

# Pearson Edexcel AS Mathematics 8MA0

## Unit Test 7 Integration

Time allowed: 50 minutes

School:

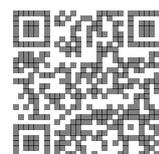
Name:

Teacher:

How I can achieve better:

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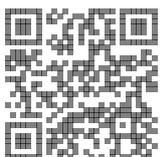
| Question | Points | Score |
|----------|--------|-------|
| 1        | 5      |       |
| 2        | 6      |       |
| 3        | 10     |       |
| 4        | 5      |       |
| 5        | 11     |       |
| 6        | 13     |       |
| Total:   | 50     |       |



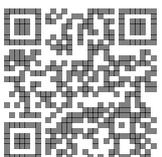
1. Find

[5]

$$\int (5 - 3\sqrt{x})^2 dx.$$



2. The curve with equation  $y = h(x)$  passes through the point  $(4, 19)$ . Given that  $h'(x) = 15x\sqrt{x} - \frac{40}{\sqrt{x}}$ , find  $h(x)$ . [6]



3. (a) Given that

[6]

$$\int_a^{2a} (10 - 6x) dx = 1,$$

find the two possible values of  $a$ .

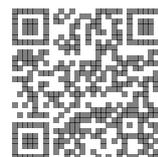
(b) Labelling all axes intercepts, sketch the graph of  $y = 10 - 6x$  for  $0 \leq x \leq 2$ .

[2]

(c) With reference to the integral in part a and the sketch in part b, explain why the larger value of  $a$  found in part a produces a solution for which the actual area under the graph between  $a$  and  $2a$  is not equal to 1 and state whether the area is greater than 1 or smaller than 1.

[2]

Total: 10



4. The speed,  $v \text{ ms}^{-1}$ , of a rollercoaster at time  $t \text{ s}$  is given by

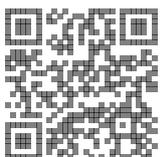
[5]

$$v(t) = \frac{1}{20} (50\sqrt{t} + 20t^2 - t^3).$$

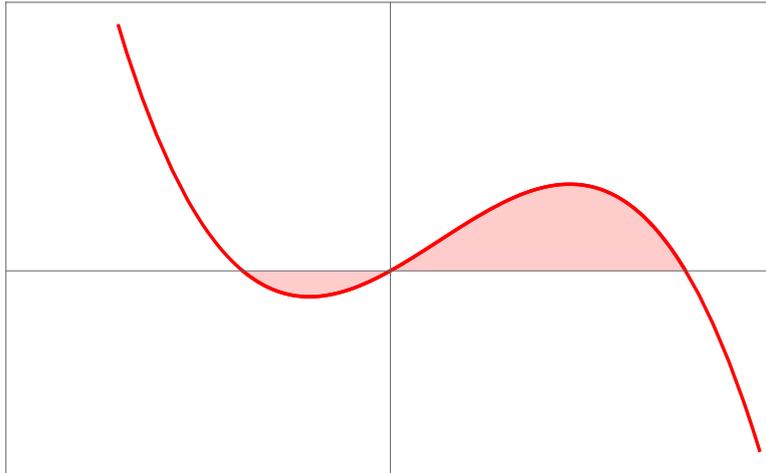
The distance,  $s \text{ m}$ , travelled by the rollercoaster in the first 20s is given by

$$s = \int_0^{20} v(t) dt.$$

Find the value of  $s$ , giving your answer to 3 significant figures.



5. The graph shows part of the curve  $C$  with equation  $y = -x^3 + 2x^2 + 8x$ .



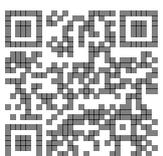
The curve  $C$  crosses the  $x$ -axis at the origin  $O$  and at points  $A$  and  $B$ .

(a) Using an appropriate algebraic method, find the coordinates of  $A$  and  $B$ . [3]

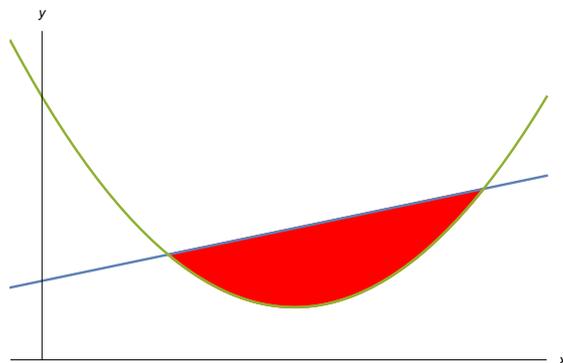
(b) The finite region shown shaded is bounded by the curve  $C$  and the  $x$ -axis. [8]

Use calculus to find the total area of the shaded region.

Total: 11



6. The diagram shows part of curve with equation  $y = x^2 - 8x + 20$  and part of the line with equation  $y = x + 6$ .



- (a) Using an appropriate algebraic method, find the coordinates of  $A$  and  $B$ . [4]
- (b) The  $x$  coordinates of  $A$  and  $B$  are denoted  $x_A$  and  $x_B$  respectively. [2]
- Find the exact value of the area of the finite region bounded by the  $x$ -axis, the lines  $x = x_A$  and  $x = x_B$  and the line  $AB$ .
- (c) Use calculus to find the exact value of the area of the finite region bounded by the  $x$ -axis, the lines  $x = x_A$  and  $x = x_B$  and the curve  $y = x^2 - 8x + 20$ . [5]
- (d) Hence, find, to one decimal place, the area of the shaded region enclosed by the curve  $y = x^2 - 8x + 20$  and the line  $AB$ . [2]

Total: 13

