

**YEAR 12 MATHEMATICS METHODS Test 3 2016**

**Logarithms**

## NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: Wednesday 29 June 2016

**TEACHER: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- | --- |
| **Calculator section:** | **15 minutes (max)** | **11 marks** |
| **Non-Calculator section:** |  | **34 marks** |
| **OVERALL:** | **45 minutes** | **45 marks** |

**INSTRUCTIONS:**

**Show FULL working Answer all questions on this test paper**

Questions or parts of questions worth more than two marks require working to be shown to receive full marks.

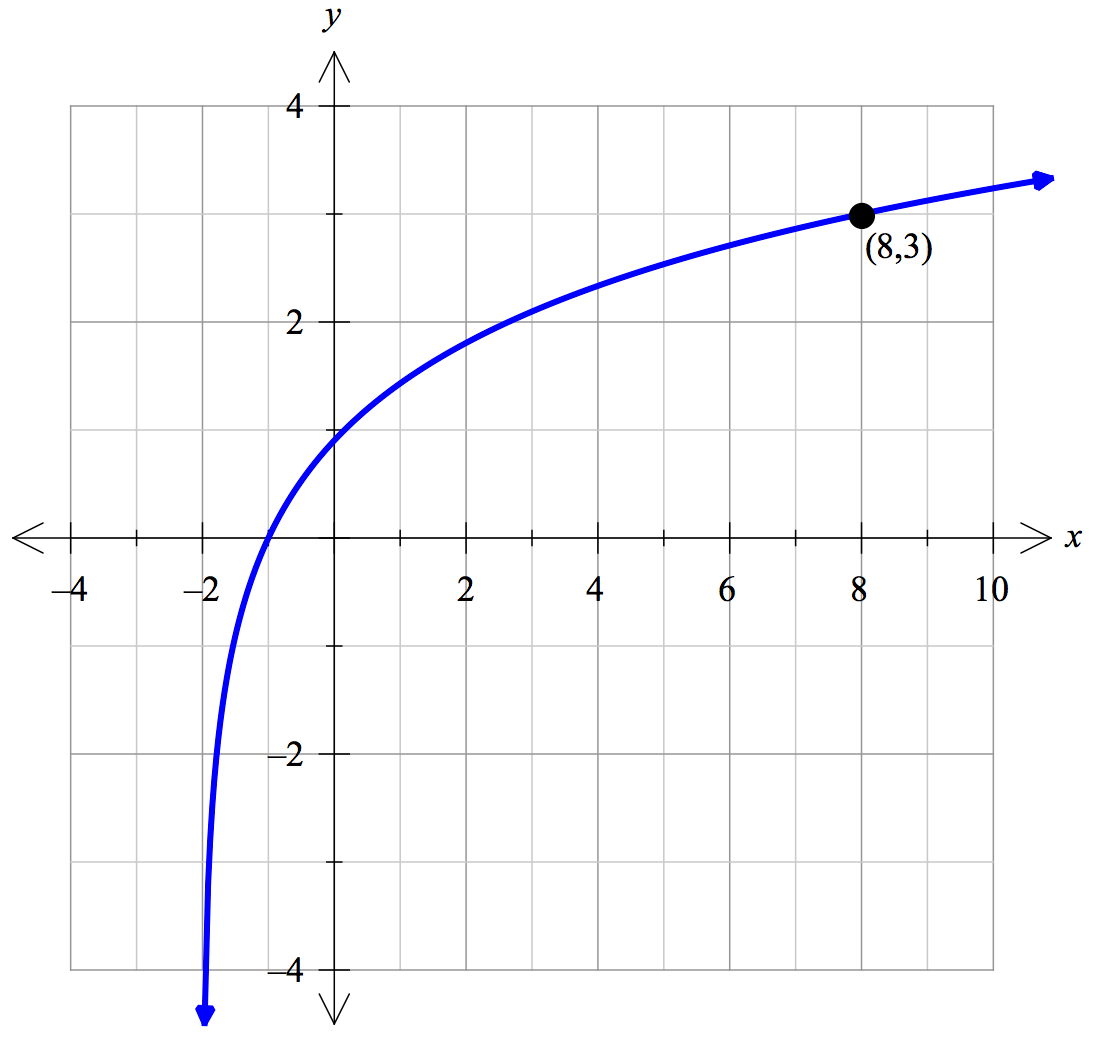
**Allowed: Maths Methods WACE formula sheets, 3 calculators, 1 A4 page of notes**

**Question 1 [3 + 2 = 5 marks]**

a. Accurately plot the graph on the axes below, clearly detailing the coordinates of any axis intercepts and the equations of any asymptotes.

b. The equation for the function shown below is

What are the values of *a* and *b* ?



**Question 2 [2 + 2 + 2 = 6 marks]**

The intensity of sound is measured in decibels. As a consequence of the sensitivity of the human ear, this scale is logarithmic, which allows sound intensities across a wide spectrum (from almost inaudible to ear-splittingly loud). Decibels are measured using the equation below:

where *D* = Decibel level (dB)

*I* = Intensity of sound in watts per square metre (W/m2)

*In* = W/m2 (this is the intensity of the least audible sound a human can hear)

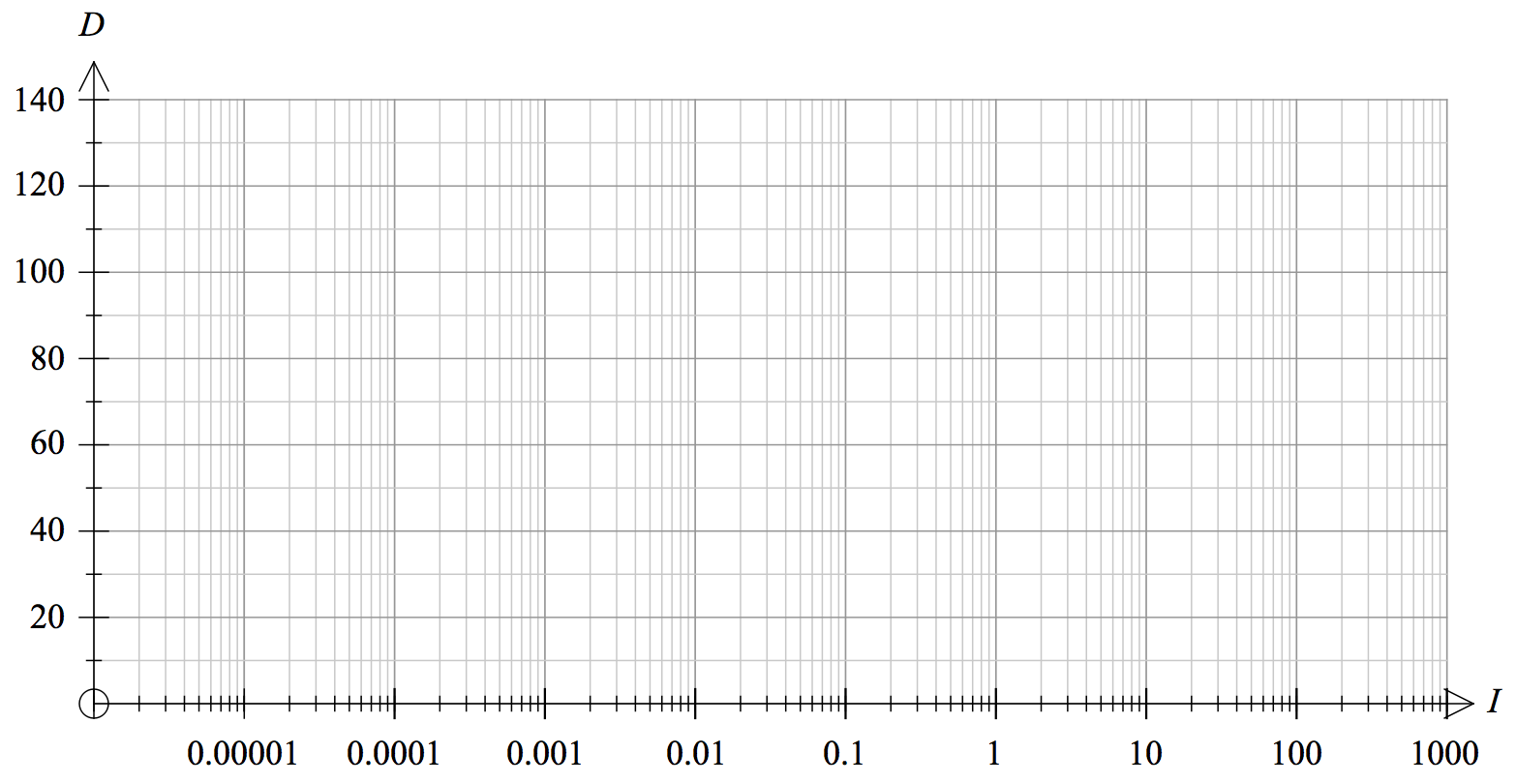
a. Calculate the decibel level for

(i) normal conversation, which has a sound intensity of *I* = W/m2.

(ii) the kerb-side of a busy road, with a sound intensity of *I* = W/m2.

b. Calculate the sound intensity (*I*) that corresponds to the pain threshold of 125 dB.

c. Represent the above three points on the logarithmic graph paper, using them to plot the relationship between I and D



**End of calculator section – go back and check your working**

**Raise your hand when you are ready to go to the non-calculator section**

**At this stage you may work on both papers (without a calculator or notes)**



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**Question 3 [2 marks]**

a. Write as an exponential statement:

b. Write as a logarithmic statement:

**Question 4 [1 + 1 + 2 + 1 = 5 marks]**

Evaluate the following:

a. b.

c. d.

**Question 5 [2 + 2 = 4 marks]**

Express each of the following as a single logarithm:

a.

b.

**Question 6 [2 + 3 + 4 = 9 marks]**

Solve using your knowledge of logarithms, giving solutions as exact values in simplest form.

a.

b.

c.

**Question 7 [3 + 4 = 7 marks]**

a. Calculate for the following:

(i) (ii)

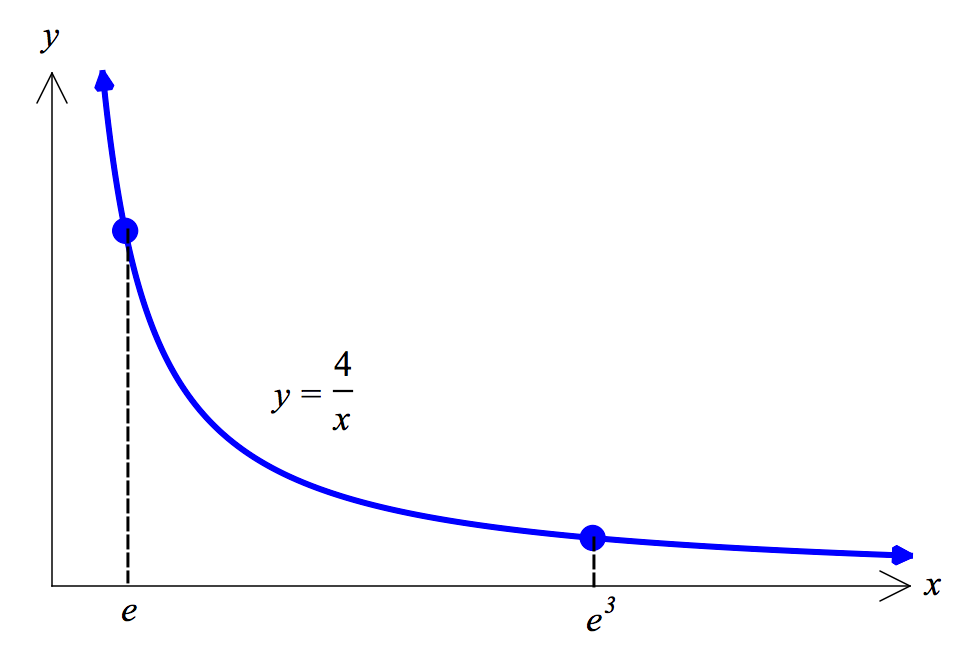
b. Evaluate the following integrals:

(i) (ii)

**Question 8 [4 + 3 = 7 marks]**

a. Calculate the equation of the tangent to the curve at the point .

b. Evaluate the area contained between the function and the *x*-axis from an *x*-value of *e* to an *x*-value of *e*3.



**End of non-calculator section – go back and check your working**