

10.2 Answers (TEST)

GCSE Mathematics Differentiation I

Answer 1

- | | | | | | |
|-------|-----|--------|----|-------|------------------|
| (i) | 125 | (ii) | 49 | (iii) | $\frac{1}{16}$ |
| (iv) | 8 | (v) | 4 | (vi) | -1 |
| (vii) | 1 | (viii) | 0 | (ix) | $\frac{81}{121}$ |

[9 marks]

Answer 2

- | | | | | | |
|-----|---------|------|-----------|-------|-------------|
| (i) | (2, -2) | (ii) | (10, 950) | (iii) | (-10, -950) |
|-----|---------|------|-----------|-------|-------------|

[3 marks]

Answer 3

- | | | | |
|-----|-------------------------------|------|----------------------------------|
| (i) | $\frac{dy}{dx} = 12x^3 - 14x$ | (ii) | $\frac{d^2y}{dx^2} = 36x^2 - 14$ |
|-----|-------------------------------|------|----------------------------------|

[2, 1 marks]

- | | | | | | |
|-------|---------|------|----|-----|---|
| (iii) | (1, -4) | (iv) | -2 | (v) | 22, i.e. +ve $\therefore$ Anticlockwise |
|-------|---------|------|----|-----|---|

[1, 1, 2 marks]

Answer 4

- | | | | |
|-----|----------------|------|---|
| (i) | $\frac{1}{16}$ | (ii) | 9 |
|-----|----------------|------|---|

[2 marks]

Answer 5

- | | | | | | |
|-----|-----------------------------|------|----|-------|--------------------|
| (i) | $\frac{dy}{dx} = 3x^2 - 12$ | (ii) | 15 | (iii) | (2, -16), (-2, 16) |
|-----|-----------------------------|------|----|-------|--------------------|

[2, 1, 4 marks]

Answer 6

- | | | | |
|-----|-----------------------------|------|--|
| (i) | $\frac{dy}{dx} = -24x^{-5}$ | (ii) | $y = 9x^2 + 30x + 25 \Rightarrow \frac{dy}{dx} = 18x + 30$ |
|-----|-----------------------------|------|--|

[2, 3 marks]

Answer 7

- | | | | |
|-----|--------------------------------------|-----|-----------|
| (a) | $v = \frac{ds}{dt} = 6t^2 - 24t + 7$ | (b) | 2 seconds |
|-----|--------------------------------------|-----|-----------|

[2, 2 marks]

Answer 8

- | | | | |
|-----|---|-----|----------------------|
| (a) | 0 | (b) | It's a turning point |
|-----|---|-----|----------------------|

[4, 1 marks]

Answer 9

$$(i) \quad y = 25x^{-5} \qquad (ii) \quad -\frac{125}{64} \text{ or about } -1.953125...$$

$$\Rightarrow \frac{dy}{dx} = -125x^{-6}$$

[3, 2 marks]**Answer 10**

$$(a) \quad \frac{dy}{dx} = 5000 - 1250x$$

[2 marks]

$$(b) \quad (4, 10\,000)$$

[3 marks]

$$(c) \quad (i) \quad \text{Maximum}$$

(ii) The curve is an upside down quadratic equation, i.e. $\cap$ because of the negative in front of the x^2 and so only has a local maximum

[2 marks]

$$(d) \quad (i) \quad \text{£4}$$

(ii) It maximises his profit

[2 marks]**Answer 11****(a)**

x	-3	-2	-1	0	1	2	3	4
y	11	18	13	2	-9	-14	-7	18

[2 marks]

(b) Points plotted to give cubic curve

[2 marks]

$$(c) \quad (i) \quad \frac{dy}{dx} = 3x^2 - 12$$

$$(ii) \quad 63$$

[4 marks]

Answer 12**(a)**

$$\begin{aligned} A &= \text{area rectangle} - \text{area four triangles} \\ &= 10 \times 8 - \frac{1}{2} (10 - x) \times 2 - \frac{1}{2} (8 - x) (x) \times 2 \\ &= 80 - x (10 - x) - x (8 - x) \\ &= 80 - 10x + x^2 - 8x + x^2 \\ &= 2x^2 - 18x + 80 \end{aligned}$$

[3 marks]**(b) (i)** $4x - 18$ **(ii)** 4.5**(iii)** Second derivative is 4 which is +ve $\therefore$ AntiClockwise $\therefore$ Min**[5 marks]**