

Page 1-3	Mark Scheme	Syllabus	Paper
	<b>COSMIC CHALLENGING EXAMINATIONS – Set 1</b>	<b>4038</b>	<b>1</b>

**Suggested Solution:**

$$(i) \frac{dy}{dx} = \frac{\sqrt{5x-3} \frac{d(8x+5)}{dx} - (8x+5) \frac{d\sqrt{5x-3}}{dx}}{(\sqrt{5x-3})^2} = \frac{\sqrt{5x-3}(8) - (8x+5) \frac{5}{2\sqrt{5x-3}}}{5x-3}$$

$$= \frac{2(5x-3)(8) - (8x+5)(5)}{2(5x-3)\sqrt{5x-3}} = \frac{80x-48-40x-25}{2(5x-3)\sqrt{5x-3}} = -\frac{40x-73}{2(5x-3)\sqrt{5x-3}}$$

When  $x = 2$ ,  $\frac{dy}{dx} = -0.189$  (ans)

$$(ii) \frac{dy}{dx} = \frac{\delta y}{\delta x}$$

When  $x = 2$ ,  $\frac{dy}{dx} = -0.189$

$$\delta y = \delta x \times \frac{dy}{dx} = p \times -0.189 = -0.189p$$
 (ans)

**Examiner Report:**

- (i) This was very well done by nearly all candidates. The majority realised the need to use function of a function and only a small proportion failed to multiply by 5.
- (ii) Answers were accurate with the majority realising that the change in y was the answer to part (i) multiplied by p.



**4 Mark Scheme:**

(i)  $ax^2 + 3x + 5 > 0$  M1  
 $b^2 - 4ac < 0$  M1  
 Leading to  $a > \frac{9}{20} \Rightarrow a = 1$  A1 [3]

(ii)  $-3x^2 + bx - 2 < 0$  M1  
 $b^2 - 4ac < 0$   
 Leading to  $-\sqrt{24} < b < \sqrt{24} \Rightarrow b = -4$  A1 [2]

**Suggested Solution:**

(i)  $ax^2 + 3x + 5 > 0$   
 $b^2 - 4ac < 0 \Rightarrow (3)^2 - 4(a)(5) < 0 \Rightarrow a > \frac{9}{20}$   
 Smallest integer  $a = 1$  (ans)

(ii)  $-3x^2 + bx < 2 \Rightarrow -3x^2 + bx - 2 < 0$