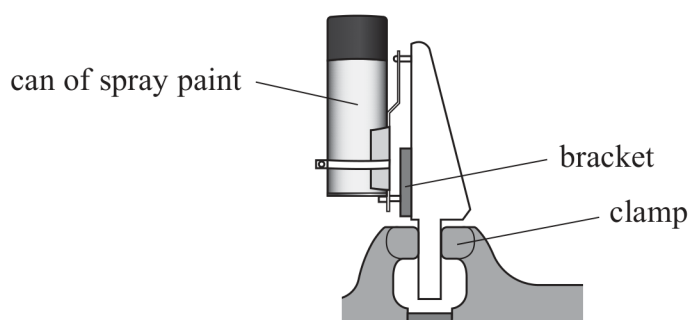19 A can of spray paint needs to be shaken before being used.

The diagram shows a machine designed to shake a can of spray paint.

The bracket oscillates vertically with simple harmonic motion.

(a) State the conditions necessary for an object to move with simple harmonic motion.

(2)

....

....

....

....

(b) When the bracket is oscillating, the distance between the highest and lowest positions of the bracket is 8.0 cm. The bracket completes 270 oscillations per minute.

(i) Sketch a graph on the axes opposite to show how the velocity v of the bracket depends upon time t. Your graph should include velocity and time values.

(6)

....

....

....

....

$v\,/\,\mathrm{m\,s}^{-1}$

$t\,/\,\mathrm{s}$

(ii) Determine the maximum acceleration of the bracket.

(2)

....

....

....

Maximum acceleration of bracket = ...

(iii) Suggest why the particles of paint in the can will experience a maximum acceleration that is different from the answer to (ii).

(1)

....

....

(Total for Question 19 = 11 marks)