RICH MATHEMATICAL TASK BOOKLET

MEASUREMENT

YEAR 7/8
ODD YEARS

Teacher Booklet

Task 1

Estimate how long the _____ is and record the estimate and measurement unit.
Estimate -

Use a measuring tool to measure the length and record the measurement count and measurement unit.
Measurement –
Convert the measurement to a different unit.
Measurement conversion –
Measurement conversion -

Repeat with five other items.

Teacher Notes

During the launch, give the students different measurement tools (metric rulers and tape measures) to look at and discuss. Ask them to look at the metre ruler or tape measure and the markings. What do the numbers represent? What are the extra markings between the centimetre? Elicit that millimetres are centimetres divided into ten parts and written as mm. How many millimetres are in a centimetre? What happens if you measure in different units? Facilitate them to notice that the smaller the unit the larger the measurement count and vice versa.

Have centimetre rulers, metre rulers, and tape measures.

Ask the students to measure a variety of objects around the classroom that are under a metre, between 2 – 5 m and over 5 m long.

Expect students to record using the correct measurement notation and to measure accurately using mixed units (e.g., metres and centimetres).

Facilitate students to convert between the different metric units and connect this to understanding of base ten.

For the independent task, have the broken rulers cut out from the copy-master template.

Shareback

Select students to share who are able to accurately measure objects using the measurement tools and to convert between whole number units.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume. When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Conceptual understanding of measurement requires understanding of conservation and transitivity. Conservation requires understanding that when moved or subdivided, an object will retain its size. Transitivity involves understanding that the measures of two objects can be compared to a third object. For example, if object A weighs more than object B, and object B weighs more than object C, then object A will weigh more than object C.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Connect

If I ran 1.5 kilometres, how many metres would I have run? How many centimetres would that be? How many millimetres?
If I ran 250 metres, how many kilometres would I have run? How many centimetres would that be? How many millimetres?

Suggested Learning Outcomes

Estimate length in a range of measurement units (mm, cm, m).

Measure length in a range of measurement units (mm, cm, m).

Identify the relationship between centimetres and a metres.

Identify the relationship between millimetres and centimetres.

Identify the relationship between millimetres and a metre.

Independent Tasks

Find the perimeter for these shapes. (see copy masters).

Curriculum Links

During Year 7/8

Estimate and then measure, length, area, volume, capacity, mass (weight), temperature, data storage, time, and angle, using appropriate units

Select and use an appropriate base measure within the metric system, along with a prefix to show the size of units.

Convert between metric measurement units, including square units

Mathematical Language

Metre, centimetre, millimetre, length, unit of measure, measurement count, ruler.

Anticipations

Solutions, Misconceptions

Task 2

Layla is helping her Nanny choose tiles for their laundry. She needs to measure the floor so that she can get the right amount of tiles. Here is the outline of a scaled model of the floor in the laundry: (see Copy Masters)
They have to pay 50 cents for each of the smaller tiles and $1 each for the medium tiles, and $3 each for the large tiles. Which is the better deal?

Teacher Notes

For the task, give students one large square, one medium, and one small square. If students need more squares than give them two squares so they can place one and then the next one to measure the area.

Facilitate the students to notice that they need to place the squares carefully with no gaps or overlaps and starting at the beginning of each row. Support them to notice that they can develop an array or an abstraction of an array to represent the area.

Notice whether students measure the entire area with the square or whether they begin to realise that each row or column would be the same measurement count and this can be recorded instead and the calculations developed from this.

Students should be scaffolded to develop the area formulae for rectangles themselves and then generalise this in the connect.

Expect students to use measurement language including area.

For the independent task give the students different coloured squares cut out from the 1 cm^2 template and a piece of blank paper.

Shareback

Select students to share who have used multiplication developed an array to represent that area and then those who have developed an abstraction of an array to find the area. Support students to see that measuring area is about filling the space with the units.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 7/8

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

Connect

Ask the students to develop a rule for how to find the area of a rectangle that will always work. Test the rules and develop a shared explanation and justification.

Mathematical Language

Area, square, unit of measure, measurement count.

Suggested Learning Outcomes

Use non-standard units (squares) to measure area.

Find the area of a surface by using multiplication.

Develop a generalisation for finding the area of a rectangle.

Use measurement language to describe how to measure area.

Independent Tasks

Layla was helping her Nanny work out how many tiles they needed for the bathroom walls and floor. She got distracted and didn't finish.
Can you help by working out a quick way to find the area and number of tiles that would be needed for each space?
(see copy masters for images)

Anticipations

Solutions, Misconceptions

Task 3

What would be the perimeter and area of the _____?

Use the metre ruler or square metre.

Estimate perimeter (m):
Estimate area (m2):

Measurement perimeter (m):
Measurement area (m2):

Convert perimeter measurement to a different unit:
Convert area measurement to a different unit:
Repeat three times.

Teacher Notes

Before you launch the task, ask students to convert between these measurements; 500 cm = ?? m, 0.75 km = ?? m, 45 mm = ?? cm; 2 km = ?? cm.

During the launch, ask the students to use the metre rulers to make a square metre. Use the term square metre and model how to record the measurement count (e.g., 5 m^2). Ask the students to estimate how many students could stand in a square metre and then measure this. Have a large rectangle (6 m by 4 m) marked out using masking tape or with chalk outside the classroom. Ask the students to use the metre rulers to find the perimeter and area.

Facilitate the students to use the metre rulers or square metres to measure the large spaces and then to use multiplication to work out the area.

Expect the students to record using the correct measurement units and abbreviation.

For the independent activity, have the activity below.

Shareback

Select students to share who are able to accurately partition the large spaces into metres to work out the area in square metres and represent this and then convert between different metric units by drawing on understanding that metric units use a base ten conversion.

Big Ideas

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Connect

Ask students to develop a set of rules for converting between different metric units.

Suggested Learning Outcomes

Estimate how much will fit in a square metre.

Measure perimeter in metres and decimals precisely.

Convert between metric units for length.

Measure area in square metres.

Convert between metric units for area.

Independent Tasks

Here are the footprints for new buildings for a school.
(see copy masters)
Each square represents 1 m^2.

Find the area and perimeter for each footprint.

What do you think each space could be used for?

Mathematical Language

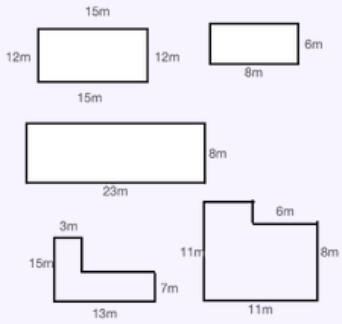
Mass, massive, massive, equal, kilogram, gram, scale.

Anticipations

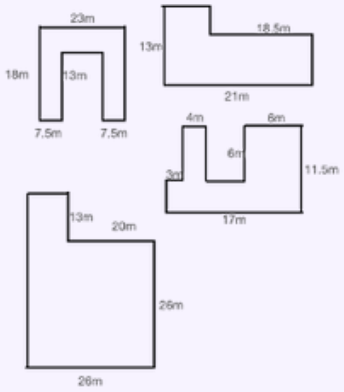
Solutions, Misconceptions

Task 4

Find the area and perimeter of these building designs.



Year 7 Option



Year 8 Option

Teacher Notes

Notice whether students use grouping or multiplication to find the perimeter and area of each composite shape. Facilitate the students to record the measurement units correctly for each using the abbreviation.

Expect students to use measurement language including area and perimeter.

Shareback

Select students to share who have divided the composite shapes and then used multiplication to find the area of each part and added them together OR have changed the composite shape into a rectangle and then found the total area and subtracted the missing parts.

Connect

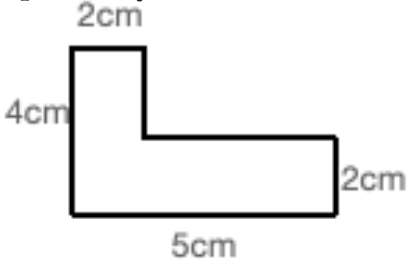
Litea is finding the area of this shape. This is her solution:

$A = 5 \times 4 = 20 \text{ cm}^2$

$A = 3 \times 2 = 6 \text{ cm}^2$

$20 - 6 = 14 \text{ cm}^2$

Do you agree or disagree with her solution? Explain why.



Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume. When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Conceptual understanding of measurement requires understanding of conservation and transitivity. Conservation requires understanding that when moved or subdivided, an object will retain its size. Transitivity involves understanding that the measures of two objects can be compared to a third object. For example, if object A weighs more than object B, and object B weighs more than object C, then object A will weigh more than object C.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

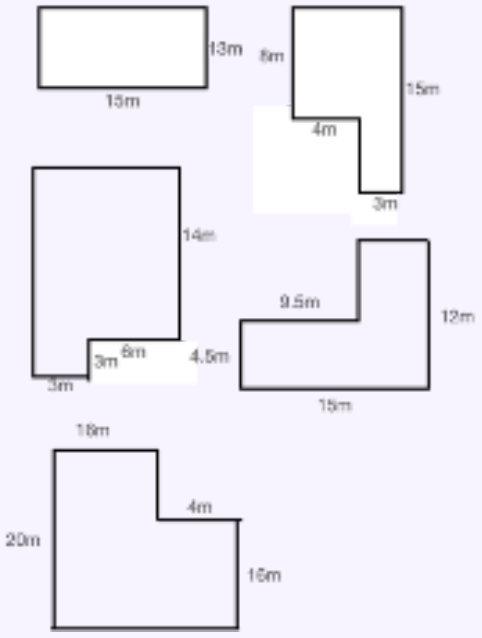
Suggested Learning Outcomes

Find the perimeter of a shape using the side lengths.

Find the area of composite shapes.

Independent Tasks

Find the area and perimeter of these building designs.



Curriculum Links

During Year 7/8

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

Mathematical Language

Square metre, area, perimeter, unit of measure, measurement count.

Anticipations

Solutions, Misconceptions

Task 5

Find the area and perimeter of these triangles:
See copy masters for triangles.

Teacher Notes

For the task, provide students with squared paper (1 cm^2) and a ruler. Facilitate the students to use the squared paper to measure the area of the triangles and then to begin abstracting the process for this and prove why you need to divide by two. Students could also use the ruler to measure the height of the triangle.

Support students to see that they need to either decompose the shape (similar to the composite shapes) or to turn it into a larger rectangle find the total area and then subtract.

Notice whether students over-generalise the formula for finding area for rectangles and apply it to the area of a triangle.

For the independent activity, provide students with squared paper (1 cm^2) and a ruler.

Shareback

Select students to share first who used the squared paper to re-construct the triangle to a rectangle by redrawing or cutting it up. Select other students to share who have used the ruler to find the height and then used the measurements successfully to find the area. If no students have done this, then model this as a solution that students previously used and illustrate how this connects to the grid paper.

Connect

Ask students to develop a rule for finding the area of a triangle. Ask them to prove that the rule (e.g., half base times height) would work to find the area of any type of triangle.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume. When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

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There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Suggested Learning Outcomes

Find the area of triangles using 1 cm^2. paper.

Develop a rule/generalisation to find the area of a triangle.

Find the area of triangles using the rule height multiplied by length and divided by two.

Independent Tasks

Draw a right-angled triangle that has an area of 16 cm^2.

Draw a triangle that has a base length of 10 cm and one side length of 6 cm. What would the area be?

Draw a non-right-angled triangle with an area of 20cm^2.

Draw as many triangles as you can with an area of 6cm^2.

Curriculum Links

During Year 7/8

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

Mathematical Language

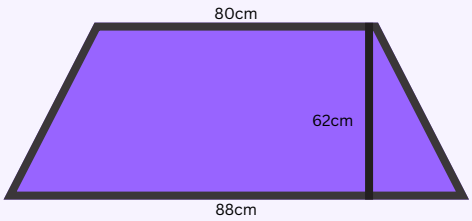
Square metre, area, perimeter, height, unit of measure, measurement count.

Anticipations

Solutions, Misconceptions

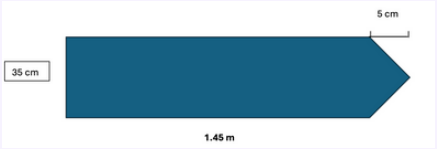
Task 6

Tiana is designing a wall-hanging and would like to ensure that she has enough material.



Work out the area measurement for the fabric.

Tiana's second design for a wall hanging looks like this:



Work out the area measurement for the fabric.
How much fabric does Tiana need altogether?

Teacher Notes

Before you launch the task, ask the students to discuss the formula for finding the area of a triangle in the previous lesson and to explain why this works.

During the lesson, support students to see that they need to decompose the shape (similar to the rectangular composite shapes) and find the total area of the shapes.

Ask students to solve the first task, and then share solutions before introducing the second part of the task.

For the second task, notice whether students see that different measurement units are used in the task and convert these to a common unit.

Facilitate the students to record the measurement units correctly for each using the abbreviation.

Expect students to use measurement language including area and perimeter.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Shareback

Select students to share who have decomposed the shape and used the formula to find the triangle/s and a formula to find the area of a rectangle and added this together.

Connect

Connect: Ask the students to develop a rule for finding the area of a trapezium and prove how it would work.

Suggested Learning Outcomes

Find the area of a rectangle using the side lengths.

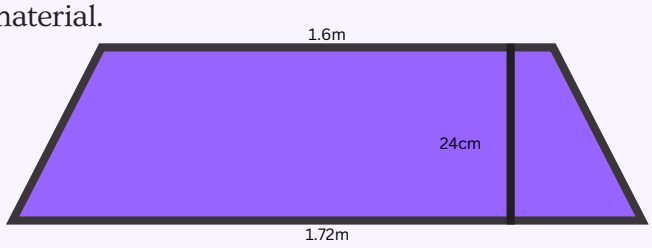
Find the area of a triangle.

Use formulae to find area.

Find the area of composite shapes including rectangles and triangles.

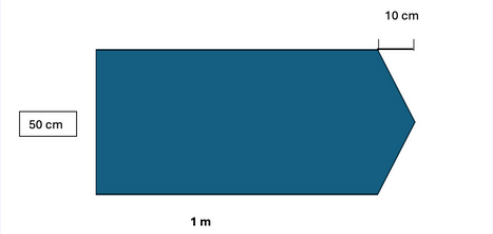
Independent Tasks

Tiana is designing a wall-hanging and would like to ensure that she has enough material.



Work out the area measurement for the fabric.

Tiana's second design for a wall hanging looks like this:



Work out the area measurement for the fabric.
How much fabric does Tiana need altogether?

Mathematical Language

Area, height, base, length, right-angled triangle, rectangle.

Anticipations

Solutions, Misconceptions

Task 7

Here are some rectangular cuboids (see Copy Masters).
Find the volume of each cuboid.
Write an explanation for how to find the volume of any cuboid.

Note: Putting a rule is NOT an explanation!

Teacher Notes

Begin by exploring with students the 3-D cube and all its attributes. Make links to the differences between cubes and cuboids (length, breadth, height). Emphasise that a cube is a special case of a square prism, and a square prism is a special case of a rectangular prism and that they are all cuboids.

Facilitate students to understand the concept that the volume of an object is the amount of space it takes up and that an object is measured by the number of unit volumes that fit into it.

For the independent activity, have multi-link or centi-cubes available if needed.

Shareback

Select students to share who have developed different explanations to find the volume of the cuboids. Work towards having all groups display their explanations side by side so that they can see all and work to refine down to an agreed explanation.

Connect

Discuss, explore, and refine the explanations until a generalised rule emerges. You may want to put this rule on your maths wall.

Suggested Learning Outcomes

Compare volume of objects using whole number units.

Use appropriate units/whole numbers to measure volume.

Use multiplicative reasoning to find the volume of cuboids.

Use all the dimensions to find the volume of cuboids.

Develop a generalised for finding the volume of a cuboid.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume. When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Conceptual understanding of measurement requires understanding of conservation and transitivity. Conservation requires understanding that when moved or subdivided, an object will retain its size. Transitivity involves understanding that the measures of two objects can be compared to a third object. For example, if object A weighs more than object B, and object B weighs more than object C, then object A will weigh more than object C.

There are key principles related to measurement including that the size of the measurement unit remains the same (including identical units or subdivisions), units are repeated with no gaps or overlaps (iteration), the unit is part of a whole and the measurement is expressed as the total number of units used.

Independent Tasks

Use 10 x 1 cm^3 cubes to build as many different box-shaped (cuboid) buildings as possible. Draw a 3-D representation for each cuboid.

Use 24 x 1 cm^3 cubes to build as many different box-shaped (cuboid) buildings as possible. Draw a 3-D representation for each cuboid.

Use 35 x 1cm^3 cubes to build as many different box-shaped (cuboid) buildings as possible. Draw a 3-D representation for each cuboid.

Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Mathematical Language

Cube, cuboid, face, vertex, vertices, length, breadth, height, surface, centimetre, 3-dimensional, 2-dimensional, volume, width, depth, multiply, rectangular prism.

Anticipations

Solutions, Misconceptions

Task 8

Tasa and his family are sending a package in a shipping container to Tonga. The shipping company has limited the size of the package to a maximum combined length and girth of 4 metres. What is the greatest volume that they could get for a rectangular cuboid package?

Teacher Notes

Before you launch the task, ask students to find the largest area possible for a rectangle with a perimeter of 24 cm.

To launch the task, ensure that the students understand that the girth refers to the measurements around the middle of the package. Use a rectangular cuboid and trace the girth for the students.

The focus of this task is to position students to examine the relationship between surface area and volume. Notice whether the students recognise the relationship between surface area and volume and draw upon this when solving the task.

Facilitate the students to use a table to record the results and work systematically to find the largest volume.

Shareback

Select students to share who have found the largest volume by either making a cuboid or by finding two cuboids (joined together) where the length is approximately twice the width and breadth.

If no students have used the second solution, then introduce this as a possible solution.

Year Eight students should be encouraged to also examine what happens when measurements are not made in whole centimetres.

Connect

What shaped cuboid gives the largest volume?

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8
Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Mathematical Language

Volume, girth, width, length, breadth, rectangular cuboid, metres, centimetres

Suggested Learning Outcomes

Find the largest volume for a given value of girth and length.

Convert between metric units (cm/m).

Identify the relationship between volume and surface area

Independent Tasks

What cuboids can you build with these dimensions?
What would be the volume for the cuboid?
Use a representation to justify your answers.

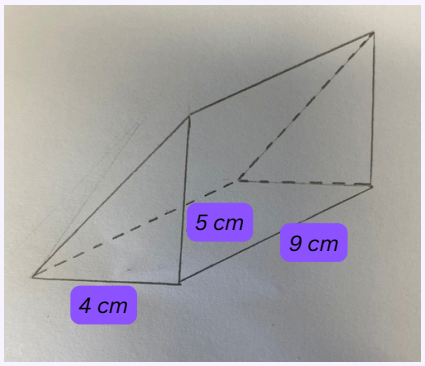
1. Length is 6 cubes; width is 3 cubes; height is 2 cubes.
2. Length is 10 cubes; width is 8 cubes; height is 3 cubes.
3. Length is 13 cubes; width is 4 cubes; height is 2 cubes.
4. Length is 12 cubes; width is 8 cubes; height is 4 cubes.
5. Length is 10 cm, width is 9 cm, height is 5 cm.
6. Length is 3 cm, width is 7 cm, height is 5 cm.
7. Length is 7 cm, width is 2 cm, height is 10 cm.
8. Length is 5 cm, width is 6 cm, height is 7 cm.

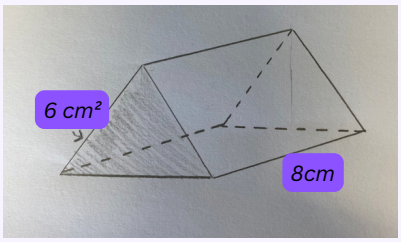
Anticipations

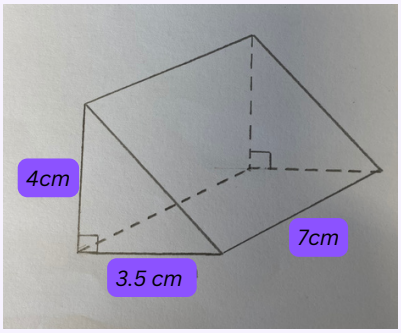
Solutions, Misconceptions

Task 9

Find the volume of these triangular prisms:







Teacher Notes

Before you launch the task, ask the students to discuss how to find the area of a triangle and also a rectangular prism.

To launch the task, if possible, show the students a right-angle triangular prism to support them to notice the relationship between the triangular prism and a rectangular prism.

Launch each part of the task separately, for the second task, show the students a triangular prism (not right-angle) and highlight that a triangular prism has the same triangular cross-section throughout its length.

Expect students to record using the correct measurement units.

Shareback

Select students to share who have found the volume by using the formula for a rectangular prism and dividing this by two. For the third task, select students to share who have used the area of the triangle and multiplied this by the length.

Connect

Ask students to develop a rule for finding the volume of a triangular prism. Ask them to prove that the rule would work to find the area of any type of triangular prism.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

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Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Suggested Learning Outcomes

Find the volume of a triangular prism.

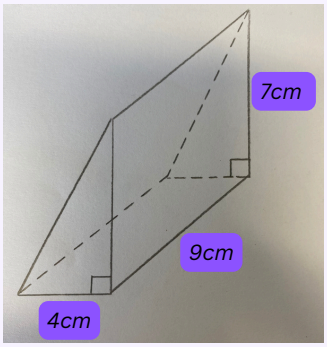
Develop formula to find the volume of triangular prisms.

Mathematical Language

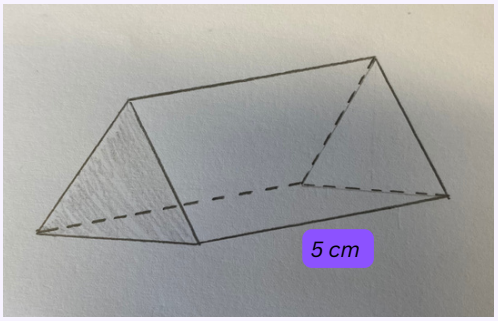
Volume, triangular prism, rectangular prism, cross-section.

Independent Tasks

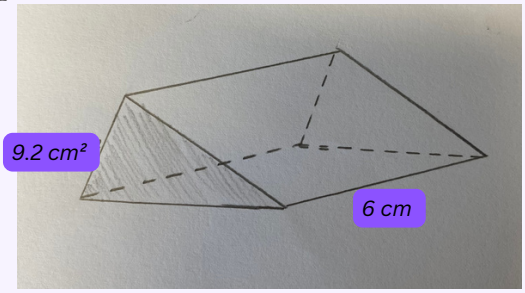
Find the volume of these triangular prisms:

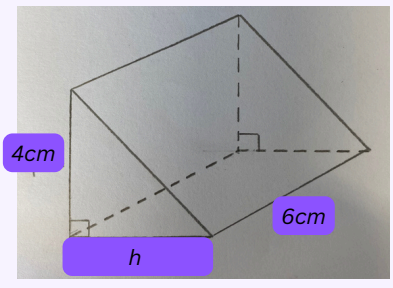


The volume of this triangular prism is 82 cm^3. What is the area of the shaded triangle?



Find the volume of this triangular prism:





The volume of this triangular prism is 84 cm^3.

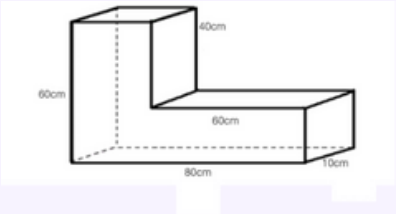
What is the length of h?

Anticipations

Solutions, Misconceptions

Task 10

Atawua is helping his father to build a step for the dollshouse. They make an L-shaped rectangular block like the one below to join two pieces of wood. His father challenges him to find the volume of this L-shaped rectangular structure. Can you help him?



Teacher Notes

Expect students to use multiplication to find the volume and use 3-D representations to explain and justify.

Shareback

Select students to share who have split the composite cuboids into two cuboids and found the volume of each.

Connect

How would you find the volume of these stairs? Use a representation and mark in the measurements you would need to find the volume.

Suggested Learning Outcomes

Use multiplicative reasoning to find volume.

Find the volume of a composite cuboid.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Curriculum Links

During Year 7

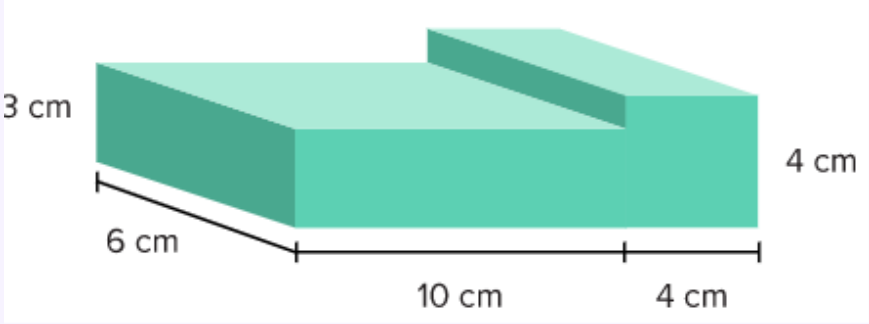
Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

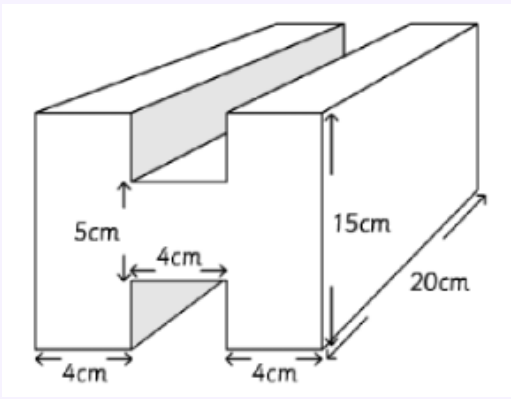
Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Independent Tasks

Find the volume:



Find the volume:



Mathematical Language

Cuboid, length, breadth, height, surface, centimetre, 3-dimensional, 2-dimensional, volume, width, depth, rectangular prism, dimensions.

Anticipations

Solutions, Misconceptions

Task 11

The school garden has 6 wooden raised garden beds. Each one has the following external dimensions: length 3 m, width 1.25 m, height 20 cm.

Each wooden board is 0.8 cm thick.

Each garden bed should be filled to 1cm below the top.

How many litres of soil will be needed to fill the garden beds?

Teacher Notes

Density is mass divided by volume $p = \frac{m}{v}$

Water was used as the basis for establishing the metric unit of mass, which means a cubic centimetre
(1 cm^3) of water weighs one gram (1g). So, 1 g /1 cm^3 = 1 g/cm^3 giving water its easy-to-remember density.

Notice students who recognise that 1000ml equals a litre and also that measures such as litres can be expressed as volume.

Shareback

Select students to share who consider the thickness of the board and link to other similar situations (chilly bin, a freezer) in their explanation.

Connect

Ask students to discuss what measures are used for volume and capacity. Introduce the concept of density.

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Suggested Learning Outcomes

Use appropriate units/whole numbers to measure volume.

Use multiplicative reasoning to find volume.

Convert cm to m (converting between metric units).

Solve volume problems involving decimals.

Mathematical Language

Volume, cubic metres, centimetres, metres, length, depth, height, capacity, litres, millilitres.

Independent Tasks

My measurements are in a jumble. Sort them out so they match correctly.

Temperature of a fridge	0.06	seconds
Length of a human intestine	1.2	kg
Area covered by one litre of paint	324	ml
Time of one TV advert	4	°C
Mass of an adult	250	cm
Area of a piece of A4 paper	15	metres
Length of a cello	22	m^2
Capacity of a teaspoon	40	km
Mass of an orange	100	months
Temperature of the human body	10	metres
Length of the Equator	40000	m^2
Capacity of a car's petrol tank	70	grams
Height of the Eiffel Tower	120	°C
Gestation of an elephant	37	litres

When you have finished write another ten for someone else to solve.

Anticipations

Solutions, Misconceptions

Task 12

Your baby sisters bath measures 70 cm long, 50 cm wide and 45 cm high.

If the bath is filled to of its $\frac{3}{5}$ height how much water is used?

Teacher Notes

Density is mass divided by volume $p = \frac{m}{v}$

Water was used as the basis for establishing the metric unit of mass, which means a cubic centimetre
(1 cm^3) of water weighs one gram (1g). So, 1 g /1 cm^3 = 1 g/cm^3 giving water its easy-to-remember density.

Notice students who recognise that 1000ml equals a litre and also that measures such as litres can be expressed as volume.

Notice students who recognise that 1000ml equal a litre and that measures such as litres can be expressed as volume.

Facilitate students to notice that uniformity is needed in measuring volume, and this is the same in measuring capacity.

Expect students to go above 1 litre including using fractional language. Facilitate them to use number lines to represent these.

Make links to the terms, millilitre, and millimetre, and that the term milli represents one thousand.

Shareback

Select students to share who have developed explanations which consider the conversions of cm to m and to ml and l.

Connect

What if the bath had been half full?

What if the bath was $\frac{3}{4}$ full?

Big Ideas

There are a range of attributes that we can measure including length, mass, time, area, angle, and volume.

When we measure, we use comparison, specifically, we compare like properties to see which is greater. We can make comparisons using standard or non-standard units of measure and we use mathematical language to describe these.

Curriculum Links

During Year 7

Calculate the perimeter and area of composite shapes composed of triangles and rectangles.

During Year 8

Calculate the volume of triangular prisms and shapes composed of rectangular prisms.

Suggested Learning Outcomes

Use multiplicative reasoning to find volume.

Convert between metric units (cm/m and ml/l).

Identify the relationship between volume and capacity.

Mathematical Language

Volume, cubic metres, centimetres, metres, length, depth, height, capacity, litres, millilitres.

Independent Tasks

Assessment Task 1: Area and Perimeter
Assessment Task 2: Juice Container

Anticipations

Solutions, Misconceptions

Assessment Task 1 - Year 7/8 Odd Years

Draw at least 3 different shapes (e.g., rectangles, triangles, parallelograms, composite shapes) that have a perimeter of 48 cm.
Which shape would have the largest area?
Show how you work out the area and perimeter of each shape. Explain and justify how this works.

Assessment Task 2 - Year 7/8 Odd Years

A juice container has the volume of 240 cm^3. What could the dimensions of the container be?

Give a range of possible solutions and use representations to justify your reasoning.

Assessment Task 2 - Year 5-6

Cadbury wants to make a new box for their chocolates. Each chocolate is a cube that measures 2 cm^3
They would like to fit 24 chocolates in the box. Can you design some different options for them to choose from and include the measurements and volume of the boxes?