Experiment Revision

Contents

To demonstrate Snell's law / To calculate the refractive index of a material - 2018 - Q2.

Describe, with the aid of a labelled diagram, how the student determined the angle of refraction.	
Diagram that includes block, pins/laser, normal, angles of incidence and refraction.	
Describe (i) how to draw the incident and refracted ray. (ii) How to draw the normal. (iii) How to correctly measure the angles of incidence and refraction.	

Draw a suitable graph to show the relationship between the angle of incidence and the angle of refraction. State this relationship and explain how the graph verifies it.	
Calculate all the sin (i) and sin (r) values, in your own table – 2 dp.	
Graph	On Graph paper, at the end of question.
(i) Describe the shape of the graph (ii) What relationship does this demonstrate?	

Use your graph to determine the refractive index of the material used.	
(i) Write out the slope formula (ii) Pick 2 points **from your line** (iii) Put into formula and evaluate.	

What would happen if the observed incident ray was perpendicular to the block.	
(i) What would you observed about the angle of refraction if the angle of incident was 90'?	

Graph of data for Q2, 2018.

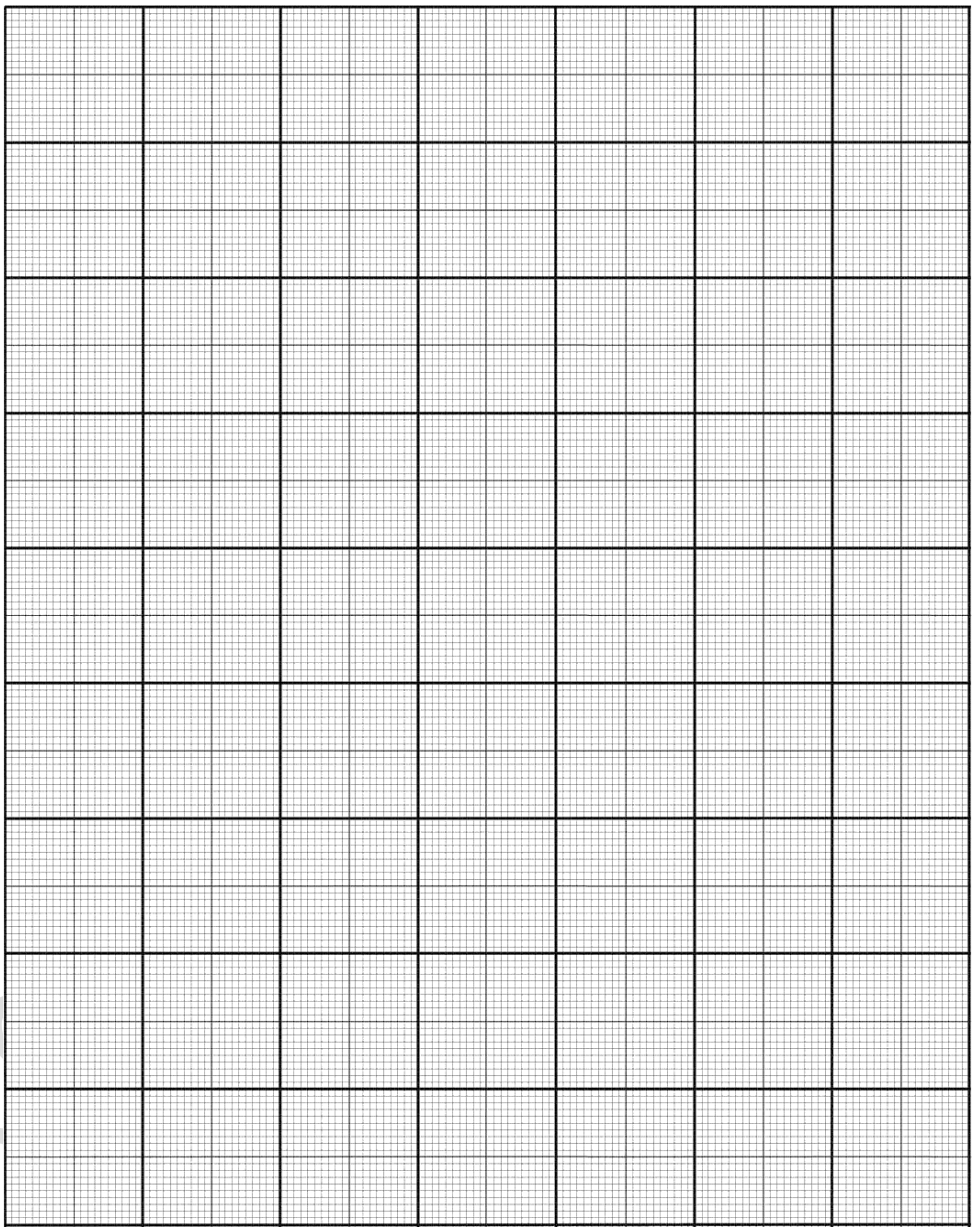
Are the scales on the axes evenly spread out?

Does the graph have a title?

Do the axes have labels and units?

Did I use the little boxes to count the decimals to ensure my points are precise?

Did I draw a straight line of best fit, through the origin?



To determine the focal length of a concave mirror – 2013 – Q3.

Draw a labelled diagram of the arrangement.	
Diagram that includes concave mirror, mirror holder, screen, candle as light source. All apparatus are drawn in the correct arrangement. Distances "u" and "v" are clearly labelled.	

Give two precautions when measuring the image distance.	
How do you (any 2): Reduce parallax error? Ensure the image is not blurry? Which part of mirror do you measure to? Ensure screen and mirror are vertical?	

Explain why the student was unable to form an image on the screen when the object was close to the mirror.	
Refer to mirror diagrams to determine what type of image is formed when object is on, or inside, the focal length.	

Use the data to calculate a value for the focal length.	
Write out lens formula. Calculate 4 separate sets of focal lengths, using each pair of values for "u" and "v". Find an average of all 4 values.	

Describe how the student could have found an approximate value for the focal length.	
Refer to write up booklet / Real world physics for this question.	

To measure the focal length of a concave lens – 2012 – Q2.

Draw a labelled diagram of the arrangement.	
Diagram that includes concave lens, lens holder, screen, candle as light source. All apparatus are drawn in the correct arrangement. Distances "u" and "v" are clearly labelled.	
Explain how to set up the apparatus. Explain how you know when the screen is the correct distance from the lens. Explain exactly how you measure "u" and "v." For how many sets of data does the student repeat the experiment.	

Why is it difficult to measure the image distance correctly?	
Refer to write up booklet / Real world physics for this question.	

Use the data to calculate a value for the focal length.	
Write out lens formula. Calculate 4 separate sets of focal lengths, using each pair of values for “u” and “v”. Find an average of all 4 values.	

Why is it difficult to measure the image distance when the object distance is less than 10 cm?	
Refer to lens diagrams to determine what type of image is formed when object is on, or inside, the focal length.	

To calculate the wavelength of monochromatic light – 2018 – Q3.

Draw a labelled diagram of the apparatus that the student used in this experiment.	
Diagram that includes laser, diffraction grating and screen, in correct order and in correct arrangement.	
How to measure the distance from screen to diffraction grating. How to measure the distance from 0 order image to 1st order image. How to use these distances to calculate θ using the tan ratio.	

Calculate the wavelength of the beam of light.	
Use $d = \frac{1}{n}$, to calculate the spacing, in metres (m). Divide ϕ by 2 to get the angle of diffraction, θ Use formula $n\lambda = d \sin\theta$	

Describe the affect on the size of angle ϕ if the diffraction grating above was replaced with a diffraction grating of 80 lines per mm.	
Refer to write up booklet / Real world physics for this question.	

Hence determine which diffraction grating would give you a more accurate value for λ. Justify your answer.	
Refer to write up booklet / Real world physics for this question.	

What would you observe if the monochromatic light source was replace with a source of white light?	
Refer to write up booklet / Real world physics for this question.	

To determine the specific latent heat of fusion of ice – 2017 – Q3.

Describe how (i) the mass of the ice was measured and (ii) it was ensured that the mass of ice added was at 0'C	
(i) Refer to which mass combinations of materials are subtracted from each-other. (ii) Refer to write up booklet / Real world physics for this question.	

State two ways in which the calorimeter could have been insulated during the experiment.	
Refer to write up booklet / Real world physics for this question.	

Calculate the specific latent heat of the fusion of ice.	
Calculate the mass of warm water, the change in temperature of the water / calorimeter and the change in temperature of the melted ice. Write out equation for this experiment (book / write-up). Substitute all values into the equation, ensure you us SI units for all. Calculate the final value for the specific latent heat of fusion of ice, and include the unit.	

State any 2 characteristics of a suitable thermometer for use in this experiment.	
Refer to write up booklet / Real world physics for this question.	

To determine the specific latent heat of fusion of ice – 2010 – Q2.

How was the water cooled to below room temperature?	
Refer to write up booklet / Real world physics for this question… But seriously… how do you cool water!	

How was the steam dried?	
Refer to write up booklet / Real world physics for this question.	

Describe how the mass of the steam was determined.	
Refer to which mass combinations of materials are subtracted from each-other.	

Why was a sensitive thermometer used.	
Explain why an error of 1'C and 0.1'C produces different percentage error in the final calculated value.	

Calculate the specific latent heat of the vaporisation of steam.	
Calculate the mass of the steam and the mass of the water. Calculate the change in temperature of the condensed steam and the water in the calorimeter. Write out equation for this experiment (book / write-up). Substitute all values into the equation, ensure you us SI units for all. Calculate the final value for the specific latent heat of vaporisation of steam, and include the unit.	

To determine the acceleration due to gravity by freefall – 2009 – Q1.

Draw a labelled diagram of the apparatus used in the experiment. Indicate the distance "s" on your diagram.	
Diagram that includes timer, ball, electromagnet, pressure plate. All apparatus must be in correct arrangement. "s" must be the perpendicular distance from the bottom of ball to top of pressure plate.	

How was the time interval "t" measured.	
Explain exactly how the timer is started. Explain exactly how the timer is stopped.	

Calculate a value for the acceleration due to gravity by drawing a suitable graph based on the recorded data.	
Calculate all the distance values in metres. Calculate all the values for t^2, in the unit of s^2.	
Graph	On Graph paper, at the end of question.
Write out slope formula. Use two points **from the line**. Double your slope value to get the acceleration due to gravity – unit is m/s^2.	

Give two ways of minimising the effect of air resistance in this experiment.	
Refer to write up booklet / Real world physics for this question.	

Graph of data for Q1, 2009.

Did I graph "s" vs "t^2"

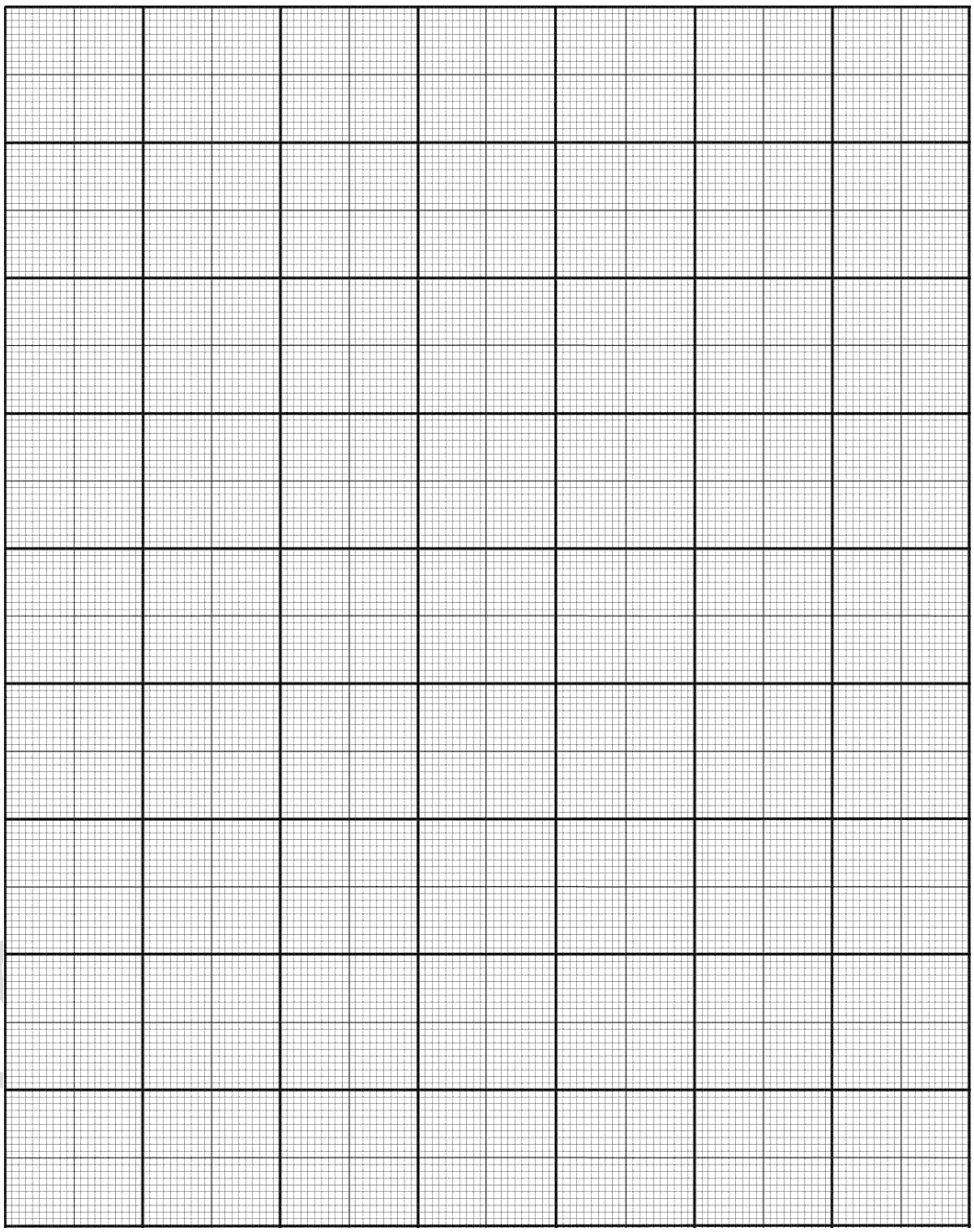
Are the scales on the axes evenly spread out?

Does the graph have a title?

Do the axes have labels and units?

Did I use the little boxes to count the decimals to ensure my points are precise?

Did I draw a straight line of best fit, through the origin?



To investigate the relationsionship between the acceleration of a body and the force applied to it – 2010 – Q1.

Describe the steps in measuring the acceleration of the body.	
Explain how to measure the initial velocity of the mass, and the time it occurs. Explain how to measure the final velocity of the mass and the time it occurs. Explain how to use these values to calculate the change in velocity and the time taken, to calculate acceleration.	

Using the recorded data, plot a graph to show the relationship between the acceleration on a body and the force applied to it. What does your graph tell you about this relationship.	
Data can be graphed without being changed.	On Graph paper, at the end of question.
Describe the shape of the graph What relationship does this demonstrate?	

Using your graph, find the mass of the body.	
Slope formula with **data points from the line**. Correct value for mass, with unit.	

Graph of data for Q1, 2010.

Did I graph “f” vs “a”

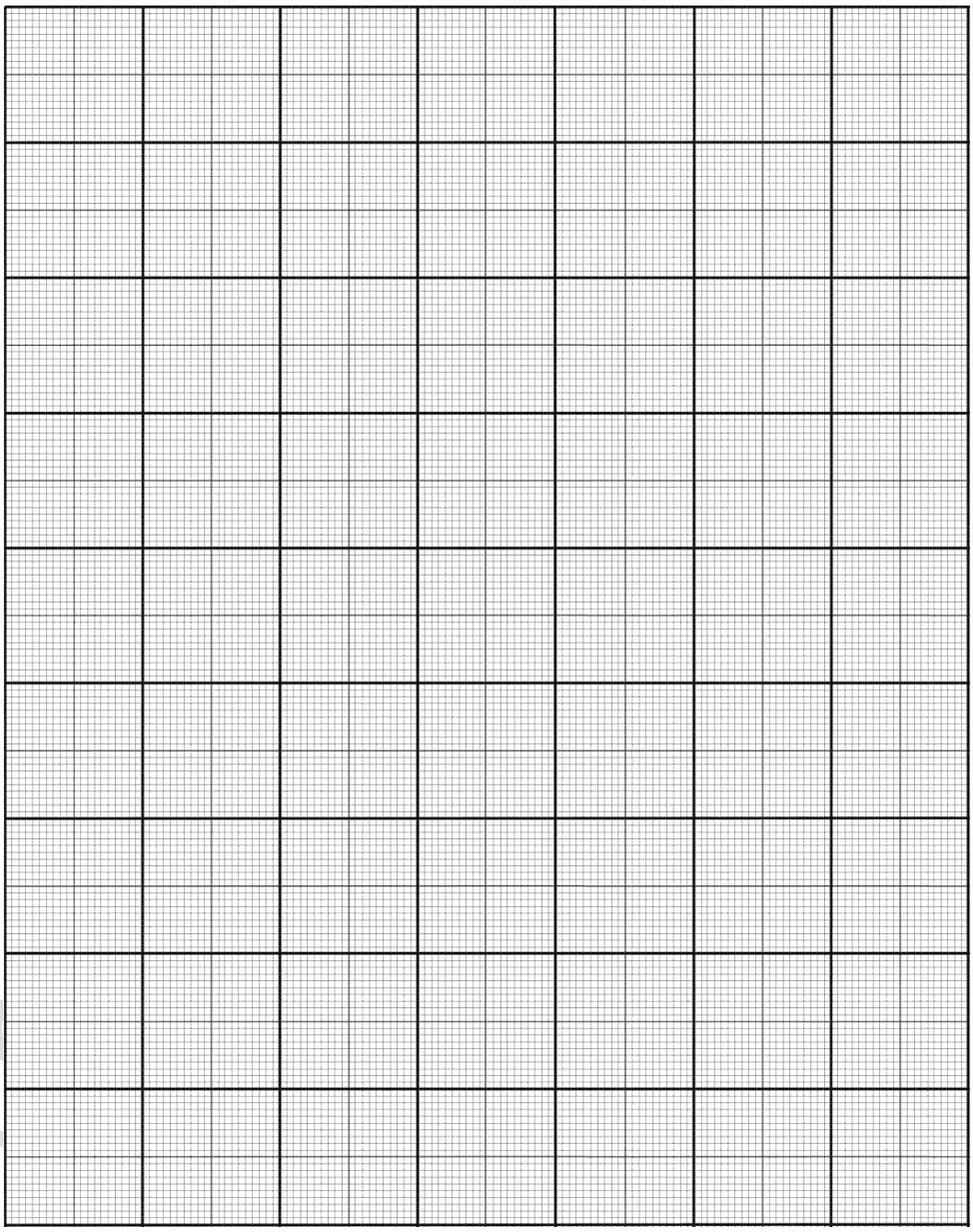
Are the scales on the axes evenly spread out?

Does the graph have a title?

Do the axes have labels and units?

Did I use the little boxes to count the decimals to ensure my points are precise?

Did I draw a straight line of best fit, through the origin?



To verify the principle of conservation of momentum – 2018 – Q1.

Draw a labelled diagram of the apparatus that the student used in this experiment.	
Diagram that includes 2 trollys on a track, a means of the 2 trollys attaching to one another and a means to record the distance travelled & time taken.	
State two principal external forces that were minimised. How were they minimised?	
Refer to write up booklet / Real world physics for this question.	

Calculate the velocities “u” and “v”. Use this data to calculate the conservation of momentum.	
Calculate velocities from the 3rd / 4th set of data in questions, using: $vel = \frac{displ}{time}$	
Write out formula for momentum (tables) Write out conservation of momentum formula (tables) and rearrange for this experiment. Calculate initial and final momentums for from this data, include the units. State, using words, how your results show that momentum is conserved	

Calculate loss of kinetic energy during the collision. What type of energy is it lost as?	
Write out kinetic energy formula (tables) Calculate (i) initial kinetic energy, (ii) final kinetic energy and subtract them There are generally only 2 types of energy losses.	

To verify the the condition for equillibrium – 2016 – Q1.

Explain how the centre of gravity was found.	
Refer to write up booklet / Real world physics for this question.	

Explain how the ***weight*** of the metre stick was found.	
Refer to write up booklet / Real world physics for this question… and remember, it's weight, not mass!	

Explain how the upward and downward forces were determined.	
Refer to write up booklet / Real world physics for this question	

Give 1 possible reason why the centre of gravity was not at the 50 cm mark.	
Refer to write up booklet / Real world physics for this question	

Using the data given, calculate (i) the net force acting on the metre stick and (ii) the sum of the moments about the 40 cm mark.	
Add up all the forces acting upwards. Add up all the forces acting downwards (including weight of metre stick) Subtract them.	
Write out formula for calculating a moment (tables) Determine all moments as clockwise or anti-clockwise, when the 40 cm mark is the fulcrum. Calculate, and add up, all the clockwise moments. Calculate, and add up, all the anti-clockwise moments. Make sure you included the moment caused by the weight of the metre stick itself in one of the last two steps. Subtract the clockwise and anti-clockwise moments.	

Explain how your calculations verify the conditions for equilibrium.	
State the first condition for equilibrium (notes / book) and explain how your calculations verify the condition. State the second condition for equilibrium (notes / book) and explain how your calculations verify the condition.	

To verify Boyles' law– 2015 – Q1.

Describe, with the aid of a labelled diagram, how the student obtained the data	
Diagram that includes a setup that has a manner of (i) Recording the volume of the gas (ii) Recording the pressure. (iii) Manner of changing the volume or pressure (iv) A label of the gas itself.	
Describe how the volume and pressure is recorded from your set up. Describe how you change the volume and pressure in this experiment (and remember to mention to take further measurements)	

Draw a suitable graph to show the relationship between the pressure of a gas and it's volume. State this relationship and explain how the graph verifies Boyle's law.	
Calculate all the volume values as $\frac{1}{Volume}$.	
Graph	On Graph paper, at the end of question.
(i) Describe the shape of the graph. (ii) What relationship does this demonstrate (definition for Boyle's law)?	

Use your graph to estimate the pressure of the gas at a volume of 250 cm^3.	
Calculate the decimal value for $\frac{1}{250}$ Go to this value on the x-axis. **Draw a line up until you hit the graph and then draw it horizontally** to the y-axis. This is the value.	

Why might the temperature of the gas changed significantly during the experiment?	
Refer to write up booklet / Real world physics for this question	
How did the student ensure the temperature was the same for each measurement?	
Refer to write up booklet / Real world physics for this question	

Graph of data for Q1, 2015.

Are the scales on the axes evenly spread out?

Does the graph have a title?

Do the axes have labels and units? (Pressure vs 1/Volume)

Did I use the little boxes to count the decimals to ensure my points are precise?

Did I draw a straight line of best fit, through the origin?