

Unit 2 Test – No Calculators Allowed (Practice Version)

Show all your work. Indicate clearly the methods you use, because you will be graded on correctness of your methods as well as on the accuracy and completeness of your results and explanations.

1. Consider the function below:

$$f(x) = -\frac{x^2}{2} - 4x - 5$$

- a. Complete the square for the function.

Identify the vertex. State if the vertex is a maximum or a minimum.

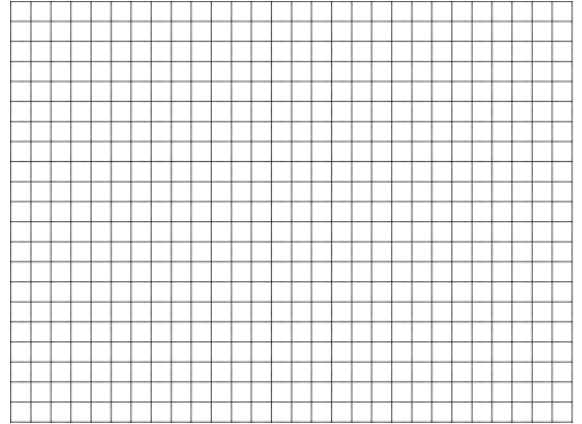
- c. Identify the axis of symmetry.
- d. Find the discriminant and determine how many roots this function has.
- e. Identify any x-intercepts.
- f. Identify any y-intercepts.

2. Complete the following:

- a. Find the equation of a parabola that has the vertex (2, 3) and passes through the point (0, 2).

b. Rewrite the equation from part a in standard form.

c. Given a parent function $f(x) = x^2$, state the transformations from $f(x)$ to the function in part a.



d. Sketch a graph of part a.

3. Mr. Braza has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fencing along the river. What are the dimensions of the field that has the largest area?

4. Derive the quadratic formula given a quadratic equation of the form $ax^2 + bx + c = 0$.

5. IB Math A&A SL Summer 21/Zone 2 - Paper 2, Question #5 [Maximum mark: 6]

No calculator this time, but here's some hints.

The functions f and g are defined for $x \in \mathbb{R}$ by $f(x) = 6x^2 - 12x + 1$ and $g(x) = -x + c$ where $c \in \mathbb{R}$.

Hint #1: Rewrite $f(x)$ in vertex form. Determine whether the vertex is a maximum or minimum.

- a. Find the range of f .

Hint #2: Evaluate $(g \circ f)(x)$. Do not simplify.

Hint #3: Discuss the transformations from $f(x)$ to $(g \circ f)(x)$.

Hint #4: Discuss what happens to the vertex & range of the function under the above transformations.

- b. Given that $(g \circ f)(x) \leq 0$ for all $x \in \mathbb{R}$, determine the set of possible values for c .