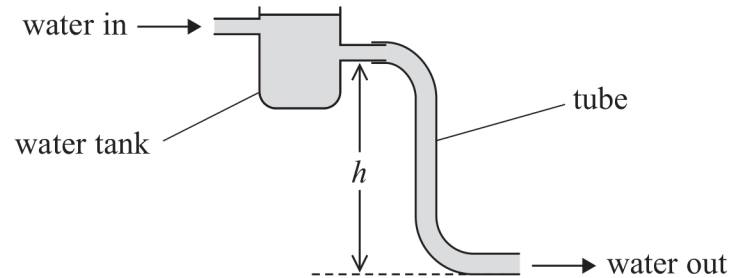


Answer ALL questions.

- 1 A water tank is shown below. The depth of water in the water tank is kept constant.
- The height h can be adjusted to vary the volume flow rate of the water moving out of the tube.



- (a) Describe a simple method to determine the volume flow rate of the water moving out of the tube.

(3)

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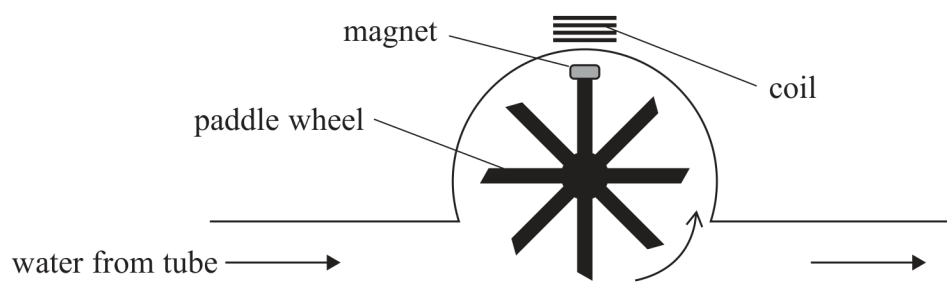
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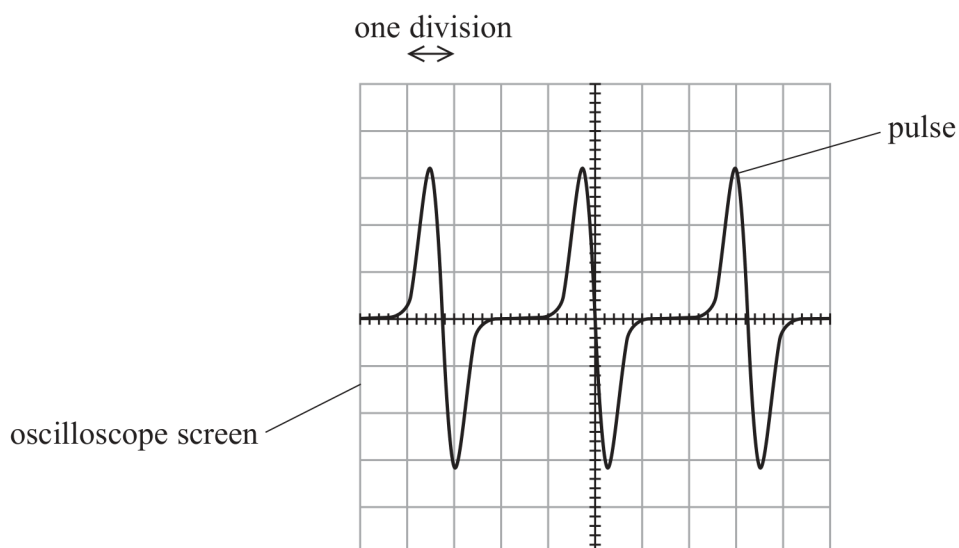
- (b) A student connected the tube to the water flow device shown below. A magnet is attached to the paddle wheel.



As water flowed through the device the paddle wheel rotated, making the magnet move past the coil.

The student connected the coil to an oscilloscope.

A series of pulses was displayed on the oscilloscope screen as shown.



The horizontal axis represents time.

The time scale was set to 50 ms per division.

Calculate the frequency f of the pulses.

(3)

$f =$

- (c) Describe how the student could investigate how f varies with the volume flow rate of the water.

(3)

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- (d) The student disconnected the water tank and oscilloscope from the water flow device.

The student placed the water flow device in a river to monitor the flow of the river water overnight.

He connected the coil of the water flow device to a data logger. The data logger recorded the frequency of the pulses.

Give **two** reasons why a data logger is an appropriate piece of equipment to use for this task.

(2)

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(Total for Question 1 = 11 marks)