# New test - October 23, 2016

**1a.** *[4 marks]*

Let  ,  .

Find  .

## Markscheme



interchanging *x* and *y* (seen anywhere) ***M1***

e.g. 

correct working ***A1***

e.g. 

collecting terms ***A1***

e.g.  , 

 ***A1 N2***

 ***[4 marks]***

**1b.** *[7 marks]*

(i) Sketch the graph of *h* for  and  , including any asymptotes.

(ii) Write down the equations of the asymptotes.

(iii) Write down the *x*-intercept of the graph of *h* .

## Markscheme

 ***A1A1A1A1 N4***

**Note**: Award ***A1*** for approximately correct intercepts, ***A1*** for correct shape, ***A1*** for asymptotes, ***A1*** for approximately correct domain and range.

(ii)  ,  ***A1A1 N2***

(iii)  ***A1 N1***

***[7 marks]***

**2a.** *[3 marks]*

Let  , for  .

Find  .

## Markscheme

**METHOD 1**

attempt to set up equation ***(M1)***

*eg*  , 

correct working ***(A1)***

*eg*  , 

 ***A1 N2***

**METHOD 2**

interchanging  and  (seen anywhere) ***(M1)***

*eg*  

correct working ***(A1)***

*eg*  , 

 ***A1 N2***

***[3 marks]***

**2b.** *[3 marks]*

Let  be a function such that  exists for all real numbers. Given that  , find  .

## Markscheme

recognizing  ***(M1)***

*eg* 

correct working ***(A1)***

*eg*  , 

 ***A1 N2***

**Note**: Award ***A0*** for multiple values, *eg*  .

 **3a.** *[3 marks]*

Let  and  .

Find  .

## Markscheme

interchanging  and  (seen anywhere) ***(M1)***

*eg* 

evidence of correct manipulation ***(A1)***

*eg* 

 (accept  ,  ,  ***A1 N2***

***[3 marks]***

**3b.** *[3 marks]*

Find  .

## Markscheme

**METHOD 1**

attempt to substitute  into  ***(M1)***

*eg* 

 ***(A1)***

 ***A1 N3***

**METHOD 2**

attempt to form composite function (in any order)  ***(M1)***

*eg*  

correct substitution

*eg*  , 

 ***A1 N3***

***[3 marks]***

**4a.** *[1 mark]*

The diagram below shows the graph of a function  , for  .



Write down the value of .

## Markscheme

 ***A1 N1***

***[1 mark]***

**4b.** *[2 marks]*

Write down the value of  .

## Markscheme

 ***A2 N2***

***[2 marks]***

.

 **4c.** *[3 marks]*

Sketch the graph of  on the grid below.

## Markscheme

**EITHER**

attempt to draw  on grid ***(M1)***

**OR**

attempt to reverse ***x*** and ***y*** coordinates ***(M1)***

*eg*  writing or plotting **at least two** of the points

 ,  ,  , 

**THEN**

correct graph ***A2 N3***



***[3 marks]***

**5a.** *[2 marks]*

Let , where .

Write down the equations of the vertical and horizontal asymptotes of the graph of .

## Markscheme

 (must be equations) ***A1A1 N2***

***[2 marks]***

**5b.** *[2 marks]*

The vertical and horizontal asymptotes to the graph of  intersect at the point .

Find the value of .

## Markscheme

recognizing connection between point of intersection and asymptote ***(R1)***

*eg* 

 ***A1 N2***

***[2 marks]***

**6a.** *[2 marks]*

Let  and , for .

Find .

## Markscheme

interchanging  and  ***(M1)***

*eg* 

 ***A1 N2***

***[2 marks]***

**6b.** *[2 marks]*

Show that .

## Markscheme

attempt to form composite (in any order) ***(M1)***

*eg* 

correct substitution ***A1***

*eg* 

 ***AG N0***

***[2 marks]***

**6c.** *[2 marks]*

Let , for . The graph of *h* has a horizontal asymptote at .

Find the -intercept of the graph of .

## Markscheme

valid approach ***(M1)***

*eg* 

 ***A1 N2***

***[2 marks]***

**7a.** *[2 marks]*

Let  and  .

Find  .

## Markscheme

attempt to form composition (in any order) ***(M1)***

  ***A1 N2***

***[2 marks]***