Mission Heights Junior College

Year 10 Examination 2018

Subject: Mathematics

Name: _____ **Class:** _____

Mountains 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

Time: 2 hours

Sections

Section	WT	A	M	E
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
Algebra	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 more complex algebra manipulations and solved linear equations	You have solved algebraic problems involving manipulation
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
Statistics	You have attempted to answer questions relating to graphs and perform basic statistical calculations.	You have answered questions relating to graphs and perform basic statistical calculations.	You have Commented on aspects of statistical graphs and draw graphs.	You are able to Interpret graphs and reports.

Section A: Number

Show ALL working.

QUESTION ONE

(a) The number of visitors to London each year is approximately 174 000 000. Write this number in standard form. (A)

(b) The most popular attraction in London is the London Eye. 3.5×10^6 people ride the London Eye each year. A standard ticket costs $55. Calculate the amount of money spent on London Eye tickets each year. (M)

(c) The London Eye has 32 capsules. 8 of the capsules can be hired for private dining events. What fraction can be hired out for dining events? (A)

(d) There are two types of tickets to the London Eye. A standard ticket, and a FastTrack ticket. Approximately $\frac{2}{5}$ of the 3 500 000 visitors each year purchase a FastTrack ticket. How many FastTrack ticket are sold per year? (A)

(e) What percentage of visitors purchase a standard ticket? (A)

(f) The price of the $55 standard ticket is going to increase next year by 15%. Calculate the new price of a standard ticket. (M)

QUESTION TWO

(a) 22% of the visitors to London arrive by train. Of the 174 000 000 visitors, how many arrive by train? **(A)**

(b) A survey of 600 visitors was taken at Buckingham palace? 420 of these visitors arrived in London on an aeroplane. What percentage had arrived on an aeroplane? **(A)**

(c) Harley has a 30% discount coupon for his visit to the London Dungeon. The normal ticket price is $42. How much will Harley pay if he uses his coupon? **(M)**

(d) Approximately 17 000 people visit the London National Museum each day. The visitors are split between adults and children in the ratio 1:3. How many children visit the museum each day? **(M)**

QUESTION THREE

(a) The Tower of London holds the Crown Jewels of England.
The weights of the crown Jewels in kilograms are as follows:
1.6 , 3.42, 1.22, 2.03, 3.05, 1.16, 2.04
Write these in order from smallest to largest. **(A)**

_____

(b) A ticket to visit the Tower of London costs $44.70. Calculate the cost of a tour group of 75 people.
Round your answer to 2 significant figures. **(A)**

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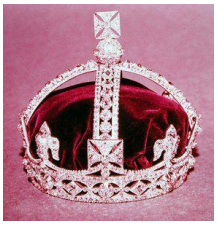

QUESTION FOUR

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

_____

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

_____

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

_____

(d) Aroha earns $800 a week. If Aroha saves $\frac{3}{8}$ of her pay for her trip to London and spends $\frac{2}{5}$ of her pay on living expenses. How much money of her pay does Aroha have left to spend each week? **(M)**

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QUESTION SIX

Aroha is saving for a trip around Europe.
She will fly to London. The air tickets will costs $2,250.
Aroha will also need to pay for Travel Insurance. This cost of the insurance is found by calculating $\frac{1}{5}$ of the price of her airfare.
Aroha will travel around Europe with a Euro rail train pass. The pass costs €919 (European dollars which are called euros). Because Aroha is under 27 she can receive a 15% discount.
One euro (€) equals $1.68 New Zealand dollars.

€ 1 = NZ $1.68

Aroha will purchase a $80 Youth Hostel membership. This will allow Aroha to stay in a Youth Hostel each night and pay the special members only price of $50 per night. She will need to pay for 22 nights accommodation.
Aroha is budgeting $40 a day for food. She will need for 23 days.
How many weeks will Aroha need to save, if she can save a minimum of $250 a week?
You must show working and state what you are calculating at each step **(E)**

Section B: Algebra and graphs

QUESTION ONE

Simplify the following expressions

(a) $6y + 4z + 2y - z =$ (A)

(b) $2xy - 2y + 5xy - 4y =$ (A)

(c) $7p^2 \times 5p^6 =$ (A)

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

(e) $\frac{49w^8}{7w^5} =$ (A)

(f) $(k^4)^7 =$ (A)

(g) $\frac{6y^5 5y^3}{2y^4} =$ (M)

(h) $\frac{3x}{8} + \frac{2x}{7} =$ (M)

QUESTION TWO

The formula for the volume of a sphere is:

$V = \pi r^2 h$ v = volume r = radius h =height

(a) Calculate the volume of a sphere with a radius of 4 cm and height of 10 cm. (A)

(b) Rearrange the formula to make h the subject. (M)

QUESTION THREE

Solve the following equations

(a) $4x = 32$ (A)

(b) $p - 5 = 11$ (A)

(c) $10x + 3 = 23$ (A)

(d) $\frac{2y}{6} - 3 = 4$ (M)

(e) $7m - 5 = 3m + 12$ (M)

(f) $3(x - 2) = 5(x + 4)$ (M)

(g) $(x + 5)(x - 7) = 0$ (M)

(h) $x^2 + 10x + 24 = 0$ (M)

(i) $\frac{5x}{8} + \frac{2x}{3} = 2$ (E)

QUESTION FOUR

The product of two consecutive even numbers equals 48. Form and solve a quadratic equation to find the two numbers. (E)

QUESTION FIVE

Each year the school needs to get all electrical equipment safety checked. Each item needs to be tested and tagged by an electrician.
The electrician charges $8 for each item tested and tagged, plus a $150 call out fee.
(a) Write an equation for the electrician's charges.
Use C = cost and I = number of items tested. (A)

(b) This year the school has 340 items to be tested. How much will this cost? (M)

(c) Last year the school paid $3,950 for the testing and tagging. How many items were tested and tagged last year? (E)

QUESTION SIX

Expand and simplify the following expressions:

(a) $9(3x - 2)$ (A)

(c) $(x + 7)(x - 5)$ (M)

(d) $(x - 5)^2$ (M)

QUESTION SEVEN

Factorise the following expressions:

(a) $5y + 25$ (A)

_____

(b) $xy + xz$ (A)

_____

(c) $8w^5 – 32w^3$ (A)

_____

(d) $14x^7y^3 – 28x^5y^9$ (M)

_____

_____

(e) $y^2 + 12y + 36$ (M)

_____

_____

(f) $2x^2 +14x + 24$ (E)

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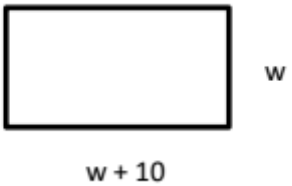
QUESTION EIGHT

The length of the rectangular shaped school field is 10 metres longer than the width , as shown below.



(a) Write an expression for the perimeter of the field. Perimeter = (M)

_____

_____

_____

_____

(b) The perimeter is 100m. Calculate the width and length of the field. (M)

_____

_____

_____

_____

QUESTION NINE

Give the next two terms in each of these patterns:

(a) 1, 6, 11, 16, _____,_____ (A)

(b) 100, 50, 25, _____,_____ (A)

(b) 1, 4, 9, _____,_____ (A)

(c) 1, 3, 6, 10 _____,_____, (A)

(d) (n +1), (n –1), (n – 3) _____,_____, (A)

QUESTION TEN

Victoria is saving for a school trip to Singapore. She opened a savings account with Kiwi bank and deposited $200. Each week she has been depositing $30.
Victoria needs to save $2700.

(a) Fill in the table below: (A)

Week	Amount in bank
1	200
2	230
3	260
4	
5	
6	
7	
8	
9	
10	

(b) Write an equation that links the amount saved and the number of weeks. (M)
Use A = Amount Saved and W= week

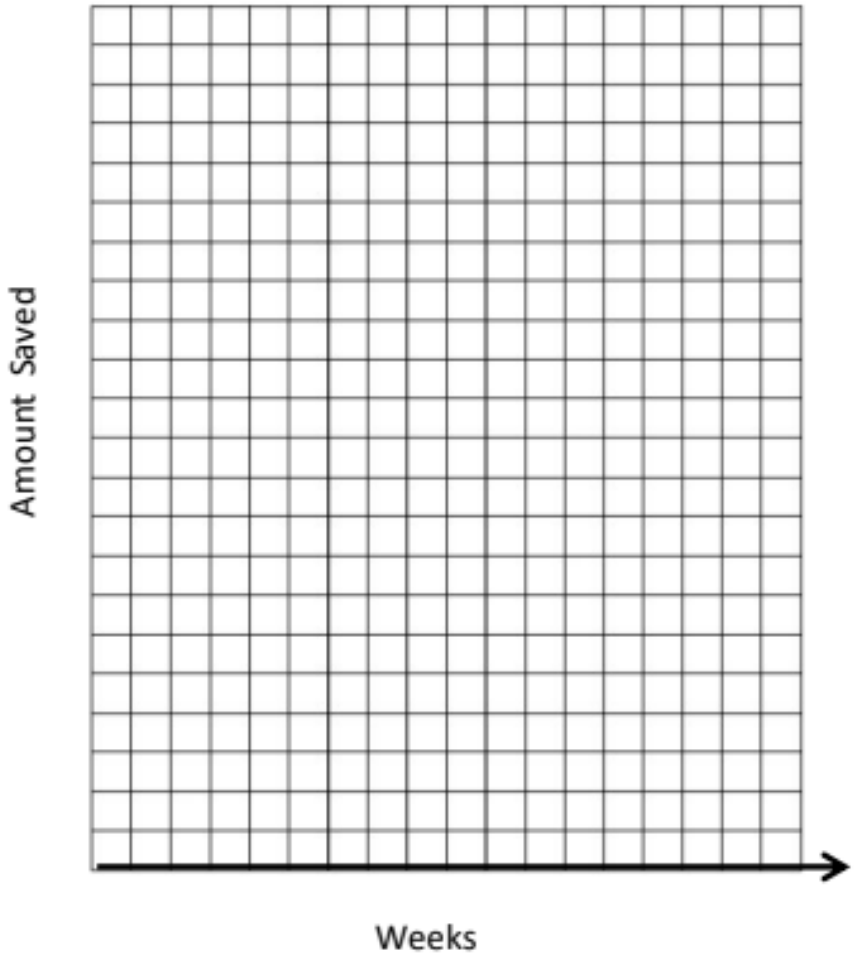
A = _____

(c) How many weeks will it take Victoria to save the whole amount for the trip? (M)

_____

_____

(d) On the graph below plot the points from the table. Make a suitable scale on each axes. (E)



(e) Discuss how the graph above relates to the equation you wrote in question (b) . Use mathematical terms in your description. (M)

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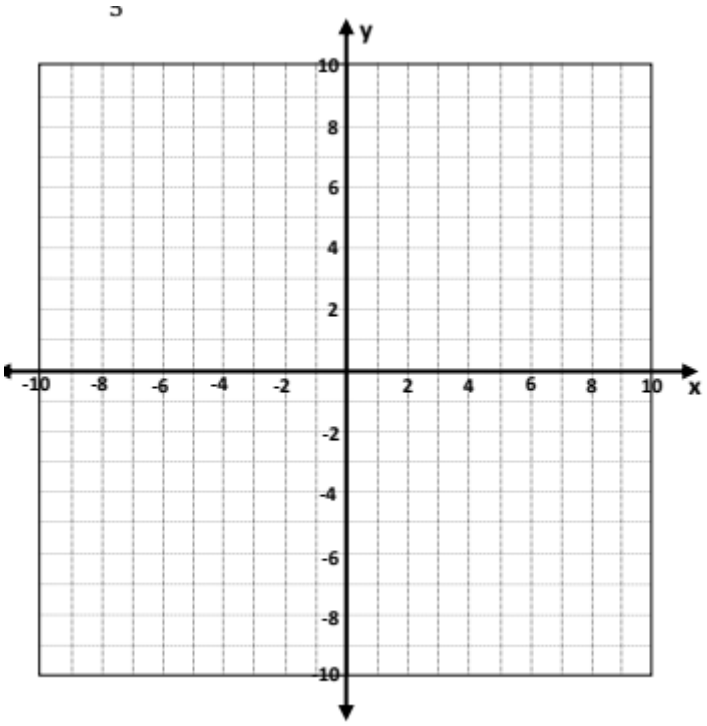
QUESTION TWELVE

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

(a) $y = -3x + 1$ (M)

(b) $y = \frac{2}{5}x + 1$ (E)



This is the working out space for making graphs.

Section C: Trigonometry

QUESTION ONE

Calculate the values of x to 1 decimal place.

(a) $6^2 + 7^2 = x^2$ (A)

_____

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

(A)

_____

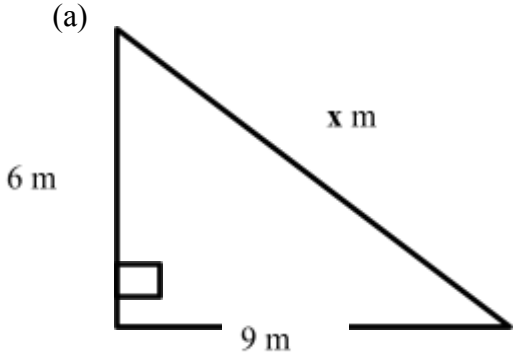
$x = 7\cos 40^o$ (A)

_____

QUESTION TWO

Calculate the size of side x to 1 decimal place.

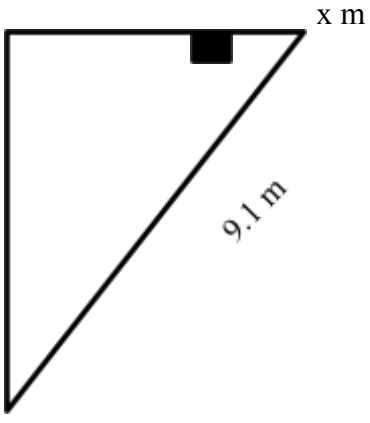
(a)



_____ (A)

_____

(b)



_____ (A)

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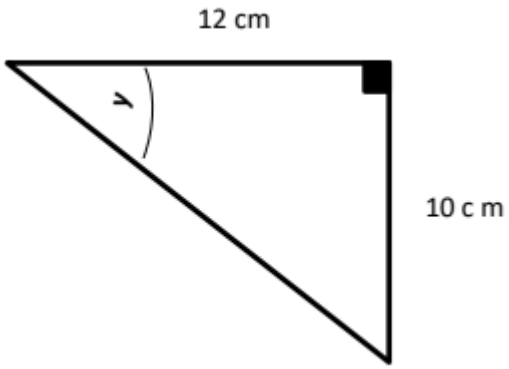
QUESTION THREE

Calculate the size of y to 1 decimal place

(a)

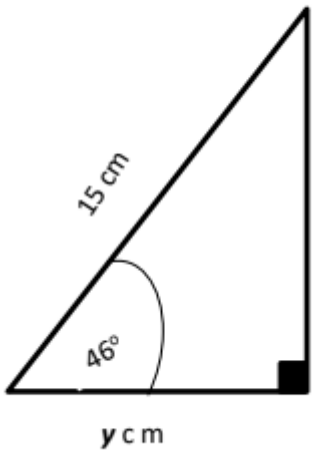


_____ (M)

_____

_____

(b)



_____ (M)

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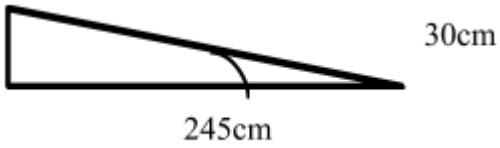
QUESTION FOUR

The caretaker needs to check if this wheelchair ramp meets the building code. The angle of elevation of the ramp must be less than 4.674 °.

The ramp is 30 cm high and 245cm long



Does the ramp meet specifications? Explain your answer supported with calculations. (M)

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QUESTION FIVE

The caretaker is calculating the amount of timber supports needed for the frame of a gate, the same as the one shown in the photo below.

Each frame is a square measuring 4.5 m by 4.5 m with a diagonal support. The frames are highlighted in black in the picture above.

Calculate the length of timber needed to make the two frames needed for the gate. (E)

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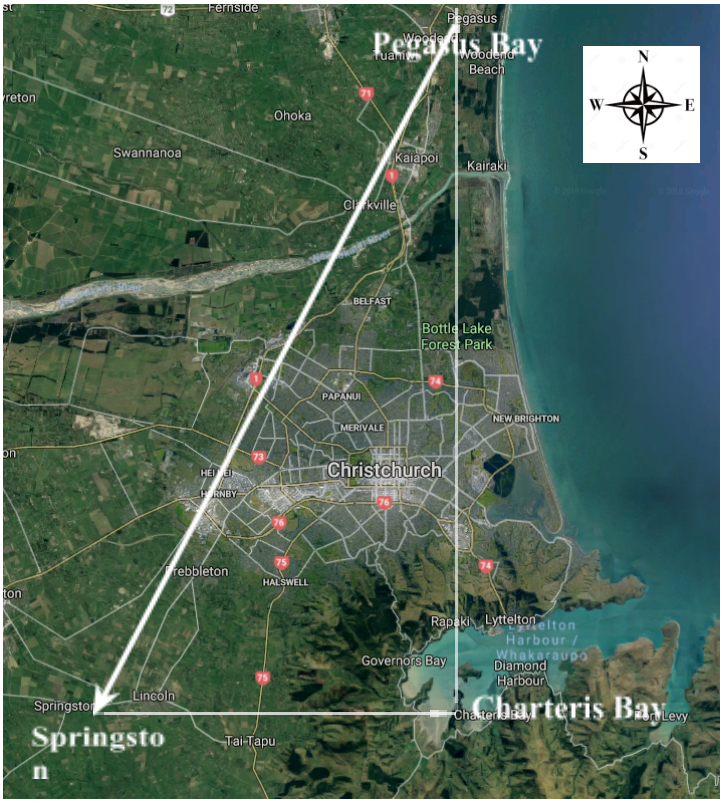
QUESTION SIX

A helicopter is taking a group of tourists on a sightseeing flight.
The helicopter starts of at Charteris Bay and flies 60 km north to Pegasus Bay, then turns and flies 65 km to Springston , then turns and flies east, back to Charteris bay.



(a) Calculate the distance the helicopter flies from Springston to Charteris Bay. (M)

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(b) Calculate the bearing the helicopter followed when flying from Pegasus Bay to Springstone. (E)

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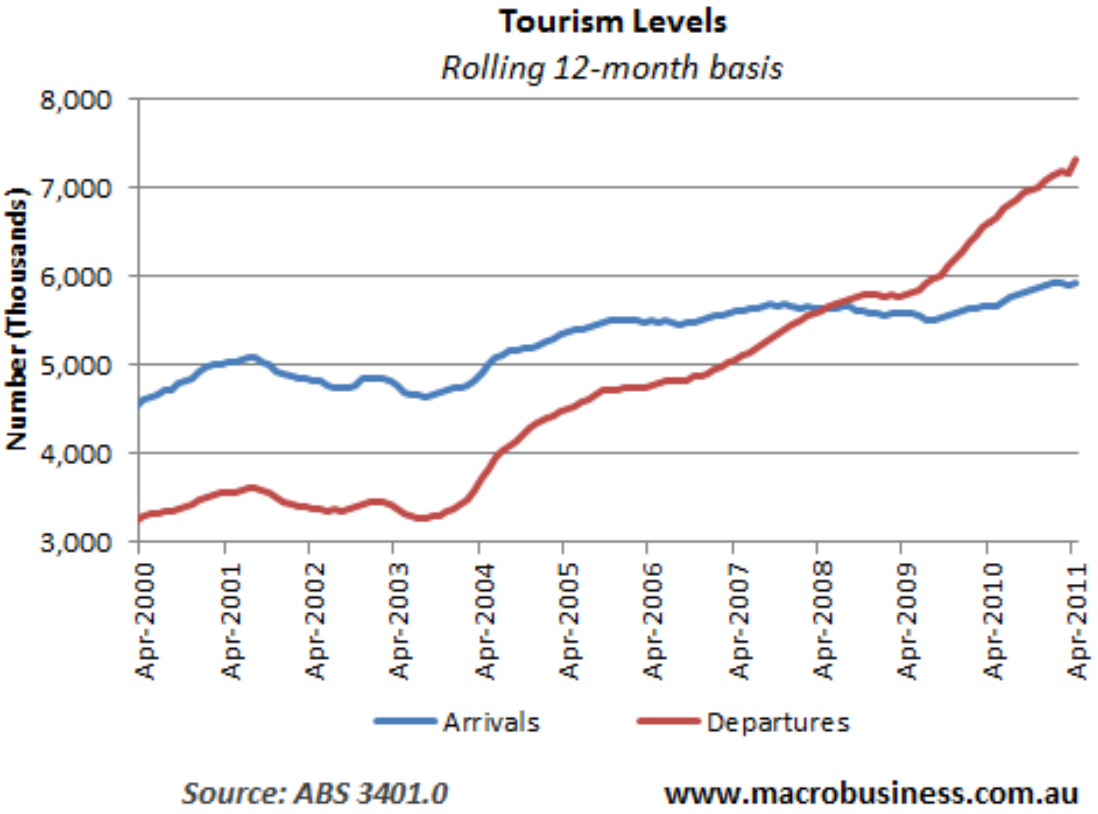
Section D: Statistics

QUESTION ONE

The graph below shows the arrivals and departures from Australia from 2002 to 2011.



Departure
s

Arrivals

(a) Describe the differences and similarities between the trends of arrivals and departures. (A)

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_____

(b) Make a prediction for the number of tourist that would have departed in April 2012. (A)

_____

_____

(c) Discuss the possibility of the trend for departures continuing. (M)

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_____

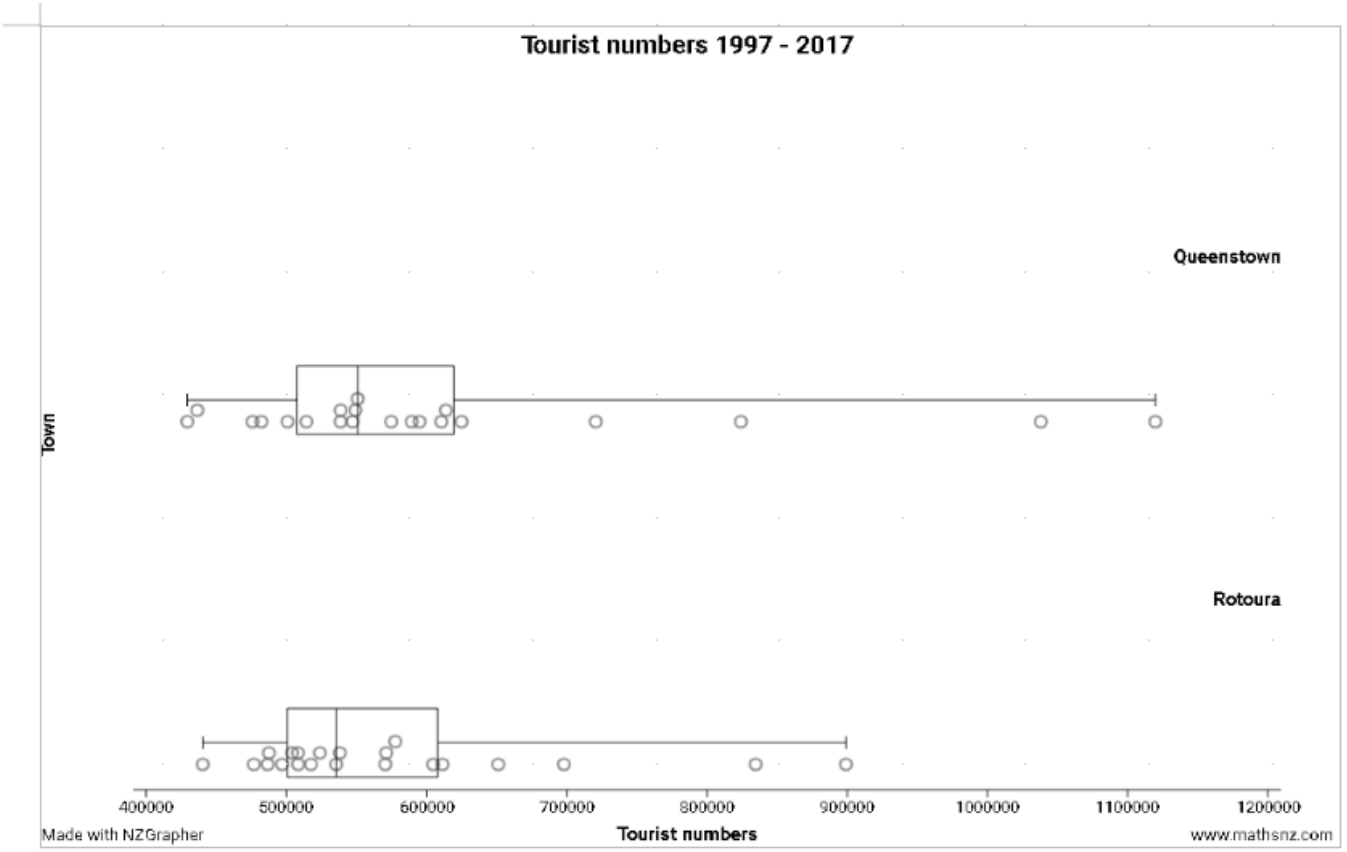
_____

QUESTION TWO

The table below shows the number of tourist who stayed in Queenstown and Rotorua from 1997 – 2017 .

Year	Queenstown	Rotorua
1997	436577	508425
1998	429379	440451
1999	475913	476901
2000	538732	523944
2001	538775	517559
2002	574855	570664
2003	547286	535542
2004	613820	611406
2005	625037	651186
2006	610555	571261
2007	595030	577715
2008	550932	508417
2009	549290	496975
2010	514349	486712
2011	500994	504194
2012	482248	487676
2013	589432	538259
2014	720663	604659
2015	824234	697969
2016	1038111	834715

2017	1119810	899088



(a) By referring to the box and whisker graphs, dot plots and table, discuss how the tourist numbers in Rotoura and Queenstown compare? Does one town tend to have more visitors? (E)

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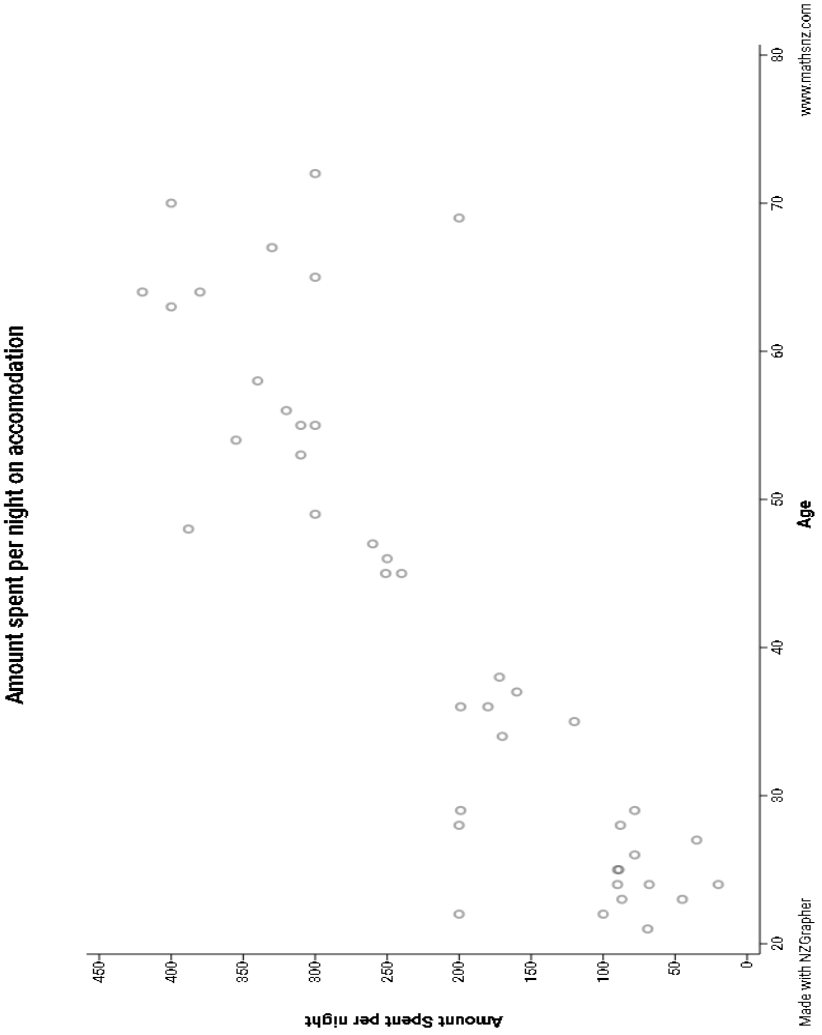
QUESTION THREE

The number of tourists who visited the Kiwi House in Queenstown over the last two weeks are as follows.
244, 255, 344, 450, 344, 298, 421, 298, 451, 333, 460, 440, 344, 278.
Calculate the following statistics

(a) Mean: _____ (A)
(b) Median: _____ (A)
(c) Mode: _____ (A)
(d) Range: _____ (A)

QUESTION FOUR

Forty two tourists were surveyed. They were asked their age and the amount of money they spent per night on accommodation in Queenstown. The results are displayed in the scatter graph below.



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(a) How useful do you think the for predicting the amount of money a tourist in Queenstown would spend on accomodation, if you knew their age ?
You must give a reason for your answer. (M)

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(b) The New Zealand Tourist Board looked at the graph and concluded that in New Zealand older tourist spend more money on accommodation than younger tourist. Do you agree or disagree with Tourist Board statement?

You must give reasons for your answer with references to the graph. (E)

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