



2020 Year 11 SET Mathematics

Assessment Task 1 Designing a greenhouse

Due Date: Week 5	Assessment Name: Designing a greenhouse
Mark: /32	Weighting: 30 %
SYLLABUS OUTCOMES TO BE ASSESSED:	
MS11-3	solves problems involving quantity measurement, including accuracy and the choice of relevant units
MS11-4	performs calculations in relation to two-dimensional and three-dimensional figures
MS11-5	models relevant financial situations using appropriate tools
MS11-6	makes predictions about everyday situations based on simple mathematical models
MS11-9	uses appropriate technology to investigate , organise and interpret information in a range of contexts
DIRECTIVES TO BE ASSESSED:	
Calculate	Determine (the amount or number of something) mathematically
Interprets	To draw meaning from a mathematical situation.
Investigate	To examine situations using various techniques and in the process of their exploration. develop skills that can be applied to other problems.
Justify	To provide evidence to support your solution.
Model	To give a representation of mathematical problem obtained.
Predict	To make an educated guess about future events.
Solve	To manipulate something for a particular purpose to find the answer for mathematical problems.
<u>TASK DESCRIPTION:</u>	
To avoid contact with the supermarket, your family has decided to build a greenhouse in your backyard to grow as much of your food as possible.	
A greenhouse (also called a glasshouse) is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated climatic conditions are grown. The interior of a greenhouse, exposed to sunlight, becomes significantly warmer than the external temperature, protecting its contents in cold weather.	
Your task will be to design a greenhouse suitable for your family and backyard and associated costs about it's construction.	
Part A - Your investigation	
Part B - Designing your own greenhouse	
Part C – Paying Wages	

Part A - Your investigation

Before you start your own design, you decide to investigate one of the most famous glass structures of all times, the Louvre Pyramid. The Louvre Pyramid is a large glass and metal pyramid designed by Chinese American architect I. M. Pei. The large pyramid serves as the main entrance to the Louvre Museum. It was completed in 1989 and has become a landmark of the city of Paris.



The pyramid is 21.6 m high (from apex to the ground) with a square base whose side length is 34m. There are 603 rhombus shapes and 70 triangular shapes.

1. What are the dimensions (height and base) of each large triangular face?
Hint: The height is not 21.6m!
2. What is the area of each triangular face of the pyramid?
3. What is the surface area of glass used in the Louvre pyramid?
4. What is the volume of the Louvre pyramid?
5. Use a suitable method to determine how many visitors would fit in the Louvre Pyramid. Justify your answer by explaining the method you used.

Part 2 - Designing your own greenhouse

Using your knowledge of the size of the components used to build the Louvre, you are to design a greenhouse for your family. It does not need to look like a traditional greenhouse, be creative. It will need to fit in your backyard in a convenient location and be large enough to provide enough vegetables for your family. You may like to visit the website <https://morningchores.com/vegetable-garden-size/> to help determine how much space you will require.

1. Draw a 3D sketch of your design. You may like to use software such as Google Sketchup, or you could draw a neat diagram by hand.
2. Draw a scaled diagram of each side and the roof of your design. Make sure you include the dimensions of all components. Again, this could be done in Google Sketchup, or neatly by hand.
3. What is the overall surface area of glass you will need?
4. Laminated safety glass costs about \$320 per m². What will the glass cost for your glasshouse?
5. What other cost considerations will you need to consider?
6. What will the volume of your greenhouse be?
7. Justify your design by talking about the size, volume and cost to build.

Part 3 – Paying Wages

To help with the cost to build your greenhouse for your family, investigate the expense of hiring two builders to complete the project.

1. Research the hourly rate for an early career builder in Australia
2. Use the following rates to determine how long the project will take to construct. Note: these rates are set for two builders completing the work
 - i. Foundations 1.5 hours/m
 - ii. Walls 2.5 hours/m²
 - iii. Roof 3 hours/m²
 - iv. Doors/windows 1 hours/opening
3. Calculate the total wages for the project, then calculate how much each builder will get paid on completion of the project.
4. If one of the builders works 50 hours a week for 49 weeks a year. Calculate how much tax they would pay annually
5. Calculate the builders' net pay for this project.

STUDENT CHECKLIST:

Complete all points in part A

Complete all points in part B

Complete all points in part C

Submitted either electronically or in hard copy on day of attendance

Marking Guide	Marks
Part A - Investigation	
1. What are the dimensions (height and base) of each triangular face? (MS11-4)	
• Calculates the dimensions of each triangular face with no errors	2
• Calculates the dimensions of each triangular face with some errors	1
2. What is the area of each triangular face of the pyramid? (MS11-4)	
• Calculates the area of each triangular face	1
3. What is the overall surface area of glass you will need? (MS11-4)	
• Calculates the surface area of glass used in the Louvre pyramid	1
4. What is the volume of the Louvre pyramid? (MS11-4)	
• Calculates the volume of the Louvre pyramid	1
5. Use a suitable method to determine how many visitors would fit in the Louvre Pyramid. Justify your answer by explaining the method you used. (MS11-3)	
• Determines how many visitors would fit in the Louvre Pyramid. With detailed justification of your answer by explaining the method you used.	3
• Determines how many visitors would fit in the Louvre Pyramid. With justification of your answer by explaining the method you used.	2
• Determines how many visitors would fit in the Louvre Pyramid. With no justification of your answer.	1
Part 2 - Designing your own greenhouse	
1. Draw a 3D sketch of your design. You may like to use software such as Google Sketchup, or you could draw a neat diagram by hand. (MS11-9)	
• Drawn a 3D sketch of your design. Showing all dimensions	2
• Drawn a 3D sketch of your design.	1
2. Draw a scaled diagram of each side and the roof of your design. Make sure you include the dimensions of all components. Again, this could be done in Google Sketchup, or neatly by hand. (MS11-9)	
• Has drawn a scaled diagram of each side and the roof of your design. With dimensions shown on all components.	4
• Has drawn a scaled diagram of each side and the roof of your design. Without dimensions shown on all components.	3
• Has drawn a diagram of each side and the roof of your design. With dimensions shown on all components.	2
• Has drawn a diagram of each side and the roof of your design. Without dimensions shown on all components.	1
3. What is the overall surface area of glass you will need? (MS11-4)	
• Calculates overall surface area of glass	2
• Calculates surface area of glass with some errors	1

4. Laminated safety glass costs about \$320 per m ² . What will the glass cost for your glasshouse? (MS11-5)				
	• Calculates the glass cost for your glasshouse			1
5. What other cost considerations will you need to consider? (MS11-6)				
	• Writes a detailed list with explanation of other cost considerations			2
	• Writes a list of other cost considerations			1
6. What will the volume of your greenhouse be? (MS11-4)				
	• Calculates the volume of your greenhouse			1
7. Justify your design by talking about the size, volume and cost to build. (MS11-9)				
	• Justifies your design by talking in detail about the size, volume and cost to build.			1
Part 3 – Paying Wages				
1. Research the hourly rate for an early career builder in Australia (MS11-9)				
	• Writes the hourly rate for an early career builder in Australia			1
2. Use the following rates to determine how long the project will take to construct. Note: these rates are set for two builders completing the work (MS11-6)				
	• Calculates the rates to determine how long the project will take to construct.			2
	• Calculates the rates to determine how long the project will take to construct. With some errors			1
3. Calculate the total wages for the project, then calculate how much each builder will get paid on completion of the project. (MS11-5)				
	• Calculates the total wages for the project and calculates how much each builder will get paid			4
	• Calculates the total wages for the project and calculates how much each builder will get paid, with some errors			3
	• Calculates the total wages for the project			2
	• Calculates the total wages for the project, with some errors			1
4. If one of the builders works 50 hours a week for 49 weeks a year. Calculate how much tax they would pay annually (MS11-5)				
	• Calculates how much tax they would pay annually			2
	• Calculates how much tax they would pay annually, with some errors			1
5. Calculate the builders' net pay for this project. (MS11-6)				
	• Calculates the builders' net pay for this project.			2
	• Calculates the builders' net pay for this project, with some errors			1
	Part A	Part B	Part C	Total
MS11-3	/3			/3
MS11-4	/5	/3		/8
MS11-5		/1	/6	/7
MS11-6		/2	/4	/6
MS11-9		/7	/1	/7
Total	/8	/13	/11	/32