**4.** **In this question you must show all stages of your working.**

**Solutions relying entirely on calculator technology are not acceptable.**

The curve $C$ has equation

$$y = 4x^{\frac{1}{2}} + 9x^{-\frac{1}{2}} + 3 \qquad x > 0$$

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

**(2)**

(b) Hence find the $x$ coordinate of the stationary point of $C$.

**(2)**

(c) (i) Find $\dfrac{d^2y}{dx^2}$ giving each term in simplest form.

(ii) Hence determine the nature of the stationary point of $C$, giving a reason for your answer.

**(2)**

(d) State the range of values of $x$ for which $y$ is decreasing.

**(1)**

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**Question 4 continued**

**(Total for Question 4 is 7 marks)**

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**5.** (a) Find, in terms of $a$, the first 3 terms, in ascending powers of $x$, of the binomial expansion of

$$(2 + ax)^6$$

where $a$ is a non-zero constant. Give each term in simplest form.

**(3)**

$$f(x) = \left(3 + \frac{1}{x}\right)^2 (2 + ax)^6$$

Given that the constant term in the expansion of $f(x)$ is 576

(b) find the value of $a$.

**(4)**

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