

c. i. Let  $f(a) = \text{area}$

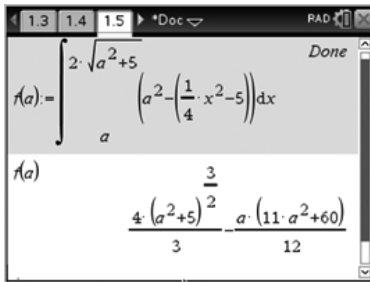
$$= \int_{x_1}^{x_2} (y - g(x)) dx$$

$$= \int_a^{2\sqrt{a^2+5}} \left( a^2 - \left( \frac{1}{4}x^2 - 5 \right) \right) dx$$

$$= \frac{4(a^2+5)^{\frac{3}{2}}}{3} - \frac{a(11a^2+60)}{12}$$

correct integral M1

correct area function A1

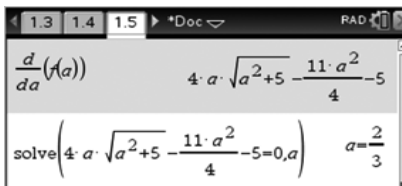


ii. For minimum area, let  $f'(a) = 0$ .

$$4a\sqrt{a^2+5} - \frac{11a^2}{4} - 5 = 0$$

$$a = \frac{2}{3}$$

M1



$$a = \frac{2}{3}, y = \left( \frac{2}{3} \right)^2 = \frac{4}{9}$$

coordinates for minimum area =  $\left( \frac{2}{3}, \frac{4}{9} \right)$

A1