

7. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

$$f(x) = 2x - 3\sqrt{x} - 5 \quad x > 0$$

- (a) Solve the equation

$$f(x) = 9 \quad (4)$$

- (b) Solve the equation

$$f''(x) = 6 \quad (5)$$

DO NOT WRITE IN THIS AREA

3. Find

$$\int \frac{(x+3)^2}{3\sqrt{x}} dx$$

writing your answer in simplest form.

(5)

DO NOT WRITE

1. Find

$$\int \left(8x^3 - 6\sqrt{x} - \frac{2}{5x^3} \right) dx$$

giving your answer in simplest form.

(4)

DO NOT WRITE

9. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

A curve has equation

$$y = \frac{4x^2 + 9}{2\sqrt{x}} \quad x > 0$$

Find the x coordinate of the point on the curve at which $\frac{dy}{dx} = 0$

(6)

DO NOT WRITE IN THIS

3.

In this question you must show all stages of your working.**Solutions relying on calculator technology are not acceptable.**

$$y = x^3 + 96\sqrt{x} + 5 \quad x > 0$$

- (a) Find $\frac{dy}{dx}$, giving each term in simplest form.

(3)

- (b) Find the solution of the equation

$$\frac{d^2y}{dx^2} = 0$$

writing the answer in the form 2^k where k is a constant.

(3)

blank

6. (Solutions based entirely on graphical or numerical methods are not acceptable.)

Given

$$f(x) = 2x^{\frac{5}{2}} - 40x + 8 \quad x > 0$$

- (a) solve the equation $f'(x) = 0$

(4)

- (b) solve the equation $f''(x) = 5$

(3)

8.

In this question you must show all stages of your working.**Solutions relying entirely on calculator technology are not acceptable.**

A curve has equation $y = f(x)$, $x > 0$

The point $P(4, 12)$ lies on the curve.

Given that

- $f'(x) = 3\sqrt{x} + kx^2$ where k is a constant
- the equation of the tangent to the curve at P has equation $y = 10x + c$ where c is a constant

- (a) (i) show that $k = \frac{1}{4}$

- (ii) find the value of c

(4)

- (b) Hence find the value of $f''(x)$ at P .

(3)

- (c) Find $f(x)$.

(4)