Question

We have next data:

$m = 16.0 \ kg$
$h = 40.0 \ m$
$g = 9.8 \ \dfrac{m}{s^2}$

We need to find:

E_K - ?

v - ?

Solution:

a) According to the Law of Energy Conservation kinetic energy of the bag as it hits the water equal to the potential energy of the bag before its falling. So, we have that:

$E_K = E_P = m \cdot g \cdot h$. So, we have: $E_K = m \cdot g \cdot h = 16 \cdot 40 \cdot 9.8 = 6272$ Joules.

<u>Answer:</u> the kinetic energy of the bag as it hits the water equal to 6272 Joules.

b) According to the definition of the kinetic energy we know that $E_K = \dfrac{m \cdot v^2}{2}$. So, we can find vertical speed the bag has on impact:

$$E_K = \frac{m \cdot v^2}{2} \Rightarrow v^2 = \frac{2 \cdot E_K}{m} \Rightarrow v = \sqrt{\frac{2 \cdot E_K}{m}} = \sqrt{\frac{2 \cdot m \cdot g \cdot h}{m}} = \sqrt{2 \cdot g \cdot h} = \sqrt{2 \cdot 9.8 \cdot 40} = 28 \ \frac{m}{s}.$$

<u>Answer:</u> $28 \ \dfrac{m}{s}$.