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 2020

91027 Apply algebraic procedures in solving problems

Tuesday 15 September 2020
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.

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 2–8 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

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(a) Find the value of $3x^2 + 8 + 2y^2 + x^2 - 2$ when $x = 2$ and $y = -3$.

(b) Solve the inequality $3(2 - x) - 2(3x + 1) \geq 14(1 - x)$.

(c) Solve the equation $\frac{3}{x+2} + \frac{5}{x-4} = 2$.

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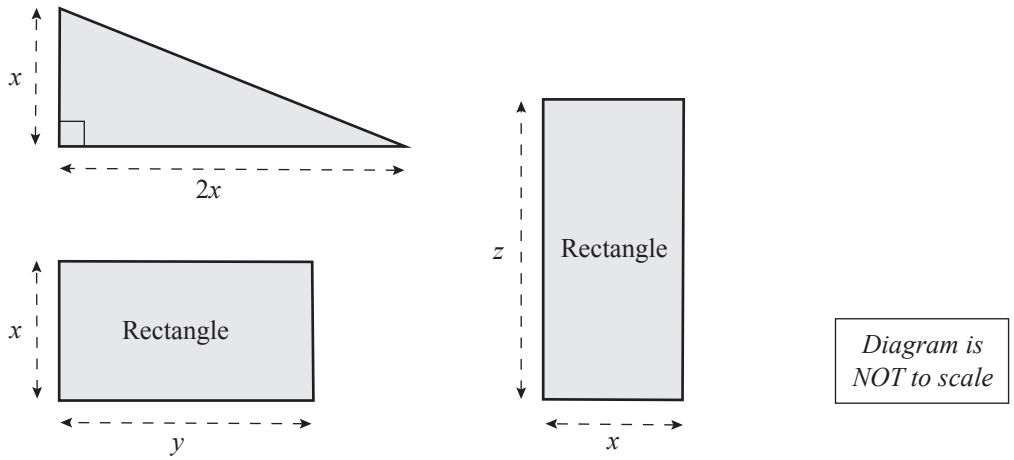
(d) Kiri draws the three shapes shown below, with the lengths of the sides indicated.

All lengths are in cm. Note: Area of a triangle = $\frac{1}{2}$ × base × height.



Find the value of the total area of all three shapes, given that $x = 6$ cm and $x + y + z = 12$ cm.

(e) Solve the equation $8^x \times 4^{x^2-6} = 4$.

QUESTION TWO

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(a) The height of a person, H cm, can be estimated from the length of their forearm, F cm, using the formula $H = 3F + 100$.

Use the formula to find the length of a person's forearm, F, if their height, H, is 160 cm.

(b) A picture is framed using four rectangular pieces of wood, as shown in the diagram below.

Find the **area** of the picture, in terms of x, giving your answer in the form $ax^2 + bx + c$.

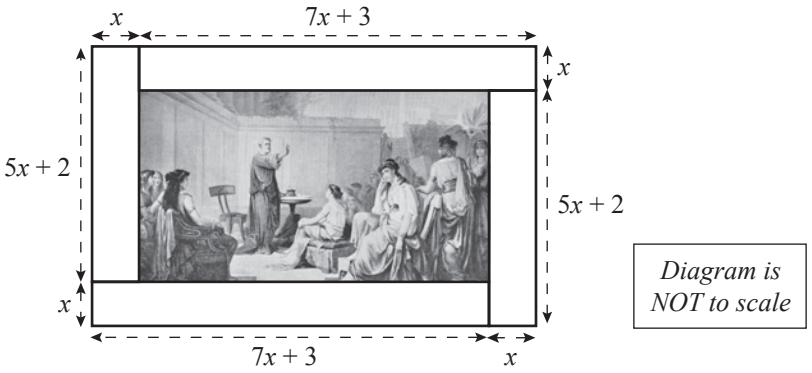

Diagram is NOT to scale

(c) Solve the inequality $(3x - 5)^2 \leq 3x^2 + 1$.

Image: https://en.wikipedia.org/wiki/Pythagoras. Public domain.

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(d) A rectangular piece of paper, PQRS, shown in the diagram below, is folded along the line FH, so that P is moved to G.

The following lengths are given: FP = 2 cm, PH = 3 cm, RS = x + 3 cm, and QR = 2x – 5 cm.

Note: Area of a triangle = $\frac{1}{2}$ × base × height.

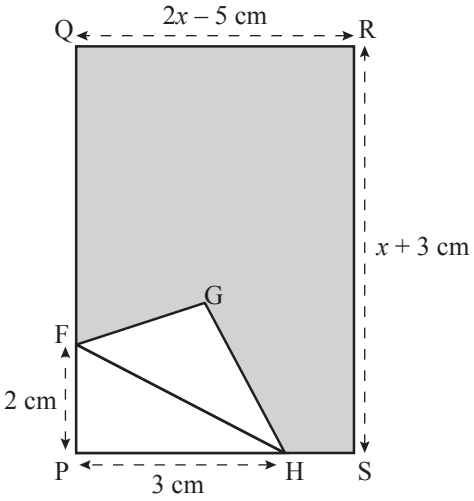

Diagram is NOT to scale

(i) Find the **perimeter** of the shaded region, in terms of x.

(ii) Find the value of x so that the **area** of the shaded region is 24 cm².

QUESTION THREE

ASSESSOR'S USE ONLY

(a) The sum of the interior angles in any quadrilateral is 360°.

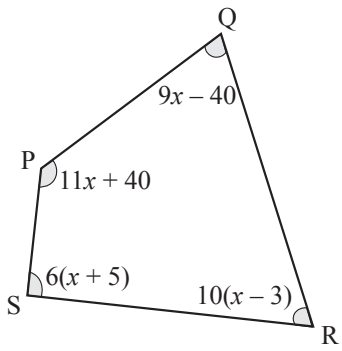

Diagram is NOT to scale

Find the value of x in the diagram above.

(b) The diagram below shows a sketch of part of the graph $y = ax^2 + bx + 2$.
The two points Q and R each lie on the graph at co-ordinates (–1,13) and (4,18).

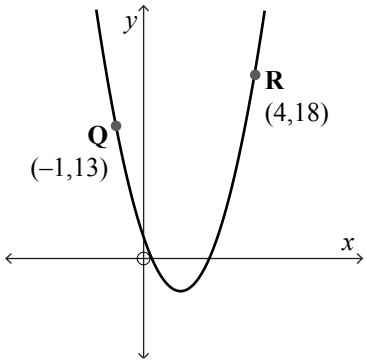

Diagram is NOT to scale

Find the values of the numbers a and b.

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(c) Teri is five years old. Mari is four years older than Teri.

How many years will it take until Teri's and Mari's ages (in years) when multiplied together, make 77?

(d) Simplify, as far as possible, $\dfrac{4x^2-25}{2x^2-x-10}$.

(e) If $y+3=\sqrt{\dfrac{c(x^2-7)}{p}}$, give the equation for x in terms of c, p, and y.

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

QUESTION NUMBER

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91027A