

91261



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SUPERVISOR'S USE ONLY

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Level 2 Mathematics and Statistics 2020

91261 Apply algebraic methods in solving problems

9.30 a.m. Thursday 19 November 2020
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 room for any answer, use the extra space provided at the back of this booklet.

You are required to show algebraic working in this paper. Guess-and-check methods or correct answer(s) only, will generally limit grades to Achievement.

Check that this booklet has pages 2–15 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

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QUESTION ONEASSESSOR'S
USE ONLY

- (a) Factorise $6x^2 + 13x - 15$.

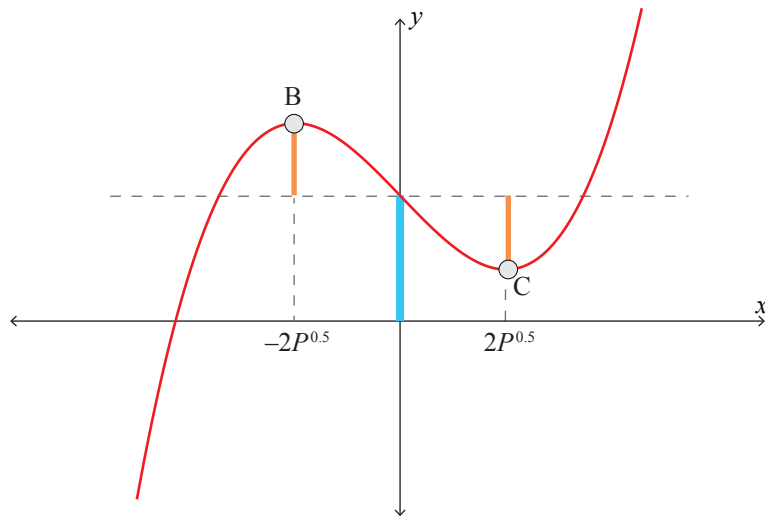
- (b) A function is defined as $f(x) = x^2 + 10x + 22$.

Express $f(x)$ in completed square form, i.e. $f(x) = (x + a)^2 + b$, where a and b are integers.

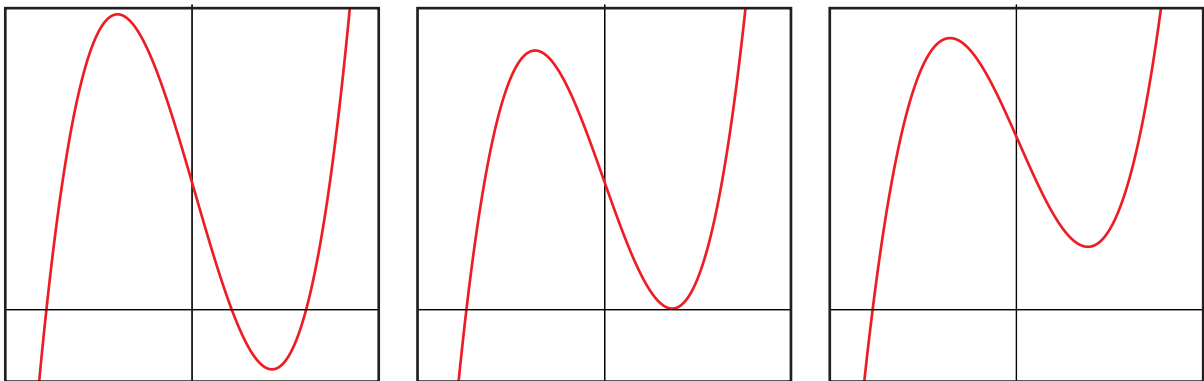
(ii) At point B it is true that $3x^2 - 12P = 0$.

Using algebra, show that $x = -2P^{0.5}$ at B.

- (iii) Consider again the curve with the equation $y = x^3 - 12Px + R$. As the values of P and R vary, the shape of the curve changes, and the lengths of the orange lines and of the central blue line (below) vary. However, by symmetry, the two orange lines remain the same length as each other.



Some examples of the graphs obtained from various values of P and R are illustrated below.



For some combinations of P and R , the curve can intersect the x -axis three times. This will happen if each orange line is longer than the blue line.

QUESTION TWO

- (a) Write as a single logarithm in simplest form: $\log(9y) + \log(4) - \log(3y)$.

- (b) Solve each of the following equations:

(i) $\log_x(36) = 2$.

(ii) $\log_5(x) + \log_5(2x) = 4$.

QUESTION THREEASSESSOR'S
USE ONLY

- (a) Solve the equation $3^{4x} = 30$.

- (b) Consider the function $W = (x+2)^{\frac{2}{5}}$, where x is a **whole number**.

- (i) Make x the subject of the formula $W = (x+2)^{\frac{2}{5}}$.

- (ii) For what values of x will the function have values less than 20?

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