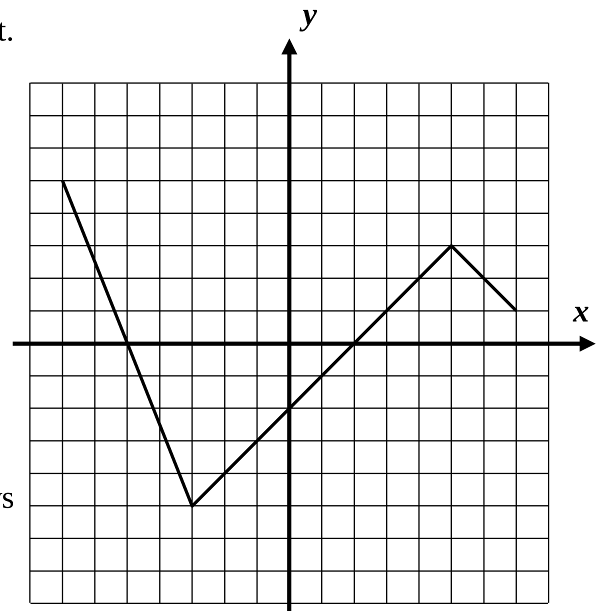
Name: ____________________________________ Date: __________________

1-3 KEY FEATURES OF FUNCTIONS

FLUENCY

1. The piecewise linear function $f(x)$ is shown to the right. Answer the following questions based on its graph.



(a) Evaluate each of the following based on the graph:

(i) $f(4) =$ (ii) $f(-3) =$

(b) State the zeroes of $f(x)$.

(c) Over which of the following intervals is $f(x)$ always increasing?

(1) $-7 < x < -3$ (3) $-5 < x < 5$

(2) $-3 < x < 5$ (4) $-5 < x < 3$

(d) State the coordinates of the maximum and the minimum of this function.

Maximum:_________________

Minimum:_________________

(e) Over which of the following intervals is $f(x) < 0$?

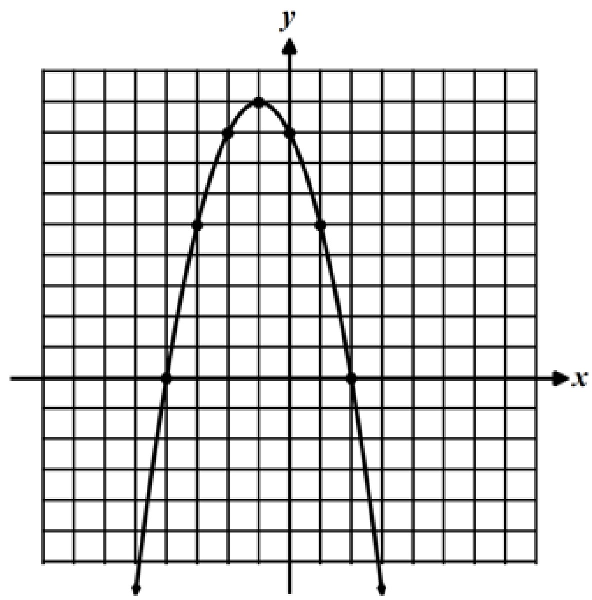
(1) $-7 < x < -3$ (3) $-5 < x < 2$

(2) $2 \le x \le 7$ (4) $-5 \le x \le 2$

(f) A second function $g(x)$ is defined using the rule $g(x) = 2f(x) + 5$. Evaluate $g(0)$ using this rule. What does this correspond to on the graph of *g*?

(g) A third function $h(x)$ is defined by the formula $h(x) = x^3 - 3$. What is the value of $g(h(2))$? Show how you arrived at your answer.

2. For the function $g(x) = 9 - (x+1)^2$ do the following.



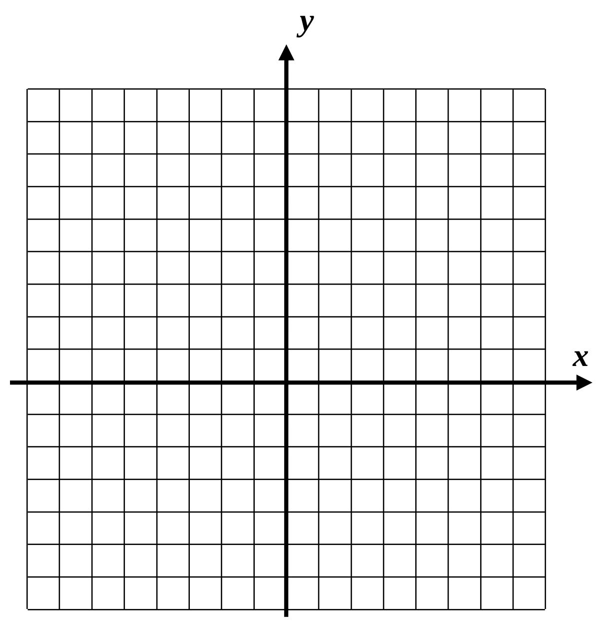
(a) Determine the y-intercept and express it in function notation.

(b) State the zeroes of *g*.

(c) Over what interval is $g(x)$ decreasing?

(d) Over what interval is $g(x) \geq 0$?(e) State the range of *g*.

3. Draw a graph of $y = f(x)$ that matches the following characteristics.



Increasing on: $-8 < x < -4$ and $-1 < x < 5$

Decreasing on: $-4 < x < -1$

$f(-8) = -5$ and zeroes at $x = -6, -2, \text{and } 3$

Absolute maximum of 7 and absolute minimum of -5

4. A continuous function has a domain of $-7 \leq x \leq 10$ and has selected values shown in the table below. The function has exactly two zeroes and a relative maximum at $(-4, 12)$ and a relative minimum at $(5, -6)$.

x	-7	-4	-1	0	2	5	7	10
$f(x)$	8	12	0	-2	-5	-6	0	4

(a) State the interval on which $f(x)$ is decreasing. (b) State the interval over which $f(x) < 0$.