Question 10 continued

(Total for Question 10 is 13 marks)

11

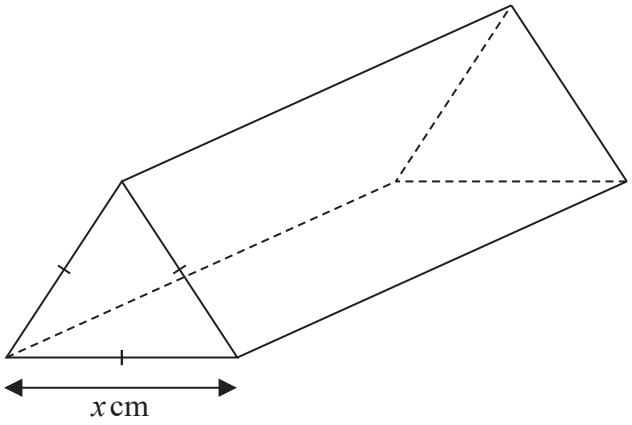

Diagram **NOT** accurately drawn

Figure 4

A company manufactures chocolate bars that are inside packaging that is in the shape of a right triangular prism.

The cross section of the prism is an equilateral triangle with sides of length x cm, as shown in Figure 4.

The volume of the prism is $72\,\text{cm}^3$

The total surface area of the prism is $S\,\text{cm}^2$

(a) Show that

$$S = \frac{\sqrt{3}x^2}{2} + \frac{288\sqrt{3}}{x}$$

(6)

Given that x can vary,

(b) use calculus to find, to 4 significant figures, the value of x for which S is a minimum, justifying that this value gives a minimum value of S.

(5)

(c) Find, to 3 significant figures, the minimum value of S.

(2)