3 **(a)** An object falls vertically from rest through air. State and explain the energy conversions that occur as the object falls.

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.....

.....

..... [3]

(b) A ball of mass 150 g is thrown vertically upwards with an initial speed of 25 m s^{-1}.

(i) Calculate the initial kinetic energy of the ball.

kinetic energy = ... J [3]

(ii) The ball reaches a height of 21 m above the point of release.

For the ball rising to this height, calculate

1. the loss of energy of the ball to air resistance,

energy loss = ... J [3]

2. the average force due to the air resistance.

force = ... N [2]