

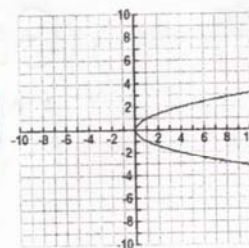
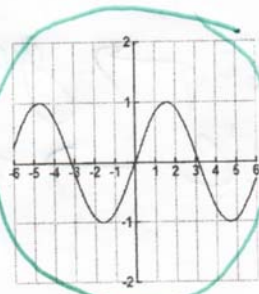
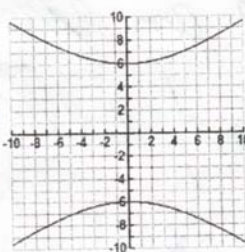
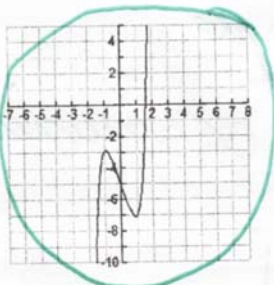
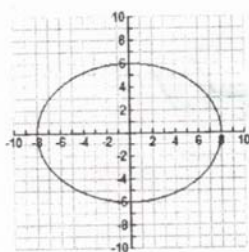
Grade 11 Functions (University Preparation)

Surprise Quest - Unit 1 - Characteristics of Functions (Introduction to Functions)

Victim: Mr. J.*As usual, your work is stupendous Mr. J.*

KU	APP	TIPS	COM
/8	/13	/4	/9

1. Circle the relations that are functions. (5 KU)



2. State whether each of the following is true or false. To receive full credit, you must provide an explanation to support each response. (4 TIPS, 4 COM)

Statement(s)	True or False?	Explanation
$\frac{f(x+h)-f(x)}{h}$ $= \frac{f(x)+f(h)-f(x)}{h}$ $= \frac{f(h)}{h}$ $= f$	F	In the given statements, function notation is treated as if it were multiplication, which is wrong! Furthermore, the final answer is "f" which is the name of the function NOT a number!!
The equation $\frac{x^2}{16} + \frac{y^2}{9} = 1$ describes a function.	F	This equation actually describes an ellipse, which is NOT a function. Solving for y we obtain $y = \pm 3\sqrt{1 - \frac{x^2}{16}}$, which means that there are two y-values for every x.
The set of possible "x-values" for the function $g(x) = \sqrt{x+3}$ consists of all real numbers less than or equal to -3.	F	For any value of x less than -3, $\sqrt{x+3}$ is an imaginary number NOT a real number.
Normally, $f(u)$ is read "f of u." For the sake of saving time, we are allowed to read this as "fu," especially when addressing elders.	F	The word "of" cannot be omitted, regardless of the name of the independent variable. Moreover, addressing your elders in such a manner might cause an angry reaction.

3. Consider the function h defined by the equation $h(t) = -4.9t^2 + 49t$.

(a) The independent variable is t . (1 KU)

(b) The value of $h(2) = -4.9(2)^2 + 49(2) = 78.4$. (2 APP)

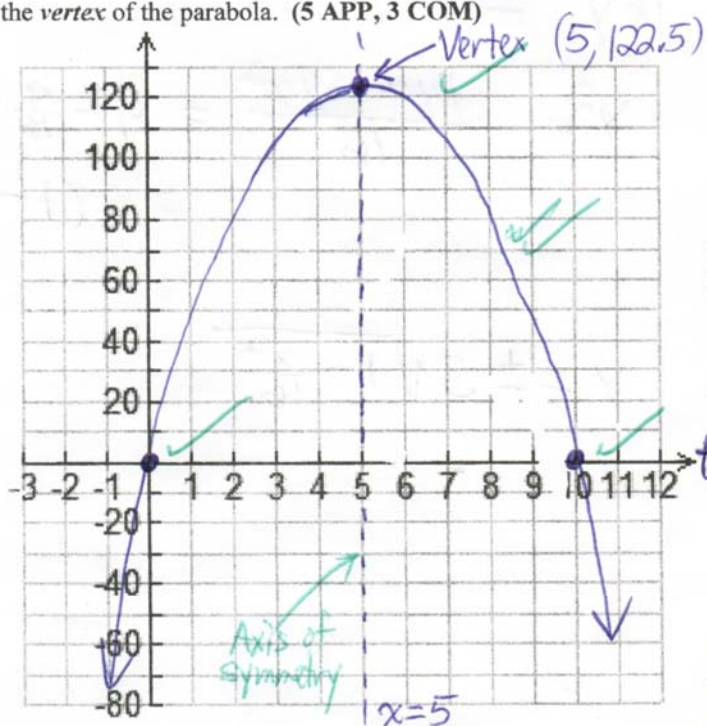
(c) $h(1) = 44.1$ means that the point (1, 44.1) lies on the graph of h . (2 APP)

(d) Solve the equation $h(t) = 0$. (4 APP, 2 COM)

$$\begin{aligned} \therefore -4.9t^2 + 49t &= 0 \\ \therefore -4.9t(t-10) &= 0 \\ \therefore t=0 \text{ or } t-10 &= 0 \\ \therefore t=0 \text{ or } t=10 \end{aligned}$$

• $\checkmark = 1$ APP mark
• 2 COM marks
→ for correct mathematical form

(e) Sketch the graph of h . Clearly mark the roots of the equation $h(t) = 0$ on your graph, as well as the co-ordinates of the vertex of the parabola. (5 APP, 3 COM)



Co-ordinates of vertex can be found by completing the square
But there is an easier way!

Easier Approach

Since the roots are $t=0$ and $t=10$, the axis of symmetry must be $t=5$ (half way between 0 and 10)

$$\begin{aligned} h(5) &= -4.9(5)^2 + 49(5) \\ &= 122.5 \\ \therefore \text{vertex has co-ordinates } (5, 122.5) \end{aligned}$$

(f) Give a physical interpretation of the equation $h(t) = -4.9t^2 + 49t$. (2 KU)

This function could ~~describe~~ describe the height of a projectile above the ground, t seconds after being launched. The analysis above would indicate that the projectile stayed in the air for ten seconds and reached a maximum height of 122.5 m. (in metres)