**7Specialist Maths Integrals Test 2015** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Time allowed: 65 minutes You may use 1 bound Reference book and CAS calculator.

Where a question is worth more than 1 mark full working must be shown.

**Total Available = 45 marks**

**Section A: Multiple Choice. Choose the best answer for these questions and write legibly in the box shown:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|  |  |  |  |  |  |  |  |  |  |

10 marks

|  |  |  |
| --- | --- | --- |
|  | If a curve passes through the point (2, −3) and at any point has a gradient given by , then the *y-*intercept of the curve must be:A −17B −13C −9D −5E −1 |  |
|  | The indefinite integral is equal to:A B C D E  |  |
|  | equals:1. 2
2.
3. 8
4. 20
5. 16
 |  |
|  | The velocity of a car is given by . The change in position after the first 2 seconds is:1. 26 m
2. 56 m
3. 40 m
4. 36 m
5. 46 m
 |  |
|  | If  and , then  must equal:A B C D E  |  |
|  | If then *k* equals:A 2B 4C 6D 8E 10 |  |
|  | An approximation for the area between the curve and the *x*-axis over the interval [1, 4] in the diagram above using the average of the left and right rectangles is:1. 26 square units
2. 16 square units
3. 22 square units
4. 17 square units
5. 19 square units
 |  |
|  | A particle moves in a straight line so that its position *x* cm from a fixed point *O* at time *t* seconds (*t* ≥ 0) is given by *x* = *t* 3 − 12*t* 2 + 24*t* − 5. The particle’s initial velocity is:**A** 0 cm/s**B** 24 cm/s**C** 1 cm/s**D** −1 cm/s**E** 9 cm/s |  |
|  | The area between the graph of  and the *x*-axis is:A  square unitsB  square unitsC  square unitsD  square unitsE  square units |  |
|  | The area between the curve  and the *x*-axis from *x* = 0 to *x* = 1 is:A  square unitsB  square unitsC  square unitsD  square unitsE 1 square unit |  |

**Section B Complete working must be shown for all questions to gain full marks.**

1. Find an approximation for the area under the graph  and the *x*-axis over the interval *x* = 1 to *x* = 5 using left rectangles and interval widths of 1 unit. (Hint: sketch a graph first)

3 marks

1. Evaluate these integrals, **showing all working**:

|  |  |
| --- | --- |
|  |  |

3 + 4 = 7 marks

1. The amount of radioactive substance, *A*, in a stockpile is given by , where *t* is measured in years and *A* in kilograms. Calculate the loss of material after 10 years if initially there is 2000 kg.

4 marks

1. The velocity, *v* m/s, of a moving body is given by .If the body’s initial displacement from *O* is 8 m,
	1. What is the rule for its displacement, *x* m, at any time *t* seconds?
	2. What is the velocity of the body after 2 seconds?
	3. When is the acceleration of the body, *a* m/s2, equal to zero?

3 + 1 +2 = 6 marks

1. q Calculate the area between the curve and the *x*-axis from *x* = 0 to *x* = 3. Leave your answer as a fraction.

4 marks

1. The velocity of a toy rocket is given by . How far did the rocket travel in the first 5 seconds?

2 marks

1. Ifand *f* (2) = 8, find *f*(*x*).

5 marks

1. Find the area bounded by the curves  and 

4 marks