MCR3U - Unit 1 Project

Name: _____

Mark: _____ / 20

K/U	A	T	C
_____ / 6	_____ / 6	_____ / 4	_____ / 4

Introduction:

The transformed city is a city designed based on the concept of transformation. Every building is a transformation of the main building City Hall (building #1). You are given a rule of transformation to:

1) identify the transformation for building #2 - #6 in comparison with the city hall;
2) based on the coordinates of the city hall, determine the coordinates for buildings #2 - #6;
3) graph each building in the city on the given coordinate plane, based on the coordinates determined in the last step.

- Building 1 (main building) - City Hall
  - its location is represented by the relation f(x).
- Building 2 - Police station
  - its location is represented by the relation g(x) = f(x + 12).
- Building 3 - Hospital
  - its location is represented by the relation h(x) = f(x) − 13.
- Building 4: Local TV station
  - its location is represented by the relation k(x) = f(3x).
- Building 5: Public library
  - its location is represented by the relation m(x) = 2f(x) – 3.
- Building 6: Airport
  - its location is represented by the relation n(x) = −f(x + 10) + 4.

Submission Checklist:

- Completed worksheet that includes all elements:
  - Filled table 1 (transformations)
  - Filled table 2 (coordinate points)
  - Completed table 3 (coordinate plane with 6 drawn buildings)
- You may submit your final work in a scanned pdf (preferred) / photos in one document.

Hint:

Transformation Rules		
Function Notation	**Type of Transformation**	**Change to Coordinate Point**
f(x) + c	Vertical translation up c units	$(x, y) \to (x, y + c)$
f(x) - c	Vertical translation down c units	$(x, y) \to (x, y - c)$
f(x + d)	Horizontal translation left d units	$(x, y) \to (x - d, y)$
f(x - d)	Horizontal translation right d units	$(x, y) \to (x + d, y)$
-f(x)	Reflection over x-axis	$(x, y) \to (x, -y)$
f(-x)	Reflection over y-axis	$(x, y) \to (-x, y)$
af(x)	Vertical stretch for $\|a\| > 0$	$(x, y) \to (x, ay)$
af(x)	Vertical compression for $0 < \|a\| < 1$	$(x, y) \to (x, ay)$
f(kx)	Horizontal compression for $\|k\| > 0$	$(x, y) \to \left(\frac{x}{k}, y\right)$
f(kx)	Horizontal stretch for $0 < \|k\| < 1$	$(x, y) \to \left(\frac{x}{k}, y\right)$

Table 1 [K+C]: <u>Identify</u> and **<u>describe</u>** transformations of each of the following relations compared to f(x).

$g(x) = f(x + 12)$
$h(x) = f(x) - 13$
$k(x) = f(2x)$
$m(x) = 3f(x) - 3$
$n(x) = -f(x + 10) + 4$

Table 2 [T]: <u>Complete the coordinate points</u> for each function transformed from f(x).

<u>Show your work below.</u> (e.g. which formula did you choose? how did you apply it?)

f(x)	g(x)	h(x)	k(x)	m(x)	n(x)
(2,2)					
(5,2)					
(5,6)					
(4,6)					
(4,5)					
(2,5)					

Table 3 [A]: According to the coordinates, **draw** buildings #2 - #6 and **label** them with the building names.