90940M

909405

1

SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Pūtaiao, Kaupae 1, 2016

90940M Te whakaatu māramatanga ki ngā āhuatanga o te pūhanga manawa

9.30 i te ata Rāhina 14 Whiringa-ā-rangi 2016
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ngā āhuatanga o te pūhanga manawa.	Te whakaatu māramatanga hōhonu ki ngā āhuatanga o te pūhanga manawa.	Te whakaatu māramatanga matawhānui ki ngā āhuatanga o te pūhanga manawa.

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 KATOA kei roto i tēnei pukapuka.

Mēnā ka hiahia whārangi atu anō koe mō ō tuhinga, whakamahia 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 2–23 kei roto i tēnei pukapuka, ā, kāore tētahi o aua whārangi i te takoto kau.

ME HOATU RAWA KOE I TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

Tērā pea ka whai hua ēnei tikanga tātai ki a koe.

$$v = \frac{\Delta d}{\Delta t} \qquad a = \frac{\Delta v}{\Delta t} \qquad F_{\text{net}} = ma \qquad P = \frac{F}{A} \qquad \Delta E_{\text{p}} = mg\Delta h$$

$$E_{\text{k}} = \frac{1}{2}mv^2 \qquad W = Fd \qquad g = 10 \text{ N kg}^{-1} \qquad P = \frac{W}{t}$$

You may find the following formulae useful.

$$v = \frac{\Delta d}{\Delta t} \qquad a = \frac{\Delta v}{\Delta t} \qquad F_{\text{net}} = ma \qquad P = \frac{F}{A} \qquad \Delta E_{\text{p}} = mg\Delta h$$

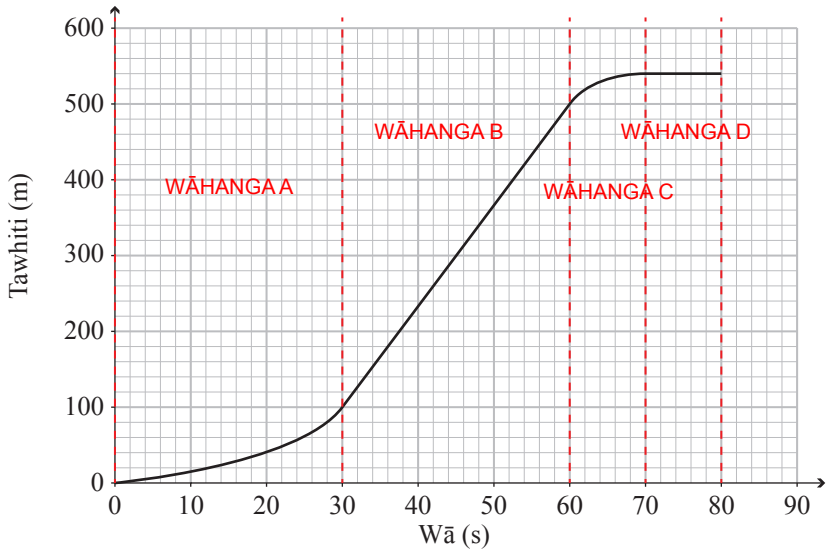
$$E_{\text{k}} = \frac{1}{2}mv^2 \qquad W = Fd \qquad g = 10 \text{ N kg}^{-1} \qquad P = \frac{W}{t}$$

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

E whakaatu ana te kauwhata i raro i te nekehanga o tētahi hōiho me te kaieke i a rāua e haere ana i tātahi.

Hōiho me te kaieke i tātahi



(a) Whakaahuahia te nekehanga o te hōiho me te kaieke i ia wāhanga o te kauwhata.
(Kāore e hiahiatia ana he tātaitanga.)

Wāhanga A: _____

Wāhanga B: _____

Wāhanga C: _____

Wāhanga D: _____

(b) Tātaihia te tere o te hōiho me te kaieke i te Wāhanga B o te kauwhata.

_____

_____

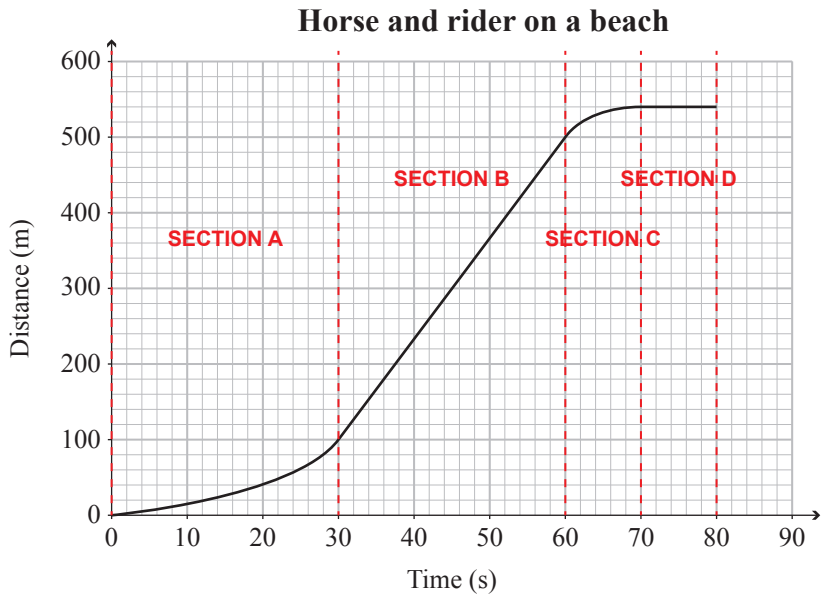
_____

_____

QUESTION ONE

ASSESSOR'S USE ONLY

The graph below shows the motion of a horse and rider as they travel along a beach.



(a) Describe the motion of the horse and rider in each section of the graph.
(No calculations are required.)

Section A: _____

Section B: _____

Section C: _____

Section D: _____

(b) Calculate the speed of the horse and rider in Section B of the graph.

_____

_____

_____

_____

(c) He 44 cm^2 (0.0044 m^2) te horahanga mata o **ia** pāua hōiho, ā, ka totohu atu ki te kirikiri ina tū te hōiho. He 200155 Pa te pēhanga ka puta i ngā pāua hōiho.

Tātaihia te taumaha o te hōiho.

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(c) **Each** of the horse's hooves has a surface area of 44 cm^2 (0.0044 m^2) and sinks into the sand when the horse stops. The hooves exert a pressure of 200155 Pa.

Calculate the weight of the horse.

(d) Ka hīkoi te kaieke i te taha o te hōiho, ā, kātahi ka eke ia ki runga i te hōiho.

MĀ TE KAIMĀKA ANAKE

Whakamāramahia he aha i totohu atu anō ai ngā pāua hōiho ki te kirikiri ina eke atu te kaieke ki runga i te hōiho.

I tō tuhinga me whai whakaaro koe ki te **pēhanga** me ngā **tōpana** kā pā.

(Kāore te tātaihanga e hiahiatia.)

(d) The rider walks beside the horse and then gets onto the horse.

ASSESSOR'S USE ONLY

Explain why the horse's hooves sink further into the sand when the rider gets onto the horse.
In your answer you should consider the **pressure applied** and the **forces acting**.
(No calculations are necessary.)

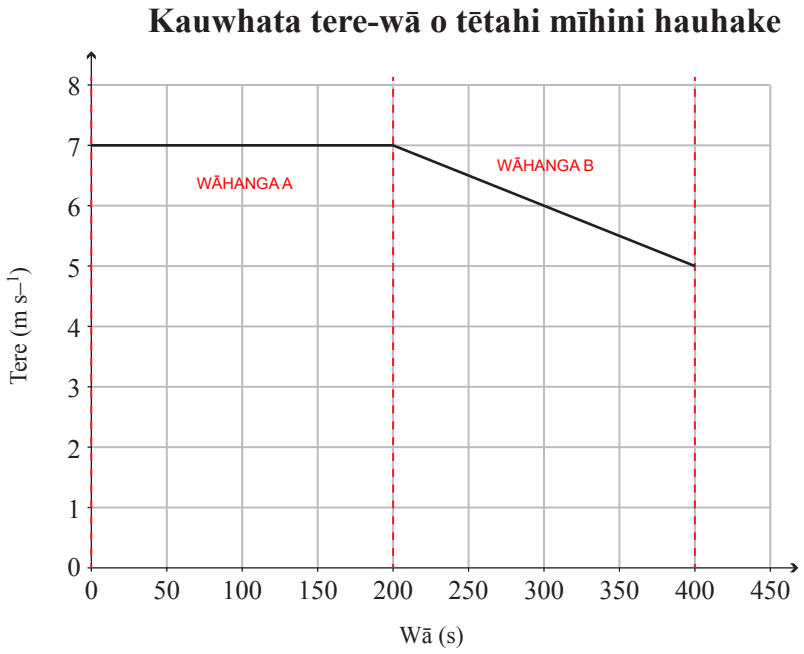
TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

I te mahi tētahi mīhini hauhake i roto i tētahi taiepa.

photo.elsoar.com

E whakaatu ana te kauwhata tere-wā i te haerenga o te mīhini hauhake.



(a) Tātaihia te tawhiti i haere ai te mīhini hauhake i ngā hēkona 200 tuatahi.

(b) Whakamāramahia mai te āhua o **ngā tōpana** e pā ana ki te mīhini hauhake e puta ai te nekehanga i te kauwhata (kāore e hiahiatia ana he tātaitanga).

Whakaurua atu ngā kōrero mō te **tōpana more**.

MĀ TE KAIMĀKA ANAKE

Wāhanga A:

Wāhanga B:

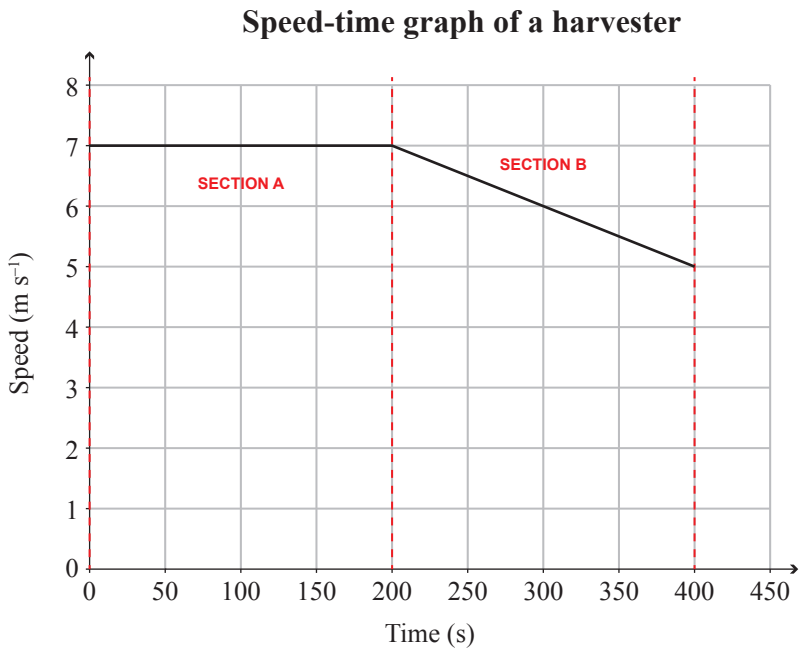
QUESTION TWO

ASSESSOR'S USE ONLY

A harvester was working in a paddock.

photo.elsoar.com

The speed-time graph shows the journey of the harvester.



(a) Calculate the distance the harvester travelled in the first 200 seconds.

(b) Explain how the **forces** acting on the harvester result in the motion shown in the graph (no calculations are needed).

Include reference to the **net force**.

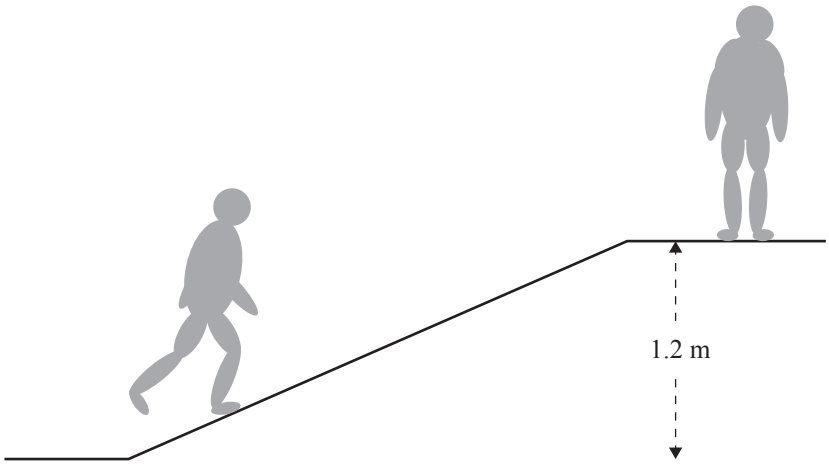
ASSESSOR'S USE ONLY

Section A:

Section B:

E puritia ana ngā pata i tētahi hēte whai rōnaki.

(c) Ka piki tētahi kaimahi 85 kg ki runga o te rōnaki, he 1.2 m te teitei. E 8 hēkona te roa o tēnei ka oti.

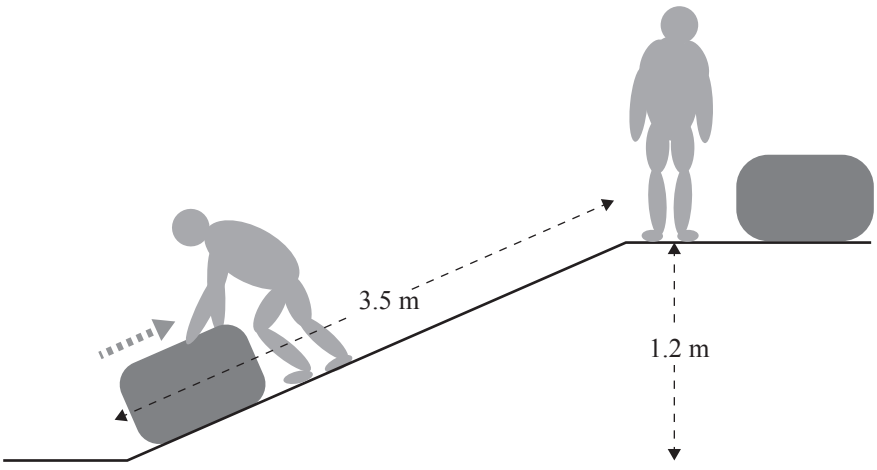


Tātaihia te **mahi** i oti i te kaimahi kia tae atu ai ia ki runga o te rōnaki, ā, otirā me te **ngoi** i puta.

Whakaurua mai ngā waeine.

(d) I tōia haerehia e te kaimahi tētahi pēke pata 25 kg te taumaha i te rōnaki 3.5 m kia tae ia ki te teitei o te 1.2 m.

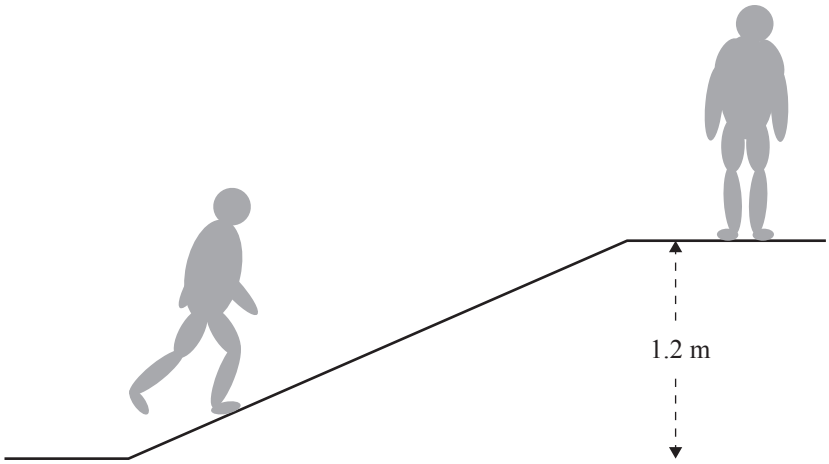
He roa atu mōna ki te tō haere i te pēke i te rōnaki tēnā i te hiki tika tonu i te pēke ki runga o te rōnaki.



ASSESSOR'S USE ONLY

The harvested grain is stored in a shed with a ramp.

(c) An 85 kg worker climbed to the top of the ramp, a height of 1.2 m. This took 8 seconds.

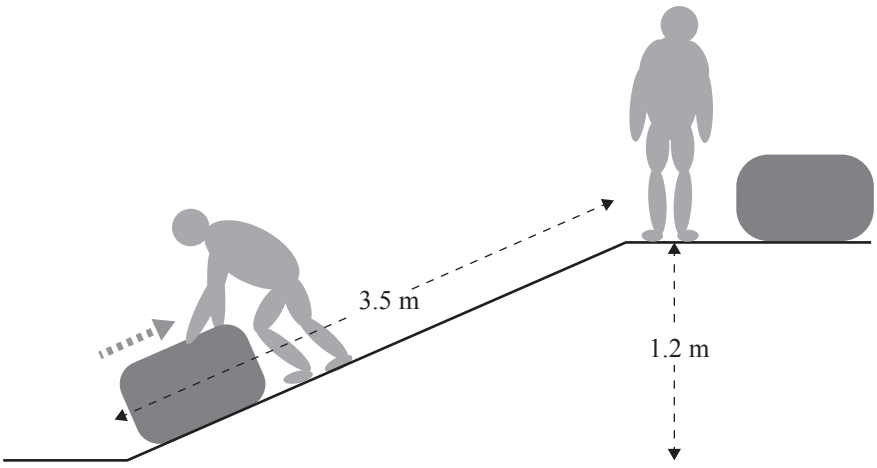


Calculate the **work** done by the worker to get to the top of the ramp and therefore the **power** exerted.

Include units.

(d) The worker dragged a 25 kg bag of grain up the 3.5 m ramp to reach the height of 1.2 m.

It took longer to drag the bag up the ramp than to lift the bag straight up to the top of the ramp.



(i) Whakamāramahia mai he aha i iti ake ai te **tōpana** e hiahiatia ana mō te tō haere i te pēke pata i te rōnaki ki runga rawa tēnā i te tōpana e hiahiatia ana ki te hiki tika tonu i te pēke (whakatepoutū). Hei aha noa te waku.

MĀ TE KAIMĀKA ANAKE

(ii) Whakamāramahia mēnā ko te **ngoi** e hiahiatia ana hei tō haere i te pēke pata ki runga o te rōnaki he nui ake, iti ake rānei i te ngoi e hiahiatia ana ki te hiki tika tonu (whakatepoutū) i te pēke ki runga o te rōnaki.

(Kāore e hiahiatia ana he tātaitanga.)

ASSESSOR'S USE ONLY

(i) Explain why the **force** needed to drag the bag of grain up the ramp to the top is less than the force needed to lift the bag straight up (vertically). Ignore friction.

(ii) Explain whether the **power** needed to drag the bag of grain to the top of the ramp is more or less than the power needed when the bag is lifted straight up (vertically) to the top of the ramp.

(No calculation is required.)

TŪMAHI TUATORU

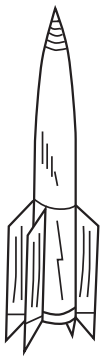
MĀ TE KAIMĀKA ANAKE

He 2.60 kg te papatipu o tētahi tākirirangi iti, ā, he 26.0 N te taumaha.

(a) Whakamāramahia te rerekētanga i waenga i te papatipu me te taumaha.

(b) I whakarewahia poutūtia te tākirirangi. I wehe mai i te papa whakarewa, ā, i muri i te 1.2 s he 20 m s^{-1} te tere.

Tātaihia te whakaterenga o te tākirirangi.



(c) He 1950 J te pūngao moe i riro mai i te tākirirangi i tōna teitei mōrahi rawa. Kātahi ka taka mai ki te papa.

He aha te tere mōrahi e tāea ana i mua tonu i te taunga ki te papa (ko te whakapae ka pūmau te pūngao)?

QUESTION THREE

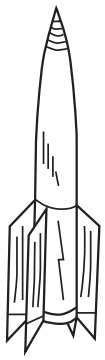
ASSESSOR'S USE ONLY

A small rocket has a mass of 2.60 kg and a weight of 26.0 N.

(a) Explain the difference between mass and weight.

(b) The rocket was fired vertically. It left the launch pad and after 1.2 s was travelling at 20 m s^{-1}.

Calculate the rocket's acceleration.

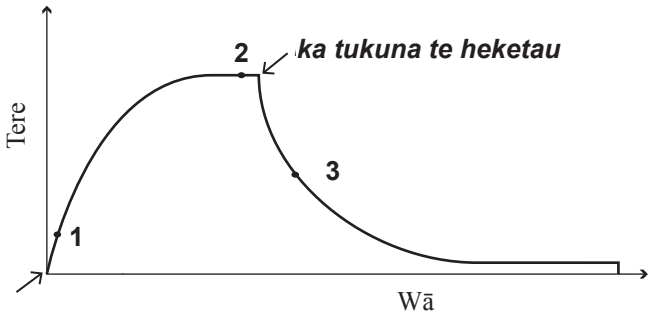


(c) The rocket had gained 1950 J of potential energy at its maximum height. It then fell back to the ground.

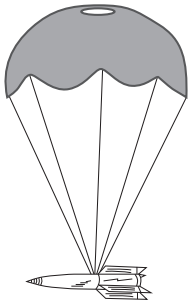
What was the maximum speed it could reach just before hitting the ground (assuming energy is conserved)?

(d) I tukuna anō te tākirirangi. I muri i te ekenga ki tōna teitei mōrahi, ka tīmata ki te taka mai ki te papa. I a ia e taka haere mai ana, ka whakaputahia he heketau.

E whakaatu ana te kauwhata i raro nei i te kauwhata tere-wā o te tākirirangi **e taka mai ana i tana teitei mōrahi** ki te papa. I muri tonu i te pūwāhi **2**, ka whakaputahia te heketau.



tākirirangi i te teitei mōrahi



Matapakihia te huri o te tere i ngā pūwāhi **1**, **2**, me te **3** i te wā e taka mai ana te tākirirangi ki te papa.

I tō tuhinga me:

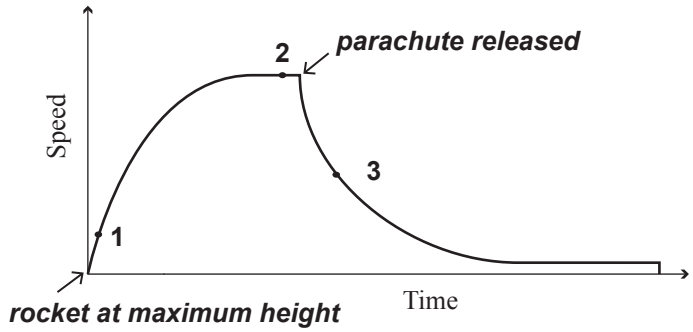
- whakaahua i ngā tōpana ka pā, ā, mēnā kei te tahatahi, taurite rānei
- whakamāramahia mai he aha te pūtake o te huri o te tere
- whakaahua i ngā tōpana waku e pā ana i te wā e heke ana te tākirirangi.

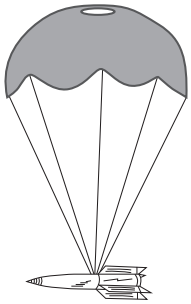
MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(d) The rocket was fired again. After it reached its maximum height, it began to fall back to the ground. As it fell, a parachute was released.

The graph below shows the speed-time graph of the rocket **falling from its maximum height** back to ground. Just after point **2**, a parachute is released.





Discuss the change in speed at points **1**, **2**, and **3** as the rocket falls to the ground.

In your answer you should:

- describe the forces involved, and whether they are unbalanced or balanced
- explain what is causing the change in speed
- describe the frictional forces acting as the rocket falls.

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

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English translation of the wording on the front cover

Level 1 Science, 2016

90940 Demonstrate understanding of aspects of mechanics

9.30 a.m. Monday 14 November 2016
Credits: Four

90940M

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of mechanics.	Demonstrate in-depth understanding of aspects of mechanics.	Demonstrate comprehensive understanding of aspects of mechanics.

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.

If you need more room for any answer, use the extra space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–23 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.