**7**

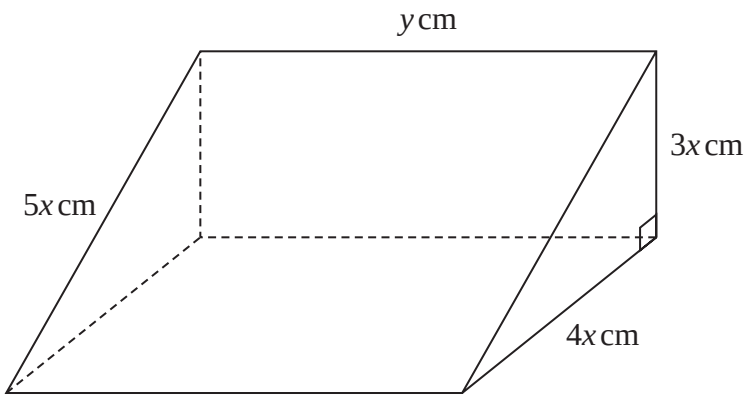


Diagram **NOT** accurately drawn

**Figure 2**

Figure 2 shows a block of wood in the shape of a right triangular prism.

The cross section of the prism is a right-angled triangle with sides of length $3x$ cm, $4x$ cm and $5x$ cm.

The length of the prism is $y$ cm.

The total surface area of the five faces of the prism is $144\,\text{cm}^2$

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

(a) Show that

$$V = 72x - 6x^3$$

**(5)**

Given that $x$ can vary,

(b) use calculus to find the value of $x$ for which $V$ is a maximum, justifying that this value gives a maximum value of $V$

**(4)**

(c) Find the maximum value of $V$

**(2)**

**Question 7 continued**

**Question 7 continued**

**Question 7 continued**

**(Total for Question 7 is 11 marks)**