Find $\int (1-6x)^{-\frac{1}{2}} dx$ where $x < \frac{1}{6}$.

A $\frac{1}{9}(1-6x)^{-\frac{3}{2}} + c$

B $3(1-6x)^{-\frac{3}{2}} + c$

C $-\frac{1}{3}(1-6x)^{\frac{1}{2}} + c$

D $-3(1-6x)^{\frac{1}{2}} + c$

Given that $y = \sin(x^2 - 3)$, find $\frac{dy}{dx}$.

A $\sin 2x$

B $\cos 2x$

C $2x \sin(x^2 - 3)$

D $2x \cos(x^2 - 3)$

Given that $\int_0^a 5\sin 3x \, dx = \frac{10}{3}, \quad 0 \leq a < \pi,$

calculate the value of a. **5**

If $y = 3\cos^4 x$, find $\frac{dy}{dx}$.

A $12\cos^3 x \sin x$

B $12\cos^3 x$

C $-12\cos^3 x \sin x$

D $-12\sin^3 x$

Find $\int (2x-1)^{\frac{1}{2}}\,dx$ where $x > \frac{1}{2}$.

A $\frac{1}{3}(2x-1)^{\frac{3}{2}}+c$

B $\frac{1}{2}(2x-1)^{-\frac{1}{2}}+c$

C $\frac{1}{2}(2x-1)^{\frac{3}{2}}+c$

D $\frac{1}{3}(2x-1)^{-\frac{1}{2}}+c$

Given that $f(x) = 4\sin 3x$, find $f'(0)$.

A 0

B 1

C 12

D 36

Given that $f(x) = (4-3x^2)^{-\frac{1}{2}}$ on a suitable domain, find $f'(x)$.

A $-3x(4-3x^2)^{-\frac{1}{2}}$

B $-\frac{1}{2}(4-6x)^{-\frac{3}{2}}$

C $2(4-3x^3)^{\frac{1}{2}}$

D $3x(4-3x^2)^{-\frac{3}{2}}$

(*a*) A curve has equation $y = (2x - 9)^{\frac{1}{2}}$.

Show that the equation of the tangent to this curve at the point where $x = 9$ is $y = \frac{1}{3}x$. **5**

(*b*) Diagram 1 shows part of the curve and the tangent.

The curve cuts the x-axis at the point A.

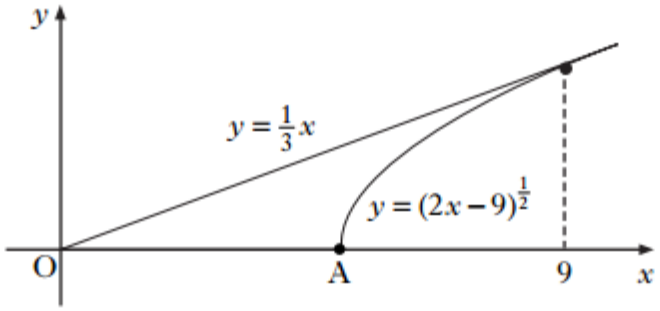


Diagram 1

Find the coordinates of point A. **1**

(*c*) Calculate the shaded area shown in diagram 2. **7**

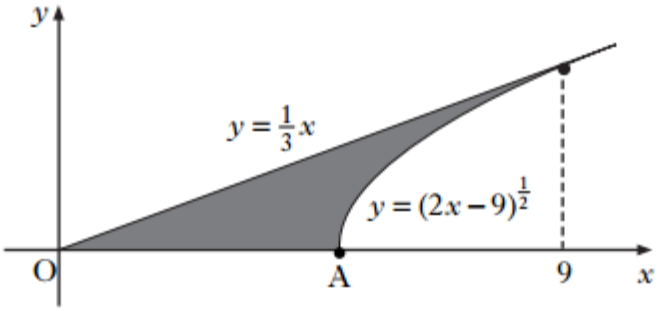
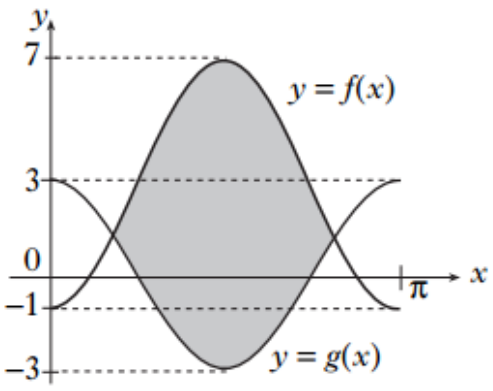


Diagram 2

The graphs of $y = f(x)$ and $y = g(x)$ are shown in the diagram.

$f(x) = -4\cos(2x) + 3$ and $g(x)$ is of the form $g(x) = m\cos(nx)$.



(*a*) Write down the values of m and n. **1**

(*b*) Find, correct to one decimal place, the coordinates of the points of intersection of the two graphs in the interval $0 \leq x \leq \pi$. **5**

(*c*) Calculate the shaded area. **6**