5. At time $t = 0$, a stone S is projected from a point A on the top of a cliff.

The point A is 120 m above horizontal ground.

The stone S is projected with speed $25\,\text{m s}^{-1}$ at an angle of 60° above the horizontal.

The stone S is modelled as a particle moving freely under gravity.

For the motion of S from A until it first hits the ground

(a) find the maximum height above the ground reached by S,

(4)

(b) find the direction of motion of S when $t = 5$ seconds,

(4)

(c) find the length of time for which S is moving at a speed greater than $25\,\text{m s}^{-1}$

(3)

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Question 5 continued

(Total for Question 5 is 11 marks)