



Mission Heights Junior College
Subject: Year 10 Mathematics CAT 2020
Time: 1 hour

Name: _____ Class/Whanau: _____

Instructions:

You should attempt all the 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 1-16 in the correct order.

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

Working Towards	AT	ABOVE	BEYOND

Sections

Section	WT	AT	ABOVE(AB)	BEYOND(TAAB)
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
Examination Conditions	You have completed this assessment, however, you did not adhere to Examination conditions.	You have completed this assessment, however, you did not adhere to Examination conditions.	You have completed this assessment, adhering to Examination conditions.	You have completed this assessment, adhering to Examination conditions.

Section A: Number Show ALL working.

QUESTION ONE

(a) $10 - 14 + 9 \times 3 =$ _____ [AT]

(b) $3^4 \div 9 - \sqrt{52} - 3 =$ _____ [AT]

(c) The Dunedin City landfill recycled 6 100 000 kg of rubbish last year.
Write **6 100 000** in standard form.

_____ [AT]

(d) In 2019 the council rubbish trucks collected 2.41×10^5 black rubbish bags.
Each rubbish bag costs \$3.20.
Calculate the total cost of the black rubbish bags used in 2019. (AT)

QUESTION TWO

(a) $\frac{3}{7} + \frac{2}{7} =$ _____ [AT]

(b) $\frac{2}{3} \times \frac{5}{9} =$ _____ [AT]

(c) $\frac{2}{5}$ of 70 = _____ [AT]

(d) $\frac{1}{9}$ of a households rubbish is cardboard and $\frac{3}{8}$ of the rubbish is plastic.
What fraction of the rubbish is neither cardboard or plastic. [AB]

(e) The ratio of males to females in Dunedin is approximately 12:13.
How many of the 128 800 residents of Dunedin are male? [AB]

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QUESTION THREE

(a) 16% of the people who live in Dunedin are students.
The population of Dunedin is 128 800.
How many students live in Dunedin? [AT]

(b) The population of Dunedin is 128 800.
32 200 of Dunedin's population are retired people.
What percentage of Dunedin's population is retired people?

[AT]

(c) Retired residents can receive a 25% discount on their rubbish bags.

Calculate the costs of the \$3.20 rubbish bag for retired residents. [AB]

(d) 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.

[AB]

QUESTION FOUR

The Dunedin City Council is calculating the cost of importing 10 electric cars from Germany for the city councillors to use.



One electric car costs €34 947 (34 947 Euros, European dollars)
One euro (€) equals \$1.85 New Zealand dollars.

Because the cars are being imported the council will need to add 15% GST to the price of the cars.

The cars will need to be charged at special charging stations. The council will install 5 charging stations. These will cost \$7 500 each. The company selling the charging stations offers a $\frac{1}{5}$ discount when more than 3 are purchased.

Calculate the cost of purchasing the cars and charging stations.
You must show working and state what you are calculating at each step.

[TAAB]

Section B: Algebra and Graphs

QUESTION ONE

Give the next two terms in each of these patterns:

(a) 3, 6, 9, ____, ____ [AT]

(b) 1, 8, 27, ____, ____ [AT]

(c) 6, 11, 16, 21, ____, ____ [AT]

(d) $(n-3)$, $(n-2)$, $(n-1)$, _____, _____ [AB]

QUESTION TWO

Andrew works at New World and stacks rolls of toilet paper.

Here is the pattern he uses.



(a) Complete the table below [AB]

Number of Pattern (P)	Number of toilet paper rolls (R)
1	1
2	3
3	6

4	10
5	
6	
7	

(b) Write an equation that links the pattern number(P) to the number of toilet paper rolls

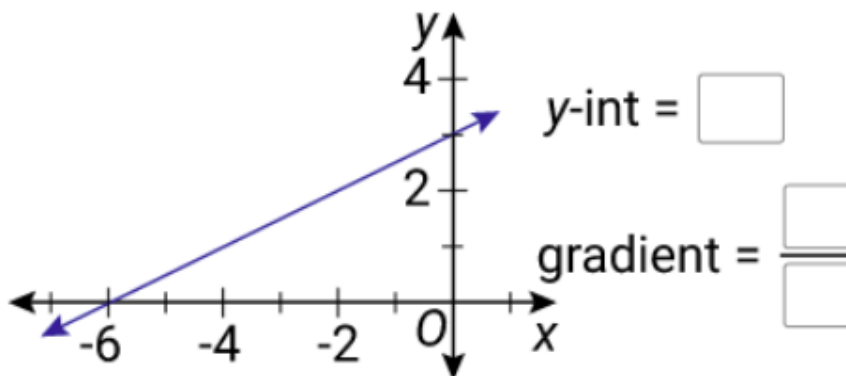
R = _____ [TAAB]

(c) If Andrew made pattern number 25, how many rolls of toilet paper would he use?

_____ [AB]

QUESTION THREE

Consider the graph.



[AT]

Equation =

QUESTION FOUR

Simplify the following expressions

(a) $6y + 2z + 5y + 6z =$

[AT]

(b) $7x^2 - 5w + 9x^2 - 4w =$

[AT]

(c) $2f^3 \times 8f^5 =$

[AT]

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

[AT]

(e) $\frac{42x^5}{7x^2} =$

[AT]

(f) $(3k^2)^7 =$

[AB]

(g) $\frac{-12p^6 4p^7}{8p^5} =$

[AB]

(h) $\frac{2y}{5} + \frac{4y}{7} =$

[AB]

QUESTION FIVE

Expand and simplify the following expressions:

(a) $4(3x + 2) =$ [AT]

(b) $2(3x - 4) - 3(x + 6) =$ [AT]

(c) $(x + 5)(x - 3) =$ [AB]

QUESTION SIX

Factorise the following expressions:

(a) $8z - 48$ [AT]

(b) $12x^5y^4 - 30x^3y^6$ [AB]

(c) $x^2 + 10x + 25$

[AB]

(d) $2y^2 + 4y - 30$

(TAAB)

QUESTION SEVEN

Solve the following equations

(a) $p + 4 = 14$

[AT]

(b) $4x + 5 = 17$

[AT]

(c) $\frac{w}{9} - 4 = 6$

[AB]

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

[AB]

(e) $3w + 8 = 2(w - 4)$

[AB]

(f) $(x - 6)(x + 3) = 0$

[AB]

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

[AB]

(h) $\frac{3y}{5} + \frac{2y}{7} = 2$

[TAAB]

QUESTION EIGHT

Mabel is a real estate salesperson. When she sells a house she is paid a \$10 000 fee plus a commission of 2.5% of the sale price of the house.

(a) Write an equation to represent what Mabel will earn if she sells a house.

Use E = Earnings and S = Sale price of the house. [AB]

Use your equation to answer the following two questions:

(b) Calculate what Mabel will earn if she sells a house for \$450 000. [AT]

(c) Mabel was paid \$23 750 for the last house she sold. What was the sale price of the house? [AB]

(d) Mabel's friend Ricki works for another real estate company. When he sells a house he is paid a \$6 000 fee plus a commission of 3% of the sale price of the house. At what price do Mabel and Ricki need to sell a house for to get the same amount of earnings?
Use algebra to solve this question.

[TAAB]

The End

Working space...

Working space

