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

*Enter solutions on the MULTIPLE CHOICE ANSWER SHEET provided*

|  |  |  |
| --- | --- | --- |
| 1. Which equation would you use in first principle differentiation? | | |
| (A) | |
| (B) | |
| (C) | |
| (D) | |
| 1. Which of the following is the graph of ? | |
| (A) | | (B) | | |
| (C) | | (D) | | |

|  |  |
| --- | --- |
| 1. What is the equation of the tangent to the curve, at the point ? | |
| (A) |
| (B) |
| (C) |
| (D) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. The general integral of is | | | | |
| (A) | | | | |
| (B) | | | | |
| (C) | | | | |
| (D) | | | | |
| 1. The vertex of the parabola, , is | | | | |
| (A) )  (B)  (C)  (D) ) | |  | | |
| 1. What is the solution to the equation, | | | | |
| (A) | | |
| (B) | | |
| (C)  (D)  **7** The equation, , has no real solutions because?  (A)  (B)  (C)  (D)  **8**  (A)  (B)  (C)  (D) | | |
|  | | | | |
| **9** A fair coin is tossed three consecutive times. The outcomes are heads (h) and tails (t)  on each occasion. The probability of obtaining at least one head is? | | | | |
| (A) | | |
| (B) | | |
| (C) | | |
| (D)  **10** The function, , has a turning point at . The conditions for this turning point to be a local maximum is?  (A) and  (B) and  (C) and  (D) and  **END OF SECTION I** | | |

**SECTION II**

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

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

1. Fully factorise . **1**
2. Solve . **3**
3. If , find values for and . **2**

d. A packet of sweets contains 5 red and 14 green sweets. Two sweets are selected   
at random without replacement.

i. Draw a tree diagram to show possible outcomes, include probabilities **1**  
on each branch.

ii. What is the probability that the two sweets are different colours? **2**

e. Solve **2**

f. Solve , for **2**

g. Prove . **2**

**QUESTION 12**  10 marks – allocation of marks as shown

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

1. The diagram below shows the points A and B. The line *L*  has

Equation and cuts the *x*-axis at C.

B(5,2)

A(-1,4)

•

*O*

*x*

*y*

*L*

*C*

•

i. Show that the length of AB is units. **1**

ii. Find the coordinates of M, the midpoint of AB. **1**

iii. Find the gradient of AB. **1**

iv. Show that the equation of AB is **1**

v. Prove that *L* is the perpendicular bisector of AB. **2**

vi. Find the coordinates of C. **1**

vii. Write down the equation of the circle with AB as the diameter. **1**

b.

The graph of is shown in the diagram above. The arc of the curve between

and is rotated about the *x*-axis.

Calculate the volume thus formed. **2**

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

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

1. Differentiate the following with respect to *x.*
2. **2**
3. **2**
4. **2**

1. Find the indefinite integral of:

i. **2**

ii. **2**

c. Evaluate dx **2**

d. i. Complete the table of values for the function . **1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | -2 | -1 | 0 | 1 | 2 |
|  |  |  |  |  |  |

ii. Hence draw the graph of for . **2**

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

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

1. Consider the function for .

i. Find any stationary points and determine their nature. **4**

ii. Locate any points of inflexion. **2**

iii. Sketch this function showing its critical points. **3**

iv. Determine the values for which the function is increasing in the given domain. **1**

v. Determine the set of values for which the function is concave up. **1**

vi. What is the maximum value of this function? **1**

b. Using Simpson’s rule, with 5 function values, find an approximation **3** for . Leave your answer in exact form.

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

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

a. Consider the functions and .

i. Find the *x* co-ordinates of their points of intersection. **1**

ii. On the same set of axes sketch the curves. **2**

iii. Find the area enclosed by the curves. **2**

b.

*O*

The above figure shows a regular pentagon. Each internal angle is equal to and   
each arm is unit in length. *O* is the centre such that the five triangles are congruent.

i. Show that the area of the above pentagon is . **2**

ii. Show that the perimeter of the above pentagon is . **2**

c. A piece of wire 14cm long is cut into two portions.   
One piece is bent to form a circle and the other piece to form a square.

i. Show that where is the radius of the circle and is the length **1**  
of the square.

ii. Write an exact expression for the sum of the areas of the circle and square  
in terms of *x*. **1**

iii. Find the exact circumference of the circle if the sum of the areas **4**  
of the circle and the square is to be a minimum. Justify your answer.

**END OF SECTION II**

**END OF ASSESSMENT**