For Examiner's Use

1 **(a)** A ball is thrown from point S, as shown on Fig. 1.1.

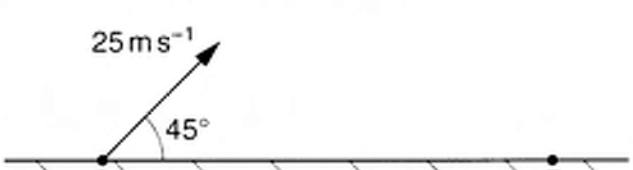

Fig. 1.1

The initial velocity of the ball is 25 m s^{-1} at an angle to the horizontal of 45°. The mass of the ball is 6.0×10^{-2} kg. The ball lands at point F. The points S and F are at the same horizontal level.

(i) Calculate the vertical component of the ball's initial velocity.

vertical component = ... m s^{-1} [1]

(ii) Show that the maximum height reached by the ball is 16 m, assuming no dissipative forces.

[1]

(iii) The kinetic energy of the ball at S is *K*. Calculate the kinetic energy and the potential energy of the ball in terms of *K* at a height of

1. 16 m,

kinetic energy = ...

potential energy = ...

2. 8.0 m.

kinetic energy = ...

potential energy = ...

[5]

For Examiner's Use

(b) The horizontal distance from S towards F is x.

(i) On Fig. 1.2, sketch the variation with x of the potential energy E_p of the ball.

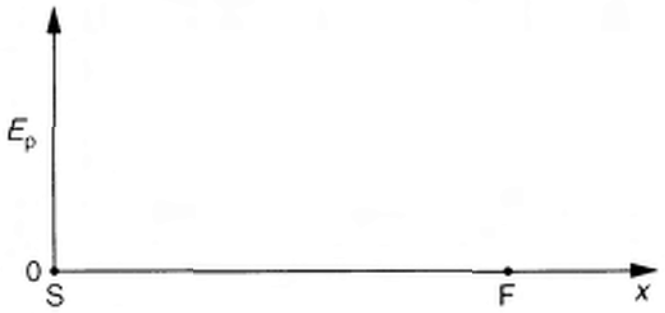

Fig. 1.2

[1]

(ii) On Fig. 1.3, sketch the variation with x of the kinetic energy E_k of the ball.

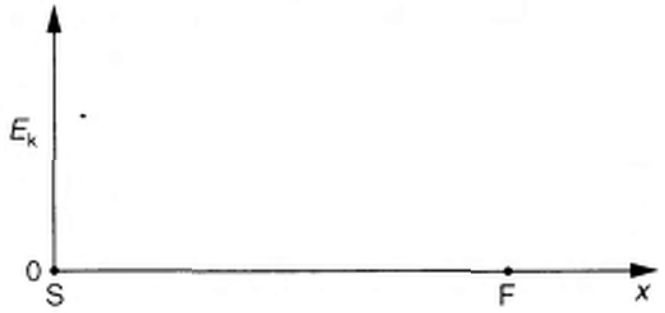

Fig. 1.3

[2]