16 A hydroelectric power station uses the gravitational potential energy of water to generate electrical energy.

In one particular power station, the mass of water flowing per unit time is $1.5 \times 10^5\,\text{kg s}^{-1}$. The water falls through a vertical height of 120 m.

The electrical power generated is 100 MW.

What is the efficiency of the power station?

A 5.6% **B** 43% **C** 57% **D** 77%

17 Which amount of energy is **not** 2400 J?

A the decrease in gravitational potential energy of a mass of 60 kg when it moves vertically downwards through 40 m near the Earth's surface

B the energy transferred in 15 s by a machine of power 160 W

C the kinetic energy of a mass of 12 kg moving at a speed of $20\,\text{m s}^{-1}$

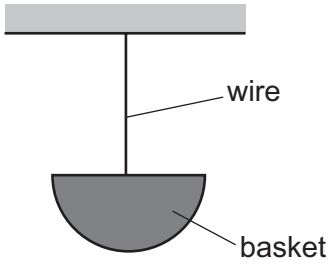
D the work done by a gas expanding against a constant external pressure of 120 kPa when its volume increases by $0.020\,\text{m}^3$

18 A train of mass 300 000 kg is accelerating at $0.80\,\text{m s}^{-2}$. At one instant, the speed of the train is $5.0\,\text{m s}^{-1}$ and the resistive force to its motion is 15 kN.

At this instant, what is the rate of increase of kinetic energy of the train?

A 0.075 MW **B** 1.2 MW **C** 1.3 MW **D** 3.8 MW

19 A wire of circular cross-section, which obeys Hooke's law, is used to suspend a basket as shown.



The Young modulus for the material of the wire is $2.5 \times 10^{11}\,\text{Pa}$.

When a weight of 34 N is added to the basket, the strain in the wire increases by 6.0×10^{-5}.

What is the radius of the wire?

A $7.2 \times 10^{-7}\,\text{m}$ **B** $2.3 \times 10^{-6}\,\text{m}$ **C** $8.5 \times 10^{-4}\,\text{m}$ **D** $1.7 \times 10^{-3}\,\text{m}$