Full name: _____

Teacher: _____

Due date: _____

YEAR 9 MATHEMATICS

Assignment 1

2019

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** • **Selects appropriate notations and conventions to communicate mathematical ideas and solutions MA5.2-1WM** • **Interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems MA5.2-2WM**		
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 8).
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

You do not have to answer all the questions!

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

1. **9MA1 and 9MA2** must include at least two tasks from the *creating* and at least 2 tasks from the *evaluating* column as part of their **35 marks**.
2. **9MA3 and 9MA4** must include at least one task from the *creating* and at least one task from the *evaluating* column as part of their **30 marks**.
3. **9MA5, 9MA6, 9MA7 and 9MA8** must complete a total of **25 marks**.
4. Most tasks will require you to write your answers on separate A4 paper that you will need to provide. Please clearly write your full name and the task number. Answer in sequential order. Use a separate sheet of A4 paper for each question.
5. 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) Bacteria Count **4 marks**	5) Rix Index **5 marks**	6) Mathematics and Space **5 marks**
Logical/ Mathematical I enjoy working with numbers & science	7) Right angled Triangle **1 mark**	8) Algebraic Alphabet **2 marks**	9) Changing the Frequency **4 marks**	10) Graphing Simple Interest **4 marks**	11) Composition of Gold in Jewellery **6 marks**	12) Tax Return **4 marks**
Visual/Spatial I enjoy painting, drawing & visualising	13) Outlier **2 marks**	14) Crosses and Noughts **2 marks**	15) Time sheets **4 marks**	16) Area of Victoria **3 marks**	17) Sporting Complex **3 marks**	18) Area and Perimeter **5 marks**
Bodily/Kinaesthetic I enjoy doing hands-on activities, sports & dance	19) Body Angles **2 marks**	20) Netball Lines **2 marks**	21) Composite Figures **4 marks**	22) Max Running **3 marks**	23) Kahoot **3 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) Aztec Museum **4 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, which shows the ways in which people are paid when they work for an employer.

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)

Marking	
1/2 mark	For each correct answer.

2) Tax Deductions (2 marks)

a) In your own words, define what is 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
$25\%\ discount$

$450
$20\%\ discount$

$260
$33\frac{1}{3}\%\ discount$

$600
$15\%\ discount$

a) Which has the largest dollar discount?

b) Which has the same dollar discount?

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

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

Marking	
1 mark	For each correct answer.

4) Bacteria Count (4 marks)

A microbiologist places m bacteria onto an agar plate. She counts the number of bacteria at approximately 3-hour intervals. The results are shown in the table below.

Time	Number of bacteria
9:00 am	m
Noon	$2m$
3:18 pm	$4m$
6:20 pm	$8m$
9:05 pm	$16m$
Midnight	$32m - 60$

a) Explain what happens to the number of bacteria in the first 5 intervals.

b) What might be causing the number of bacteria to increase in this way?

c) What is different about the last bacteria count?

d) What may have happened to cause this?

Marking	
1 mark	For each correct answer.

5) Rix Index (5 marks)

Since you first learned how to read, you have probably read many books. These books would have ranged from picture books with simple words to books with short sentences. As you learned more words, you read short stories and more challenging books. Have you ever picked up a book and put it down straight away because you thought there were too many 'difficult words' in it?

The reading difficulty of a text can be described by a readability index. There are several different methods used to calculate reading difficulty, and one of these methods is known as the Rix index.

The Rix index is obtained by dividing the number of long words by the number of sentences.

$$Rix\ Index = \frac{Number\ of\ Long\ Words}{Number\ of\ Sentences}$$

To determine the readability index, follow these guidelines:

- A long word is a word that contains seven or more letters.
- A sentence is a group of words that ends with a full stop, question mark, exclamation mark,
- colon or semi-colon.
- Headings and numbers are not included, and hyphenated words count as one word.

Consider this passage from a Science textbook.

A fatal fall . . . or was it murder?

In 1991, some German hikers found a body preserved in ice near the Italy–Austria border. Scientists used radiometric dating and found that the body was about 5300 years old! They thought that the person, known now as the Iceman, had died of hypothermia (extreme cold). Ten years later, another group of scientists using high-tech X-rays found the remains of an arrowhead lodged near his left lung. Specialists have not yet confirmed whether the Iceman fell back onto his arrow, or if he was murdered. And without any witnesses to question, the truth may never be known!

a) How many sentences and long words appear in this passage of text?

b) Use your formula to calculate the Rix index for this passage. Round your answer to 2 decimal places.

Once you have calculated the Rix index, the table below can be used to work out the equivalent year level of the passage of text.

Rix index	Equivalent year level
Below 0.2	1
0.2–0.49	2
0.5–0.79	3
0.8–1.29	4
1.3–1.79	5
1.8–2.39	6
2.4–2.99	7

Rix index	Equivalent year level
3.0–3.69	8
3.7–4.49	9
4.5–5.29	10
5.3–6.19	11
6.2–7.19	12
Above 7.2	University level

c) What year level is the passage of text equivalent to?

d) Choose a passage of text from a magazine or newspaper with at least 10 sentences and collect the required information for the formula. Calculate Rix index and use the table above to determine the equivalent year level.

Note: Attach your passage of text with the assignment

Marking	
1 mark	a) correct number of sentences and long words.
1 mark	b) correct Rix index with suitable working shown.
1 mark	c) correct year level.
2 marks	d) calculate the Rix index and correct year level with adequate working shown.

6) Mathematics and Space (5 marks)

Scientists work with many extremely large (and small) numbers, and it is not easy to use them in their basic numeral form. For example, the distance to the nearest star outside the solar system, Proxima Centauri, is 40 000 000 000 000 000 m, and the radius of a hydrogen atom is 0.000 000 000 025 m.

Such numbers can look a little clumsy. Counting the zeros can be hard on the eye, and it's easy to miss one. Furthermore, your calculator would not be able to fit all the digits on its screen!

Scientists use powers of 10 in a number system called **scientific notation or standard form**. They have also come up with prefixes that stand for certain powers of 10. There is a prefix for every third power.

a) Use either the internet or a science encyclopaedia to complete the following table, which shows the scientific notation prefixes and abbreviations for a wide range of numbers. Note: SI is the abbreviation for International System of Units.

Standard form	Basic numeral	Name	SI prefix	SI symbol
1.0×10^{12}	1 000 000 000 000		tera	
1.0×10^{9}		Billion		
1.0×10^{6}	1 000 000		mega	M
1.0×10^{3}				
	100	Hundred	hecto	
1.0×10^{1}			deca	da
1.0×10^{-1}	0.1			
1.0×10^{-2}	0			
1.0×10^{-3}	0.001	Thousandth		
1.0×10^{-6}		Millionth	micro	μ
1.0×10^{-9}			nano	
1.0×10^{-12}	0.000 000 000 001	Trillionth		p

Proxima Centauri, near the Southern Cross, is the closest star to Earth and is 4.2 light-years away. A light-year is the distance that light travels in 1 year. Light travels at 300 000 kilometres per second.

b) Write 300 000 km/s in scientific notation.

c) Find the distance travelled by light in 1 minute in scientific notation (km/min).

d) Find the distance travelled by light in 1 hour in scientific notation (km/hr).

e) Find the distance travelled by light in 1 day in scientific notation (km/day).

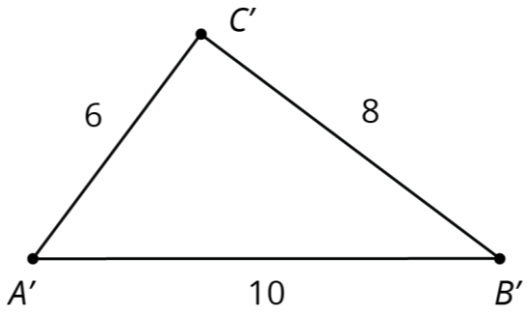
f) Multiply your answer in part e) by 365.25 to find the length of a light-year in kilometres. Why do we multiply by 365.25? Write this distance in scientific notation.

g) Calculate the distance from Earth to Proxima Centauri in kilometres.

Marking	
1 mark	a) Table accurately completed.
1/2 mark	b) Correct solution.
1/2 mark	c) Correct solution with working.
1/2 mark	d) Correct solution with working.
1/2 mark	e) Correct solution with working.
1 mark	f) Correct solution with working and explanation.
1 mark	g) Correct solution with working.

7) Right angled Triangle (1 mark)

Prove if the triangle has a right angle, using $c^2 = a^2 + b^2$ [Pythagoras' Theorem]



Marking	
1 mark	For the correct answer with adequate working shown.

8) Algebraic Alphabet (2 marks)

An expression contains 26 terms, one for each letter of the alphabet. It starts

$$a + 4b + 9c + 16d + 25e + \cdots$$

If the pattern were to continue:

a) What is the coefficient of *f*?

b) Which pronumeral has a coefficient of 400?

c) What would be the 10th term in the pattern?

d) What number term is 169m?

Marking	
1/2 mark	For each correct answer.

9) Changing the frequency (4 marks)

Consider the data below, given as a frequency distribution table.

Number	1	2	3	4	5
Frequency	2	4	1	1	3

a) What is the range?

b) How would the range change if the frequency of each number doubled?

c) If the scores were doubled but frequencies remained the same, how would this change the range? Draw a table to demonstrate this.

Marking	
1 mark	For each correct answer a) and b).
2 marks	For correct answer and table for c).

10) Graphing Simple Interest (4 marks)

Aiden invested $1000 at 2% per annum simple interest for 4 years.

a) Use this formula $Interest = Pricipal \times rate \times number\ of\ years$ 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.

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

Marking	
1 mark	a) Correct answer entered into a table.
2 marks	b) Graph correctly created.
1 mark	b) Graph correctly created with some minor errors.
1 mark	c) Correct answer predicted.

11) Composition of Gold in Jewellery (6 marks)

You may be aware that most gold jewellery is not made of pure gold. It is actually an alloy, or mixture of metals. The finest gold used in jewellery is 24 carat and is known as fine gold. Gold in this form is very soft and is easily scratched. Most metals will form an alloy with gold, the most common being silver, copper and zinc in jewellery making. Other metals may be used to create coloured gold. A table of the composition of some of the common gold alloys used in jewellery pieces is shown below:

a) Study the table and list the metals used to create the alloys of gold mentioned.

b) A particular rose-gold bracelet weighs 36 grams. Calculate the masses of the various components in the bracelet.

c) How much more gold would be in a yellow-gold bracelet of the same mass? What fraction is this of the mass of the bracelet?

Gold Name	Composition	
Gold (24 carat)	Gold	100%
Yellow gold (22 carat)	Gold	91.67%
	Silver	5%
	Copper	2%
	Zinc	1.33%
Pink gold (18 carat)	Gold	75%
	Copper	20%
	Silver	5%
Rose gold (18 carat)	Gold	75%
	Copper	22.25%
	Silver	2.75%
Red gold (18 carat)	Gold	75%
	Copper	25%
White gold (18 carat)	Gold	75%
	Palladium	10%
	Nickel	10%
	Zinc	5%
Grey-white gold (18 carat)	Gold	75%
	Iron	17%
	Copper	8%
Green gold (18 carat)	Gold	75%
	Silver	20%
	Copper	5%
Blue gold (18 carat)	Gold	75%
	Iron	25%
Purple gold (18 carat)	Gold	80%
	Aluminium	20%

d) 24 -carat gold is classed as 100% gold. On this basis, an alloy of gold containing 75% gold has a carat value of 18 carat. Note this fact in the table above. The purple gold is 80% gold. What would its carat value be?

e) Just as there are various qualities of gold used in jewellery making, the same is true of silver jewellery. Sterling silver, which is commonly used, is actually not pure silver. Find out about the composition of silver used in jewellery making. Write a short report on your findings on a separate sheet of paper (approximately 100 words).

Marking	
1 mark	a) list all the alloys from the table.
1 mark	b) for correct answer with adequate working shown.
1 mark	c) for correct answer with adequate working shown.
1 mark	d) for correct answer with adequate working shown.
2 marks	e) report includes accurate findings with full sentences, correct punctuation, grammar and spelling.

12) Tax return (4 marks)

Milly has come to the end of her first financial year. She has earned $2450 per fortnight and $360 on investments. Milly throughout the year has 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– $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

a) Calculate Milly's Taxable Income.

b) Use the tax table from above to calculate Milly's tax payable.

c) Milly needs to pay the Medicare levy of 2% of her taxable income. How much is the Medicare levy?

d) If Milly's employer has sent in a total $14 500 of tax to the ATO, has Milly paid enough tax? How much does Milly receive back or pay more?

Marking	
1 mark	For each correct answer with adequate working shown.

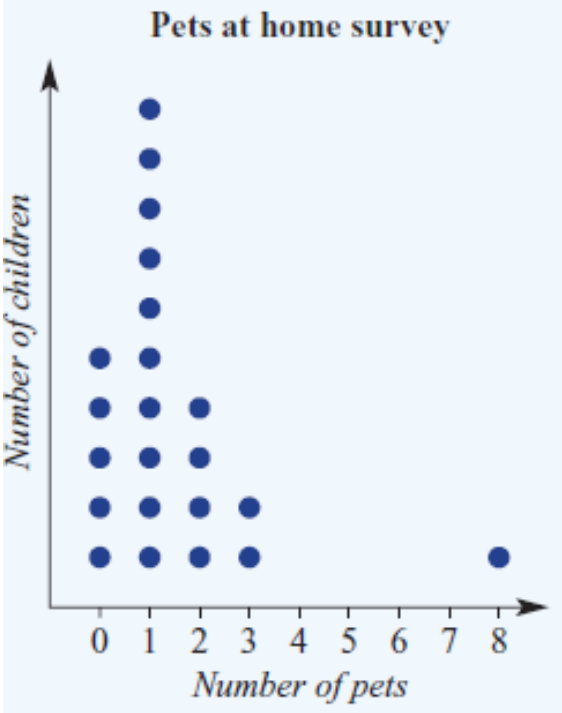
Visual/Spatial

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 below.

a) What is the outlier?

b) What is the mode?



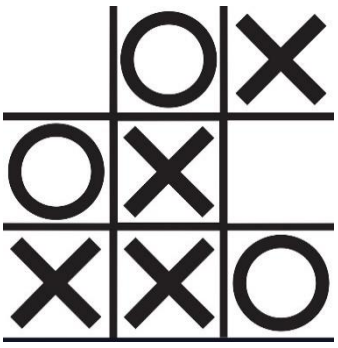
Marking	
1 mark	For each correct answer

14) Crosses and Noughts (2 marks)

Look at the completed game of noughts and crosses at right and write the ratios of:

a) crosses to noughts

b) noughts to unmarked spaces.



Marking	
1 mark	For each correct answer

15) Time sheets (4 marks)

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

	Start	Finish	Normal Hours	Overtime (1.5)
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

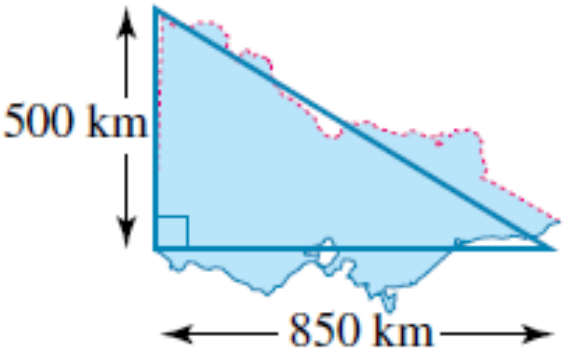
d) Total wage

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.



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.

Marking	
1 mark	For each correct answer

17) Sporting Complex (3 marks)

Draw three scaled diagrams of different sporting fields (e.g. basketball or soccer).

The diagrams must:

- have a scale of $1cm : 5m$;
- be drawn with a pencil and ruler.

a) What is the area of each field? Show all working.

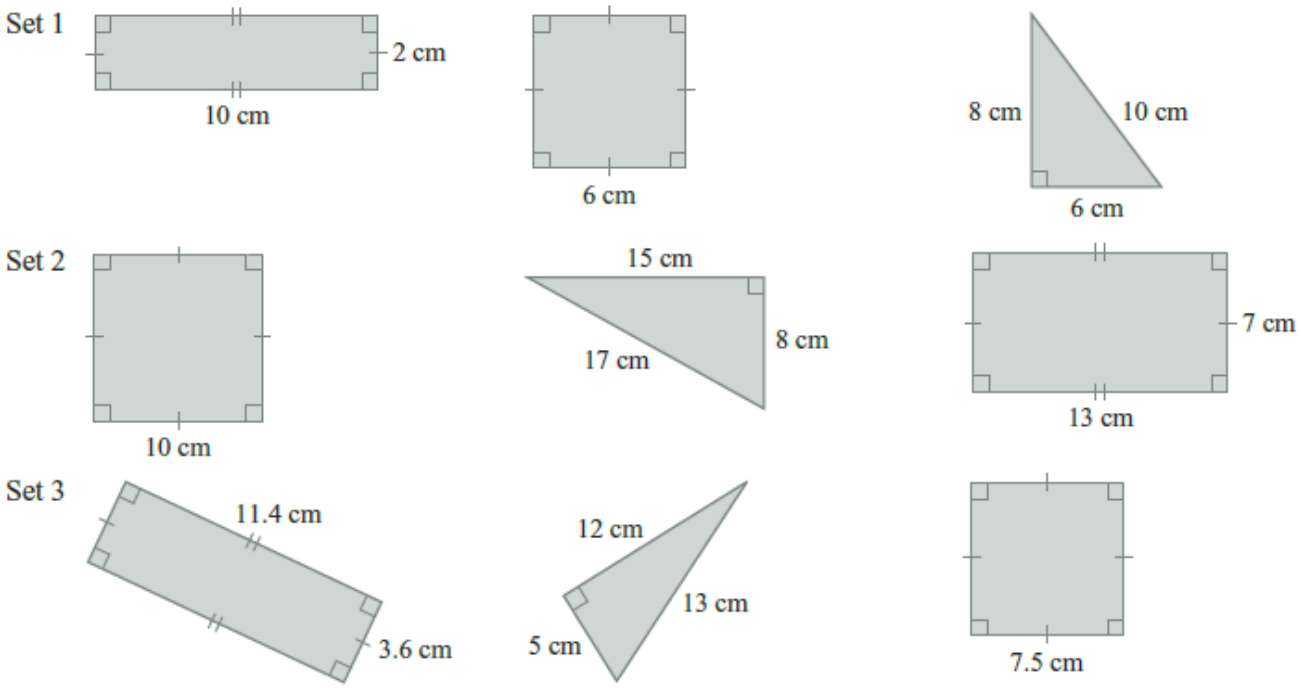
b) Write the areas of the 3 sporting fields as a simplified ratio.

Marking	
1/2 mark	For each drawing to scale.
1/2 mark	For using a pencil and a ruler to draw.
1 mark	a) For correct solutions.
1/2 mark	b) For correct answer.
1/2 mark	b) For simplifying the ratio.

18) Area and Perimeter (5 marks)

Calculate the perimeter and area of the shapes in each of the following sets to complete the table below.

a)



b) If shapes have the same perimeter, do they also have the same area? Why or why not? Explain giving reasons for your answer.

c) Construct one shape that has the same perimeter and the same area. Give it's dimensions.

Marking	
2 marks	a) For the correct solutions with working shown.
2 mark	b) 1 mark for each correct reason.
1 mark	c) For each correct answer

Bodily/Kinaesthetic (Questions 19 to 24)

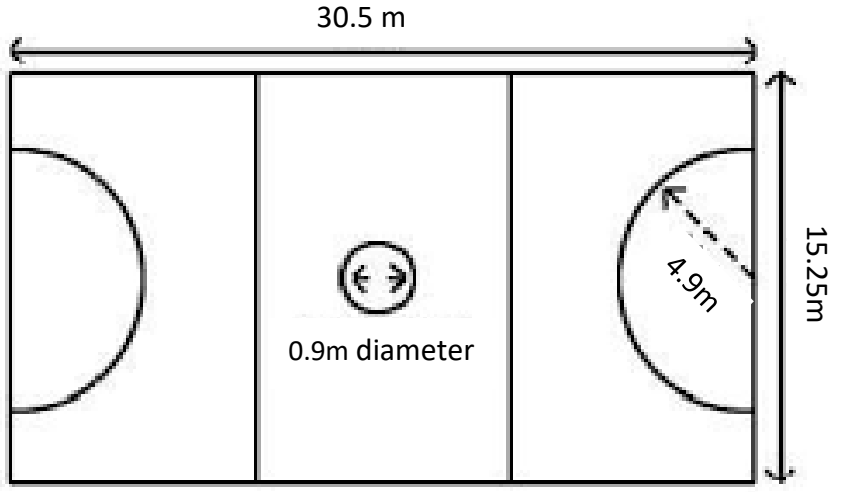
19) Body Angles (2 marks)

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) Netball Lines (2 marks)

Using your knowledge of circles, in particular circumference, calculate the length of paint used to mark all lines. Show all marking for full marks.



Marking	
1 mark	For correct answer.
1 mark	For adequate working shown.
1/2 mark	For adequate working shown with one mistake.

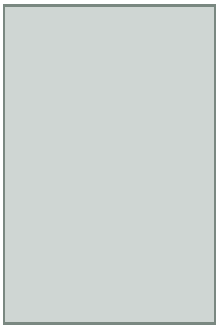
21) Composite Figures (4 marks)

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

22) Max Running (3 marks)

Conduct the following experiment at either a pool or running track/oval.

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

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

c) Convert this speed into kilometres per hour (km/h)

Marking	
1 mark	a) Data accurately entered into a table.
1 mark	b) For correct answer with adequate working shown.
1 mark	c) for correct answer with adequate working shown.

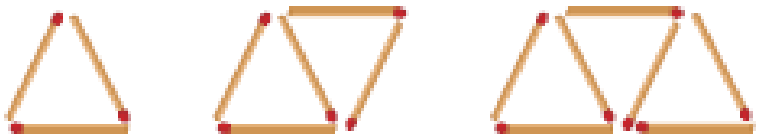
23) Kahoot (3 marks)

Create a Kahoot with at least 10 mathematical based questions using real life applications of financial mathematics. Take screenshots of each question and submit these with your assignment.

Marking	
3 marks	The Kahoot contain at least 10 questions that are mathematics based
2 marks	The Kahoot contain 10 questions but some are not mathematics based
1 mark	The Kahoot contains only 5 to 7 questions

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				
Number of matches				

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.

d) Use your rule to work out the number of matchsticks required for make a figure made up of 7 triangles. Check your answers by drawing the figures and counting the number of matchsticks required.

e) Create a matchstick pattern that can be represented by the rule m = 5n + 3.

f) Why is it useful to describe the rule for a pattern by drawing up a table and looking for the connection between the top row and the bottom row of the table?

Marking	
1/2 mark	a) Drawn correct figures
1/2 mark	b) Table accurately completed
1 mark	c) Correct rule identified and described
1 mark	d) Correct solution identified
1 mark	e) Correct matchstick pattern created
1 mark	f) Answer includes at least one reason

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 screen shot

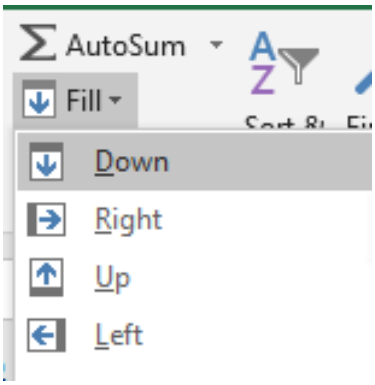
Marking	
2 marks	Data accurately entered into a spreadsheet
1 mark	Data entered into spreadsheet with some minor errors

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 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 in Microsoft Word explaining the following questions. Attach the report with your assignment.

a) What can you find out about the International Date Line?

b) Why is it not a straight line?

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

Marking	
1 mark	report includes the purpose of the IDL.
1 mark	report includes why the IDL is not a straight line.
1 mark	report includes the explanation for part c.

28) Aztec Museum (4 marks)

Go to https://bit.ly/1hfIdKF and complete 2 levels of the interactive game. To successfully complete the 2 levels, you must answer a variety of measures of central tendency questions (mean, median and mode). At each stage, you must take screenshots of your progress and paste those screenshots on a separate word document. Submit the respective word document with your assignment.

Marking	
1 mark	Screenshot showing a game was started, but no progress/results
2 marks	Screenshots showing some progress/results
3 marks	Screenshots showing progress and mostly correct results
4 marks	Screenshots clearly showing progress and a success rate of 85% or better

29) PowerPoint (3 marks)

Create a PowerPoint that can be used to teach others one mathematical concept that you have learnt this year. This PowerPoint must be a minimum of 5 slides.

Submit a copy of this PowerPoint with your assignment.

Marking	
3 marks	The PowerPoint is comprehensive and accurately teaches the concept. It contains at least 5 slides.
2 marks	The PowerPoint teaches the concept. Some information may be missing, or it is only 4 slides.
3 marks	The PowerPoint is missing important information and is less than 5 slides.

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

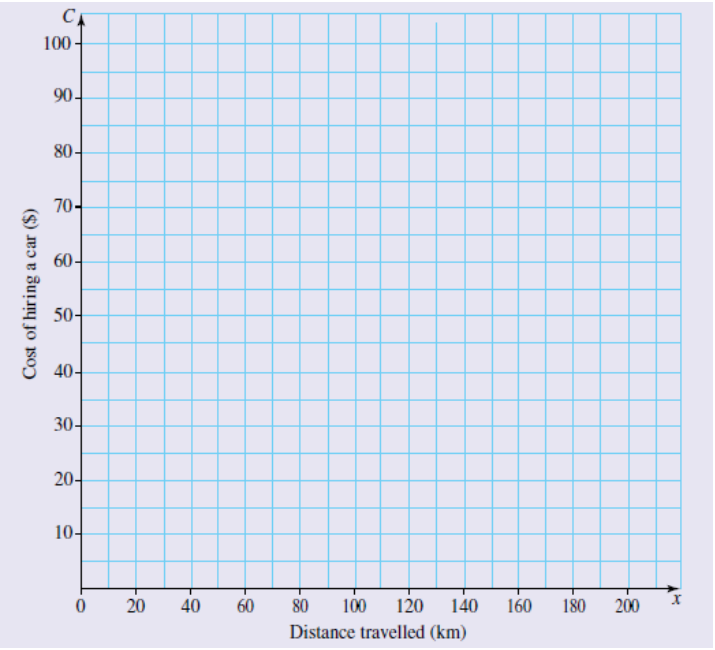
Option 2 $30 per day and 25 cents/km

Option 3 $40 per day and 35 cents for every kilometre over 100 each day

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?

b) Use Microsoft Excel to plot the graphs of the three 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.



c) Examine the graphs of the three 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.

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

Overall marking comments