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90940M

909405

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, 2015

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

9.30 i te ata Rātū 10 Whiringa-ā-rangi 2015
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 2–25 kei roto i tēnei pukapuka, ka mutu, 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 ture tātai ki a koe.

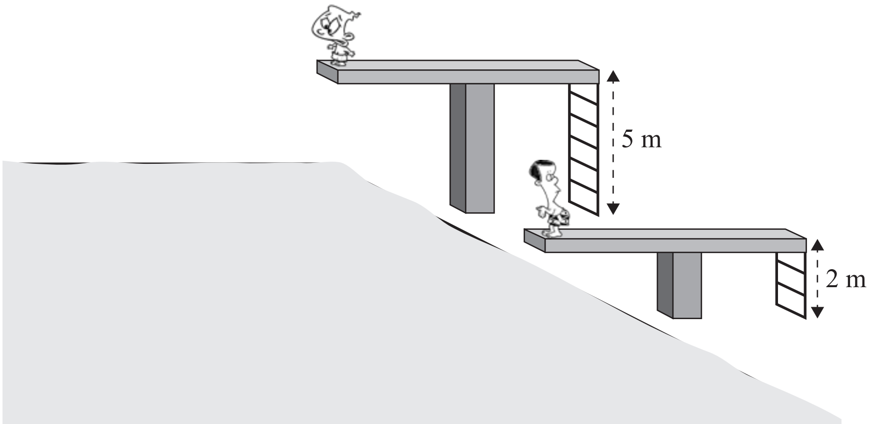
$$v = \frac{\Delta d}{\Delta t} \qquad a = \frac{\Delta v}{\Delta t} \qquad F_{\text{net}} = ma \qquad P = \frac{F}{A} \qquad \Delta E_{\text{p}} = mg\Delta h$$

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

Ko te uara o g ko te 10 m s^{-2}

TŪMAHI TUATAHI: TE HŌPUA KAUKAU

I te pekepeke atu a Chris rāua ko Ian mai i ngā paparuku rerekē ki roto i te hōpua kaukau.



(a) He 0.60 hēkona te roa o te tae atu o Chris ki te wai mai i tana peketanga i te paparuku e 2 m te teitei.

Tātaihia tana tere toharite.

(b) E hia te nui o te mahi a Chris (48 kg) i oti i a ia i tana pikitanga i te arawhata ki te paparuku e 2 m te teitei?

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You may find the following formulae useful.

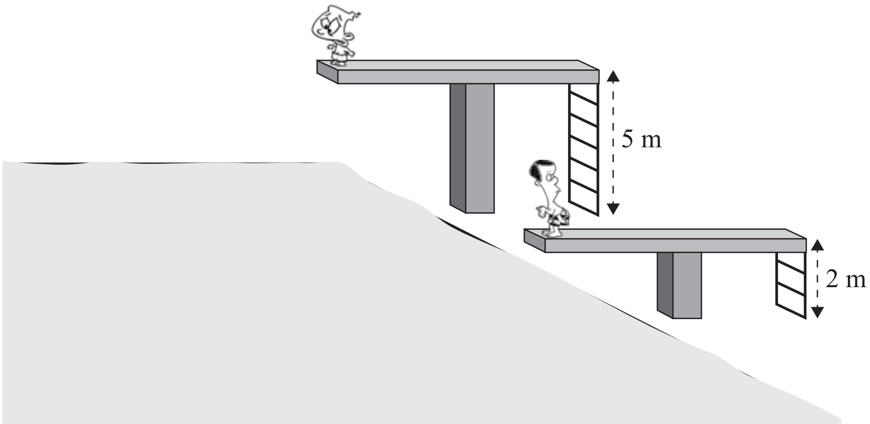
$$v = \frac{\Delta d}{\Delta t} \qquad a = \frac{\Delta v}{\Delta t} \qquad F_{net} = ma \qquad P = \frac{F}{A} \qquad \Delta E_p = mg\Delta h$$

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

The value of g is given as 10 m s^{-2}

QUESTION ONE: SWIMMING POOL

Chris and Ian were jumping off different platforms into a pool.



(a) It took Chris 0.60 s to reach the water once he had jumped from the 2 m platform.

Calculate his average speed.

(b) How much work did Chris (48 kg) do when he climbed up the stairs to the 2 m platform?

(c) 52 kg te papatipu o Ian.

He aha te take he nui ake te mahi a Ian ki te piki i te arawhata e 5 m te teitei tēnā i a Chris i piki i te arawhata e 2 m te teitei?

Kāore te tātaihanga e hiahiatia.

(d) Ka peke atu a Ian ki roto i te hōpua kaukau mai i te paparuku e 5 m te teitei.

Tātaihia te tere o Ian i mua tonu i tana pā ki te wai (e ai ki te ture mō te pūmau o te pūngao).

I tō tuhinga me:

- whakaingoa ngā momo pūngao o Ian i mua i tana peketanga, ME ērā anō i mua i tana pā ki te wai
- tātai te tere o Ian i mua tonu i tana pā ki te wai.

ASSESSOR'S USE ONLY

(c) Ian's mass is 52 kg.

Why did Ian do more work climbing up the 5 m ladder compared to Chris climbing up the 2 m ladder?

No calculations are needed.

(d) Ian jumps into the pool from the 5 m platform.

Calculate Ian's speed as he is about to hit the water (assuming conservation of energy).

In your answer you should:

- name the types of energy Ian has before he jumps, AND as he is about to hit the water
- calculate Ian's speed as he is about to hit the water.

(e) Whakamāramahia mai te take he pōturi ake te tere o Ian i mua tonu i tana pā ki te wai, ki tērā i tātaihia i te wāhanga (d).

MĀ TE KAIMĀKA ANAKE

(e) Explain why Ian’s actual speed as he is about to hit the water, is slower than that calculated in part (d).

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MĀ TE KAIMĀKA ANAKE

TŪMAHI TUARUA: NGĀ TŌPANA

Ko te kererū (e mōhiotia anō ko te kūkupa) o Aotearoa tētahi o ngā manu tino nui o tēnei tūmomo i te ao katoa.

I runga i ngā here manatārua, kāore e whakaaetia te whakaaturanga o tēnei rauemi i konei.

http://nzbirdsonline.org.nz/species/new-zealand-pigeon

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

(ii) Tātaihia te taumaha o tētahi kererū he papatipu 630 g tōna.

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QUESTION TWO: FORCES

The kererū (also known as New Zealand wood pigeon or kūkupa) is one of the largest pigeons in the world.

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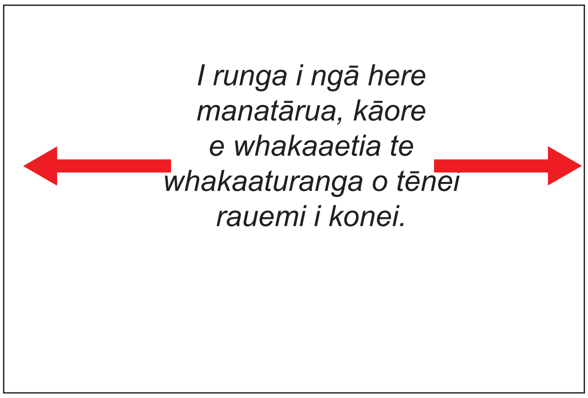
http://nzbirdsonline.org.nz/species/new-zealand-pigeon

(a) (i) Explain the difference between mass and weight.

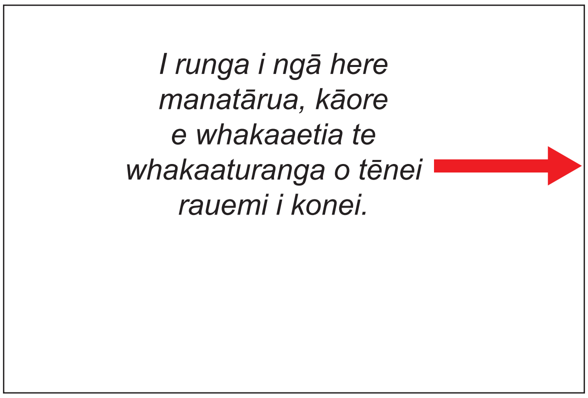
(ii) Calculate the weight of a kererū that has a mass of 630 g.

MĀ TE KAIMĀKA ANAKE

(b) E whakaatu ana ngā hoahoa tōpana i raro i tētahi atu kererū e rere ana ki tētahi tere aumou, ēngari kātahi ka āta haere ia. Ko ngā tōpana huapae anake e whakaaturia ana ki ēnei hoahoa. Me kī, kei te taharite ētahi atu tōpana.



Tere aumou



Āta haere ana

he mea urutau mai i http://nzbirdsonline.org.nz/species/new-zealand-pigeon

E ai ki ngā hoahoa tōpana i runga ake, whakamāramahia te hono i waenga i te tōpana tapeke huapae e pā ana ki te manu, me te momo nekehanga ka puta.

I tō tuhinga me:

- whakamārama he aha te tikanga o te tōpana tapeke
- whakamārama i te hono i waenga i te tōpana tapeke huapae me te nekehanga mō ia āhuatanga e whakaahuahia ana
- whakataurite i te ahunga o te tōpana tapeke huapae me te ahunga o te nekehanga mō te manu i ia hoahoa.

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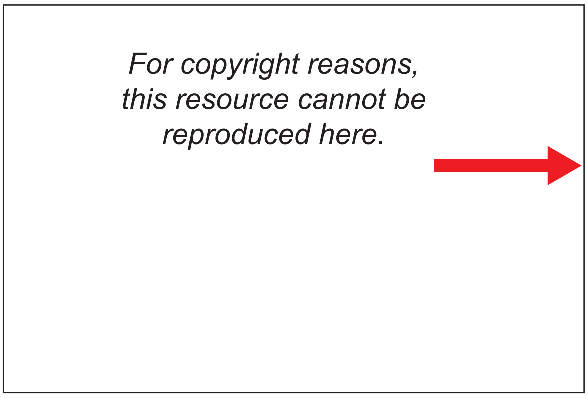
(b) The force diagrams below show another kererū flying at a constant speed, but then slowing down. Only horizontal forces are shown in these diagrams. Assume any other forces are balanced.

Constant speed



Slowing down

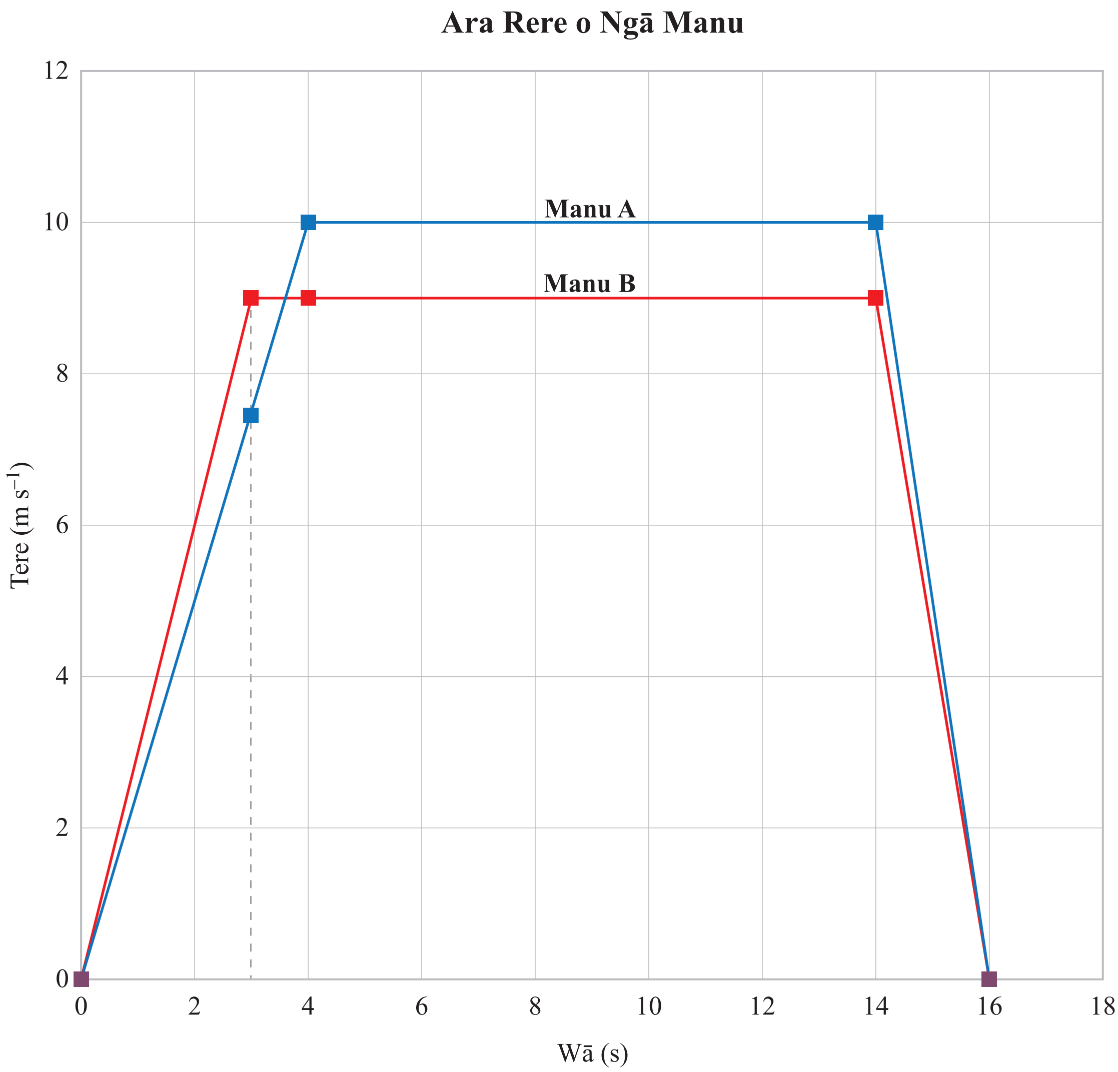
adapted from http://nzbirdsonline.org.nz/species/new-zealand-pigeon

Referring to the force diagrams above, explain the link between the horizontal net force acting on the bird, and the type of motion produced.

In your answer you should:

- describe what is meant by net force
- explain the link between the horizontal net force and motion for each situation described
- compare the direction of the horizontal net force and the direction of the motion for the bird in each diagram.

(c) E whakaatu ana te kauwhata tere-wā i ngā rerenga o ngā manu e rua.



(i) Whakamahia te kauwhata ki te whakamārama ko tēhea te manu he nui ake te whakaterenga i te 3 hēkona tuatahi.

Kāore i te hiahiatia ngā tātaitanga ēngari ka tāea te whakamahi.

(ii) I roto i te 16 hēkona, he 121.5 m te rerenga o **Manu B**.

E hia te tawhiti atu o te rerenga o **Manu A** i roto i taua wā anō?

Whakaaturia ngā mahinga katoa.

MĀ TE KAIMĀKA ANAKE

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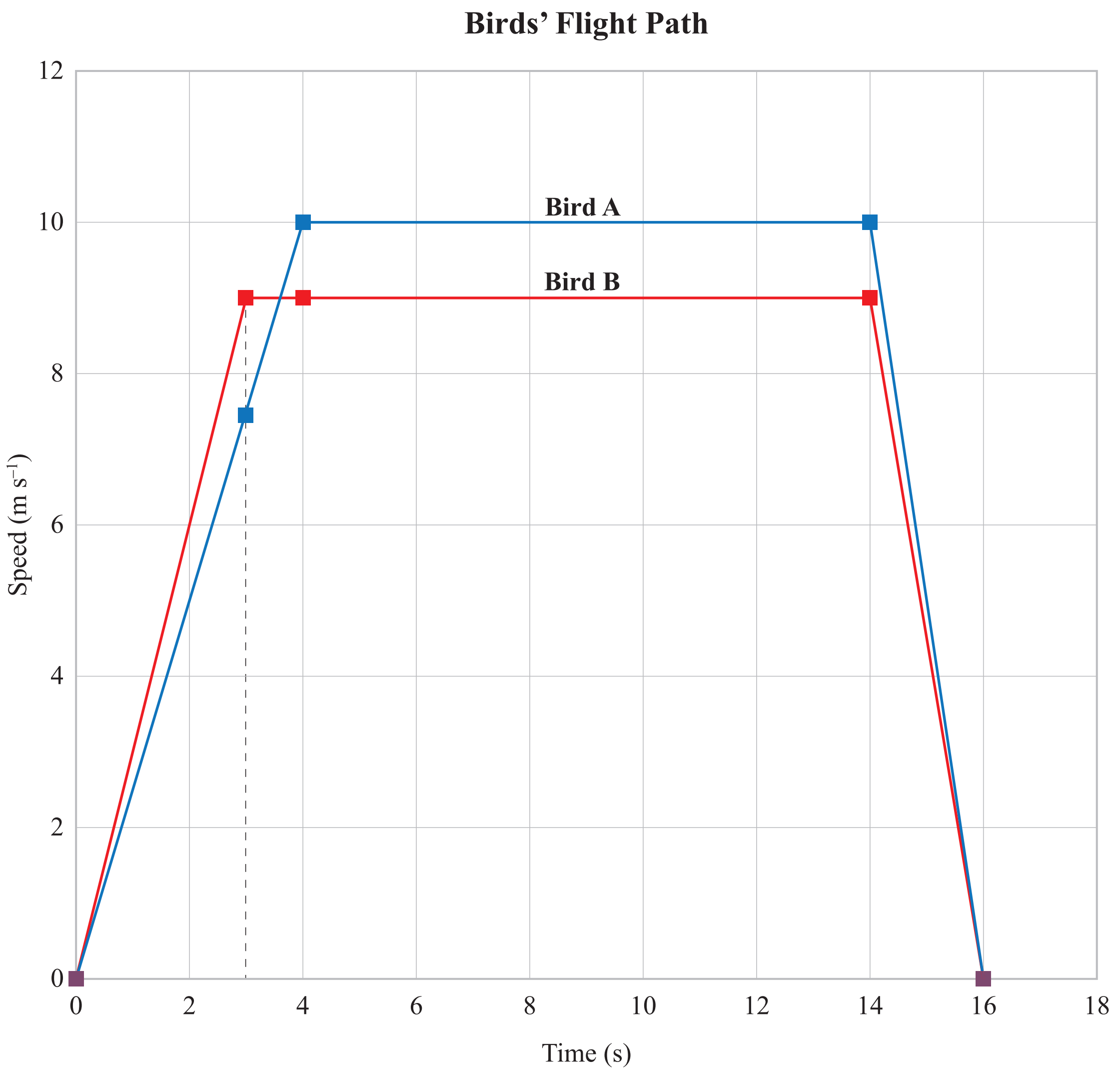
(c) The speed-time graph shows the flights of two birds.



(i) Use the graph to explain which bird has the greater acceleration in the first 3 seconds.

Calculation is not required but may be used.

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(ii) In 16 s, **Bird B** travelled 121.5 m.

How much further did **Bird A** travel in the same time?

Show all working.

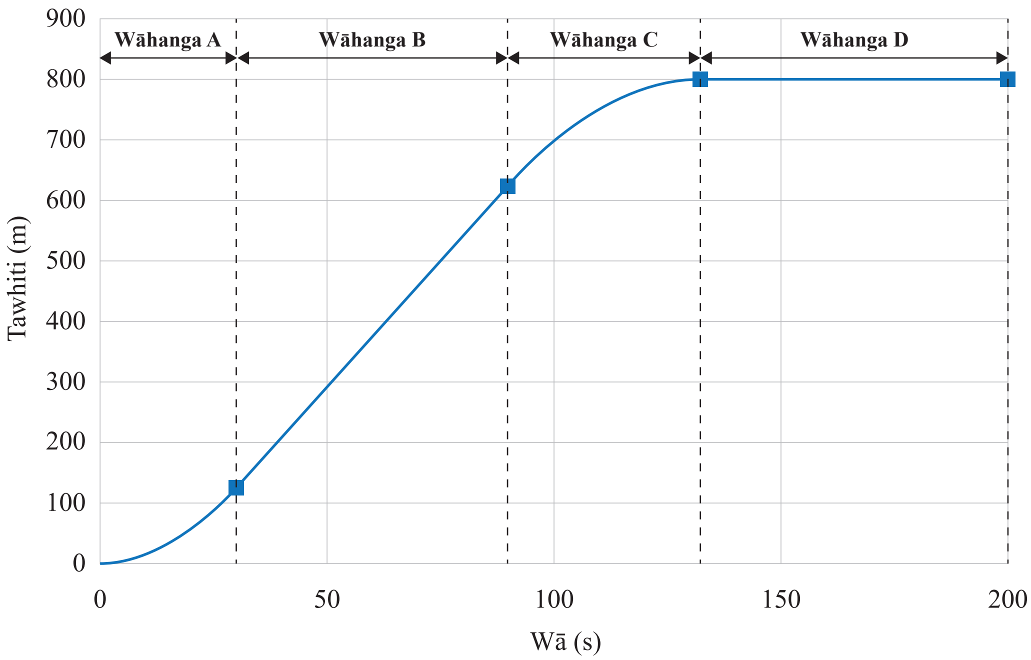
TŪMAHI TUATORU: HOE WAKA

I runga i ngā here manatārua, kāore e whakaaetia te whakaaturanga o tēnei rauemi i konei.

http://www4.pictures.zimbio.com/gi/Zoe+Stevenson+Samsung+World+Cup+Sydney+T5PlDwyWCo8l.jpg

Ka whakaatu te kauwhata tawhiti-wā i raro nei i te haerenga o tētahi waka hoe i roto i tētahi tauwhawhai.

Kauwhata tawhiti-wā mō te tauwhawhai hoe waka



MĀ TE KAIMĀKA ANAKE

(a) Whakaahuahia te nekehanga o te waka puta noa i te haerenga.

Kāore te tātaihanga e hiahiatia.

Wāhanga A:

Wāhanga B:

Wāhanga C:

Wāhanga D:

(b) I ngā hēkona 30 tuatahi o te tauwhawhai, i huri te tere o ngā kaihoe mai i te 0.0 m s^{-1} ki te 8.3 m s^{-1}.
I tēnei wā anō he 125 m te tawhiti i oti i a rātau. Ko te papatipu tapeke o ngā kaihoe me te waka he 140 kg.

(i) Tātaihia te **whakaterenga toharite** o te waka i roto i ngā hēkona 30 tuatahi.

Whakaaturia ngā mahinga katoa.

(ii) Tātaihia te **mahi i oti** kia tutuki ai te tawhiti o te 125 m.

Whakaaturia ngā mahinga katoa.

QUESTION THREE: ROWING

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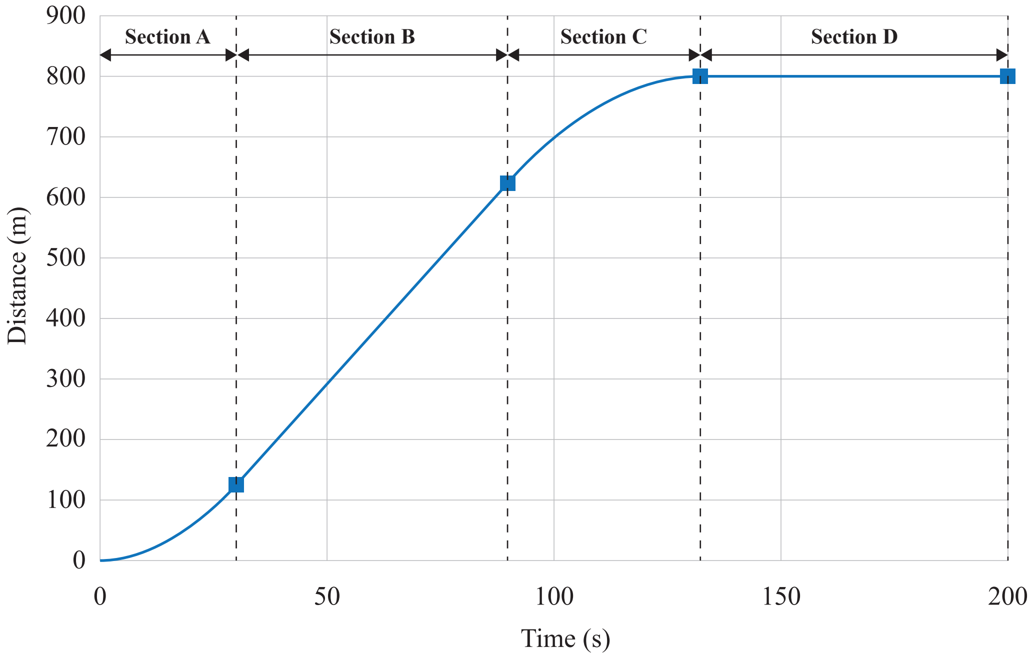
http://www4.pictures.zimbio.com/gi/Zoe+Stevenson+Samsung+World+Cup+Sydney+T5PlDwyWCo8l.jpg

The distance-time graph below shows the journey of a rowing boat in a race.

Distance-time graph for rowing race



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(a) Describe the motion of the boat throughout the journey.

No calculations required.

Section A:

Section B:

Section C:

Section D:

(b) During the first 30 s of the race, the rowers' speed changed from 0.0 m s^{-1} to 8.3 m s^{-1}. During this time they covered 125 m. The total mass of the rowers and the boat is 140 kg.

(i) Calculate the boat's **average acceleration** during the first 30 seconds.

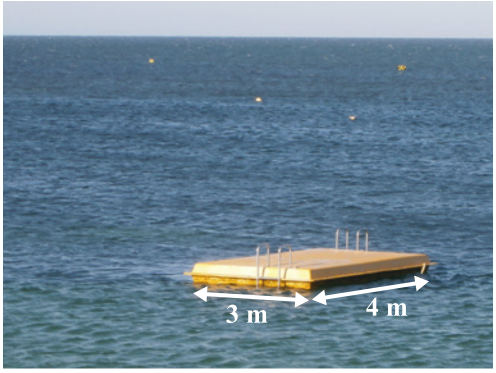
Show your working.

(ii) Calculate the **work done** to cover the distance of 125 m.

Show your working.

MĀ TE KAIMĀKA ANAKE

(c) Tokorua ngā tāngata i hoe atu ki tētahi papa kārewa e mānu ana i te wai.



He 185 kg te papatipu o te papa kārewa. E whakaaturia ana ngā ine o te papa kārewa ki te whakaahua i runga ake.

(i) Whakamahia te horahanga mata me te tōpana hei tātai i te pēhanga ka puta i te papa kārewa ki te wai.

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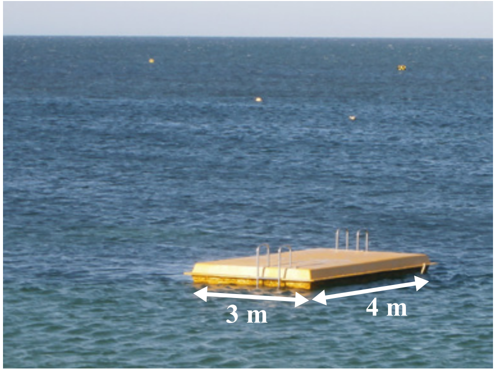
(c) Two people rowed out to a pontoon floating in the water.



The pontoon has a mass of 185 kg. The dimensions of the pontoon are shown in the photo above.

(i) Use surface area and force to calculate the pressure exerted by the pontoon on the water.

(ii) Kātahi ka eke atu ngā tokorua ki te papa kārewa ka tū atu ki runga.

Whakamāramahia te take ka totohu atu te papa kārewa ki roto i te wai ina tū ngā tokorua nei ki runga.

MĀ TE KAIMĀKA ANAKE

(ii) The two people then climb onto the pontoon and stand on it.

Explain why the pontoon will sink lower in the water when the people stand on it.

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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, 2015

90940M Demonstrate understanding of aspects of mechanics

9.30 a.m. Tuesday 10 November 2015
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 2–25 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.