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MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Mathematics, 2007

90800 Demonstrate an understanding of the features of graphs

Credits: Three
9.30 am Tuesday 20 November 2007

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 answer ALL the questions in this booklet.

You should 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 2–8 in the correct order and that none of these pages is blank.

Note that the questions in this booklet are not necessarily in increasing order of difficulty. Answers to some questions could provide evidence for more than one level of achievement.

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

For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Demonstrate an understanding of the features of graphs.	Demonstrate an understanding of the relationship between functions and the features of their graphs.	Determine and apply appropriate model(s) to solve graphical problem(s).
Overall Level of Performance		

You are advised to spend approximately 30 minutes answering the questions in this booklet.

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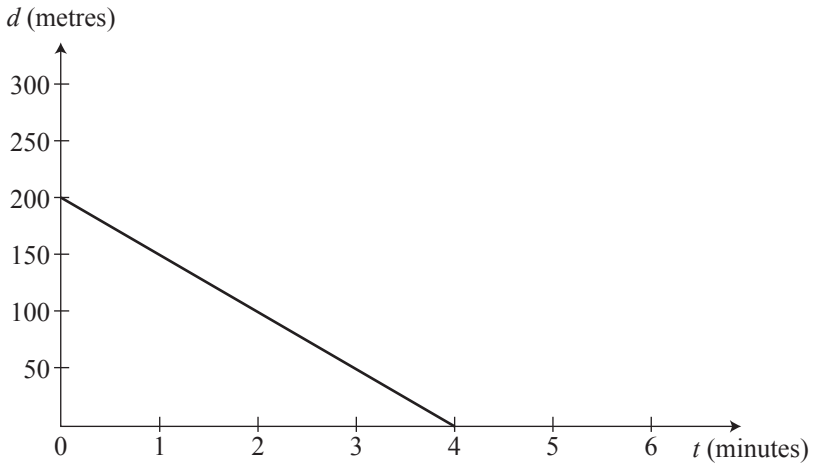
SUMMER HOLIDAYS

QUESTION ONE

Lynda walks at a constant rate from her home to an ice cream shop.
A graph is drawn showing her distance, *d,* from the ice cream shop at any time *t.*
The equation of her distance from the ice-cream shop on the graph is given by

$$d = -50t + 200$$

where *d* is the distance in metres from the ice-cream shop
and *t* is time in minutes.



(a) How is the distance from Lynda's home to the ice cream shop shown on the graph?

(b) Ruth lives 100 m further away from the ice cream shop than Lynda, and also walked to the shop. Ruth left home at the same time and walked at the same rate as Lynda.

Show the graph of Ruth's distance from the shop on the axes above.

(c) How much longer did it take for Ruth to walk to the shop than Lynda?

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(d) Describe how the graph would change if Lynda walked twice as fast to the ice cream shop.

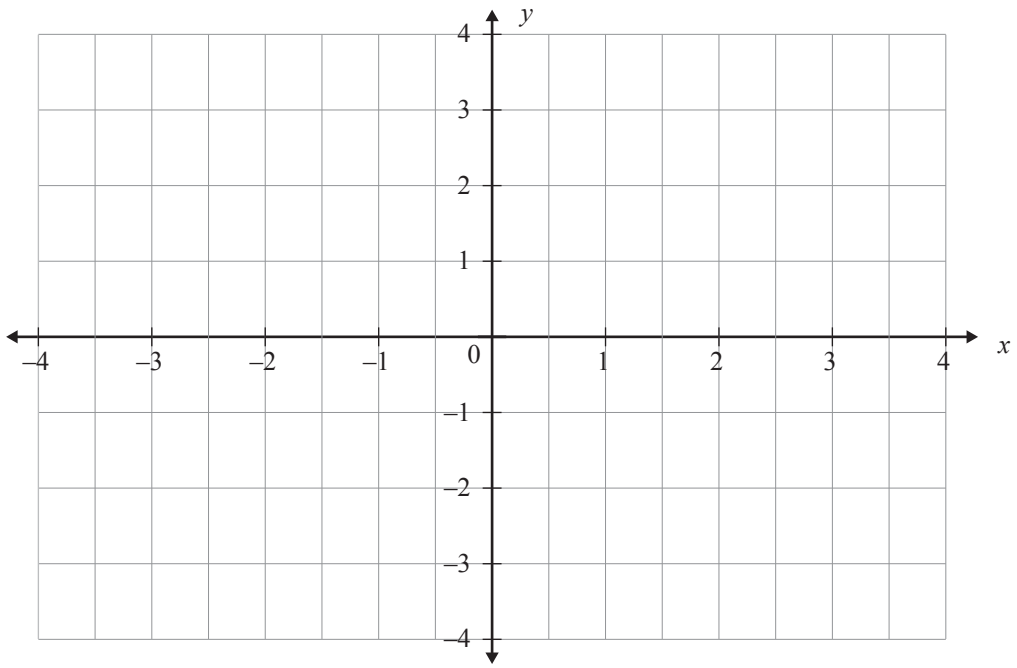
QUESTION TWO

The cross-section of a symmetrical irrigation ditch can be modelled by

$y = 3x(x - 2)$,

where y is the depth below ground.

Graph the cross-section of the irrigation ditch.
Clearly show the ground level and the bottom of the ditch on the graph.



If you need to redraw this graph, use the grid on page 7.

QUESTION THREE

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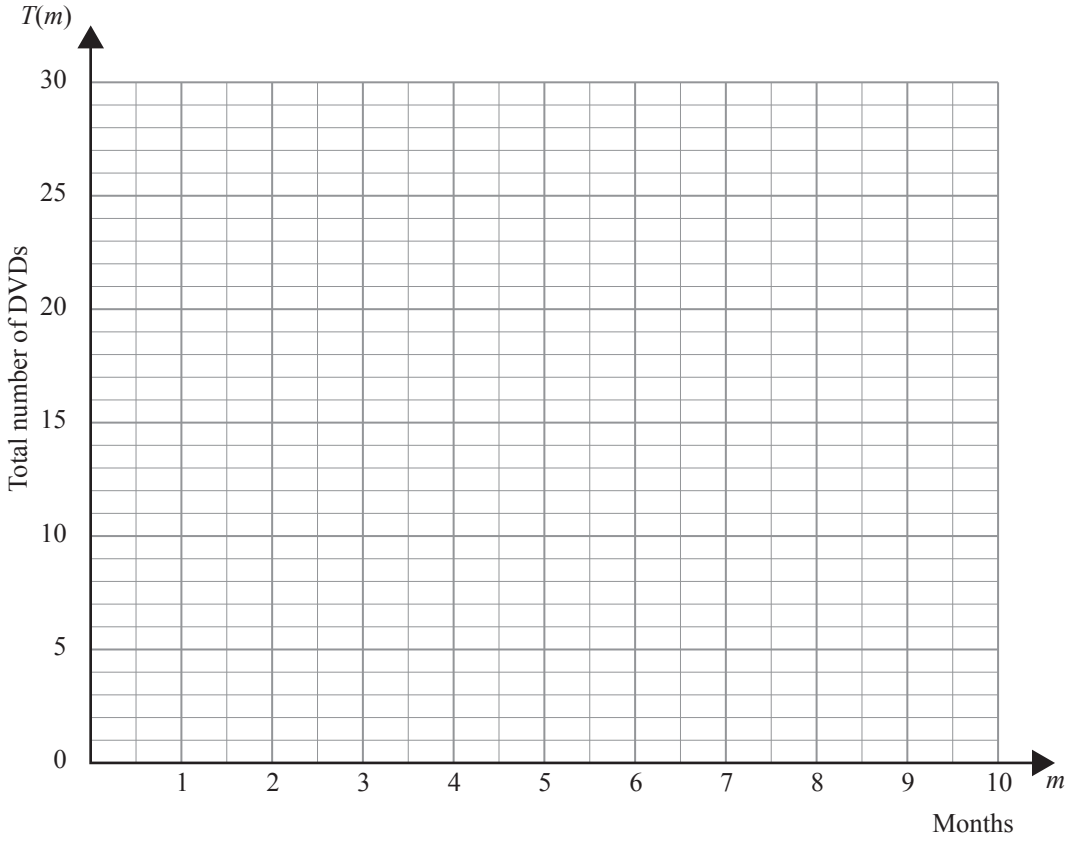
Sarah has a collection of DVDs. She buys more DVDs each month.
The total number of DVDs , $T(m)$, that she has at the end of each month (m) is described by the function

$$T(m) = 2m + 7.$$

Dan also buys DVDs each month.
When Sarah had 17 DVDs, Dan had 18.
He begins buying DVDs at the same time as Sarah. He buys 1 each month.

Draw the graphs and show the period of **time** when Dan has **more** DVDs than Sarah.



If you need to redraw this graph, use the grid on page 7.

QUESTION FOUR

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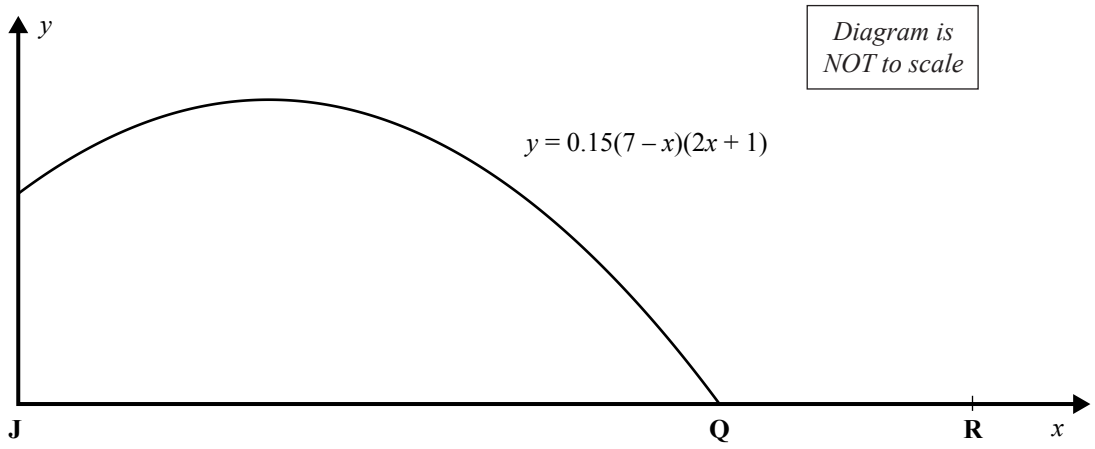
http://media02.liquidblue.com

John and his friend Richard were playing with a hacky-sack (footbag). John (J) kicks the hacky-sack, which lands on the ground at point Q.

The graph that models the path of the hacky-sack has the equation

$$y = 0.15(7 - x)(2x + 1),$$

where x represents the distance of the hacky-sack from John in metres and y represents its height above the ground in metres.



(a) Richard is standing with his feet at point R (9.5,0).

How far from Richard did the hacky-sack land?

(b) Write an equation that describes the family of parabolic graphs that could model the path of a hacky-sack with the same x-intercepts as $y = 0.15(7 - x)(2x + 1)$.

(c) It started to rain, so John and Richard went inside a shed where the ceiling was 2.15 m high.

If the hacky-sack does not hit the ceiling, how would the equation that describes the family of graphs change if the x-intercepts stay the same as for $y = 0.15(7 - x)(2x + 1)$?

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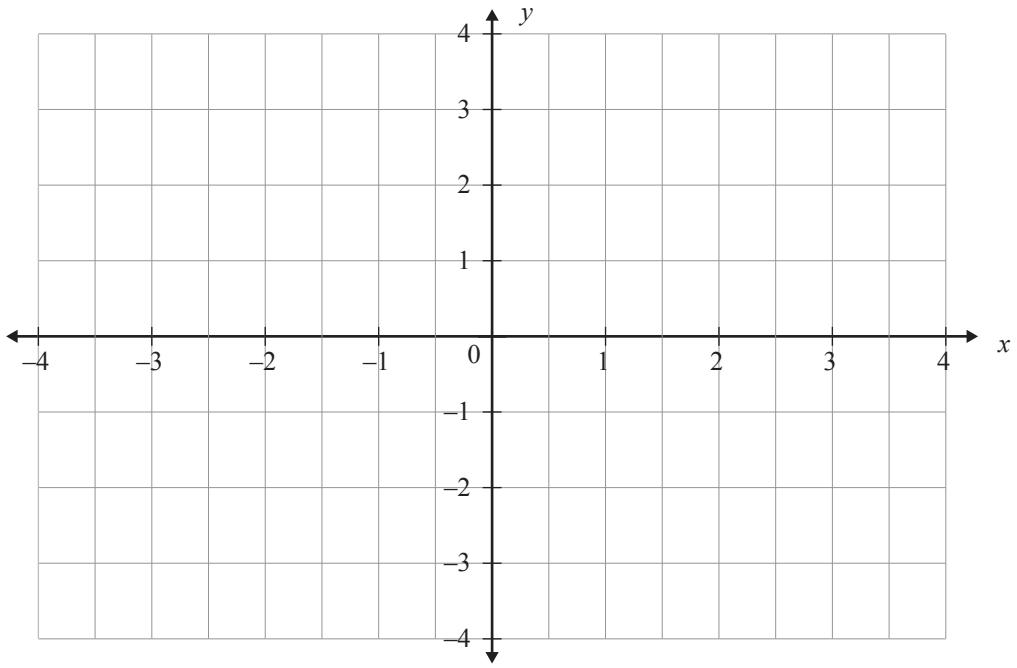
If you need to redraw the graph from Question Two, draw it on the grid below.

You must cross out the graph that you do not want marked.



If you need to redraw the graph from Question Three, draw it on the grid below.

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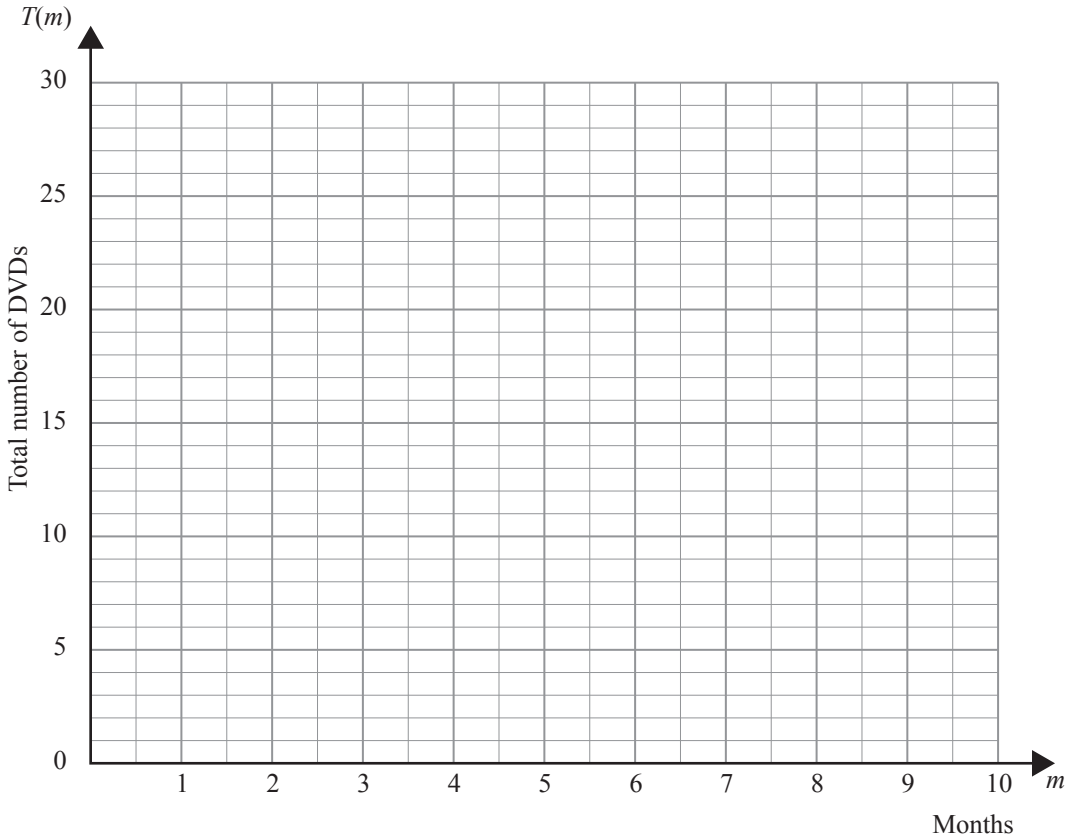

Extra paper for continuation of answers if required.
Clearly number the question.

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