

91028M



910285



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD  
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

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## Te Pāngarau me te Tauanga, Kaupae 1, 2017

**91028M Te tūhura i ngā pānga i waenganui i ngā papatau,  
ngā whārite me ngā kauwhata**

9.30 i te ata Rāhina 20 Whiringa-ā-rangi 2017  
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te tūhura i ngā pānga i waenganui i ngā papatau, ngā whārite me ngā kauwhata.	Te tūhura i ngā pānga i waenganui i ngā papatau, ngā whārite me ngā kauwhata mā te whakaaro whaipānga.	Te tūhura i ngā pānga i waenganui i ngā papatau, ngā whārite me ngā kauwhata mā te whakaaro waitara hōhonu.

Tirohia mēnā e rite ana te Tau Ākonga ā-Motu (NSN) kei runga i tō puka whakauru ki te tau kei runga i tēnei whārangi.

**Me whakamātau koe i ngā tūmahi KATO A kei roto i tēnei pukapuka.**

Whakaaturia ngā mahinga KATO A.

He tukutuku kei ētahi whārangi. He wāhi mahinga tēnei māu mō te tātuhi kauwhata, hoahoa rānei, te hanga papatau, te tuhi whārite, te tuhi rānei i tō tuhinga.

Mēnā ka hiahia whārangi atu anō koe mō ō tuhinga, whakamahia te (ngā) whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i te tau tūmahi.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–27 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

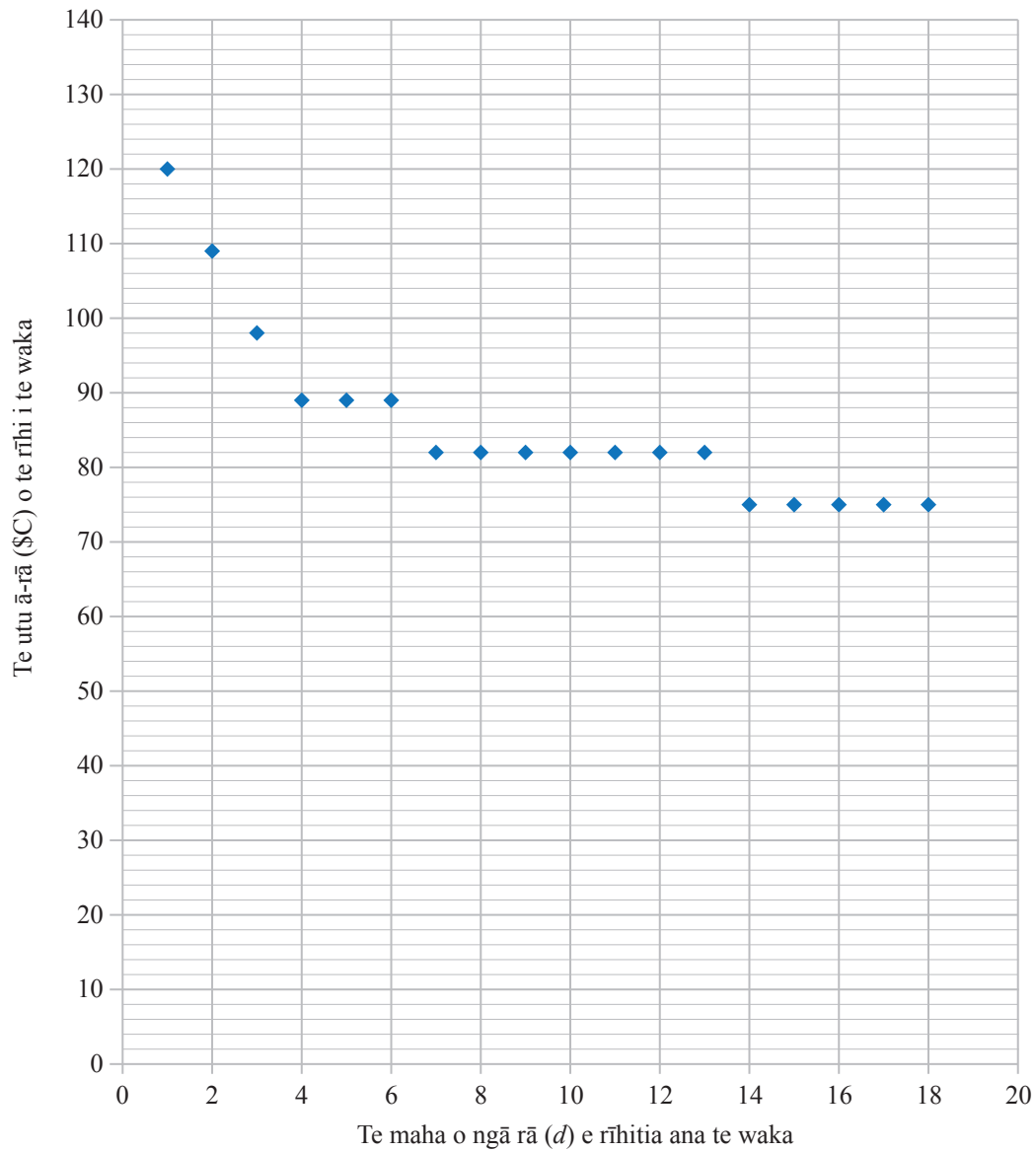
**HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.**

TAPEKE

MĀ TE KAIMĀKA ANAKE

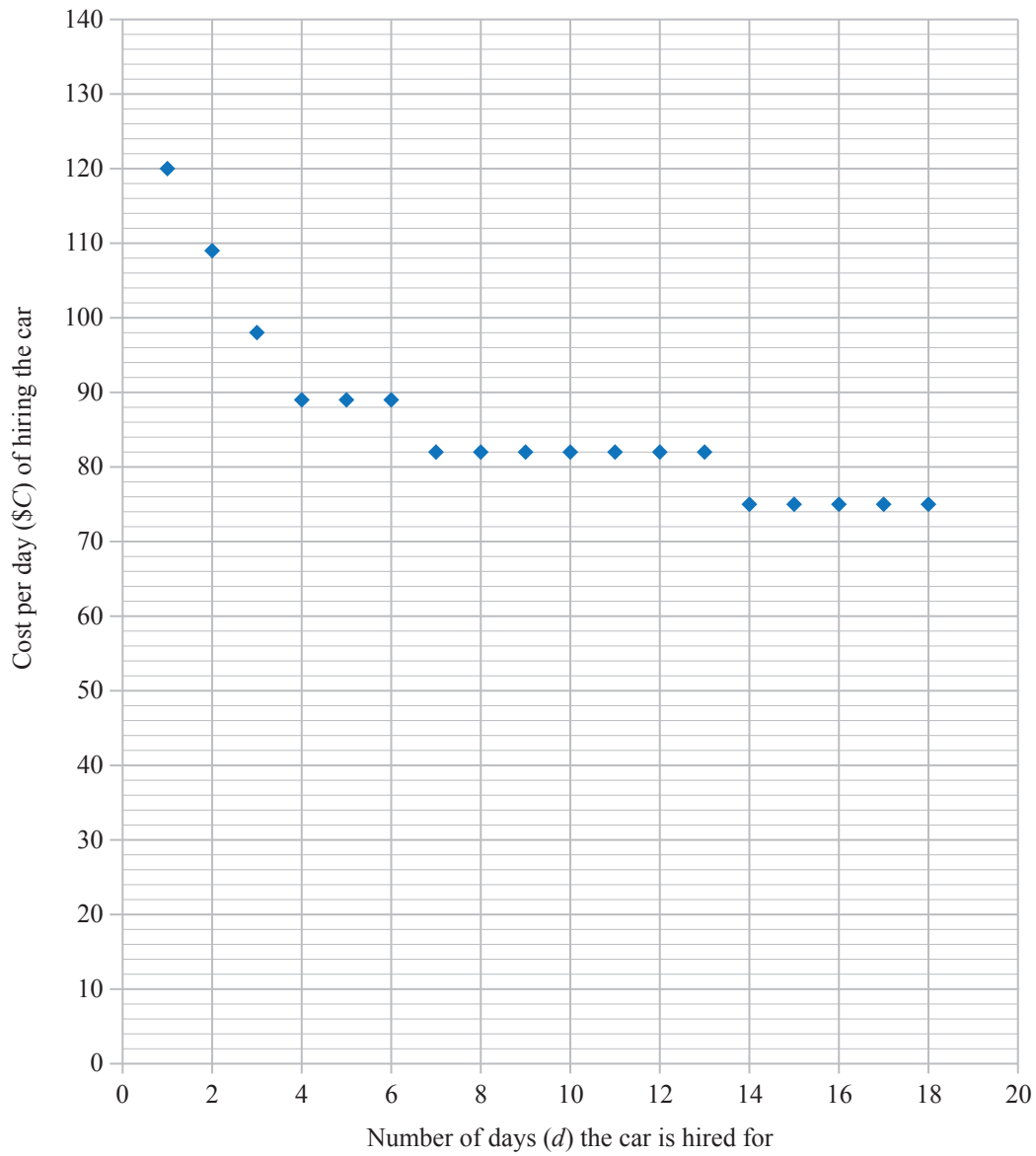
## TŪMAHI TUATAHI

- (a) He kamupene rēti waka a *Rent A Car*. E whakaatu ana te kauwhata i raro nei i te **utu i te rā** (\$C), mō te rīhi i tētahi o ō rātou waka rahinga-waenga, e ai ki te pikinga o **ngā rā** (*d*) e **rīhitia ana te waka**.



**QUESTION ONE**

- (a) *Rent A Car* is a car rental company. The graph below shows the **cost per day** (\$ $C$ ), of hiring one of their standard-sized cars, as the **number of days the car is hired for** ( $d$ ) increases.



- (i) E hia te iti ake o te utu ia rā mēnā ka rīhi i te waka mō ngā rā 3 i te rā 1?

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- (ii) Homai te whārite mō te **utu i te rā** o te rīhi i te waka:

- (1) mō ngā ra 4 ki ngā rā 6

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- (2) mō ngā rā mai i te 1 ki te 3.

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- (i) How much cheaper per day is it to hire the car for 3 days than 1 day?

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- (ii) Give the equation for the **cost per day** of hiring the car:

- (1) for 4 to 6 days

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- (2) for the first 3 days.

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- (b) Ka whakatau a *Rent A Car* ki te whakauru i tētahi whakaritenga motuhake, me te whakaputa i tētahi tohu e whakaaturia ana i te taha matau.

Kei te ngana a Mere ki te rapu i te kōwhiringa iti rawa te utu mō te rīhi i tētahi waka. Ka pātai ia he aha ake nei tēnei ‘WHAKARITENGA MOTUHAKE’.

Ka tukuna e te kamupene te tātai ki a Mere e whakamahia ana e rātau hei whiriwhiri i te utu ia rā.

$$C = 140 \times 0.9^{d-1}$$

ina ko  $C$  te utu ia rā, ā, ko  $d$  te maha o ngā rā e rīhitia ana te waka.

Whakatewhatewhatia, mā te whakamahi i te whārite, i te papatau, i te kauwhata rānei, mēnā ka whai hua ki a Mere tēnei ‘whakaritenga motuhake’ ina whakatauritehia e ia ki te utu tūturu, e ai ki te kauwhata kei te whārangi 2 (kua whakaputaina anō i raro).

*Parahautia tō tuhinga.*

### HE WHAKARITENGA MOTUHAKE

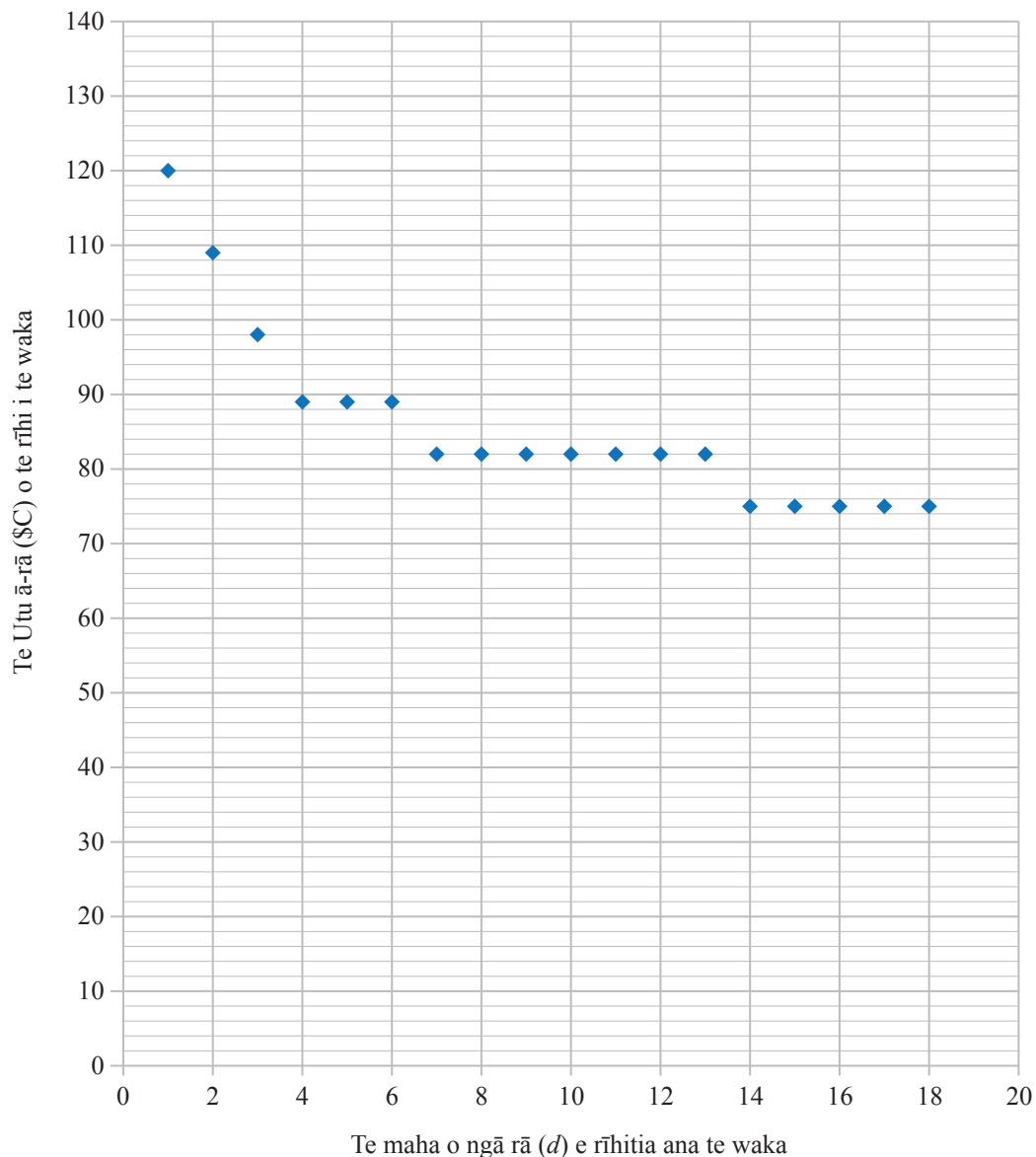
Ki te rīhita waka

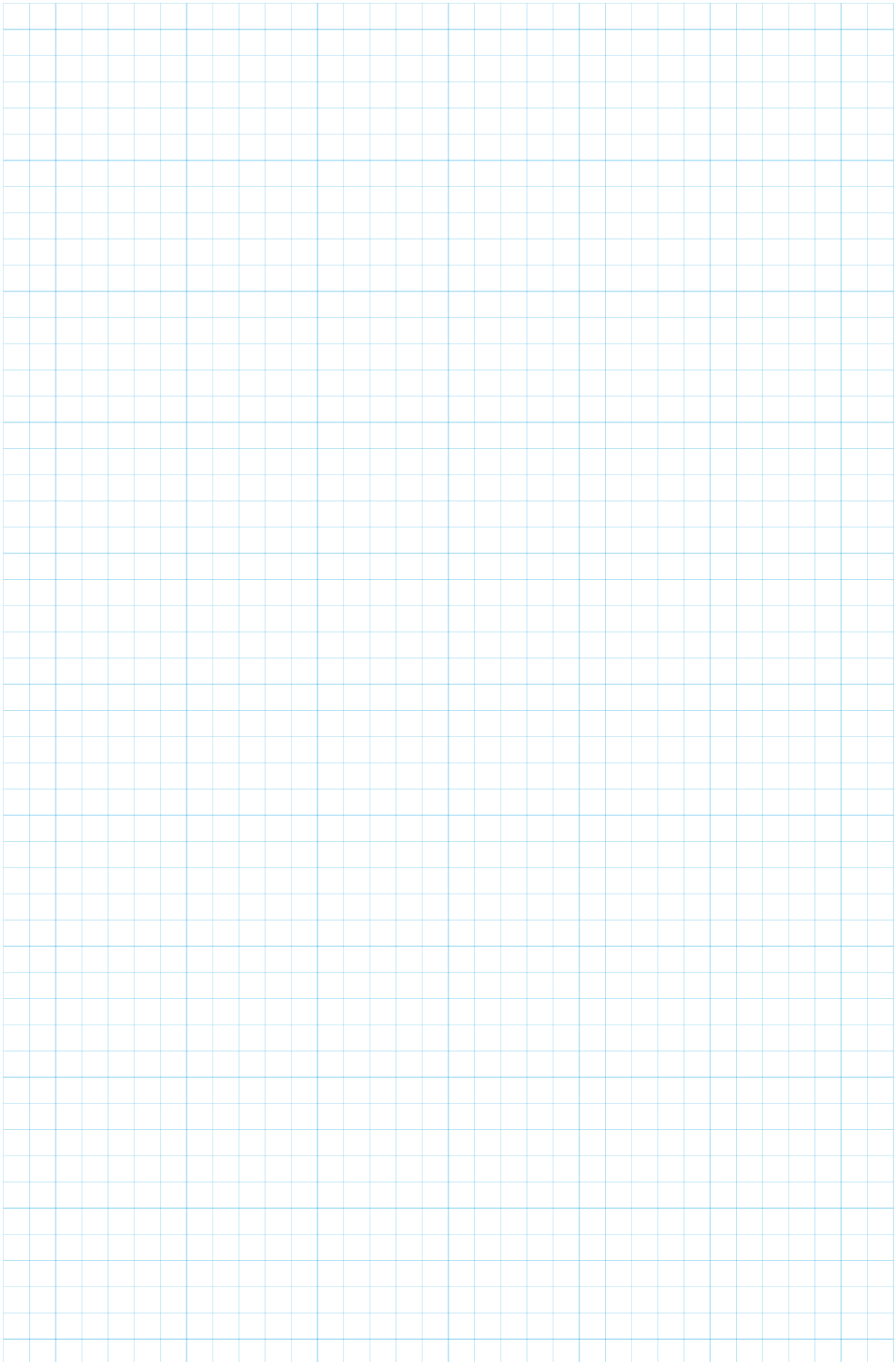
Ko te utu mōrahi ia rā \$140

Ka heke iho te utu rīhita o te waka ia rā ki te 10%

(Ko te utu mōkito i te rā he \$80)

Te kauwhata mai i te whārangi 2





- (b) *Rent A Car* decides to introduce a special deal, and produces a sign as shown on the right.

Mere is trying to find the cheapest option for renting a car. She asks what this 'SPECIAL DEAL' actually means.

The company gives Mere the formula they use to work out the daily rate.

$$C = 140 \times 0.9^{d-1}$$

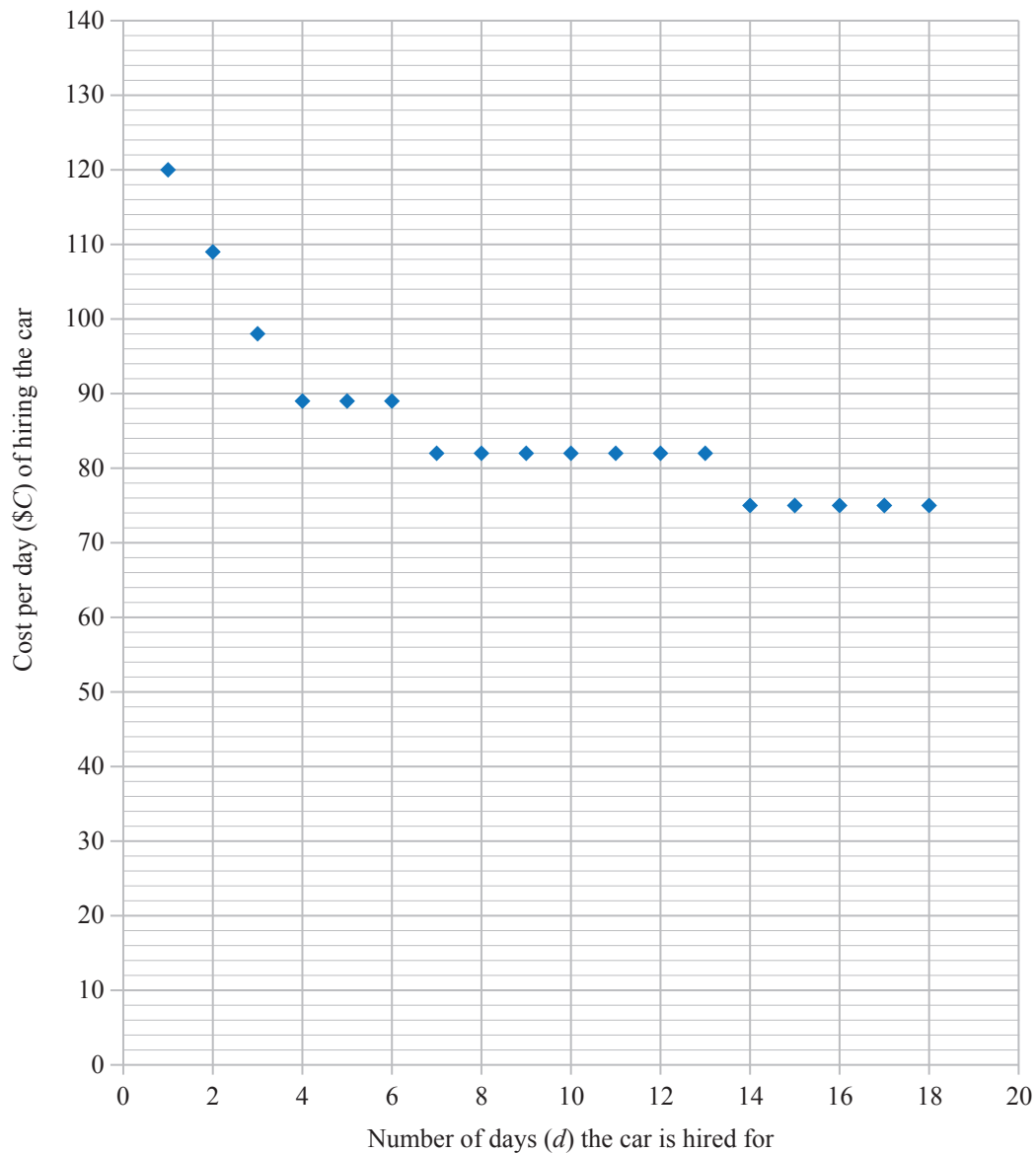
where  $C$  is the daily cost and  $d$  is the number of days for which the car is hired.

Investigate, using an equation, table, or graph, whether Mere is any better off with this 'special deal' offer compared to the original price, as shown on the graph from page 3 (reproduced below).

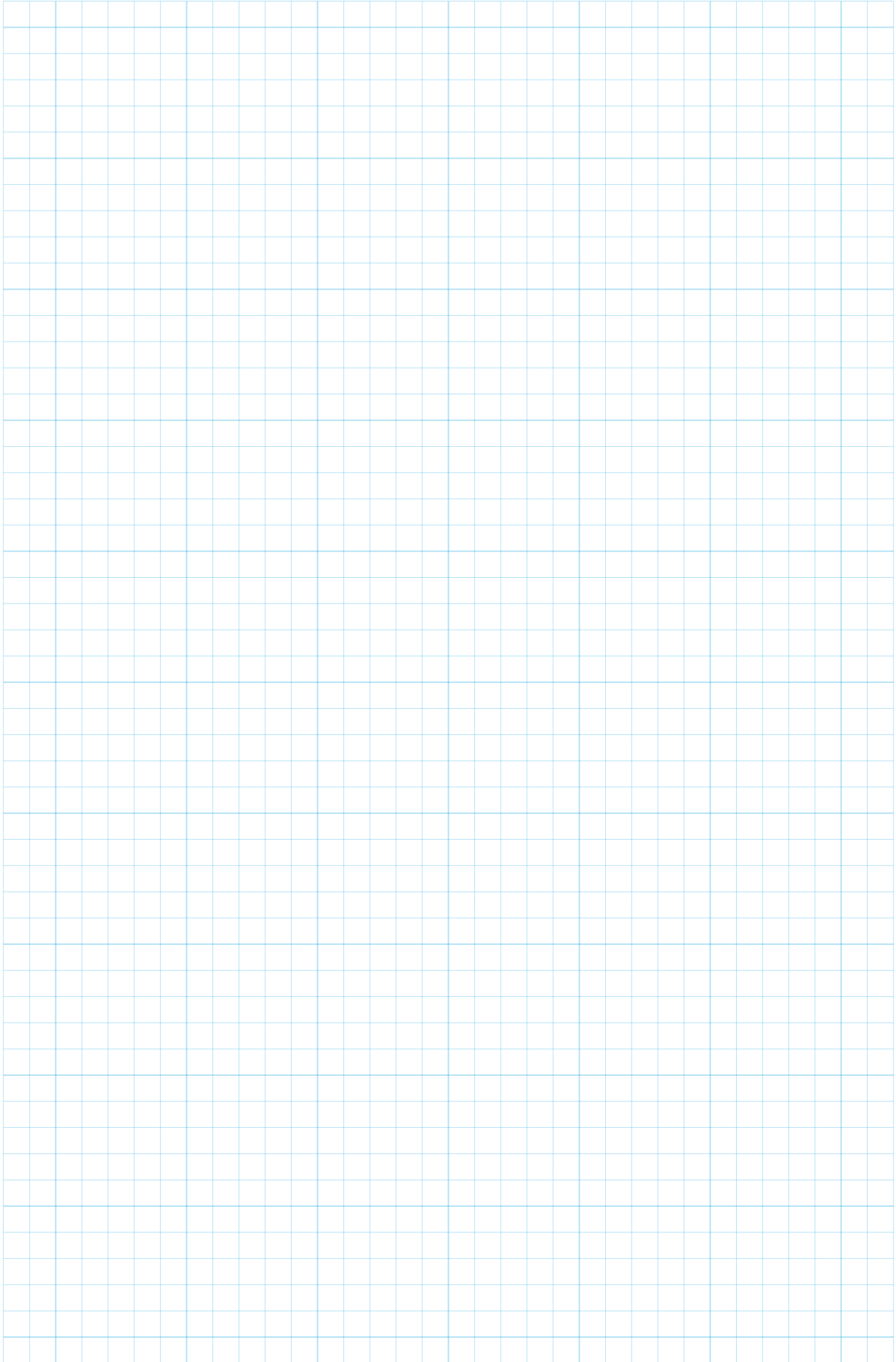
*Justify your answer.*



**Graph repeated from Page 3**

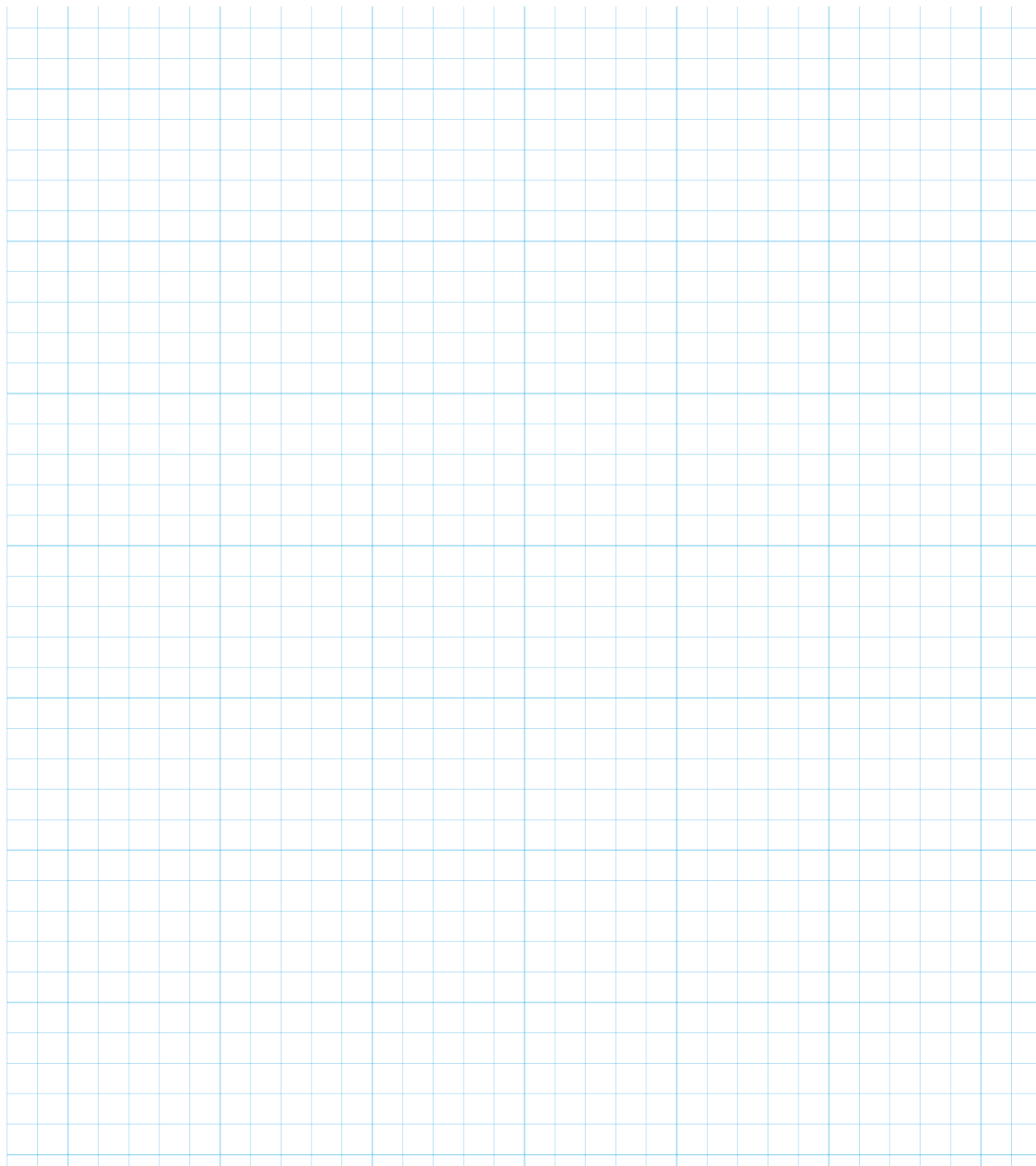




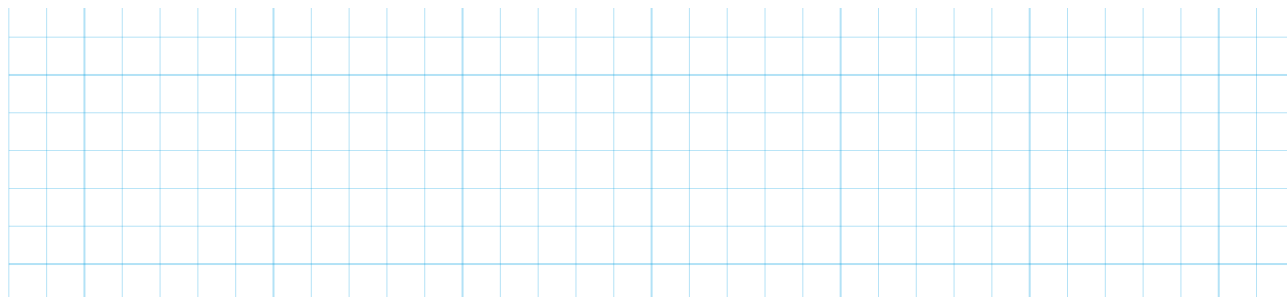


**TŪMAHI TUARUA**

- (a) (i) Tuhia te kauwhata o  $y = 2^x$ .



- (ii) Tuhia te whārite o tēnei kauwhata ka puta mēnā ka whakaheke iho mā te 3 waeine, ka whakaatahia ki te tuaka-y.

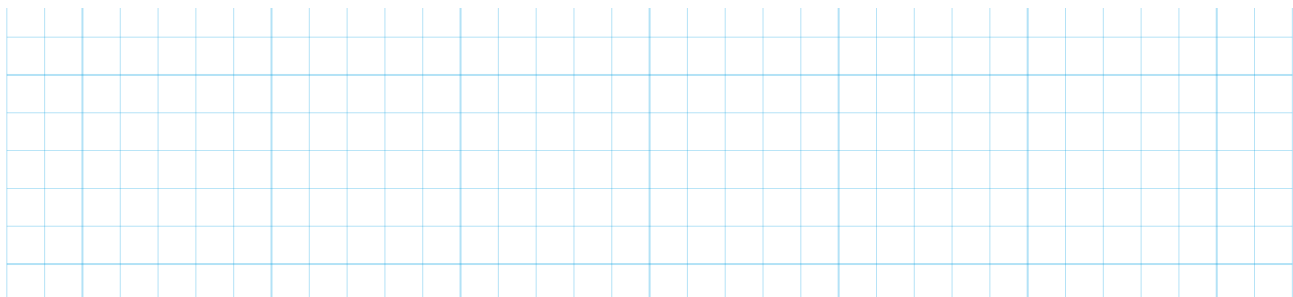


**QUESTION TWO**ASSESSOR'S  
USE ONLY

- (a) (i) Sketch the graph of  $y = 2^x$ .



- (ii) Give the equation of this graph if it is translated down by 3 units, and then reflected in the  $y$ -axis.



- (b) I te papatākaro tamariki e tārere mai ana he taura mai i ngā pūwāhi e rua, A me B, kei tētahi pae huapae.

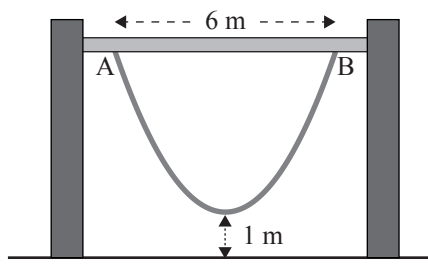
He 6 mita te tawhiti i waenga i a A me B.

Ko te pūwahi hahaka rawa o te taura he 1 m o runga ake i te papa.

Ka whakatauiratia te āhua o te taura mā

$$y = \frac{x}{3}(x - p) + 4$$

ina ko  $y$  te teitei i runga ake i te papa,  $\bar{a}$ , ko  $x$  te tawhiti mai i A.



MĀ TE  
KAIMĀKA  
ANAKE

- (i) E hia te teitei ake o A i runga ake i te papa?

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- (ii) Tuhia te uara o  $p$ .

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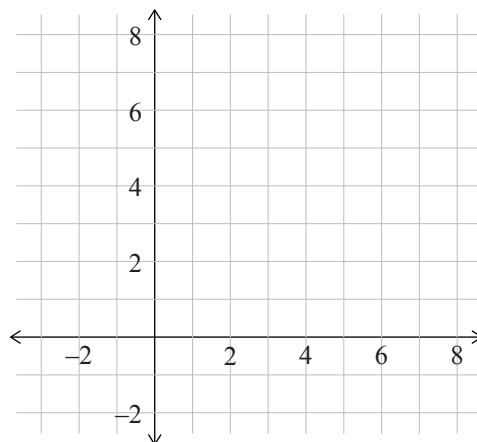


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- (iii) I te tukutuku ki raro, me āta tuhi te kauwhata e whakatauiratia ana i te hanga o te taura.



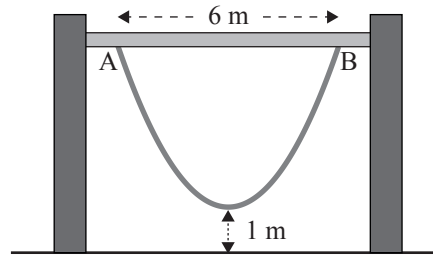
- (b) In a children's playground there is a rope hanging from two points, A and B, on a horizontal beam.

A and B are 6 metres apart.

The lowest point of the rope is 1 m above the ground.

The shape of the rope can be modelled by

$$y = \frac{x}{3}(x - p) + 4$$



ASSESSOR'S  
USE ONLY

where  $y$  is the height above the ground, and  $x$  is the distance from A.

- (i) How high above the ground is A?

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- (ii) Give the value of  $p$ .

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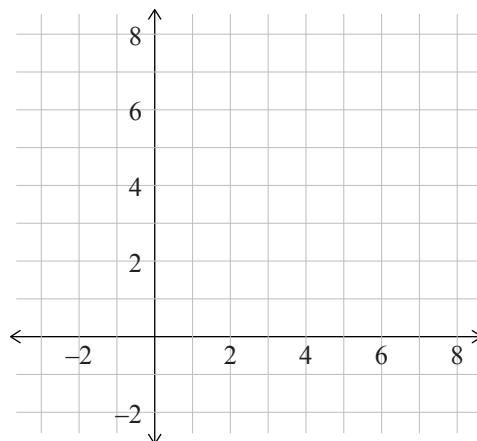


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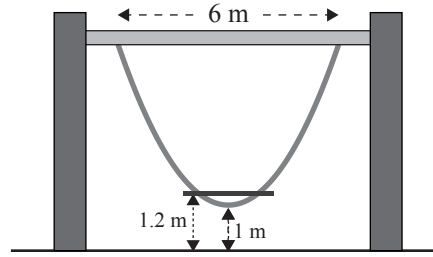
- (iii) On the grid below sketch the graph that models the shape of the rope.



- (iv) Ka wiria he puare i tētahi papa huapae 2 m te roa.  
Ka kuhuna atu te taura i ngā puare hei mahi tārere.  
1.2 mita te teitei o te tūru mai i te papa.

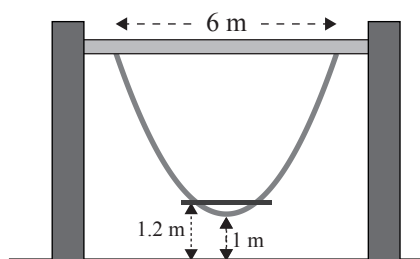
Kia pēhea te tawhiti i waenga i ngā puare i te papa  
kia noho ōrite te hanga o te taura i runga ake o te  
tūru?

Tuhia tō tuhinga ki te 2 mati whaiira<sup>1</sup>.



<sup>1</sup> mati ā-ira

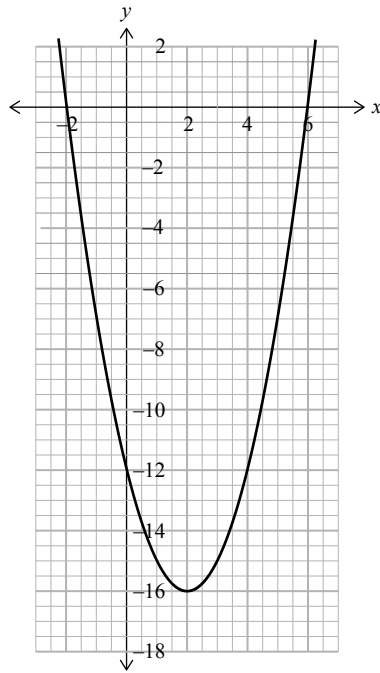
- The height of the seat is 1.2 metres above the ground.



Give your answer to 2 dp.

## TŪMAHI TUATORU

- (a) (i) Tuhia te whārite mō te unahi e whakaaturia ana i raro nei.




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- (ii) Tuhia te whārite o te kauwhata i runga ake mēnā ka nekehia mā te 2 waeine ki te taha matau.

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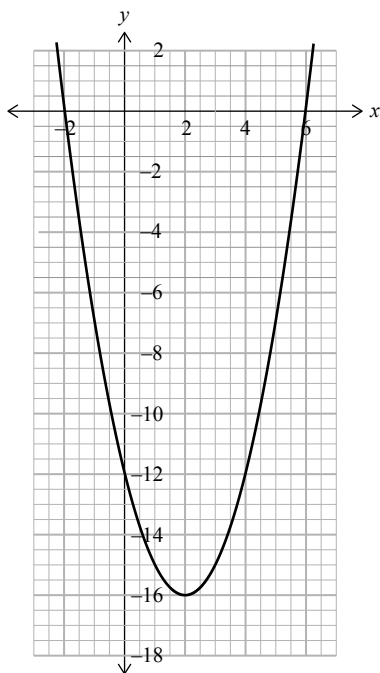


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**QUESTION THREE**ASSESSOR'S  
USE ONLY

- (a) (i) Give the equation of the parabola shown below.



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- (ii) Give the equation of the above graph if it is translated by 2 units to the right.

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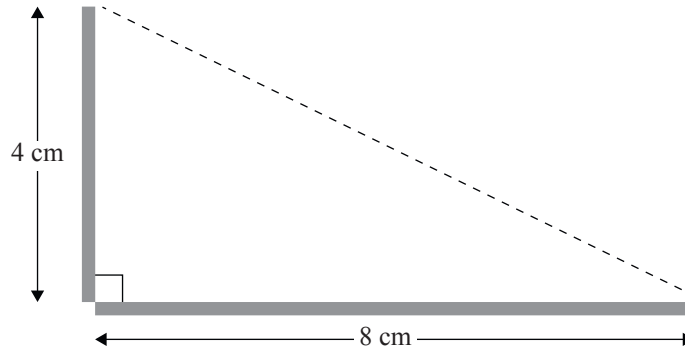
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- (b) Kei a Jono ētahi ngaku kirihou he 12 cm te roa o ia ngaku.

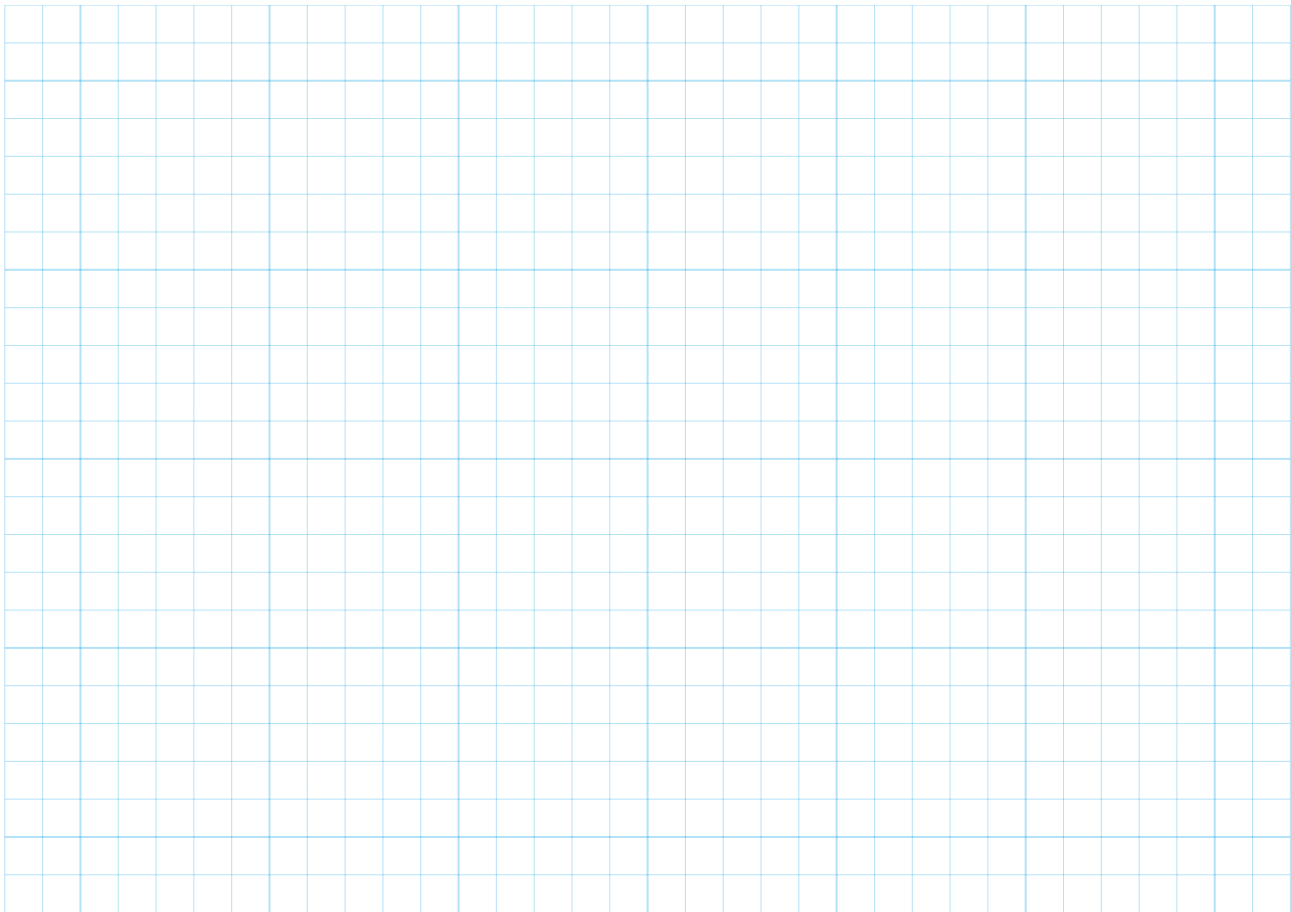
Ka tapahia e ia tētahi o ēnei ngaku kia rua ngā wāhanga, ā, ka whakamahia e ia aua wāhanga mō ngā taha poto ake e rua o tētahi tapatoru hāngai.

Ka tīmata ia ki te tapahi i tētahi wāhanga e 4 cm te roa mai i te ngaku 12 cm me te whakamahi i tēnei hei taha mō tētahi tapatoru hāngai. Ka whakatakotohia e ia te wāhanga 8 cm kei te toe kia koki hāngai hei taha tuarua, e ai ki te whakaaturanga i raro.



Kātahi ia ka tātai i te horahanga o te tapatoru ka puta mā te tūhono i ngā pito e rua.

- (i) Whakamahia i te papatau, i te whārite, i te kauwhata rānei hei tūhura i te pānga i waenga i te horahanga o te tapatoru me ngā roa rerekē o te wāhanga o te kirihou ka taea te tapahi mai i te ngaku 12 cm.



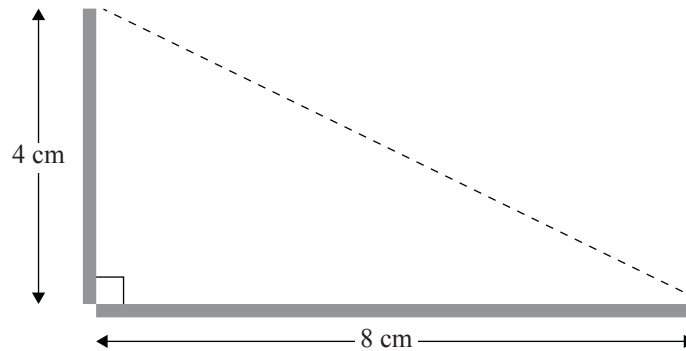
Tuhia te whārite pai rawa mō te tohu i te pānga i waenga i te horahanga o te tapatoru me te roa o te kirihou i tapahia mai i te ngaku 12 cm.



- (b) Jono has some strips of plastic that are each 12 cm long.

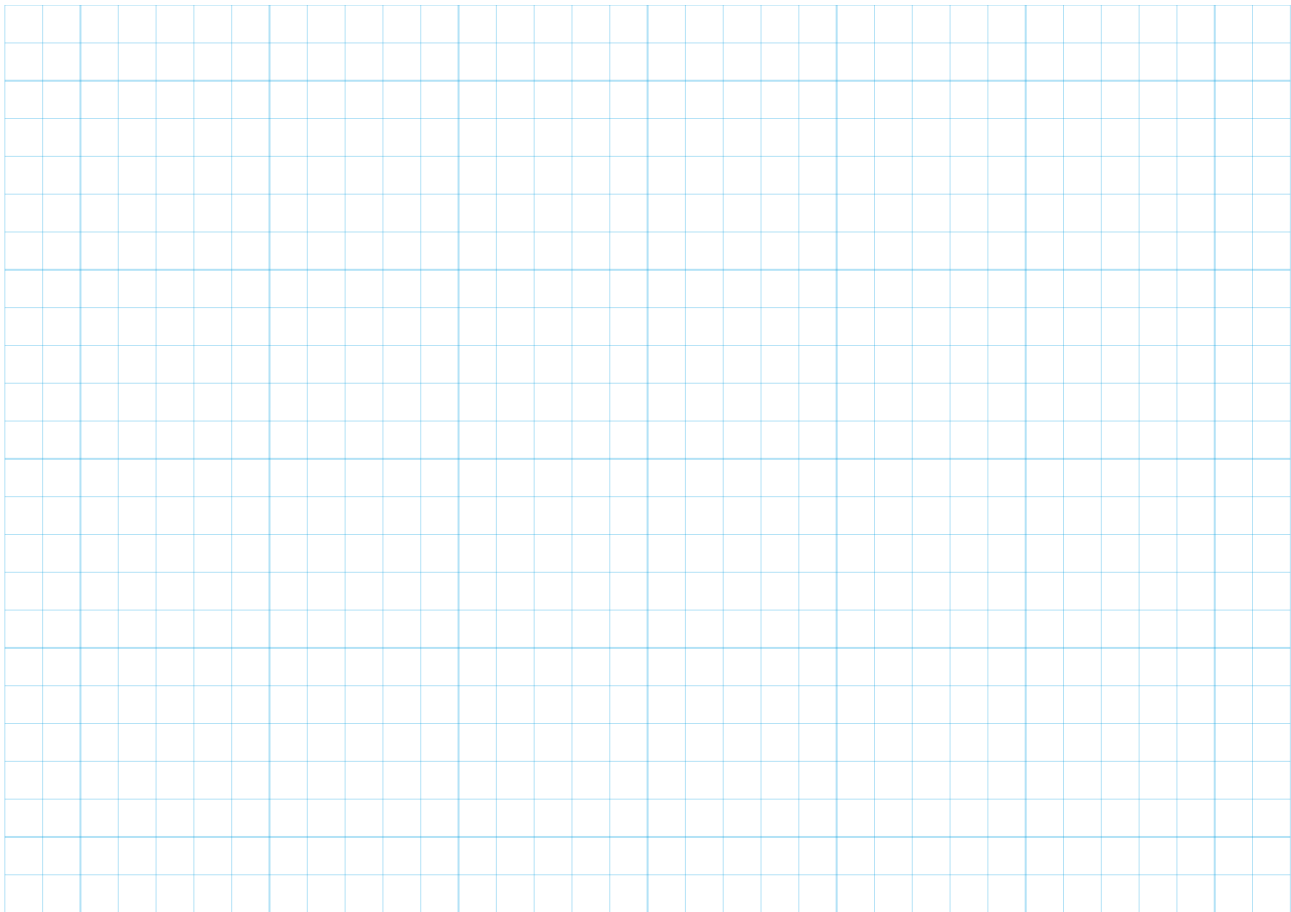
He cuts one of these strips into two pieces and uses them as the two shorter sides of a right-angled triangle.

He starts by cutting a piece 4 cm long from a 12 cm strip, and uses this as one side of a right-angled triangle. He places the remaining 8 cm piece at right angles as the second side, as shown below.



He then calculates the area of the triangle that would be formed by joining the two end points.

- (i) Use a table, equation, or graph to investigate the relationship between the area of the triangle, and the different lengths of the piece of plastic that can be cut from the 12 cm strip.



State the equation that best represents the relationship between the area of the triangle and the length of plastic cut from the 12 cm strip.

- (ii) What features can be noticed about the area when Jono increases the length of the strip of plastic that he cuts from the 12 cm strip?

ASSESSOR'S  
USE ONLY

- Whakaurua mai ngā taunga o te akitu o te unahi.

- Include the co-ordinates of the vertex of the parabola.

**He whārangi anō ki te hiahiatia.  
Tuhia te (ngā) tau tūmahi mēnā e tika ana.**

TAU TŪMAHI

MĀ TE  
KAIMĀKA  
ANAKEA large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for writing answers.



**Extra paper if required.**  
**Write the question number(s) if applicable.**

QUESTION  
NUMBER

ASSESSOR'S  
USE ONLY

A large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for calculations or drawing.

He whārangi anō ki te hiahiatia.  
Tuhia te (ngā) tau tūmahi mēnā e tika ana.

TAU TŪMAHI

MĀ TE  
KAIMĀKA  
ANAKE

**Extra paper if required.**  
**Write the question number(s) if applicable.**

QUESTION  
NUMBER

ASSESSOR'S  
USE ONLY

*English translation of the wording on the front cover*

## **Level 1 Mathematics and Statistics, 2017**

### **91028 Investigate relationships between tables, equations and graphs**

9.30 a.m. Monday 20 November 2017  
Credits: Four

91028M

<b>Achievement</b>	<b>Achievement with Merit</b>	<b>Achievement with Excellence</b>
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.

Grids are provided on some pages. This is working space for the drawing of a graph or a diagram, constructing a table, writing an equation, or writing your answer.

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 2–27 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.**