1. **In this question you must show all stages of your working.**

Solutions relying entirely on calculator technology are not acceptable.

(i) Show that

$$\int_{4}^{4\sqrt{3}} \frac{8}{16 + x^2}\,\mathrm{d}x = p\pi$$

where p is a rational number to be determined.

(3)

(ii) Determine the exact value of k for which

$$\int_{\frac{3}{4}}^{k} \frac{2}{\sqrt{9 - 4x^2}}\,\mathrm{d}x = \frac{\pi}{12}$$

(4)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 1 continued

Question 1 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 1 continued

(Total for Question 1 is 7 marks)