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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Level 1 Mathematics and Statistics, 2013

91028 Investigate relationships between tables, equations and graphs

9.30 am Wednesday 13 November 2013

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Investigate relationships between tables, equations and graphs.	Investigate relationships between tables, equations and graphs, using relational thinking.	Investigate relationships between tables, equations and graphs, using extended abstract thinking.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

Show ALL working.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

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You are advised to spend 60 minutes answering the questions in this booklet.

QUESTION ONE

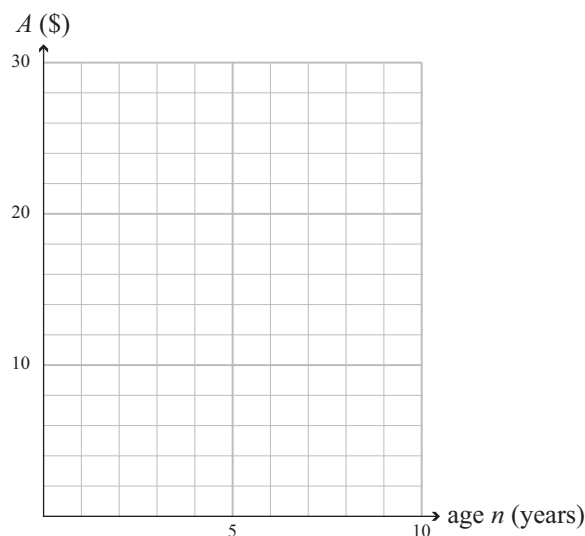
- (a) Each year at Christmas, Jamie's grandmother gave him five dollars plus two dollars for each year of his life. His age and the amount he received for three Christmases is shown in the table below.

Age, n	Amount Jamie received, A	
1	\$7	
2	\$9	
3	\$11	

- (i) Write the equation for the amount, A , Jamie was given by his grandmother in terms of his age, n , at Christmas.

- (ii) Find the amount Jamie was given by his grandmother at Christmas when he was 12. You must show use of your equation from part (i).

- (iii) On the grid below plot the graph that shows the amount of money that Jamie's grandmother had given him for each Christmas.



If you need to redraw this graph, use the grid on page 8.

- (iv) Jamie's sister Arna is three years younger than him.

Each Christmas her grandmother also gave her five dollars plus two dollars for each year of Arna's life.

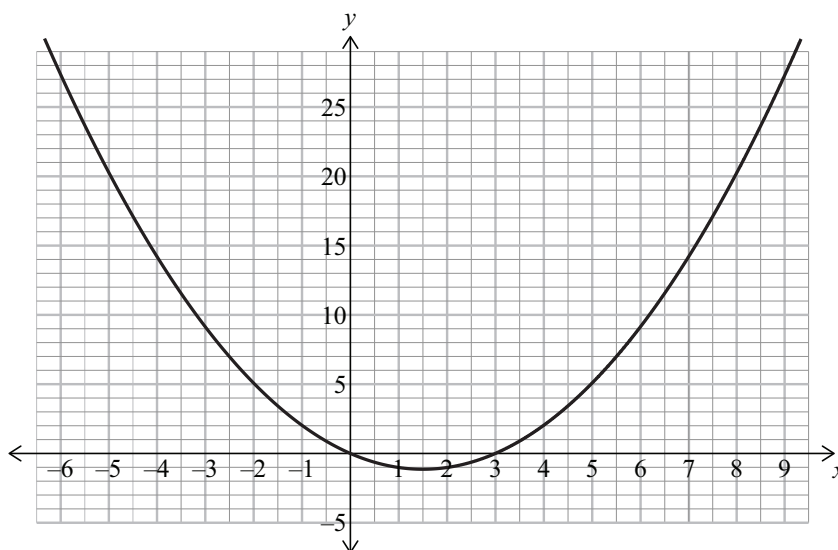
On the grid for part (iii), sketch the graph showing the **total amount** that their grandmother had given them each Christmas.

- (v) This Christmas Jamie and Arna received a total of \$44 from their grandmother.

Write at least one equation and use this to find how old Jamie was this Christmas.

- (vi) Give the equation to calculate the total amount Jamie's grandmother had given him in n Christmases.

- (b) Give the equation of the graph below.



Equation: _____

QUESTION TWO

- (a) Marnie is about to start saving for a school netball trip.

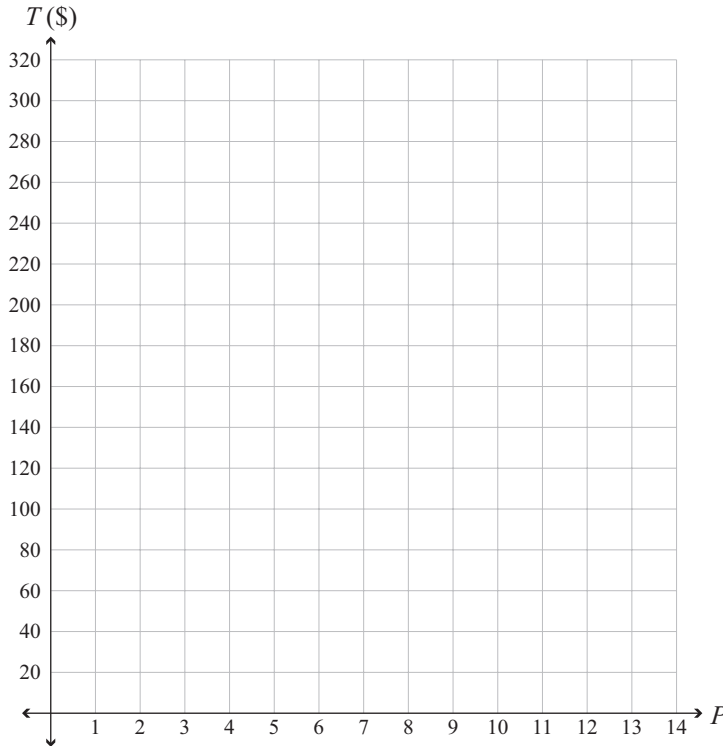
She has a part-time job.

Her netball team practises each Friday.

There are 14 more practices before the trip.

She decides to give her coach \$20 for the trip at each of the 14 Friday practices.

- (i) Plot the graph of the total amount,
- T
- , Marnie has given her coach at the end of each practice,
- P
- .



*If you
need to
redraw
this
graph,
use the
grid on
page 8.*

- (ii) If a line is drawn through the total amounts she has given her coach at each practice, give the equation of this line.

- (iii) The total cost of the trip is \$300.

After several practices, when Marnie has paid her coach, she is told that she is not going to have enough money for the trip.

Marnie needs to start paying the coach \$30 a week so that she meets her \$300 target.

On the above grid, plot the graph of the changed amount she needs to pay.

- (iv) For how many weeks does Marnie need to pay the increased amount so that she meets her \$300 target at the 14th practice?

- (v) Give the equation for the graph representing the increased payments.

- (b) Sam found a puzzle in a book.

He was told to think of a number and then to follow some instructions and see what number he had as the answer.

Sam was curious so he made a table and filled in some numbers:

	1st try	2nd try	3rd column
Think of a number	5	10	N
Add 2	7		$N + 2$
Multiply by 3		36	
Add on your number	26		
Add 6	32	52	
Divide by 4	8	13	
Take away your number		3	

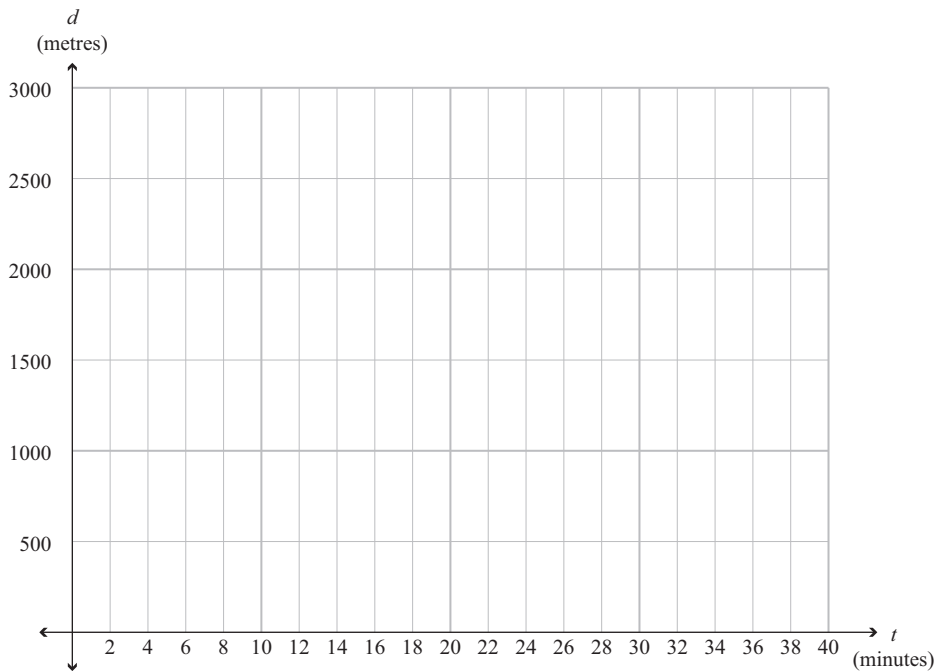
- (i) Complete the 3rd column of the table.
- (ii) Explain in detail why the answer is always 3, no matter what number he starts with.

QUESTION THREE

- (a) Susie rides her bike to her friend's house at a constant speed.
They then walk to school together at a constant speed.
The distance that Susie is from school is given in the table below.

Susie	Time t since leaving home in minutes	Distance d from school in metres
Leaves home		2500
Arrives at friend's house	2	2000
Leaves friend's house	15	2000
Arrives at school	35	

- (i) On the axis below sketch the graph of the distance, d , that Susie is from school at any time, t minutes after leaving home.



*If you
need to
redraw
this
graph,
use the
grid on
page 9.*

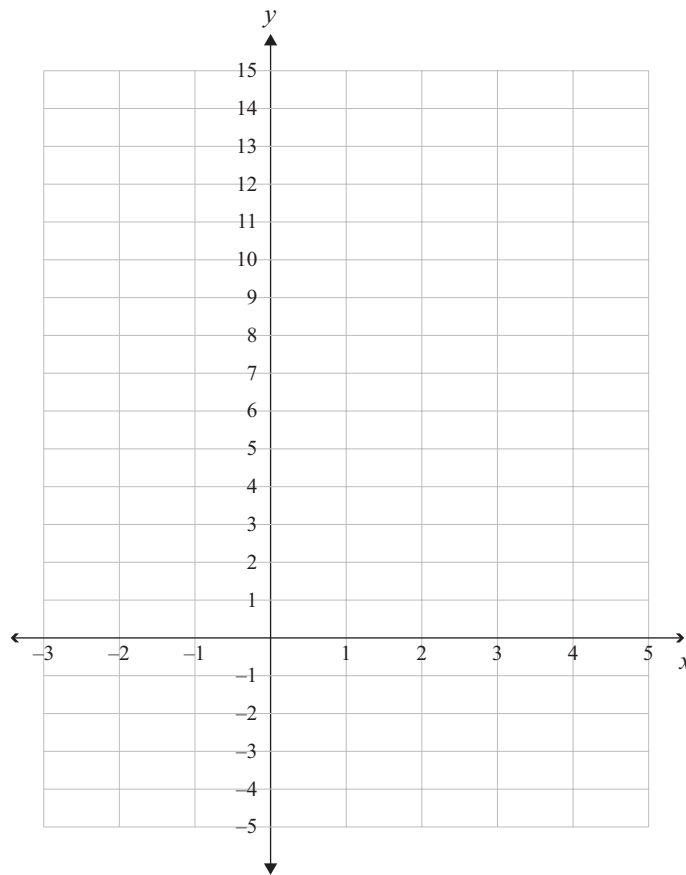
- (ii) For your graph give the equation to find how far Susie and her friend are from school at any time for:

- $2 \leq t \leq 15$

- $15 < t < 35$

(b) Charne is making tables of numbers.

x	y
-2	5
-1	0
0	-3
1	-4
2	-3
3	0
4	5
5	12



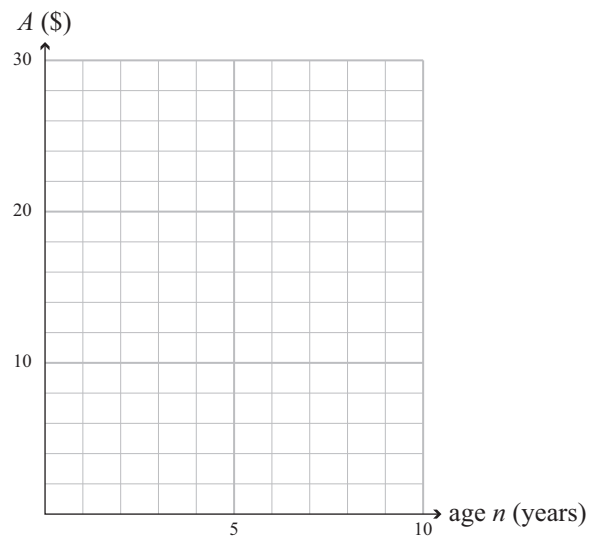
If you need to redraw this graph, use the grid on page 9.

- (i) On the above grid plot the graph of the relationship shown in the table.
- (ii) Give the equation that she would have used to get this set of numbers.

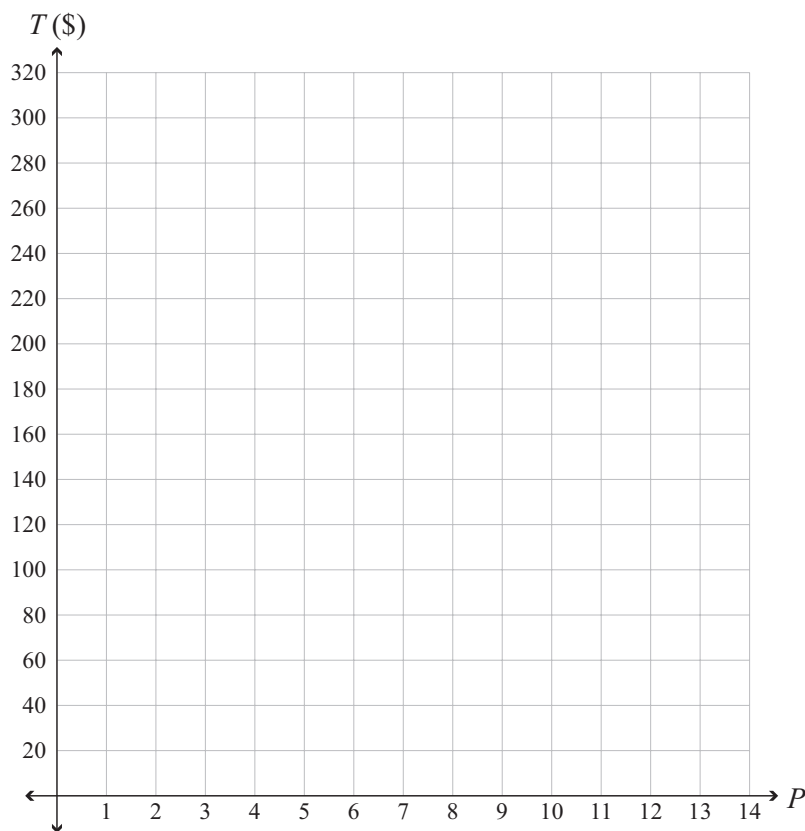
- (iii) If the graph was moved so that its lowest point was at $(3, -1)$, describe how the graph would change, and give the new equation of the graph.

If you need to redraw the graph from Question One (a)(iii), draw it on the grid below. Make sure it is clear which graph you want marked.

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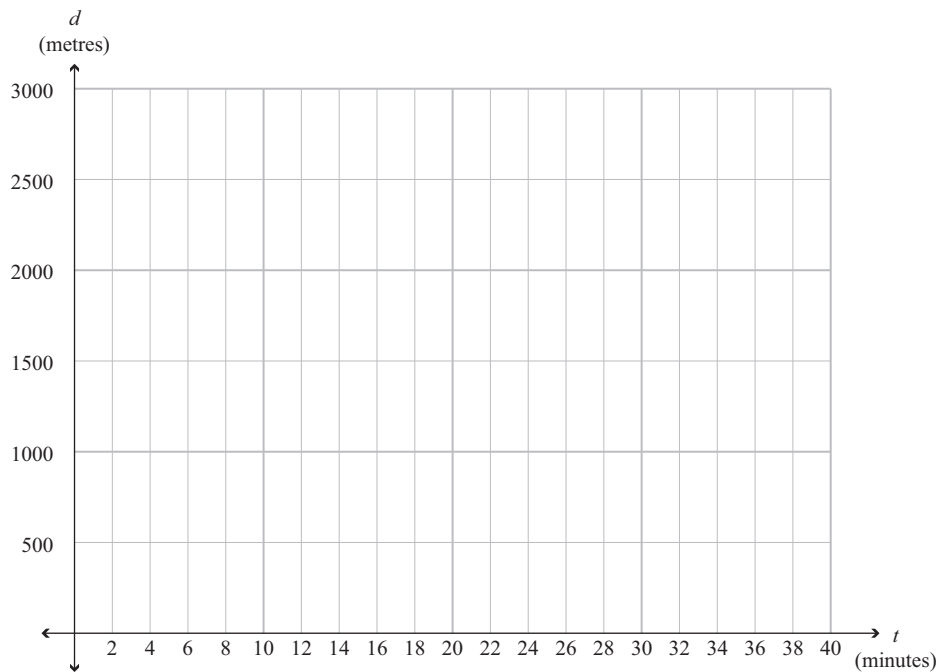


If you need to redraw the graph from Question Two (a)(i), draw it on the grid below. Make sure it is clear which graph you want marked.

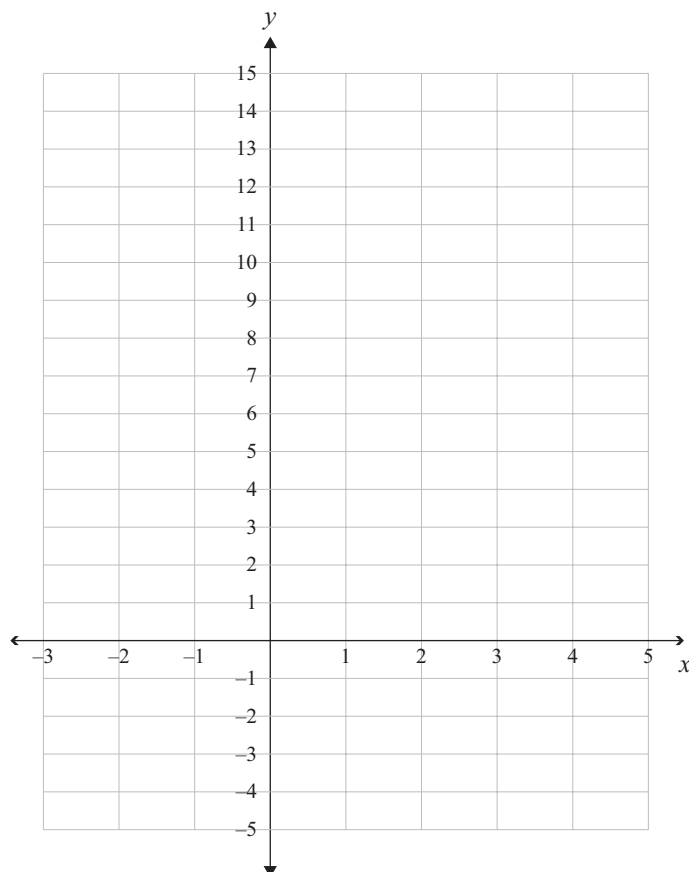


If you need to redraw the graph from Question Three (a)(i), draw it on the grid below. Make sure it is clear which graph you want marked.

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If you need to redraw the graph from Question Three (b), draw it on the grid below. Make sure it is clear which graph you want marked.



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