

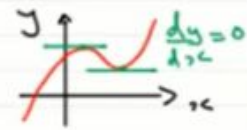


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Stationary Point | Past Paper Question | C1 OCR June 2012 Q8

- (i) Find the coordinates of the stationary point on the curve $y = x^4 + 32x$.
- (ii) Determine whether this stationary point is a maximum or a minimum.
- (iii) For what values of x does $x^4 + 32x$ increase as x increases?



$i) y = x^4 + 32x$ $\therefore \frac{dy}{dx} = 4x^3 + 32$ $\therefore \text{At stat. pts. } \frac{dy}{dx} = 0$ $\therefore 4x^3 + 32 = 0$ $\therefore x^3 + 8 = 0$ $\therefore x^3 = -8$	$\therefore x = \sqrt[3]{-8}$ $= -2$ $\therefore \text{when } x = -2$ $\therefore y = (-2)^4 + 32(-2)$ $= -48$ $\therefore \text{Stationary point}$ $(-2, -48)$	$ii) \frac{d^2y}{dx^2} = 12x^2$ $\text{when } x = -2$ $\therefore \frac{d^2y}{dx^2} = 12(-2)^2$ $= 48$ > 0 $\therefore \text{minimum}$	<table border="1"> <thead> <tr> <th>x</th> <th>-3</th> <th>-2</th> <th>-1</th> </tr> </thead> <tbody> <tr> <td>$\frac{d^2y}{dx^2}$</td> <td>-76</td> <td>0</td> <td>28</td> </tr> </tbody> </table> $\therefore x^3 + 8 > 0$ $\therefore x^3 > -8$ $\therefore x > -2$	x	-3	-2	-1	$\frac{d^2y}{dx^2}$	-76	0	28
x	-3	-2	-1								
$\frac{d^2y}{dx^2}$	-76	0	28								
		$iii) \text{ when } \frac{dy}{dx} > 0$ $\therefore 4x^3 + 32 > 0$									

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