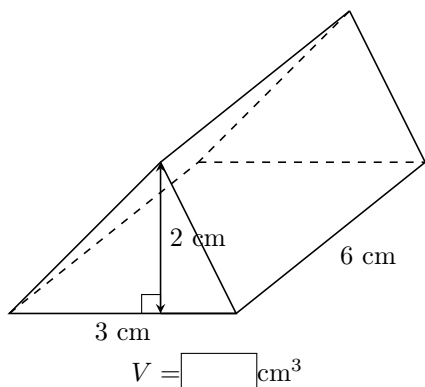

1 cm

$V = $ ⬚ cm³

Ex 39: Find the volume of the solid:

1 cm

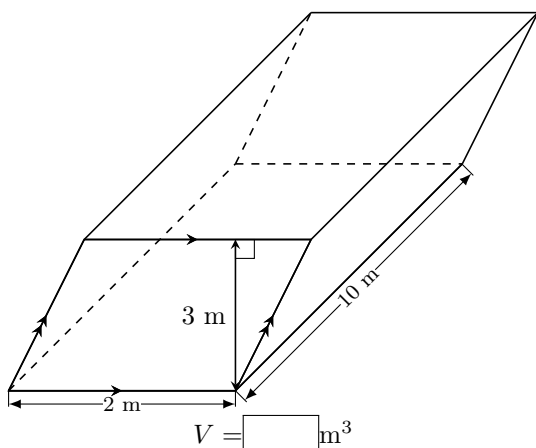$V = $ ⬚ cm³
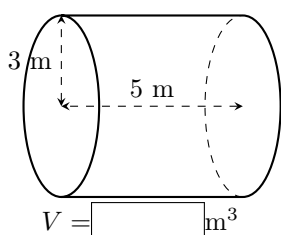
E.3 FINDING VOLUMES OF SOLIDS WITH UNIFORM CROSS-SECTION

Ex 40: 🖩 Find the volume of the solid:

2 cm

6 cm

3 cm

$V =$ ⬚ cm³

Ex 41: 🖩 Find the volume of the solid:

3 m

10 m

2 m

$V =$ ⬚ m³

Ex 42: 🖩 Find the volume of the solid (round to 1 decimal place):

3 m

5 m

$V =$ ⬚ m³

Ex 43: 🖩 Find the volume of the solid:

2 m

5 m

3 m

$V =$ ⬚ m³
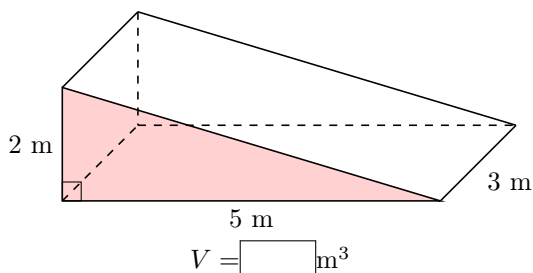
Ex 44: 🖩 Find the volume of the solid (round to 1 decimal place):

2 m

10 m

$V =$ ⬚ m³
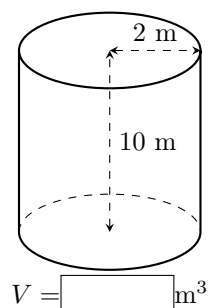
Ex 45: 🖩 Find the volume of the solid (round to 1 decimal place):

4 m

2.5 m

$V =$ ⬚ m³
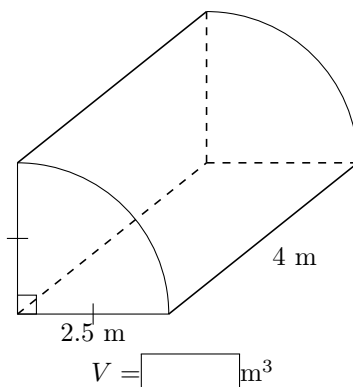
F VOLUMES OF TAPERED SOLIDS AND SPHERES

F.1 CALCULATING VOLUMES OF TAPERED SOLIDS AND SPHERES: LEVEL 1

Ex 46: 🖩 Find the volume of the sphere. (Leave your answer in terms of π)

r = 9 cm

$V =$ ⬚ cm³
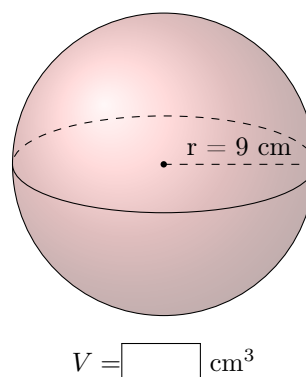
Ex 47: 🖩 Find the volume of the square-based pyramid.

h = 12 cm

s = 10 cm

$V =$ ⬚ cm³
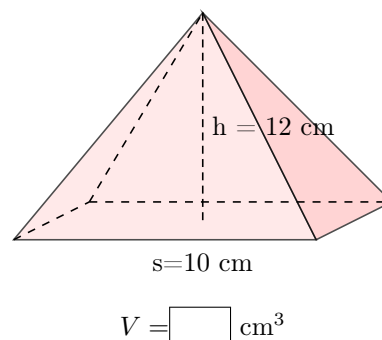
Ex 48: Find the volume of the sphere. (Round to two decimal places)

d=12 m
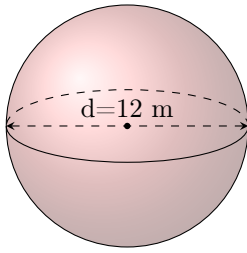
$V \approx$ ☐ m³

Ex 49: Find the volume of the cone. (Round to two decimal places)

h = 15 m

r = 8 m

$V \approx$ ☐ m³

F.2 CALCULATING VOLUMES OF TAPERED SOLIDS AND SPHERES: LEVEL 2

Ex 50: Find the volume of a cone with a slant height of 13 cm and a radius of 5 cm. (Leave your answer in terms of π)

h

13 cm

r=5 cm

Ex 51: A square-based pyramid has a base side length of 10 cm and a slant height (the height of each triangular face) of 13 cm. Calculate the volume of the pyramid.

13 cm

10 cm

Ex 52: Find the volume of the hemisphere with a diameter of 24 m. (Round to one decimal place)

d=24 m

Ex 53: ⌨ Find the volume of the composite solid, which consists of a cylinder and a hemisphere. (Round to one decimal place)

Cylinder height = 8 cm

Diameter = 6 cm
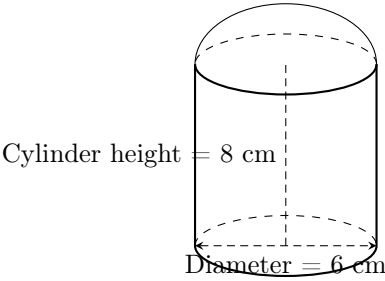
G CAPACITY

G.1 CHOOSING UNITS FOR CAPACITY

MCQ 54: What unit best measures the capacity of a bathtub?
Choose 1 answer:

☐ 220 mL

☐ 2 200 mL

☐ 220 L

MCQ 55: What unit best measures the capacity of a dosage of medicine?
Choose 1 answer:

☐ 5 mL

☐ 0.5 L

☐ 5 L

MCQ 56: What unit best measures the capacity of a wine glass?
Choose 1 answer:

☐ 150 L

☐ 15 cL

☐ 1.5 L

MCQ 57: What unit best measures the capacity of a soup bowl?
Choose 1 answer:

☐ 40 cL

☐ 40 mL

☐ 40 L

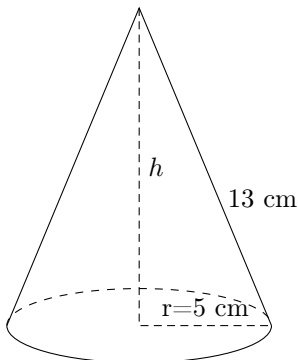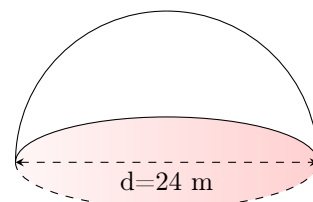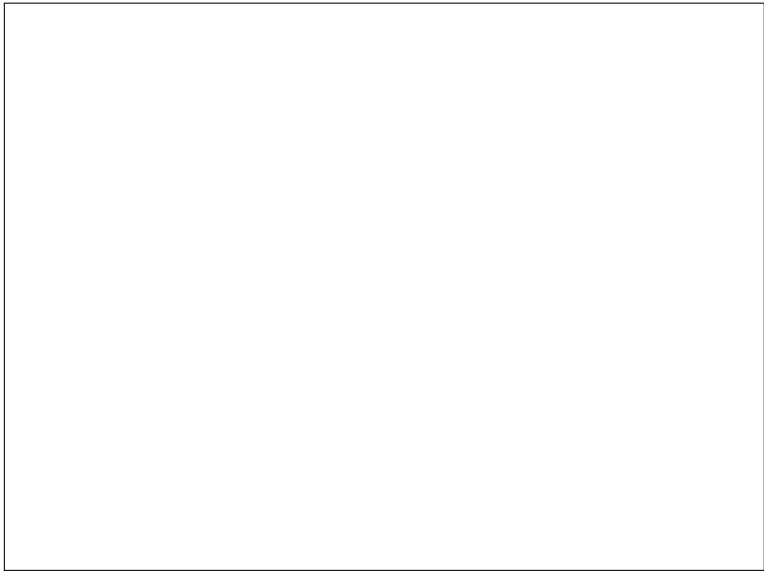**MCQ 58:** What unit best measures the capacity of a car's fuel tank?
Choose 1 answer:

☐ 60 mL

☐ 60 L

☐ 600 L

MCQ 59: What unit best measures the capacity of a pitcher?
Choose 1 answer:

☐ 2.5 mL

☐ 2.5 L

☐ 25 L

G.2 CONVERTING CAPACITY UNITS

Ex 60: Convert:
$$3\,\text{L} = \boxed{}\ \text{cL}.$$

Ex 61: Convert:
$$1.5\,\text{L} = \boxed{}\ \text{cL}.$$

Ex 62: Convert:
$$20\,\text{cL} = \boxed{}\ \text{L}.$$

Ex 63: Convert:
$$250\,\text{cL} = \boxed{}\ \text{L}.$$

Ex 64: Convert:
$$2\,\text{L} = \boxed{}\ \text{mL}.$$

Ex 65: Convert:
$$30\,\text{mL} = \boxed{}\ \text{cL}.$$

G.3 CONVERTING BETWEEN METRIC VOLUME AND CAPACITY UNITS

Ex 66: Convert:
$$5\,\text{m}^3 = \boxed{}\ \text{L}.$$

Ex 67: Convert:
$$500\,\text{L} = \boxed{}\ \text{m}^3.$$

Ex 68: Convert:
$$3.4\,\text{m}^3 = \boxed{}\ \text{L}.$$

Ex 69: Convert:
$$2\,\text{L} = \boxed{}\ \text{m}^3.$$

H DENSITY

H.1 SOLVING PROBLEMS INVOLVING DENSITY

Ex 70: A solid gold bar is a rectangular prism with dimensions 5 cm by 10 cm by 2 cm. The density of gold is 19.3 g/cm^3. What is the mass of the gold bar in kilograms?

Ex 71: A block of ice in the shape of a cube has a side length of 50 cm. Its mass is measured to be 114.5 kg. What is the density of the ice in g/cm^3?

Ex 72: A scientist has a 5.4 kg sample of aluminum. The density of aluminum is 2700 kg/m^3. If the sample is a cylinder with a radius of 5 cm, what is its height in cm? (Round to one decimal place)

Ex 73: A solid sphere made of lead has a mass of 380 g. If the density of lead is 11.34 g/cm^3, what is the radius of the sphere? (Round to one decimal place)

Ex 74: A cone has a radius of 10 cm, a height of 30 cm, and a mass of 7.85 kg. Calculate its density in g/cm^3. Based on your result, is the material more likely to be glass ($\rho \approx 2.5$ g/cm^3) or aluminum ($\rho = 2.7$ g/cm^3)?
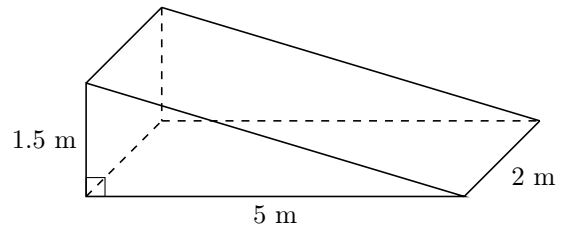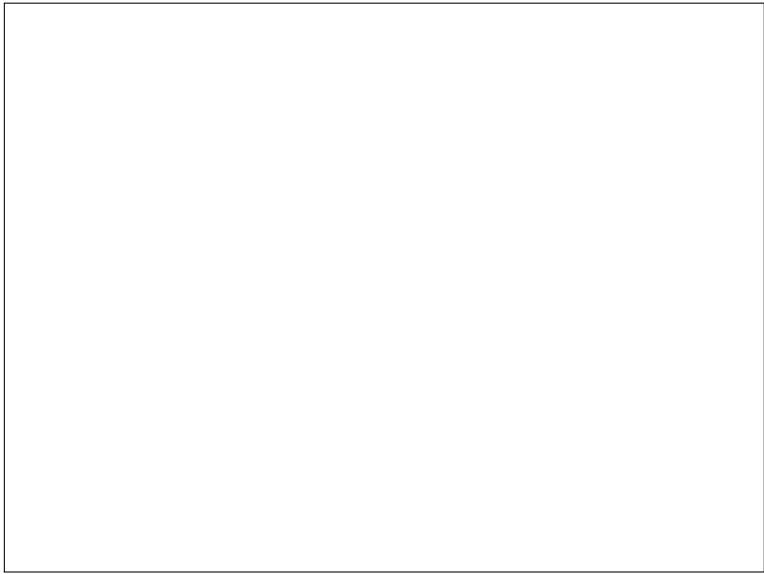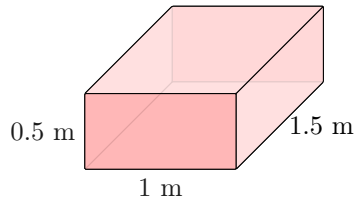
$S = \boxed{}$ m² (round to 1 decimal place)

I SURFACE AREA

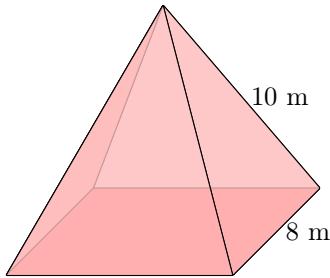## I.1 FINDING SURFACE AREAS

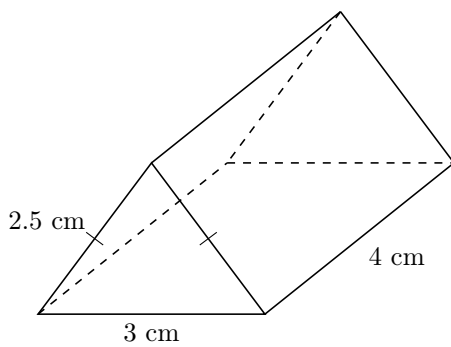**Ex 75:** Find the surface area of the rectangular cuboid.

0.5 m 1.5 m 1 m

$S = \boxed{}$ m²

Ex 76: Find the surface area of the square-based pyramid.

10 m 8 m

$S \approx \boxed{}$ m² (round to the nearest integer)

Ex 77: Find the surface area of the triangular prism.

2.5 cm 4 cm 3 cm

$S = \boxed{}$ cm²

Ex 78: Find the surface area of the triangular prism.