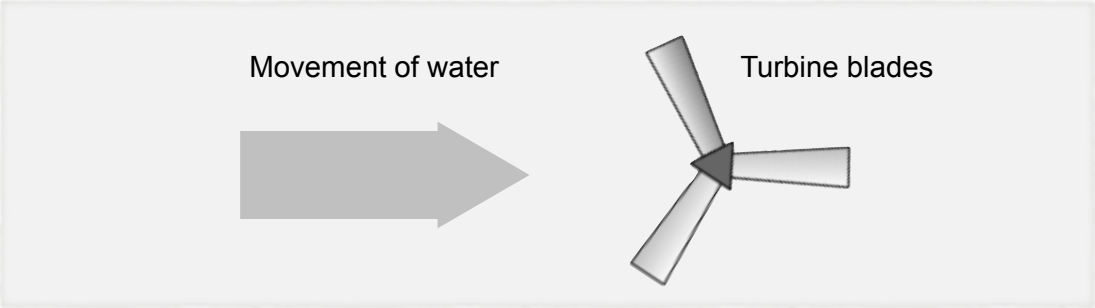
1 The diagram shows the blades of a turbine that is used to generate electricity from moving tidal water. For a period of time, the average mass of the water that hits the blades is 20,000 kg. The velocity of the water is 5 m/s.



1 (a) Calculate the kinetic energy of the water hitting the blades.

Use the correct equation from the equation sheet.

Show your working.

½ x 20,000 x 5 x 5 [1 mark] or 10,000 x 5 x 5 or 10,000 x 25 or ½ x 500,000 [1 mark]

You get the full two marks if you just put the answer but you must show your working.

Kinetic Energy = …250,000… Joules

(2 marks)

1 (b) If the velocity of the water doubles, the kinetic energy of the water more than doubles.

Explain why.

Velocity of the water is squared or doubling velocity makes (kinetic) energy 4 times bigger

(1 Mark)

(Total 3 marks)

2 A car travels at a constant velocity of 20 m/s along a road. The mass of the car is 500 kg.

Calculate the kinetic energy of the car.

Show your working.
½ x 500 x 20 x 20 or correct calculation

100,000

You must show the way you calculated the answer for this question. It shows that you understand that a decrease in potential energy causes a proportional increase in kinetic energy.

Kinetic energy = ……100,000…. J

(2 marks)

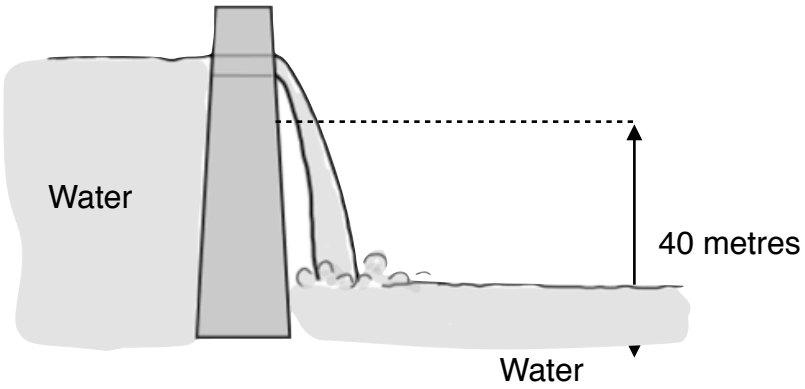
2 (a) The driver of the car applies the brakes and the car comes to a stop.

Explain what happens to most of the kinetic energy of the car?

Friction with the wheels/brakes shoes/brakes [1 marks]
converted to heat (energy) [1 mark]
given/emitted to the surroundings. [1 mark] *Max 2 marks*

(2 marks)
(Total 4 marks)

3 The diagram shows water falling from the top of a dam.



3 (a) The water drops from a height of 40 metres and on average, 10,000 Kg of water falls per second. Calculate the potential energy of 1000 Kg of water when it is at the top of the dam.

Gravitational Field Strength = 10 N/kg

Use the correct equation from the equation sheet.

Show your working

1000 x 10 x 40 or correct calculation [1 mark]

Potential Energy = …400 000. J

(2 marks)

3 (b) What is the kinetic energy of the of the 1000 kg of water, exactly 10 metres from the top of the point where it starts to fall? Assume no energy is lost other than gravitational potential energy.

Show how you calculate your answer.

400 000 / 4 or 10/40 x 400 000 or a quarter of 400 000 [1 mark]

100 000 [1 mark]

If you made an error in 3 (a), then you will still get the mark for your calculation, if it is correct, with the figure you got in 3 (a).

(2 marks)

Total 4 marks)