

**NAME: SOLUTIONS**

**Parent Signature:**

12 ATMAM TEST 2

**Section 1: / 34**

**Section 2: / 25**

**Total: / 59**

**%**

Material required/recommended for this test

To be provided by the supervisor

Question/answer booklets for Sections One and Two.

SCSA 12 Formulae Sheet

To be provided by the candidate

Section One:

Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler

Special materials: drawing instruments, templates, no notes, formula sheet

Section Two:

Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler

Special materials: drawing instruments, templates, notes on a maximum of one unfolded sheet of A4 paper, double sided, up to three approved calculators, CAS, graphics, or scientific.

Important note to candidates

No other items may be taken into the test room. It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the test room. If you have any unauthorised material with you, hand it to the teacher before reading any further.

STRUCTURE OF SECTION 1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number  of  questions  available | Number  of  questions  to  be  answered | Working  time  (minutes) | Marks  available | Percentage  of Test |
| Section  One:  Calculator-free | 5 | 5 | 35 | 34 |  |
| Section  Two:  Calculator-assumed |  |  |  |  |  |
| Total | | | | |  |

1. Determine each of the following leaving your answers with positive indices. [10 marks: 2, 3, 2, 3]

A close up of a logo

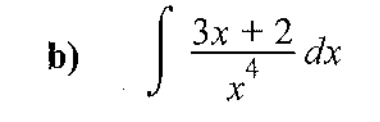
Description automatically generated

= (5*x* + 2)5 + c

25

1 mark correct antidifferentiation

1 mark for +c



A close up of text on a white background

Description automatically generated

A close up of a logo

Description automatically generated

A close up of a clock

Description automatically generated

A close up of a logo

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A close up of text on a white background

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1. [5 marks: 2, 3]

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A close up of a logo

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Description automatically generated

1. [8 marks:2, 6]

A curve has first derivative and passes through the point .

(a) Determine the value(s) of for which .

A screenshot of a cell phone

Description automatically generated

(b) Sketch the curve on the axes below, clearly indicating the location of all axes intercepts, stationary points and points of inflection.

A close up of a map

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4. [4 marks:3, 1]

Given 

a) Determine the value of *f* “(-1)

A picture containing text, whiteboard

Description automatically generated

b) Describe the concavity of the curve at this point.

A close up of a logo

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5. [7 marks: 2, 5]

An Isosceles triangle ΔPQR is inscribed inside a circle of fixed radius r and centre O, let θ be defined as in the diagram below.

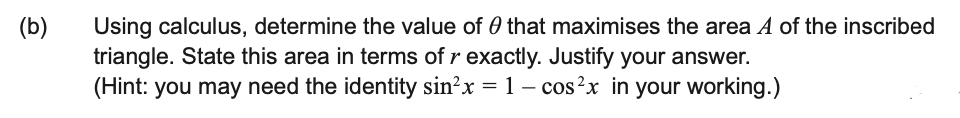
A picture containing sky, sitting

Description automatically generated

1. Show that the area A of the triangle ΔPQR is given by A = r2sinθ(1 + cosθ)

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A screenshot of a cell phone

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**NAME:**

**Section 2: / 25**

12 ATMAM TEST 2

CALCULATOR ASSUMED

Show all your working clearly. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat any question, ensure that you cancel the answer you do not wish to have marked.

STRUCTURE OF SECTION 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number  of  questions  available | Number  of  questions  to  be  answered | Working  time  (minutes) | Marks  available | Percentage  of Test |
| Section  One:  Calculator-free |  |  |  |  |  |
| Section  Two:  Calculator-assumed | 4 | 4 | 25 | 25 |  |
| Total | | | | |  |

6. [6 marks:1, 1, 1, 3]

The table below contains information about the sign of ,  and  at six points on the graph of the continuous function .

Apart from those in the table, there are no other points where ,  or  are equal to zero.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | -3 | -1 | 0 | 2 | 3 | 4 |
|  | - | 0 | + | + | 0 | - |
|  | + | 0 | + | 0 | - | - |
|  | - | 0 | + | - | - | - |

a) Describe the nature of the graph when 



b) At what value(s) of  is  increasing at an increasing rate?

****

c) Describe the nature of the graph when .

A picture containing object

Description automatically generated

d) Sketch the function on the axes below.

**A close up of a map

Description automatically generated**

7. [6 marks:1, 5]

A closed box is constructed with a square base. Exactly 10 square metres of material is to be used in the construction of the box, without wastage.

a) Show that the amount of material used is equivalent to: 

A close up of a mans face

Description automatically generated

**A close up of a logo

Description automatically generated**

b) By using calculus, determine the maximum volume of the box and state the dimensions required to achieve this maximum.

A close up of text on a whiteboard

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8. [6 marks]

A popcorn container of capacity mL is made from paper and has the shape of an open inverted cone of radius and height .

Determine the least area of paper required to make the container.

A screenshot of a cell phone

Description automatically generated

9. [7marks: 1, 3, 3]

The rate of change of displacement of a particle moving in a straight line at any time seconds is given by

Initially, when , the particle is at , a fixed point on the line.

(a) Calculate the initial velocity of the particle.

A screenshot of a cell phone

Description automatically generated

(b) Determine the distance of the particle from after .

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Description automatically generated

(c) Determine when the acceleration of the particle is .

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