



Mission Heights Junior College

Subject: Mathematics 2019

Time: 2 hours

Name: _____ **Class:** _____

xxx Whanau

Instructions:

Time allowed for this examination is TWO hours.

You should attempt all the required questions in this examination. You are allowed to use a calculator.

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

Use the space provided after each question to write all your answers with **the working shown very clearly**. If you need extra writing sheets then ask your teacher. Round your answers to 2 dp where applicable. Use only black or blue pen to write the paper. Use pencil only to draw the graph and diagrams.

Check that this booklet has pages 1-22 in the correct order and a separate planning sheet.

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

| Working Towards | Achieved | Merit | Excellence |
|-----------------|----------|-------|------------|
| | | | |

Sections

| Section | WT | AT | ABOVE | BEYOND |
|-----------------------|--|---|---|--|
| A: Number | You have attempted to solve problems involving integers, decimals and fractions | You have solved problems involving integers, decimals and fractions | You have solved number problems involving few steps | You have solved number problems in context involving several steps |
| B: Algebra and graphs | You have attempted to carry out simple algebraic manipulations and solved simple equations | You have carried out simple algebraic manipulations and solved simple equations | You have carried out complex algebraic manipulations and solved linear equations and graphs | You have applied algebraic skills to solve problems |
| C: Trigonometry | You have attempted to use trigonometry to solve mathematical problems | You have used trigonometry to solve mathematical problems | You have used trigonometry to solve mathematical problems with reasoning | You have used trigonometry to solve problems in context with justification |
| D: Statistics | You have attempted to answer questions relating to graphs and performed basic statistical calculations | You have answered questions relating to graphs and performed basic statistical calculations | You have Commented on aspects of statistical graphs | You are able to Interpret graphs and reports. |

Section A: Number

Show ALL working.

QUESTION ONE

The questions in this section relate to Faafoi family. The families weekly income is **\$1200**.

(a) The family spends 37% of their income on mortgage repayments. Calculate the value of the weekly mortgage repayments.

(AT)

(b) \$300 is budgeted for food each week. What percentage of the income is this?

(AT)

(c) Each week the family saves \$50. What fraction of the income does the family save?

(AT)

(d) The family have an unlimited broadband plan. This costs $\frac{1}{50}$ of their income each week. Calculate the monthly cost of the broadband plan (Use 4 weeks in a month).

(AA)

(e) The monthly charge for having rubbish collected has increased by 6%. It now costs \$23.32. Calculate the old monthly charge of having rubbish collected.

(AA)

QUESTION TWO

The family use gas for heating their hot water. The amount of gas used each day, measured in kg has been monitored over the last week.

(a) List these amounts in order from smallest to largest.

0.23, 0.16, 0.211, 0.305, 0.098, 0.106, 0.203

(AT)

(b) Write the total amount of gas used last week correct to 2 significant figures.

(AT)

(c) The family have been investigating using solar panels to power their home. When Mr Faafoi googled Solar panels on the internet, he got 24 300 000 results.

Write 24 300 000 in standard form.

(AT)

QUESTION THREE

Below is part of the families' last electricity bill.

| Account reading | | |
|--|--|-----------------|
| Previous activity | Charges | Credits |
| Previous balance | | \$236.99 |
| Incoming Payment (13 Mar 19) | | \$173.85 |
| Prompt Payment Discount | | \$63.14 |
| Balance outstanding | | \$0.00 |
| Summary of Current activity | Charges | Credits |
| Fixed daily charges | \$31.29 | |
| Variable charges | \$211.44 | |
| GST | \$36.41 | |
| Total current charges | | \$279.14 |
| Total amount due | | \$279.14 |
| Save \$61.41 with your prompt payment discount if paid by 23 Apr 2019 | (includes \$28.40 of GST on current charges) | \$217.73 |

(a) The bill shows a total amount due of \$279.14, with a prompt payment discount of \$61.41. Calculate the percentage of the prompt payment discount. (AT)

(b) The current total charges is \$279.14 and the previous total charge was \$236.99. Calculate the percentage change in the electricity cost. (AA)

(c) The electricity usage is broken into a daily fixed charge and a variable charge in the ratio of 1:3. From the total of \$217.73; calculate the amount of the variable charge. (AA)

QUESTION FOUR

(a) $\frac{2}{9} - \frac{1}{2} =$ (AT)

(b) $\frac{1}{9} \div \frac{2}{5} =$ (AT)

(c) $\frac{3}{5}$ of 60 = (AT)

(d) $2\frac{3}{5} + (\frac{1}{2})^2$ (AT)

QUESTION FIVE

The Faafoi family wishes to purchase a spa pool and install this on the patio of their house. (TAAB)



**SPA POOL 5 SEATER PREMIUM
35 JET**

PRE-ORDER NOW, NEW STOCK ARRIVING 1 JUN

★★★★★ 1 review

**NOW ONLY
\$6,999**

PRICE GUARANTEE Seen a lower price? [Ask us to beat it](#)

Buy direct from the importer - Trade Tested.
[Read more](#)

 **SHIPPING OPTIONS TO OTAGO**

No door to door delivery options.

Delivery to [Dunedin Depot](#) **\$219** 2-5 days.
Pickup Auckland Store **FREE**

They have decided on the pool in the picture above.
The pool cost \$6 999 plus \$219 deliver fee.
It will cost \$320 plus GST (15%) to get an electrician to install a special plug for the pool.



A cover for the pool costs \$479.00. However, Mrs Faafoi has negotiated a 20% discount.
The family have been given approval for a \$6999 loan from the bank to pay for the pool. The loan has an interest rate of 5.45%. The loan and interest need to be repaid by the end of 12 months.
The family have saved \$1000 to cover the cost of delivery, installation and the cover. They can spare $\frac{1}{10}$ of their weekly income to repay the loan.

Can the Faafoi family afford to buy the spa pool?
You must show working and state what you are calculating at each step. (TAAB)

(a) $3y + 5y - y =$ (AT)

(b) $4z + 6w - 2z + 7w =$ (AT)

(c) $3q^3 \times 6q^7 \times 9q =$ (AT)

(d) $n \times n \times n \times n =$ (AT)

(e) $\frac{24w^{10}}{8w} =$ (AT)

(f) $(2k^4)^7 =$ (AA)

(g) $\frac{-3p^6 \ 4p^7}{8p^5} =$ (AA)

(h) $\frac{5x}{8} - \frac{4x}{9} =$ (AA)

QUESTION TWO

The formula for the volume of a cylinder is:

$$V = \pi r^2 h \quad v = \text{volume} \quad r = \text{radius} \quad h = \text{height}$$

(a) Calculate the volume of a sphere with a radius of 5 cm and height of 9 cm. (AT)

(b) Rearrange the formula to make r the subject. (AA)

QUESTION THREE

Solve the following equations

(a) $\frac{x}{10} = 4$ (AT)

(b) $5x - 3 = 47$ (AT)

(c) $\frac{w}{6} + 3 = 20$ (AA)

(d) $5x + 6 = 2x - 10$ (AA)

(e) $6(y - 4) = 2y + 20$ (AA)

(f) $(x - 8)(x + 7) = 0$ (AA)

(g) $x^2 + 7x + 12 = 0$ (AA)

(h) $\frac{5x}{8} + \frac{2x}{3} = 2$ (TAAB)

(c) The gardener charged the next door neighbours \$185 How many hours did he work for the neighbours? (TAAB)

QUESTION SIX

Expand and simplify the following expressions:

(a) $x(x + 9)$ (AT)

(c) $(x + 3)(x + 4)$ (AA)

(d) $(x - 7)^2$ (AA)

QUESTION SEVEN

Factorise the following expressions:

(a) $4w + 20$ (AT)

(b) $25y^5 - 30y^7$ (AT)

(c) $6x^6y^2 + 20x^3y^9$

(AA)

(d) $x^2 + 13x + 36$

(AA)

(e) $2x^2 + 18x + 40$

(TAAB)

QUESTION EIGHT

The cover for the spa pool is a rectangular shape. The longer side is 50 cm longer than the shorter side. The perimeter of the cover is 900 cm.

Write an equation for the perimeter of the cover **and** use the equation to find the dimensions of the spa pool cover. (AA)

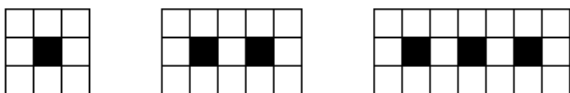
QUESTION NINE

Give the next two terms in each of these patterns:

- (a) 2, 4, 8, 16, _____, _____ (AT)
- (b) 1, 4, 7, 10, _____, _____ (AT)
- (c) 1, 4, 9, _____, _____ (AT)
- (d) 1, 1, 2, 3, 5, 8, 13 _____, _____ (AT)
- (e) 1, 6, 31, 156, _____, _____ (AT)

QUESTION TEN

Mr Faafoi is pathing the area around the outside of the spa pool. He is using light and dark paving stones. The relationship between the number of light and dark stones can be seen in the images below



- (a) Fill in the table below: (AT)

| Dark stone(D) | Light stone (L) |
|---------------|-----------------|
| 1 | 8 |
| 2 | 13 |
| 3 | 18 |
| 4 | |
| 5 | |

(b) Write a rule linking the number of dark stones and the number of light stones. (AA)

L = _____

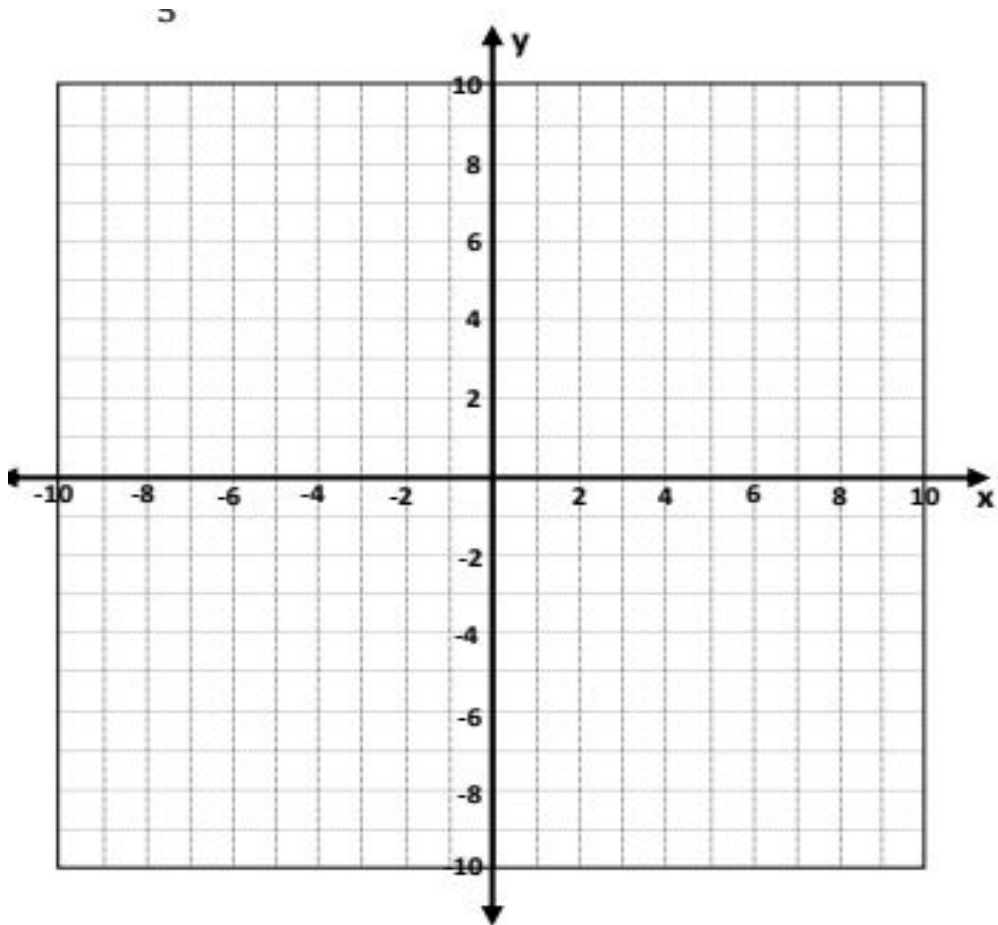
(c) If Mr Faafoi needs to use 24 dark stones, how many light stones will he need to use? (AA)

QUESTION TWELVE

Plot the following straight lines on the axes below. Remember to label each line.

(a) $y = -2x + 1$ (AA)

(b) $y = \frac{3}{5}x + 1$ (TAAB)



This is the working out space for making graphs.

Section C: Trigonometry

QUESTION ONE

Calculate the values of x to 1 decimal place.

(a) $3^2 + 8^2 = x^2$

(AT)

(b) $x^2 + 2.3^2 = 5.4^2$

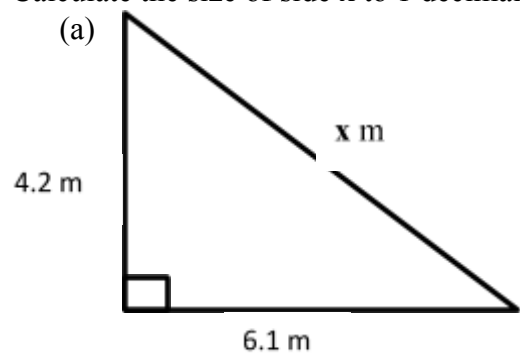
(AT)

(c) $x = 3.5 \sin 50^\circ$

(AT)

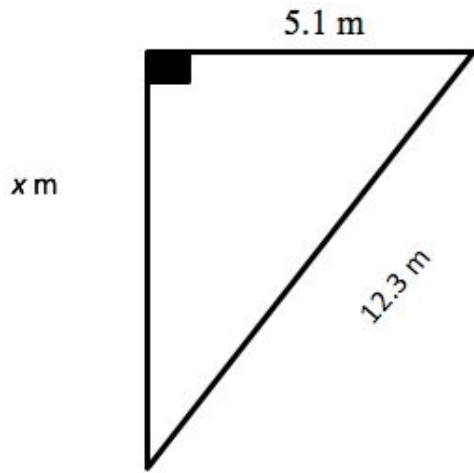
QUESTION TWO

Calculate the size of side x to 1 decimal place.



(AT)

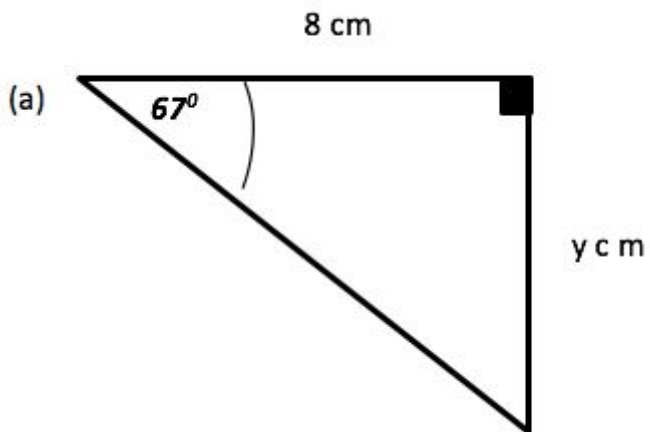
(b)



(AT)

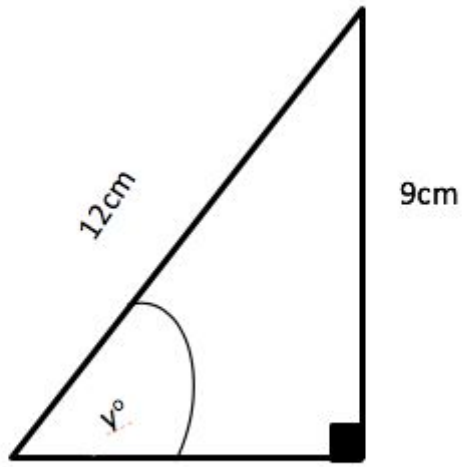
QUESTION THREE

Calculate the size of y to 1 decimal place



(AA)

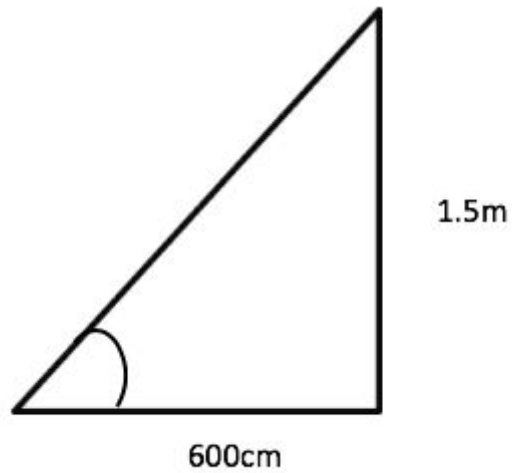
(b)



(AA)

QUESTION FOUR

Mr Faafoi is going to construct a handrail on the steps up to the front door. The height of the steps is 1.5m and the depth 600cm.



(a) Calculate the minimum length the handrail should be.

(AA)

(b) Calculate the bearing the boat needs to travel back to the boathouse.

(TAAB)

Section D: Statistics

QUESTION ONE

The graph below shows the Faafoi families monthly electricity usage from April 2017 to March 2019



(a) Describe the family’s electricity usage.

(AT)

(b) Make a prediction the electricity usage for November 2019.

(AT)

(b) Mr Faafoi is concerned that his family is using more electricity than they should be. How do the graphs above support or not support his concern? (AA)

QUESTION THREE

The family's electricity usage in November for the past ten years is listed below.

900, 850, 780, 920, 950, 875, 866, 810, 898, 900

Calculate the following statistics

(a) Mean: _____ (AT)

(b) Median: _____ (AT)

(c) Mode: _____ (AT)

(d) Range: _____ (AT)
