Mission Heights Junior College
Year 10 Examination 2015
Subject: Mathematics

Name:

Whanau: Water

10W2

Instructions:

Time allowed for this examination is 2 hours.

You should attempt all the questions provided in this examination. You are allowed to use a
calculator and should show all working steps.

Start writing when you are instructed to do so. You have 5 minutes reading time before you start writing.

Use the space provided after each question to write all your answers. If you need extra writing sheets then ask your teacher.

Check that this booklet has 15 pages in the correct order.

YOU MUST HAND THIS BOOKLET TO THE TEACHER AT THE END OF THE TEST.

Working Towards	Achieved	Merit	Excellence

10W2 Mathematics Exam Rubric

Working Towards	Achieved	Merit	Excellence
You have: • attempted to apply numeric reasoning in solving problems • attempted to solve simple measurement problems • attempted to answer questions relating to graphs and perform basic statistical calculations • attempted to carry out simple algebraic manipulations and solve linear equations	You have: • applied numeric reasoning in solving problems • solved simple measurement problems • answered questions relating to graphs and performed basic statistical calculations • carried out simple algebraic manipulations and solved linear equations	You have: • applied numeric reasoning, using relational thinking, in solving problems • solved measurement problems • commented on aspects of statistical graphs and drawn graphs • carried out more complex algebra manipulations and solved equations	You have: • applied numeric reasoning, using extended abstract thinking, in solving problems • plan, carryout and evaluate a measurement task • interpreted graphs and reports • solve algebra problems involving graphs and manipulation

Section A: Leadership - Piha Mill Camp

QUESTION ONE

At the Piha Mill Camp, Year 7 students were watching the night sky and learning about the solar system. They found out the following information...

(a) The distance to the sun is 150 000 000km, write this distance in standard form. **(A)**

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(b) The distance to the moon is 3.8×10^8 km. The Great Wall of China is 3.2×10^6 km long. How many Great Walls of China would you need to build to walk from the earth to the moon?

(M)

_____

_____

(c) The length of a year on Mars is 687 days. Write the length of an Earth year as a fraction of a Mars Year.

(A)

_____

(d) Roughly two thirds of all spacecraft destined for Mars have failed their mission. What is the percentage success rate of a mission to Mars?

(M)

_____

(e) Nasa is planning a manned mission to Mars in 2033. The USA government has planned to increase NASA's budget by 4.5%. If NASA's current budget is $75, 000, 000,000 calculate the new increased budget.

(E)

_____

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_____

QUESTION TWO

(a) Avinash carried a family bag of 24 jet plane lollies as a treat on camp, and shared these with his two friends Samson and Felixsun.
If Samson ate $\frac{1}{3}$ and Felixsun ate $\frac{3}{8}$ how many Jet Planes did Avinash eat? **(A,M)**

_____

_____

(b) Timothy took a part time job as a part of his leadership training. He has to pay $\frac{1}{5}$ of his pay to the Government as tax. Calculate the amount of tax he pays per week if he earns $96 a week.

(M)

_____

_____

(c) Bob has decided to run a business importing and selling models of the solar system on **Trade Me**

i) He imports the models from China. Each model costs $5.95.
ii) He has to pay a 5 % import tax on his imported models.
iii) Bob wishes to make a 60% profit on each model.
iv) He also needs to add GST onto the price of each model before he sells them to the public.
vi) Trade Me charges a 10% success fee for each model sold.

Calculate the minimum price that Bob will need to sell his models.
(A,M,E)

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QUESTION THREE

Jasneek is considering a new proposal as a part of leadership and wants to buy the following items from the NZ online store '**Sports R US'** for Whanau gym resources.

Jasneek wants to buy...

'Sports R US' is having an "**Online you choose the discount**" sale. These are the offers shown below:

8 pieces of sporting equipment are to be placed in the area suggested by Avinash and Samson in their measurement proposal...

(Prices given include NZ GST)

- Tread mill $539.95	- Exercise bike $519.95
- Stationary bike $319.95	- 6 pairs 2 kg weights $99.95
- Rowing machine $89.99	- Nike Strength Training balls $41.99
- Punching bag $38.97	- Bench press station $239.95

25% OFF any one item which costs up to a maximum of $20 12.5% OFF any one item which costs up to a maximum of $500

20% off the price any one item which costs up to a maximum of $50

12.5% OFF any one item which costs up to a maximum of $500

15% off any one item which costs up to a maximum of $100

8% off any one item which costs up to a maximum of $1000

15% of any one item which costs up to a maximum of $100

10% off the cost of any one item which costs up to a maximum of $1000

You may choose as many offers as you want but you may only choose one per item and each offer can only be used once (ie. 3 items need 3 different offers)

A New Zealand dollar is worth 0.793 Australian Dollars (for this assessment)
*Jasneek has **three** options...*

1. He can choose to pay for all the items using the online discount choices.
2. He can choose to send the money to another friendly school who can then use their loyalty card and receive 1/9 off all the items.
3. Get his sister who works for **'Sport's R US'** in New Zealand to use her staff discount which gives GST off all items.

'Sport's R US' Task: (continued...)

Work out what the best option is for Jasneek **and** what it will cost him in Australian Dollars. Justify your answers. Discuss any assumptions you have made.

In the solution of this problem you should:

• *show all relevant workings;*

• *display high quality discussion and reasoning;*

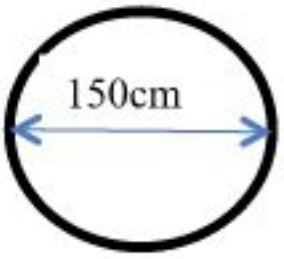
• *be mindful that how well you link your discussion and reasoning to the context, will determine your overall grade.*

Calculate three different options, dividing the following space into three. **(M, E)**

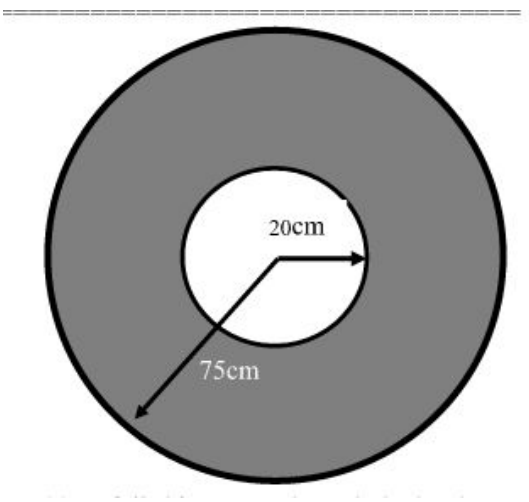
SECTION B: Leadership in Using Mathematics – Measurement Proposal

QUESTION ONE

(a) Ngapipi wants to make a proposal to the school to change the design of the school skirt. She is making a skirt and needs to cut out a full circle of material. **Calculate the area of the full circle.**



Area =_____ **(A)**



(b) A pattern for a full skirt has a hole the shape of a circle cut out of the middle. Ngapipi's
skirt has a circle with a radius of 20cm cut from the centre of a full circle, which radius is 75cm.
Calculate the amount of material in the skirt. **(M)**

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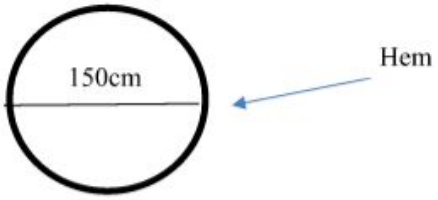
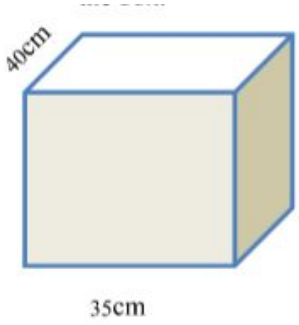
(c) Lace is going to be sewn around the hem of the skirt. Calculate the length of lace



needed. **(M)**

QUESTION TWO

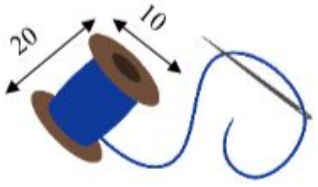
(i) The lace for the hem of the skirt comes in a cuboid shaped box. Calculate the volume of the box.



(M)

(ii) The lace is stored on cylinder shaped reels. The reels have a radius of 5cm and height of 20cm. If the lace is wound onto the reels to a thickness of 10cm, how many full reels of lace can fit into the box?

(E)



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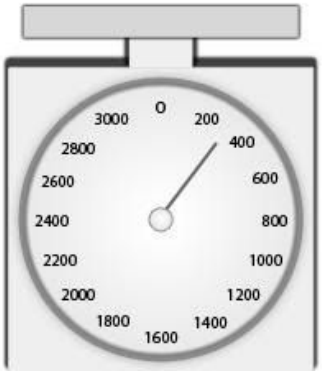
QUESTION THREE

The weight of a full box of reels in grams is shown on the scales below.



(a) Give the weight of a box of lace
(A)

_____

(b) Calculate the weight of 10 boxes of lace, give your answer in kilograms. **(A)**

_____

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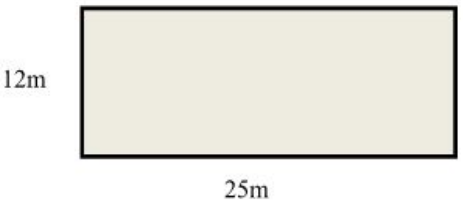
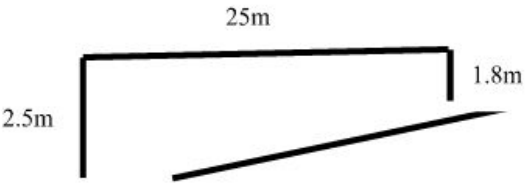
QUESTION FOUR

Victor is planning to promote an idea of having a school pool and has given a proposal to the principal to build a swimming pool on the lower field area, which is not used. According to his plan to maintain the pool he suggested that at the start of the school year the school pool needs to be emptied and filled with freshwater.

Here is a diagram of the pool looking down.



Here is a cross section view of the pool.



(a) Calculate the volume of the pool?

(A)

_____

(b) How many litres of water will be needed to fill the pool?

(M/**E)**

(c) The pool needs to be divided into 8 lanes for swimming sports. Calculate the width of each

lane?

_____ **(M)**

d) Victor is planning to promote an idea of having a school pool and has given a proposal to the principal to build a swimming pool in the lower field area, which is not used. He plans paving a 1.5m wide path around the outside of the pool.

The paving stones to be used are rectangles measuring 30cm by 15cm. How many paving stones will the caretaker need to pave a 1.5 m wide path around the outside of the pool?

(E)

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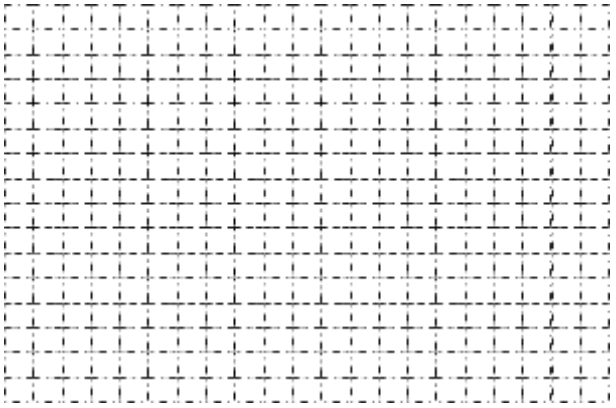
SECTION C: NCEA Statistics

QUESTION ONE

Victor wondered if there was a difference in the length of arm span between back stroke specialist swimmers and butterfly specialist swimmers. He measured the arm span of the 20 male backstroke swimmers and 20 female butterfly swimmers at his swim club. The results are in the table below.

(a) Draw a double dot plot of the arm span



(M)

Backstroke (cm)	Butterfly (cm)
159	162
159	163
165	165
166	167
166	168
167	169
168	172
168	173
168	175
169	175
170	176
171	176
171	179
172	180
173	180
173	180
173	181
174	185
175	200
180	230

(b) Complete the table for the above data and draw a double box and whisker plot

(E)

	Backstroke	Butterfly
Lowest Value		

Lower quartile		
Median		
Upper quartile		
Highest value		
Mean		
Range		
Mode		

(c) What do the graphs show about the arm spans of backstroke swimmers compared to breaststroke swimmers. **(E)**

_____

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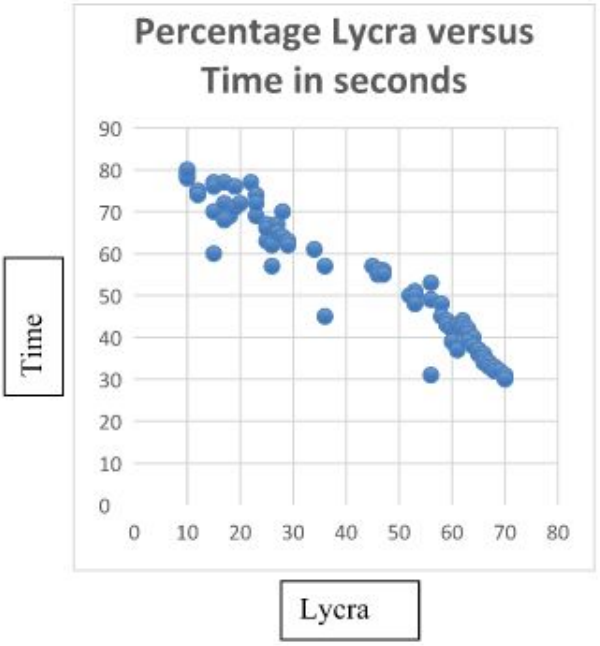
Most swimsuits are made with a blend of Lycra and other materials. Adidas have been trialling some new fabric for swimsuits. They have varied the amount of lycra in the new mens' body suit and measured the times for a 50m swim. The results are presented in the graph below:



(d) Describe the relationship between the amount of lycra in the swimsuit and the time to swim 50m. **(E)**

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SECTION D: Shaping Our Future

QUESTION ONE

Members of 10w2 used formulas to convert temperature for their **Science Fair** experiment.

The formulas for converting degrees Celsius (C) to degrees Fahrenheit (F) is:

$F = \frac{9C}{5} + 32$

(a) Convert 16 degrees Celsius to degrees in Fahrenheit.
(A)

_____

_____

(b) Rearrange the formula so you could change a temperature given in degrees Fahrenheit to
degrees Celsius. **(M)**

_____

_____

QUESTION TWO

The product of two consecutive positive numbers is 56. Form and solve an equation to find the value of the integers.

_____

_____

According to the careers study conducted by Molly, a real estate agent is paid $550 a week plus $100 for every house she is advertising for sale. Her weekly pay is given by the formula:

(E)

P= 550 + 100h

(a) Explain what P and h represent

_____

_____

(b) What will she get paid next week if she is advertising 7 houses?

(M)

_____

(c) If she was paid $1750 last week, how many houses was she advertising?

(M)

_____

QUESTION THREE

Fully factorise the following expressions

(a) $3y + 9 =$ _____ **(A)**

(b) $ab + ac =$ _____ **(A)**

(c) $24w^4 - 36w^2 =$ _____ **(A)**

(d) $15xy^3 + 10x^2y =$ _____ **(A)**

(e) $x^2 - 6x + 8 =$ _____ **(M)**

(f) $y^2-49 =$ _____ **(E)**

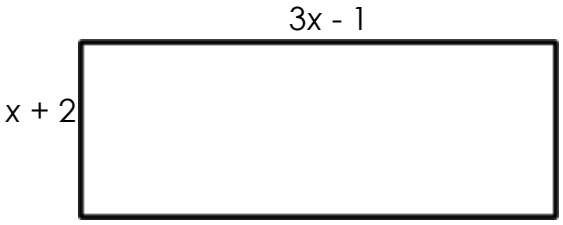
(g) $2x^2 + 13x + 18 =$ _____ **(E)**

_____

_____

QUESTION FOUR

(a) Write an expression for the perimeter of this rectangle.



_____

(b) If the perimeter is equal to 82cm, calculate the length of each side of the rectangle? **(E)**

_____

_____

QUESTION FIVE

Expand the following, simplify if necessary.

(a) $7(3y + 6) =$ _____ **(A)**

(b) $12(n + 4) - 3(n - 3) =$ **(M)**

_____

_____

(C) $(x - 4)(x + 3)$ **(E)**

_____

_____