1 A curve with equation $y = f(x)$ is such that $f'(x) = 6x^2 - \frac{8}{x^2}$. It is given that the curve passes through the point $(2, 7)$.

Find $f(x)$. [3]

7 The point (4, 7) lies on the curve $y = f(x)$ and it is given that $f'(x) = 6x^{-\frac{1}{2}} - 4x^{-\frac{3}{2}}$.

(b) Find the equation of the curve. [4]

2 The equation of a curve is such that $\frac{dy}{dx} = 3x^{\frac{1}{2}} - 3x^{-\frac{1}{2}}$. It is given that the point $(4, 7)$ lies on the curve.

Find the equation of the curve. [4]

10 At the point $(4, -1)$ on a curve, the gradient of the curve is $-\frac{3}{2}$. It is given that $\frac{dy}{dx} = x^{-\frac{1}{2}} + k$, where k is a constant.

(a) Show that $k = -2$. [1]

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(b) Find the equation of the curve. [4]

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2 The function f is defined by $f(x) = \dfrac{2}{(x+2)^2}$ for $x > -2$.

(b) The equation of a curve is such that $\dfrac{dy}{dx} = f(x)$. It is given that the point $(-1, -1)$ lies on the curve.

Find the equation of the curve. [2]

6 A curve is such that $\dfrac{dy}{dx} = \dfrac{6}{(3x-2)^3}$ and $A\ (1,\ -3)$ lies on the curve. A point is moving along the curve and at A the y-coordinate of the point is increasing at 3 units per second.

(b) Find the equation of the curve. [4]

7 The curve $y = f(x)$ is such that $f'(x) = \dfrac{-3}{(x+2)^4}$.

(b) Find $f(x)$ given that the curve passes through the point $(-1, 5)$. [3]

10 The gradient of a curve at the point (x, y) is given by $\frac{dy}{dx} = 2(x+3)^{\frac{1}{2}} - x$. The curve has a stationary point at $(a, 14)$, where a is a positive constant.

(c) Find the equation of the curve. [4]

from (a): a = 6

11 The gradient of a curve is given by $\frac{dy}{dx} = 6(3x - 5)^3 - kx^2$, where k is a constant. The curve has a stationary point at $(2, -3.5)$.

(b) Find the equation of the curve. [4]

from (a): k = 3/2

9 A curve which passes through $(0, 3)$ has equation $y = \mathrm{f}(x)$. It is given that $\mathrm{f}'(x) = 1 - \dfrac{2}{(x-1)^3}$.

(a) Find the equation of the curve. [4]

The tangent to the curve at (0, 3) intersects the curve again at one other point, P.

(b) Show that the x-coordinate of P satisfies the equation $(2x + 1)(x - 1)^2 - 1 = 0$. [4]

(c) Verify that $x = \frac{3}{2}$ satisfies this equation and hence find the y-coordinate of P. [2]