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

*Enter solutions on the MULTIPLE CHOICE ANSWER SHEET provided*

|  |  |  |  |
| --- | --- | --- | --- |
| 1. The diagram below shows the graph of  and . | | | |
|  | | | |
| What is the area between the curves  and ? | | | |
|  | | (A) 4.5 units2 | |
|  | | (B) 5.5 units2 | |
|  | | (C) 9.0 units2 | |
|  | | (D) 13.5 units2 | |
| 1. Which of the following is equal to? 2. – 1 3. A and B are the points (4 , 8) and (12 , 10). The distance of AB is 5. 68 6. 60   **4** Which of the following is the simplification of ?      **5** If , which of the following statements is true?      **6** Which of the following equations describes the locus of all points with vertex (-2 , -2)  and directrix .         **7** If and , which of the following is a correct statement?         **8** Which of the following represents the domain of ?         **9** | |
|  | |

Which of the following pairs of inequalities could describe the shaded region in the diagram above?

1. and
2. and
3. and
4. and

**10** In the diagram, ABC is a triangle where AC = 6m, CB = 4m and .

A

C

B

1200

6 m

4 m

NOT TO SCALE

The distance of AB is

1. 16 (B) 76 (C) (D) 36

**SECTION II**

**QUESTION 11** 14 marks – allocation of marks as shown

|  |  |  |  |
| --- | --- | --- | --- |
| (a) | Solve . | | **2** |
| (b) | Evaluate. | | **2** |
| (c) | The gradient of the curve is given by . The curve passes through . Find the equation of the curve. | | **2** |
| (d) | Find the value of *p* if the points A(2 , 5), B(3 , *p*) and C(4 , 11) are collinear. | | **2** |
| (e) | In the diagram above, and . | |  |
|  | (i) | Find the gradient of *AC*. | **1** |
|  | (ii) | Hence find the angle of inclination of *AC (answer to nearest minute)*. | **1** |
|  | (iii) | Find the equation of line *AC*. | **2** |
|  | (iv) | Find point *M*, the midpoint of *AC* and hence show that *MB* is perpendicular to *AC*. | **2** |

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

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

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

1. Five values of the function are shown in the table below. **2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *x* | 0 | 2 | 4 | 8 | 16 |
| *f(x)* | 1 | 4 | 8 | 14 | 25 |

Using the table (5 ordinates) and the Simpsons Rule, evaluate .

1. For what values of *k* does the quadratic have real roots. **3**
2. Find the equation of the directrix for the parabola **2**
3. If and β are the roots of , find the value of **3**

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

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

1. For the curve

(i) Find the coordinates of the stationary points, and determine their nature. **3**

(ii) Find the point of inflexion and show that it is the midpoint of the stationary points. **2**

(iii) Sketch the curve, showing all necessary information **2**

(b)

*x*

*y*

0

*A*

*B*

**

**

5

NOT TO SCALE

The shaded region *OAB* is bounded by the parabolas , and the *x*-axis.

Point *A* is the intersection of the two parabolas and point *B* is the *x*-intercept of the

parabola **.

(i) Find the *x* components (ordinate values) of points *A* and *B*. **2**

(ii) Show that the exact area of the shaded region *OAB* is given by

 square units. **4**

(c) Differentiate with respect to *x.* **2**

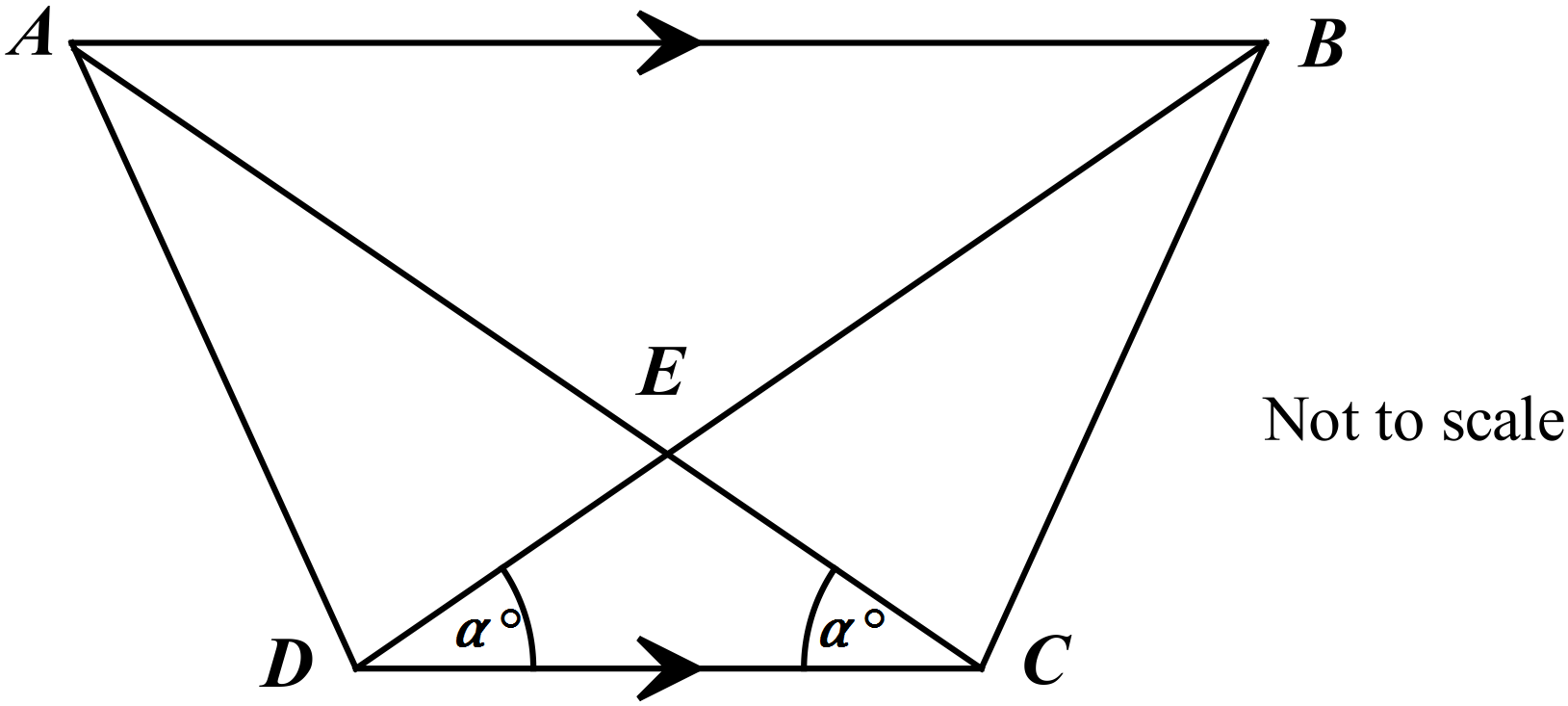
**QUESTION 14**  14 marks – allocation of marks as shown

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

1. If
2. Show that **1**
3. Find the equation of the normal to this curve at the point **2**
4. Find the coordinates of *Q*, the other point on this curve where the tangent

is parallel to the tangent at *P*. **2**

1. In the diagram below, *AB* is parallel to *CD* and ∠*BDC* = ∠*ACD* = αo.



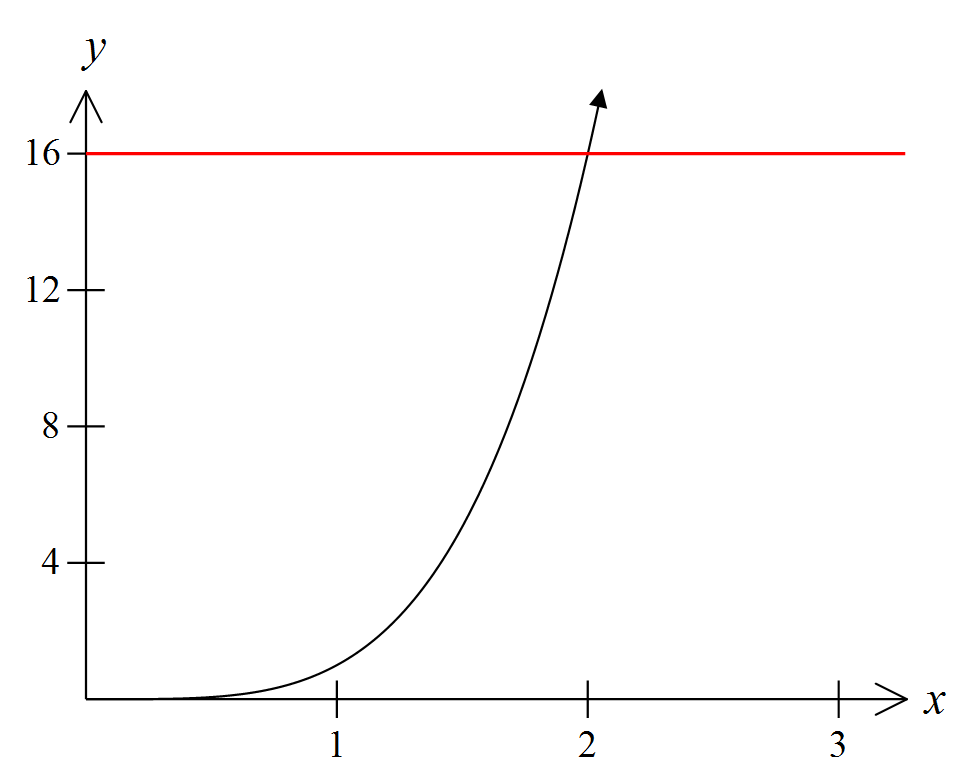
1. Show that *AE* = *EB*  **1**
2. Prove that Δ*ACD BCD* **2**
3. Hence prove that ∠*ADE* = ∠*BCE* **1**
4. Graph the region bounded by and . **3**
5. Solve **2**

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

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

1. A rainwater tank is to be designed in the shape of a cylinder with radius *r* metres and the height *h* metres. The volume of the tank is the be 10m3. Let *A* be the surface area of the tank including its top and base in m2.
2. Given that , show that **2**
3. Show that *A* has a minimum value and find the value of *r* for which the

minimum occurs. **3**



A region in the diagram is bounded by the curve , the *x*-axis and the line .

Find the volume of the solid of revolution when this region is rotated about the *y*-axis? **3**

1. Differentiate **2**
2. Find **2**

**END OF SECTION II**

**END OF ASSESSMENT**