15 The total energy input E_{in} in a process is partly transferred to useful energy output U and partly transferred to energy that is wasted W.

What is the efficiency of the process?

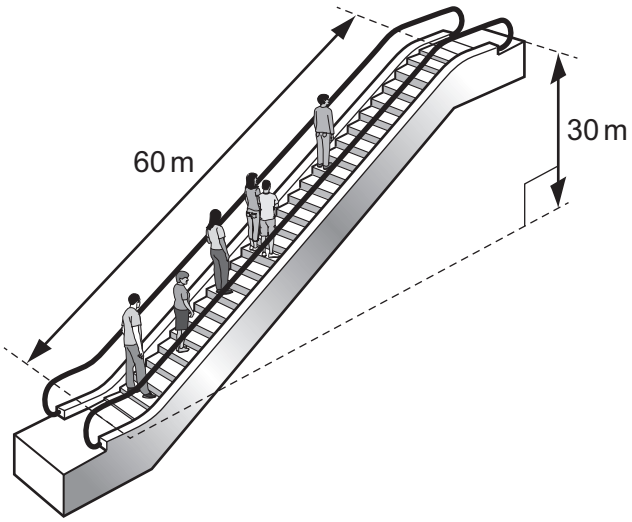
A $\frac{U}{E_{in}} \times 100\%$

B $\frac{W}{E_{in}} \times 100\%$

C $\frac{U}{W} \times 100\%$

D $\frac{U+W}{E_{in}} \times 100\%$

16 An escalator is 60 m long and lifts passengers through a vertical height of 30 m, as shown.



To drive the escalator against the forces of friction when there are no passengers requires a power of 2.0 kW.

The escalator is used by passengers of average mass 60 kg and the power to overcome friction remains constant.

How much power is required to drive the escalator when it is carrying 20 passengers and is travelling at 0.75 m s^{-1}?

A 4.4 kW **B** 6.4 kW **C** 8.8 kW **D** 10.8 kW

17 A rock of mass 40 kg is released from rest from a height of 20 m above the surface of a planet.

The rock has a kinetic energy of 32 kJ when it hits the surface of the planet. The planet does not have an atmosphere.

What is the weight of the rock on the surface of the planet?

A 1.6 N **B** 390 N **C** 1.6 kN **D** 64 kN