**SECTION I – MULTIPLE CHOICE** 10 marks – each question is of equal value

Enter solutions on the Multiple Choice Answer Sheet provided

|  |
| --- |
| 1. What is the solution to the equation ? |
| (A) |
| (B) |
| (C)  or |
| (D)  and |

|  |  |
| --- | --- |
| 1. *P, Q, R* and *S* are points on a circle with centre *O*. . | |
|  | |
| What are the values of *x* and *y*? | |
|  | (A)  and |
|  | (B)  and |
|  | (C)  and |
|  | (D)  and |

|  |  |
| --- | --- |
| 1. Line *TA* is a tangent to the circle at *A* and *TB* is a secant meeting the circle at *B* and *C*. | |
|  | |
| Given that ,  and , what is the value of *x*? | |
|  | (A) |
|  | (B) 2 |
|  | (C) 3 |
|  | (D) 4 |

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| 1. What is the minimum value of ? | |
| (A) |
| (B) |
| (C) |
| (D) |

|  |  |
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| 1. A rectangular pyramid shown below has ,  and angle . | |
|  | |
| What is the perpendicular height of the pyramid? | |
|  | (A) 12 cm |
|  | (B) 14 cm |
|  | (C) 19 cm |
|  | (D) 24 cm |

|  |  |
| --- | --- |
| 1. What is the acute angle between the lines  and ? | |
| (A) 4°24` |
| (B) 32° 28` |
| (C) 57°32` |
| (D) 85°36` |

|  |  |
| --- | --- |
| 1. What are the coordinates of the point *P* that divides externally the interval joining the points  and  in the ratio 3:1? | |
| (A) |
| (B) |
| (C) |
| (D) |

|  |  |
| --- | --- |
| 1. A curve has parametric equations and .   What is Cartesian equation of this curve? | |
| (A) |
| (B) |
| (C) |
| (D) |

|  |  |
| --- | --- |
| 1. How many arrangements of all of the letters of the word ADDITION are possible? | |
| (A) 720 |
| (B) 10 080 |
| (C) 20 160 |
| (D) 40 320 |

|  |  |
| --- | --- |
| 1. Let ,  and  be the roots of .   What is the value of ? | |
| (A) |
| (B) |
| (C) |
| (D) |

**END OF SECTION I**

**SECTION II**

**QUESTION 11** 15 marks – allocation of marks as shown

*Use a SEPARATE writing booklet*  **Marks**

a. Consider the function .

(i) Find the first derivative. **1**

(ii) Find the second derivative. **1**

(iii) State the domain. **1**

(iv) Show that is a minimum turning point. **2**

(v) What happened to as *x* approaches infinity. **1**

(vi) Show that a point of inflexion occurs at . **2**

(vii) Draw on the same number plane, sketches of the graphs of  
  
 , and . **2**

b. Differentiate . **2**

c. If , find the value of . **3**

**QUESTION 12**  15 marks – allocation of marks as shown

*Use a SEPARATE writing booklet* **Marks**

a. (i)How many 10 letter “words” can be made by arranging the letters **1**  
 of the word SIMPLIFIES?

(ii) In how many of these will the word MISS appear? **2**

b. Five women and their husbands belong to a Bridge Club.  
A committee of three is to be formed and it is decided that no man should be on  
the committee if his wife is also on it.  
In how many ways can the committee be formed? **3**

c. Prove by Mathematical induction for integers ,  
  
 . **4**

d. (i) Sketch the function . **1**

(ii) Evaluate . **2**

e. Express in its simplest form. **2**

**QUESTION 13**  15 marks – allocation of marks as shown

*Use a SEPARATE writing booklet* **Marks**

a. The diagram shows a circle with centre *O* and a tangent *AB* at *T.*

*T*

*C*

*A*

*B*

*O*

If the angle *CTB* is , find the value of the angle *OCT*. **2**

b. The diagram shows *PQ*, a tangent to the circle touching it at *C.* *AB* is a chord of the circle, parallel to *PQ*. Prove that the triangle *ABC* is isosceles. **3**

*B*

*P*

*A*

*Q*

*C*

c. Find the indefinite integrals, using the indicated change of variable.

(i) **3**

(ii) **4**

d. If , prove that , where . **3**

**QUESTION 14**  15 marks – allocation of marks as shown

*Start this question in a SEPARATE booklet* **Marks**

a. Mickey is in Year Twelve at Disney High School and wants to buy a car   
when he finishes school.

He has saved but wishes to save a total of $8000. Mickey sets up a car fund on  
1st January 2015.

The fund is paying 6% per annum interest which is compounding monthly.

(i) If Mickey makes no further deposits it would take years for his investment  
 to accumulate to $8000. Show that to the nearest dollar. **2**

(ii) To reach his target by the end of 2015, Mickey decides that after his initial   
deposit of he will make regular deposits of at the beginning of each  
 month starting in February 2015.

Mickey plans to collect his savings of at the close of business on   
31st December 2015 just after the interest is paid.

Let represent the amount Mickey has saved after months.

( Show that by the 30th April 2015, Mickey will have saved:

**3**

Find the value of his monthly deposits, , correct to the nearest dollar. **3**

b. Consider the series

Find the set of *x* values for which this series has a sum to infinity. **3**

c. In a certain series the Sum is given by .

(i) Find the expression for the general term . **2**

(ii) Show that this Sum is representative of an arithmetic sequence. **2**

**END OF SECTION II**

**END OF ASSESSMENT**