Year 8 Core Maths 2018
MEASUREMENT ASSESSMENT TASK: Backyard Blitz

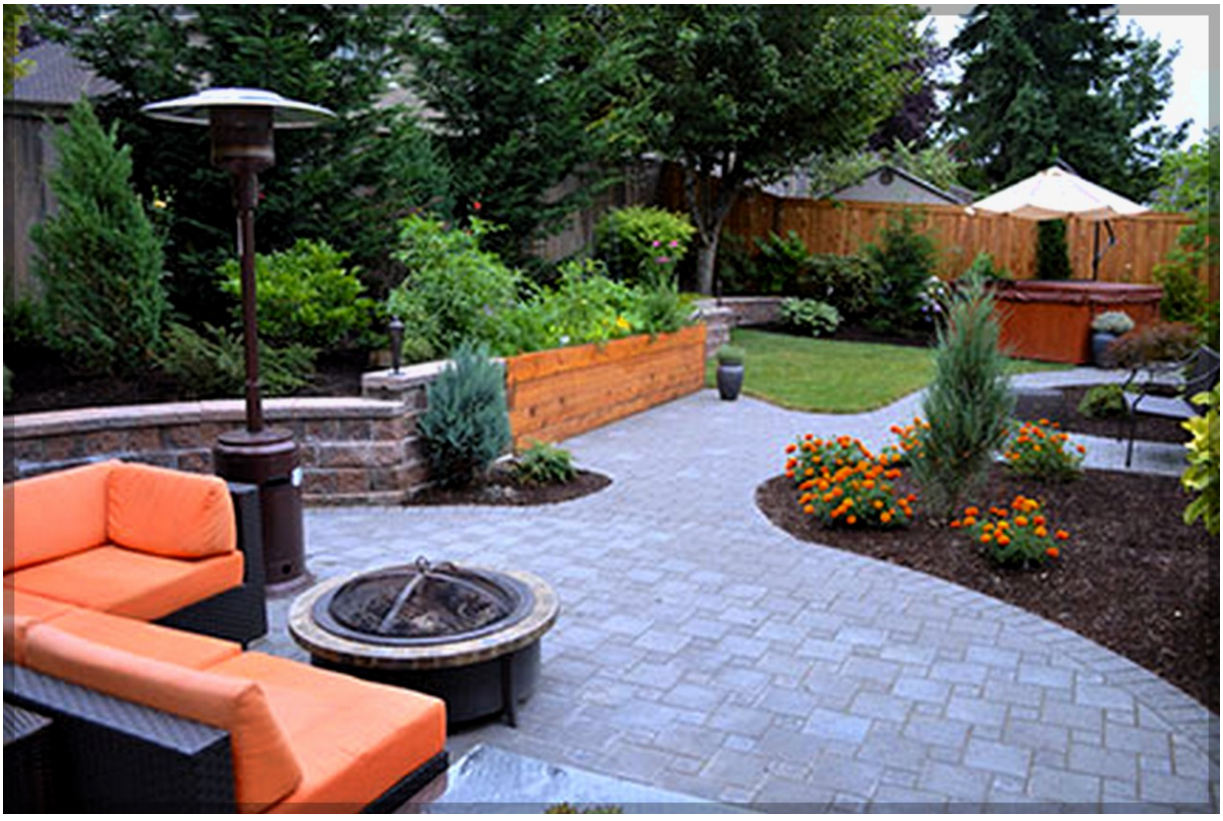
NAME : _____

Reading Time: 5 minutes **Writing Time: 65 + 30 = 95 minutes**

Percentage: _____
Grade: O EX VG G A BA NS

INSTRUCTIONS:

1. This assessment task consists of 4 parts:
   - Parts 1 and 2 are to be completed in 65 minutes under tests conditions.
   - Parts 3 and 4 are to be completed in pairs or groups of 3 in 30 minutes.
2. Your teacher will collect your Parts 1 and 2 before you start Parts 3 and 4.
3. You are permitted to use a calculator.
4. You are permitted to use one reference book.
5. All working must be shown to achieve the allocated marks.
6. Answers must be given with appropriate units of measure.

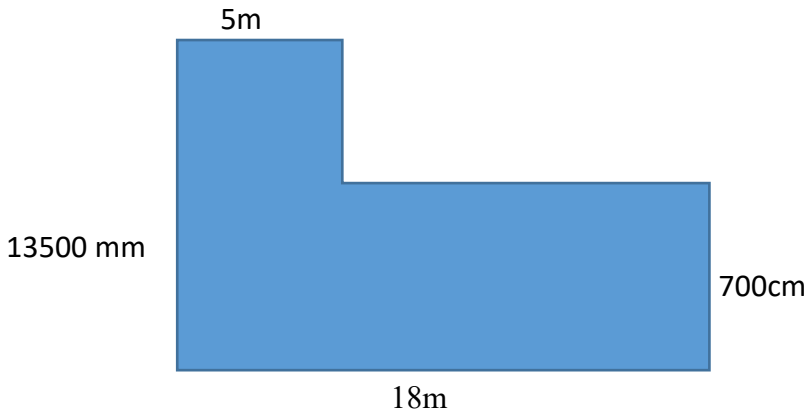


You have been selected to be an entrant on a new TV show which involves redesigning a backyard for a chosen family.
This job will involve you using the skills you have learnt in the Measurement Unit.
You must make sure you follow all of the requirements given by the family.

Part 1. Demonstrating your mathematical knowledge and skills **(18 marks)**

Before you start with the design, the owner of the home wants to make sure you can do some basic measurement calculations☺

The backyard is composite in shape, with measurements as shown:



1. Calculate:
   a) the perimeter of the backyard, correct to the nearest metre. (3 marks)

   _____
   _____
   _____
   _____
   _____

   b) The area of the backyard, correct to the nearest square metre. (3 marks)

   _____
   _____
   _____
   _____
   _____

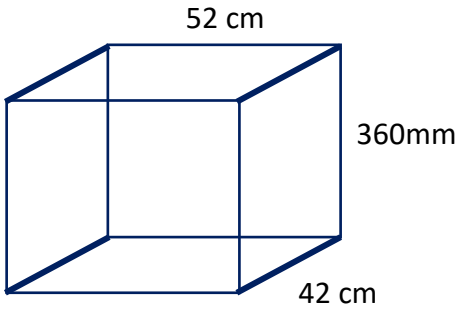
2. The backyard will have a circular firepit that the owner wants to use but is not sure where it will fit best. To help work this out:
   a) Calculate the circumference of the firepit, correct to the nearest centimetre, given the **diameter is 540mm**. (2 marks)

   _____
   _____

   b) Calculate the area of the firepit, correct to the nearest square centimetre. (2 marks)

   _____
   _____
   _____

3. The owner is a keen recycler so wants you to use the planter boxes she already has as part of the garden design. Each of the boxes has the dimensions as shown below:



a) Calculate the volume of this planter box in cubic centimetres. (2 marks)

_____

_____

_____

b) If there are four of these planter boxes, would they fit in a 1 square metre area near the back door? Show calculations to explain your answer. (2 marks)

_____

_____

_____

_____

4. The owner would like you to work your garden design between 0800 and 1730 from Monday to Friday.

a) Convert these times to 12 hour times. (2 marks)

_____

_____

b) If the owner allows you to have a snack break from 10:30am to 11:00am and lunch from 1200 to 1245, how long, in hours and minutes, do you have for breaks each day? (2 marks)

_____

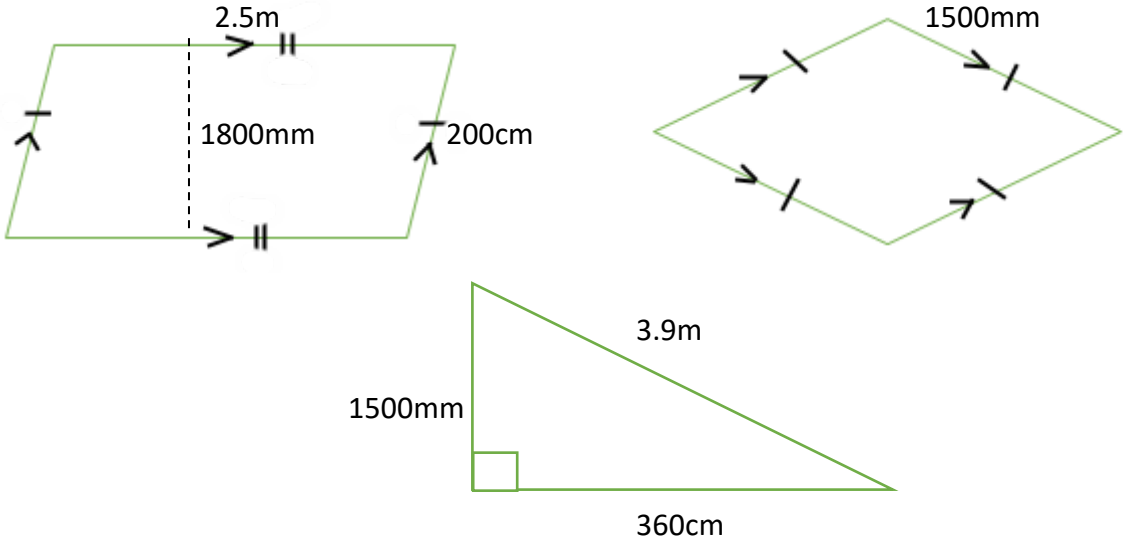
_____

_____

_____

Part 2. Applications of Measurement and Geometry **(25 marks)**

1. The owner enjoys gardening and is also a little bit of a Maths nerd! So, she has asked you to include three different shaped garden beds for her backyard as shown below:



a) Give the correct mathematical name of each shape. (3 marks)

_____
_____
_____

b) Calculate the perimeter of each garden bed, correct to the nearest metre. (3 marks)

_____
_____
_____
_____
_____

c) Each garden bed needs to have a timber edge around it so you can put soil and plants inside. Bunnings sells timber sleepers, **in the shape of a cuboid**, which you can use for the edging as shown**. Dimensions are W=200mm H=50mm L=1.8m**

How many sleepers will you need to buy for each garden bed? (3 marks)

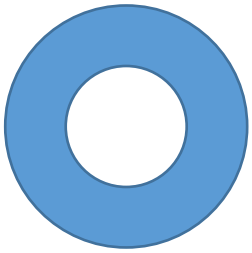
_____
_____
_____
_____
_____

2. The owner also really loves sitting by the firepit on the weekends, enjoying reading her book. To make sure she doesn't sit too close to the fire, she would like you to include an area around the firepit and fill it with pebbles. (3+1+2=6 marks)

a) Calculate the **area** that needs to be filled with pebbles, to the nearest square centimetre.

_____
_____
_____
_____

A 'bird's eye view' if the firepit is shown:
The shaded area to be filled with pebbles is 30cm wide.
Remember: the diameter of the firepit is 540mm.



b) If the pebbles need to be 10cm deep to cover the area properly, how many cubic centimetres of pebbles will be needed?

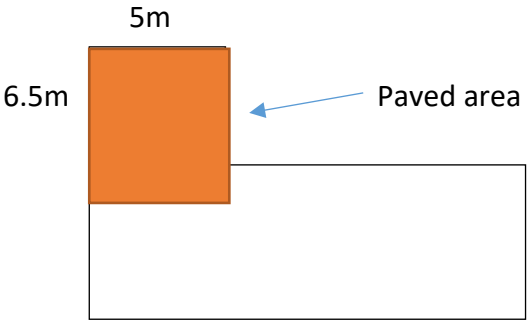
_____
_____
_____
_____

c) Pebbles come in 20 litre bags from Bunnings. How many bags of pebbles will you need to order?

Remember: 1000 cubic centimetres = 1 litre

_____
_____
_____
_____

3. The owner would like paved area where she can put her outdoor furniture. This area will be the shaded section of the backyard as indicated on the diagram below:



a) Calculate the area to be paved, correct to the nearest square metre. (1 mark)

_____
_____

b) The pavers the owner would like to use are 45cm x 45cm. How many of these pavers would you need to order to cover the area? (3 marks)

_____
_____
_____
_____
_____

4. The owner wants to install a water tank to make sure she can water her plants using recycled water. She found a couple on ebay, shown below. (2+2+2=6 marks)

a) Calculate the volume of each water tank to the nearest cubic metre.

_____
_____
_____
_____
_____
_____

Length =3.5m
Width=60cm
Height=1.85m

b) If the owner needs at least 4000 litres of water, which one should she choose?
Remember: 1 cubic metre = 1000 litres

_____
_____
_____
_____

Part 3: Using Design Thinking Process to design a new veggie patch **(21 marks)**

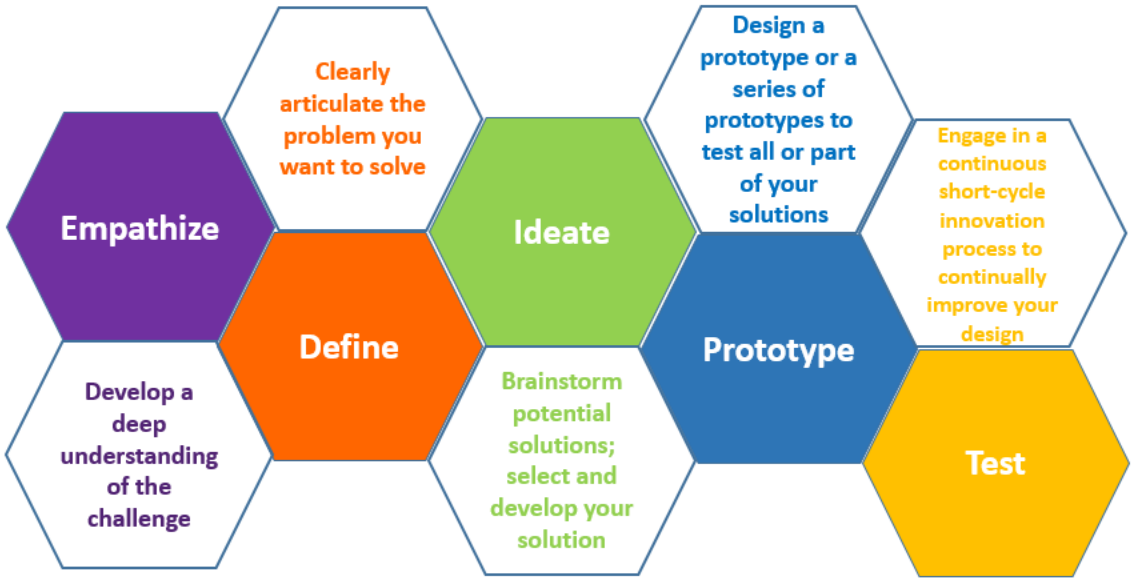
The last thing the owner wants you to include is a veggie patch. She is happy for you to choose the shape of the veggie patch as long as it is mathematical and has an area of $30m^2$.

To design the veggie patch, you need to:

- work in groups of 3 or 4
- follow the Design Think Process
- produce three designs which must include one trapezium
- produce a final design as a group, which must:
  - be a geometry shape
  - have an area of 30 m^2
  - have the smallest perimeter among your group's choices of designs

1. An overview of Design Thinking process

Design Thinking is a human centred approach to collaborative and creative problem solving. The diagram below is a brief summary of Design Thinking procedure.



2. Using Design Thinking To Design a Veggie Patch

(a) Empathizing **(3 marks)**

During this stage, you work in a group to develop a deep understanding of the challenge and answer the following sentences below and record your findings using the spaces provided below:

What is the challenge?

_____

_____

What are the people involved in the challenge?

_____

_____

What are the key requirements?

_____

_____

(b) Defining **(1+1+1=3 marks)**

Articulate the key requirements, the people involved in the challenge and available resources in the table below.

List the Key requirements:	List the people involved:	List the available resources:
_____	_____	_____
_____	_____	_____
_____	_____	_____

(c) Ideating and prototyping **(1+4+3 = 8 marks)**

Write a big "How Might We …?" question which will help you generate design ideas. Below is an example:

"*How might we use the grid to design a veggie patch which will have an area of 30 m^2 and a smallest perimeter of your designs?"*

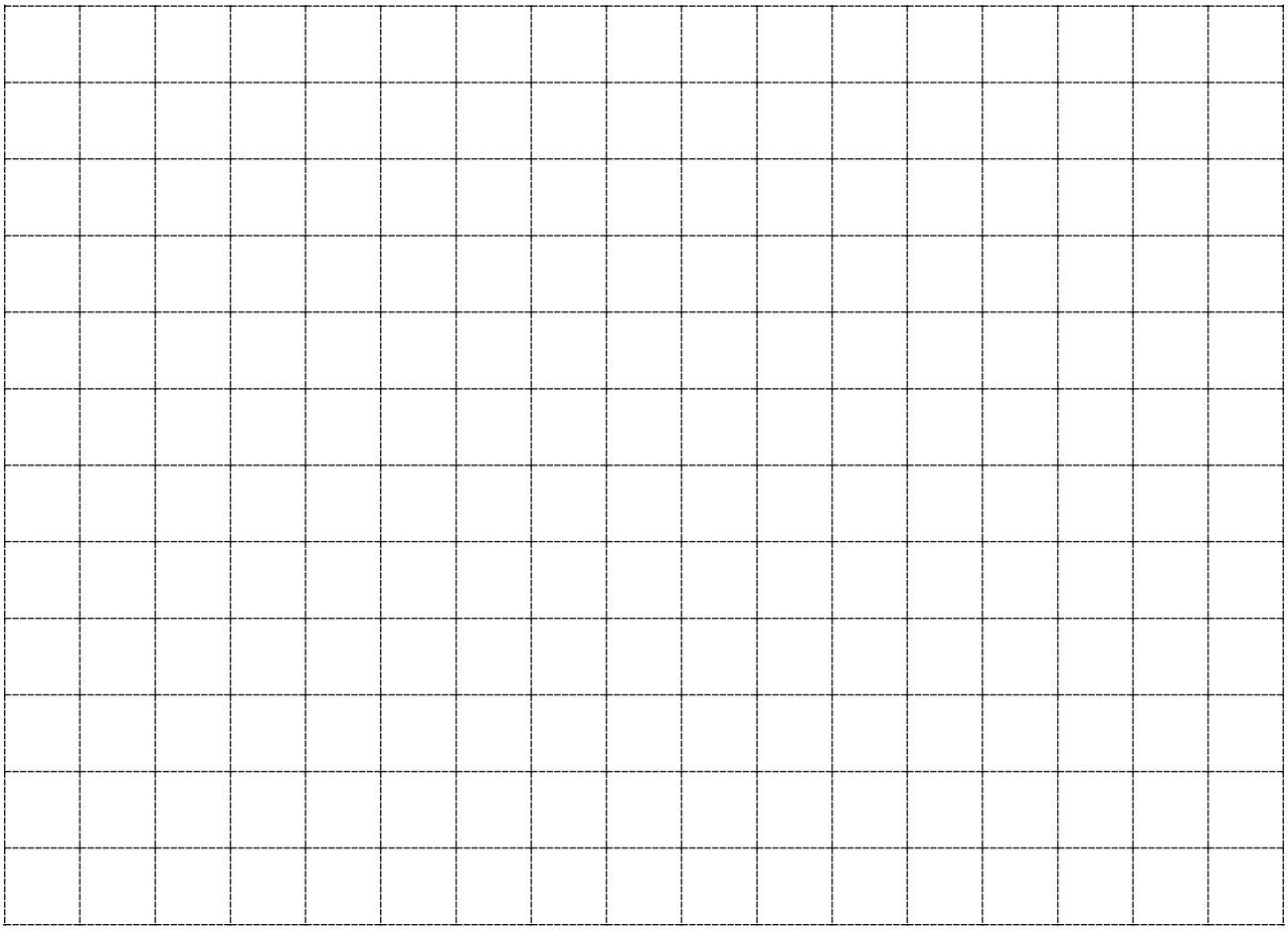
Write your **HMW** sentence below.

_____

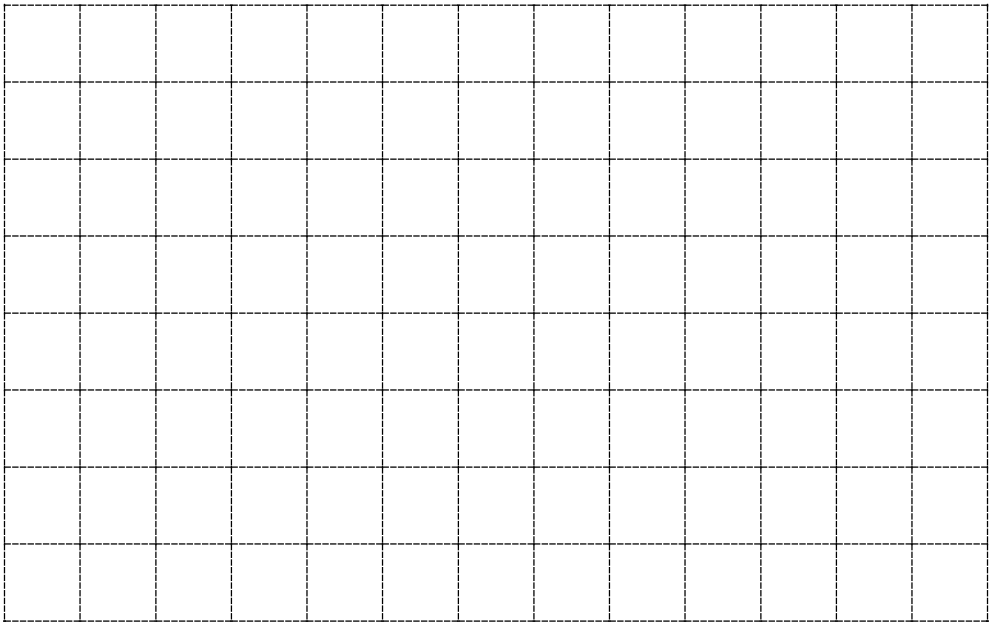
_____

_____

Brainstorm four shapes which have an area of 30 m^2 each. Draw the shapes on the grid below and calculate the perimeter and area for each shape beside it. Mark the scale ratio(s) on the grid paper on the next page.



Draw your group's design of a new veggie patch on the grid below including the dimensions of the veggie patch and a scale ratio.



(d) Testing **(3+3+1 = 7 marks)**

Engage in a continuous short-cycle innovation process to continually improve your design. You need to ensure that your group's final design satisfies the key requirements by asking the follow questions:

Is the area of our group's design 30 m^2? Is the perimeter of the new veggie patch the smallest?

To prove that the perimeter of the veggie patch is the smallest among all the designs, choose one of the other designs to complete the calculations below.

(i) Draw your group's design of a new veggie patch and calculate its area and perimeter. Round the perimeter to the nearest whole number if it is not a whole number. Show working.

My group's design	Area (A)	Perimeter (P)

(ii) Draw one of the other designs of a new veggie patch and calculate its area and perimeter. Round the perimeter to the nearest whole number if it is not. Show working.

My group's design	Area (A)	Perimeter (P)

(iii) Write sentences to explain that your group's final design is better than your other designs.

_____

_____

_____

Part 4. A rough sketch of the back yard **(5 marks)**

On the separate grid paper provided on the next page, draw a rough sketch of the way you would design the backyard. Remember the backyard is in L-shape.

Make sure you include:

- The firepit
- The three garden beds
- One of your designs for a veggie patch
- The paved area
- The water tank

End of Assessment Task