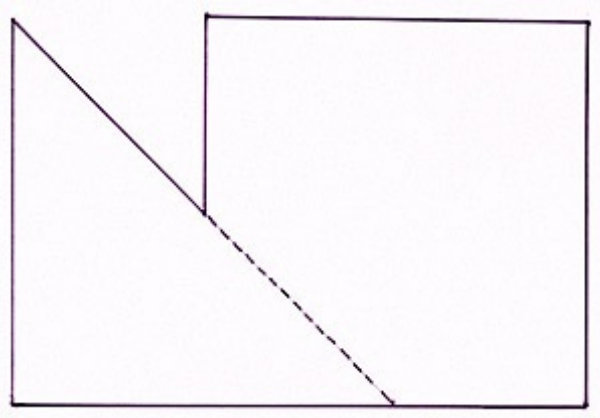
Complex area

Annotation

Georgia is able to calculate the area of a complex shape by mentally separating the shape into familiar shapes. She is able to use her knowledge of the formula for the area of a rectangle and a right-angled triangle to calculate the area of the complex shape.

Problem: Complex area

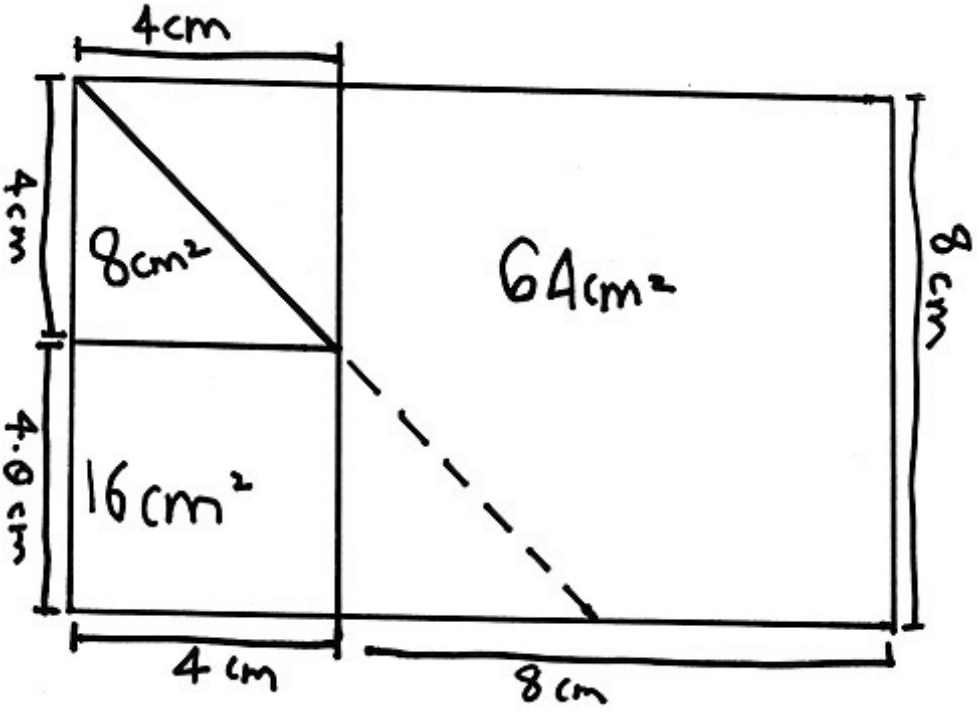
The teacher gives the student a ruler, shows her the shape below and asks the student to calculate the shape's area.



Student Response

> **Georgia:** If I draw a line from here to the bottom, I will make two rectangles. The area of the big square is 64 square centimetres.

Georgia then focuses on the second rectangle and deconstructs it into two squares. She calculates the area of the bottom square as 16 square centimetres. She calculates the top square as 16 square centimetres and halves this amount to work out the area of the triangle.



Georgia: So, altogether it's 64 + 16 + 8, which is 88 square centimetres.

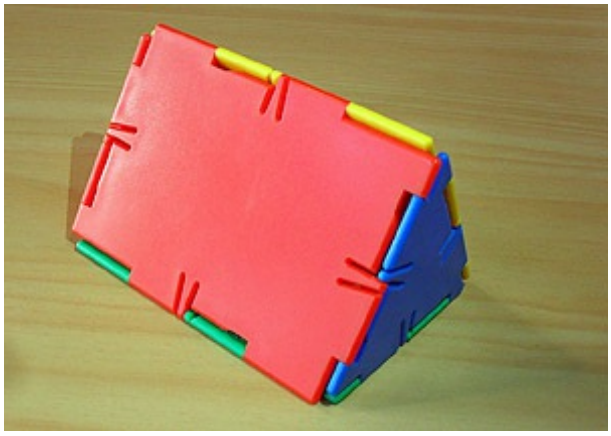
Triangular prisms

Annotation

Jamie identifies an object as a triangular prism and he understands that, to determine the volume, he must calculate the area of the triangular base first and then multiply this area by the prism's height.

Problem: Triangular prisms

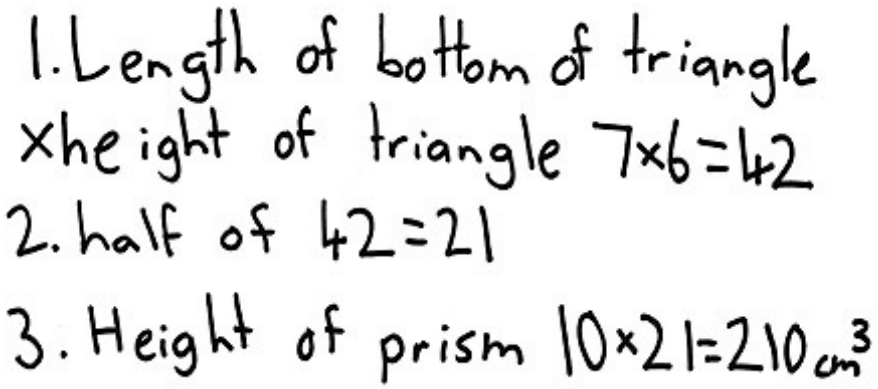
The teacher places a triangular prism with whole-number dimensions in front of the student and asks the student to identify the shape and to measure its volume.



Student Response

Teacher:	What is this shape?
Jamie:	A triangular prism?
Teacher:	Could you calculate its volume?

Jamie turns the prism so that it sits on one of its triangular ends. He measures the base and the height of the triangular face that is now at the top of the prism. He records these measurements and calculates the area of the triangle (half base x height). He measures the height of the standing prism and multiplies the area of the triangle by the height of the prism to work out its volume in cubic centimetres.



Calculating circumference

Annotation

Katie shows that she understands the relationship between the diameter and the circumference of a circle. She knows that the circumference is about three times larger (3.14) than the diameter, and she is able to calculate the circumference by multiplying the diameter by 3.14. She understands that this rule can be applied to all circles because the ratio between diameter and circumference is constant.

Problem: Calculating circumference

The teacher gives the student a ruler and a circular lid. Then the teacher asks the student to calculate the circumference of the lid.

Student Response

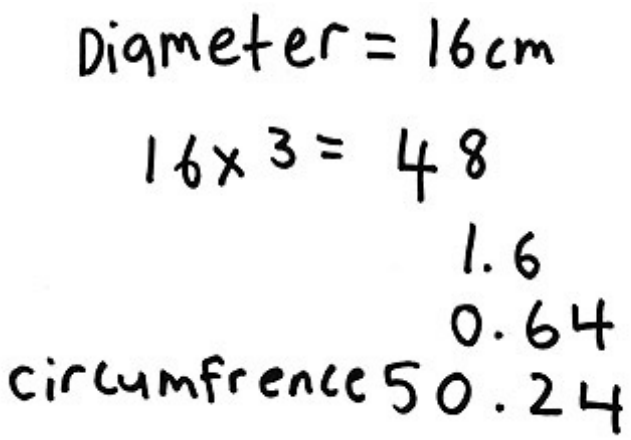
Teacher: What are you measuring when you measure circumference?

Katie: The perimeter of the circle.

Katie measures across the circle and calculates the diameter to be 16 centimetres. She records her calculation.

Teacher: Why did you measure across the circle?

Katie: Because, for any circle, the circumference is just over three times larger than the diameter. It's actually 3.14.



Katie: The circumference is 16 x 3.14. So it's 50.24 centimetres.

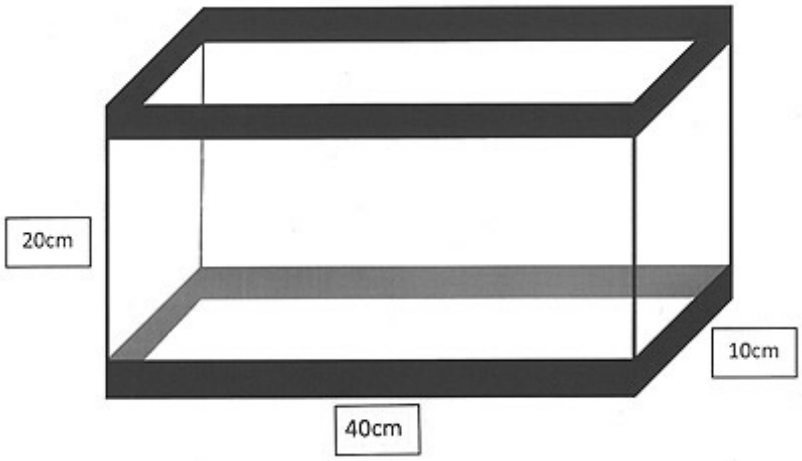
The fish aquarium

Annotation

Aleisha understands the metric units of measure and the mathematical relationship between them. She knows that 1 litre of water has a weight/mass of 1 kilogram and a volume of 1000 cubic centimetres. She uses this knowledge to solve problems and is able to clearly explain the connections between the units as she uses them.

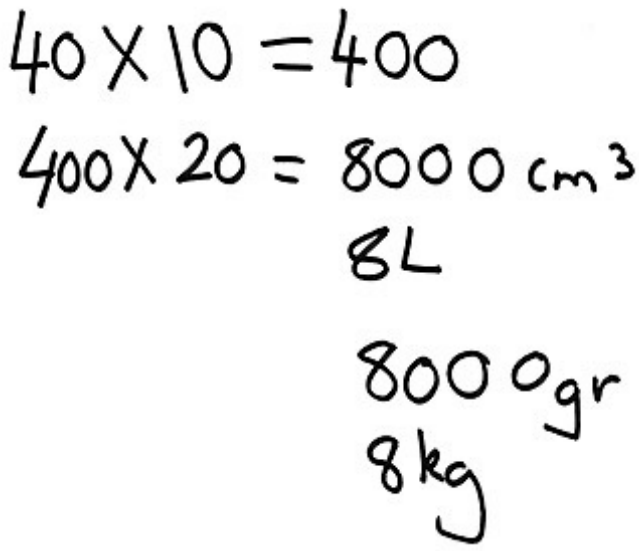
Problem: The fish aquarium

The teacher places a diagram of an aquarium with its dimensions in front of the student. Then the teacher asks the student how many litres of water the aquarium would hold if it were filled to the top and the weight of this amount of water.



Student Response

Aleisha calculates the volume of the aquarium and converts between measurement units.



Teacher: Please explain your working.

Aleisha: I multiplied the length of all the sides together, so that's 40 x 10, which is 400. And then 400 x 20 is 8000 – that's cubic centimetres because the sides are all in centimetres.

Teacher: Tell me about the 8 litres and the 8 kilograms.

Aleisha: Well 1 cubic centimetre is the same as 1 millilitre, and 1 millilitre weighs 1 gram. So 8000 cubic centimetres is 8000 millilitres, which is 8000 grams. Another way to think about it is that 1 litre of water weighs 1 kilogram, so 8 litres weighs 8 kilograms.