



Name: _____

Year 11 2019 Mathematics Advanced Assessment Task 2 - Assignment

Assignment: Functions and Graphs

Task number: 2

Weighting: 30%

Due Date: 27 /6/19

Outcomes assessed:

- **MA11-1**
uses algebraic and graphical techniques to solve, and where appropriate, compare alternative solutions to problems
- **MA11-2**
uses the concepts of functions and relations to model, analyse and solve practical problems
- **MA11-8**
uses appropriate technology to investigate, organise, model and interpret information in a range of contexts
- **MA11-9**
provides reasoning to support conclusions which are appropriate to the context

Nature and description of the task:

As a result of completing this Assignment, students should be familiar with the properties of functions and graphs. They should be able to use Geogebra efficiently to determine the shape of each graph and interpret non-linear information in terms of their properties.

The Assignment will consist of :

- **An Activity Worksheet- Transformation of Functions. You will use the sketching tool Geogebra to complete the assignment**– Your assignment will be completed at home. The suggested time for this assignment is two weeks. All answers will need to be printed out on your own paper and attached to this booklet. The marks allocated to each question is shown next to the question. All necessary working will need to be shown and answers /responses should be correct / detailed to obtain full marks.
- **This task will be due before 9:00am on Thursday 27th June. It will be handed in at the Library to Mrs Beeby or Miss Stevenson**

Non-Completion of Task:

If you know you are going to be away on the day the Assessment Task is due and are unable to hand in Assignment on the due day, then you must have supportive documentation. *Zero marks will apply if the Assessment Task is submitted/completed late, unless an Illness/ Misadventure or Application for Extension form has been submitted.*

Use the graphing program Geogebra with this assignment

Activity Worksheet - Transformation of Functions

Total Marks: 77

Use the following conditions to answer questions 1 to 6:

The function $f(x)$ is defined as $f(x) = x^2$

The function $g(x)$ is defined as $g(x) = \sin x$

The function $h(x)$ is defined as $h(x) = x^2 - 1$

The function $p(x)$ is defined as $p(x) = x^2 - 2x$

Mark

QUESTION 1 (14 Marks)

(i) Deduce an expression in x for:

(a) $f(x) + 2$

3

(b) $f(x) + 3$

(c) $f(x) + c$

(ii) Use Geogebra to draw graphs of:

(a) $y = f(x)$

3

(b) $y = f(x) + 2$

(c) $y = f(x) + 3$

(iii) By considering the graphs in part (ii), state the transformation of $y = f(x)$ which produces the graphs of $y = f(x) + 2$ and $y = f(x) + 3$, and deduce the graphical effect of transforming $y = f(x)$ into $y = f(x) + c$. Express your findings as clearly as possible. What happens if c is negative?

4

(iv) Deduce an expression in x for $g(x) + c$

1

(v) By choosing a suitable value for c , check if your answer to (iii) still applies. Sketch the graphs of $y = g(x)$ and $y = g(x) + c$

3

QUESTION 2 (14 Marks)

Mark

(i) Deduce an expression in x for:

(a) $f(x + 2)$

3

(b) $f(x + 3)$

(c) $f(x + c)$

(ii) Use Geogebra to draw graphs of:

(a) $y = f(x)$

3

(b) $y = f(x + 2)$

(c) $y = f(x + 3)$

(iii) By considering the graphs in part (ii), state the transformation of $y = f(x)$ which produces the graphs of $y = f(x + 2)$ and $y = f(x + 3)$, and deduce the graphical effect of transforming $y = f(x)$ into $y = f(x + c)$. Express your findings as clearly as possible. What happens if c is negative?

4

(iv) Deduce an expression in x for $g(x + c)$. By choosing a suitable value for c , check if your answer to (iii) still applies. Sketch the graphs of $y = g(x)$ and $y = g(x + c)$.

4

QUESTION 3 (13 Marks)

(i) Deduce an expression in x for:

(a) $2h(x)$

3

(b) $3h(x)$

(c) $kh(x)$

(ii) Use Geogebra to draw graphs of:

(a) $y = h(x)$

3

(b) $y = 2h(x)$

(c) $y = 3h(x)$

(iii) By considering the graphs in part (ii), state the transformation of $y = h(x)$ which produces the graphs of $y = 2h(x)$ and $y = 3h(x)$, and deduce the graphical effect of transforming $y = h(x)$ into $y = kh(x)$. Express your findings as clearly as possible.

3

(iv) Deduce an expression in x for $kg(x)$. By choosing a suitable value for k , check if your answer to (iii) still applies. Sketch the graphs of $y = g(x)$ and $y = kg(x)$.

4

QUESTION 4 (22 Marks)

(i) Deduce an expression in x for:

(a) $h(2x)$

(b) $h(3x)$

(c) $h\left(\frac{x}{2}\right)$

(d) $h\left(\frac{x}{3}\right)$

(e) $h(kx)$

(f) $h\left(\frac{x}{k}\right)$

(ii) Use Geogebra to draw graphs of:

(a) $y = h(x)$

(b) $h(2x)$

(c) $h(3x)$

(d) $h\left(\frac{x}{2}\right)$

(e) $h\left(\frac{x}{3}\right)$

(iii) By considering the graphs in part (ii), state the transformation of $y = h(x)$ which produces the graphs of $y = h(2x)$ and $y = h(3x)$, $y = h\left(\frac{x}{2}\right)$ and $y = h\left(\frac{x}{3}\right)$, and deduce the graphical effect of transforming $y = h(x)$ into $y = h(kx)$ and $y = h\left(\frac{x}{k}\right)$. Express your findings as clearly as possible.

(iv) Deduce an expression in x for $g(kx)$ and $g\left(\frac{x}{k}\right)$. By choosing a suitable value for k , check if your answer to (iii) still applies. Sketch the graphs of $y = g(x)$, $y = g(kx)$ and $y = g\left(\frac{x}{k}\right)$.

6

5

5

6

QUESTION 5 (8 Marks)

Mark

(i) Deduce an expression in x for:

2

(a) $-h(x)$

(b) $p(-x)$

(ii) Use Geogebra to draw graphs of:

4

(a) $y = h(x)$

(b) $y = p(x)$

(c) $y = -h(x)$

(d) $y = p(-x)$

(iii) By considering the graphs in part (ii), state the graphical transformation of $y = h(x)$ which produces the graph of $y = -h(x)$ and the graphical transformation of $y = p(x)$ which produces the graph of $y = p(-x)$. Express your findings as clearly as possible.

2

QUESTION 6 (6 Marks)

Summarise the graphical transformations of $y = f(x)$ given by:

6

(a) $f(x) + c$

(b) $f(x + c)$

(c) $kf(x)$

(d) $f(kx)$

(e) $f\left(\frac{x}{k}\right)$

(f) $-f(x)$

(g) $f(-x)$

Express your findings as clearly as possible.

END OF ASSIGNMENT