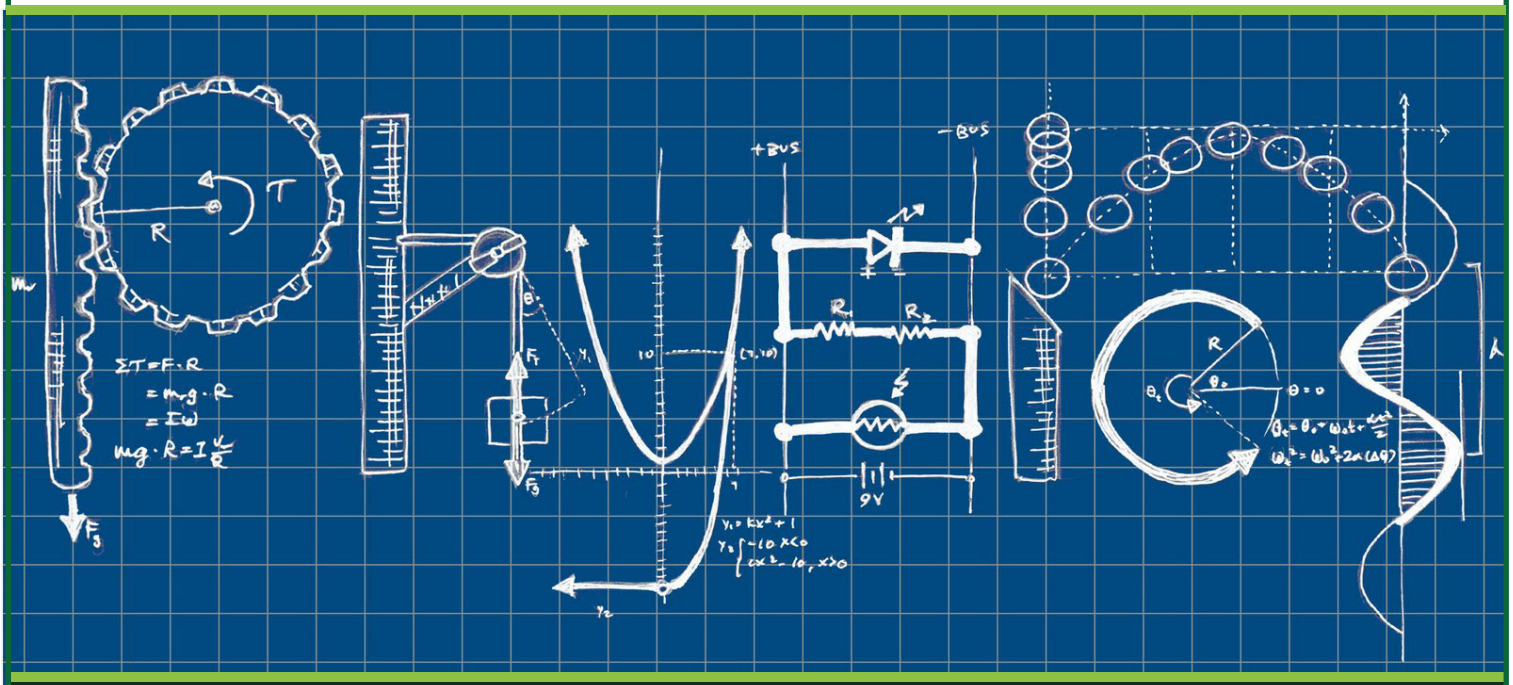
Bentley Wood
High School for Girls

Physics
Bridging work

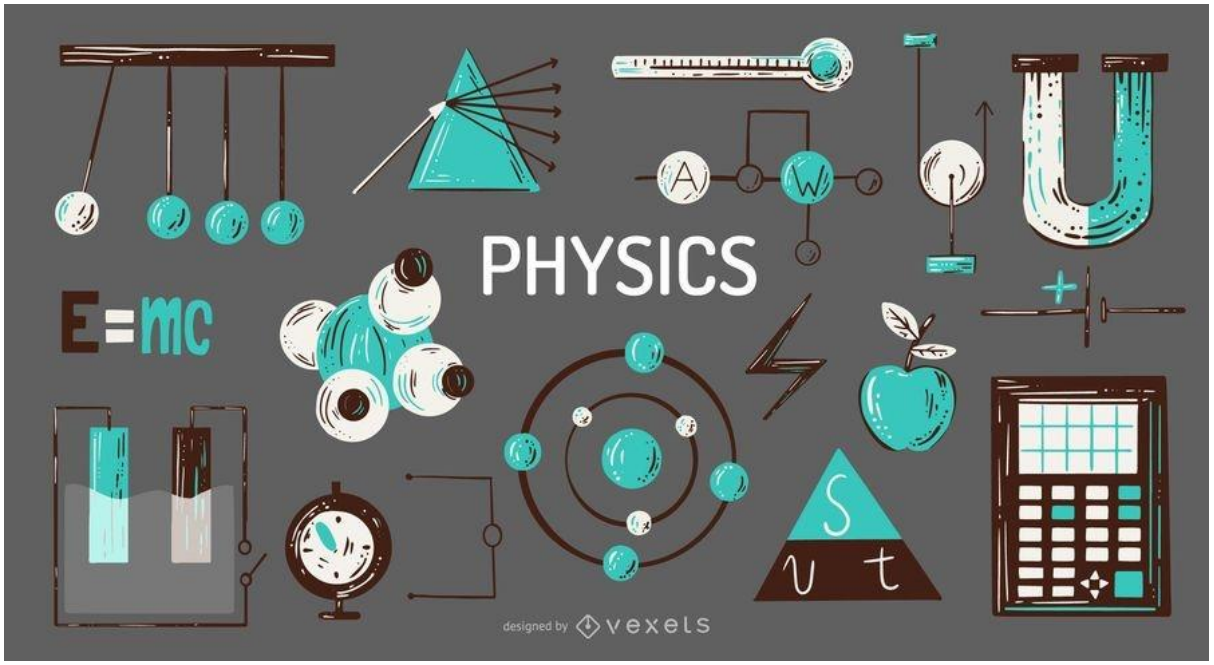
Year 10 into 11 for 2025/26



Name: _____

Tutor Group: _____

Teacher: _____



Yr10 to yr11 Bridging work

1. Congratulations on completing your year 10 year and welcome to year 11, the year of your GCSE's.
2. The first mock will be at the end of your first half term back. This means that you need revise the year 9 and year 10 content over the summer.
3. This pack is your revision. You will need to show this fully completed to your first science lesson back.
4. This pack is divided into 4 sections:
    a. Reflection of year 10 and 9 content
    b. Required practical
    c. Exam question practice
    d. Algebra
5. **If you get stuck, please use the resources available to you, including your textbook, youtube channels such as cognito and free science lessons and websites such as save my exams and bitesize.**
6. Make sure you organise yourself to ensure that you also enjoy some time off and be ready to go in September.

Section 1: reflection

When you revise for your exams, there are 3 questions that you need to ask yourself:

1. Do you **know** the content
2. Do you **understand** the content
3. Can you answer the **exam questions**.

So far, the content you learnt is:

1. Energy
   a) Stores and transfers
   b) Energy equations (work done, efficiency, kinetic, gravitational potential, elastic potential and power)
   c) conduction and convection
   d) Infra-red radiation
   e) Specific heat capacity
   f) Thermal insulation
   g) Energy resources

2. Electricity
   a) component diagrams
   b) current, potential difference and resistance
   c) series and parallel rules
   d) IV characteristics
   e) Power and efficiency
   f) National grid
   g) plug and safety
   h) Static electricity (triple)

4. Particle model
   a) Density
   b) Solid, liquid and gas
   c) Internal energy
   d) Specific latent heat
   e) Pressure and temperature
   f) Pressure and Volume (triple)

5. Atomic structure
   a) History of the atom
   b) ions and isotopes
   c) alpha, beta and gamma
   d) contamination, irradiation
   e) half life
   f) Uses in medicine (triple)
   g) fission and fusion (triple)

6. Forces
   a) scalar and vectors
   b) contact and non-contact
   c) Resultant force
   d) Centre of mass
   e) Moments (triple)
   f) pressure in a fluid (triple)
   g) Distance-time graphs
   h) velocity-time graphs

Forces cont.
   i) acceleration
   j) Newtons 3 laws of motion
   k) Weight and terminal velocity
   l) Momentum
   m) Conservation of momentum (triple)
   n) Elasticity and Hooke's law

Task 1: With a red, yellow and green pen label each section of content with Red (very unconfident, yellow (somewhat confident) and green (very confident)

Task 2: Pick 3 red topics, 3 yellow topics and 3 green topics to complete some of the following tasks for.

Red – these tasks are aimed at increasing your knowledge of the topic:

☐ Create flashcards for that topic

☐ Brain dump: write down everything you remember from one topic without notes in one colour then, use resources **(textbooks, BBC bitesize, Cognito, Savemyexams**) to add on any information you've forgotten in another colour.

☐ Can you write down all of the equations have learnt so far?

☐ Quiz yourself on a topic using BBC Bitesize or Educake or quizzes

Go further

☐ Create a mind map that links the three red topics into 1 mind map

☐ Complete Seneca for the topics you have chosen

Yellow - these tasks are aimed at increasing your understanding of the topic:

☐ Use "I used to think… now I know…" to address a misconception from your exam

☐ Create clear and easy to use explanation posters for each topic.

☐ Teach someone about each of your topics

☐ What are the common errors that people can make for each topic?

Go further

☐ Use everyday examples to explain the topics chosen

☐ Draw diagrams to explain the topics

Green – These tasks are aimed at increasing your ability to answer the exam questions:

☐ Re-do any questions where you lost marks – focus on Q3(b), Q4, Q6

☐ Write down command words (e.g. describe, explain, calculate) and explain what they mean

☐ Practise writing 4-mark and 6-mark extended response questions

☐ Complete past questions on **SaveMyExams or Cognito** for the topics chosen

Go further

☐ Re-do any questions where you lost marks – focus on Q3(b), Q4, Q6

☐ Write down command words (e.g. describe, explain, calculate) and explain what they mean

Section 2: Required Practicals

Required practicals		Topic
14	**Determining specific heat capacity.** Determine the specific heat capacity of a metal block of known mass by measuring the energy transferred to the block and its temperature rise, and using the equation for specific heat capacity.	P2.2
15	**Investigating resistance.** Set up circuits and investigate the resistance of a wire, and of resistors in series and parallel.	P4.2 P4.5
16	**Investigating electrical components.** Correctly assemble a circuit and investigate the potential difference–current characteristics of circuit components.	P4.3
17	**Calculating densities.** Measure the mass and volume of objects and liquids and calculate their densities using the density equation.	P6.1
18	**Investigate the relationship between force and extension for a spring.** Hang weights of known mass from a spring and, using the correct apparatus, measure the resulting extension. Use the results to plot a force-extension graph.	P10.5
19	**Investigate the relationship between force and acceleration.** Using a newton-metre, investigate the effect on the acceleration of an object of varying the force on it and of varying its mass.	P10.1
20	**Investigating plane waves in a ripple tank and waves in a solid.** Determine which apparatus are the most suitable for measuring the frequency, speed, and wavelength of waves in a ripple tank, and investigate waves on a stretched string.	P11.4
21	**Investigating infrared radiation.** Determine how the properties of a surface affect the amount of infrared radiation absorbed or radiated by the surface.	P12.2

The following pages are designed to revise practicals 14, 16 and 19.

Practicals 20 and 21 will be completed in year 11.

Some useful video links:

Insulation - GCSE Science Required Practical (youtube.com)

GCSE Physics Revision "Required Practical 1: Specific Heat Capacity" (youtube.com)

All PHYSICS Required Practicals - GCSE Science (AQA) (youtube.com)

Specific Heat Capacity

1. Read the method used to measure the effects of different insulation:

• Connect the heater to an ammeter and power source in series and voltmeter in parallel.
• Measure and record the mass of the copper block in kg, using a digital pan balance.
• Place the heater in the larger hole in the block.
• Put the thermometer in the smaller hole, to measure temperature.
• Switch the power pack to 12 V. Switch it on.
• Using the ammeter to measure current
• Using the voltmeter to measure potential difference.
• Use a timer to measure time
• Record the temperature every minute for 10 minutes.
• Use E = I x V x t to calculate the energy transferred
• Use E = m x c x $\Delta\theta$ to calculate the specific heat capacity

2. Improvements:

Suggest ways in which you could improve these in experiment

Accuracy (how close to the real value):

Precision (the spread of results):

Reliability (how repeatable the method is):

3. Specific Heat Capacity can be measured using the equation

Energy = mass x Specific Heat Capacity x temperature change

Rearrange the formula to find:

Specific heat capacity =

What are the units for?

Energy:

Specific Heat Capacity:

Temperature change:

Mass:

4. Calculation

1. What is the specific heat capacity if the temperature rise is 5°C
of a 1Kg mass with 2000J of energy?

2. What is the specific heat capacity if the temperature rises from
27°C to 45°C of a 2kg mass with 1000J of energy?

3. What is the energy needed to increase the temperature from
55°C to 100°C of a 200g mass and specific heat capacity of 345J/kg^{o}C?

5. Plan

<u>Without turning over</u> write a step by step plan for measuring the specific heat capacity

7. Risk assessment

Write a risk assessment for this practical including what you would do to minimise these risks

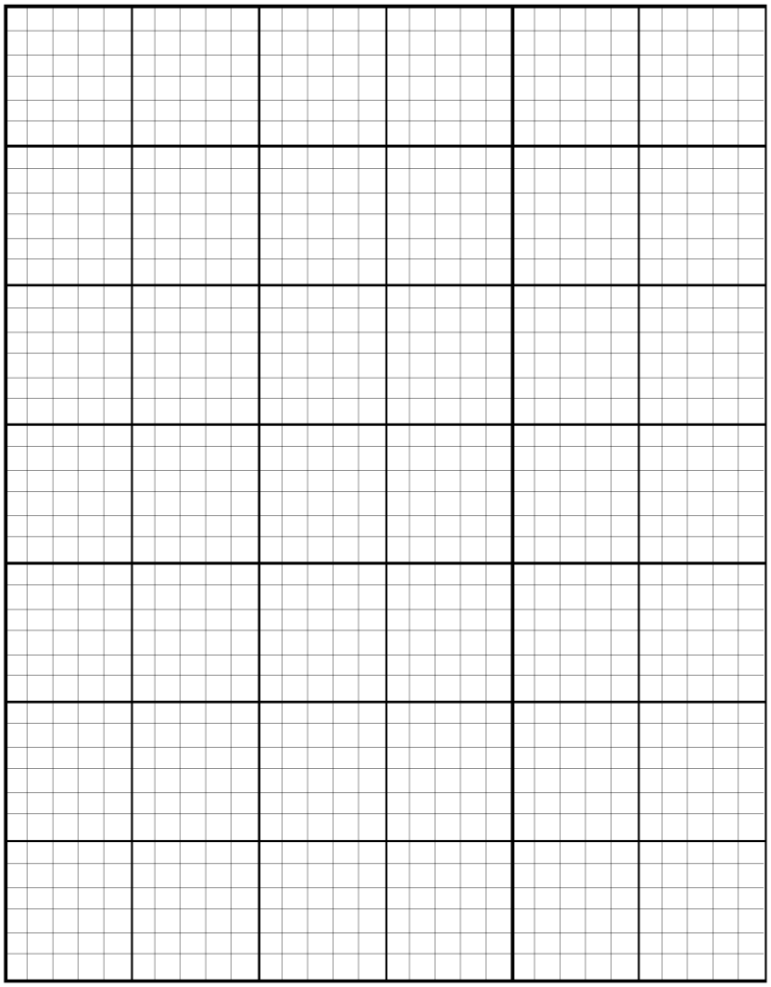
1. Hazard

2. Risk

3. Minimise

6. Results

Use the results table to draw a graph of time on the x axis and temperature on the y axis



Time (min)	**Temperature (**°C)
1	35
2	35
3	37
4	40
5	42
6	44
7	45
8	47
9	49
10	52
11	54

I-V Characteristics

1. Read the method used to measure the effects of different insulation:

• Connect the Voltmeter in parallel across the Power Supply to measure the potential difference.
• Connect the Ammeter in series to measure the current.
• Connect the resistor and variable resistor in the series circuit.
• Adjust the voltage and current using the variable resistor and record the new ammeter and voltmeter readings. Repeat this to obtain several pairs of readings.
• Record the readings on the ammeter and voltmeter in a suitable table.
• Swap the connections on the battery.
• Continue to record pairs of readings of current and potential difference with the battery reversed.
• The readings on the ammeter and voltmeter should now be negative.
• Draw a graph with current on the y axis and potential difference on the x axis.
• Change the component from a resistor to a diode/lamp and repeat.

2. Risk assessment:

Suggest what the risks are in this experiment. Describe what you should do to minimise the risks.

1. Hazard

2. Risk

3. Minimise

3. What are the variables in this experiment?

Independent:

Dependent:

Control:

How would you control these variables to minimise their effect?

4. Convert

1mA = 0.001A

1. 500 mA = ……..A

2. 25 mA = ……..A

3. 770 mA = ……..A

1kV = 100V

4. 5.8 kV = ……..V

5. 900 kV =……..V

6. 0.1 kV = ……..V

5. Plan

Without turning over write a step by step plan for draw a I-V graph for a bulb, include a circuit diagram

7. Conclusion

Explain the each of the graphs:

a) Diode

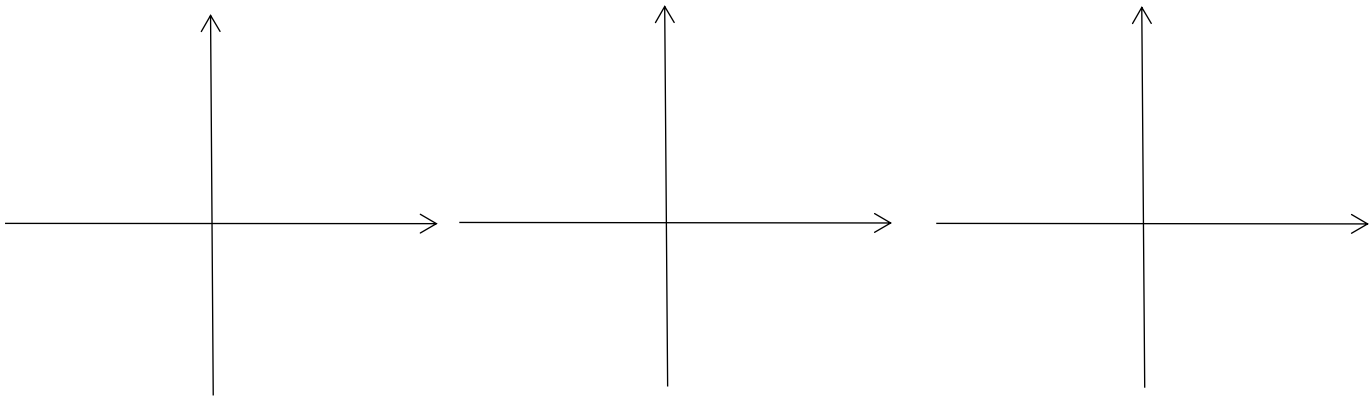
b) fixed resistor

c) filament lamp

6. I-V graphs

Sketch a IV graph for:

a) diode b) fixed resistor c) filament lamp



Acceleration

1. Read the method used to obtain results on acceleration:

• Connect the light gates to the data logger, to measure the velocity of the trolley. Input the length of the card on the trolley.
• Set up a track on a slope (to account for friction).
• Tie a length of string to the trolley. Pass the string over the pulley and attach the mass stack to the other end of the string.
• Make sure the mass stack doesn't touch the floor before going through the light gate.
• Clamp a light gate horizontally. Position them above the slope so that the card passes through them as the trolley moves.
• Use the data logger to measure the acceleration.
• Repeat three times and find a mean.
• Repeat the experiment changing the force by changing the masses attached to the string
• The mass of the system stays constant.

2. Risk assessment:

Suggest what the risks are in this experiment. Describe what you should do to minimise the risks.

1. Risk

2. Hazard

3. Minimise

3. What are the variables in this experiment?

Independent:

Dependent:

Control:

How would you control these variables to minimise their effect?

4. Calculation

$$\boldsymbol{Acceleration} = \frac{\boldsymbol{change\ of\ velocity}}{\boldsymbol{time}}$$

Complete the following calculations:
1. A mass accelerates from rest to 4 m/s in 8 seconds. What is the acceleration?

2. A mass accelerates from 2m/s to 8 m/s in 2 seconds. What is the acceleration?

3. A mass decelerates to 50 m/s in 10 seconds at a rate of -2.6m/s^2. What is the initial speed?

5. Plan

<u>Without turning over</u> write a step by step plan for measuring the acceleration of a trolley.

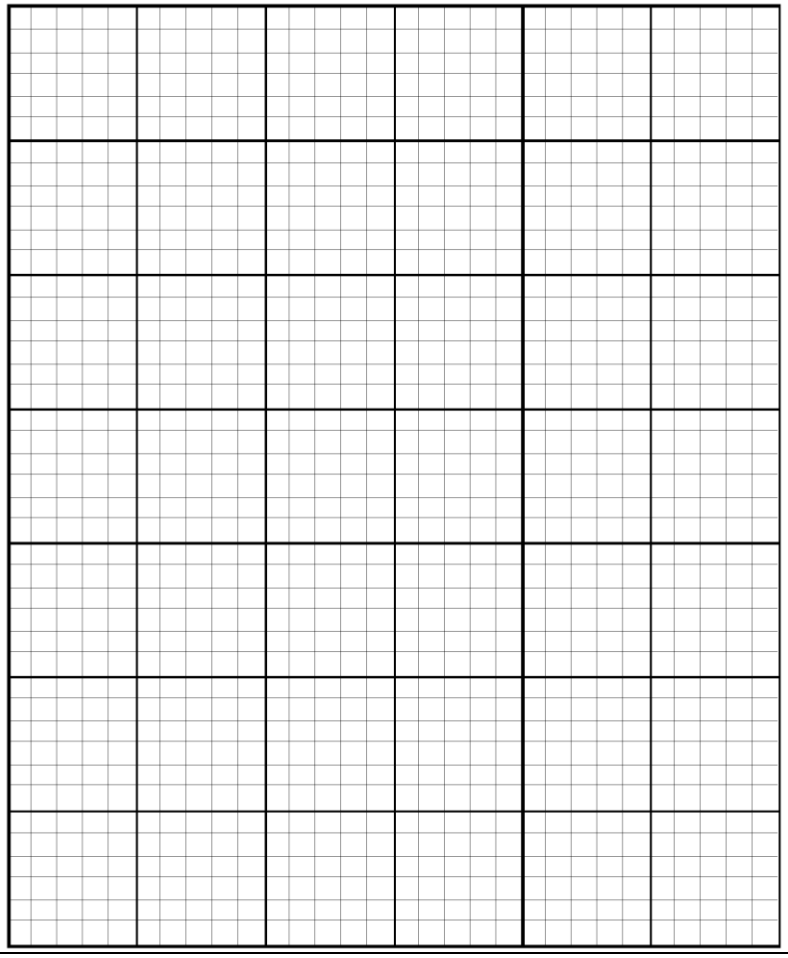
7. Correlation

What is the correlation between force and acceleration?

What does this mean?

How would you use the graph to find the mass of the trolley and masses?

6. Results



Force (N)	Acceleration (m/s/s)
0.2 N	0.8 m/s/s
0.4 N	1.6 m/s/s
0.6 N	2.4 m/s/s
0.8 N	3.2 m/s/s
1 N	4.0 m/s/s

Use the results table to draw a graph with the force on the x axis and acceleration on the y axis.

Section 2: Exam Questions

Q1.

A student investigated how the current in a circuit varied with the number of lamps connected in parallel in the circuit.

Figure 1 shows the circuit with three identical lamps connected in parallel.

Figure 1

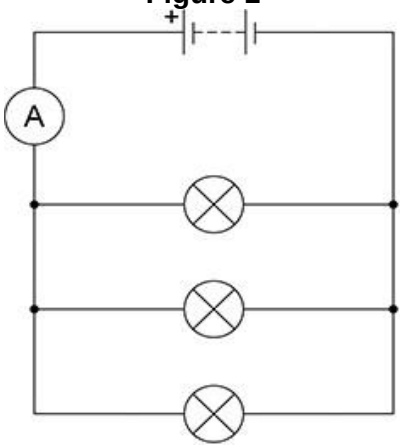
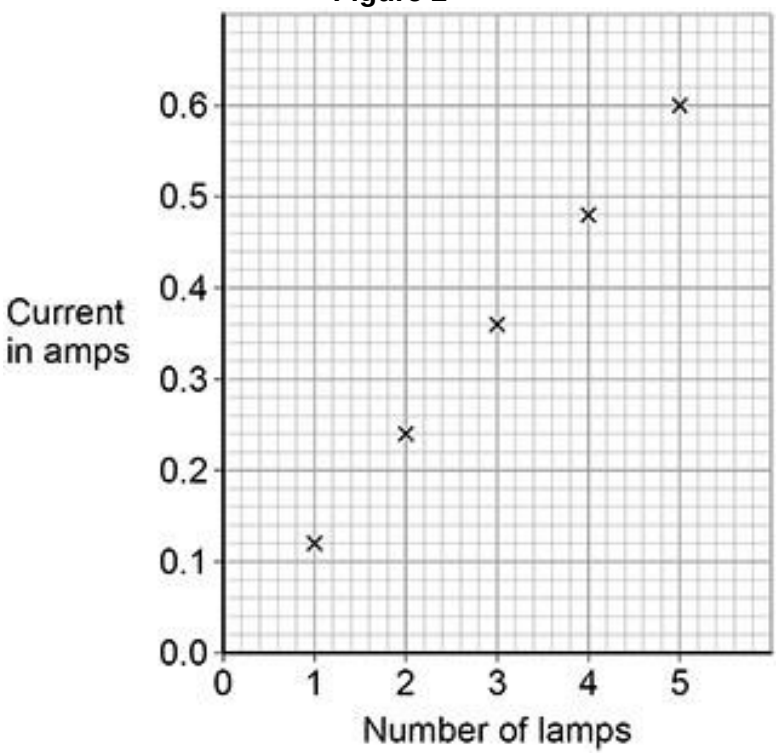


Figure 2 shows the results**.**

Figure 2



(a) Complete the sentences.
Choose answers from the box.
Each answer can be used once, more than once or not at all.

decreased	**stayed the same**	**increased**

As the number of lamps increased, the current _____.

As the number of lamps increased, the total resistance of the circuit _____ .

As the number of lamps increased, the potential difference across the battery _____ .

(3)

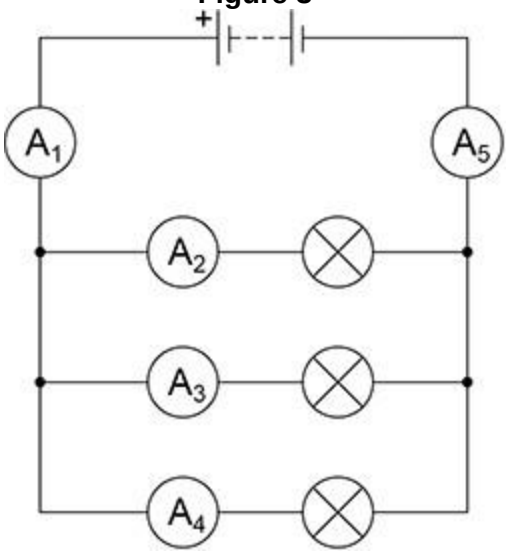
(b) When there were three lamps in the circuit the ammeter reading kept changing between 0.35 A and 0.36 A.
What type of error would this lead to?
Tick (✓) **one** box.

Random error	☐
Systematic error	☐
Zero error	☐

(1)

Figure 3 shows a circuit with five ammeters and three identical lamps.

Figure 3



(c) Complete the table below to show the readings on ammeters A_2 and A_5.

Ammeter	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
Current in amps	0.36		0.12	0.12	

(2)

(d) The resistance of one lamp is 15 Ω.
The current in the lamp is 0.12 A.
Calculate the power output of the lamp.

_____

_____

_____

Power = _____ W

(2)

(Total 8 marks)

Q2.

A student investigated the density of different fruits.
The table below shows the results.

Fruit	Density in g/cm^3
Apple	0.68
Kiwi	1.03
Lemon	0.95
Lime	1.05

(a) The student determined the volume of each fruit using a displacement can and a measuring cylinder.
What other piece of equipment would the student need to determine the density of each fruit?

_____

(1)

(b) Write down the equation which links density (ρ), mass (m) and volume (V).

_____

(1)

(c) The mass of the apple was 85 g.
The density of the apple was 0.68 g/cm^3.
Calculate the volume of the apple.
Give your answer in cm^3.

_____

_____

_____

Volume = _____ cm^3

(3)

(d) The student only measured the volume of each fruit once.
The volume measurements **cannot** be used to show that the method to measure volume gives precise readings.
Give the reason why.

_____

_____

_____

(1)

(Total 6 marks)

B2 Algebra

1. Write the following expression in words: $x \propto y$

2. Make variable u the subject of this equation.

$$v^2 = u^2 + 2as$$

3. A certain constant can be calculated using the equation

$$\text{constant} = \frac{\text{force}}{\text{current} \times \text{length}}$$

Given that the units of force = N, current = A and length = m, what are the units of the constant?

4. A car is travelling at 10 m/s and accelerates at 3 m/s^2 to 20 m/s. Calculate the distance travelled by the car during the acceleration. Use the equation in question 2, where u = 10 m/s, v = 20 m/s and a = 3 m/s^2.

5. If I eat one square of chocolate from a bar of chocolate every minute until I've eaten it all, describe the relationship between the amount of chocolate **remaining** and the time I have it for.

6. Water pours into a bucket at a rate of 50 cm^3 per second. If the bucket contained 500 cm^3 of water to begin with, describe the relationship between the volume of water in the bucket and the time for which the water is flowing into the bucket.

7. If the temperature, θ, of a cup of tea falls from 95 °C to 85 °C in 300 seconds, calculate $\Delta\theta$, the rate of change of the temperature of the tea.