Full name: _____

Teacher: _____

Due date: _____

YEAR 9 5.1 MATHEMATICS
Assignment – Term 3
2023

Outcomes Assessed
Working Mathematically: Students • **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. Each student is to complete tasks of their choosing.

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 – Failure to submit the assignment within the negotiated time frame may result in an N-award in Mathematics.

Gardner's Multiple Intelligences and Revised Blooms Taxonomy

This assignment has been designed to give all students an opportunity to best demonstrate their 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 also 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

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

1. ***You do not have to answer all the questions!***
2. You must complete a total of **25 marks** worth of tasks.
3. Please highlight on the Task Grid which tasks you are completing.

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) Earning an Income **2 marks**	2) Tax Deductions **2 marks**	3) Discounts **4 marks**	4) Pythagoras' Theorem **4 marks**	5) Fencing **3 marks**	6) Tennis balls. **3 marks**
Logical/ Mathematical I enjoy working with numbers & science	7) Adding up your name? **2 marks**	8) Indices **2 marks**	9) Amusement Park **3 marks**	10) Graphing Simple Interest **4 marks**	11) Saving for the Family Car **6 marks**	12) Tax Return **5 marks**
Visual/Spatial I enjoy painting, drawing & visualising	13) Outlier **2 marks**	14) Pegs drama **2 marks**	15) Time sheets **4 marks**	16) Area of Victoria **3 marks**	17) Folding Paper **4 marks**	18) Area Ratios **3 marks**
Bodily/Kinaesthetic I enjoy doing hands-on activities, sports & dance	19) Body Angles **2 marks**	20) Handshakes **2 marks**	21) Composite Figures **2 marks**	22) Max Running **4 marks**	23) Area Grid Puzzle **4 marks**	24) Set of Triangles **6 marks**
Technology I enjoy using computers	25) Spreadsheet **2 marks**	26) Total Pay **2 marks**	27) International Date Line **3 marks**	28) Kahoot! **3 marks**	29) PowerPoint **3 marks**	30) Hire a Car **6 marks**

Task Details

Verbal/Linguistic

1) Earning an income (2 marks)
   There are several different ways in which people are paid for providing their labour, knowledge, skills and services. People who work for themselves charge a fee, but most people work for an employer. Complete the table below by listing two occupations for each type of income.

Method of payment	Description	Examples of occupations
Salary	A fixed amount per year, usually paid weekly or fortnightly.	1) 2)
Wages	An hourly rate for an agreed number of hours per week, usually paid weekly or fortnightly.	3) 4)
Piecework	Being paid for the number of items (pieces) produced or completed.	5) 6)
Commission	People who are paid a percentage of the value of their sales.	7) 8)

Marking	
1/2 mark	Per 2 correct occupations for each type of income.

2) Tax Deductions (2 marks)

   a) In your own words, define a "tax deduction"?

   ……

   ……

   ……

b) Choose one profession and describe at least 2 taxable deductions for that job?

……

……

Marking	
1 mark	a) For correct answer.
1/2 mark	b) For each taxable deduction.

3) Discounts (4 marks)

The following items are all discounted.

$380	$450	$260	$600
25% *discount*	20% *discount*	$33\frac{1}{3}\%$ *discount*	15% *discount*

a) Which item has the largest dollar discount?

………

b) Which two items have the same dollar discount?

………

c) What is the difference between the largest and the smallest dollar discount?

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………

d) If the surfboard has a discount of 20%, would $470 be enough to buy it?

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Marking	
1 mark	For each correct answer.

4) Pythagoras' Theorem (4 marks) : $c^2 = a^2 + b^2$
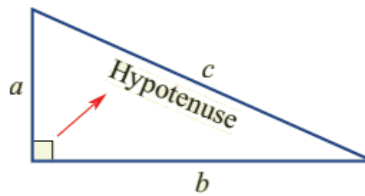
Circle the correct option for part a) and b):

I.   The longest side of a right-angled triangle is called a:
   a) Shortest side
   b) Middle side
   c) Hypotenuse
   d) None of these

II.   Calculate the Hypotenuse of the given right-angled triangle:

....

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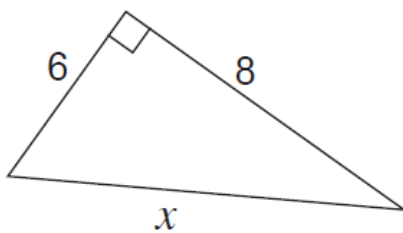
III.   A 15 metre ladder rests against a wall and its foot is 4 metres away from the base of the wall.
       How high does it reach up the wall? Give your answer correct to two decimal places.

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Marking	
1 mark	Correct answer I)
1 mark	Correct answer II)
2 marks	Correct answer III)

5) Fencing (3 marks)

Henry wants to make a rectangular chicken run at the back of his house. He buys 12 metres of fencing wire.
What is the largest area he can make? Complete the table below to estimate your answer.
Use the space below to work out different combinations of the length and breadth.
Draw more than one diagram to explain your answer.

Length	Breadth	Area = $l \times b$	perimeter

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Marking	
2 marks	a) Student completed the table.
3 marks	b) Student drew at least one the diagram of the rectangle.

6) **Tennis Balls (3 marks)**

Tennis balls are often sold in tubes of three, as shown.

Which is greater: the height of the tube?

OR

The distance around the tube?

OR

Are they the same?

Include all your calculations in your answer.

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Marking	
1 mark	Some calculations shown.
2 marks	All calculations shown.
3 marks	All calculations and the correct answer shown.

Logical/Mathematical

7) Adding up your Name? (2 marks)

If $A = a$, $B = 2a$, $C = 3a$, $D = 4a$ ...., the value of Gill's name is $7a + 9a + 12a + 12a = 40a$

    a) What is the value of your name?

………..

………

    b) Change the rules so that the value of your name is $100a$.

………..

………

………

………

Marking	
1 mark	correct answer a) with adequate working shown.
2 marks	correct answer b) with adequate working shown.

8) Indices (2 marks)

Circle the correct for part a) and b):

    I. What is the expanded version of the expression $4^3 + 4^5 =$
- a) 44^{35}
- b) 44^{15}
- c) $4 \times 4 \times 4 \times 4 \times 4^5$
- d) $4 \times 4 \times 4 + 4 \times 4 \times 4 \times 4 \times 4$

    II. What could be the value of x int eh equation $x^2 = 25$?
- a) $x = 5 \; only$
- b) $x = \pm 5$
- c) $x = 625 \; only$
- d) $x = \pm 625$

Marking	
1 mark	For each correct answer.

9) Amusement Park (3 marks)

40% of the 7920 visitors to an Amusement Park were children. 25% of the children and $\frac{1}{3}$ of the adults were repeat visitors. What percentage of visitors were visiting the Amusement Park for the first time?

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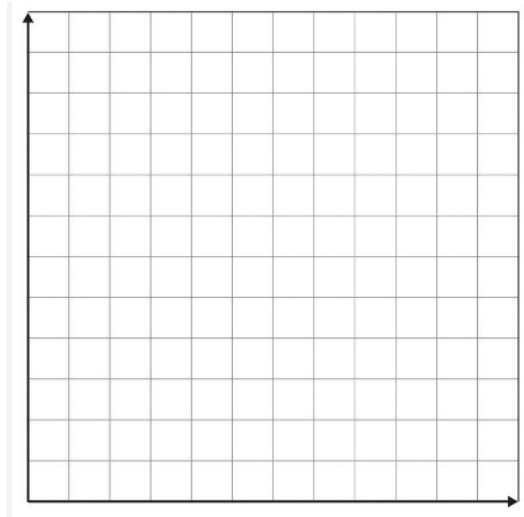| Marking	
1 mark	The number of children and adults calculated correctly.
2 marks	Calculating the number of first-time visitors.
3 marks	Percentage of first-time visitors.

10) Graphing Simple Interest (4 marks)

Aiden invested $15000 at 3% per annum, simple interest for 4 years.

a) Use the formula, $Interest = Principal \times rate \times number\ of\ years$, to complete the following table of values.

Number of years (n)	1	2	3	4
Interest (I)				

b) Draw a graph with n as the horizontal axis and I as the vertical axis. Plot the points from the table of values on to the graph. Join the points to make a straight line.

c) Using the graph, predict the total amount of interest after six years.

……

……

Marking	
1 mark	a) Correct answers entered into a table.
2 marks	b) Graph correctly created, 1 mark if minor errors occur.
1 mark	c) Correct answer predicted.

11) Saving for the Family Car (6 marks)

Riley is planning to save to buy for the first family car. He is thinking of setting aside an amount each year for it.

A table of his expenses and income is shown below:

Income		Expenses	
Wages	$1 100 per week	Council rates	$2 300 for the year
Bonus	$20 per week	Electricity	$ 745 per quarter of the year
		Food	$ 350 per week
		Entertainment	$50 per week
		Christmas	$ 4000 for the year
		Mobile phone bills	$65 every month
		Other living costs	$45 each week

a) Study the table and calculate his total income for the whole year. (1 mark)

………

………

b) Calculate all the expenses for the year and add them up. (2 marks)
Make sure you have all the expenses for the whole year.
(Hint: per quarter means multiplying by 4, per week means multiplying by 52, per week means multiplying by 12.)

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c) The family has an additional expense of $20 000 per year to pay on their mortgage.
Taking this into account, how much saving do they have remaining at the end of the year?
(2 marks)

………

………

………

d) The car is priced at $14 000. How many years and months would the family have to wait to save up the money for the car? (1 mark)

……

……

Marking	
1 mark	a) calculate the total income from the table.
2 marks	b) for correct answer with adequate working shown.
2 marks	c) for correct answer with adequate working shown.
1 mark	d) for correct answer with adequate working shown.

12) Tax return (5 marks)

Milly has come to the end of her first financial year. She earned $2450 per fortnight for the whole year and she made $360 on investments. Throughout the year, Milly spent $400 on uniforms, donated $80 to charity, spent $150 on work related equipment and completed a training course which cost $75.

Taxable income	Tax on this income
0–$18 200	Nil
$18 201– $45 000	19c for each $1 over $18 200
$45 001– $120 000	$5092 plus 32.5c for each $1 over $45 000
$1200 01–$180 000	$29 467 plus 37c for each $1 over $120 000
$180 001 and over	$51 667 plus 45c for each $1 over $180 000

a) Calculate Milly's Taxable Income.

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……

b) Use the tax table above to calculate the income tax Milly must pay.   (2 marks)

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……
……

c) How much tax does Milly need to pay each week?

……
……

d) If Milly's employer has sent in a total $14 500 of tax to the ATO, has Milly paid enough tax? How much of a refund or how much is still owing to/from the ATO?
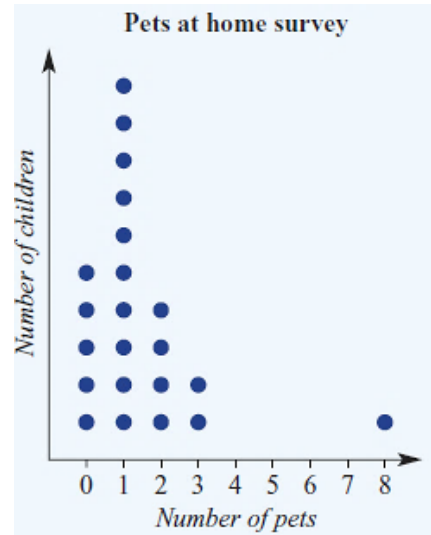
……
……

Marking	
1 mark	For each correct answer with adequate working shown.
2 marks	Correct working out for part b)

Visual/Spatial

13) Outlier (2 marks)

Some children were asked the following question in a survey:
"How many pets do you have at home?"
The responses are shown in the dot plot to the right.

a) What number is the outlier in the dot plot?

……………………………………………………………………..

b) What number is the mode?

………………………………………………………………………

Pets at home survey

Marking	
1 mark	For each correct answer

14) Pegs Drama(3 marks)

Brian has a pegboard with 9 pegs in a 3 x 3 square(see diagram).

He also has a piece of string that he puts from the top left-hand ppeg to the bottom right-hand so that it touches all of the other pegs on the way once.
If the string does not go diagonally between the pegs, how may different ways can Brian string up the peg board?
Draw a diagram of each way.

Marking	
1 mark	Two ways shown
2 marks	Four ways shown
3 marks	More than four ways shown

15) Time sheets (4 marks)

Fiona works in a department store. In the week before Christmas she worked overtime. Her time sheet is shown below. Fill in the details on her pay slip.

	Start	Finish	Normal Hours	Overtime (x1.5)
M	9.00	15.00	6	
T	9.00	17.00	8	
W	9.00	17.00	8	
T	9.00	19.00	8	2
F	9.00	15.00	8	2
S				

Pay slip for: **Fiona BLACK**	**Week ending December 21**
Total of normal hours	
Normal rate	$17.95
Total of overtime hours	
Overtime rate	
Total wage	

a) Total of normal hours

……

b) Total of overtime hours

……

c) Overtime rate

……

……

d) Total wage

……

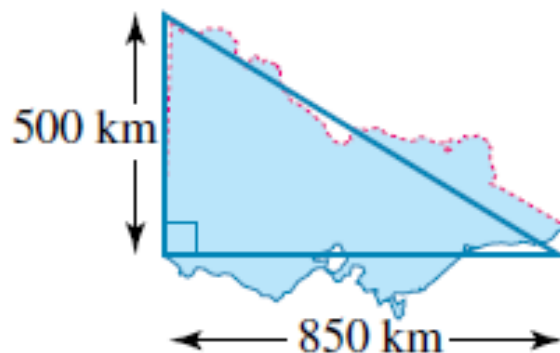……

Marking	
1 mark	For each correct answer

16) Area of Victoria (3 marks)

The area of Victoria can be approximated using a right-angled triangle with the measurements shown below.

a) Estimate the area of Victoria by calculating the area of the triangle.

....

500 km

850 km

b) Use the internet to compare your estimate with the actual area of Victoria.

....

....

c) Explain why the answer you obtained in part a) can be regarded only as an estimate.

....

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Marking	
1 mark	For each correct answer

17) Folding Paper (4 marks)

A square piece of paper, ABCD, of side length 30 cm is folded to form a right-angled triangle ABC. The paper is folded a second time to form a right-angled triangle ABE as shown in the diagram below. Glue your completed shape onto a separate sheet of paper or take a picture of your finished product.
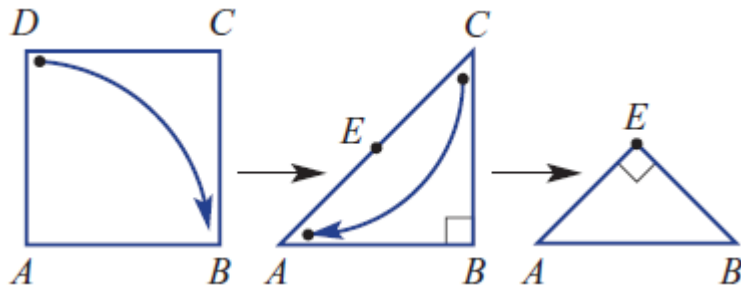
a) Find the length of AC correct to two decimal places.

....

b) Find the perimeter of each of the following, correct to one decimal place where necessary:
   i.   square ABCD

....

....

    ii.   triangle ABC

....

....

c) Use Pythagoras' theorem and your answer for part a to confirm that AE = BE in triangle ABE.

....

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....

....

Marking	
1 mark	Length of AC is calculated with all working shown.
1 mark	Perimeter is calculated with all working shown.
2 marks	Prove AE=BE in triangle ABE with all working shown.

18) Area Ratio (3 marks)

Consider these three similar triangles (not drawn to scale).
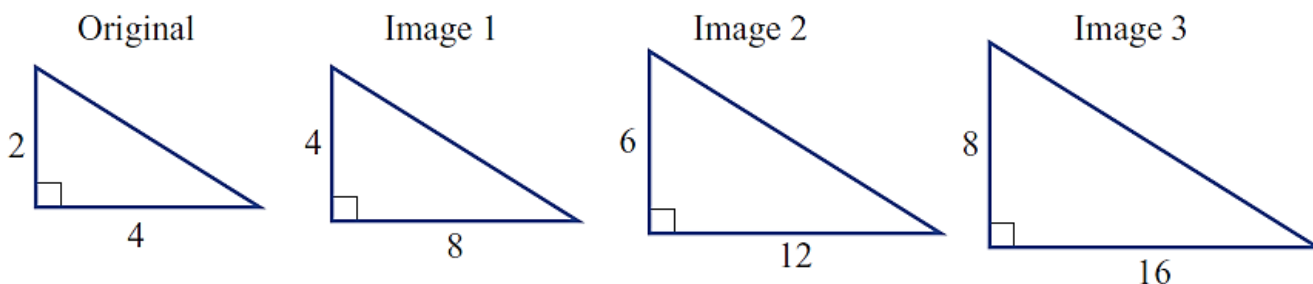
a) Complete this table, comparing each image to the original.

Triangle	Original	Image 1	Image 2	Image 3
Length Scale Factor	1	2		
Area				
Area Scale Factor	1			

b) What do you notice about the area scale factor compared to the length scale factor? And what would be the area scale factor if the length scale factor is n? [Support your answer with mathematical calculations]

....

....

....

Marking	
2 marks	Part a) Student completed the table
1 mark	Part b) answered correctly with adequate working shown.

Bodily/Kinaesthetic (Questions 19 to 24)

19) Body Angles (2 marks)

Using your body, demonstrate in one photo the following angles: right-angle, acute, reflex and supplementary angles. On your photo, clearly label the four angles. Attach the photo with your assignment.

Marking	
1/2 mark	For each correct angle labelled.

20) Handshakes (2 marks)

Six people meet for lunch and shake hands with each other. How many handshakea are there?
Show all marking for full marks.
You may wish to try this with five other people.

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……

Marking	
2 marks	Correct answer with adequate working
1 mark	Adequate working shown with one or more mistakes.

21) Composite Figures (2 marks)

Divide the following figures into the plane shapes specified.

a)   4 triangles

b) 1 parallelogram and 1 triangle

c) 1 kite and 4 triangles

d) 1 quadrilateral and 2 triangles

Marking	
1/2 mark	For each correct answer

22) Max Running (4 marks)
Conduct the following experiment at a running track/oval.

a)   Measure the amount of time it takes for three people to run 400m. Allow a 5-minute break, then measure the amount of time to run 100m. Record this data in a table.

Person	400 m running time	100 m running time
A		
B		
C		

b) Calculate the speed of both scores in metres per second (m/s).

| Person	400 m running time	100 m running time
A $speed = \frac{distance(m)}{time(sec)}$		
B $speed = \frac{distance(m)}{time(sec)}$		
C $speed = \frac{distance(m)}{time(sec)}$		

Marking	
2 marks	For correct answer in part a)
2 marks	For correct answer with adequate working shown in part b)

23) Area Grid Puzzle (4 marks)

Attached at the back of this booklet (APPENDIX A) is a series of shapes. You are to cut out each shape. Using all 12 pieces in any arrangement, fit these shapes in to the rectangles pictured below. Take a photo of each rectangle completed and attach it to the assignment.

Here is an example of a completed one (Do not use this solution as your own – there are many!)
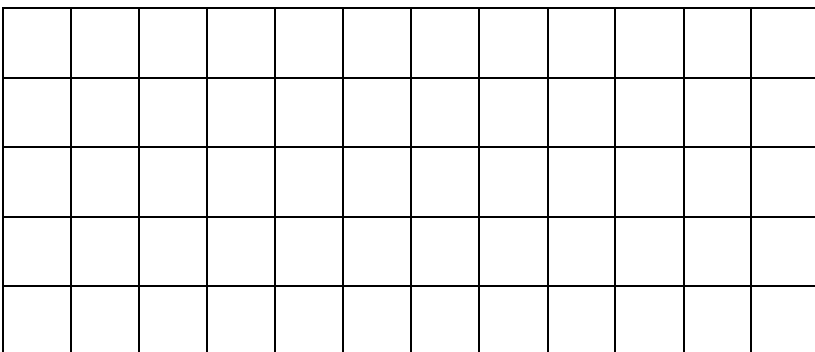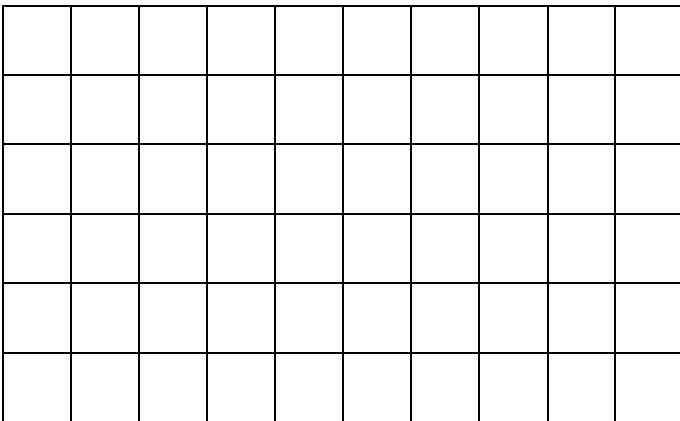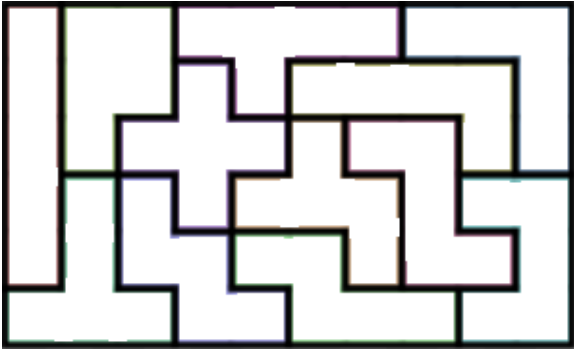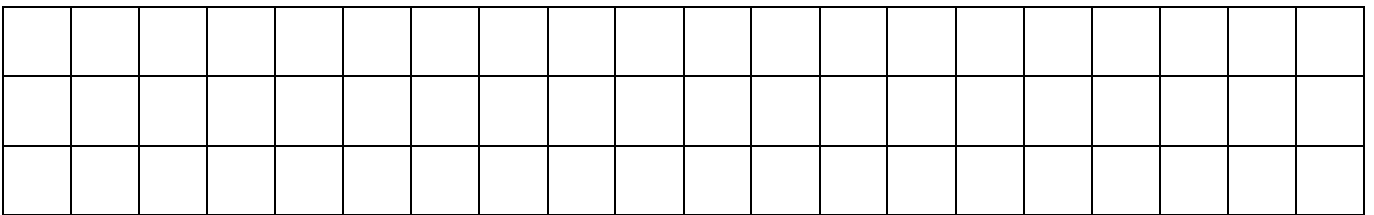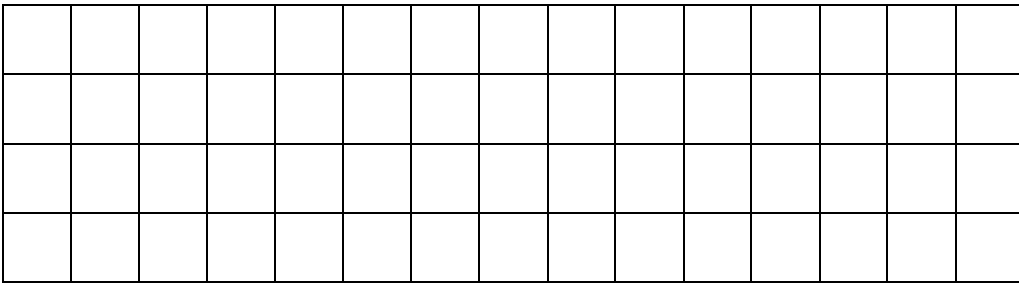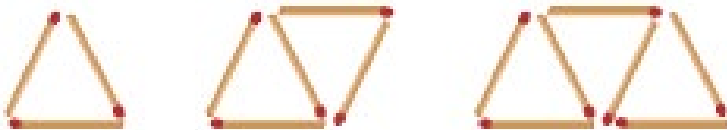
	Marking
1 mark for each rectangle	Photo correctly depicts the rectangle being successfully covered by the cut-out shapes.

24) Set of Triangles (6 marks)

For each of the sets of shapes below, follow these instructions to investigate the pattern.

a) Using pencils or similar objects, construct the above figures. Draw the next two figures in the series.

b) Construct a table to show the relationship between the number of triangles in the figure and the number of matchsticks used to construct it.

Number of triangles (n)	1	2		
Number of matches (m)	3			

c) Devise a rule in words that describes the pattern relating the number of shapes in the figure and the number of matchsticks used to construct it.

………

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………

d) Use your rule to work out the number of matchsticks required for make a figure made up of 17 triangles. Check your answers by drawing the figures and counting the number of matchsticks required.

………

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………

e) Draw the first 3 figures that could be represented by the rule $m = 5n + 3$, where m is the number of matchsticks and n is the number of shapes.

………

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………

Marking	
6 marks	All questions answered correctly.
5 marks or less	For each incorrect response.

Technology

Use the data below for **questions 25 and 26**.
The data shows the pay rates and the number of hours worked for the employees of a factory.

Employee	Rate ($/h)	Normal time (h)	Overtime (h) time-and-a-half	Overtime (h) double-time	Total Pay
Brody	24.72	36	8	4	
Chloe	18.94	36	6	1	
Alan	23.65	28	5	2	
Gillian	26.36	35	4	3	
Natasha	33.56	30			
Yami	19.43	40	1	1	

25) Spreadsheet (2 marks)

Enter the above data into an Excel spreadsheet. Submit a screenshot
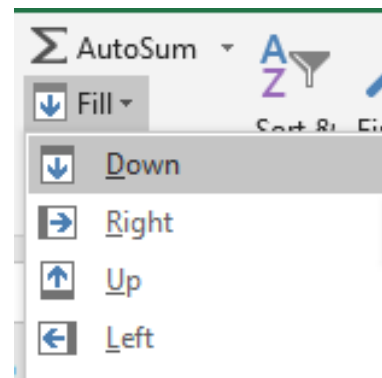
Marking	
2 marks	Data accurately entered into a spreadsheet
1 mark	Data entered into spreadsheet with some minor errors

26) Total pay (2 marks)

In cell F2 type the formula $= (C2 + D2 * 1.5 + E2 * 2) * B2$

a) To find the total pay for the other employees:

- Highlight cells F2 to F7.

- Go to Home.

- Select Fill Down. See the screenshot to the right.

b) Add at least 5 more employees. Enter their pay rates and the numbers of hours worked. Calculate their total pays.

Marking	
1 mark	a) Column added with all total pays calculated
1 mark	b) 5 more employees added with their pay rates and number of hours worked

27) International Date Line (3 marks)

Use the Internet to research the purpose of the International Date Line (IDL). Write a report that answers the following questions. Attach the report with your assignment.

a) What is the International Date Line?

....

....

b) Why do we have it?

....

....

c) When was it created/agreed upon?

....

....

d) Why is it not a straight line?

....

....

e) How is it possible to gain or lose a day while travelling throughout the world?

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Marking	
1 mark	Part a) and b) correct
1 mark	Part c) and d) correct
1 mark	Part e) correct.

28) Kahoot (3 marks)

Create a Kahoot with at least 10 questions using real life applications of Financial Mathematics. Your questions must include a question on each of the following:
- wages
- salaries
- overtime
- piecework
- commission
- tax
- simple interest

Take screenshots of each question and submit these with your assignment.

Marking	
3 marks	The Kahoot contains at least 10 questions including the concepts listed
2 marks	The Kahoot contains 10 questions but is missing one or two of the concepts listed
1 mark	The Kahoot is missing more than 2 of the financial concepts listed

29) PowerPoint (3 marks)

Create a PowerPoint that could be used to teach a person one of the mathematical concepts that you have studied this year. This PowerPoint must be a minimum of 5 slides, include any definitions, explanations or formulas. It should also include numerous different examples.

Submit a copy of this PowerPoint with your assignment.

Marking	
1 mark	The PowerPoint contains at a formula and/or definition but with no examples.
2 marks	The PowerPoint teaches the concept, with minimal examples or examples that lack variety.
3 marks	The PowerPoint is comprehensive with definitions, formulas and at least three varying examples.

30) Hire a car (6 marks)

A group of tourists have just arrived at Sydney airport and are investigating the best hire car deals. They decide to study the different options offered by Orange Car Rentals.

**Option 1** $60 per day unlimited kilometres

Option 2 $30 per day and $5/ 10km

The group know that on their first day they will be visiting the local attractions close to Sydney, so they will not be travelling many kilometres.

a) How much would each option cost if the total kilometres travelled in a day was 90 km?

……

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……

b) Plot the graphs of both options on the set of axes provided to show the cost of hiring a car for a day to travel 200 km. Submit a screen shot if you are using MS Excel to graph.
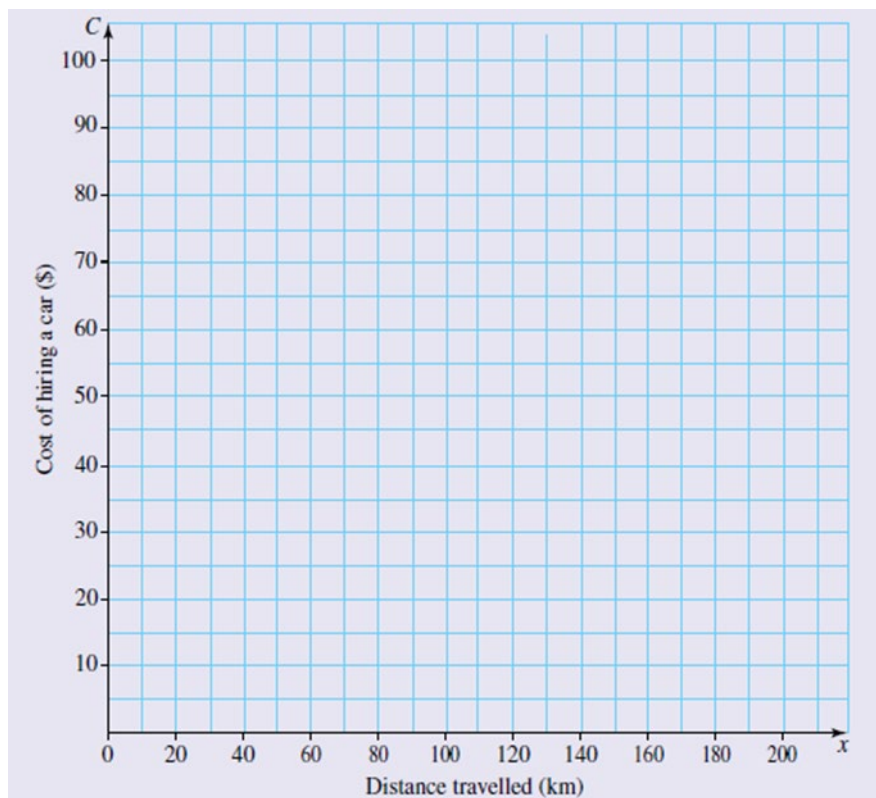
c) Examine the graphs of the two options carefully. Write a brief statement in Microsoft Word (approximately 150 words) to explain the costs associated with each option over 200 km. Submit a typed word document.

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Marking	
2 marks	a) Correct solution and working
2 marks	b) Graph correctly created with some minor errors
2 marks	c) Statement includes accurate findings with full sentences, correct punctuation, grammar and spelling

APPENDIX A (Task 23 – AREA GRID PUZZLE)