15. What is the derivative of $(x^3 + 4)^2$?
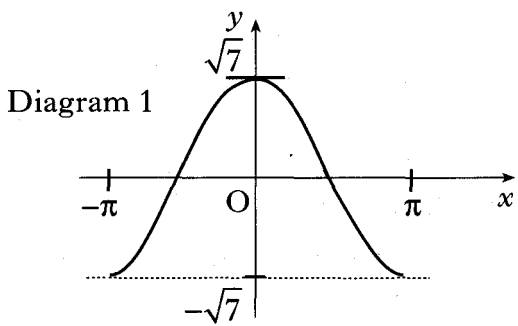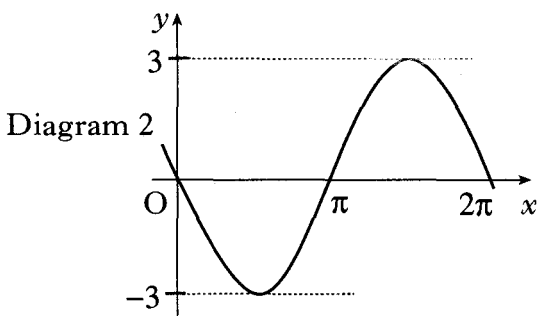
A $(3x^2 + 4)^2$

B $\frac{1}{3}(x^3 + 4)^3$

C $6x^2(x^3 + 4)$

D $2(3x^2 + 4)^{-1}$

2008 P1

2

Ans C

3. (*a*) (i) Diagram 1 shows part of the
graph of $y = f(x)$, where
$f(x) = p\cos x$.

Write down the value of p.   Diagram 1

(ii) Diagram 2 shows part of the
graph of $y = g(x)$, where
$g(x) = q\sin x$.

Write down the value of q.   Diagram 2

2

(*b*) Write $f(x) + g(x)$ in the form $k\cos(x + a)$ where $k > 0$ and $0 < a < \frac{\pi}{2}$.   4

(*c*) Hence find $f'(x) + g'(x)$ as a single trigonometric expression.   2

2008 P2

Ans (*a*) $p = \sqrt{7}$, $q=-3$ (*b*) $4Cos(x+0.848)$ (*c*) $-4Sin(x+0.848)$

10. Given that $y = \sqrt{3x^2 + 2}$, find $\frac{dy}{dx}$.   3

2007 P1

Ans $\frac{1}{2}(3x^2 + 2)^{-\frac{1}{2}} \times 6x$ ($= 3x(3x^2 + 2)^{-\frac{1}{2}}$)

2007 P2	**7.** Find the value of $\int_0^2 \sin(4x+1)\,dx$.	4
Ans	0.36	
2006 P1	**5.** A function f is defined by $f(x) = (2x - 1)^5$. Find the coordinates of the stationary point on the graph with equation $y = f(x)$ and determine its nature.	7
Ans	point of inflexion at $(\frac{1}{2},0)$	
2006 P2	**9.** If $y = \dfrac{1}{x^3} - \cos 2x$, $x \neq 0$, find $\dfrac{dy}{dx}$.	4
Ans	$-3x^{-4} + 2\sin 2x$	
2005 P1	**5.** Differentiate $(1 + 2\sin x)^4$ with respect to x.	2
Ans	$4(1 + 2\sin(x))^3$ $\ldots \times 2\cos(x)$	
2004 P1	**6.** Given that $y = 3\sin(x) + \cos(2x)$, find $\dfrac{dy}{dx}$.	3
Ans	$3\cos(x) - 2\sin(2x)$	
2004 P1	**7.** Find $\int_0^2 \sqrt{4x+1}\ dx$.	5
Ans	$\dfrac{13}{3}$	
2003 P1	**8.** Find $\int_0^1 \dfrac{dx}{(3x+1)^{\frac{1}{2}}}$.	4
Ans	$\frac{2}{3}$	
2003 P2	**6.** If $f(x) = \cos(2x) - 3\sin(4x)$, find the exact value of $f'\left(\dfrac{\pi}{6}\right)$.	4
Ans	$6 - \sqrt{3}$	

2002W P1	**10.** A function f is defined by $f(x) = 2x + 3 + \dfrac{18}{x-4}$, $x \neq 4$. Find the values of x for which the function is increasing.	5
Ans	$f'(x) = 2 - \dfrac{18}{(x-4)^2}$ $f'(x) = 0 \Rightarrow x = 1, 7$ $f'(x) > 0 \Rightarrow x < 1, \ x > 7$	
2002W P2	**8.** Find $\displaystyle\int_0^1 \left(\cos(3x) - \sin\left(\tfrac{1}{3}x + 1\right)\right) dx$ correct to 3 decimal places.	3
Ans	$a = -0{\cdot}868$	
2002 P1	**10.** (a) Find the derivative of the function $f(x) = (8 - x^3)^{\frac{1}{2}}$, $x < 2$. (b) Hence write down $\displaystyle\int \dfrac{x^2}{(8 - x^3)^{\frac{1}{2}}} \, dx$.	2 1
Ans	(a) $f'(x) = -\tfrac{3}{2}\, x^2 (8 - x^3)^{-\frac{1}{2}}$ (b) $-\tfrac{2}{3}\, (8 - x^3)^{\frac{1}{2}} + c$	
2002 P2	**6.** Find the equation of the tangent to the curve $y = 2\sin\left(x - \dfrac{\pi}{6}\right)$ at the point where $x = \dfrac{\pi}{3}$.	4
Ans	$y = \sqrt{3}\,x + 1 - \dfrac{\pi}{\sqrt{3}}$	
2001 P2	**10.** A curve for which $\dfrac{dy}{dx} = 3\sin(2x)$ passes through the point $\left(\tfrac{5}{12}\pi, \ \sqrt{3}\right)$. Find y in terms of x.	4
Ans	$y = -\tfrac{3}{2}\cos(2x) + \tfrac{1}{4}\sqrt{3}$	
2000 P1	**8.** The graph of $y = f(x)$ passes through the point $\left(\dfrac{\pi}{9}, 1\right)$. If $f'(x) = \sin(3x)$ express y in terms of x.	4
Ans	$y = -\tfrac{1}{3}\cos(3x) + \tfrac{7}{6}$	
2000 P2	**8.** Given that $f(x) = (5x - 4)^{\frac{1}{2}}$, evaluate $f'(4)$.	3

Ans	$\frac{5}{8}$	
2000 P2	**10.** Find $\int \dfrac{1}{(7-3x)^2}\,dx.$	2
Ans	$\dfrac{1}{3(7-3x)}+c$	
Specimen 1 P1	**9.** Find $\dfrac{dy}{dx}$ given that $y=\sqrt{1+\cos x}.$	3
Ans	$-\dfrac{1}{2}\sin x(1+\cos x)^{-\frac{1}{2}}$	