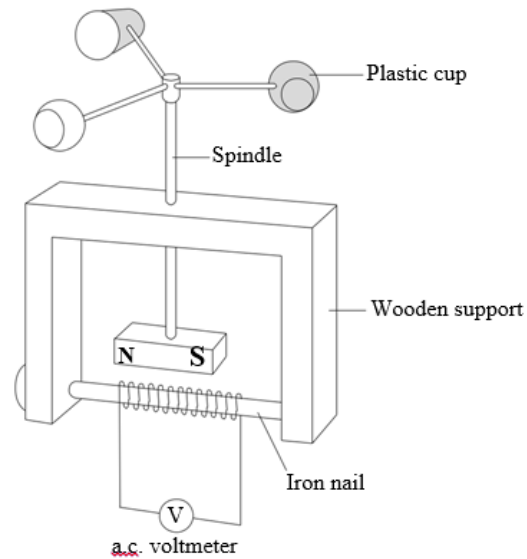


# GENERATOR EFFECT

**Q1** The diagram shows a student's design for a simple wind speed gauge.



**(a)** Explain why the wind causes the a.c. voltmeter to give a reading. The explanation has been started for you.

The wind causes the plastic cups to turn. This causes the spindle and magnet to turn.

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(2 marks)

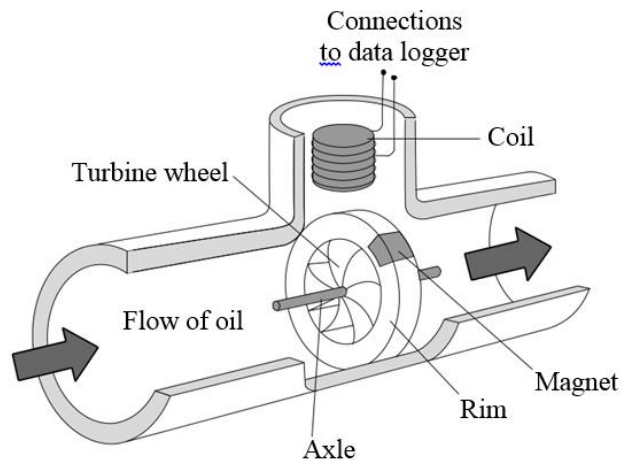
(b) The gauge is not sensitive enough to measure light winds. Suggest one way that the design can be modified to make the gauge more sensitive.

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(1 mark)

**Q 2.** The diagram shows the inside of an oil pipeline and a student's design for a meter to measure the flow of oil.



As oil flows through the pipeline, the oil rotates a turbine wheel. Above the turbine wheel is a coil of wire connected to a data logger. There is a magnet in the rim of the turbine wheel. The turbine wheel spins and this induces a varying potential difference (p.d.) across the ends of the coil. This varying p.d. is recorded by the data logger.

(a) Complete the sentence by writing in the space.

The faster the oil flows through the pipeline, \_\_\_\_\_ the the maximum p.d. across the coil.

(1 mark)

(b) Explain why a varying p.d. is induced across the coil even when the rate of flow of oil remains constant.

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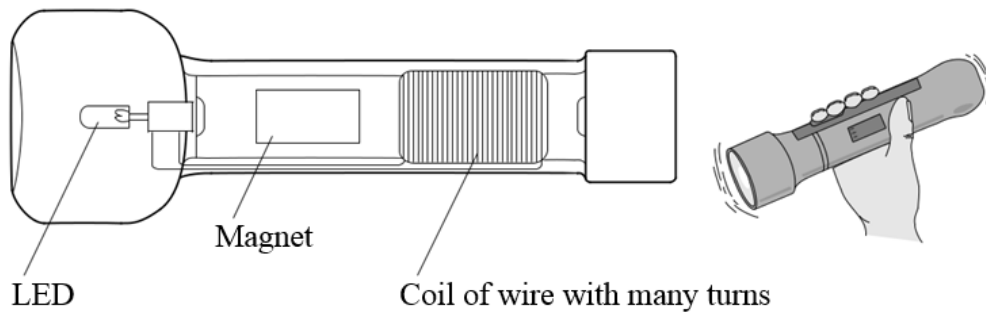
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(3 marks)

**Q3.** The diagram shows some parts of a torch which works without batteries. The coil is part of a complete circuit with the LED (light-emitting diode).

You have to shake the torch for a short time and then it is ready to use.



**(a)** Arrange the letters, A, B, C, D and E, in the correct order to explain how shaking the torch produces an electric current.

- A** An electric current is induced in the circuit.
- B** The magnetic field cuts through the coil.

**C** The magnet moves in and out of the coil.

**D** A potential difference (p.d.) is induced across the ends of the coil.

**E** The torch is shaken to and fro.

The first letter has been done for you.

E				
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(2 marks)

**(b)** Give two changes which you would make to the design of the torch to increase the size of the induced potential difference.

1.

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2.

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(2 marks)

**(c)** A few minutes after shaking, the LED gets dimmer and then stops giving out light.

A student tests the torch. She shakes it for a period of time. Then she switches it on and times how long the light lasts.

These are her results.

Period of time torch is shaken measured in seconds	How long the light lasts measured in seconds
30	168
60	312
90	420
120	546
150	654

(c)(i) What conclusion can the student come to on the basis of these results?

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(1 mark)

(c)(ii) The student's friend says that the results are not reliable. Her friend is correct.

Give two reasons why.

1.

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2.

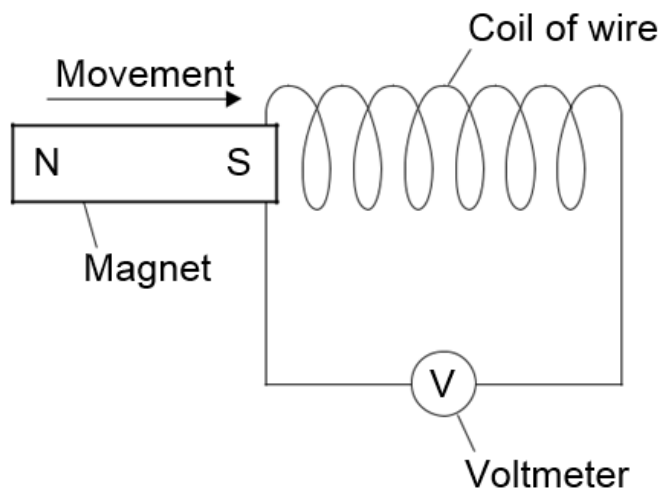
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(2 marks)

**Q4.** Figure 11 shows a magnet moving into a coil of wire. This movement causes a reading on the voltmeter.

**Figure 11**



**(a)** Use the correct word from the box to complete the sentence.

generated	induced	produced
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Moving the magnet into the coil of wire causes a reading on the voltmeter because a potential \_\_\_\_\_ difference across the ends of the wire.

(2 marks)

**(b)** A student investigated how the number of turns on the coil of wire affects the maximum voltmeter reading. The student changed the number of turns on the coil of wire, then moved the magnet into the coil. The student recorded the maximum voltmeter reading.

To obtain valid data, suggest two variables that the student should control in this investigation.

1.

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2.

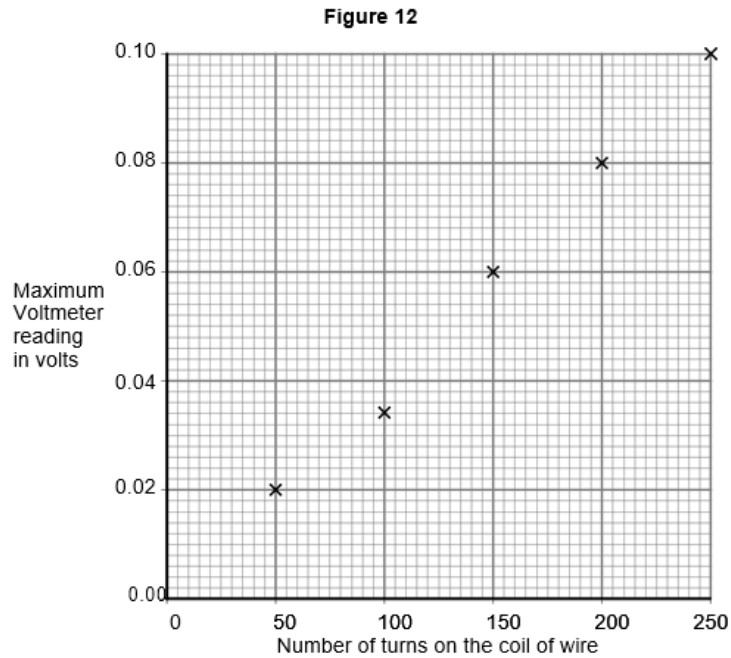
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[2 marks]

(c) The student's results are shown in **Figure 12**



(c) (i) One of the results is anomalous.

Suggest a reason for the anomalous result.

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[1 mark]

(c) (ii) Draw a line of best fit on Figure 12.

[1 mark]

(d) A data-logger can automatically record and store data.

It may have been better for the student to have used a data-logger in his investigation rather than a voltmeter.

Suggest one reason why.



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[1 mark]