To be completed by candidate and school

Name: _____

NSN

School Code

1

SUPERVISOR'S USE ONLY

DAY 1
TUESDAY

NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

COMMON ASSESSMENT TASK

Level 1 Mathematics and Statistics 2022

91027 Apply algebraic procedures in solving problems

Tuesday 13 September 2022
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 2–16 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.

ASSESSOR'S USE ONLY	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Apply algebraic procedures in solving problems.	Apply algebraic procedures, using relational thinking, in solving problems.	Apply algebraic procedures, using extended abstract thinking, in solving problems.
		Overall level of performance

QUESTION ONE

ASSESSOR'S USE ONLY

(a) (i) Find the perimeter of the right-angled triangle shown below.

Fully simplify the expression.

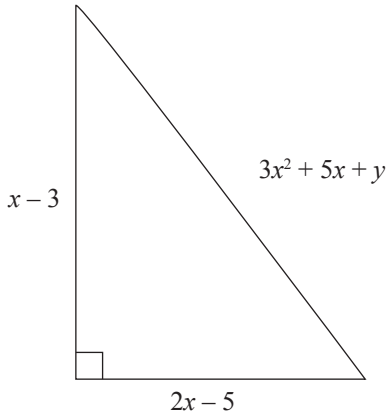


Diagram is NOT to scale

(ii) If the area of this same triangle shown above is 3 cm², then find the value of x.

Area of a triangle $= \frac{1}{2} \times \text{base} \times \text{height}$.

All measurements are in cm.

ASSESSOR'S USE ONLY

(b) Find an equation for p, in terms of q, if $9 \times 3^{p+q} = 27^{2q}$.

(c) A company makes plastic ducks.

The total cost, \$$P$, of making n plastic ducks is given by the formula

$$P = 2a + bn$$

where a and b are some fixed numbers.

The cost of making 140 plastic ducks is \$580.
The cost of making 200 plastic ducks is \$640.

Calculate the cost of making 300 plastic ducks.

(d) Show that if you add the squares of three consecutive **even numbers** and then subtract 2, the result is a multiple of 2.

ASSESSOR'S USE ONLY

QUESTION TWO

ASSESSOR'S USE ONLY

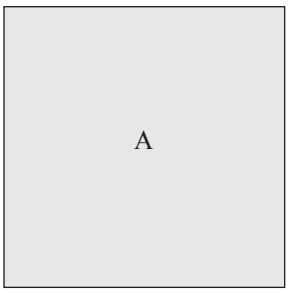
(a) Find the value of $4 + 2(5x^2y - z)$ when $x = -2$, $y = 2$, $z = 10$.

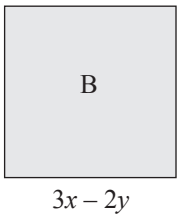
(b) Solve the equation $3 \times 2^{4x-5} = 24$.

(c) Using the two squares drawn below, calculate how much bigger the area of square A is than the area of square B.

ASSESSOR'S USE ONLY

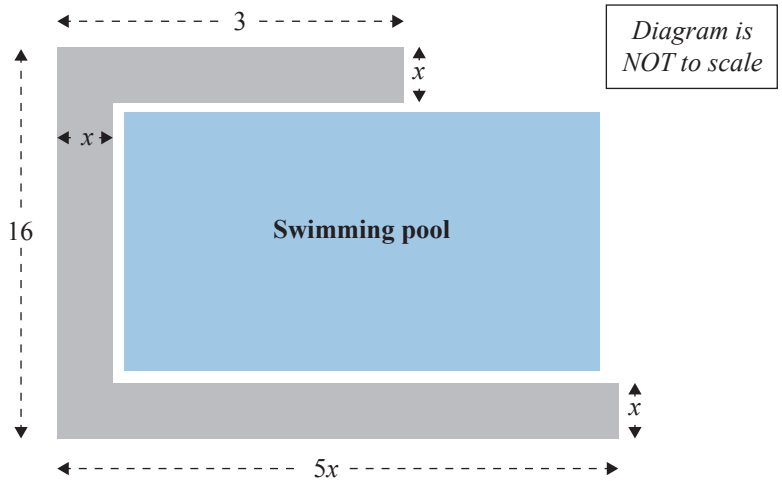
Diagram is NOT to scale





ASSESSOR'S USE ONLY

(d) Manaaki wants to make a path around his swimming pool, as shown in the diagram below.



The path has three rectangular sections. All measurements are in metres.

Manaaki has concrete to make a path with a total area of 14 m².

Find the width, x, of the path.

(e) The number of small squares used in the n^{th} shape of a pattern is given by $n^2 - 2$.

Show that the difference in the number of small squares used between two consecutive **odd-numbered** shapes is always divisible by 4.

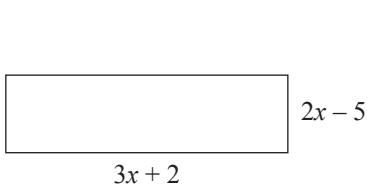
ASSESSOR'S USE ONLY

This page has been deliberately left blank.
The examination continues on the following page.

QUESTION THREE

ASSESSOR'S USE ONLY

(a) The rectangle and square, shown below, have the same **perimeter** as each other.



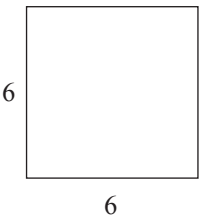


Diagram is NOT to scale

Find the value of x.

(b) Simplify as far as possible $\dfrac{9x^2-4}{15x^2-13x+2}$.

ASSESSOR'S USE ONLY

(c) Solve the following equation $\dfrac{x^2+3x-10}{x^2+8x+15}=\dfrac{3x}{2}$.

Question Three continues on the next page.

(d) Ihaka played basketball on Monday, Tuesday, and Wednesday.
On Tuesday, he scored twice as many points as he did on Monday.
On Wednesday, he scored 17 more points than he did on Monday.
Ihaka scored a total of 93 points over the three days.

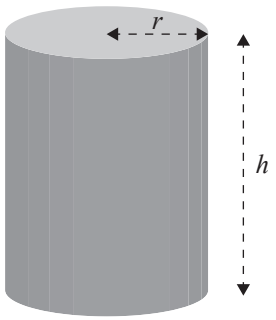
How many points did he score on Wednesday?

ASSESSOR'S USE ONLY

(e) The formula for the surface area, A cm², of a closed circular cylinder, where r is the radius in cm, and h is the height in cm, is given by

$$A = 2\pi r\,(r + h)$$

Find the radius of the cylinder with surface area 33π cm^2 and height 9.5 cm.



ASSESSOR'S USE ONLY

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

91027