

Mā te kaiwhakauru me te kura e whakaoti

Ingoa: \_\_\_\_\_

NSN

--	--	--	--	--	--	--	--	--	--

Waehere Kura

--	--	--	--

# 1

SUPERVISOR'S USE ONLY

**RĀ 1  
RĀTŪ**



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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

AROMATAWAI AROWHĀNUI

## Te Pāngarau me te Tauanga, Kaupae 1, 2021

### 91027M Te whakamahi tikanga taurangi hei whakaoti rapanga

Rātū 14 Mahuru 2021

Whiwhinga: Whā

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

KĀORE e whakaaetia ngā tātaitai.

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.

**Me whakaatu e koe ngā mahinga taurangi i tēnei pepa.** Kāore e whakaaturia ana te whakaaro whai pānga mā te whakamahi anake i ngā tikanga o te 'whakaarohia, whakatauhia' me te 'whakautu tika', ā, ka herea te taumata mō tērā wāhanga o te tūmahi ki te taumata Paetae. Ka taea anake te whakamahi ngā tikanga o te 'whakaarohia, whakatauhia' me te 'whakautu tika' mō te wā kotahi anake i roto i tēnei pepa, ā, kāore e whakamahia tēnei hei taunakitanga o te whakaoti rapanga. Me mātua whakaoti te ākongā i tētahi rapanga i te iti rawa kia taea ai te taumata Paetae i tēnei paerewa mā te whakamahi taurangi.

**Me tuhi ngā otinga ki te āhua taurangi rūnā rawa.**

**Inā he tuhinga ā-kupu tētahi pātai, me whakaatu e koe te whārite e whakamahia ana hei whakaoti i te rapanga.**

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–17 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.**

MĀ TE KAIMĀKA ANAKE		
Paearu Paetae		
Paetae	Kaiaka	Kairangi
Te whakamahi tikanga taurangi hei whakaoti rapanga.	Te whakamahi tikanga taurangi mā te whakaaro tūhonohono hei whakaoti rapanga.	Te whakamahi tikanga taurangi mā te whakaaro waitara hei whakaoti rapanga.
<b>Whakakaotanga o te tairanga mahinga</b> <input type="checkbox"/>		

**TŪMAHI TUATAHI**

- (a) Whiriwhiria te uara o  $2x^2 - 3xy$  ina ko  $x = -3$  me  $y = 4$ .

---

---

---

---

---

---

---

---

- (b) E rua ngā otinga o te whārite  $6 = 2x^2 - 11x$ , ko  $p$  me  $q$ , ā, he nui ake a  $p$  i a  $q$ .

He aha te uara o  $p - q$ ?

---

---

---

---

---

---

---

---

- (c) Whiriwhiria ngā uara o ngā tau  $m$  me  $n$  e pono ai a  $(2x + m)^2 = 4x^2 + nx + 9$ , ina ko  $m$  me  $n$  he tau tōrunga.

---

---

---

---

---

---

---

---

---

---

---

---

**QUESTION ONE**

- (a) Find the value of  $2x^2 - 3xy$  when  $x = -3$  and  $y = 4$ .

---

---

---

---

---

---

---

---

- (b) The equation  $6 = 2x^2 - 11x$  has two solutions,  $p$  and  $q$ , with  $p$  being greater than  $q$ .

What is the value of  $p - q$ ?

---

---

---

---

---

---

---

---

- (c) Find the values of the numbers  $m$  and  $n$  that will make  $(2x + m)^2 = 4x^2 + nx + 9$  true, given that both  $m$  and  $n$  are positive numbers.

---

---

---

---

---

---

---

---

---

---

---

---

(d) Whakaotihia te whārite:  $w^4 - 18w^2 + 81 = 0$

---

---

---

---

---

---

---

---

---

---

(e) Mēnā ko  $R = \frac{5y - 4x}{y - 2x}$ , tuhia te whārite mō  $x$  e ai ki  $a$  me  $R$ .

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

(d) Solve the equation:  $w^4 - 18w^2 + 81 = 0$

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

(e) If  $R = \frac{5y - 4x}{y - 2x}$ , give the equation for  $x$  in terms of  $y$  and  $R$ .

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

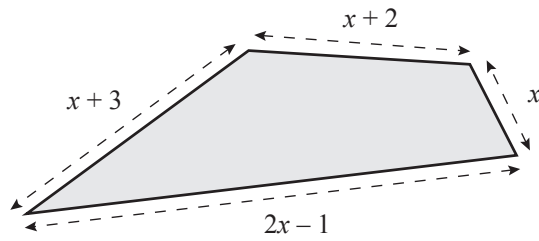
---

---



## TŪMAHI TUARUA

- (a) Mēnā ko te paenga o te āhua e whakaaturia ana i raro he 34 cm, whiriwhiria te uara o  $x$ .



*KĀORE i tuhi  
ā-āwhatatia  
tēnei hoahoa*

---

---

---

---

---

---

---

---

- (b) Whakaotihia te tōrite:  $(3x + 2)(2x - 1) \leq (6x + 1)(x - 3)$

---

---

---

---

---

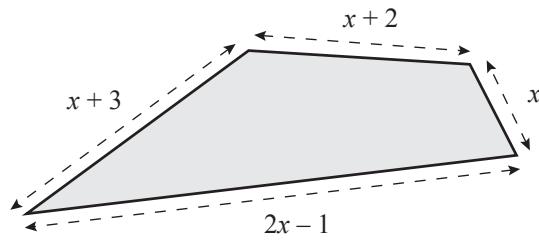
---

---

---

**QUESTION TWO**

- (a) Given that the perimeter of the shape shown below is 34 cm, find the value of  $x$ .



*Diagram is  
NOT to scale*

---

---

---

---

---

---

---

---

- (b) Solve the inequality:  $(3x + 2)(2x - 1) \leq (6x + 1)(x - 3)$

---

---

---

---

---

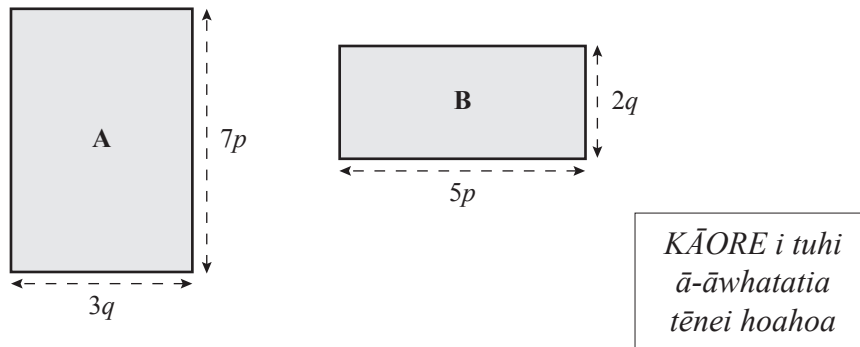
---

---

---

- (c) Ko te paenga o te tapawhā hāngai A he 46 cm, ā, ko te paenga o te tapawhā hāngai B he 32 cm, kei te hoahoa i raro.

Whiriwhiria te roa me te whānui o ngā tapawhā hāngai A me B.




---

---

---

---

---

---

---

---

---

---

---

---

- (d) Whakaotihia te whārite:  $\frac{x+2}{3} - \frac{2x-1}{5} = 1$

---

---

---

---

---

---

---

---

---

---

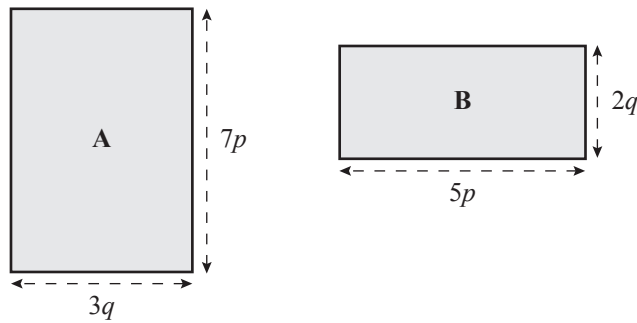
---

---



- (c) The perimeter of rectangle A is 46 cm, and the perimeter of rectangle B is 32 cm, in the diagram below.

Find the length and width of rectangles A and B.




---



---



---



---



---



---



---



---



---



---

- (d) Solve the equation:  $\frac{x+2}{3} - \frac{2x-1}{5} = 1$

---



---



---



---



---



---



---



---



---

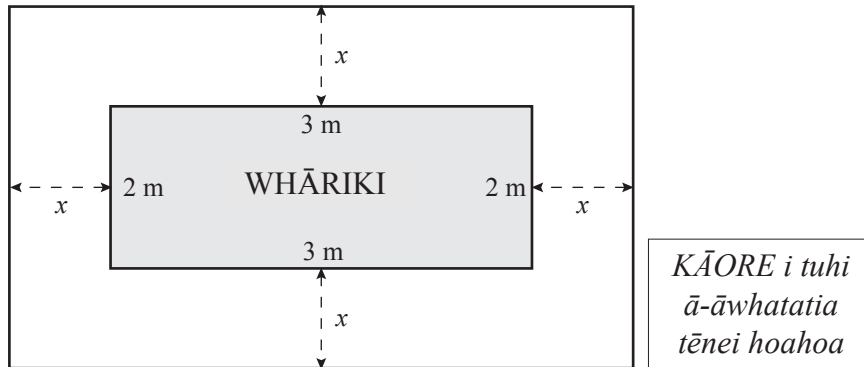


---

- (e) E takoto ana tētahi whāriki, he 3 mita te roa me te 2 mita te whānui, ki waenganui o tētahi rūma tapawhā hāngai, ā, he taitapa o te  $x$  mita te whānui i waenga i ia taha o te whāriki me te pātū.

He rearua ake te horahanga o te rūma katoa i te horahanga o te whāriki.

Whiriwhiria te whānui,  $x$  mita, o te taitapa.




---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

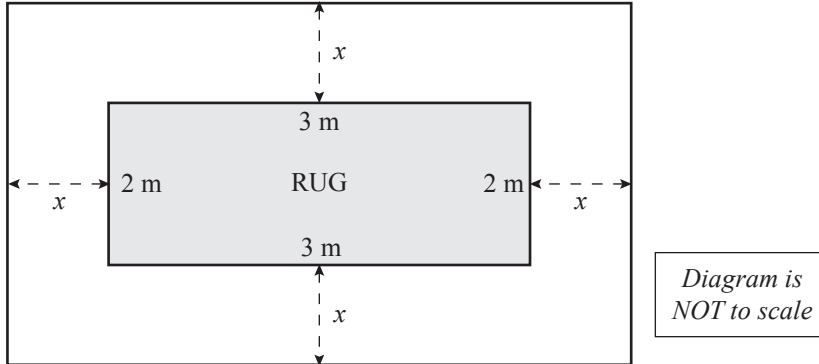
---

---

- (e) A rug, 3 metres long and 2 metres wide, lies in the centre of a rectangular room, leaving a border  $x$  metres wide between each edge of the rug and the wall.

The area of the whole room is double the area of the rug.

Find the width,  $x$  metres, of the border.




---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---



**TŪMAHI TUATORU**

- (a) He aha te horahanga o tētahi tapawhā mēnā he  $(3x + 5)$  cm te roa o ngā taha?  
Tuhia tō whakautu e ai ki a  $x$ , ā, ki te āhua o  $ax^2 + bx + c$ .

---



---



---

- (b) Whakaotihia te whārite:  $2^x \times 2^{3x-8} = 16$

---



---



---



---



---

- (c) Whakaotihia te whārite:  $\frac{2}{x-3} - \frac{2}{x+1} = \frac{3}{x+5}$

---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---

**QUESTION THREE**ASSESSOR'S  
USE ONLY

- (a) What is the area of a square with sides of length
- $(3x + 5)$
- cm?

Give your answer in terms of  $x$  and in the form  $ax^2 + bx + c$ .

---



---



---

- (b) Solve the equation:
- $2^x \times 2^{3x-8} = 16$

---



---



---



---



---

- (c) Solve the equation:
- $\frac{2}{x-3} - \frac{2}{x+1} = \frac{3}{x+5}$

---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---



---

- (d) Whakarūnātia, ki tērā e tino taea ana:  $\frac{2x^2 - 3x - 14}{2x^2 - 8}$

---



---



---



---



---



---



---

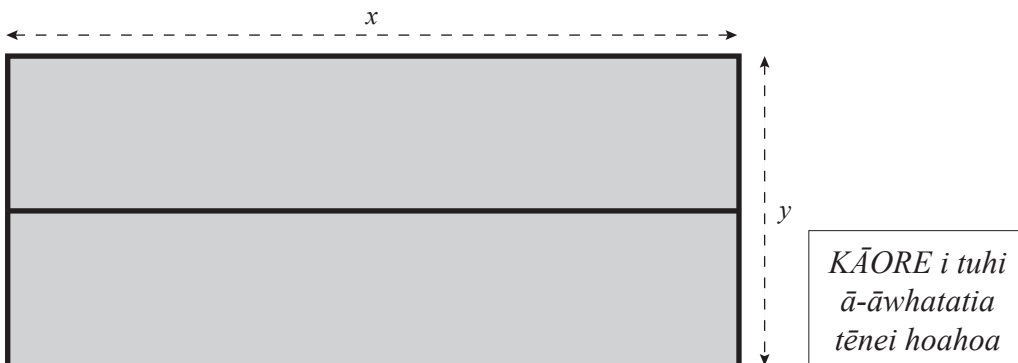


---

- (e) I te peita a Ben i ngā rārangi torotika ki te papatākaro mō tōna kapa whutupōro hei mahi i ētahi mahinga whakangungu.

Ko te tapeke o te roa o ngā rārangi katoa i peitatia e whakaaturia ana i roto i te hoahoa i raro he 20 mita.

Mēnā ko te wāhi i kaurukutia he  $14 \text{ m}^2$ , whiriwhiria ngā uara o  $x$  ka taea.




---



---



---



---



---



---



---



---



---



---

- (d) Simplify, as far as possible:  $\frac{2x^2 - 3x - 14}{2x^2 - 8}$

---



---



---



---



---



---



---

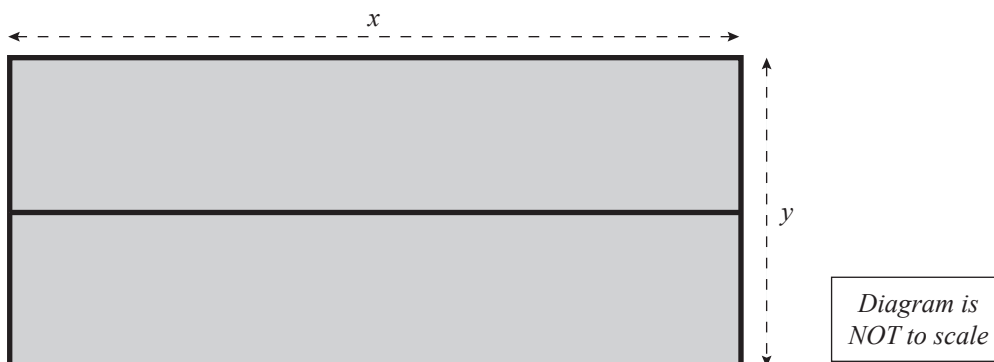


---

- (e) Ben has been painting some straight lines on the field for his rugby team to do some training exercises.

The total length of all the painted lines shown in the diagram below is 20 metres.

If the shaded area is  $14 \text{ m}^2$ , find the possible values of  $x$ .




---



---



---



---



---



---



---



---



---



---











*English translation of the wording on the front cover*

COMMON ASSESSMENT TASK

## Level 1 Mathematics and Statistics 2021

### 91027 Apply algebraic procedures in solving problems

Tuesday 14 September 2021

Credits: Four

**You should attempt ALL the questions in this booklet. Show ALL working.**

Calculators may NOT be used.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

**You are required to show algebraic working in this paper.** 'Guess and check' and 'correct answer only' methods do not demonstrate relational thinking and will limit the grade for that part of the question to a maximum of Achievement. 'Guess and check' and 'correct answer only' may only be used a maximum of one time in the paper and will not be used as evidence of solving a problem. A candidate cannot gain Achievement in this standard without solving at least one problem using algebra.

**Answers must be given in their simplest algebraic form.**

**Where a question is given in words, you are expected to show the equation that you used to solve the problem.**

Check that this booklet has pages 2–17 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.**