National 5: Measurement & Geometry

Learning Intention	I can calculate a quantity based on two related pieces of information.	(GM Outcome 1)

Success Criteria	☺	😐	☹
• I can calculate a quantity based on two related pieces of information. (1) Find the volume of the triangular prism with a height of 3 cm, width of 5 cm and length of 12 cm. (2) If a = 5, b = 7 and c = 11 then evaluate: (a) $4a + 2b$ (b) $b^2 - 6ab$ (c) $50c^2 + 3ab$ (3) Tom spent half of his allowance going to the cinema. He washed the family car and earned £9. What is his weekly allowance if he ended with £17?			

Learning Intention	I can construct a scale drawing, including choosing a scale.	(GM Outcome 1)

Success Criteria	☺	😐	☹
• I can construct a scale drawing, including choosing a scale, from verbal information or a sketch. (3) (a) On a scaled map of Orkney the distance from Finstown to Kirkwall is 11.5 cm. In real life the distance and bearing from Kirkwall to Finstown is 6.9 miles and 288° respectively. What is the scale on this map? (b) Make a scale drawing of the journey from Finstown to Kirkwall using your scale.			

Learning Intention	I can plan a navigation course.	(GM Outcome 1)

Success Criteria	☺	😐	☹
• I can plan a navigation course using a given map or using bearings and lengths. (4) Joey wins a helicopter tour of Orkney in a competition. The helicopter flies from Stromness to Kirkwall and then on to Birsay. Write the directions for this journey using scaled distances and bearings.  			

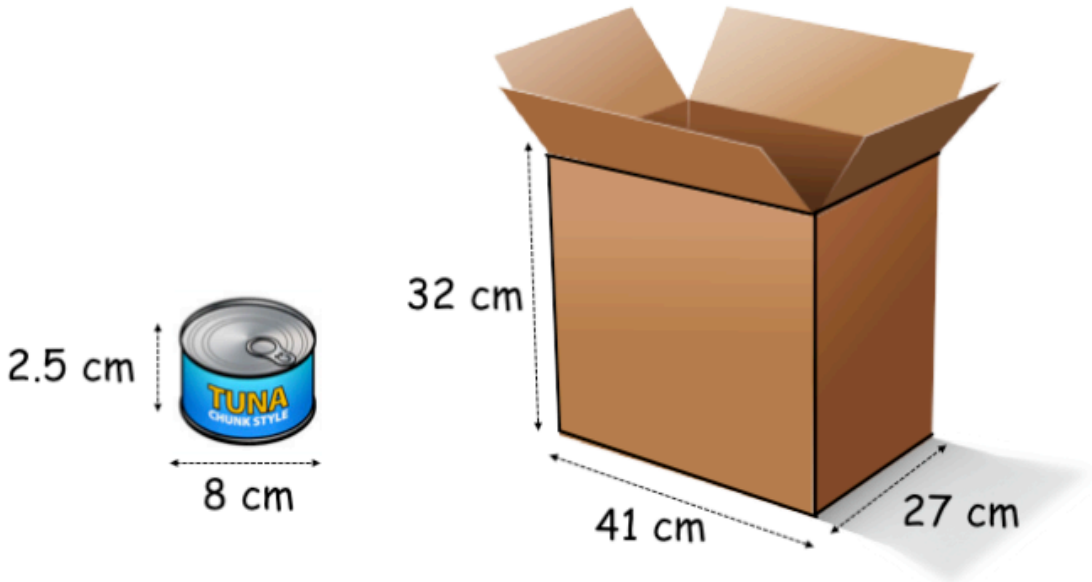
Learning Intention	I can carry out efficient container packing.	(GM Outcome 1)

Success Criteria	☺	😐	☹

- I can assign items to uniform containers to minimise the amount of containers used.

(5) Josephine has a summer job backing boxes at a local factory. One job is packing cylindrical tins into a box.

The dimensions are as follows:



Note: drawing is not to scale.

What is the maximum number of tins she can fit into the box? **Justify your answer with workings.**

Learning Intention	I can use precedence tables to plan tasks.	(GM Outcome 1)

Success Criteria	☺	😐	☹

- I know that some activities can be done simultaneously whereas others must be done in sequence.

(6) The table shows what Emma does in the morning before she leaves for work and the times, in minutes, required to complete the steps. Some steps can be completed at the same time.

	Steps	**Time (minutes)**
A	Get up	5
B	Walk dog	40
C	Feed dog	10
D	Have Shower	20
E	Get dressed	8
F	Make tea	2
G	Make Toast	4
H	Eat breakfast	5
I	Drive to work	35

(a) Draw a network diagram to show the sequence of events.

(b) Calculate the least time it takes Emma to get ready for work in the morning.

Learning Intention	I can solve problems involving time management.	(GM Outcome 1)

Success Criteria	☺	😐	☹

- I can solve problems in time management by planning timing of activities with some complex features including working across time zones.

(7) Brian McKeever, from Calgary in Canada is a 90% blind cross country skier and Biathlete.

He starts his race at 09:35 in Sochi, Russia.

He takes 23 minutes and 57 seconds to complete his race.

(a) What time does he finish his race?

(b) The following table illustrates different time zones, compared to Greenwich Mean Time (GMT).

Calgary, Canada	Halifax, Canada	London, GB	Sochi, Russia	Tokyo, Japan
-7	-4	0	+3	+9

If his family in Calgary wanted to watch his match live, what time would they need to start watching?

Learning Intention	I can consider the effects of tolerance.	(GM Outcome 2)

Success Criteria	☺	😐	☹

- Given tolerance, I can calculate the limits.
- Given the accuracy of the methods of production of two fitting components, I can consider the implications for compatibility. (Including the use of millimetres)

(8) A company that makes 'Sticks of Rock' monitors the thickness, in millimetres, of twenty sticks. The results are as follows:

22.1	22.5	21.9	21.6	22.2	21.8	22.6	22.4	21.7	22.2
22.1	22.0	21.5	21.6	22.4	22.1	23.0	22.0	21.9	22.4

(a) To pass quality control, the maximum thickness is 22.6 mm and the minimum is 21.6 mm. Write this in tolerance form.

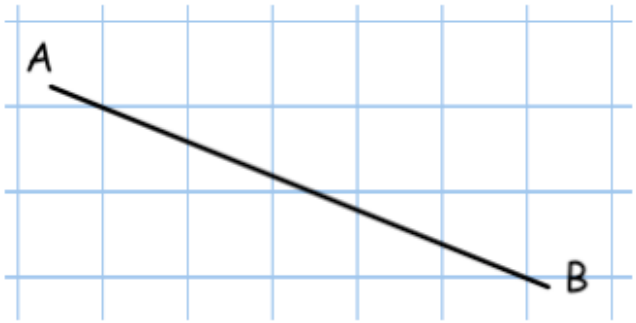
(b) What percentage of 'Sticks of Rock' pass quality control?

Learning Intention	I can investigate a situation involving gradient.	(GM Outcome 2)

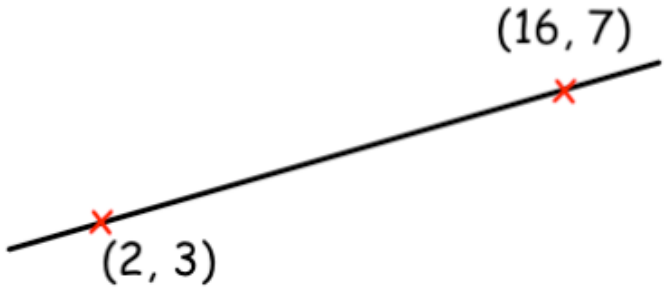
Success Criteria	☺	😐	☹

- I can find the gradient of a slope using: $m = \dfrac{vertical}{horizontal}$
- I can find the gradient of a slope between two points, using the formula: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

(1) (a) Find the gradient of the slope AB.



(b) Find the gradient between (2, 3) and (16, 7).



Learning Intention	I can solve a problem involving a composite shape, which include part of a circle.	(GM Outcome 2)

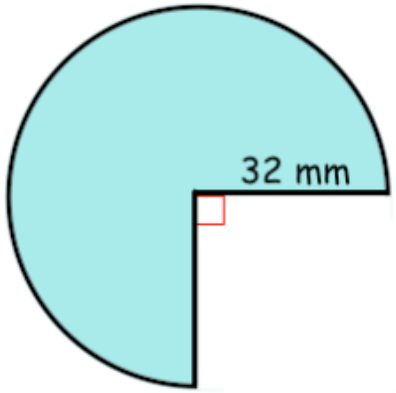
Success Criteria	☺	😐	☹

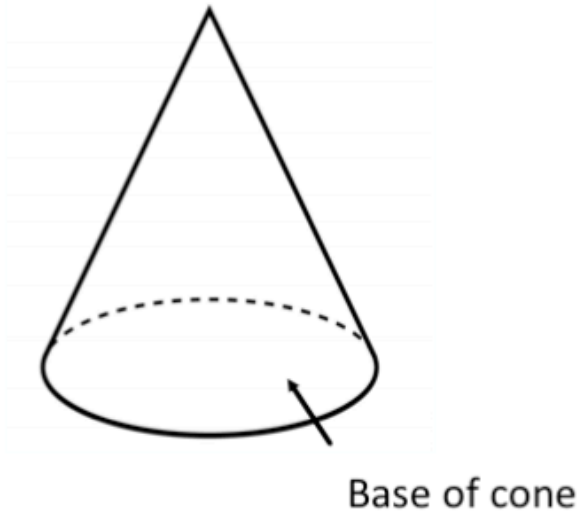
- I can calculate the perimeter and area of a composite shape:

(2) Alice is making a cone decoration. The decoration is made from part of a circle, which is curved to make the cone shape. The radius of the circle is 32mm.

(a) How much card will Alice need to make the decoration?

(b) Alice decides to put ribbon around the base of the cone. What length of ribbon will Alice need? Give your answer to the nearest centimetre.



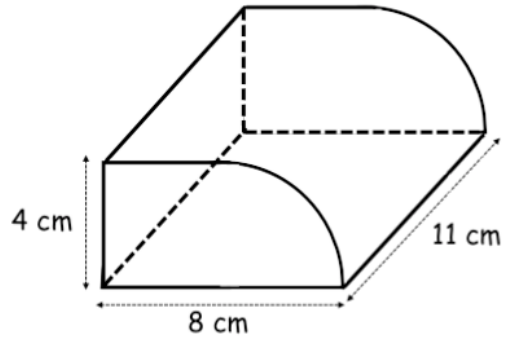


Learning Intention	I can solve problems involving the volume of a composite solid.	(GM Outcome 2)

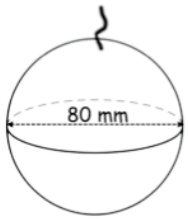
Success Criteria	☺	😐	☹

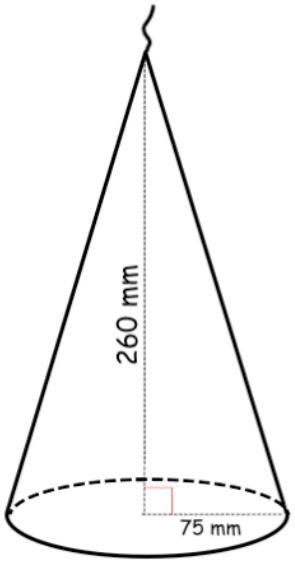
- I can calculate the volume of a solid including simple fractional parts of a solid.

(3) (a) Calculate the volume of the following composite solid: which is made from a cuboid and quarter of a cylinder.



(b) How many spherical candles can be made by melting down the wax candle shaped like a cone?



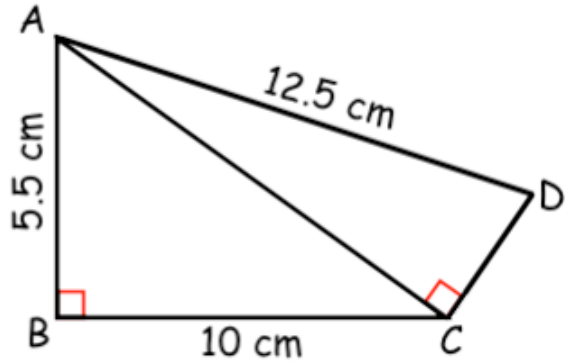


Learning Intention	I can solve a problem using Pythagoras' theorem within a two-stage calculation.	(GM Outcome 2)

Success Criteria	☺	😐	☹

- I can find the missing side of a right-angled triangle using Pythagoras' theorem more than once.

(4) (a) Calculate the length of the side AD.



(b) In the cuboid below the length is 12 cm, the breadth is 5 cm.

Your job is to work out the height, GC, of the box given the space diagonal is 15 cm.