

L2-PHYSMR



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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

## Ahupūngao, Kaupae 2, 2019

9:30 i te ata Rāmere 8 Whiringa-ā-rangi 2019

**PUKAPUKA RAUEMI**  
mō 91170M, 91171M, 91173M

Tirohia tēnei pukapuka hei whakatutuki i ngā tūmahi o ō Pukapuka Tūmahi, Tuhiinga hoki.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–3 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

**KA TAEA TĒNEI PUKAPUKA TE PUPURI HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.**

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

**91170M Te whakaatu māramatanga ki te ngaru**

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \quad s_i s_o = f^2 \text{ rānei}$$

$$m = \frac{d_i}{d_o} = \frac{h_i}{h_o} \quad m = \frac{f}{s_o} = \frac{s_i}{f} \text{ rānei}$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \quad \frac{n_1}{n_2} = \frac{v_2}{v_1} = \frac{\lambda_2}{\lambda_1}$$

$$v = f\lambda \quad f = \frac{1}{T} \quad v = \frac{d}{t}$$

Tere o te aho i rō korekore =  $3.00 \times 10^8 \text{ m s}^{-1}$

**91171M Te whakaatu māramatanga ki te pūhanga manawa**

$$v = \frac{\Delta d}{\Delta t} \quad a = \frac{\Delta v}{\Delta t} \quad v_f = v_i + at$$

$$d = v_i t + \frac{1}{2} at^2 \quad d = \frac{v_i + v_f}{2} t \quad v_f^2 = v_i^2 + 2ad$$

$$a_c = \frac{v^2}{r}$$

$$F = ma \quad \tau = Fd \quad F = -kx$$

$$F_c = \frac{mv^2}{r} \quad p = mv \quad \Delta p = F\Delta t$$

$$E_p = \frac{1}{2} kx^2 \quad E_k = \frac{1}{2} mv^2 \quad \Delta E_p = mg\Delta h$$

$$W = Fd \quad P = \frac{W}{t}$$

ina hiahiatia, whakamahia te  $g = 9.8 \text{ m s}^{-2}$

**91173M Te whakaatu māramatanga ki te hiko me te autōhiko**

$$E = \frac{V}{d} \quad F = Eq \quad \Delta E_p = Eqd$$

$$E_k = \frac{1}{2} mv^2$$

$$I = \frac{q}{t} \quad V = \frac{\Delta E}{q} \quad V = IR$$

$$P = IV \quad P = \frac{\Delta E}{t}$$

$$R_T = R_1 + R_2 + \dots \quad \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$F = BIL \quad F = Bqv \quad V = BvL$$

Whana hiko ki te irahiko =  $-1.60 \times 10^{-19} \text{ C}$

Papatipu o te irahiko =  $9.11 \times 10^{-31} \text{ kg}$

You may find the following formulae useful.

**91170 Demonstrate understanding of waves**

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \quad \text{or} \quad s_i s_o = f^2$$

$$m = \frac{d_i}{d_o} = \frac{h_i}{h_o} \quad \text{or} \quad m = \frac{f}{s_o} = \frac{s_i}{f}$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \quad \frac{n_1}{n_2} = \frac{v_2}{v_1} = \frac{\lambda_2}{\lambda_1}$$

$$v = f\lambda \quad f = \frac{1}{T} \quad v = \frac{d}{t}$$

Speed of light in a vacuum =  $3.00 \times 10^8 \text{ m s}^{-1}$

**91171 Demonstrate understanding of mechanics**

$$v = \frac{\Delta d}{\Delta t} \quad a = \frac{\Delta v}{\Delta t} \quad v_f = v_i + at$$

$$d = v_i t + \frac{1}{2} at^2 \quad d = \frac{v_i + v_f}{2} t \quad v_f^2 = v_i^2 + 2ad$$

$$a_c = \frac{v^2}{r}$$

$$F = ma \quad \tau = Fd \quad F = -kx$$

$$F_c = \frac{mv^2}{r} \quad p = mv \quad \Delta p = F\Delta t$$

$$E_p = \frac{1}{2} kx^2 \quad E_k = \frac{1}{2} mv^2 \quad \Delta E_p = mg\Delta h$$

$$W = Fd \quad P = \frac{W}{t}$$

where needed, use  $g = 9.8 \text{ m s}^{-2}$

**91173 Demonstrate understanding of electricity and electromagnetism**

$$E = \frac{V}{d} \quad F = Eq \quad \Delta E_p = Eqd$$

$$E_k = \frac{1}{2} mv^2$$

$$I = \frac{q}{t} \quad V = \frac{\Delta E}{q} \quad V = IR$$

$$P = IV \quad P = \frac{\Delta E}{t}$$

$$R_T = R_1 + R_2 + \dots \quad \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$F = BIL \quad F = Bqv \quad V = BvL$$

Charge on an electron =  $-1.60 \times 10^{-19} \text{ C}$

Mass of an electron =  $9.11 \times 10^{-31} \text{ kg}$

*English translation of the wording on the front cover*

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## Level 2 Physics, 2019

9.30 p.m. Friday 8 November 2019

**RESOURCE BOOKLET**  
for 91170, 91171, and 91173

Refer to this booklet to answer the questions in your Question and Answer Booklets.

Check that this booklet has pages 2–3 in the correct order and that none of these pages is blank.

**YOU MAY KEEP THIS SHEET AT THE END OF THE EXAMINATION.**