25   Characteristics

Component characteristic graphs can be used to predict the amount of current drawn by an electrical component when a certain potential difference is across it. With these two values, the resistance of the component can be calculated using the equation,

$$\text{resistance} = \text{voltage}/\text{current} \qquad R = V/I$$

A voltage-current graph that is a straight line through the origin shows that the resistance of the component is independent of the potential difference across it, or the current flowing through it.

A graph with a curved line shows that the resistance depends on the potential difference applied across it; the resistance does not have a constant value.

Characteristic graphs are typically drawn with the current (I) on the y-axis (the vertical axis) and the potential difference (V) on the x-axis (the horizontal axis), although they can also be drawn the other way around.

A negative value for V means that the supply is connected to the component the other way round. You then get a negative value for I meaning that the current is now flowing the opposite way through it.

25.1   For these questions consider the following graph. When reading
       values from the axes, round to the nearest integer.

   (a) What current is drawn at a voltage of 2 V?

   (b) What current is drawn at a voltage of 6 V?

   (c) What is the resistance at 1 V?

   (d) What is the resistance at 10 A?
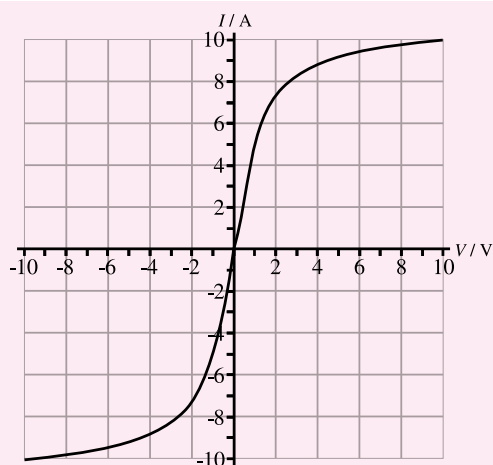
**25.2** The following characteristic graph is for a typical diode.

    (a) What is the resistance at 1 V?

    (b) Does the resistance change above 1 V? Explain your answer.
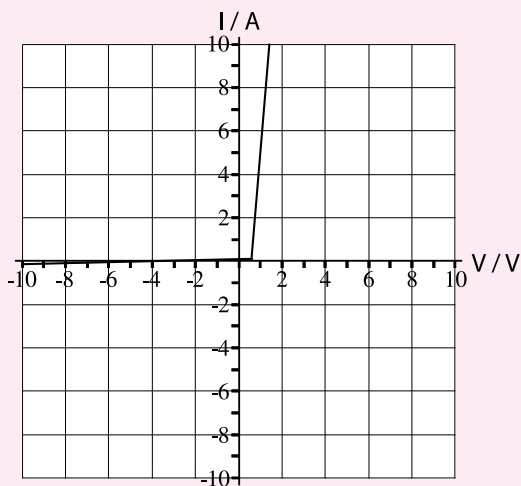
25.3 An ohmic device is one where the resistance does not depend on voltage for fixed physical conditions (e.g. temperature). What two

features would you expect to see in a characteristic graph of an
ohmic device?

25.4 The following graph shows how the potential difference across a
conductor varies with the current through it. Calculate the resist-
ance of the conductor.
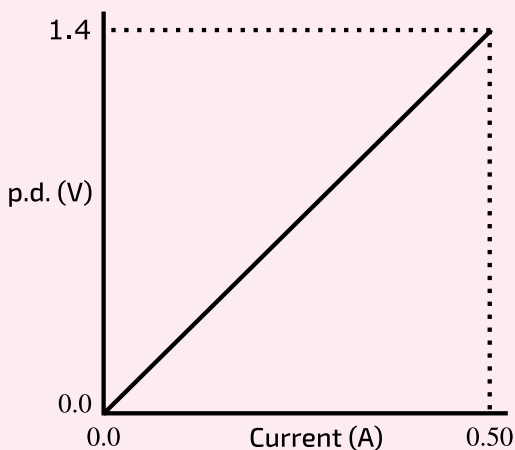
25.5 The graph below shows how the potential difference across a con-
ductor varies with the current through it. How does the resistance
of the conductor change with increasing current?

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