



Full name: _____

Teacher: _____

Due date: _____

Year 10 Mathematics

Assignment 1

2021

Outcomes Assessed

This assignment will address many outcomes from the Stage 5 syllabus, with particular focus on:

- Calculates the areas of composite shapes, and the surface area of rectangular and triangular prisms MA5.1-8MG
- Calculates the surface areas of right prisms, cylinders and related composite solids MA5.2-11MG.
- Applies formulas to calculate the volumes of composite solids composed of right prisms and cylinder s MA5.2-12MG
- Uses appropriate terminology, diagrams and symbols in mathematical contexts MA5.1-1WM
- Selects and uses appropriate strategies to solve problems MA5.1-2WM
- Provides reasoning to support conclusions that are appropriate to the context MA5.1-3WM

Content Assessed

Refer to the attached assignment booklet and instructions. All activities are based around the Measurement, Financial Mathematics and Working Mathematically Units, which have been studied in class.

Weighting

15%

Due:

This assignment is due to your classroom teacher 2 weeks from the date received (due in Week 7).

Penalties as per assessment booklet

Gardner's Multiple Intelligences and Revised Blooms Taxonomy

This assignment is designed to give all students an opportunity to demonstrate their best ability in Mathematics. Students can choose from tasks aligned to the different categories of Gardner's Multiple intelligences. The tasks are also aligned to the Revised Bloom's Taxonomy - a multi-tiered model of classifying thinking according to six cognitive levels of complexity.

Thus, students can choose tasks according to their preferred modes of learning, or try different styles of learning. Students are able to revise and explore key concepts of this unit by completing lower-order tasks and then challenge themselves to develop their understanding and skills by completing higher-order tasks.

Instructions

You do not have to answer all the questions!

Each box in the Task Grid (on the next page) is a task.

1. 10MA1 and 10MA2 must include at least 2 tasks from the *Creating* and *Evaluating* columns as part of their total of 35 marks.
2. 10MA3 and 10MA4 must include at least 1 task from the *Creating* and *Evaluating* columns as part of their total of 30 marks.
3. 10MA5, 10MA6, 10MA7 and 10MA8 must complete a total of 25 marks.
4. Most tasks will require you to write your answers on separate paper that you will then need to submit with your assignment. Please clearly write your full name and the task number on each piece of paper and place in sequential order.
5. Please highlight and/or mark off which tasks have been completed on the task grid.

Marking

Marks are awarded based on the difficulty and amount of work required to complete each task. Marking guidelines are provided under each task description.

Task Grid

Multiple Intelligences	Bloom's Taxonomy: Six Thinking Levels					
	Knowing	Understanding	Applying	Analysing	Creating	Evaluating
Verbal/Linguistic I enjoy reading, writing & speaking	1. Which Job? 1 mark	2. Volume of a Cylinder 1 mark	3. Surface Area 2 marks	4. Best Buy 3 marks	5. Simple vs Compound Interest 3 marks	6. Pay Rise 7 marks
Logical/Mathematical I enjoy working with numbers & science	7. Conversions 1 mark	8. Mouldings 3 marks	9. Monthly Repayments 3 marks	10. Pay Rise 3 marks	11. Building a Box 4 marks	12. Pair Squares 3 marks
Visual/Spatial I enjoy painting, drawing & visualising	13. Mind Map 2 marks	14. Tennis Court Lengths 2 marks	15. Suit Jacket 2 marks	16. What Size 3 marks	17. Floor Plan 4 marks	18. Circles and Rectangles 4 marks
Bodily/Kinesthetic I enjoy doing hands-on activities, sports & dance	19. Volume of Household Items 1 mark	20. Crazy Calendar 2 marks	21. Plane Shapes 4 marks	22. Usain Bolt 4 marks	23. Building Your Property 5marks	24. Which Paint? 4 marks
Technology I enjoy using computers	25. Shapes from Space 2 marks	26. Find Parallelograms 1 mark	27. International Date Line 3 marks	28. Deep Water 3 marks	29. Tiny Houses 4 marks	30. Renovation 6 marks

Task Details

Verbal/Linguistic

Use the following diagrams for Questions 1 and 2.

1) Which job? (1 mark)

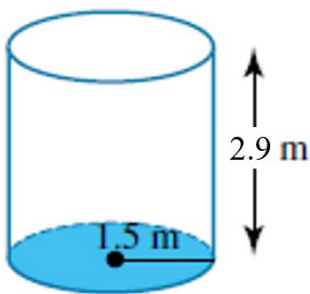
List 5 jobs and what types of measurement they might use (i.e., area, perimeter, volume, surface area, etc).

Job	Types of Measurement

Marking	
1	All information provided
$\frac{1}{2}$	Only partially completed

2) Volume of a Cylinder (1 mark)

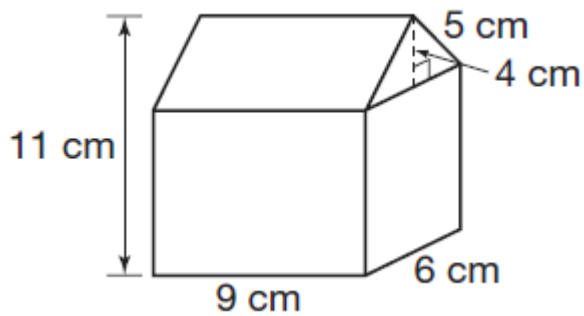
Calculate the volume of this cylinder, correct to 1 decimal place.



Marking	
1	Answer correct with calculations shown

3) Surface Area (2 marks)

Calculate the surface area of this composite shape.



Marking	
1	Correct calculation of the hemisphere
1	Correct calculation of the cone

4) Best Buy (3 marks)

John needs to buy some concrete for a project he is working on at home. He can buy a 25kg bag of DryMix Quick to Set concrete from Mitre 10 for \$10.98, or he can purchase a 20kg bag of Australian Builders Quick Set Concrete for \$8.10. By showing your calculations, show which option is the best buy.



\$10.98 each



\$8.10

Marking	
1	Correct calculations for DryMix concrete
1	Correct calculations for Australian Builders concrete
1	Correctly identifies which option is the best buy

5) **Simple vs Compound Interest (3 marks)**

Write a minimum 300 word paragraph explaining the difference between simple interest and compound interest. Give an example of simple interest over 5 years versus compound interest over the same period of time with the same principal and interest rate.

Marking	
1	Well written paragraph that explains the difference between simple and compound interest
1	All calculations are accurate
1	Literacy and grammar is correct

6) **Pay Rise (7 marks)**

Molly was earning \$120 000 (gross pay) before being promoted and receiving a 20% pay rise. Using the tax table below, show how her net income is only a 17% (rounded to the nearest percent) increase.

(net income = gross income - tax)

Taxable income	Tax on this income
0–\$18 200	Nil
\$18 201– \$37 000	19c for each \$1 over \$18 200
\$37 001– \$80 000	\$3 572 plus 32.5c for each \$1 over \$37 000
\$80 001–\$180 000	\$17 547 plus 37c for each \$1 over \$80 000
\$180 001 and over	\$54 547 plus 45c for each \$1 over \$180 000

Marking	
1	Correct calculation of tax for current salary
1	Correct calculation of net income for current salary
1	Correct calculation of new salary
1	Correct calculation of tax for new salary
1	Correct calculation of net income for new salary
1	Correct calculation in difference in wages
1	Correct calculation in net income percentage increase

Logical/Mathematical

7) Conversions (1mark)

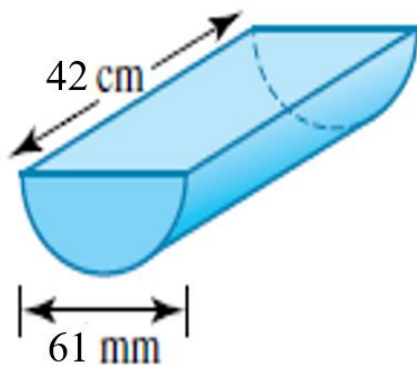
Complete the questions below by converting:

- a) 4cm to mm
- b) 0.875km to m
- c) 23 000cm to km
- d) 45mm^2 to cm^2
- e) 3.78ha to m^2
- f) 66 000L to m^3

Marking	
1	All correct
$\frac{1}{2}$	3 correct

8) Mouldings (2 marks)

Wooden mouldings are made by cutting cylindrical dowels in half as shown at right. Calculate the surface area of the moulding and show all of your working out.



Marking	
2	Correct surface area and all working out
1	Calculations mostly correct with some errors

9) Monthly Repayments (3 marks)

Gavin borrows \$20 000 over 4 years from the bank. The loan is charged at 8.4% p.a. flat-rate interest. The loan is to be repaid in equal monthly instalments. Calculate the amount of each monthly repayment and the total amount to be paid.

Marking	
1	Correct interest calculation
1	Correct monthly repayment
1	Correct total to be paid

10) Pay Rise (3 marks)

Which would be better, and by what percentage: a wage rise of 20% or two successive wage rises of 10%? Justify your answer by showing all of your working out.

Marking	
3	Correct wage calculations and percentage to justify answer
2	Calculations are mostly correct with only a few errors
1	Many errors present in calculations

11) Building a Box (4 marks)

Create a square sheet of paper with dimensions 15 cm by 15 cm. Cut a 1 cm square out of each corner. The remainder of the square is folded to form an open box.

- Calculate the volume of the box.
- Write a general formula for calculating the volume of a box of any size with any size square cut out of the corners.
- Be sure to include your square sheet of paper and all of your working out as part of your answers.

Marking	
4	Correct solutions for (a), (b) and (c) with all working out shown.
3	All working out shown but with a few errors
2	Correct solutions for (a) and (b), but (c) is incorrect
1	Some working out shown but with multiple errors

12) Pair Squares (3 marks)

The numbers 2, 34 and 47 are such that the sum of any pair of these numbers is a perfect square. Find a method for choosing three square number and from them finding a corresponding set of three integers with this property and give some examples.

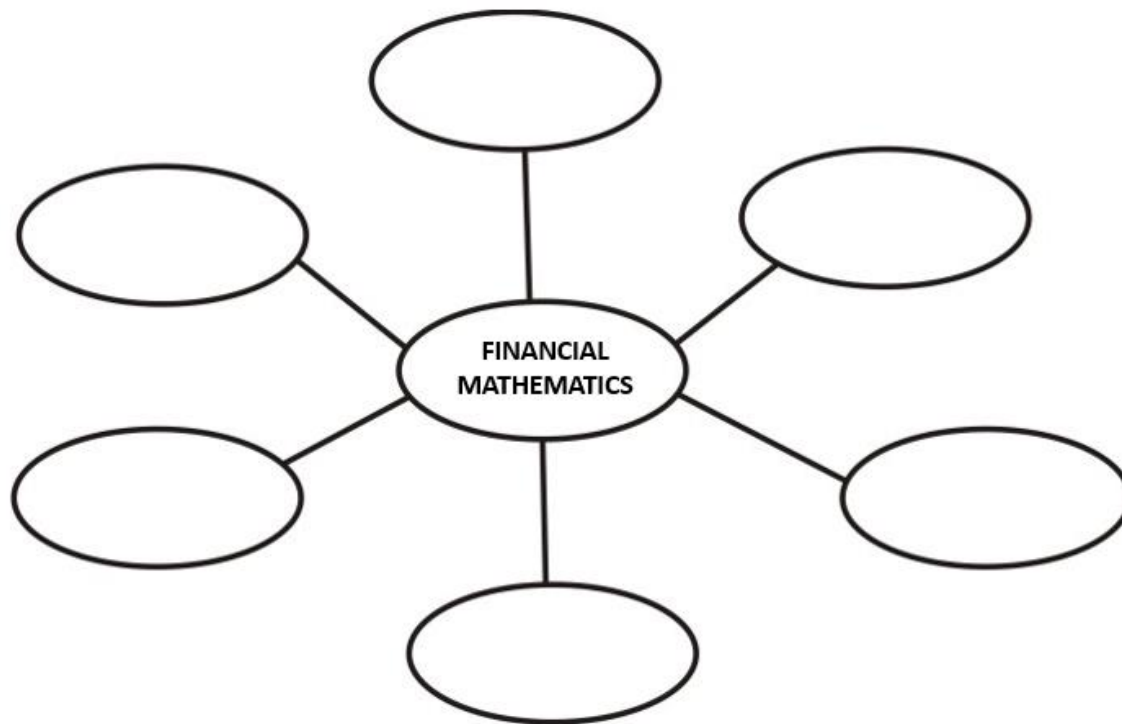
The integers 208, 224, 352 and 737 also have the property that the sum of any pair of these numbers is a perfect square. Find other sets of four integers with this property.

Marking	
3	Method clearly outlined with examples provided
2	Examples but with limited method outlined
1	Examples but no method identified

13) Mind Map (2 marks)

On a separate piece of paper, create a mind map on Financial Mathematics. Be sure to include all formulas and key concepts covered.

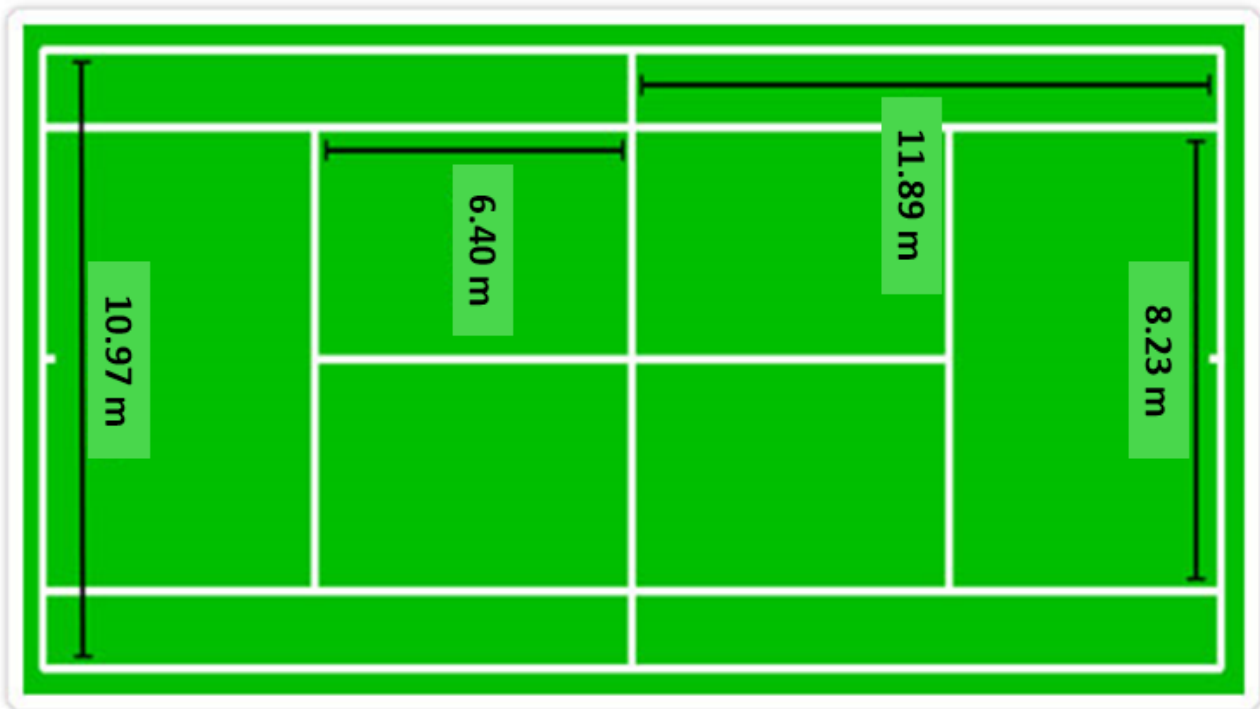
NOTE – the mind map shown below is not necessarily large enough to cover all topics of Financial Mathematics.



Marking	
2	Detailed mind map including all formulas and key concepts
1	Basic mind map including most formulas and key concepts

14) Tennis Court Lengths (2 marks)

A grass tennis court has white chalk lines. Find the total number of metres of chalk required to mark all the lines of the tennis court pictured below.



Marking	
2	Correct answer with all working clearly set out.
1	Correct answer with no working shown or some working but with errors.

15) Suit Jacket (2 marks)

Maths teachers are filthy rich and often wear suit jackets made out of money! The dimensions of an Australian \$20 note are 160mm x 48mm and the average suit jacket requires 2m of material.

- a) How many \$20 notes (to the nearest whole number) would you need to make a suit jacket?
- b) What is the total value of material (i.e., \$20 notes) needed for this suit jacket?

Marking	
1	Correct answer for part A
1	Correct answer for part B

16) What Size (3 marks)

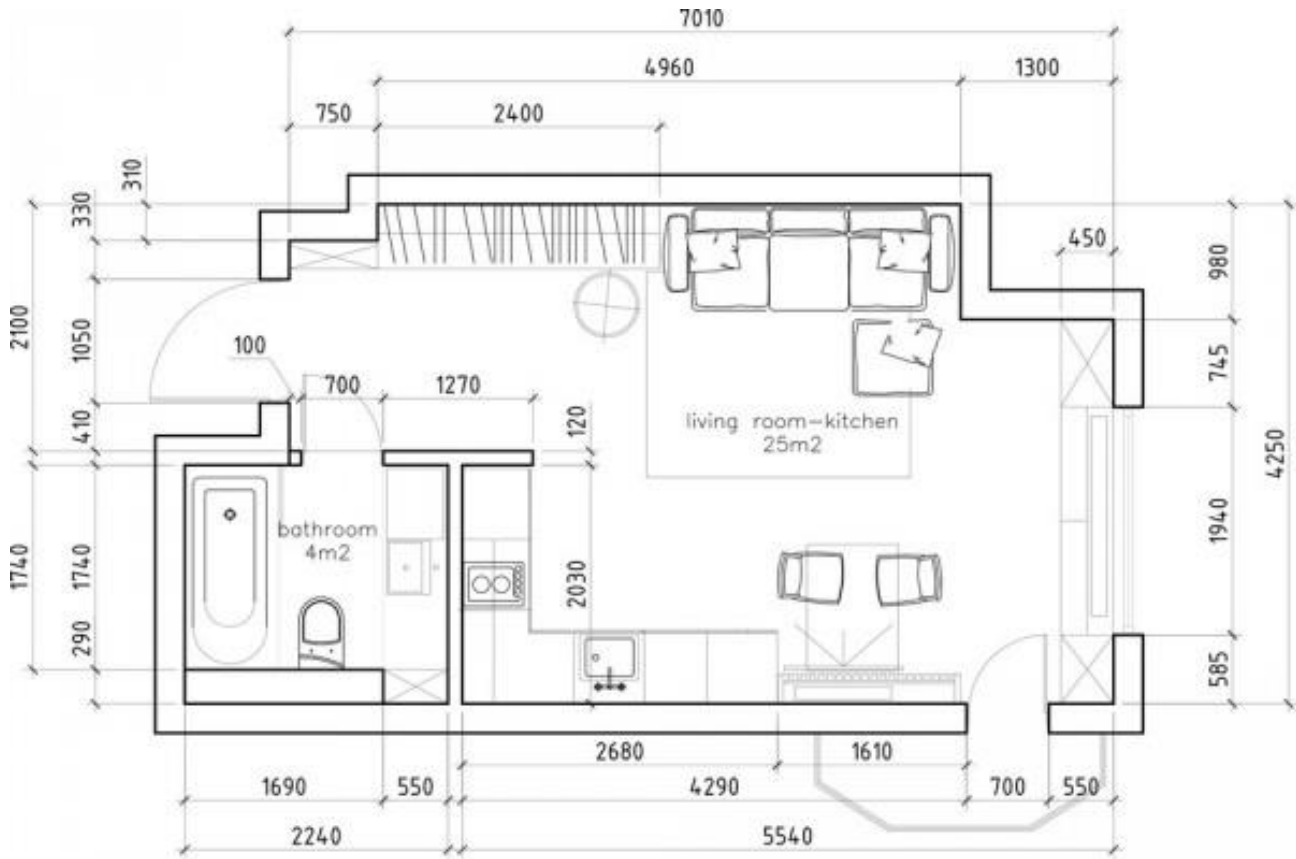
A sheet of paper measures 29.5cm by 21.0 cm.

- a) What is the area of the sheet of paper?
- b) What is the **radius** of the largest circle that can be drawn on this sheet?
- c) What is the area of this circle?

Marking	
1	Correct answer to part A
1	Correct answer to part B
1	Correct answer to part C

17) Floor Plan (4 marks)

Scale drawings are often used in architecture, engineering and many trades. A floor plan is a scale drawing that provides a view from above and illustrates the dimensions of rooms. Floor plans are generally created using a scale of 1:100, which means that the real measurements are 100 times longer than they are on the plan (i.e., 1 cm represents an actual length of 100 cm, or 1 metre). Below is an example of a floor plan.



Using a scale of 1:100, create a floorplan of your house. Your floor plan must clearly label each room (i.e., Master Bedroom, bathroom, kitchen, etc.) and the dimensions of each room.

Marking	
1	Neat design using grid paper
1	Rooms and dimensions are clearly labelled
2	Scale of 1:100 was used correctly

18) Circles and Rectangles (4 marks)

Lauren cuts circles with a radius of 8 cm from a rectangular piece of cardboard 16 cm by 32 cm.

- a) What is the area of the rectangular piece of cardboard?
- b) How many circles can be cut from the piece of cardboard?
- c) What is the area of the remaining cardboard after the circles have been cut? Answer correct to two decimal places.

Marking	
1	Correct answer for (a)
2	Correct answer for (b)
1	Correct answer for (c)

Bodily/Kinesthetic

19) Volume of Household Items (1 mark)

Identify and measure 3 items in your house that have approximately the same volume. Provide the measurements and a picture of each item and attach it to this assessment.

Marking	
1	3 items listed that have the same volume

20) Crazy Calendar (2 marks)

Using a calendar, mark off any dates in July that fit the following criteria:

- The date is an odd number
- The date is a prime number
- The date is a square number

a) How many days are left in July if we were to remove these days from the calendar?

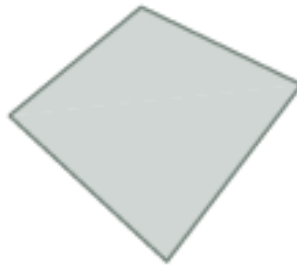
b) How many days are left in a regular year if we were to remove these days from the calendar?

Marking	
1	Part (a): Correct answer
1	Part (b): Correct answer

21) Plane Shapes (4 marks)

Copy each of the following figures and divide them into the plane shapes specified. Attach the plane shapes with your assignment.

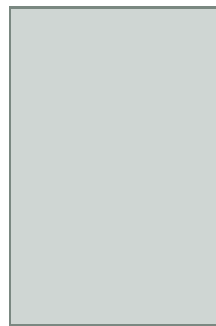
a) 4 triangles



b) 1 parallelogram and 1 triangle



c) 1 kite and 4 triangles



d) 1 quadrilateral and 2 triangles



Marking	
1 mark	For each correct answer

a) Usain Bolt (4 marks)

b) Usain Bolt runs 100 metres in 9.58 seconds. Calculate his speed in metres per second (m/s).

c) Get someone to time how long it takes you to run 100 metres. Calculate your speed in metres per second (m/s).

Your time: _____ seconds

Your speed: _____ m/s

d) Convert both speeds to kilometres per hour (km/h).

Usain Bolt's speed: _____ km/h

Your speed: _____ km/h

Marking	
1	Part (a): Accurate calculation of Usain Bolt's speed in m/s
1	Part (b): Accurate calculation of own speed in m/s
2	Both speeds accurately converted to km/h (1 mark for each correct answer)

Use the following information for task 23:

The perimeter of four walls and the ceiling of a building are as follows:

Wall 1 – 81cm

Wall 2 – 68cm

Wall 3 – 68cm

Wall 4 – 81cm

Ceiling – 69cm

22) Building Your Property Your Property (5 marks)

a) Complete the table below, using the height and perimeter of each wall to find the width:

	Height	Width	Area (cm ²)
Wall 1	20cm		
Wall 2	20cm		
Wall 3	20cm		
Wall 4	20cm		
Ceiling			

b) Use the completed table above to create and construct the building using paper and/or cardboard and sticky tape. The building should appear as a rectangular prism. You must include a photograph of your constructed building with the assessment, you are not required to submit the actual building.

c) Which two pairs of walls are opposite each other in the building?

Marking	
2	Part (a): table completed with ALL sections correct (1 mark if only 3 or less errors)
2	Part (b): building constructed accurately with photograph included (1 mark if building is constructed but not correctly assembled)
1	Part (c): Both answers correct

23) Which Paint? (4 marks)

Taubmans 4L White 1 Paint+Prime Interior Low Sheen Paint

British Paints 10L White Interior Low Sheen Paint & Prime

Dulux Wash&Wear 6L Vivid White Low Sheen Paint

Use the three brands of paint shown above to:

a) Evaluate which paint is the most cost effective.

b) You've been given a budget of \$300 to paint a room with a surface area of 180m². Assuming that 1L of paint covers approximately 9m², evaluate which paint is best to use and its cost to paint this area.

Marking	
2	Part (a): Correct answer with working shown (1 mark if no working is shown)
2	Part (b): 1 mark for each correct answer

Technology

24) Shapes from Space (2 marks)

Using Google Earth, identify objects (i.e., buildings, land, bodies of water, etc.) that are the same as the following shapes:

- Circle
- Rectangle
- Triangle
- Trapezium

Screenshot each image and attach it to a separate piece of paper.

Marking	
2	½ mark for each correct image.

25) Find Parallelograms (1 mark)

Research a building that is shaped like a parallelogram providing its name and location. Include an image of the building with your description.

Marking	
1	Image provided of a relevant building including description

26) International Date Line (4 marks)

Use the Internet to answer the following questions on the purpose of the International Date Line (IDL).

- In your own words, explain what the “International Date Line” is.
- Which country is the first in the world to reach the new day?
- When London celebrates the New Year at 12am on January 1st, what is the time and date in Tokyo, Japan?
- How is it possible to gain or lose a day while travelling throughout the world?

Marking	
4 marks	1 mark for each accurate answer

27) Deep Water (3 marks)

A number of students were tested to identify if they could swim.
The results appear in the two-way table below.

	Swim	Can't swim	Totals
Boys	97	13	110
Girls	102	16	118

- i. Copy this table into a word or excel document. Add an extra row along the bottom for all of the totals. *Print this out and submit this with your assignment.*
- ii. How many children are there in *total*?
- iii. What **fraction** of those who *can swim* are boys?
- iv. What **percentage** of girls *can't swim*?
- v. What **percentage** of all of the children *can swim*?

Attach your answers to the back of the assignment.

Marking	
3	1 mark for part (i). ½ mark each for parts (ii), (iii), (iv) and (v).

28) Tiny Houses (4 marks)

In recent years there has been a movement towards “Tiny Houses”, which are houses that are less than $75m^2$. Using an online home design application, you are to design a house floorplan that incorporates the following features:

- No larger than $75m^2$.
- Minimum of 2 bedrooms
- Minimum of 1 bathroom
- Kitchen
- Living area

Be creative in your design, but it **MUST BE REALISTIC AND DRAWN TO SCALE**.

There are many online sites that allow you to create floorplans and you may find these two helpful:

- <https://home.by.me/en/>
- <https://www.roomsketcher.com/>

Your floorplan must be clearly labelled to show you have included all of the features listed above. Attach a screenshot of your floorplan.

Marking	
4	Floorplan is creative/original, all features have been included and is drawn to scale
3	Floorplan is basic with all/most features included and an accurate scale
2	Floorplan is basic with some features included and the scale is not accurate
1	Floorplan provided but with significant errors.

29) Renovation (6 marks)

Tim and Debra want to lay new carpet in their bedrooms and timber floorboards in their kitchen, living and dining rooms. They have a budget of \$14 000 to complete their renovations and have been quoted the following prices:

Carpet

- Installation - \$25 per square metre
- Carpet - \$63.17 per square metre

Timber Floorboards

- Installation - \$80 per square metre
- Timber Floorboards - \$162.21 per square metre

Using the floorplan below, evaluate:

- The total area to be carpeted
- The total area to be covered in timber floorboards
- The cost to lay new carpet in the bedrooms
- The cost to lay timber floorboards in the kitchen, living and dining rooms
- The total cost for all flooring
- Is Tim and Debra's budget sufficient for this renovation?

You must show all calculations to support your answers.



Marking	
6	1 mark for each question

Overall marking comments	Result
	/