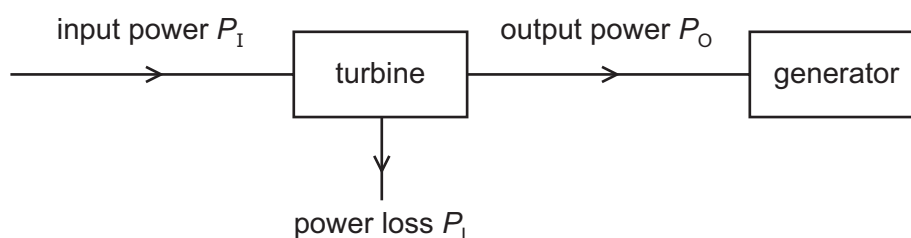**15** A steam turbine is used to drive a generator. The input power to the turbine is P_I and the output power is P_O. The power loss in the turbine is P_L, as shown below.

What is the efficiency of the turbine?

A $\dfrac{P_L}{P_O}$ **B** $\dfrac{P_I}{P_O}$ **C** $\dfrac{P_L}{P_I}$ **D** $\dfrac{P_O}{P_I}$

16 A constant force pushes a block along a horizontal frictionless surface. The block moves from rest through a fixed distance.

What is the relationship between the final speed v of the block and its mass m?

A $\sqrt{v} \propto \dfrac{1}{m}$ **B** $v \propto \sqrt{m}$ **C** $v \propto \dfrac{1}{\sqrt{m}}$ **D** $\sqrt{v} \propto m$

17 A man has a mass of 80 kg. He ties himself to one end of a rope which passes over a single fixed pulley. He pulls on the other end of the rope to lift himself up at an average speed of $50\,\text{cm s}^{-1}$.

What is the average useful power at which he is working?

A 40 W **B** 0.39 kW **C** 4.0 kW **D** 39 kW

18 Two wires with the same Young modulus E and cross-sectional area A, but different lengths L, are subject to different tensile forces F. The extension e of each wire is the same.

The column headings in the table show four different quantities.

Which quantities have the same value and which quantities have different values for the two wires?

	$\dfrac{FL}{e}$	$\dfrac{Ae}{L}$	$\dfrac{E}{FL}$
A	different	different	same
B	different	same	same
C	same	different	different
D	same	different	same