**IB Math SL Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Unit 4 – Review**

**1.** Let *f* (*x*) = 1 – *x*2. Given that *f* (3) = 0, find *f* (*x*).

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| *Working:* |  |
|  | *Answer:*.................................................................... |

(Total 4 marks)

 **2.** Let *f* (*x*) = (3*x* + 4)5. Find

(a)*f* (*x*);

(b) *f* (*x*)d*x*.

|  |  |
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| *Working:* |  |
|  | *Answers*:(a) ..................................................................(b) .................................................................. |

(Total 6 marks)

**3.** The velocity *v* in m s−1 of a moving body at time *t* seconds is given by *v* = e2t−1. When *t* = 0 5. the displacement of the body is 10 m. Find the displacement when *t* =1.

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(Total 6 marks)

**4.** (a) Find 

(2)

(b) Given that  = ln , find the value of *P*.

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 (4)

(Total 6 marks)

**5.** A particle moves along a straight line so that its velocity, *v* ms−1 at time *t* seconds is given by *v* = 6e3*t* + 4. When *t* = 0, the displacement, *s*, of the particle is 7 metres. Find an expression for *s* in terms of *t*.

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(Total 7 marks)

**6.** The diagram shows part of the graph of *y* = 

(a) Find the coordinates of the point *P*, where the graph meets the *y*-axis.

(2)

 The shaded region between the graph and the *x*-axis, bounded by *x* = 0
and *x* = ln 2, is rotated through 360° about the *x*-axis.

(b) Write down an integral which represents the volume of the solid obtained.

(4)

(c) Show that this volume is .

(5)

(Total 11 marks)

**7.** Let 

(a) Show that .

(2)

(b) Find the value of

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(5)

(Total 7 marks)

**8.** The diagram shows part of the graph of *y* = . The area of the shaded region is 2 units.

 Find the exact value of *a*.

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| *Working:* |  |
|  | *Answer:*...................................................................... |

(Total 4 marks)

 **9.** In this question, *s* represents displacement in metres, and *t* represents time in seconds.

(a) The velocity *v* m s–1 of a moving body may be written as *v* =  = 30 – *at*, where *a* is a constant. Given that *s* = 0 when *t* = 0, find an expression for *s* in terms of *a* and *t.*

(5)

 Trains approaching a station start to slow down when they pass a signal which is 200 m from the station.

(b) The velocity of Train 1 *t* seconds after passing the signal is given by *v* = 30 – 5*t.*

(i) Write down its velocity as it passes the signal.

(ii) Show that it will stop before reaching the station.

(5)

(c) Train 2 slows down so that it stops at the station. Its velocity is given by
*v* =  = 30 – *at*, where *a* is a constant.

(i) Find, in terms of *a*, the time taken to stop.

(ii) Use your solutions to parts (a) and (c)(i) to find the value of *a*.

(5)

(Total 15 marks)

**10.** (a) Find the equation of the tangent line to the curve *y* = ln *x* at the point (e, 1), and verify that the origin is on this line.

(4)

(b) Show that  (*x* ln *x* – *x*) = ln *x*.

(2)

(c) The diagram shows the region enclosed by the curve y = ln *x*, the tangent line in part (a), and the line *y* = 0.



 Use the result of part (b) to show that the area of this region is e – 1.

(4)

(Total 10 marks)

**11.** The diagram shows the graph of the function *y* = 1 + , 0 < *x*  4. Find the **exact** value of the area of the shaded region.

(Total 4 marks)

**12.** The graph of *y* = sin 2*x* from 0 *x*   is shown below.



The area of the shaded region is 0.85. Find the value of *k*.

(Total 6 marks)

**13.** The following diagram shows part of the graph of *y* = cos *x* for 0  *x*  2. Regions A and B are shaded.



(a) Write down an expression for the area of A.

(1)

(b) Calculate the area of A.

(1)

(c) Find the total area of the shaded regions.

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(4)

(Total 6 marks)