



Name: _____ Date: _____

IBSL Year 1

Quadratics Test - Paper 1

Score: /48

CAC%:

IB:

INSTRUCTIONS TO CANDIDATE

- Write your name in the boxes above.
- Do not open this examination paper until instructed to do so.
- You are not permitted access to any calculator for this paper.
- Section A: answer all questions in the boxes provided.
- Section B: answer all questions in the answer booklet provided. Write your name on the front of the answer booklet turn it in with your examination paper.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the *Mathematics SL formula booklet* is required for this paper
- The maximum mark for this examination paper is [48 marks].

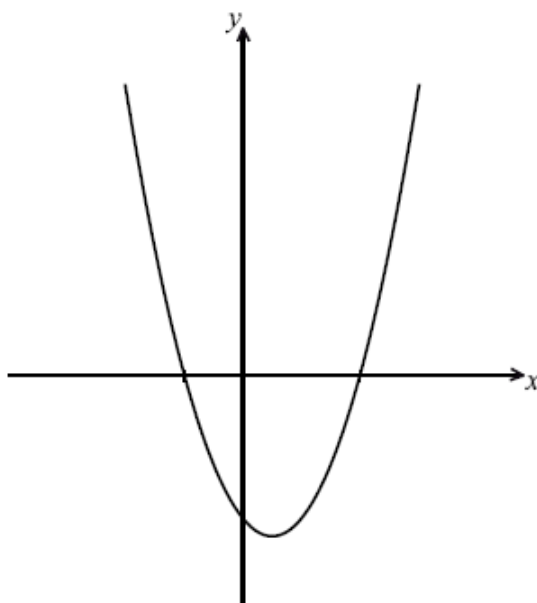
Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

Section A

Answer **all** questions in the space provided. Working may be continued in the answer booklet.

1a. [4 marks]

The following diagram shows part of the graph of f , where $f(x) = x^2 - x - 2$.



Find both x -intercepts.

1b. [2 marks]

Find the x -coordinate of the vertex.

2a. [5 marks]

Consider $f(x) = 2kx^2 - 4kx + 1$, for $k \neq 0$. The equation $f(x) = 0$ has two equal roots.

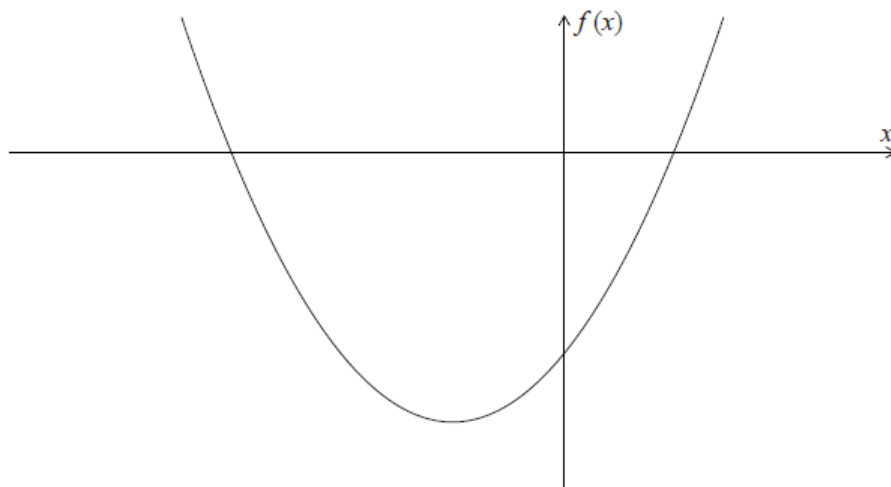
Find the value of k .

2b. [2 marks]

The line $y = p$ intersects the graph of f . Find all possible values of p .

3. [6 marks]

The diagram below shows part of the graph of $f(x) = (x - 1)(x + 3)$.

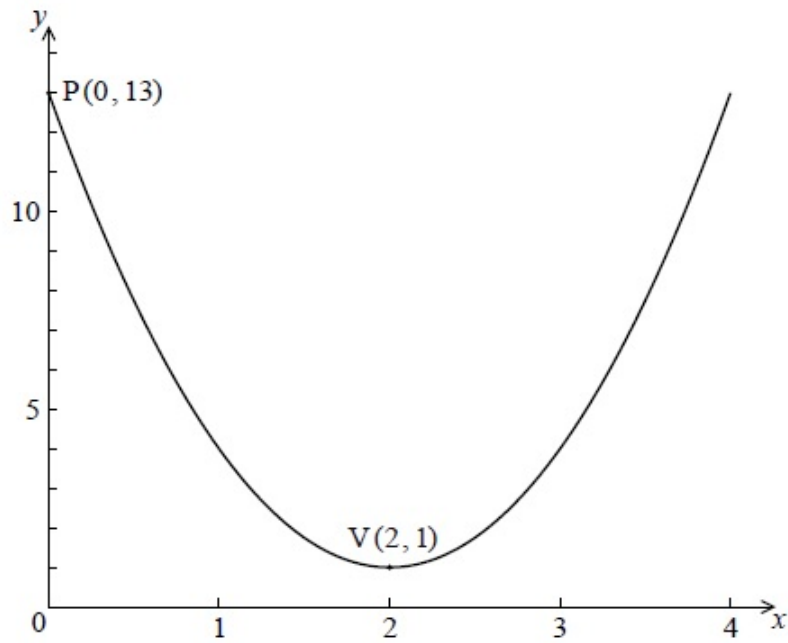


(a) Write down the x -intercepts of the graph of f .

(b) Find the coordinates of the vertex of the graph of f .

4a. [4 marks]

The following diagram shows the graph of a quadratic function f , for $0 \leq x \leq 4$.



The graph passes through the point $P(0, 13)$, and its vertex is the point $V(2, 1)$.

The function can be written in the form $f(x) = a(x - h)^2 + k$.

(i) Write down the value of h and of k .

(ii) Show that $a = 3$.

4b. [3 marks]

Find $f(x)$, giving your answer in the form $Ax^2 + Bx + C$.

Do **not** write solutions on this page.

Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

5a. [8 marks]

$$\text{Let } f(x) = 3(x+1)^2 - 12.$$

For the graph of f

- (i) write down the coordinates of the vertex;
- (ii) write down the **equation** of the axis of symmetry;
- (iii) write down the y -intercept;
- (iv) find both x -intercepts.

5b. [2 marks]

Hence sketch the graph of f .

5c. [3 marks]

Let $g(x) = x^2$. The graph of f may be obtained from the graph of g by the two transformations:

a stretch of scale factor t in the y -direction followed by a translation of $\begin{pmatrix} p \\ q \end{pmatrix}$.

Find $\begin{pmatrix} p \\ q \end{pmatrix}$ and the value of t .

Do **not** write solutions on this page.

6a. [2 marks]

Let $f(x) = x^2 + 4$ and $g(x) = x - 1$.

Find $(f \circ g)(x)$.

The vector $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ translates the graph of $(f \circ g)$ to the graph of h .

6b. [2 marks]

Show that $h(x) = x^2 - 8x + 19$.

6c. [5 marks]

The line $y = 2x - 6$ is a tangent to the graph of h at the point P. Find the x -coordinate of P.

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