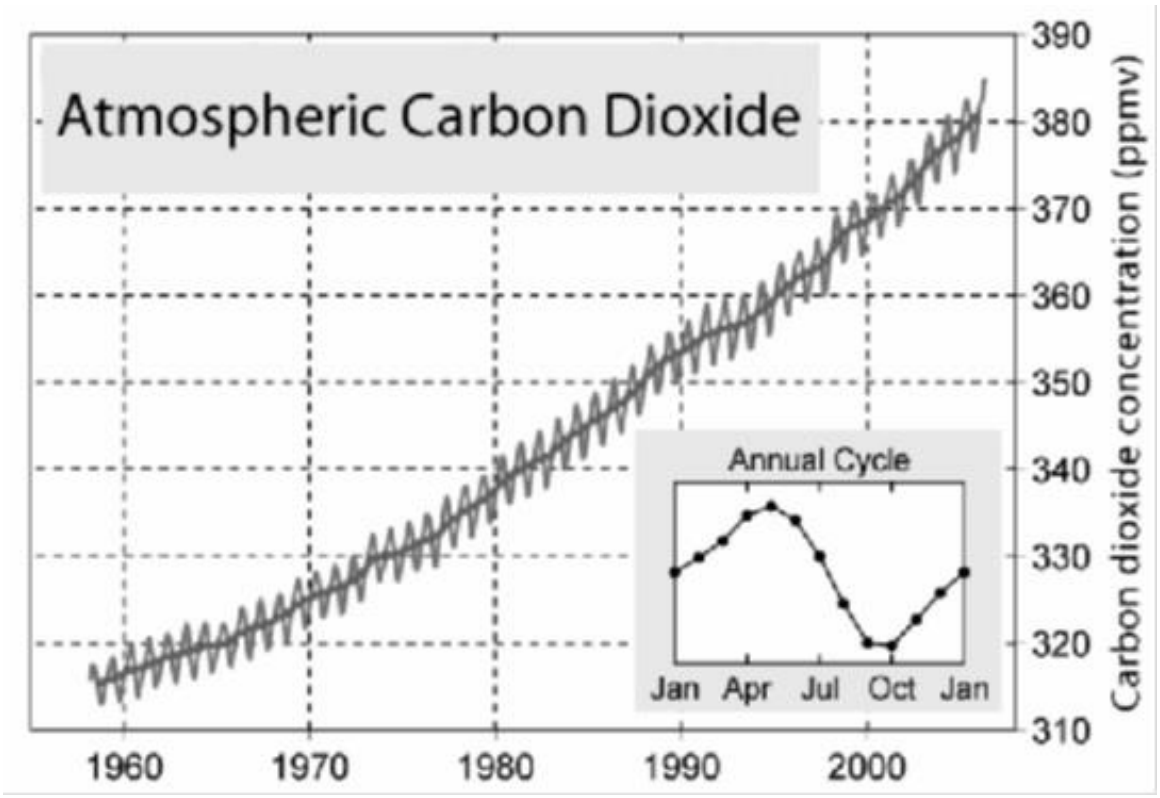
Graph Questions
from
Junior Cert Science Past Papers

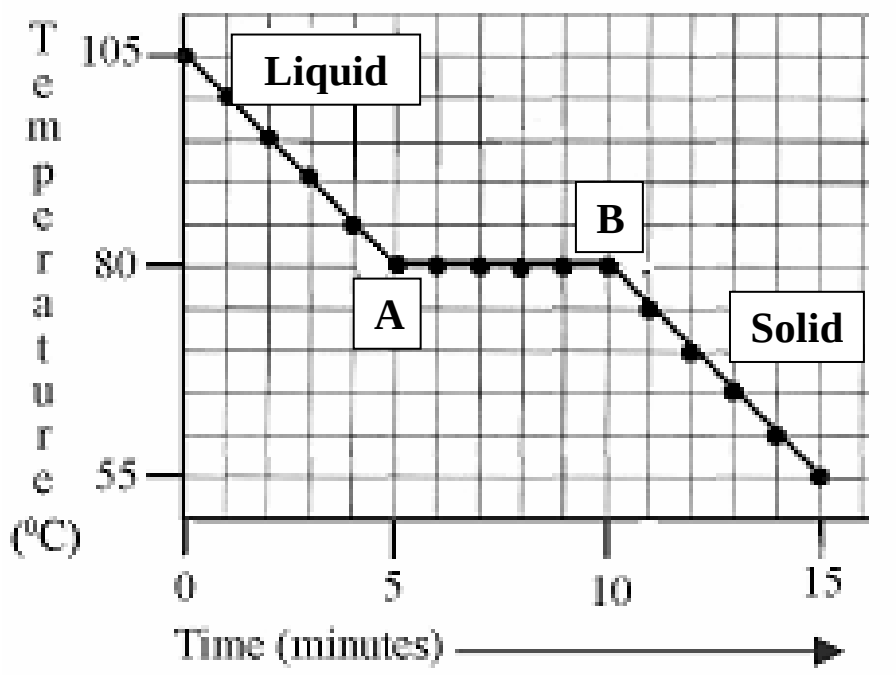


Compiled by
Declan Finlayson

Contents

2006 HL Question 8 (c) Cooling Curve

The graph is a ***cooling curve***.



The substance used in this experiment was naphthalene. Naphthalene has a melting point of 80 °C.
The rate of heat loss was constant throughout the experiment.

(*i*) What is ***happening*** to the naphthalene between points **A** and **B** on the graph? (3)

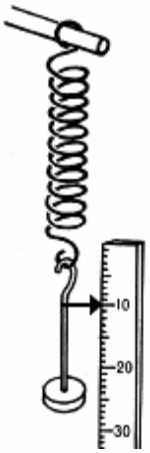
_____

_____

(*ii*) What is the ***heat loss***, between points **A** and **B**, on the curve called? (3)

_____

2006 HL Question 9 Hooke's Law



(*a*) Robert Hooke (1635-1703) made a number of discoveries including the effect of force on elastic bodies now known as Hooke's law. ***State Hooke's law***. (6)

Hooke's law _____

_____

A student was given a box of identical springs and asked to analyse them so that they could be used as newton meters.

The student performed an experiment, using the apparatus shown in the diagram, on one of the springs.

In the experiment the student measured the increase in length of the spring caused by a number of weights. The spring was tested to destruction (that is weights were added until the spring was damaged).

The data from the experiment is given in the table.

Weight (N)	0.0	0.4	0.8	1.2	1.6	2.0	2.4
Extension (cm)	0.0	2.0	4.0	6.0	8.0	8.5	8.6

(*i*) Plot a ***graph of extension*** (increase in length) ***against weight*** (*x*-axis), in the grid provided on the right. (9)

(*ii*) Use the graph to find the ***weight*** that would produce an ***extension*** of 5 cm in the spring. (3)

Weight

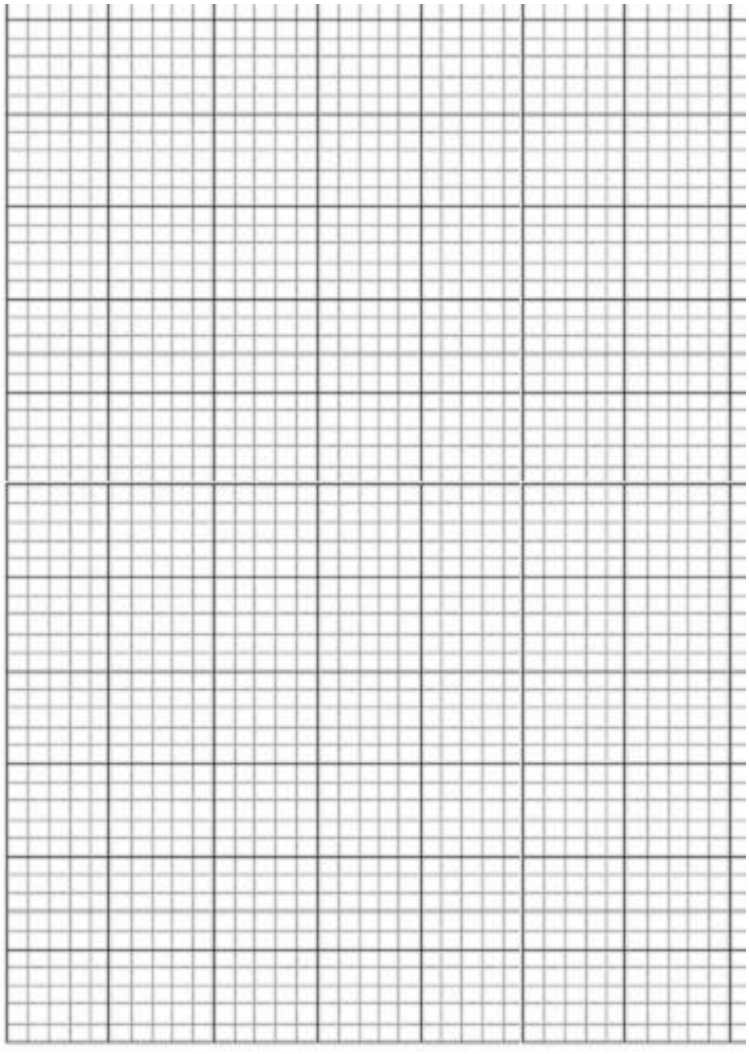
_____

(*iii*) Study your graph carefully.

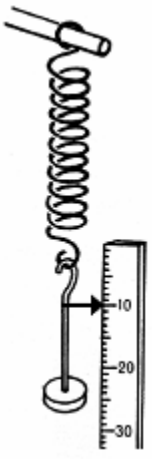
The spring obeys Hooke's law for the earlier extensions and then when the spring becomes damaged it does not appear to do so.

Estimate, from your graph, ***the weight after the addition of which the law seems no longer to apply***. (3)

_____



2006 OL Question 9 (b) Hooke's Law



(*b*) A student carried out an investigation to examine the **relationship** between the **extension** (increase in length) **of a spring** and the **force applied** to it.
The diagram shows the apparatus used.
The table shows the data collected by the student.

Force (N)	0	2	4	6	8
Extension (cm)	0	4	8	12	16

(*i*) **Describe** how the student could have taken any one of these measurements. (6)

_____

_____

_____

(*ii*) **Draw a graph** of the extension (*y*-axis) against the force in the grid provided on the right. (9)

(*iii*) **What force** results in a **6 cm** extension of the spring? _____ **N** (3)

2007 HL Question 5 Solubility

(*a*) Distinguish between a ***concentrated*** and a ***dilute*** solution? (3)

_____

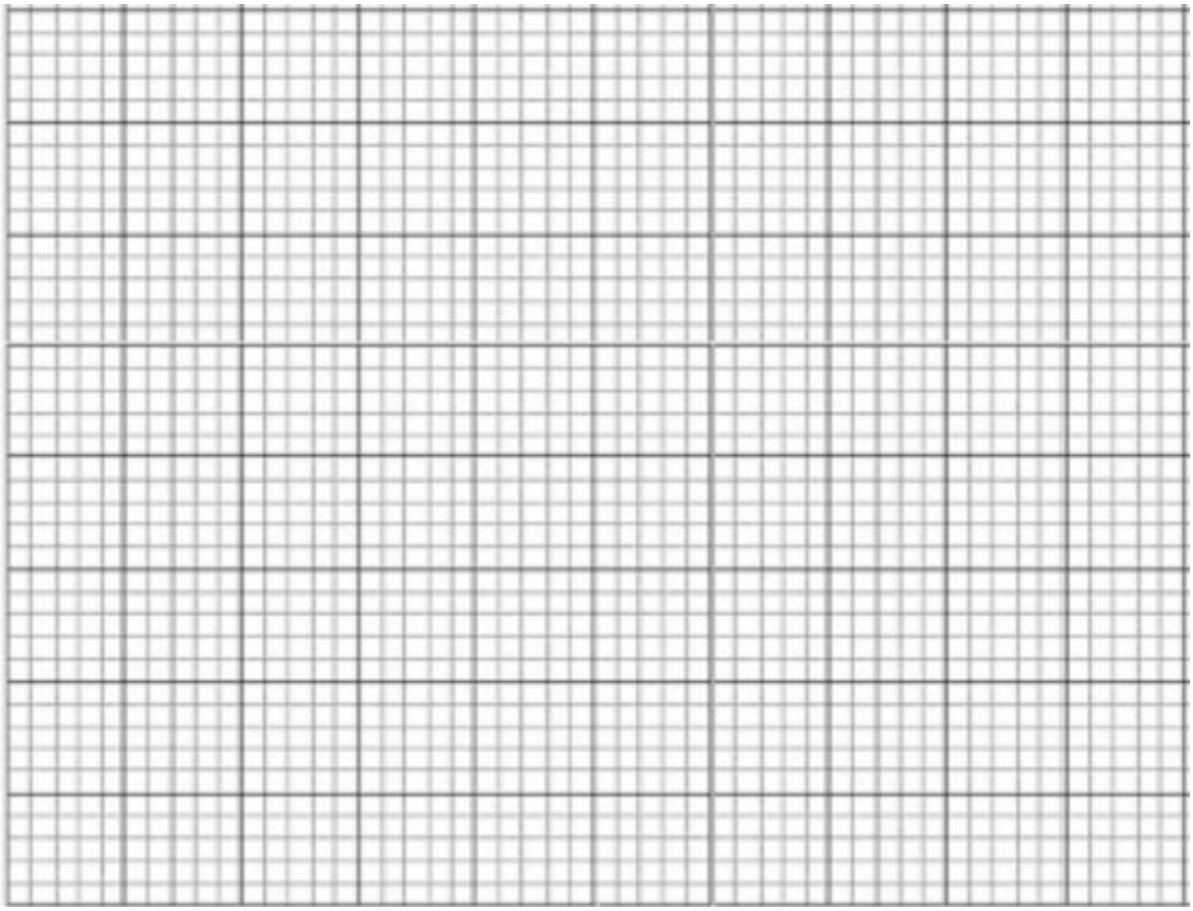
_____

_____

A pupil investigated the ***effect of temperature on the solubility*** of the salt ammonium chloride in water. She determined the maximum mass, in grams, of the salt that would dissolve in 100 g of water at various temperatures.
The data from this experiment are given in the table.

Solubility (g/100 g water)	29	37	46	55	66	77
Temperature (° C)	0	20	40	60	80	100

Plot a graph of solubility against temperature in the grid below. (9)



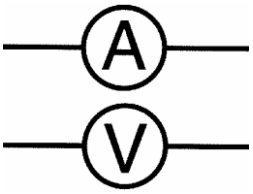
Use the graph to ***estimate the solubility*** of ammonium chloride at 70° C. (3)

Solubility _____

What ***conclusion*** about the solubility of ammonium chloride can be drawn from analysis of the graph? (3)

Conclusion _____

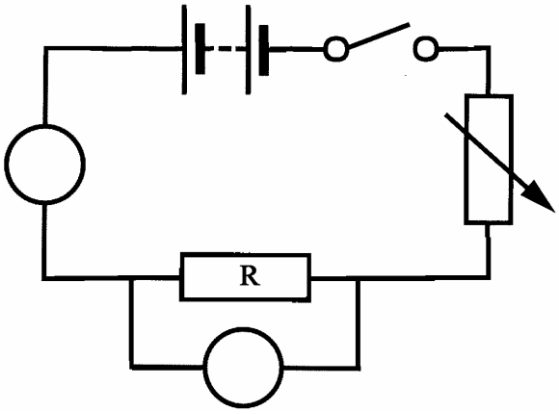
2007 HL Question 9 (b) Ohm's Law



The symbols for two electrical meters are given in the diagram. The 'V' symbol is for a meter that measures potential difference, often called 'voltage'.

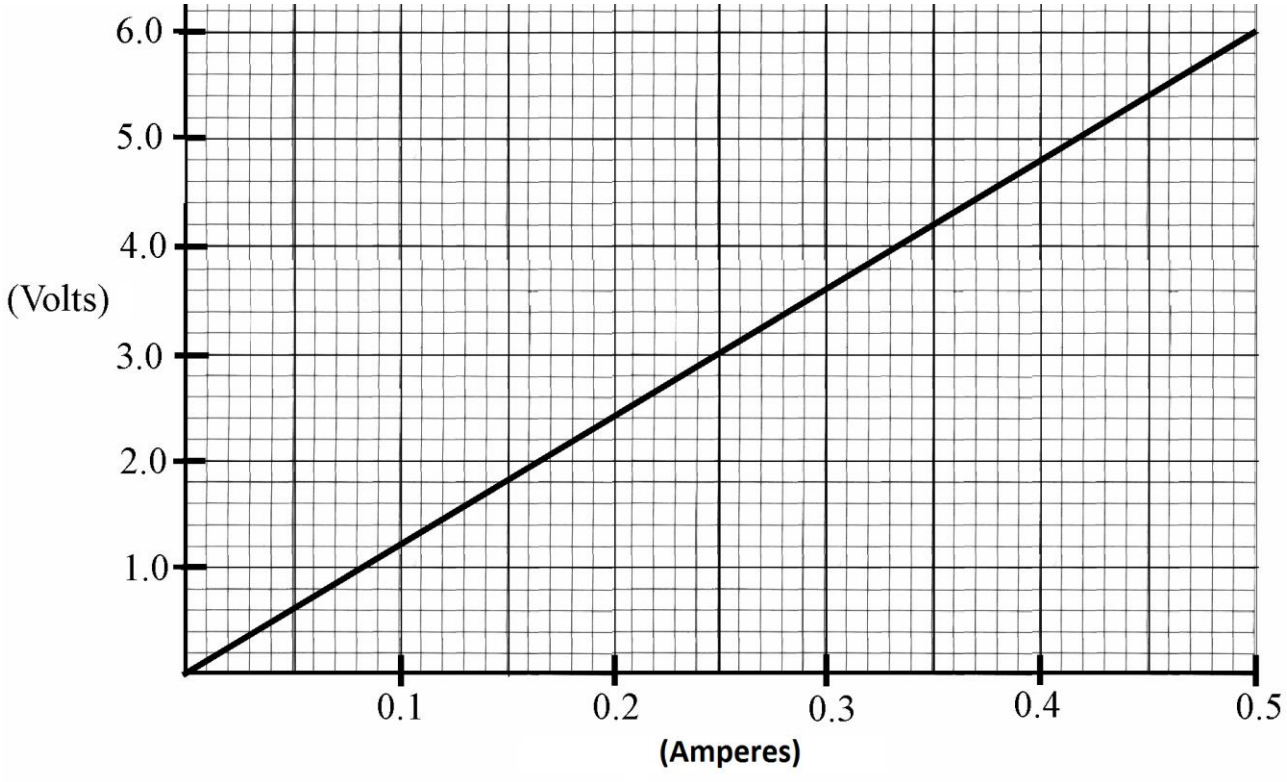
What ***electrical quantity*** can be measured using the meter with the 'A' symbol? (3)

What? _____



Meters and are used in the circuit shown.
Enter '**A**' into the ***appropriate circle of one of the meter symbols*** in the circuit diagram so as to clearly identify its correct position. (3)

A pupil used this circuit to get a set of readings from both meters for different values and then plotted this data in the graph shown.



Use this graph to ***calculate the resistance*** of resistor **R** shown in the diagram.
Give the unit of resistance with your answer. (9)

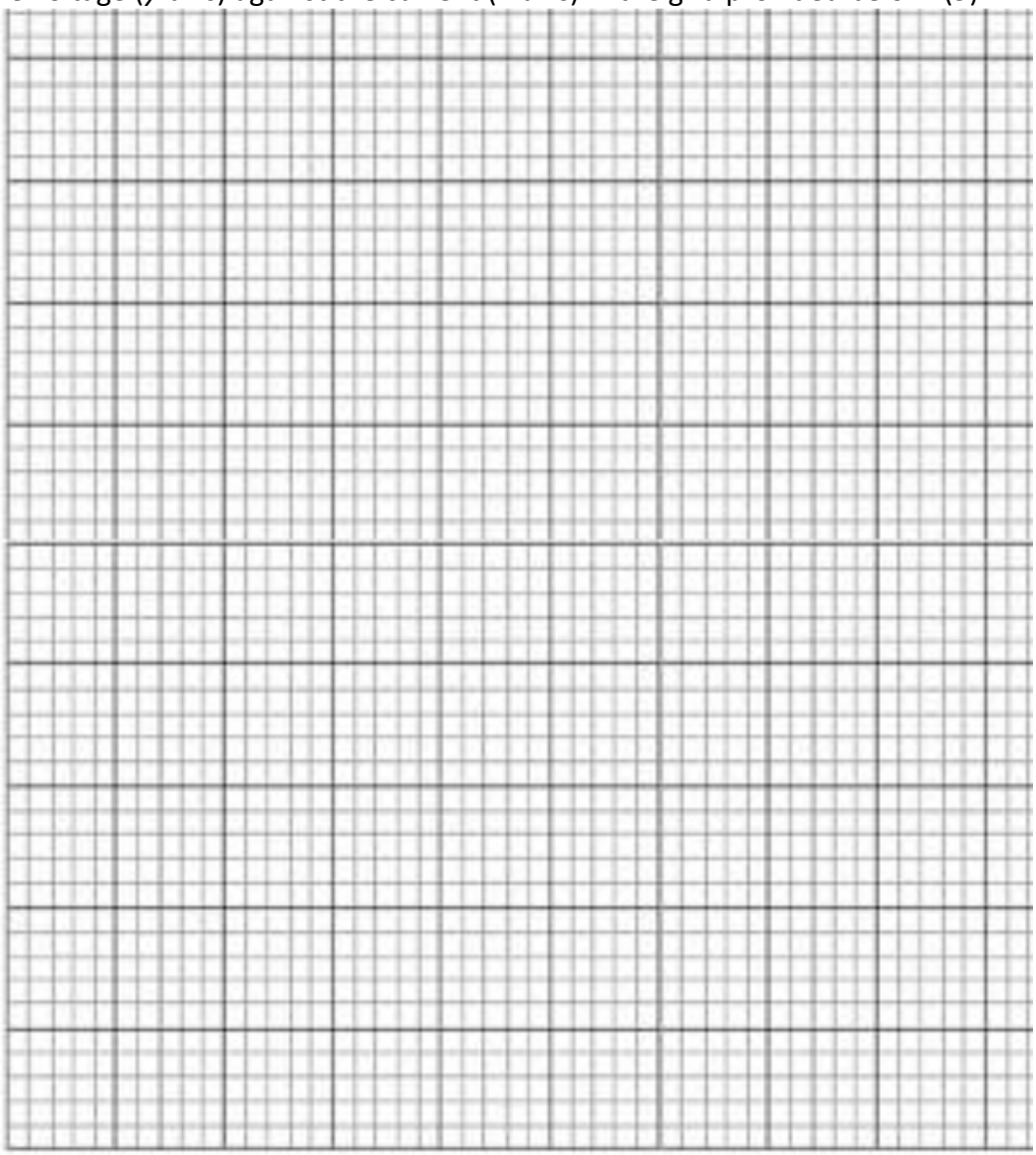
_____

2007 OL Question 9 Ohm's Law

The student used the variable voltage supply to apply different voltages across the resistor. She measured the voltage across the resistor and the current passing through it several times. She collected the following data.

Voltage(V)	0	2	4	6	8
Current(A)	0	0.5	1.0	1.5	2.0

Draw a graph of the voltage (*y*-axis) against the current (*x*-axis) in the grid provided below. (9)



What conclusion can you draw from the graph about the **relationship between the potential difference (voltage) and the current** passing through the wire conductor? (3)

_____

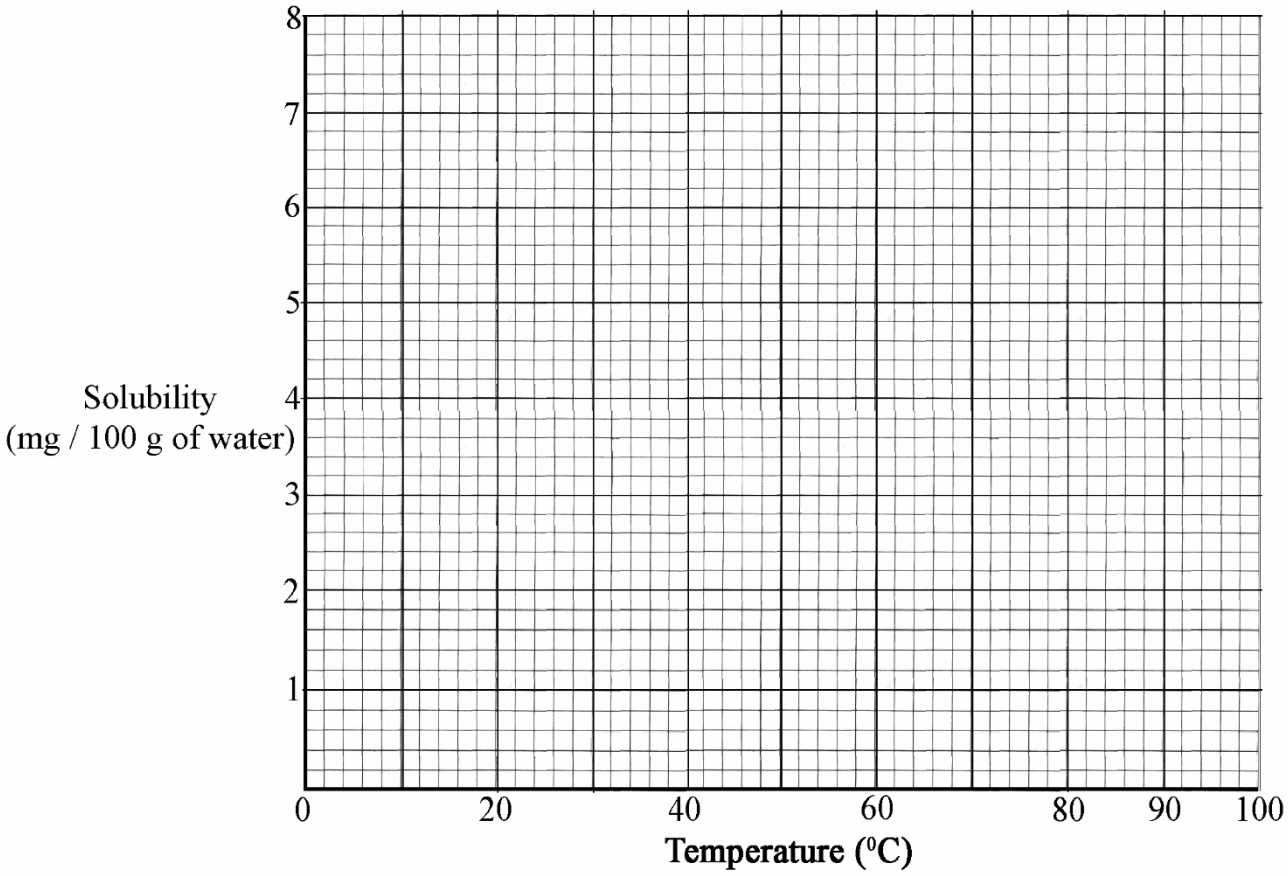
_____

2008 HL Question 5 Solubility

(*a*) The *limit of solubility* (maximum solubility) of *oxygen* gas (O2) in *water* was measured, in *mg of oxygen per 100 g of water*, at a number of *different temperatures*. These measurements are given in the table.

Solubility(mg/100gwater)	7.0	4.3	3.0	2.3	1.4	0.8	0.0
Temperature(°C)	0	20	40	60	80	90	100

(*i*) Draw a ***graph*** of ***solubility (y-axis) against temperature (x-axis)*** in the grid provided below.



(*ii*) Use the graph to ***estimate the solubility*** of oxygen at 30 °C. (3)

_____

(*iii*) What ***effect has temperature*** on the ***solubility*** of oxygen in water? (6)

_____

(*iv*) Global warming has many implications. What ***implication***, which could be inferred (concluded) from the information in the graph, might ***global warming*** have ***for animals that live in water*** e.g. fish? (6) _____

_____

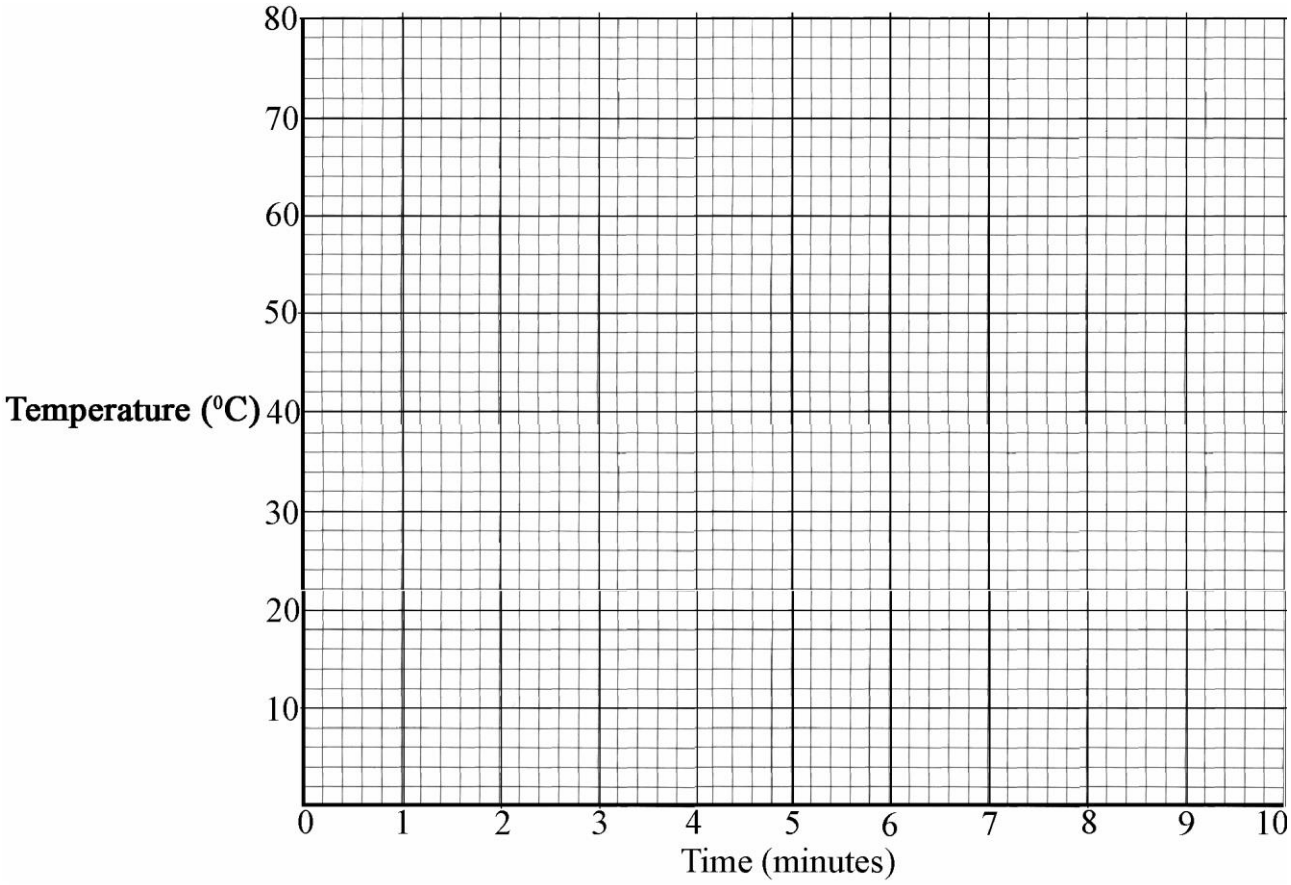
_____

2008 HL Question 9 Cooling Curve

(*a*) A pupil *heated* some *lauric acid*, which is a *solid* at room temperature, until it turned into a *liquid*. The lauric acid was then allowed to *cool* at a *uniform* rate. The *temperature* of the lauric acid was taken *every minute*.
The data from this experiment is given in the table.

Temperature (°C)	75	64	54	43	43	43	43	43	32	22	10
Time (minutes)	0	1	2	3	4	5	6	7	8	9	10

(*i*) Draw a ***graph***, using this data, of ***temperature against time (x-axis)*** in the grid provided below. (9)



(*ii*) Explain the ***shape of the graph*** that you obtain. (9)

_____

_____

_____

_____

(*iii*) Use the graph to estimate the ***melting point*** of lauric acid. (3)

_____

2008 OL Question 9 (c) Distance & Time

A cyclist moved along a track.
The distance travelled by the cyclist was measured every 2 seconds.
The data collected is presented in the table below.

Distance travelled (m)	0	10	20	30	40
Time (s)	0	2	4	6	8

(*i*) Use this data to draw a graph of distance travelled (*y*-axis) against time (*x*-axis) using the grid provided below. (12)

(*ii*) Use the graph to estimate the distance travelled by the cyclist in 5 seconds. (6)

_____

(*iii*) Calculate the speed of the cyclist in ms^{-1} (m/s). (3)

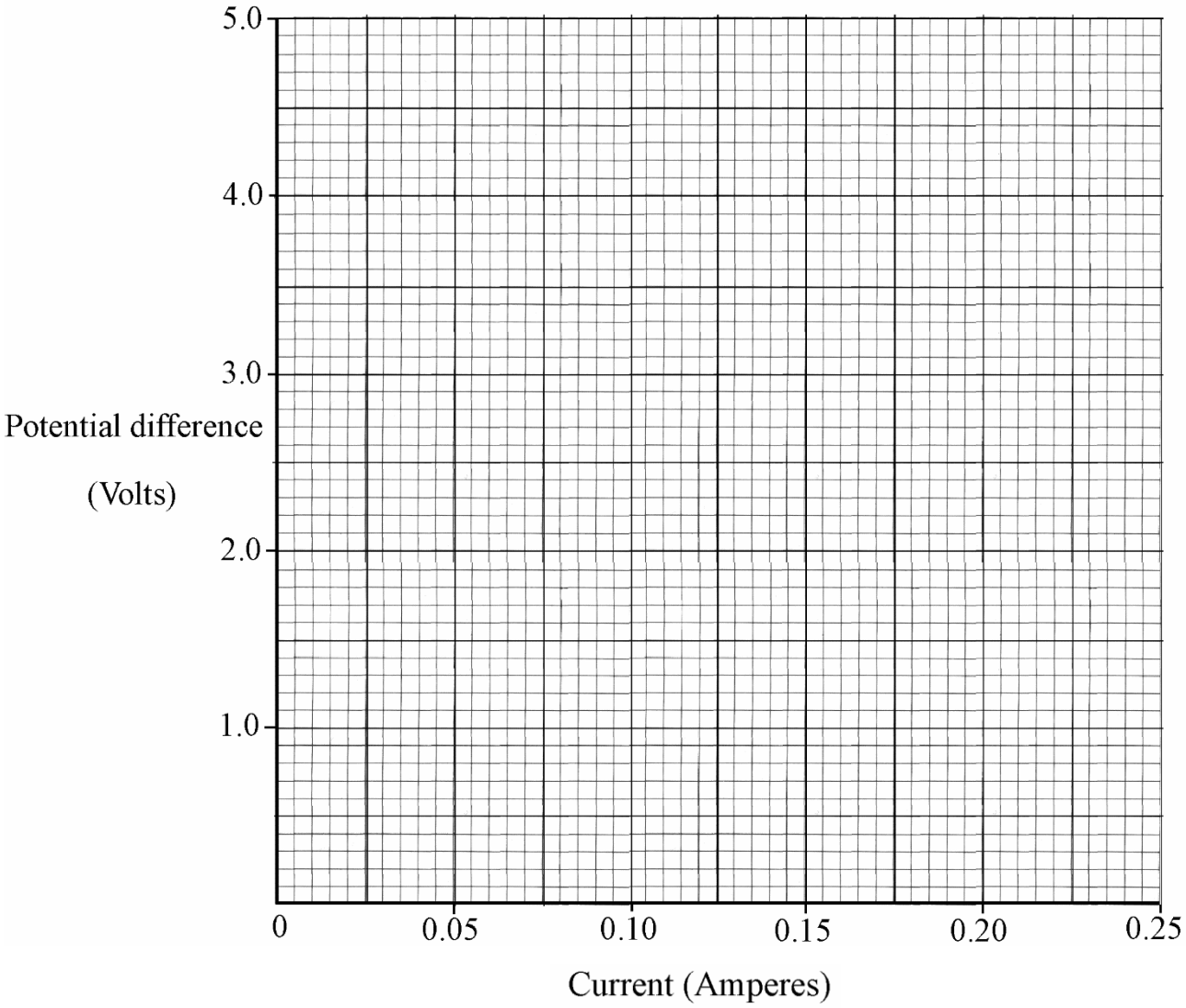
_____

2009 HL Question 8 (c) Ohm's Law

A pupil performed an experiment on a resistor to ***investigate the relationship between potential difference*** (voltage) applied to the resistor and the ***current*** flowing through the resistor. The data from this experiment is in the table.

Potential difference (Volts)	**0**	**1**	**2**	**3**	**4**	**5**
Current (Amperes)	**0.00**	**0.05**	**0.10**	**0.15**	**0.20**	**0.25**

(*i*) Draw a ***graph*** of potential difference (voltage) on the y-axis against current on the x-axis in the grid below. (6)



(*ii*) Calculate the ***resistance*** of the resistor used in this experiment. (3)

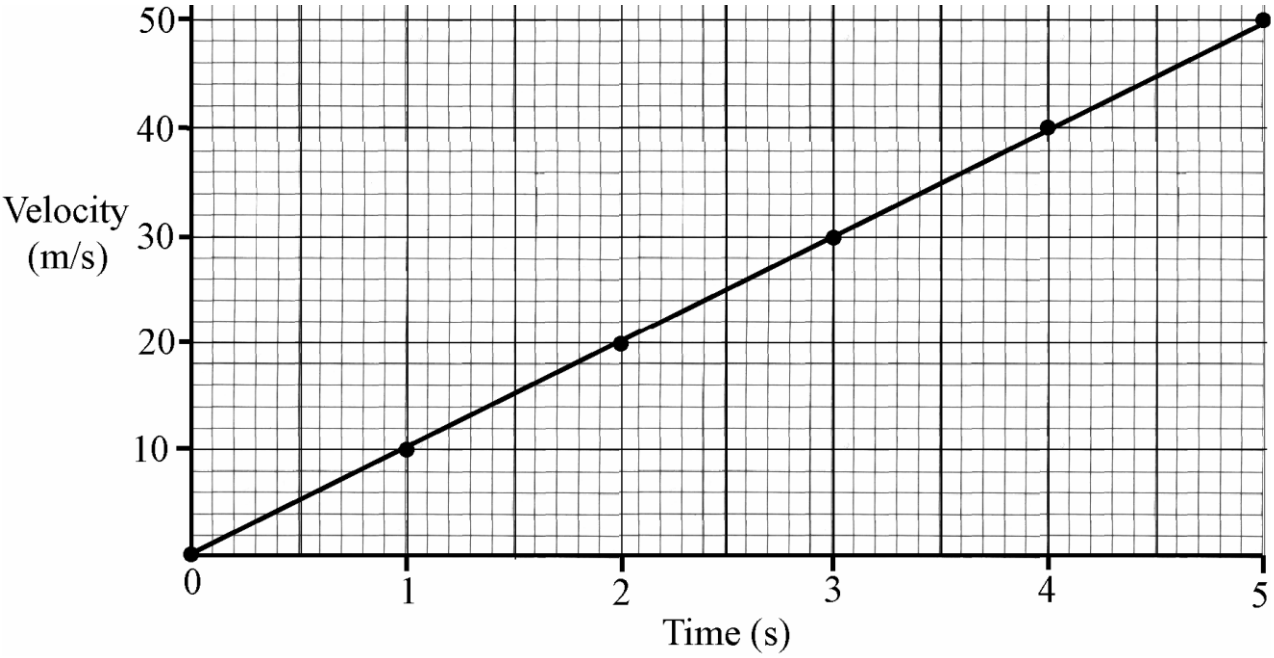
Calculate _____

(*iii*) What is the evidence from the graph that potential difference (voltage) is ***directly proportional*** to current in this case? (3)

What? _____

2009 HL Question 9 (c) Velocity & Acceleration

A stone was dropped from the top of a tall cliff. The stones approximate velocity was measured each second as it fell. The data collected during this experiment is given in the graph.



(*i*) Define ***velocity***. (6)

_____

_____

_____

(*ii*) Use data from the graph to ***estimate the acceleration of the stone*** as it fell. Give the ***units of acceleration*** with your answer. (6)

_____

_____

(*iii*) Name the ***force*** that caused the stone to fall. (3)

Name _____

(*iv*) The stone had a mass of 2 kg.

What was the ***weight*** of the stone on earth? Give the unit. (6)

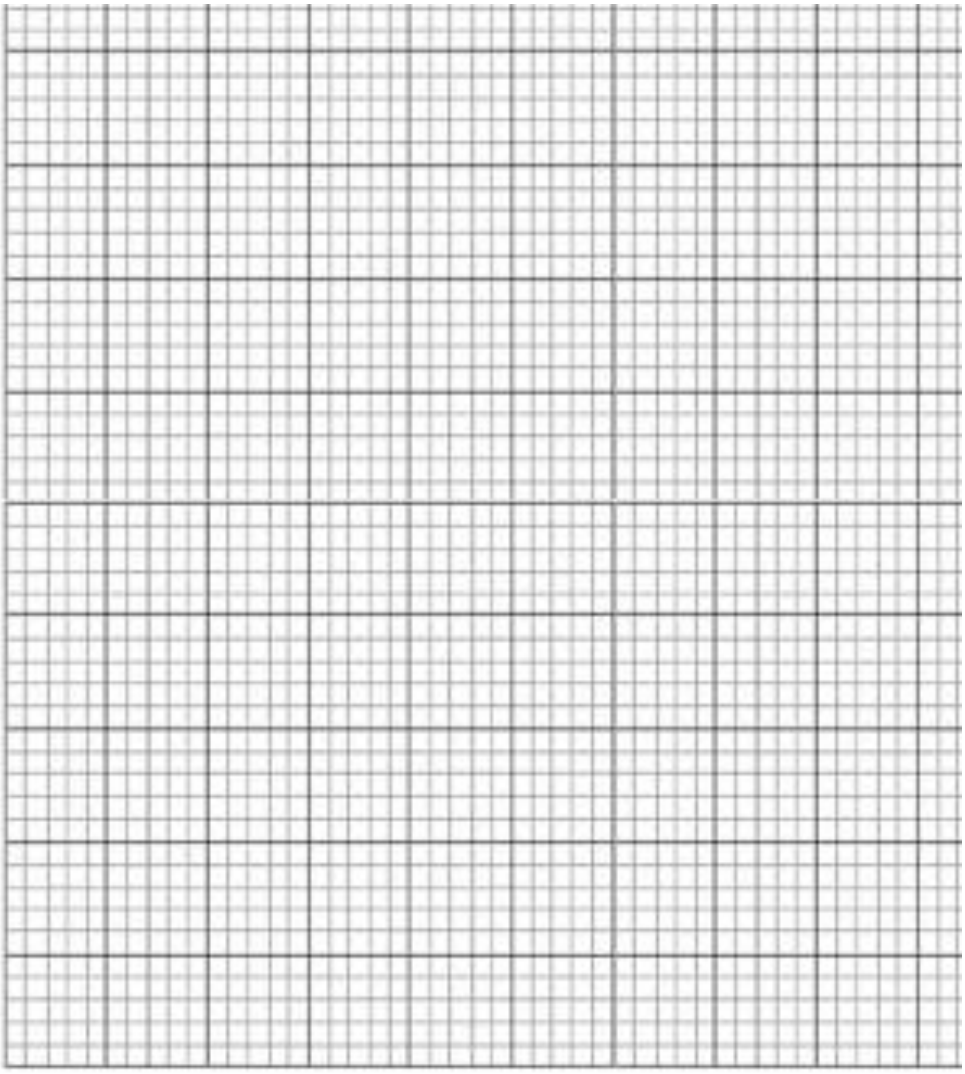
_____

2009 OL Question 6 (b) Solubility

In a school laboratory, a student **investigated the solubility of a salt** in water.
The amount of salt which dissolved in water at different temperatures was measured. The data collected is presented in the table below.

Temperature (°C)	20	30	40	70	90
Solubility g per 100 cm^3 of water	10	20	30	60	80

(*i*) Use this data to draw a graph of **solubility (*y*-axis)** against **temperature (*x*-axis)** using the grid provided below.



(*ii*) Use the graph to estimate the solubility at 60 °C. (6)

Solubility at 60 °C _____

(*iii*) What can you **conclude** about the solubility of the salt in water from the graph?

_____ (6)

2009 OL Question 8 (a) Hooke's Law

A student investigated the **relationship between the extension of a spring and the force applied to it**.

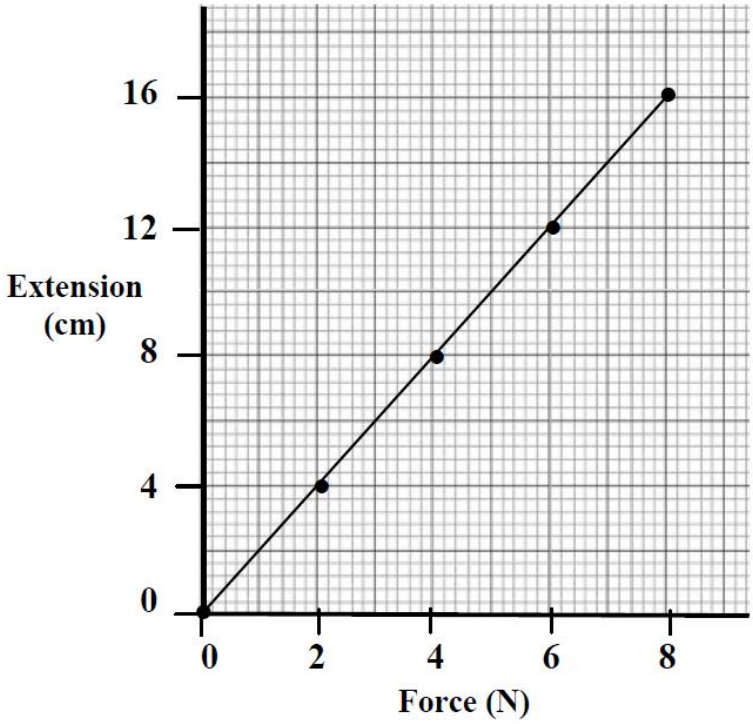
The equipment shown in the diagram was used.

The data collected is shown in the table.

The student then drew the graph shown below.

Answer the questions that follow about this investigation.

Force (N)	0	2	4	6	8
Extension (cm)	0	4	8	12	16



Name an instrument used to measure the force in this investigation.

_____

Describe how the student could have measured the extension of the spring.

_____

_____

_____

What **conclusion** would you draw from this investigation?

_____

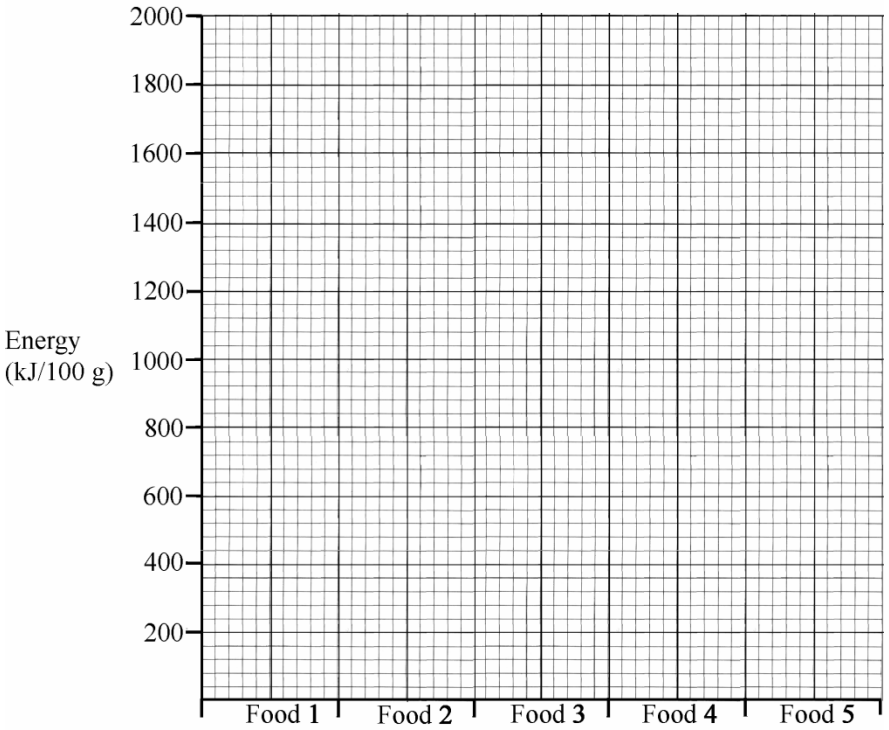
_____

2010 HL Question 2 (b) Food Constituent Values

Protein, carbohydrate and fat can all be used to provide energy in our bodies.
The table gives the amount of these food constituents, in grams per 100 grams for five common foods. The energy content per 100 g of each food has also been given. The energy values have been rounded off to the nearest 100 kJ.

Food Constituent	Protein	Carbohydrate	Fat	Energy kJ/100 g
Food1-Baked beans	4.0	17.5	0.4	400
Food2-Cooked chicken	26.2	nil	1.6	500
Food3-Eggs	12.5	nil	11.2	600
Food4-Bread (wholemeal)	9.0	45.0	2.2	1000
Food5-Cheddar cheese	25.4	0.1	34.9	1700

(*i*) Draw a ***bar chart***, in the grid below, to ***compare the energy content*** of 100 g of foods 1-5 given in the table above. (9)



(*ii*) Which ***food constituent*** is primarily responsible for the high energy content of cheese? What ***evidence*** does the table provide to support your answer? (6)

Which? _____

What? _____

_____

(*iii*) Describe how to ***test a food*** for the presence of ***fat***. (6)

_____

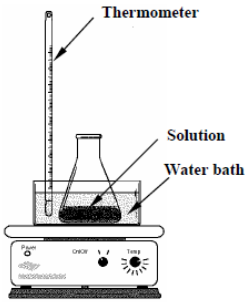
_____

_____

_____

_____

2010 HL Question 5 Solubility

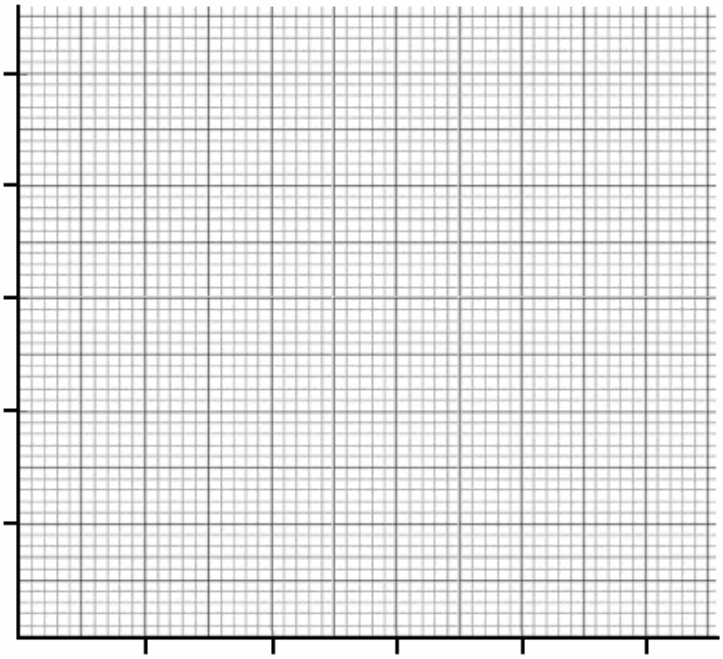


A pupil used the apparatus shown in the diagram to quantitatively investigate the effect of temperature on the solubility of copper sulfate crystals in water.
100 g of water in the conical flask was brought to the required temperature using the water bath. Copper sulfate crystals were added to the water until no more would dissolve. The mass of the copper sulfate crystals that dissolved was noted.

The data was recorded and is given the table.

Temperature (°C)	0	20	40	60	80	100
Mass of copper sulfate crystals dissolved (g/100 g)	14	21	29	40	55	75

(*i*) Draw a ***graph*** of mass of copper sulfate crystals dissolved (solubility) (y-axis) against temperature (x-axis) in the grid below. A ***smooth curve*** through the plotted points is required. (9)



(*ii*) Use your graph to ***estimate the solubility*** of copper sulfate crystals at 10 °C. (3)

_____

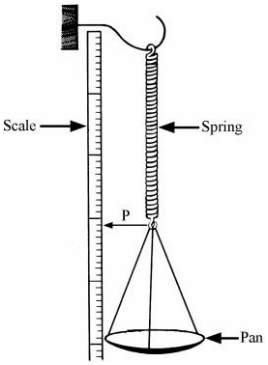
(*iii*) Describe, using an appropriate labelled diagram in the box provided, how to ***grow and collect crystals*** of copper sulfate from the solution produced at 100 °C. (12)

_____

_____

_____

2010 HL Question 8 Hooke's Law



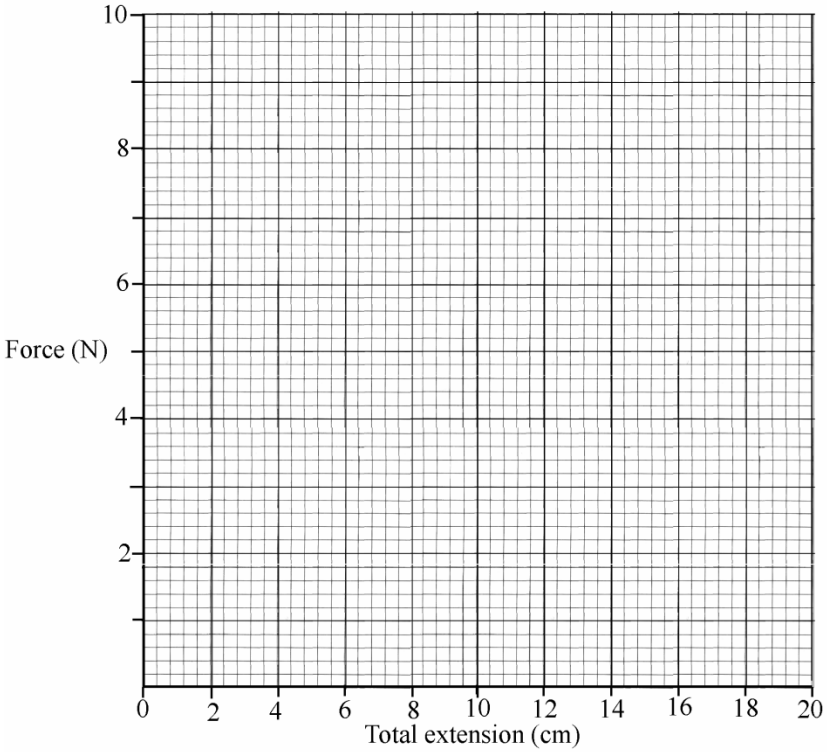
(*a*) A pupil used the apparatus shown in the diagram to investigate the relationship between the force applied and the extension produced in the spring by that force. Pointer, P, was used to read the scale. Weights were added to the pan to apply forces to the spring.

The data recorded is in the table.

(*i*) Calculate the ***total extension*** for each force and enter them in the table. (6)

Force (N)	Scale reading (cm)	Total extension (cm)
0	31.0	0
2	35.0	
4	39.0	
6	43.0	
8	47.0	
10	51.0	

(*ii*) Draw a ***graph*** of force against total extension in the grid below. (6)



(*iii*) What ***conclusion*** can be drawn from the graph regarding the relationship between the force applied to the spring and the extension produced by it? (6)
What? _____

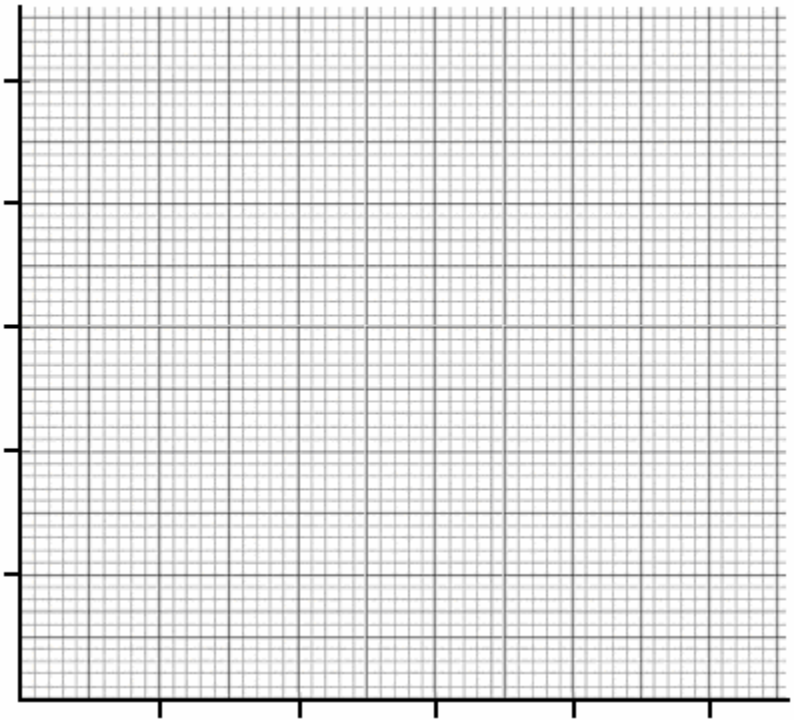
(*iv*) Use the graph to ***determine the weight*** of a stone that produced an extension of 14 cm in the spring. (3)
Use _____

2010 OL Question 9 Ohm's Law

A student carried out an investigation of the relationship between current flowing through a wire resistor and the voltage across it. The data collected is presented in the table below.

Current A	0.2	0.4	0.6	0.8	1.0
Voltage V	1	2	3	4	5

(*i*) Use this data to draw a graph of voltage (*y*-axis) against current (*x*-axis) using the grid provided below. (12)



(*ii*) Use the graph to estimate the **current** at **3.5 V**. _____ (3)

(*iii*) **Name** the instrument used by students to measure voltage. (3)

Instrument _____

(*iv*) **Name** the instrument used by students to vary the current. (3)

Instrument _____

(*v*) What is the relationship between voltage and current in this investigation?

_____

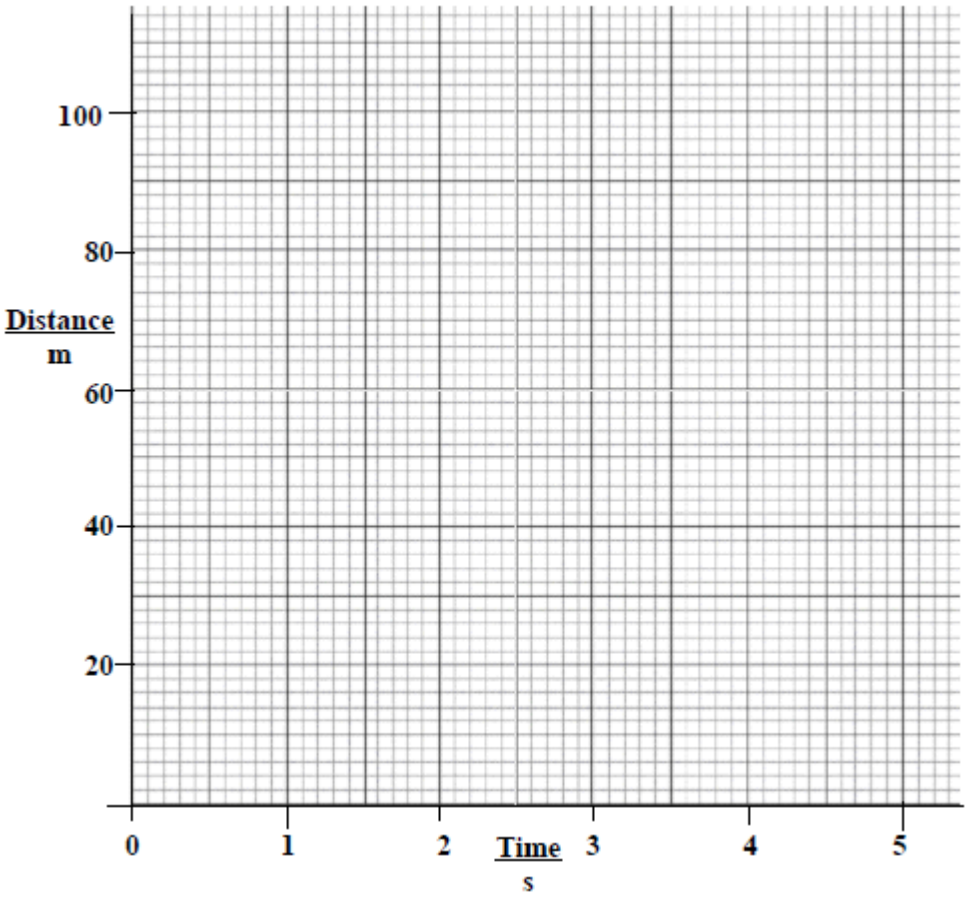
_____ (6)

2011 HL Question 9 Distance & Time

(a) A stone was dropped from the top of a cliff and the distance that it fell was measured at the intervals of time as given in the table below.

Distance (m)	0	5	20	45	80	100
Time (s)	0	1	2	3	4	4.5

(i) Draw a graph of distance against time in the grid below.
A smooth curve through the plotted points is required.



(ii) Use the graph to find how far the stone had fallen in 3.5 s.(3)

_____

(iii) Calculate the average speed of the falling stone between the second and the fourth second.

Give the unit with your answer.(6)

_____

(iv) In this experiment is distance fallen directly proportional to time? Justify your answer. (6)

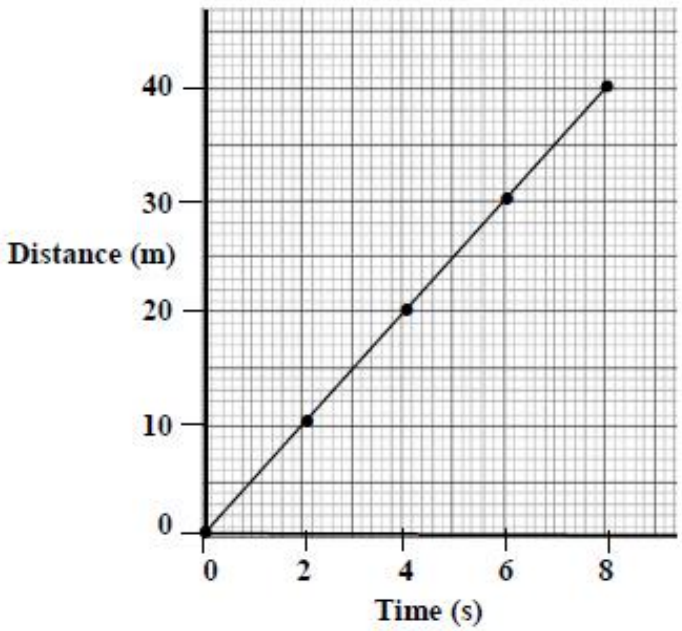
_____

_____

2011 OL Question 8 Distance & Time

A cyclist moved along a straight track. A student measured the time taken by the cyclist to travel various distances.
The data collected is shown in the table.
The student then drew the graph shown below.
Answer the questions that follow about this investigation.

Distance (m)	0	10	20	30	40
Time (s)	0	2	4	6	8



(*i*) **Name** an instrument used to measure the **distance** in this investigation.

Instrument _____

(*ii*) **Name** an instrument used to measure the **time** in this investigation.

Instrument _____

(*iii*) Use the graph to estimate the distance travelled by the cyclist in 5 seconds.

_____

(*iv*) Calculate the **speed** of the cyclist in ms^{-1} (m/s).

_____

(*v*) Is the cyclist **accelerating**? _____

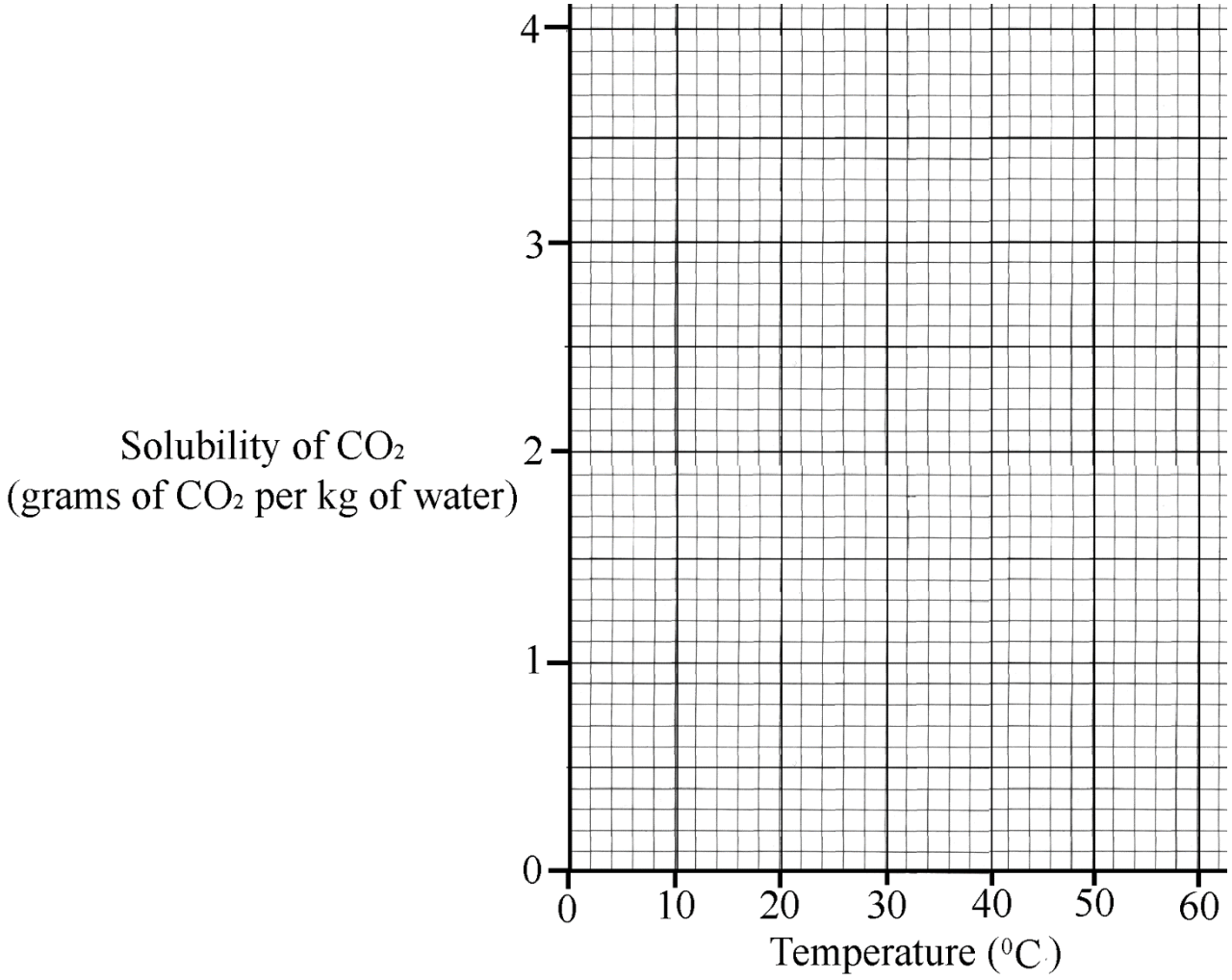
Give a reason for your answer. _____

2012 HL Question 5 Solubility

(*a*) An experiment was performed to investigate the effect of temperature on the solubility of carbon dioxide in water. The data obtained from this experiment is given in the table below.

Solubility of CO_2 (grams of CO_2 per kg of water)	3.4	2.5	1.7	1.4	1.0	0.8	0.6
Temperature (°C)	0	10	20	30	40	50	60

(*i*) Draw a graph of solubility against temperature in the grid below using the data from the table. A smooth curve is required. (9)



(*ii*) Usually the solubility of a solid increases with increasing temperature. The solubility of a gas decreases as the temperature increases. Suggest a reason why this decrease happens. (3)

Suggest _____

_____

_____

(*iii*) From the graph estimate the temperature at which the solubility of CO_2 is 2 g per kg of water.

_____

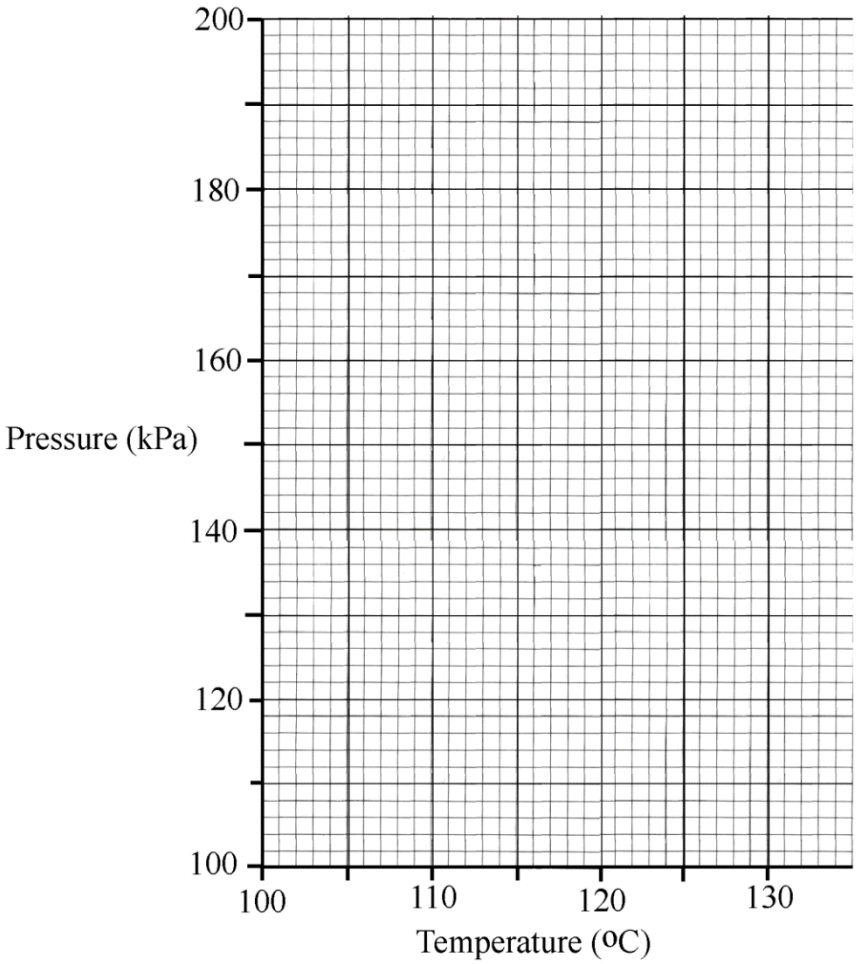
2012 HL Question 8 Pressure & Temperature

(*a*) Define pressure._____ (3)

An experiment was performed to investigate the effect of pressure on the boiling point of water. The data from the experiment is given in the table below.

Pressure (kPa)	100	120	140	160	180	200
Temperature (°C)	100	105	109	114	119	124

(*i*) Draw a graph of pressure against temperature using the grid below. (9)



(*ii*) What two pieces of information can be drawn from the graph about the relationship between the boiling point of water and pressure? (6)

1 _____

2 _____

(*iii*) What effect would reducing the pressure on water below normal atmospheric pressure, about 100 kPa, have on its boiling point? (3)

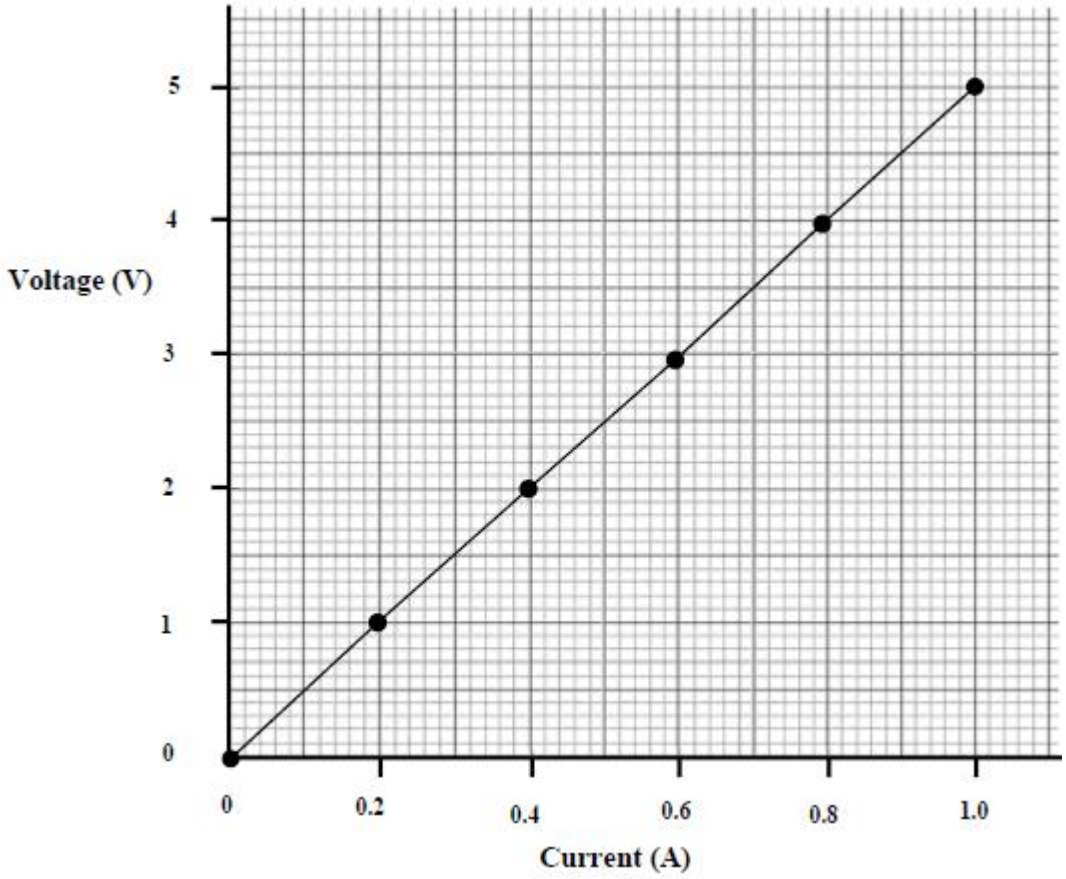
What? _____

2012 OL Question 8 (d) Ohm's Law

A student carried out an investigation of the **relationship between current flowing through a wire resistor and the voltage across it**.
The data collected is presented in the table below.

Current (A)	0	0.2	0.4	0.6	0.8	1.0
Voltage (V)	0	1	2	3	4	5

The student then used this data to draw a graph of voltage (*y*-axis) against current (*x*-axis) as shown on the grid below.



(*i*) Use the graph to estimate the **current** at **2.5 V**. _____ (3)

(*ii*) **Name** the instrument used by the student to measure voltage. (3)

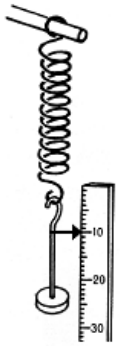
Instrument _____

(*iii*) What is the relationship between voltage and current in this investigation?

_____

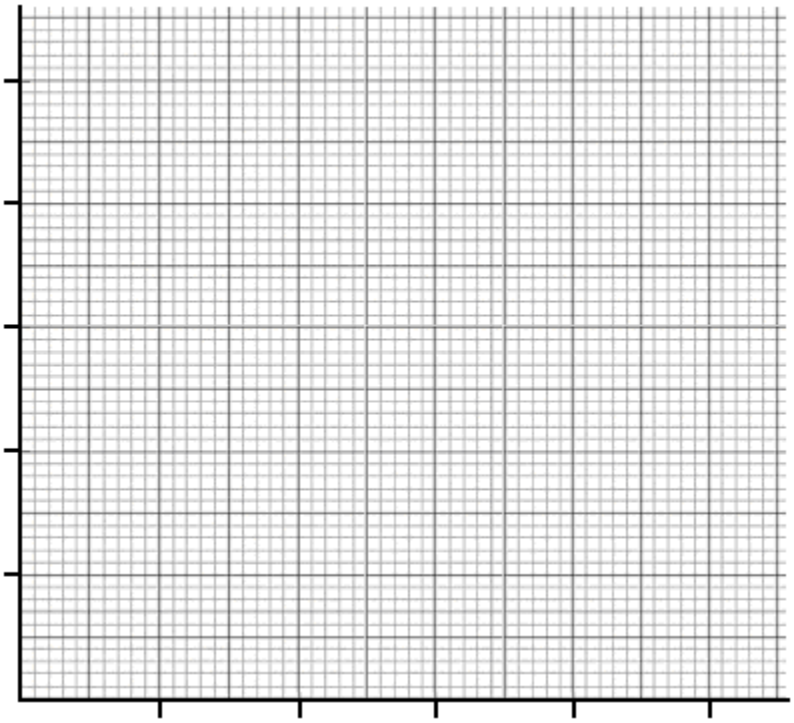
_____

2012 OL Question 9 (d) Hooke's Law

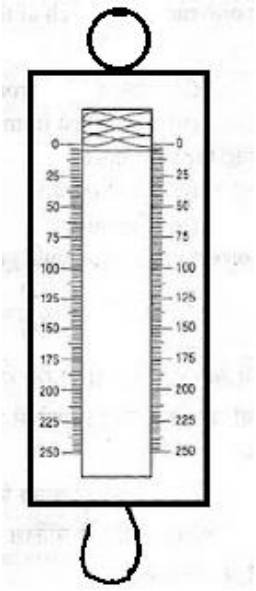


An investigation was carried out on the **relationship between the extension of a spring and the force applied to it**.
The data collected is presented in the table below. (18)

Force (N)	0	2	4	6	8
Extension (cm)	0	4	8	12	16



(*i*) Use the data in the table to draw a graph of **Extension** (*y*-axis) against **Force** (*x*-axis) using the grid above.



(*ii*) Use the graph to estimate what force results in a 14 cm extension of the spring.

Force _____ N

(*iii*) **Name** the instrument shown on the right that can be used to measure force.

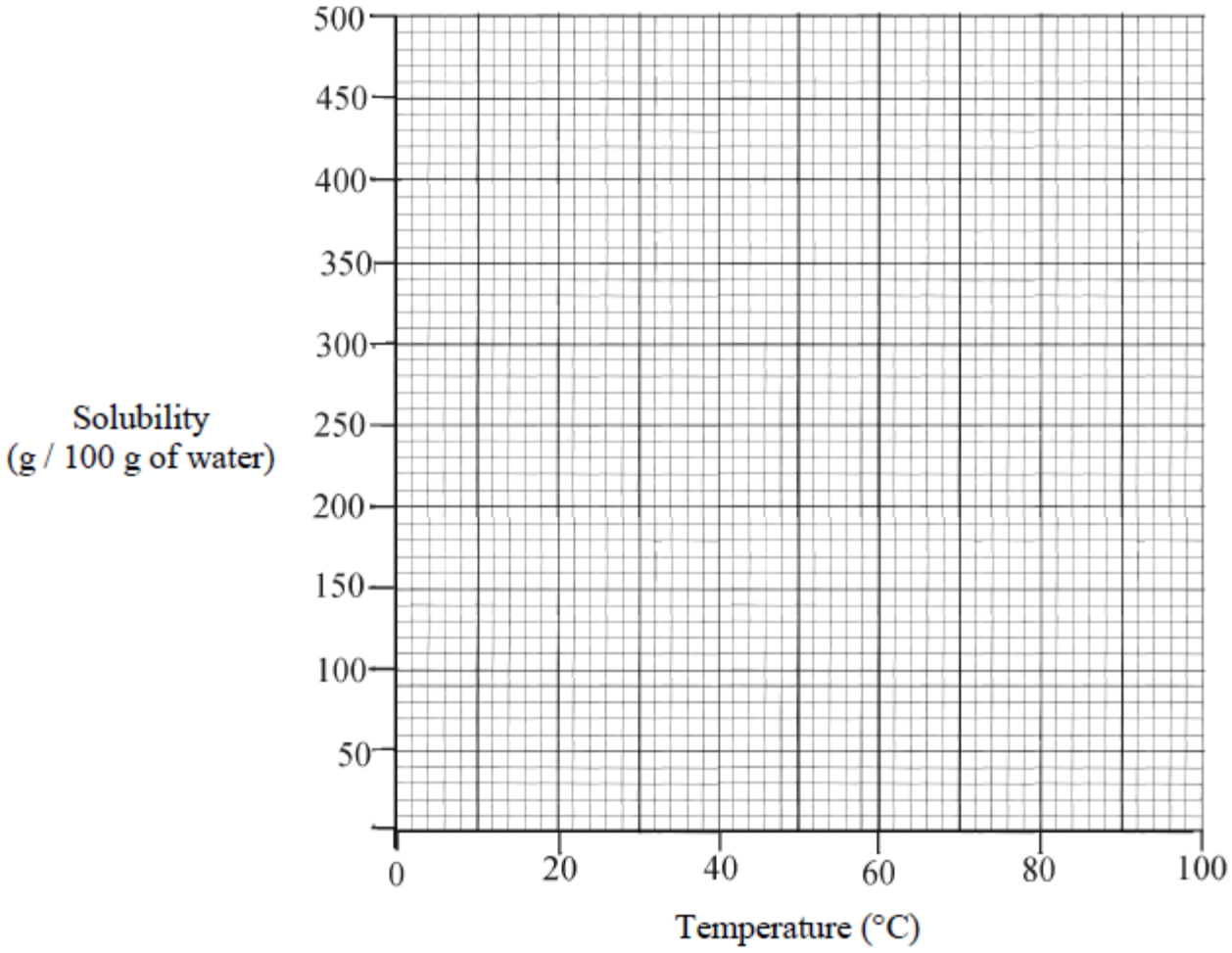
Name _____

2013 HL Question 5 Solubility

(*a*) A science student investigated the solubility of two common substances, sugar and salt, in water for a range of temperatures. The data for sugar are given in the table. Salt maintained a constant solubility of 40 g/100 g of water for the temperature range investigated, 0 °C to 100 °C.

Sugar (g/100 g of water)	175	200	240	290	370	480
Temperature (°C)	0	20	40	60	80	100

(*i*) Draw a graph of the effect of temperature on the solubility of sugar in the grid below. (9)



(*ii*) Use the graph to estimate the increase in the solubility of sugar if the temperature of the solution is raised from 50 °C to 70 °C. (9)

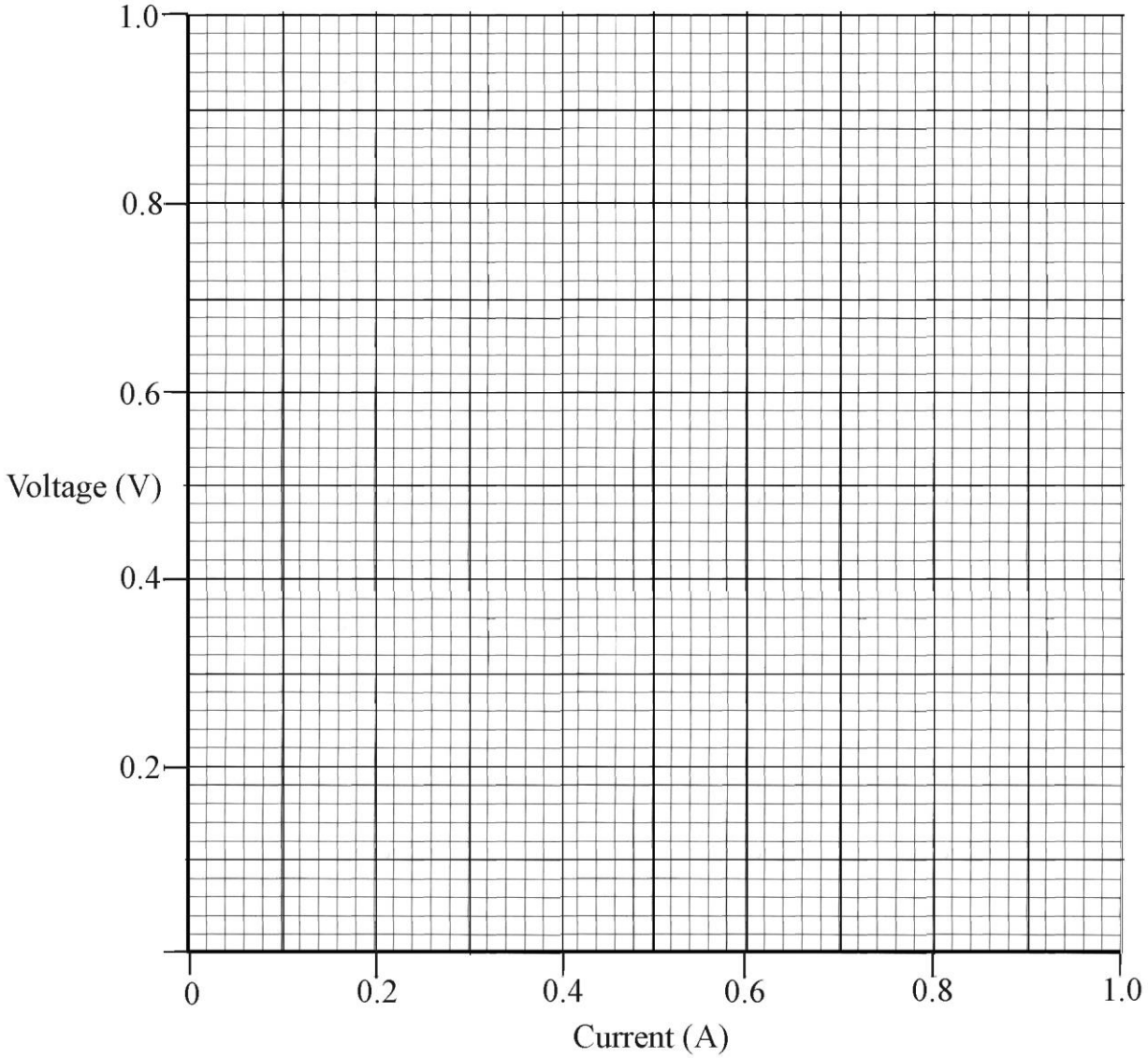
(*iii*) Using the same grid, draw a graph of the effect of temperature on the solubility of salt. (3)

2013 HL Question 9 Ohm's Law

(*a*) A science student investigated the relationship between voltage and current for a resistor. The data are given in the table below.

Voltage (V)	0	0.22	0.40	0.58	0.80
Current (A)	0	0.20	0.40	0.60	0.80

(*i*) Draw a graph in the grid below of voltage *versus* current. (9)



(*ii*) Describe clearly the relationship between voltage and current shown by the graph that you have drawn. (6)

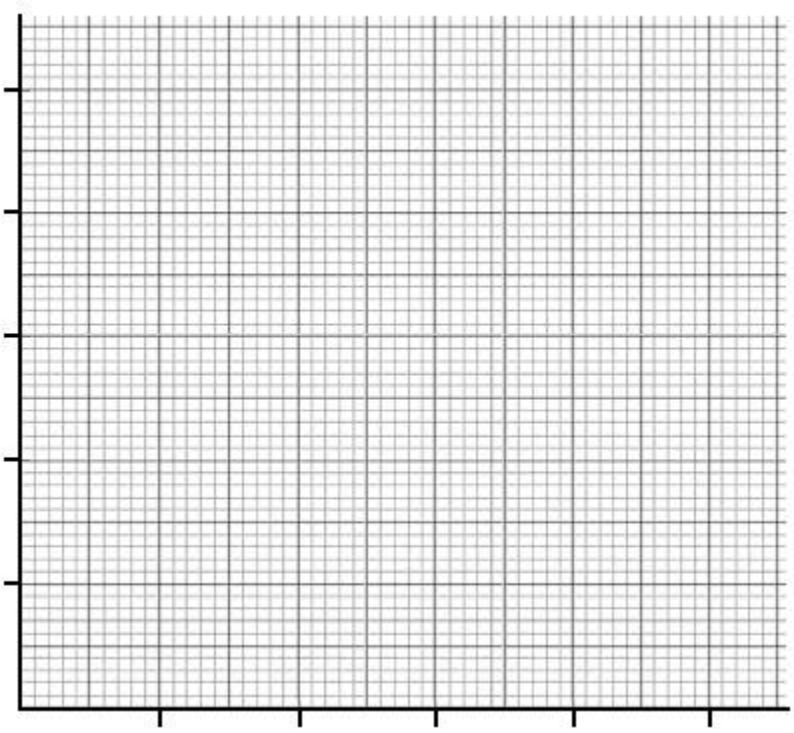
(*iii*) Use the graph to calculate the resistance of the resistor used in this experiment. (6)

2013 OL Question 6 (c) Solubility

A student investigated the solubility of a salt in water in the school laboratory.
The mass of the salt that dissolved at different temperatures was measured. The data collected are presented in the table below.

Temperature (°C)	**20**	**40**	**60**	**80**	**100**
Solubility (g/100 cm^3 of water)	**10**	**30**	**50**	**70**	**90**

(*i*) Use this data to draw a graph of **solubility (*y*-axis)** against **temperature (*x*-axis)** using the grid provided below. (12)

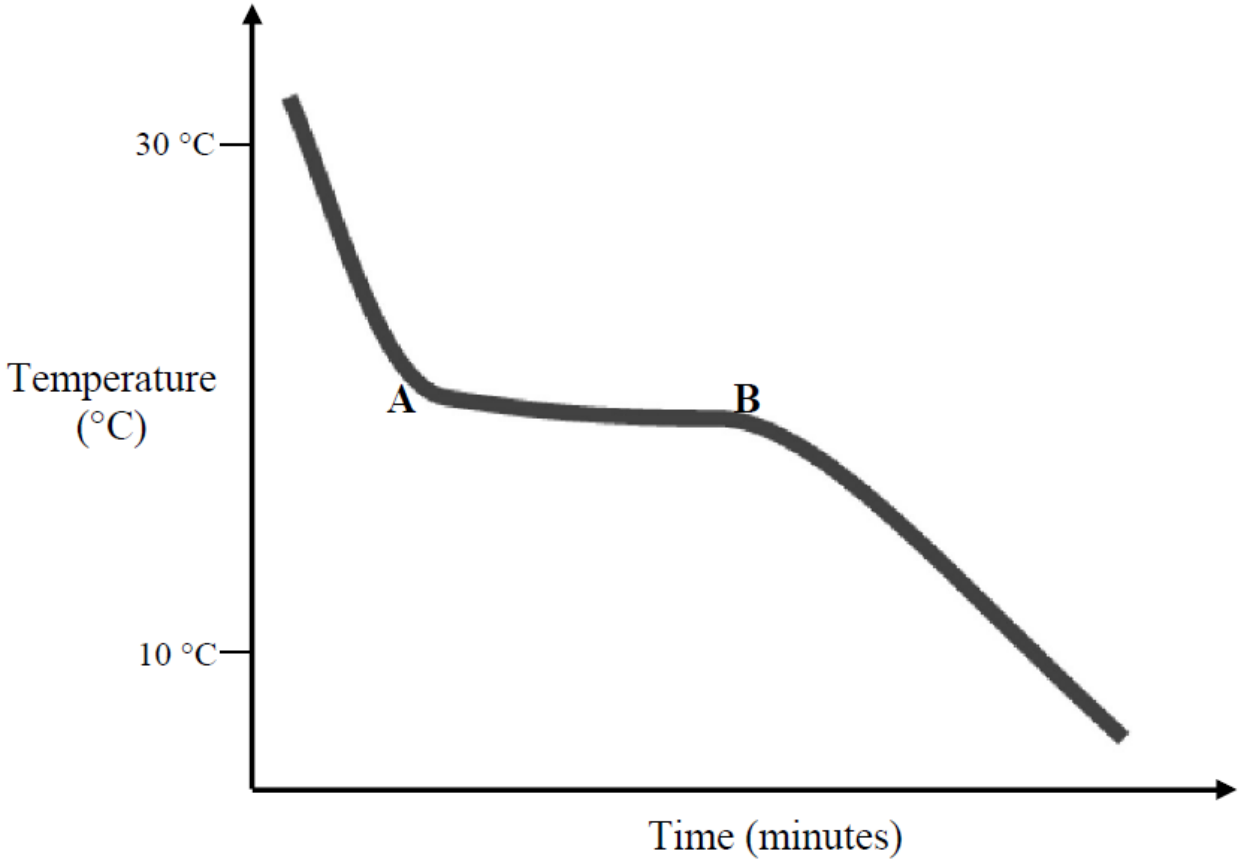


(*ii*) Use the graph to estimate the solubility at 50 °C. (3)

Solubility at 50 °C _____

2014 HL Question 8 (b) Cooling Curve

(*b*) The diagram below shows the cooling curve for chocolate. (12)



(*i*) Which state of matter describes the chocolate when it is at 30 °C?

_____

(*ii*) Which state of matter describes the chocolate when it is at 10 °C?

_____

(*iii*) In terms of heat loss *or* heat gain, describe and explain what happens to the chocolate between position **A** and position **B** on the diagram.

_____

_____

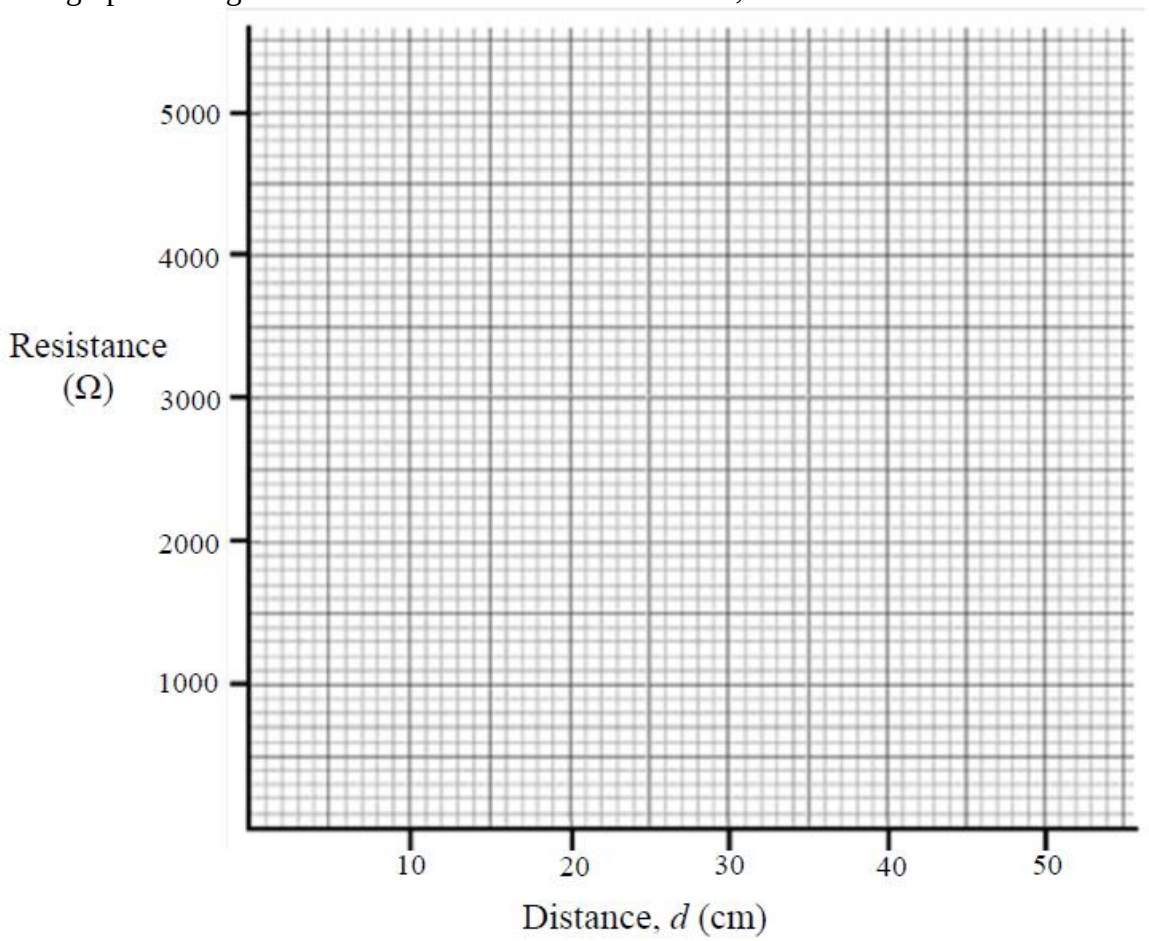
_____

2014 HL Question 9 (c) Electricity

(*c*) A lamp is placed a distance *d* from the LDR in a circuit. The switch is closed and the resistance of the LDR is calculated. This process is repeated for a number of different values of *d*. The results are given in the table. (24)

Resistance (Ω)	200	800	1800	3200	5000
Distance, *d* (cm)	10	20	30	40	50

(*i*) Draw a graph in the grid below of resistance *versus* distance, *d*.



(*ii*) From your graph, describe what happens to the resistance of the LDR as the lamp is moved away.

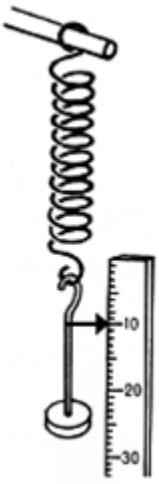
(*iii*) Use your graph to estimate the resistance of the LDR when the lamp is placed 25 cm from it.

(*iv*) Calculate the current that flows through the LDR when the lamp is placed 25 cm from it and device **Y** reads 6 V.

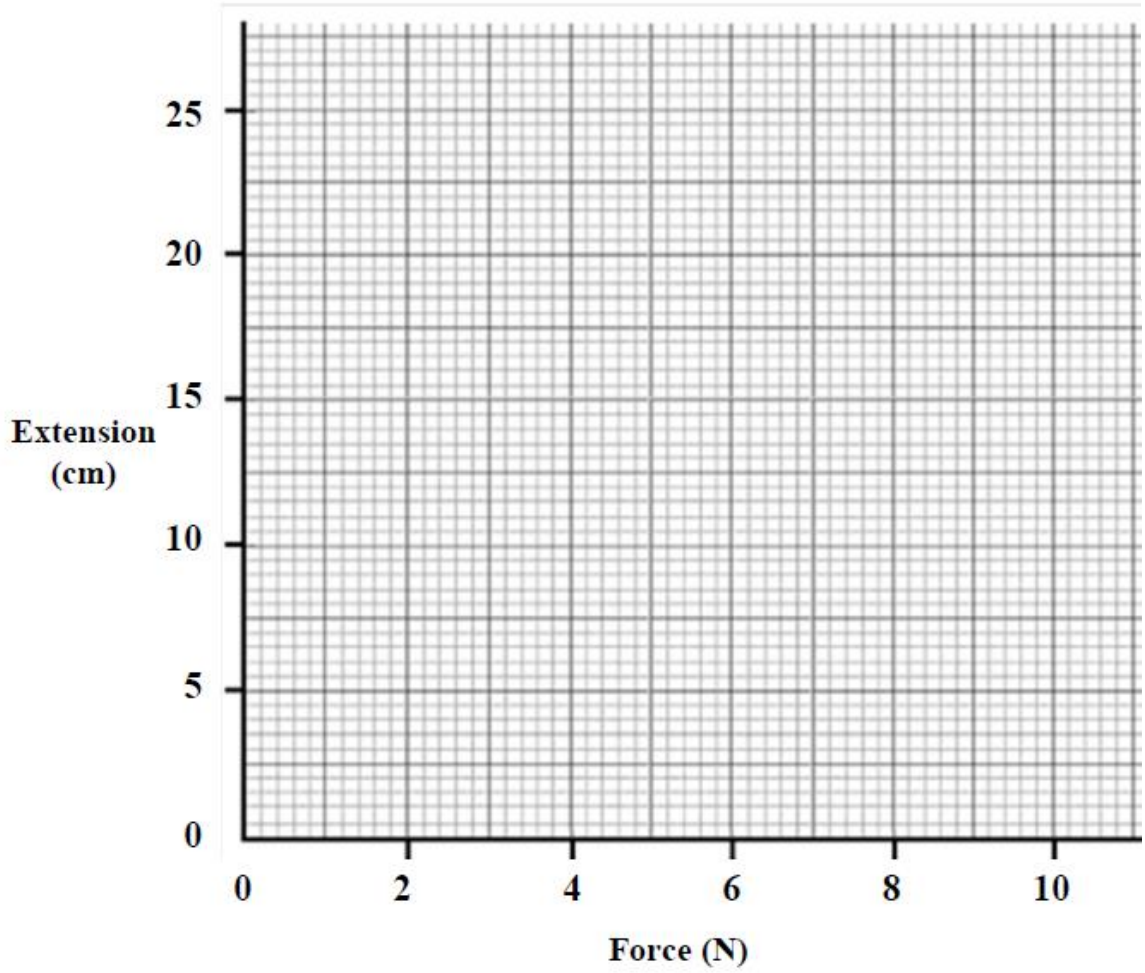
(*v*) Explain why an LED is more efficient than a standard light bulb.

2014 OL Question 8 (c) Hooke's Law

(*c*) The equipment shown was set up and used to investigate the **relationship between the extension of a spring and the force applied to it**.
The data collected are presented in the table below. (18)



Force (N)	2	4	6	8	10
Extension (cm)	5	10	15	20	25



(*i*) Use the data in the table to draw a graph of **Extension** (*y*-axis) against **Force** (*x*-axis) using the grid above.

(*ii*) Use the graph to estimate the extension if a force of 3 N is applied to the spring.

Extension _____ cm

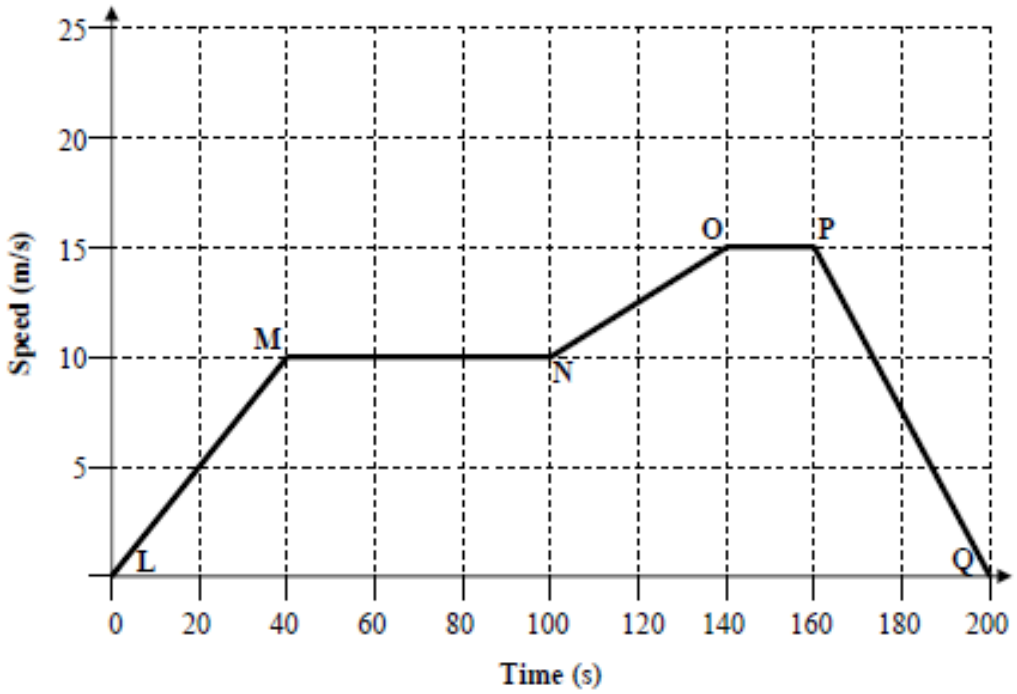
(*iii*) What would happen if too large a force is applied to the spring?

_____

_____

2015 HL Question 8 (c) Distance & Acceleration

(*c*) The graph shows the speed of a Luas tram as it travels from Stop **L** to Stop **Q**.



(*i*) What is the maximum speed of the tram during its journey? _____

(*ii*) Calculate the distance travelled by the tram between position **M** and position **N**.

Conclusion

(*iii*) Calculate the acceleration of the tram between position **N** and position **O**.

Conclusion

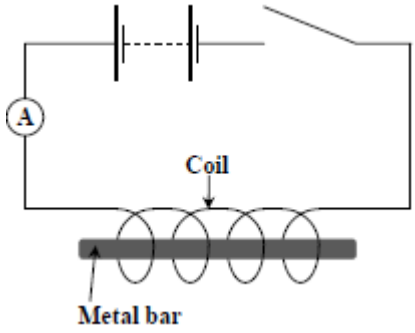
(*iv*) What are the units of acceleration? _____

(*v*) Describe the motion of the tram between positions **P** and **Q**.

_____

2015 HL Question 9 Electric current, Magnetic effect

(a) A student set up the circuit shown to investigate the magnetic effect of a constant electric current. She varied the number of turns of wire in the coil and counted how many paper-clips were picked up by the metal bar each time.
Her results are given in the table below.



Number of turns of wire in the coil	**20**	**40**	**60**	**80**	**100**
Number of paper clips picked up	**5**	**11**	**16**	**20**	**26**

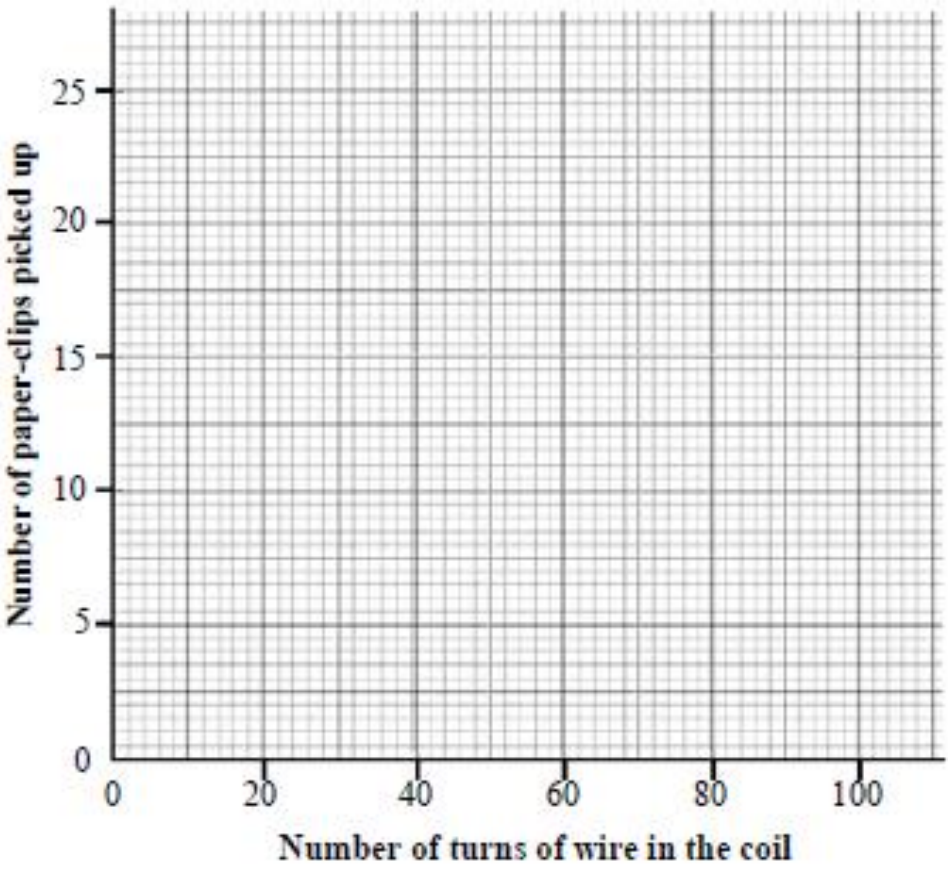
(*i*) Name a suitable material from which the bar and the paper-clips should be made.

_____

(*ii*) Name the instrument labelled **A** in the circuit diagram. _____

What does this instrument measure? _____

(*iii*) Draw a graph in the grid below of the number of paper-clips picked up *versus* the number of turns of wire in the coil.



(*iv*) Use your graph to estimate how many paper-clips would be picked up if there were 30 turns of wire in the coil. _____

(*v*) State one way in which the student might have made sure that this investigation was a fair one. _____

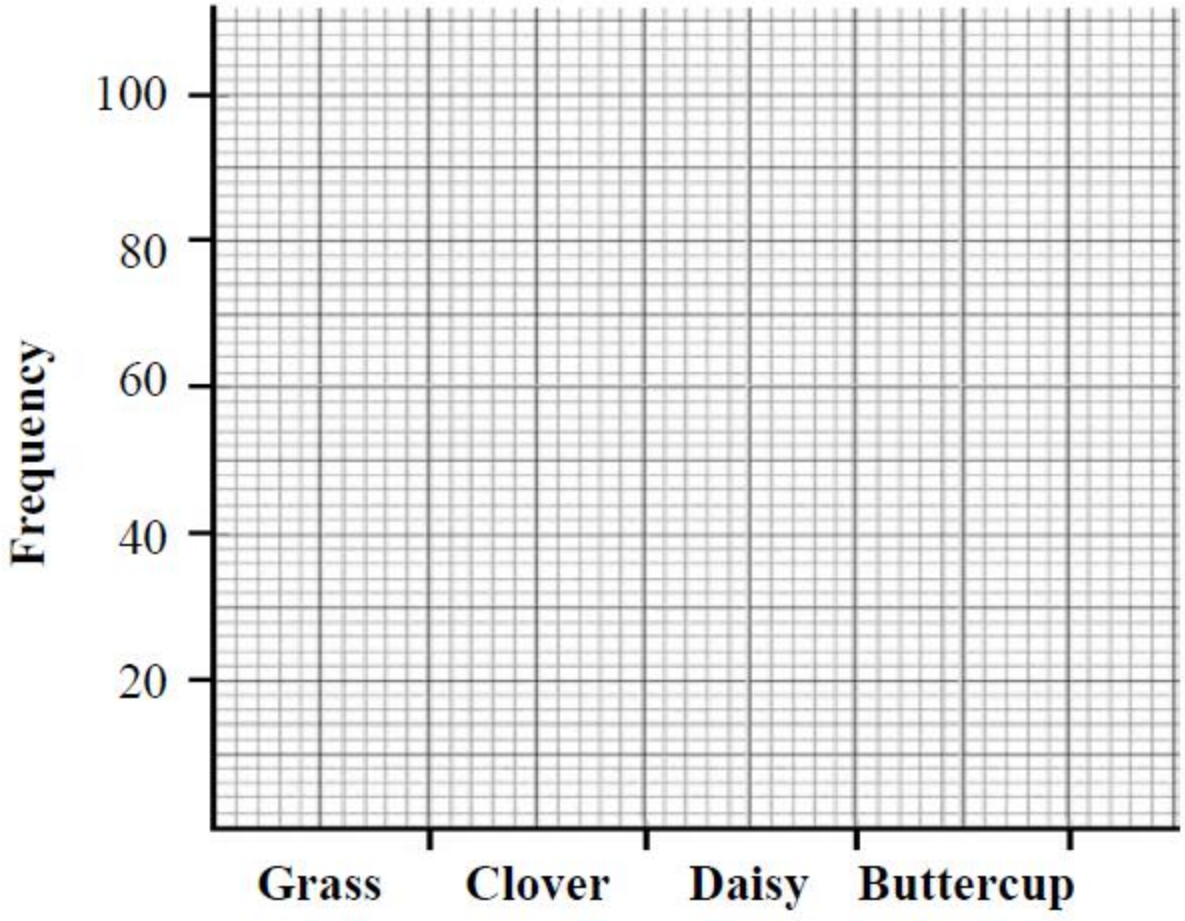
_____

2015 OL Question 3 (a) Habitat Study

A student carried out a survey of the plants in a grassland habitat. The table shows the results of the survey.

Plant	Grass	Clover	Daisy	Buttercup
Frequency	**100**	**30**	**60**	**50**

(i) Use this data to draw a bar chart of the frequency for each plant on the grid provided below.



(*ii*) Name a plant that has a lower frequency than the daisy. _____

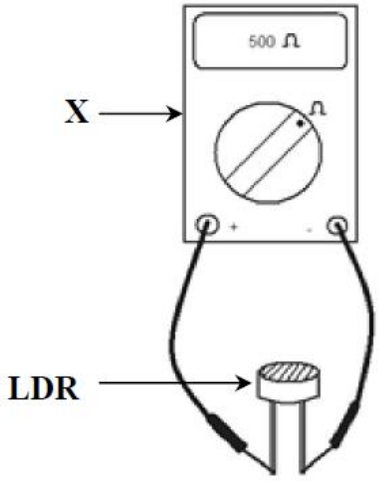
(*iii*) Name a piece of equipment the student may have used during the survey.

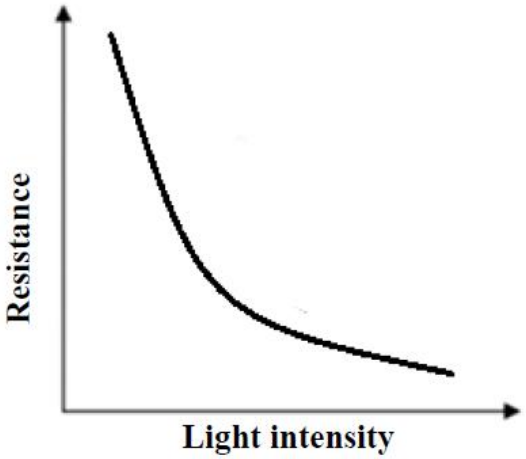
_____

2015 OL Question 9 (c) Light intensity & Resistance

A student carried out an experiment to investigate the relationship between light intensity and resistance in a circuit containing a light-dependent resistor (LDR).

On the left is some of the equipment the student used.
On the right is the graph of the results the student obtained.





(*i*) How would the student vary the light intensity shining on the LDR?

_____

(*ii*) Name the piece of equipment labelled **X**, which is used to measure resistance.

_____

(*iii*) From the graph state how resistance changes as light intensity increases.

_____

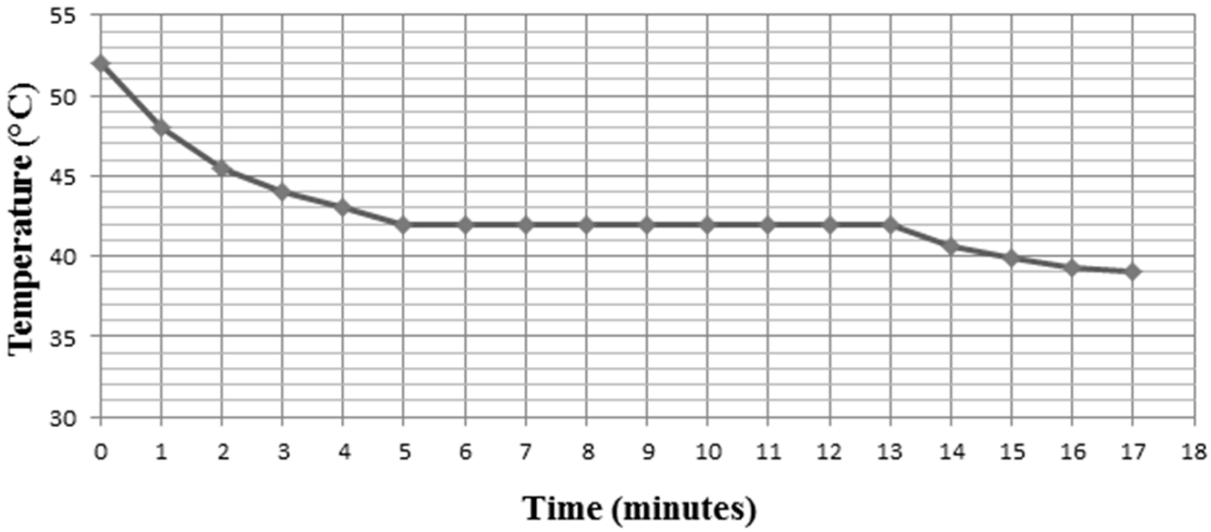
(*iv*) Describe one way that an LDR can be used in everyday life.

_____

_____

2016 HL Question 7 (b) Cooling curve

(b) A cooling curve for a certain mass of molten candle wax is given below.



(i) Why is the temperature on the graph constant between A and B?

_____

_____

(ii) Use the graph to find the melting point of candle wax.

_____

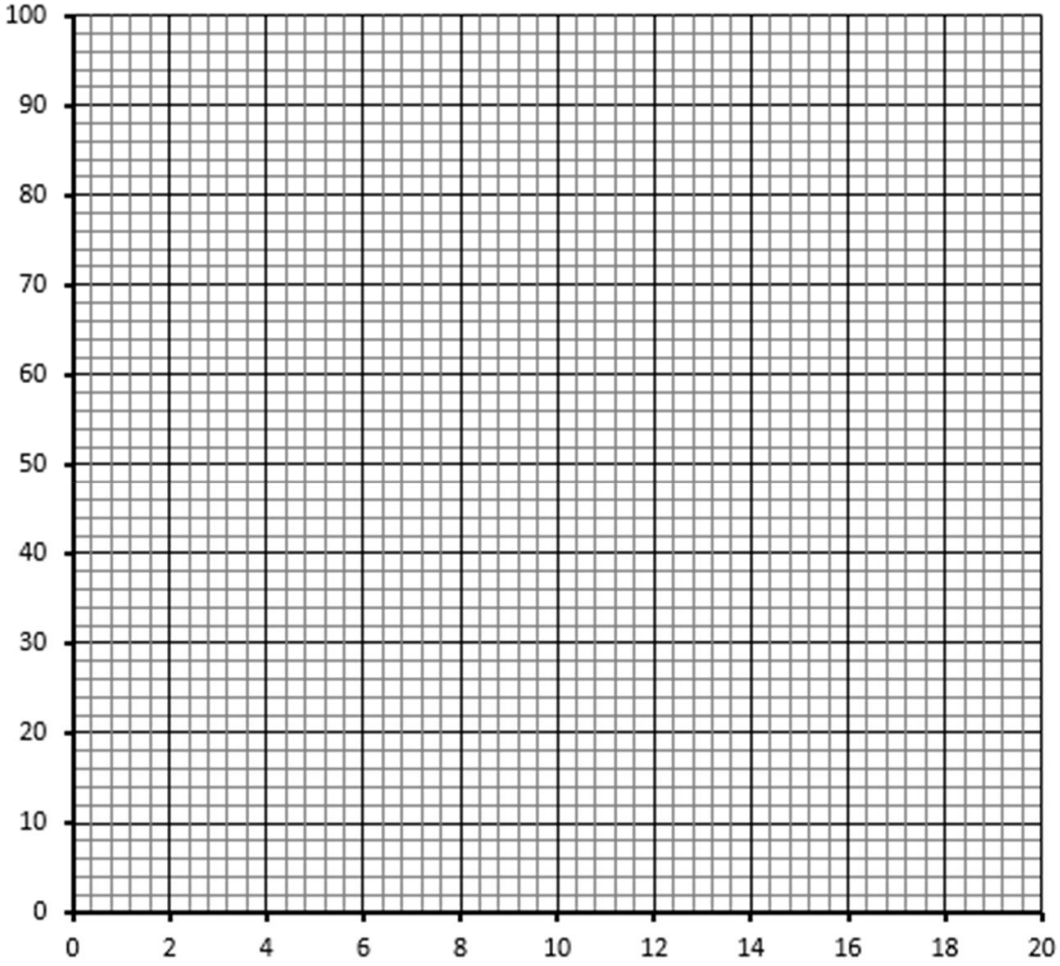
2016 HL Question 9 (c) Speed

In a 'soapbox' competition a driver raced against the clock in a straight line down a track in a vehicle with no power source. (18)

The table below gives the distances (from the start) travelled by the driver at various times during the run down the track.

Time (s)	0	4	8	12	16	20
Distance (m)	0	6	14	24	44	100

(i) Use this table to draw a distance against time graph.



(ii) Find the time taken for the vehicle to travel 80 m. _____

(iii) Calculate the average speed of the vehicle during the last four seconds of the run.

_____

_____

(iv) What is the difference between speed and velocity?

_____

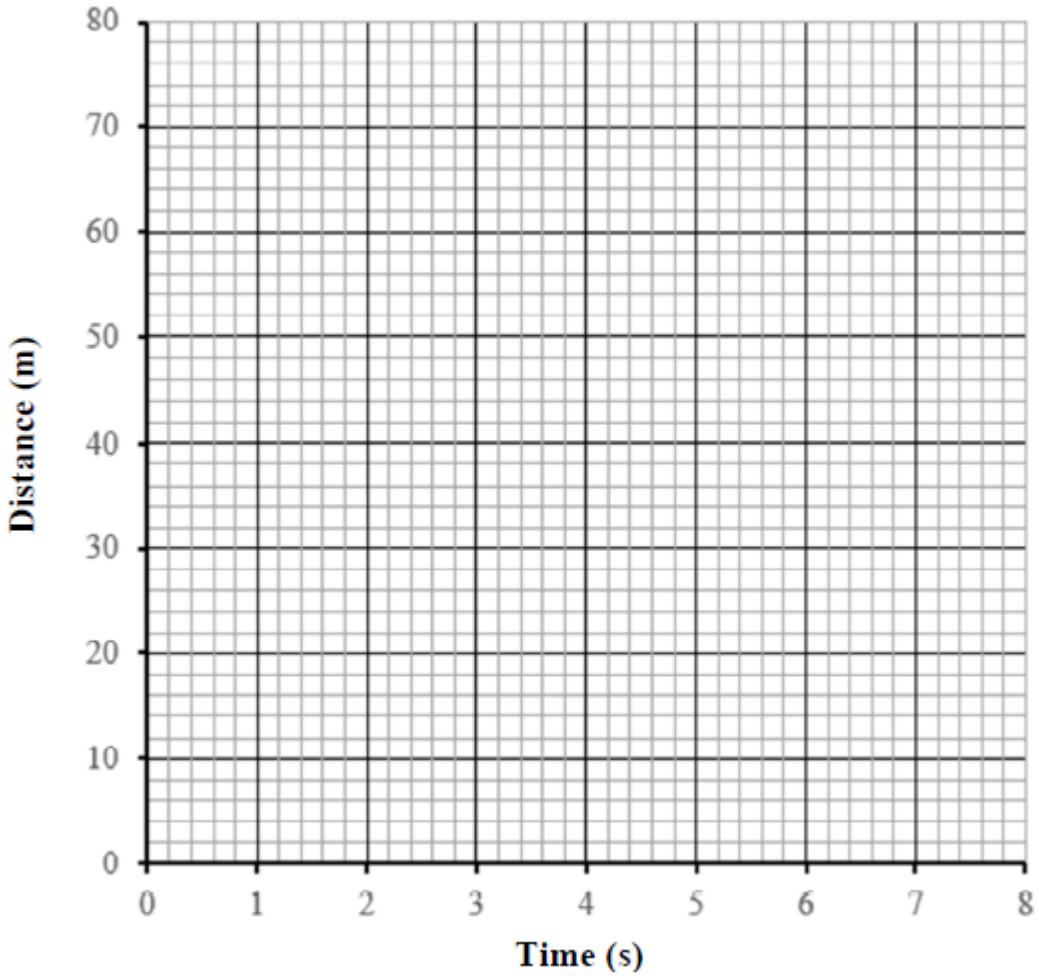
_____

2016 OL Question 8 (b) Speed

A man runs along a track. The total distance he has run since he started is measured every two seconds. The data collected is shown in the table below. (21)

Time (s)	0	2	4	6	8
Distance (m)	0	20	40	60	80

(i) Use the data in the table to draw a graph of distance (y-axis) against time (x-axis) using the grid below.



(ii) Use the graph to estimate the distance the man had run after five seconds.

_____

(iii) Calculate the speed of the man in m/s.

_____

_____

_____

2017 HL Question 2 (a) Ecology

A group of students carried out a line transect study to show the distribution of the daisy, a common wildflower plant, in a grassland habitat.

One end of a string was staked next to the trunk of a tree and the other end was staked 8 m away from the tree, as shown.

The string had knots at 1 m intervals. The number of daisy plants touching the string in each 1 m interval (station) is given in the table below.

Station 1 was nearest the tree. (15)

Station	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Number of daisy plants	**0**	**2**	**3**	**5**	**7**	**8**	**7**	**6**

(*i*) Using the results in the table, draw a suitable graph to show the relationship between the number of daisy plants and the distance from the tree.

(*ii*) Suggest a reason why there were no daisy plants in the first interval (Station 1).

_____

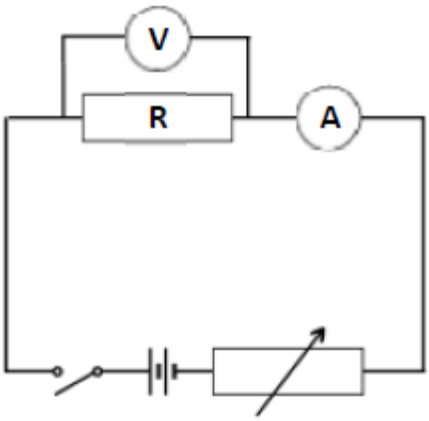
_____

(*iii*) Name another method that could be used to investigate the distribution of the daisy plant in a habitat.

_____

2017 HL Question 9 (a) OHM's Law

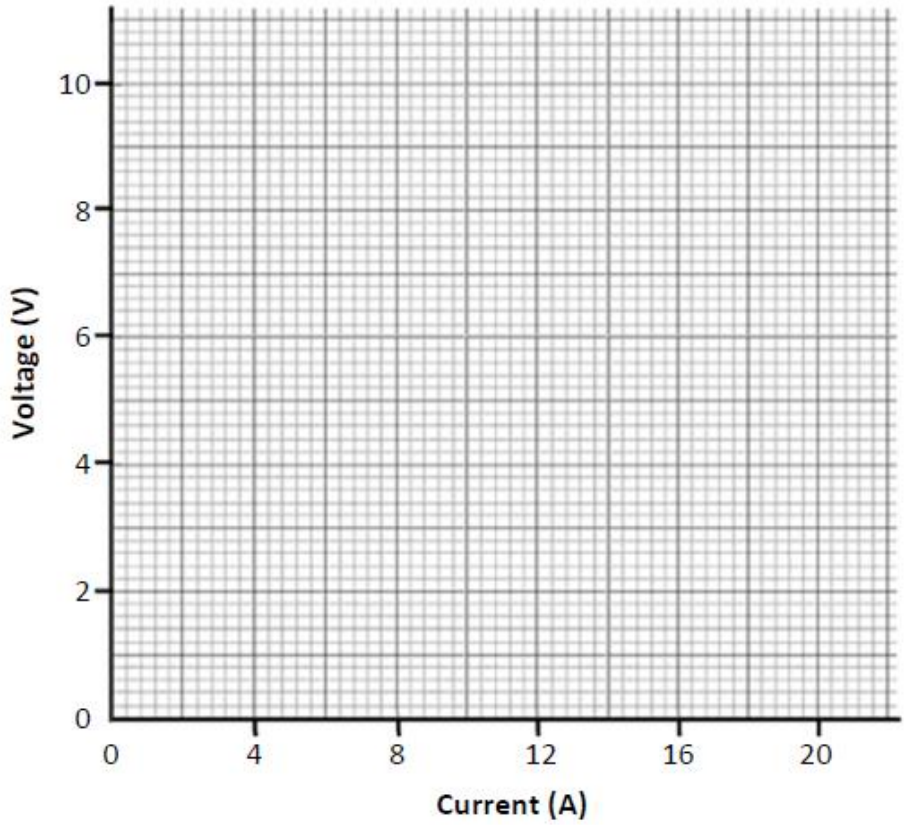
A student used the circuit shown to investigate the relationship between the potential difference (voltage) across a resistor and the current flowing through it.



The results are given in the table below. (21)

Voltage (V)	2	4	6	8	10
Current (A)	3.6	7.2	10.8	14.4	18.0

(*i*) Draw a graph of voltage against current for these results.



(*ii*) What is the relationship between voltage and current shown by your graph?

_____

(*iii*) Calculate the resistance of the resistor.

(*iv*) What happens to the resistor when current flows through it?

_____

_____

Calculation

2017 OL Question 2 (a) Micro-organisms

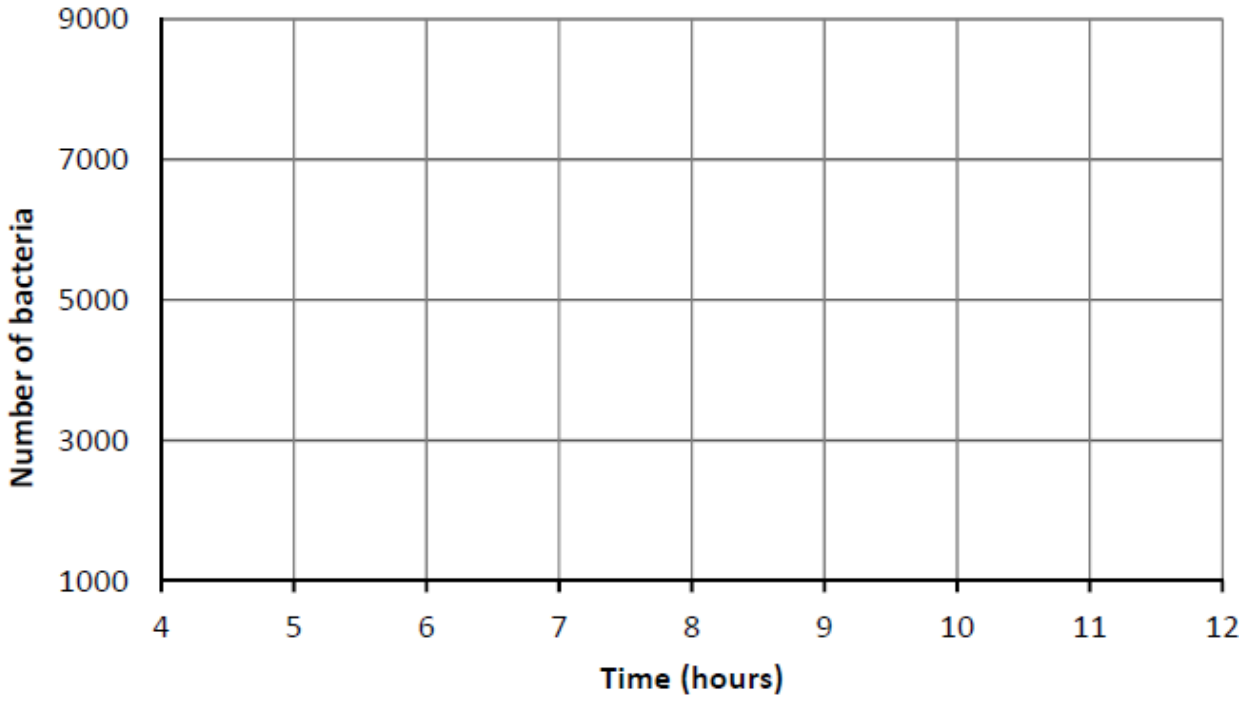
A scientist set up an agar plate to grow micro-organisms from an air sample.

Starting 4 hours after the plate was exposed to the air, the total number of bacteria present was counted every 2 hours.

The data collected is shown in the table below. (21)

Time (hours)	4	6	8	10	12
Number of bacteria	1000	3000	5000	7000	9000

(*i*) Use the data in the table to draw a graph of the number of bacteria (*y*-axis) against time (*x*-axis) using the grid below.



(*ii*) Using your graph, estimate the number of bacteria present after 7 hours.

_____

(*iii*) Name two factors that micro-organisms need in order to grow in agar plates.

1. _____

2. _____

NOTES