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SUPERVISOR'S USE ONLY

Level 2 Mathematics and Statistics, 2016

91261 Apply algebraic methods in solving problems

9.30 a.m. Thursday 24 November 2016
 Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Apply algebraic methods in solving problems.	Apply algebraic methods, using relational thinking, in solving problems.	Apply algebraic methods, using extended abstract thinking, in solving problems.

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.

Make sure that you have Formulae Sheet L2–MATHF.

Show ALL working.

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 methods and correct answer(s) only will generally limit grades to Achievement.

Check that this booklet has pages 2–11 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.

TOTAL

ASSESSOR'S USE ONLY

QUESTION ONE

ASSESSOR'S
USE ONLY

- (a) Simplify $\left(\frac{3b}{c^2}\right)^{-4}$ leaving your answer with positive indices.

- (b) Write $x^2 - 8x + 10$ in the form $(x - p)^2 + q$.

- (c) (i) Show that the solutions of the equation $x^2 + x - 56 = 0$ are four times the solutions of the equation $4x^2 + x - 14 = 0$.

- (ii) Find the relationship between the solutions of the equation $dx^2 + ex + f = 0$ and the solutions of the equation $x^2 + ex + df = 0$, where d , e , and f are real numbers.

- Find a possible set of values for a , b , and c .

- Justify your answer.

QUESTION TWOASSESSOR'S
USE ONLY

- (a) Find the discriminant of the quadratic equation $x^2 = 10x + 3$.

- (b) Simplify $\frac{4 \log(u^3)}{\log u}$.

- (c) Marie buys a new car for \$24 990.

The car's value decreases continuously by 12% each year.

The value of the car, $\$P$, t years after she first bought it, can be modelled by a function of the form $P = A(r)^t$.

How long will it take for the value of the car to halve?

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(Area of circle = πr^2)

QUESTION THREEASSESSOR'S
USE ONLY

- (a) Where would the graph of $y = 12x^2 - x - 6$ cut the x -axis?

- (b) For what value(s) of x does $\log_x(216) = 3$?

- (c) Rearrange the following formula to make x the subject: $\frac{4x}{5} = \frac{y(x+3)}{2}$.

**Question Three continues
on the following page.**

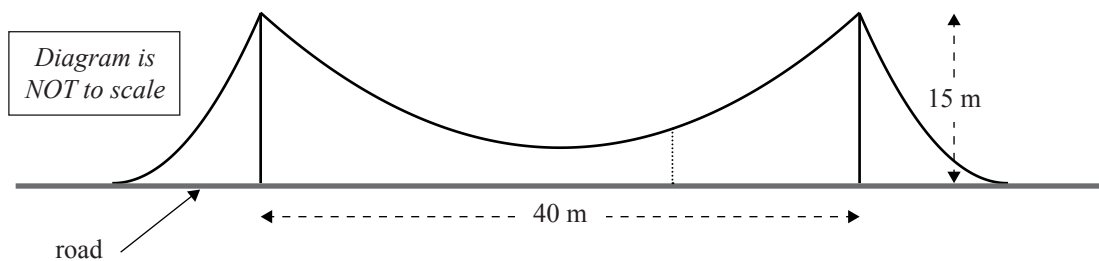
- (d) Solve the equation $9^{8n+6} = 27^{n^2-1} \times 3^{1-3n}$.

- (e) A symmetrical bridge has its central cable in the shape of a parabola, as shown in the diagram below.

The towers supporting the cable are each 15 m high and 40 m apart.

At the point midway between the towers, the height of the cable above the road is 3 m.

A vertical post (shown dotted in the diagram) is placed 10 m from the centre of the bridge and just touches the cable.



- (i) Use algebra to show that the post is 6 m high.

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

QUESTION
NUMBER

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Write the question number(s) if applicable.

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