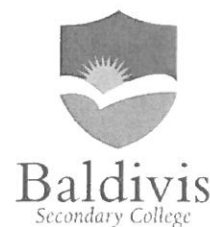


YEAR 12 Essentials Mathematics
Semester 1 2018
Test 3 - Volume, Capacity, 2D & 3D shapes, Scale, plans.



Name: Marking Guide

Total Marks: 56 marks
Total Time: 60 minutes

Full working out must be shown to get full marks.

Attempt all questions

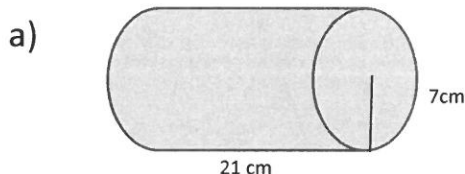
Total Time: 60 minutes

Resources allowed:

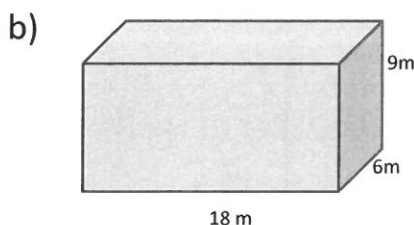
**1 A4 page, (1 side) of hand written notes, ruler
Calculator**

1. Using the correct formula find the volume for each figure

[2, 2, 2, 2, 2-10 Marks]

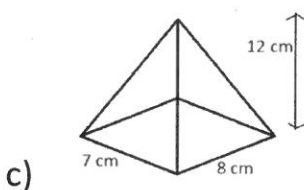


$$\begin{aligned} V &= \pi r^2 \times h \\ &= \pi \times 7^2 \times 21 \\ &= 3232.70 \text{ cm}^3 \end{aligned}$$

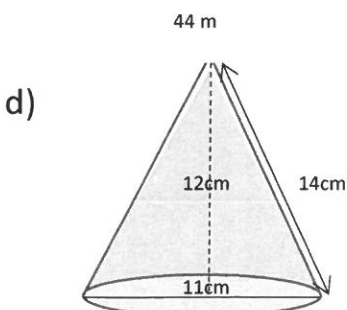


$$\begin{aligned} V &= \text{Area of base} \times h \\ &= 18 \times 6 \times 9 \\ &= 972 \text{ m}^3 \end{aligned}$$

$-\frac{1}{2}$ mark
once if no/
incorrect units.

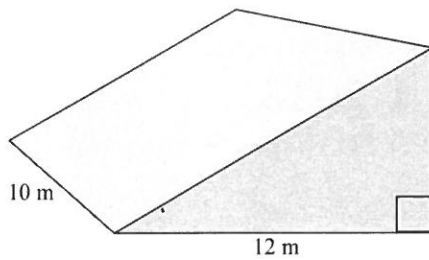


$$\begin{aligned} V &= \frac{1}{3} \times L \times W \times h \\ &= \frac{1}{3} \times 7 \times 8 \times 12 \\ &= 224 \text{ cm}^3 \end{aligned}$$



$$\begin{aligned} V &= \frac{1}{3} \times \pi r^2 \times h \\ &= \frac{1}{3} \times \pi \times 5.5^2 \times 12 \\ &= 380.13 \text{ cm}^3 \end{aligned}$$

e)



5 m

$$\begin{aligned} & \left(\frac{1}{2} b \times h\right) \times l \\ & = \left(\frac{1}{2} \times 12 \times 5\right) \times 10 \checkmark \\ & = 30 \times 10 \\ & = 300 \text{ m}^3 \checkmark \end{aligned}$$

2. Convert the following measurement to the units specified: [1,1,1,1 - 4 marks]

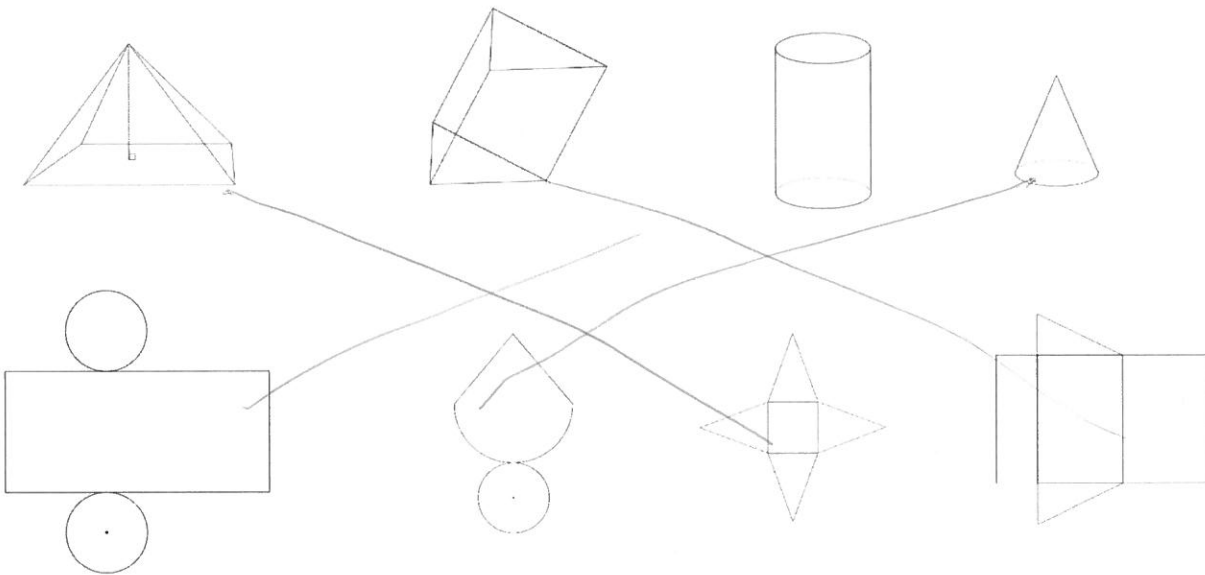
a) $7500 \text{ cm}^3 = \frac{7500}{1000} \text{ m}^3 = 7.5 \text{ m}^3$

b) $0.185 \text{ m}^3 = 0.185 \times 1000 \text{ cm}^3 = 185 \text{ cm}^3$

c) $9.6 \text{ L} = 9.6 \times 1000 \text{ cm}^3 = 9600 \text{ cm}^3$

d) $7154 \text{ m}^3 = 7154 \times 1000 \text{ L} = 7154000 \text{ L}$

3. Match the nets with the following shapes: [1,1,1,1 - 4 marks]



4. Thelma and David built a recycling bin that is 6 meters wide, 12 meters long, and 14 meters high. What volume of trash can fit inside of the bin? [2 Marks]

$$\begin{aligned} V &= L \times W \times H \\ &= 12 \times 6 \times 14 \checkmark \\ &= 1008 \text{ m}^3 \checkmark \end{aligned}$$

1008 m³ of trash can fit inside

5. The cylindrical canister of a fire extinguisher has a radius of 4 cm and is 12 cm high. What is the capacity, in litres, of the fire extinguisher? [3 Marks]

$$\begin{aligned}
 V &= \pi r^2 \times h \\
 &= \pi \times 4^2 \times 12 \checkmark \\
 &= 603.19 \text{ cm}^3 \checkmark = 603.19 \text{ mL} = 0.603 \text{ L} \checkmark
 \end{aligned}$$

6. Cindy went to Maggie Moo's for an ice cream cone after school. The ice cream cone had a radius of 3 cm, a height of $2\frac{1}{2}$ cm, and a slant length of $3\frac{1}{2}$ cm, how much ice cream could the cone hold? \rightarrow need to recognise that it is capacity. [3 Marks]

$$\begin{aligned}
 V &= \frac{1}{3} \times \pi \times r^2 \times h \text{ (perpendicular) NOT slant.} \\
 &= \frac{1}{3} \times \pi \times 3^2 \times 2.5 \checkmark \\
 &= 23.56 \text{ cm}^3 \checkmark = 23.56 \text{ mL} \checkmark
 \end{aligned}$$

7. Concrete blocks can be used to build houses

3 marks.
[3, 1-4 marks]

- a. Each concrete block measures 45cm by 17cm by 210mm. Calculate the volume of one block.

$$\begin{aligned}
 V &= L \times W \times h \checkmark \left(\frac{1}{2}\right) \\
 &= 45 \times 17 \times 21 \checkmark \left(\frac{1}{2}\right) \\
 &= 16065 \text{ cm}^3 \checkmark \left(\frac{1}{2}\right)
 \end{aligned}$$

- b. A wall is made from 80 concrete blocks. Calculate the volume of the wall, in cubic meters?

$$\begin{aligned}
 &16065 \times 80 \left(\frac{1}{2}\right) \\
 &= 1285200 \text{ cm}^3 \div 100^3 \left(\frac{1}{2}\right) \\
 &= 1.29 \text{ m}^3 \checkmark \left(\frac{1}{2}\right)
 \end{aligned}$$

8. Sketch the following:

[2, 2-4 marks]

- a) A regular octagon

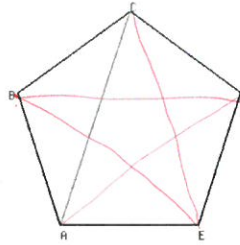
- 8 sided
- note that
sides are
equal

- b) An irregular hexagon

6 sided
not all lengths
are the same.

9. Consider the polygon ABCDE

[1,1,1- 3 marks]



a) State the number of vertices and edges of the polygon

Vertices = 5 (A, B, C, D, E) $\left(\frac{1}{2}\right)$

Edges = 5 (A-B, B-C, C-D, D-E, E-A) $\left(\frac{1}{2}\right)$

b) Hence, name the polygon

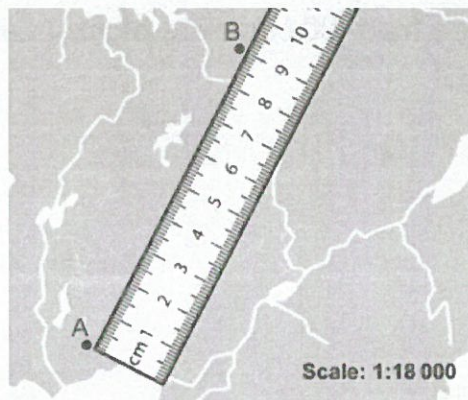
pentagon

c) The diagonal [AC] is shown using a dashed line. List the other diagonals of the polygon

A-D, E-B, E-C, B-D $\frac{1}{4}$ mark each

10. What is the distance between A and B, in meters, using this map? [2 marks]

What is the distance between A and B in metres, using this map?

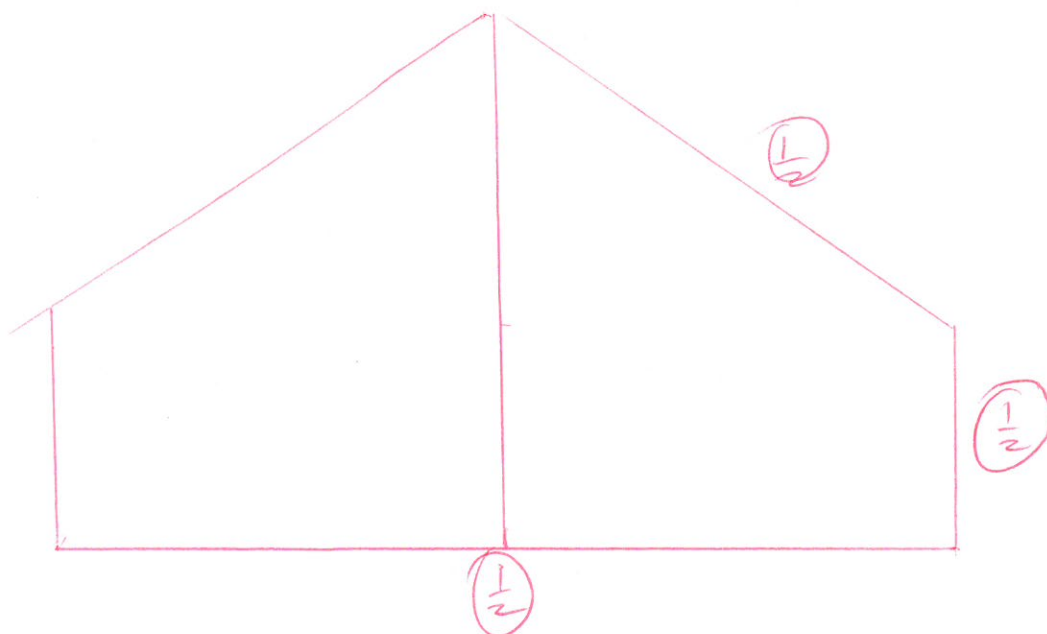
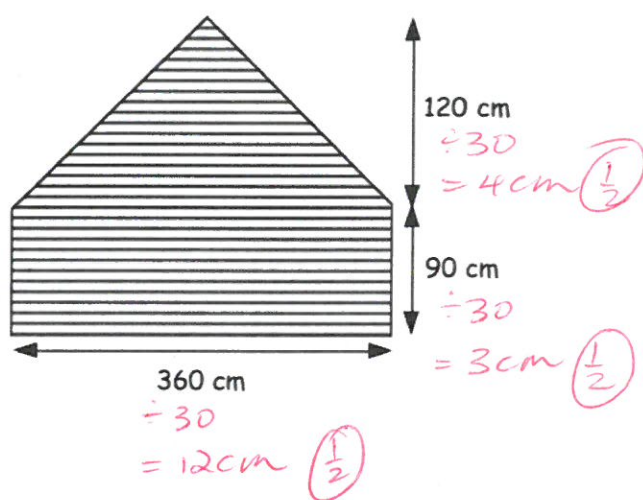


$\times 9 \left(\begin{array}{l} 1:18000 \\ \downarrow 9:162000 \end{array} \right) \times 9 \checkmark \textcircled{1}$
 $162000 \div 1000 \checkmark \left(\frac{1}{2}\right)$
 $= 162 \text{ m} \checkmark \left(\frac{1}{2}\right)$

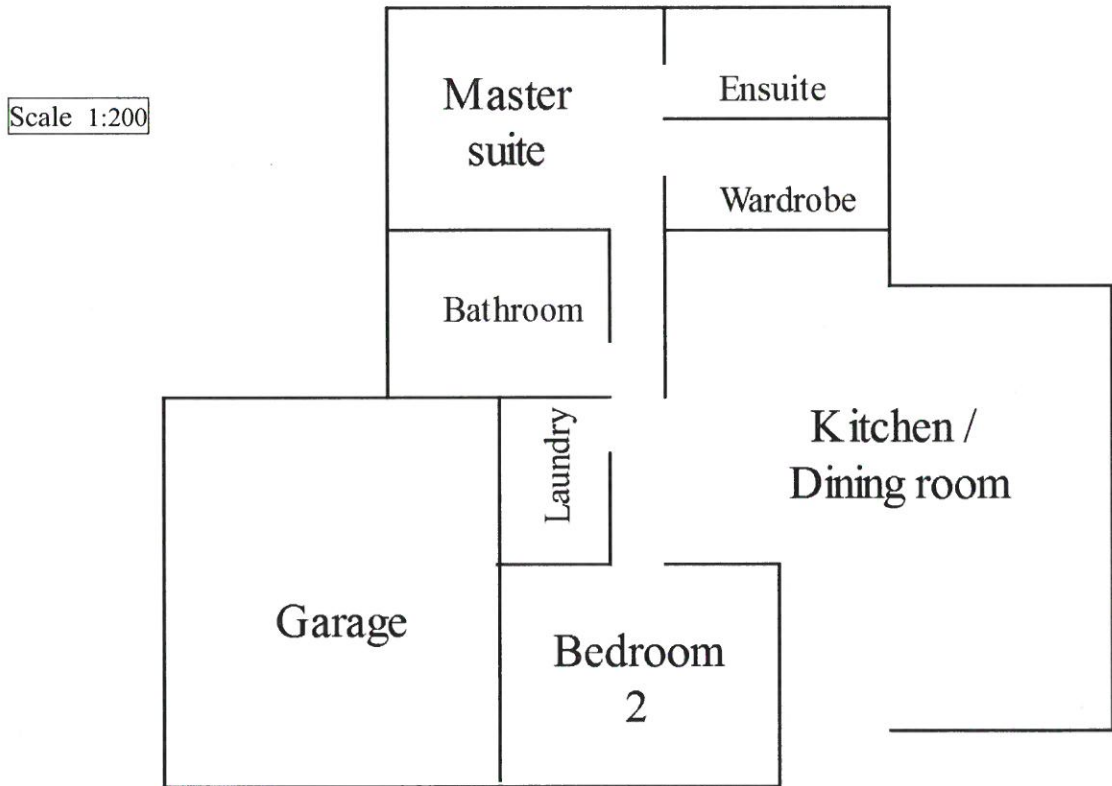
11. Ben is producing a scale diagram of a swimming pool he plans to build. The pool's dimensions are 2m by 6m. When he measures the drawing of his plan he sees that it is 8cm by 24 cm. What scale should he use on his plan? [2 marks]

$$\begin{array}{l} \times 25 \quad (8:24) \quad \times 25 \\ \quad \downarrow \quad \quad \downarrow \\ \quad 200:600 \quad \checkmark \end{array} \quad \begin{array}{l} 1:25 \\ \checkmark \end{array}$$

12. This sketch shows the side view of a children's garden house. It consists of an isosceles triangle on top of a rectangle. Make a scale drawing of it using a scale of 1 cm = 30 cm [3 marks]



13. Below is the floor plan for Miss Granville's new holiday house. [3, 2, 5,-10 marks]



a. Using the scale given, find the area of the garage in meters².

$$\begin{aligned}
 A &= L \times W \\
 &= 4.7 \times 4.2 \quad \checkmark \textcircled{1} \\
 &= (4.7 \times 200) \times (4.2 \times 200) \\
 &= 940 \text{ cm} \times 840 \text{ cm} \quad \checkmark \textcircled{1}
 \end{aligned}$$

$$\begin{aligned}
 &9.4 \times 8.4 \\
 &= 78.96 \text{ m}^2 \quad \checkmark \textcircled{1}
 \end{aligned}$$

b. Miss Granville decides that she wants to concrete the floor of the garage. If concrete costs \$21.20 per square meter, how much will it cost to complete?

$$\begin{aligned}
 &78.96 \times 21.20 \quad \checkmark \textcircled{1} \\
 &= \$1673.95 \quad \checkmark \textcircled{1}
 \end{aligned}$$

- c. The bathroom, laundry and ensuite are to be tiled, with tiles costing \$41.40/m². How much will it cost to buy tiles?

Bathroom area

$$\begin{aligned} A &= L \times W \\ &= 2.7 \times 2.1 \\ &= (2.7 \times 200) \times (2.1 \times 200) \\ &= 540 \text{ cm} \times 420 \\ &= 5.4 \text{ m} \times 4.2 \text{ m} \quad \left(\frac{1}{2}\right) \\ &= 22.68 \text{ m}^2 \quad \left(\frac{1}{2}\right) \end{aligned}$$

Laundry - 2.1 x 1.4

$$\begin{aligned} &= 420 \times 280 \\ &= 4.2 \text{ m} \times 2.8 \text{ m} \quad \left(\frac{1}{2}\right) \\ &= 11.76 \text{ m}^2 \quad \left(\frac{1}{2}\right) \end{aligned}$$

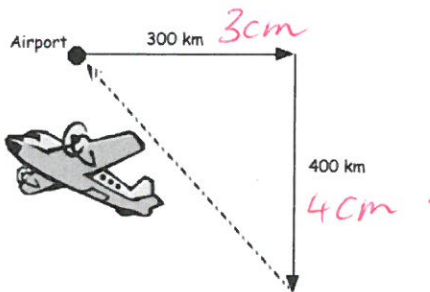
Ensuite - 2.8 x 1.4

$$\begin{aligned} &= 560 \text{ cm} \times 280 \text{ cm} \\ &= 5.6 \text{ m} \times 2.8 \text{ m} \quad \left(\frac{1}{2}\right) \\ &= 15.68 \text{ m}^2 \quad \left(\frac{1}{2}\right) \end{aligned}$$

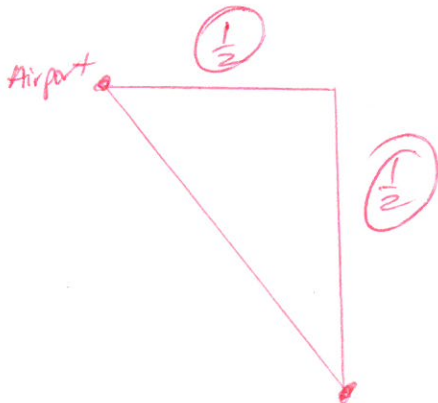
$$\begin{aligned} \text{Total area to be tiled} &= 22.68 + 11.76 + 15.68 = 50.12 \text{ m}^2 \quad \left(\frac{1}{2}\right) \\ \text{Cost of tiles} &= 50.12 \times 41.40 \quad \left(\frac{1}{2}\right) \\ &= \$2074.97 \quad \left(\frac{1}{2}\right) \end{aligned}$$

14. An aeroplane leaving an airport flew due east for 300 km and due south for 400 km. He then discovered he had engine trouble and decided to fly directly back to the airport.

[3 marks]



- a) Make a scale drawing of the journey using a scale of 1 cm = 100 km.



- b) When he began to fly back to the airport the pilot noticed he only had enough fuel to travel 520 km. Can the plane make it back to the airport safely? Explain

measure the distance back = 500 km \therefore 500 km. $\left(\frac{1}{2}\right)$

Yes, he only needs to travel 500 km + he has an extra bit of fuel for 20 km.

End of Test

