

Topics on the first Unit Test

Linear/Function Topics

- Determine when a relation is a function
- Find the Domain and Range of a Relation or Function
- Representations of Functions and relations
- Function Notation
- Composite Functions
- Find a Linear Equation
- Use Parallel and Perpendicular Slopes
- Graph Lines

Quadratics Topics

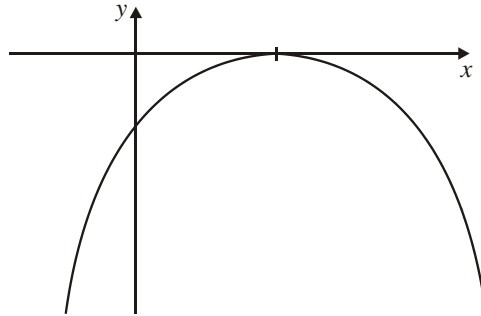
- 3 forms of quadratics – standard form, vertex form, quadratic form – what effect do the constants have on the graph in each of these forms?
- Solving quadratic equations
- Completing the square (solving vs writing in vertex form)
- Discriminant test – when do you use it?
- Write equation from a graph – how many pieces of information do you need? What are they?
- Quadratic Formula – when do you use it?
- Interpretation of Quadratic Models – these most commonly have something to do with a projectile or ball thrown in the air.
- Use information to create and interpret Quadratic Models
- Intersection of quadratics with other curves – you should know how to do this both algebraically and graphically

The following questions review *most* of the material which will be on your test. However the following problems are heavily weighted toward the second part of the unit. You should still spend time reviewing material from the first part of the unit. Don't forget to review your quizzes. Your quizzes and your notes are your best resources for preparing for the test.

Practice with past IB Questions and IB-like questions

You are **required** to do the first 4 questions before class Wednesday.

1. (NC) The diagram shows the graph of the function $y = ax^2 + bx + c$.



Complete the table below to show whether each expression is positive, negative or zero.

Expression	positive	negative	zero
a			
c			
$b^2 - 4ac$			
b			

(Total 4 marks)

2. (NC) Consider the function $f(x) = 2x^2 - 8x + 5$.

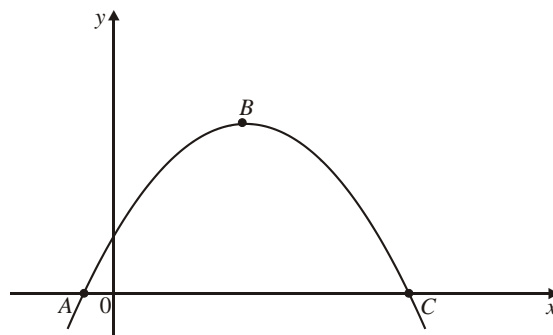
- (a) Express $f(x)$ in the form $a(x - p)^2 + q$, where $a, p, q \in \mathbb{Z}$.
(b) Find the minimum value of $f(x)$.

(Total 6 marks)

3. (NC) The quadratic equation $5x^2 + 2kx + 2 = 0$, $k > 0$ has exactly one solution for x .
Find the value of k .

(Total 4 marks)

4. (NC) The diagram shows the parabola $y = (7 - x)(1 + x)$. The points A and C are the x -intercepts and the point B is the maximum point.



Find the coordinates of A , B and C .

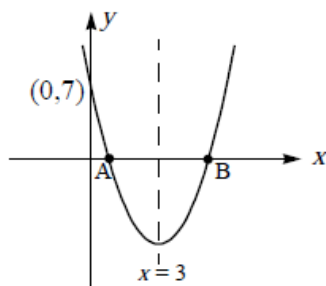
(Total 4 marks)

5. Consider the function $f(x) = 3x^2 - 6x + 7$.
- (a) Express $f(x)$ in the form $a(x-h)^2 + k$, where $a, b, c \in \mathbb{Z}^+$.
- (b) For the graph of $f(x)$ write down the
- coordinates of its vertex.
 - equation of the axis of symmetry.
- (c) (i) Find the coordinates of the y -intercept.
(ii) Sketch the graph of $f(x)$, clearly labelling the vertex, y -intercept and axis of symmetry.

6. **Question 7**

The graph of the function $g(x) = 2x^2 - 12x + 7$ is shown below. The coordinates of B are

$(a + \sqrt{\frac{b}{c}}, 0)$ where $a, b, c \in \mathbb{Z}$. Find the values of a, b and c .



7. **Question 8**

Consider the function $g(x) = x + \frac{1}{x}, x > 0$.

- (a) (i) Find $g(2)$.
(ii) Find the x -value for which $g(x) = 2$.
- (b) The composite function $(g \circ g)(x) = \frac{f(x)}{x(1+x^2)}, x > 0$. Find $f(x)$.

8. **Question 15**

- (a) On the same set of axes sketch the graphs of $f(x) = 5x + 2$ and $g(x) = 3x^2$.
- (b) Find (i) $\{x : f(x) = g(x)\}$.

9. **Question 19**

The function $g(x) = ax - b$ passes through the points with coordinates $(1, 9)$ and $(-3, 1)$. Find a and b .

10	<p>Question 24</p> <p>Let $f(x) = x^3$ and $g(x) = x - 1$. Find</p> <p>(a) $(f \circ g)(1)$.</p> <p>(b) $(g \circ f)(2)$.</p>
11	<p>Question 26</p> <p>Find all real values of k so that the graph of the function $h(x) = 2x^2 - kx + k$, $x \in \mathbb{R}$ cuts the x-axis at two distinct points.</p>
12	<p>A garden measuring 12 meters by 16 meters is to have a pedestrian pathway installed all around it, increasing the total area to 285 square meters. What will be the width of the pathway? (Ans 1.5 m)</p>
13	<p>A farmer wishes to enclose a rectangular region bordering a river using 600 feet of fencing. He wants to divide the region into two equal parts using some of the fence material. What is the maximum area that can be enclosed with the fencing?</p>
14	<p>Your factory produces lemon-scented widgets. You know that each unit is cheaper, the more you produce. But you also know that costs will eventually go up if you make too many widgets, due to the costs of storage of the overstock. The guy in accounting says that your cost for producing x thousands of units a day can be approximated by the formula $C = 0.04x^2 - 8.504x + 25302$. Find the daily production level that will minimize your costs.</p>
15	<p>A water balloon is launched at 19.6 meters per second (m/s) from a 58.8-meter tall platform. The equation for the water balloon's height s at time t seconds after launch is $s(t) = -4.9t^2 + 19.6t + 58.8$, where s is in meters.</p> <p>a) When does the water balloon strike the ground?</p> <p>b) What is the initial height of the balloon?</p> <p>c) When does the water balloon attain a height of 75 m?</p> <p>d) What is the maximum height of the water balloon?</p>