ST MARY'S SCIENCE DEPARTMENT:

PHYSICS

H

GCSE PHYSICS **HOMEWORK BOOK**
TOPIC 6: FORCES - INTERACTIONS
STUDENT BOOK

YOU MUST ANSWER ALL THREE SECTIONS IN EACH PART OF THE HOMEWORK TASKS

NAME	
CLASS	
TEACHER	
FORM	

TASK	MARK	GRADE
1		
2		
3		
4		
5		
6		
OVERALL		

GCSE PHYSICS

YEAR 11

TOPIC 1

HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

Task	Submission Date	Completed?	On Time?
Task 1 Scalars and Vectors			
Task 2 Resultant Forces			
Task 3 Gravity			
Task 4 Forces and Elasticity			
Task 5 Moments, Levers and Gears			
Task 6 Pressure			

PHYSICS DEPARTMENT MARKING CODE

ID = Insufficient detail in answer
W = Wrong understanding of physics
IR = Irrelevant information given.
V = This is too vague to get a mark.
AQ = Answer the question asked
R = Read the question/information
M = Maths mistake
BOD = Benefit of the doubt given.
E = Explain the answer further please.
U = Wrong units used.
SF = Wrong significant figures used.
SP = Wrong spelling of a technical term
SR = Same reason given twice.
A circle means this lost you marks
An underline means this gained you marks

IMPORTANT NOTE

All sections in each task must be **FULLY ATTEMPTED.**

If students fail to achieve an acceptable mark on each task, they will be made to carry out supervised intervention the following week.

Each week, intervention sessions will be provided to help assist with answering the questions in the homework booklet if students are struggling with the difficulty of the problems.

PLEASE READ

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull

TASK 1: SCALARS AND VECTORS

SPEC CHECK

Content	Achieved?
Scalar quantities have magnitude only.	
Vector quantities have magnitude and an associated direction.	
A vector quantity may be represented by an arrow. The length of the arrow represents the magnitude, and the direction of the arrow the direction of the vector quantity.	
A force is a push or pull that acts on an object due to the interaction with another object.	
All forces between objects are either: • contact forces – the objects are physically touching • non-contact forces – the objects are physically separated. Examples of contact forces include friction, air resistance, tension and normal contact force. Examples of non-contact forces are gravitational force, electrostatic Force and magnetic force.	
Force is a vector quantity. Students should be able to describe the interaction between pairs of objects which produce a force on each object. The forces to be represented as vectors.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	**What Topics Do I Need to Revise?**

SECTION A **Atomic Structure Revision**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Cobalt-60 is a radioactive isotope used to treat cancer.

1.1 An atom of cobalt-60 can be represented as:

$$^{60}_{27}Co$$

How many protons and neutrons are there in the nucleus of a cobalt-60 atom?

[2 marks]

Number of protons = ...

Number of neutrons = ...

1.2 Atoms of cobalt-60 contain protons, neutrons and one other type of particle.

Name the other type of atomic particle in an atom of cobalt-60.

[1 mark]

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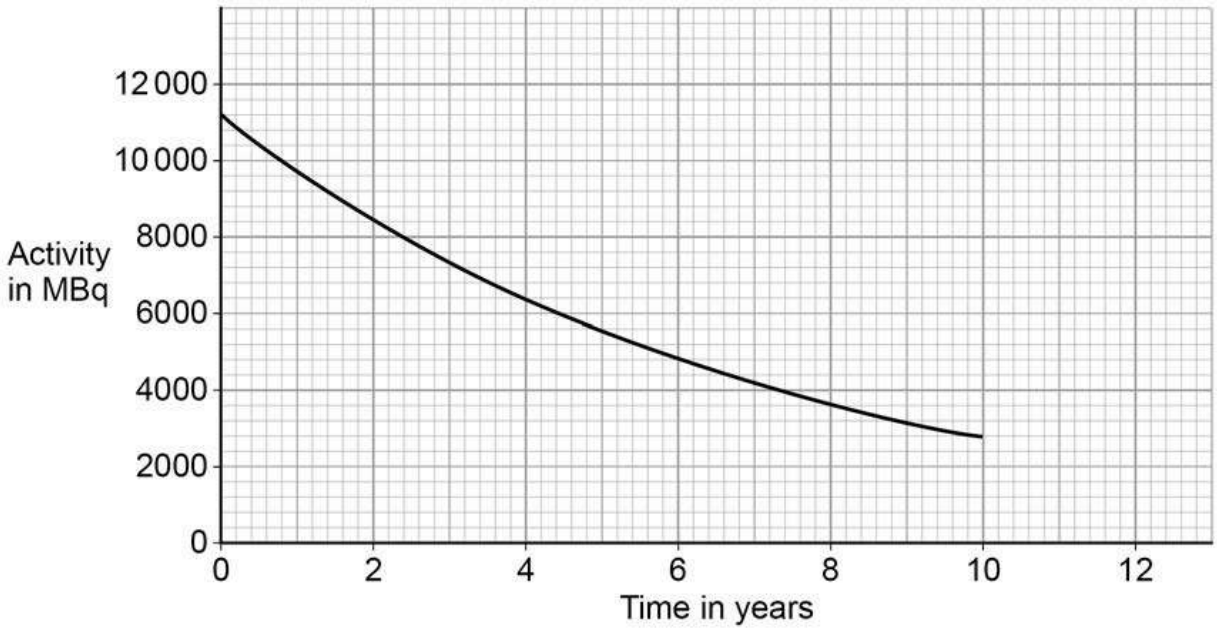
1.3 Figure 3 shows how the activity of a sample of cobalt-60 changes with time.

Figure 3



Determine the half-life of cobalt-60.

Show your working on **Figure 3**.

[2 marks]

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Half-life = _____ years

1.4 Samples of cobalt-60 are used in schools to demonstrate radioactive decay.

Suggest two safety precautions that should be used in schools when using radioactive sources.

[2 marks]

Precaution One

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Precaution Two

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SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

Q1. When two objects interact, they exert forces on each other.

1.1 Which statement about the forces is correct?

Tick (✓) **one** box.

[1 Mark]

	Tick (✓)
The forces are equal in size and act in the same direction.	
The forces are unequal in size and act in the same direction.	
The forces are equal in size and act in opposite directions.	
The forces are unequal in size and act in opposite directions.	

A fisherman pulls a boat towards land.

The forces acting on the boat are shown in **Diagram 1**.

The fisherman exerts a force of 300 N on the boat.
The sea exerts a resistive force of 250 N on the boat.

Diagram 1

1.2 Describe the motion of the boat.

[2 Marks]

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1.3 When the boat reaches land, the resistive force increases to 300 N.
The fisherman continues to exert a force of 300 N.

Describe the motion of the boat.

[1 Mark]

Tick (✓) **one** box.

Accelerating to the right	☐
Constant velocity to the right	☐
Stationary	☐

1.4 Explain your answer to part **1.3**

[2 Marks]

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1.5 Another fisherman comes to help pull the boat. Each fisherman pulls with a force of 300 N, as shown in **Diagram 2**.

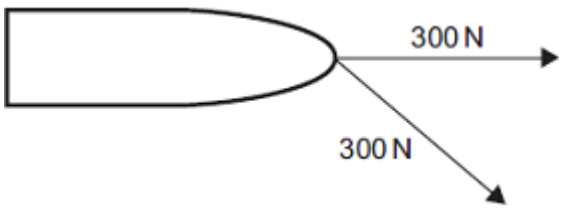
Diagram 2 is drawn to scale.

Add to **Diagram 2** to show the single force that has the same effect as the two 300 N forces.

Determine the value of this resultant force.

[4 Marks]

Diagram 2



Resultant force = ... N

SECTION C This will contain questions on content found later in the course

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1.1 What is meant by a scalar quantity?

[1 Mark]

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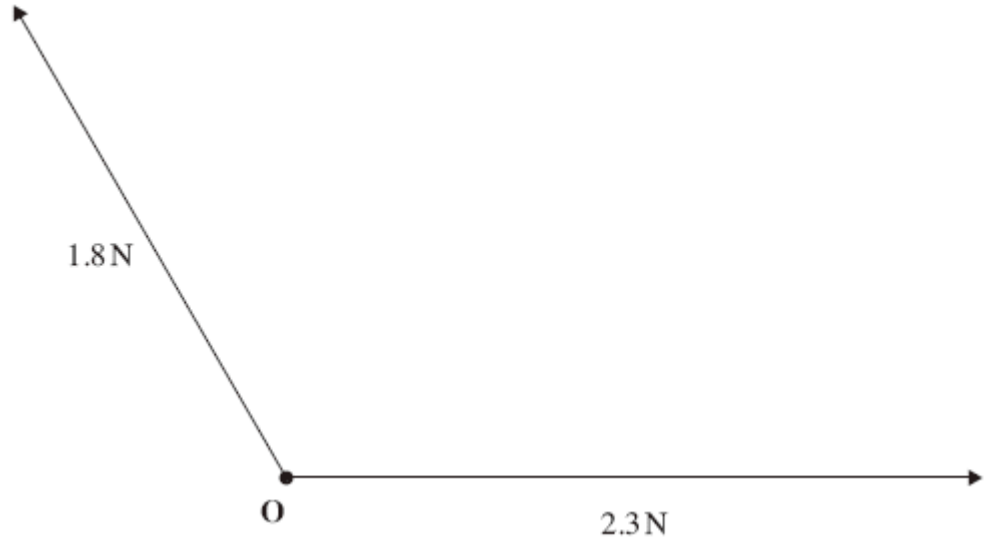
The figure below shows two forces acting on an object at **O**. The forces have been drawn to scale.



1.2 State the scale used in the figure above

[1 Mark]

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1.3 Complete the scale drawing, the figure above, to determine the magnitude of the resultant force.

[3 Marks]

Magnitude of Resultant Force ..... N

FEEDBACK SHEET

Overall Mark:	**/22**	**GRADE ACHIEVED:**	
		9 ☐	**5** ☐
		8 ☐	**4** ☐
		7 ☐	**3** ☐
		6 ☐	**U** ☐
Section A: Mark	/7		
Section B: Mark	/10		
Section C: Mark	/5		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision. ☐ Complete outstanding work. ☐ Make corrections as indicated by the teacher. ☐ Attend intervention for this topic ☐ Include more information in responses. ☐ Include more key words in responses. ☐ Attend departmental revision sessions. ☐ Read the questions carefully. ☐ Explain your answers in more detail. ☐ Carry out revision on Seneca Learning.	☐ Revise the equations. ☐ Check the units on answers. ☐ Check the correct amount of sig figs on answers. ☐ Check to convert values correctly. ☐ Show your full working out. ☐ Check your calculations. ☐ Revise the science investigative skills. ☐ Revise the key concepts of the topics. ☐ Thoroughly check your work for mistakes. Other:

Student response:

TASK 2: RESULTANT FORCES

SPEC CHECK

Content	Achieved?
A number of forces acting on an object may be replaced by a single force that has the same effect as all the original forces acting together. This single force is called the resultant force.	
Students should be able to calculate the resultant of two forces that act in a straight line.	
(HT only) Students should be able to: • describe examples of the forces acting on an isolated object or system. • use free body diagrams to describe qualitatively examples where several forces lead to a resultant force on an object, including balanced forces when the resultant force is zero.	
(HT only) A single force can be resolved into two components acting at right angles to each other. The two component forces together have the same effect as the single force.	
(HT only) Students should be able to use vector diagrams to illustrate resolution of forces, equilibrium situations and determine the resultant of two forces, to include both magnitude and direction (scale drawings only).	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	**What Topics Do I Need to Revise?**

SECTION A **Energy Revision**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Neon is an element. Neon is used in advertising signs.

Figure 11 shows a neon sign.

Figure 11

1.1 Explain why the atoms of neon give out electromagnetic radiation when the tube is connected to an electricity supply.

[4 marks]

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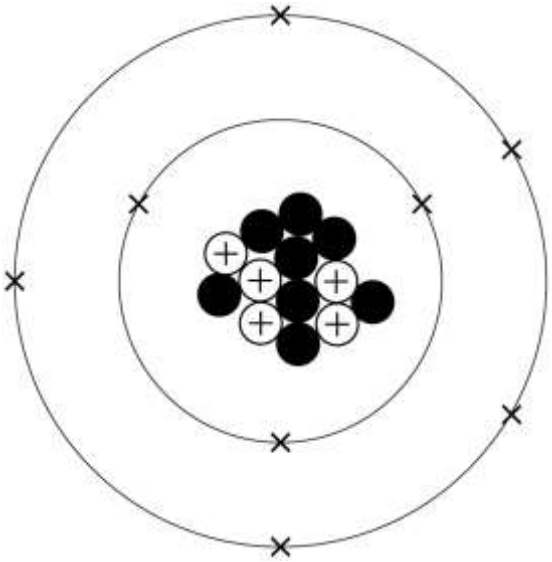
Some elements can have different isotopes.

An isotope of carbon can be shown as $^{13}_{6}C$

Figure 12 shows an incorrect diagram of the structure of an atom of $^{13}_{6}C$

Figure 12



1.2 Explain why the diagram of the atomic structure shown in **Figure 12** is incorrect.

[4 marks]

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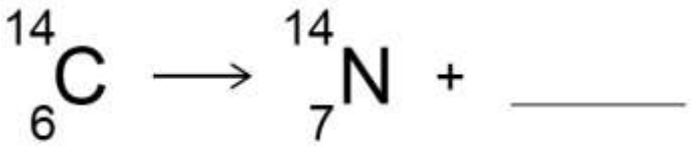
Carbon-14 ($^{14}C_6$) is a radioactive isotope of carbon. Carbon-14 undergoes beta decay.

Figure 13 shows an incomplete nuclear equation for the radioactive decay of carbon-14.

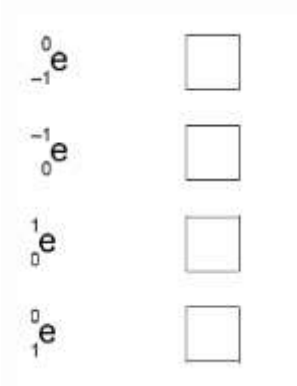
Figure 13



1.3 Which of the following correctly completes the nuclear equation in **Figure 13**?

[1 mark]

Tick **one** box.



1.4 Explain the change in atomic number in the nuclear equation shown in **Figure 13**.

[2 marks]

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1.5 The half-life of carbon-14 is 5730 years.

Carbon-14 is used for carbon dating. Carbon dating can tell us how old some objects are.

A skeleton was carbon dated. The results showed that there was only 12.5% of the original amount of carbon-14 left in the skeleton.

Calculate the age of the skeleton.

[2 marks]

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Age of Skeleton = _____ years old

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Layla and Kai place a steel ball on the laboratory bench. The steel ball has a mass of 52g.

They can apply two forces of magnitude 3.0 N and 4.5 N to the ball.

The direction of the forces can be changed.

1.1 How should they direct the two forces to produce the maximum acceleration of the ball?

Calculate this maximum acceleration.

[5 Marks]

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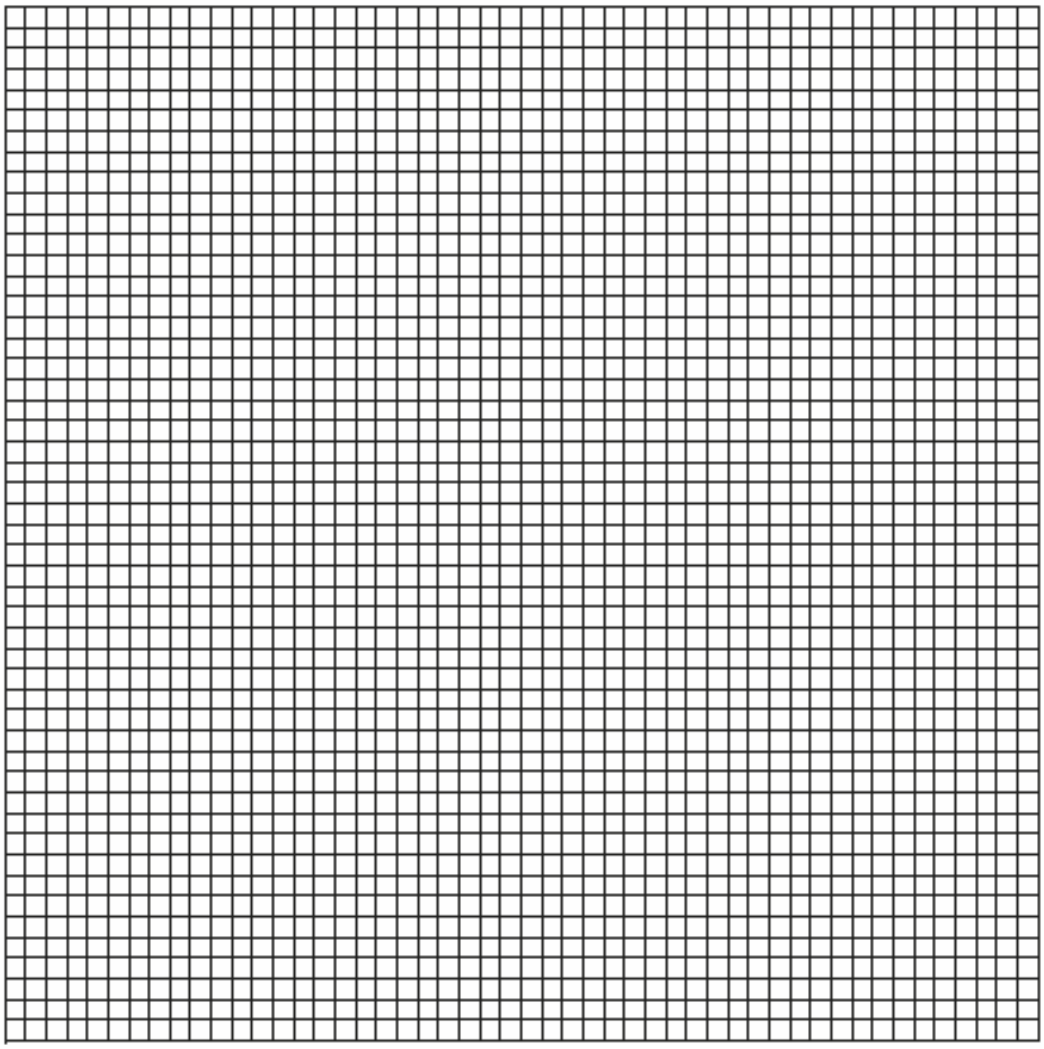
Maximum Acceleration = ... m / s^2

1.2 They now set the two forces at right angles to each other.

Draw a scale vector diagram to determine the magnitude of the resultant force.

[2 Marks]



Resultant Force = ... N

SECTION C This will contain questions on content found later in the course

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 10 shows the horizontal forces acting on a man swimming in the sea.

Figure 10

1.1 Describe the movement of the man when the resultant horizontal force is 0 N

[1 mark]

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1.2 The man increases Force **A.**

Explain what happens to Force **B** and to the movement of the man.

[4 marks]

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1.3 A boat moves through the sea.

There is a 3000 N force to the west on the boat.

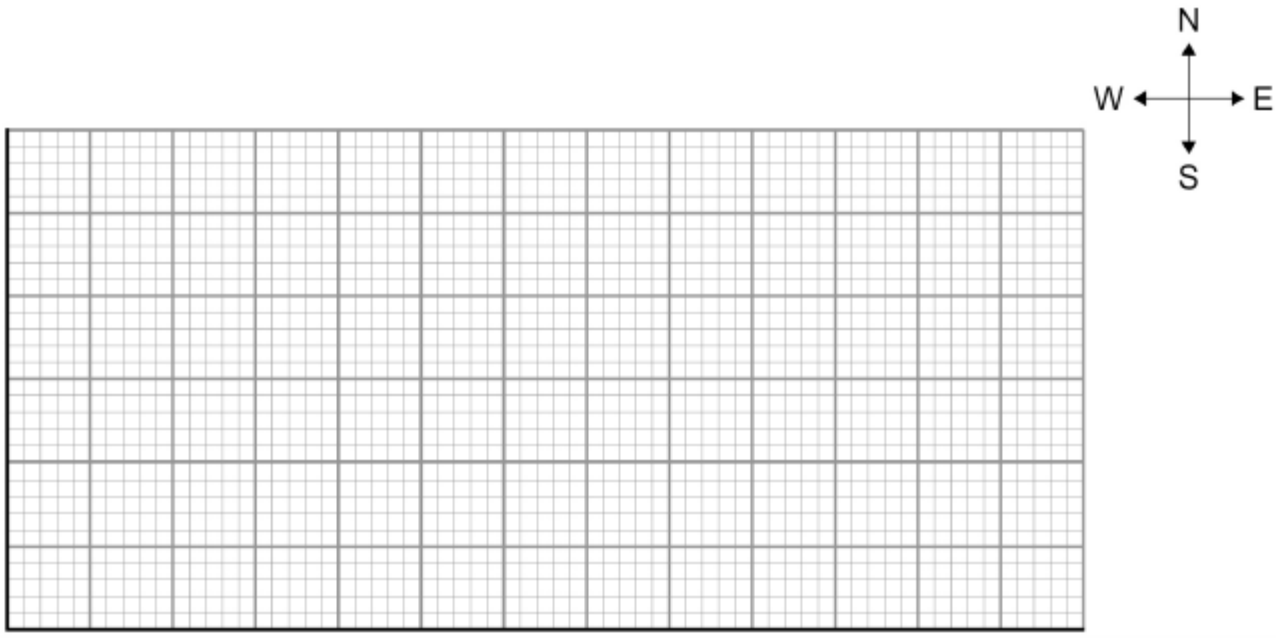
There is a 1000 N force to the south on the boat.

Determine the magnitude and direction of the resultant force on the boat.

Draw a vector diagram of these forces to scale on **Figure 11**

[3 marks]

Figure 11



Magnitude of resultant force = _____ N

Direction of resultant force = _____°

1.4 The force to the south on the boat increases.

What effect does this have on the resultant force on the boat?

[2 marks]

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FEEDBACK SHEET

Overall Mark:	**/30**	**GRADE ACHIEVED:**	
		9 ☐	**5** ☐
		8 ☐	**4** ☐
		7 ☐	**3** ☐
		6 ☐	**U** ☐
Section A: Mark	/13		
Section B: Mark	/7		
Section C: Mark	/10		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response:

TASK 3: GRAVITY

SPEC CHECK

Content	Achieved?
Weight is the force acting on an object due to gravity. The force of gravity close to the Earth is due to the gravitational field around the Earth.	
The weight of an object depends on the gravitational field strength at the point where the object is.	
The weight of an object can be calculated using the equation: weight = mass × gravitational field strength W = m x g weight, W, in newtons, N mass, m, in kilograms, kg gravitational field strength, g, in newtons per kilogram, N/kg (In any calculation, the value of the gravitational field strength (g) will be given.)	
The weight of an object may be considered to act at a single point referred to as the object's 'centre of mass'.	
The weight of an object and the mass of an object are directly proportional. Weight is measured using a calibrated spring-balance (a newton meter).	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A **Paper 1 Revision**

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Figure 9 shows a car tyre and part of the suspension system in a car.

Figure 9

The tyre and spring help to reduce the effect of driving over any holes in the road surface.

1.1 The tyre is filled with air.

The air particles in the tyre move faster after the car has been driven.

Explain why the pressure in the tyre is different after the car has been driven.

[2 marks]

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1.2 When a car hits a hole in the road, the spring shown in Figure 9 compresses by 20 mm.

The spring constant = 90 kN/m.

Calculate the energy stored in the spring by this compression.

[4 marks]

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Energy Stored = ... J

1.3 After being compressed the spring returns to its original length.

Describe the changes in energy stored as the car drives over the hole in the road.

[4 marks]

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SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Forces are vector quantities.

1.1 What is the difference between a vector quantity and a scalar quantity?

[2 marks]

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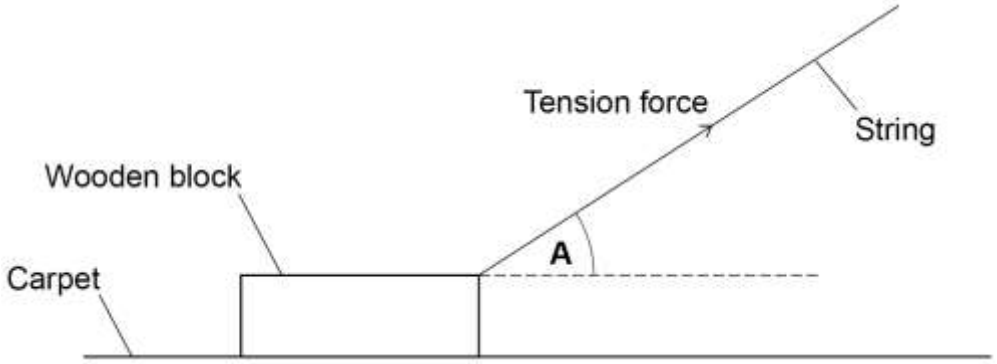
Figure 4 represents a wooden block being pulled across a surface at a constant speed in a straight line.

The block is in contact with the surface.

The arrow in **Figure 4** represents the tension force in the string pulling the block.

Figure 4

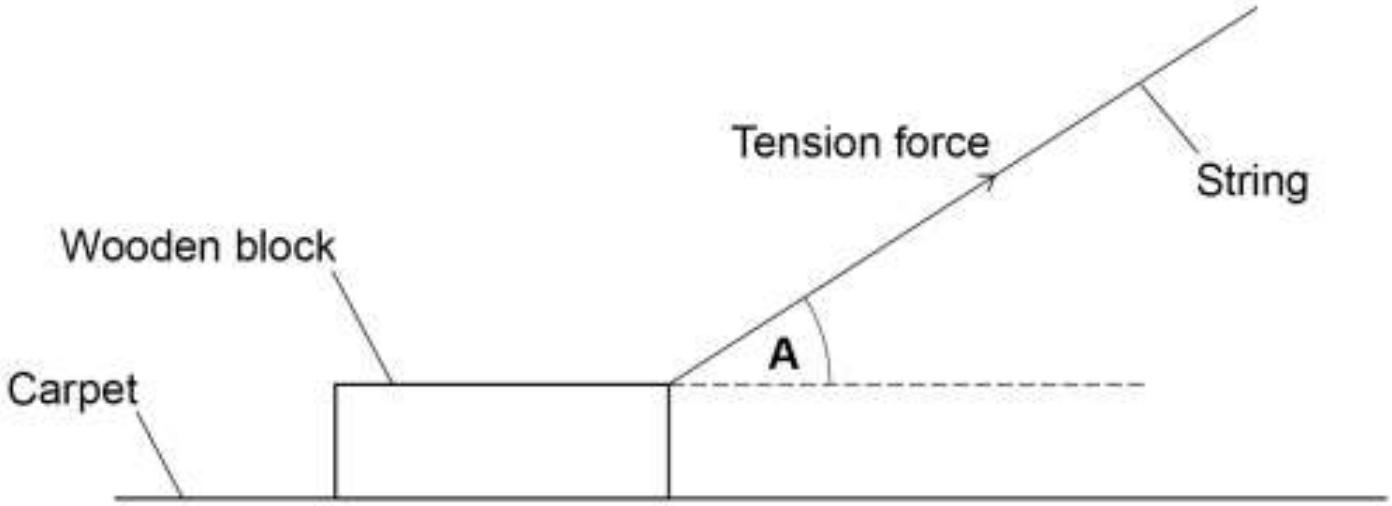


1.2 Complete **Figure 4** to show the other three forces acting on the block.

[3 marks]

Figure 5 is a copy of **Figure 4** to help you answer the following question.

Figure 5



1.3 Figure 5 is drawn to scale. The scale is 1 cm: 0.5 N

Determine the horizontal and vertical components of the tension in the string.

Show these components on **Figure 5**.

[3 marks]

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Horizontal Component = _____N

Vertical Component = _____N

A student collects data on the size of the force required to pull the block across different surfaces at a constant speed.

Table 2 shows the results.

Table 2

Type of surface	Force in N			Mean force in N
	Trial 1	Trial 2	Trial 3	
Cardboard	1.4	1.6	1.5	1.5
Carpet	2.6	3.1	3.9	3.2
Glass	0.7	0.8	0.6	0.7
Sandpaper	5.2	**X**	5.3	5.4

1.4 Calculate value **X** in **Table 2**.

[2 marks]

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X = _____ N

1.5 Give three control variables for this investigation.

[3 marks]

Variable **1**

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Variable **2**

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Variable **3**

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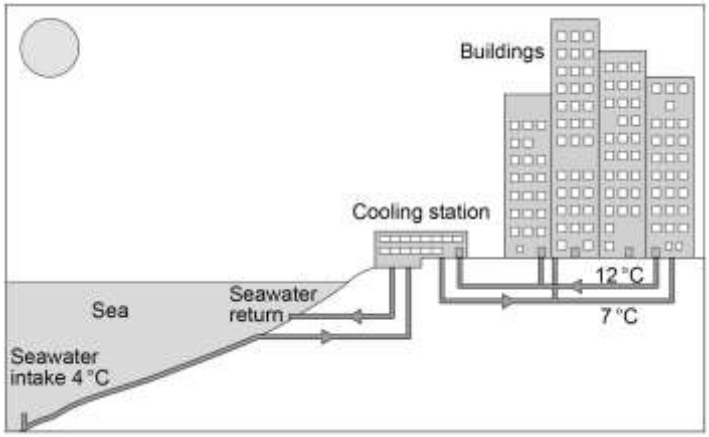
SECTION C This will contain questions on content found later in the course

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 17 shows a system that uses cold sea water to cool buildings.

Figure 17



1.1 Some of the energy from the Sun is absorbed by the surface of the sea.

Explain why heating the water at the surface increases the rate of evaporation from the sea.

[3 marks]

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1.2 Energy from the Sun that is absorbed by the sea does not heat up the water deep below the surface.

Explain why.

[4 marks]

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1.3 The cooling station shown in **Figure 17** has a power of 315 MW. It cools water from 12 °C to 7 °C.

Calculate the mass of water that the cooling station can cool each second.

specific heat capacity of water = 4200 J/kg °C

Use the Physics Equations Sheet.

[4 marks]

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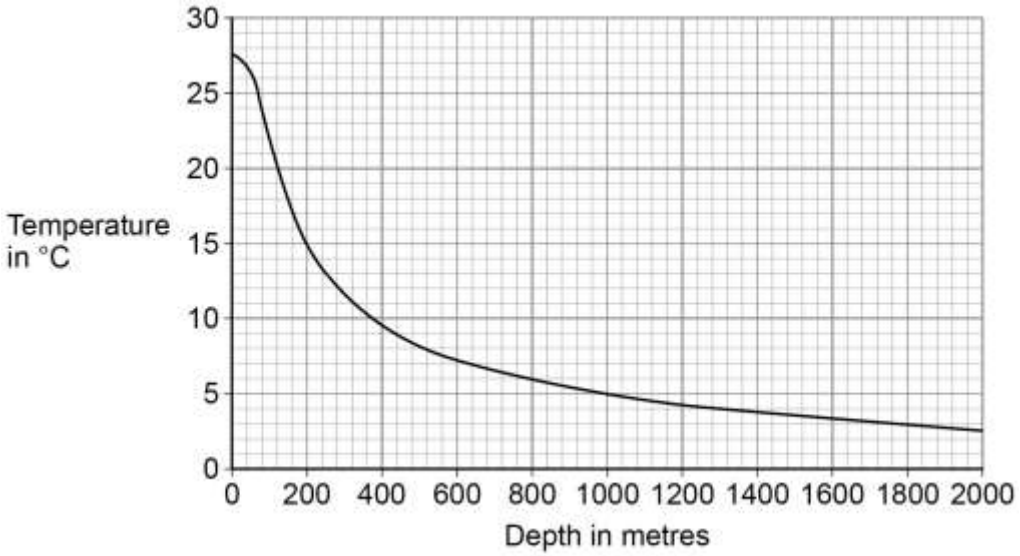
Mass of Water Each Second =..... kg

1.4 Figure 18 shows the temperature of the sea at different depths.

Figure 18



Explain why sea water is not pumped up to the cooling station from depths greater than 1700 m.

[3 marks]

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FEEDBACK SHEET

Overall Mark:	**/37**	**GRADE ACHIEVED:**	
		9 ☐	**5** ☐
		8 ☐	**4** ☐
		7 ☐	**3** ☐
		6 ☐	**U** ☐
Section A: Mark	/10		
Section B: Mark	/13		
Section C: Mark	/14		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
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Student response:

TASK 4: FORCES AND ELASTICITY

SPEC CHECK

Content	Achieved?
Students should be able to: • give examples of the forces involved in stretching, bending or compressing an object • explain why, to change the shape of an object (by stretching, bending or compressing), more than one force has to be applied – this is limited to stationary objects only • describe the difference between elastic deformation and inelastic deformation caused by stretching forces.	
The extension of an elastic object, such as a spring, is directly proportional to the force applied, provided that the limit of proportionality is not exceeded.	
Calculate work done in stretching (or compressing) a spring (up to the limit of proportionality) using the equation: elastic potential energy = 0.5 × spring constant × extension ^{2} $E_e = 1/2 \times k \times e^2$	
A force that stretches (or compresses) a spring does work and elastic potential energy is stored in the spring. Provided the spring is not inelastically deformed, the work done on the spring and the elastic potential	
Students should be able to: • describe the difference between a linear and non-linear relationship between force and extension. • calculate a spring constant in linear cases. • interpret data from an investigation of the relationship between force and extension.	
force = spring constant × extension $F = k \times e$ force, F, in newtons, N spring constant, k, in newtons per metre, N/m extension, e, in metres, m This relationship also applies to the compression of an elastic object, where 'e' would be the compression of the object. The energy stored will be equal to the elastic potential energy store.	

Electricity Revision

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1.1 Figure 5 shows a metal chair being sprayed with paint.

The paint droplets come from a gun with an electric charge.

Inside the spray gun, electrons move along a charged wire towards the nozzle to charge the paint.

The charged paint droplets are sprayed from the nozzle.

The chair is connected to earth.

Which row of the table shows the correct combination of the charges as the

charged paint droplets get near to the chair?

[1 Mark]

		paint droplets	chair
☐	A	negative	negative
☐	B	negative	positive
☐	C	positive	negative
☐	D	positive	positive

Glass is an insulator.

A student rubs a piece of glass with some silk.

The glass becomes positively charged.

1.2 Explain how rubbing silk charges the glass.

[2 Marks]

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1.3 The silk is also charged when it rubs against the glass.

Explain how the silk becomes charged.

[2 Marks]

.....

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.....

1.4 Describe one situation where separation of electric charge can create a spark.

[2 Marks]

.....

.....

1.5 In a spark, the total charge of 0.22 μC (microcoulombs) flows in 2 ms (milliseconds).

Calculate the average current in that time.

[4 Marks]

.....

.....

.....

.....

Average Current = ... A

SECTION B

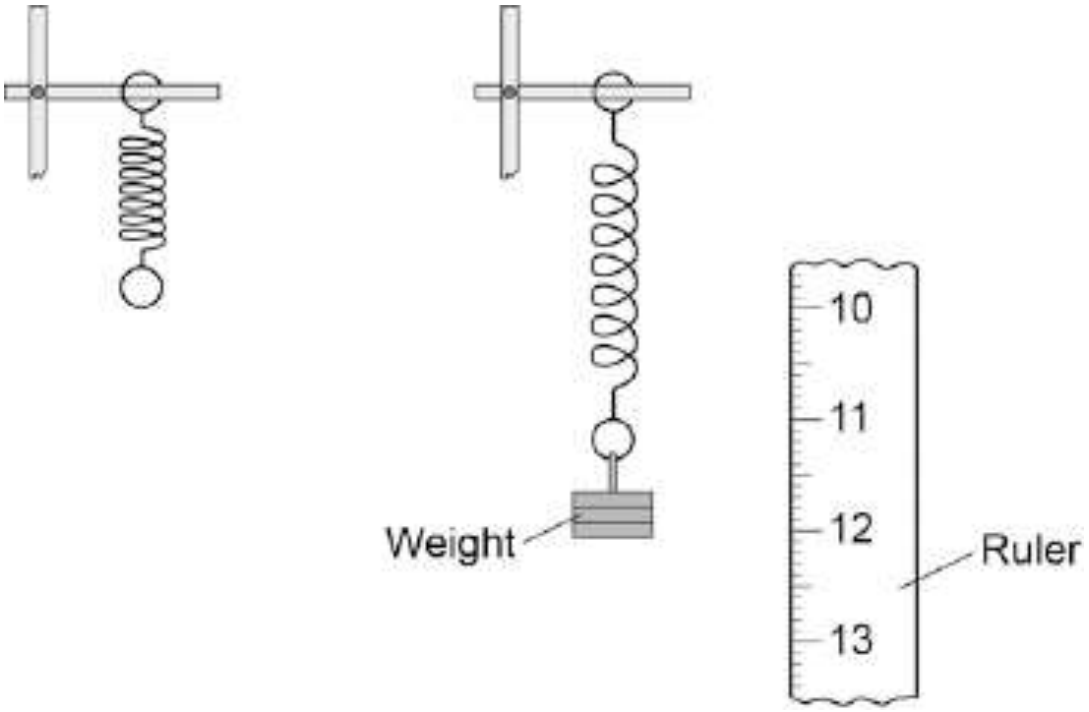
This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. A student suspended a spring from a laboratory stand and then hung a weight from the spring.

Figure 1 shows the spring before and after the weight is added.

Figure 1



1.1 Measure the extension of the spring shown in **Figure 1**.

[1 mark]

Extension = ... mm

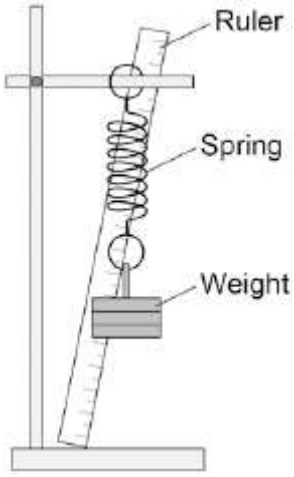
The student used the spring, a set of weights and a ruler to investigate how the extension of the spring depended on the weight hanging from the spring.

Before starting the investigation, the student wrote the following prediction:

The extension of the spring will be directly proportional to the weight hanging from the spring.

Figure 2 shows how the student arranged the apparatus.

Figure 2



1.2 Before taking any measurements, the student adjusted the ruler to make it vertical.

Explain why adjusting the ruler was important.

[2 marks]

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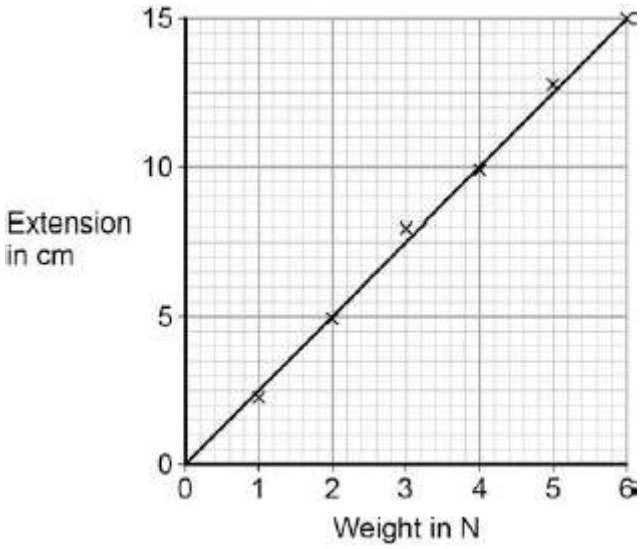
.....

1.3 The student measured the extension of the spring using a range of weights.

The student's data is shown plotted as a graph in **Figure 3**.

Figure 3



What range of weight did the student use?

[1 mark]

.....

.....

1.4 Why does the data plotted in **Figure 3** support the student's prediction?

[1 mark]

.....

.....

1.5 Describe **one** technique that you could have used to improve the accuracy of the measurements taken by the student.

[2 marks]

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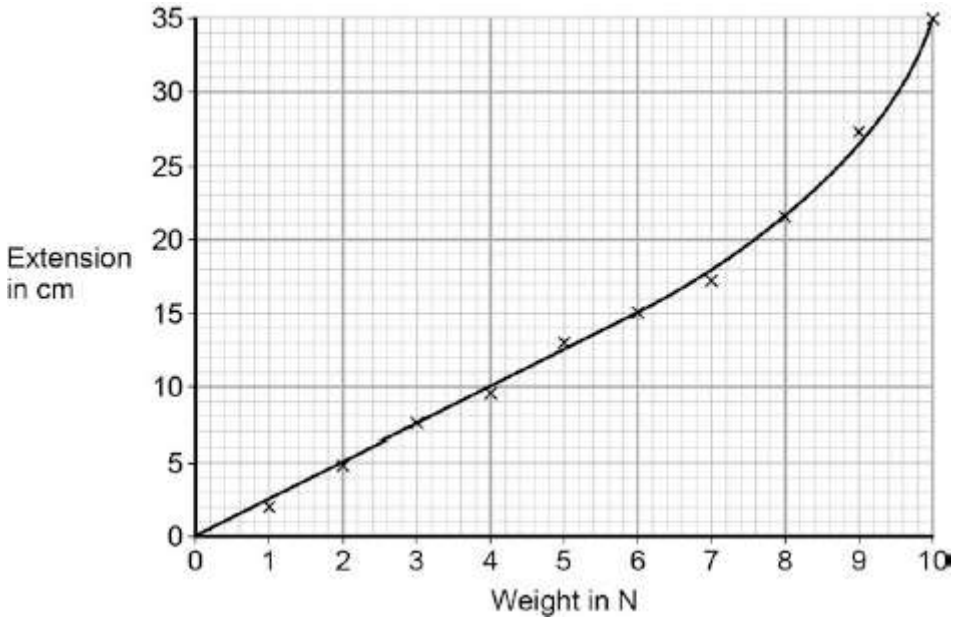
1.6 The student continued the investigation by increasing the range of weights added to the spring.

All of the data is shown plotted as a graph in **Figure 4**.

Figure 4



At the end of the investigation, all of the weights were removed from the spring.

What can you conclude from **Figure 4** about the deformation of the spring?

[2 marks]

.....

.....

Give the reason for your conclusion.

.....

.....

SECTION C This will contain questions on content found later in the course

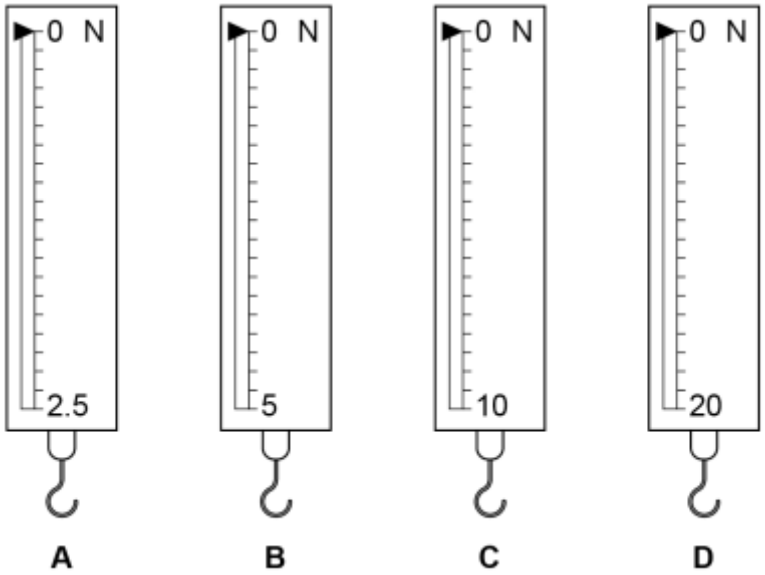
This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. Figure 6 shows four newtonmeters.

Each newtonmeter contains a spring.

Figure 6



1.1 Which newtonmeter has the spring with the greatest spring constant?

Give a reason for your answer.

[2 marks]

Newtonmeter …….

Reason

……

……

……

……

1.2 The newtonmeter in **Figure 7** will give an error when used to make a measurement.

Figure 7

Name the type of error.

Describe how this error can be corrected.

[2 marks]

Type of error

.....

Correction

.....

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A student hangs a weight on a newtonmeter.

The energy now stored in the spring in the newtonmeter is 4.5×10^{-2} J

The student then increases the weight on the newtonmeter by 2.0 N

1.3 Calculate the total extension of the spring.

Spring constant = 400 N/m

[6 marks]

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Total extension = _____ m

FEEDBACK SHEET

Overall Mark:	**/30**	**GRADE ACHIEVED:**	
		9 ☐	**5** ☐
		8 ☐	**4** ☐
		7 ☐	**3** ☐
		6 ☐	**U** ☐
Section A: Mark	/11		
Section B: Mark	/9		
Section C: Mark	/10		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response:

TASK 5: MOMENTS, LEVERS AND GEARS

SPEC CHECK

Content	Achieved?
A force or a system of forces may cause an object to rotate. The turning effect of a force is called the moment of the force. The size of the moment is defined by the equation: moment of a force = force × distance M = F x d With moment of a force, M, in newton-metres, Nm force, F, in newtons, N distance, d, is the perpendicular distance from the pivot to the line of action of the force, in metres, m.	
If an object is balanced, the total clockwise moment about a pivot equals the total anticlockwise moment about that pivot.	
You should be able to calculate the size of a force, or its distance from a pivot, acting on an object that is balanced.	
A simple lever and a simple gear system can both be used to transmit the rotational effects of forces.	
You should be able to explain how levers and gears transmit the rotational effects of forces.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

Particle Model of Matter Revision

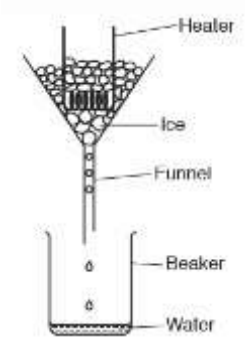
SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Two students design an experiment to find the specific latent heat of water.

They set up their equipment as shown in the diagram.



The students also have access to a power supply, a voltmeter, an ammeter, a stop-clock and a top-pan balance.

1.1 Explain how the students could use this equipment to determine an accurate value for the specific latent heat of water.

[6 Marks]

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1.2 The students find that 250 g of ice takes 95 kJ of energy to change state.

Calculate the specific latent heat.

[3 Marks]

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Answer = ... J/kg

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

The steering mechanism of a lorry is connected to a gear wheel of radius 40 cm (**Figure 1**). This gear wheel is used to turn a second gear wheel of radius 15 cm with a force of 85 N.

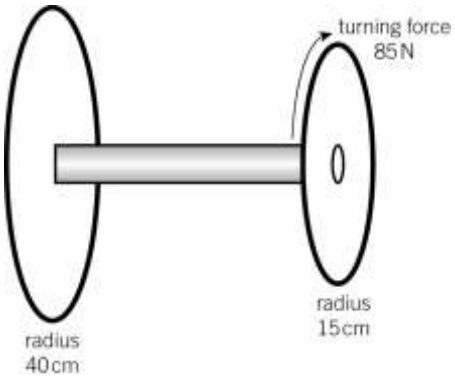

Figure 1

1.1 Calculate the moment of the turning force on the second gear wheel.

Give your answer correct to 2 significant figures.

[3 Marks]

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A large gear wheel is attached to the shaft from an engine (**Figure 2**). The large gear wheel is attached to a smaller gear wheel on an output shaft connected to the wheel of a car.

Figure 2

1.2 Describe what happens to the smaller gear wheel if the radius of the large gear wheel is increased. The engine speed stays the same.

[2 Marks]

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1.3 A student writes that the displacement of the lorry is 5 km when delivering goods. Explain why this statement may not be correct.

[2 Marks]

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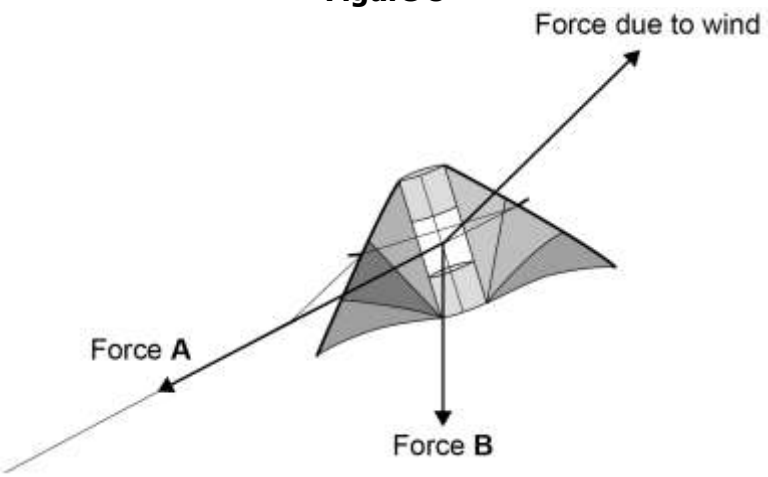
SECTION C This will contain questions of the highest demand in the course.

This is a challenge question to extend your understanding.

You should aim to spend **15 minutes** answering this section.

1. Figure 8 shows the forces acting on the kite.
The kite is not moving.

Figure 8



1.1 Identify forces **A** and **B**.

[2 marks]

Force A

.....

Force B

.....

1.2 The person flying the kite concludes that the resultant force on the kite is zero.
What is the evidence for this conclusion?

[1 mark]

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.....

.....

The string breaks.
This means that force **A** is no longer acting on the kite.
1.3 Explain what will happen to the kite as a result.

[2 mark]

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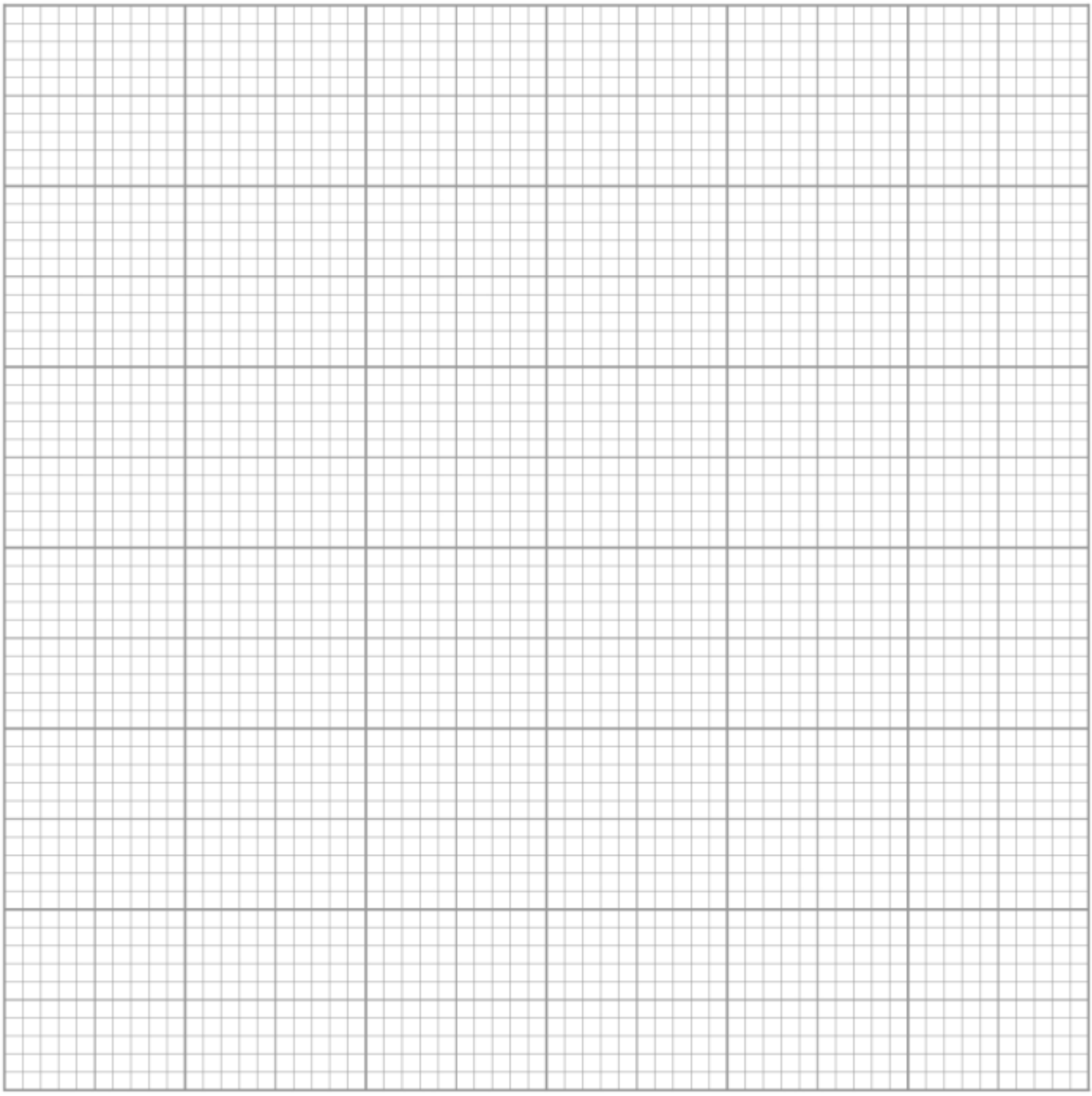
1.4 When the string breaks the force due to the wind acts at an angle of 135° to force **B.**
Force due to the wind = 5.9 N
Force **B** = 1.8 N
Draw a vector diagram on **Figure 9** to determine the magnitude of the resultant force acting on the kite.

[4 marks]

Figure 9



Magnitude of Resultant Force = _____ N

FEEDBACK

Overall Mark:	**/25**	**GRADE ACHIEVED:**	
		9 ☐	**5** ☐
		8 ☐	**4** ☐
		7 ☐	**3** ☐
		6 ☐	**U** ☐
Section A: Mark	/9		
Section B: Mark	/7		
Section C: Mark	/9		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
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☐ Include more information in responses.	☐ Show your full working out.
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☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response:

TASK 6: PRESSURE

SPEC CHECK

Content	Achieved?
A fluid can be either a liquid or a gas. The pressure in fluids causes a force normal (at right angles) to any surface. The pressure at the surface of a fluid can be calculated using the equation: pressure = force normal to a surface / area of that surface p = F / A With pressure, p, in pascals, Pa force, F, in newtons, N area, A, in metres squared, m	
The pressure due to a column of liquid can be calculated using the equation: pressure = height of the column × density of the liquid × gravitational field strength p = h x ρ x g With pressure, p, in pascals, Pa height of the column, h, in metres, m density, ρ, in kilograms per metre cubed, kg/m3 gravitational field strength, g, in newtons per kilogram, N/kg (In any calculation, the value of the gravitational field strength (g) will be given.) You should be able to explain why, in a liquid, pressure at a point increases with the height of the column of liquid above that point and with the density of the liquid. You should be able to calculate the differences in pressure at different depths in a liquid. A partially (or totally) submerged object experiences a greater pressure on the bottom surface than on the top surface. This creates a resultant force upwards. This force is called the upthrust. You should be able to describe the factors which influence floating and sinking	
The atmosphere is a thin layer (relative to the size of the Earth) of air round the Earth. The atmosphere gets less dense with increasing altitude. Air molecules colliding with a surface create atmospheric pressure. The number of air molecules (and so the weight of air) above a surface decreases as the height of the surface above ground level increases. So as height increases there is always less air above a surface than there is at a lower height. Atmospheric pressure decreases with an increase in height.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

Forces Revision

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. A student hangs a length of copper wire from the ceiling.

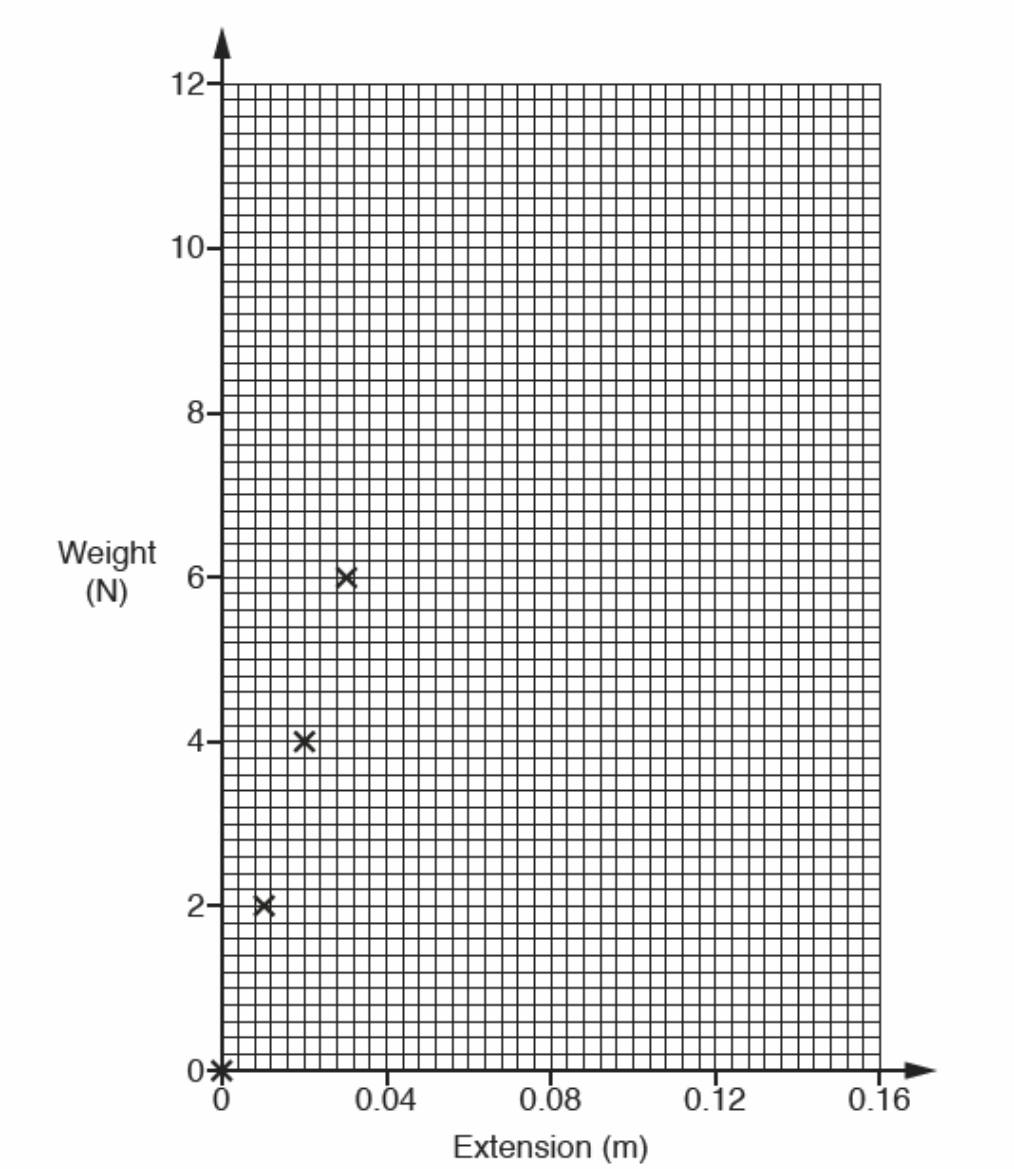
She adds weights to the bottom of the wire and measures the extension of the wire.

Look at a table of some of her results.

Weight (N)	Extension (m)
0	0
2	0.01
4	0.02
6	0.03
8	0.04
10	0.08
12	0.16

1.1 Plot the values on the graph. Some have been done for you.

[2 Marks]



1.2 Draw a line of best-fit on the graph.

[1 Marks]

1.3 Describe and explain the shape of the graph.

[3 Marks]

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1.4 Calculate the spring constant for the 0 – 6 N part of the graph.

[3 Marks]

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Answer = ... N/m

1.5 Calculate the work done in stretching the wire to 0.04 m.

[2 Marks]

.....

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.....

Answer = ... J

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **15 minutes** answering this section.

A manufacturer of garden syringes is testing a new range of plastic syringes with variable size nozzles. The nozzles can be removed and replaced with another nozzle of a different size.

The syringe used in the test is shown in **Figure 1**.

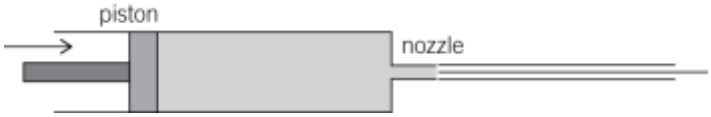

Figure 1

This is the method used:

1. Attach a 0.5 mm diameter nozzle onto the syringe.

2. Fill the syringe with 150 ml of water.

3. Press the piston into the syringe.

4. Measure the distance the water flows from the end of the nozzle.

5. Records the results in a table.

6. Repeat with other sizes of nozzle.

1.1 Name a piece of apparatus not shown.

[1 Mark]

.....

.....

.....

1.2 Name the independent variable.

[1 Mark]

.....

.....

.....

1.3 Name the dependent variable.

[1 Mark]

.....

.....

.....

1.4 Name one factor that must be kept constant.

[1 Mark]

.....

.....

.....

1.5 Suggest one safety precaution.

[1 Mark]

.....

.....

.....

1.6 The results of the investigation are shown below.

Nozzle size in mm	Distance of water in cm		
	Test 1	Test 2	Mean
0.5	33.5	32.5	
1.0	25.0	24.5	24.8
1.5	18.0	14.5	16.3
2.0	13.0	12.5	12.8
2.5	10.0	10.0	10.0

Complete the table by calculating the mean value of the distance of water for a nozzle size of 0.5 mm.

[1 Mark]

1.7 State one advantage repeating the tests.

[1 Mark]

.....

.....

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1.8 A graph of the Test 2 results is shown in **Figure 2**.

Draw a line of best fit through the points on the graph.

[2 Marks]

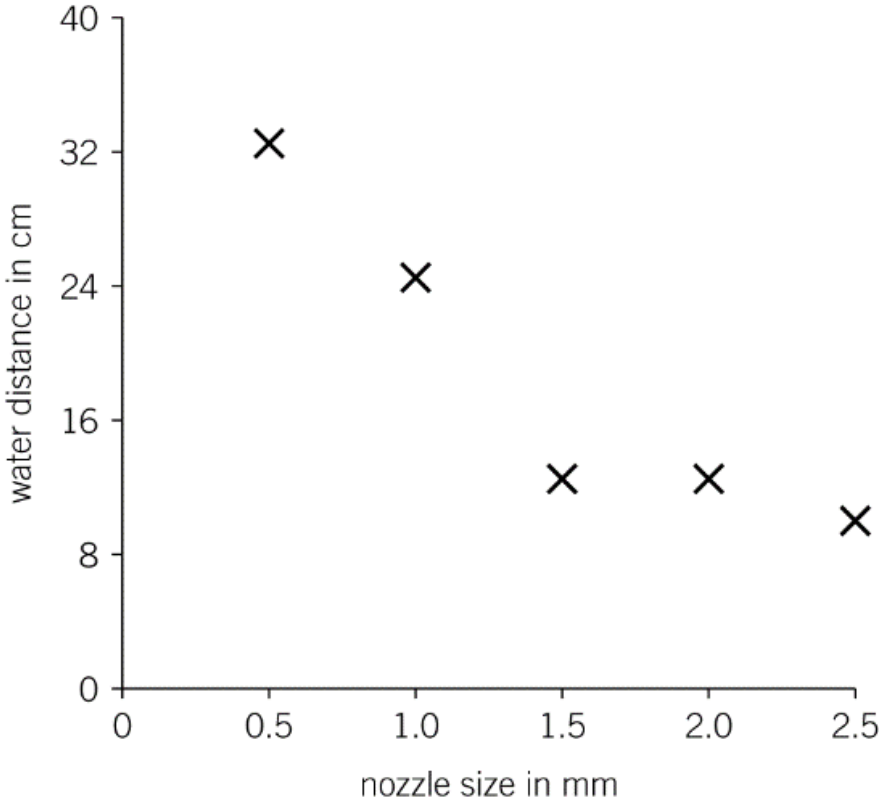

Figure 2

1.9 Conclude a relationship between the size of nozzle and the water distance.

[2 Marks]

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.....

.....

SECTION C This will contain questions of the highest demand in the course.

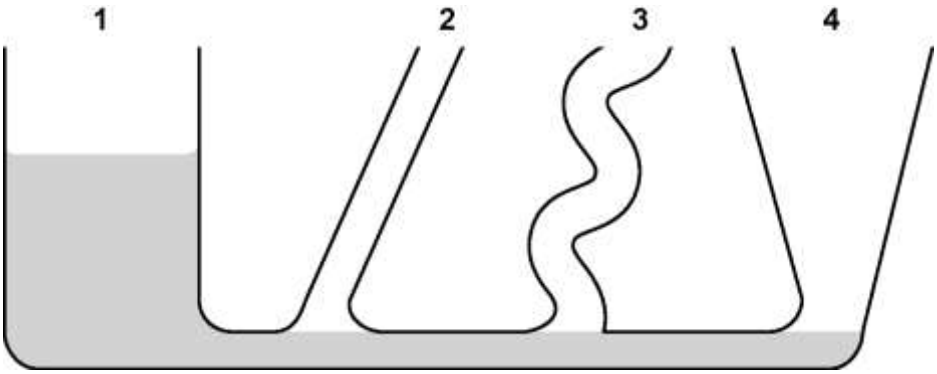
This is a challenge question to extend your understanding.

You should aim to spend **15 minutes** answering this section.

1. Figure 6 shows an unusually shaped container.

The container has four vertical tubes of different shape and size.

Figure 6



Water is poured into the container up to the level shown in tube 1.

1.1 Complete **Figure 6** to show the height of the water in tubes 2, 3 and 4.

[1 mark]

1.2 The further a swimmer dives below the surface of the sea, the greater the pressure on the swimmer.

Explain why.

[2 marks]

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.....

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.....

1.3 A person swims from a depth of 0.50 m to a depth of 1.70 m below the surface of the sea.

density of the sea water = 1030 kg/m^3

gravitational field strength = 9.8 N/kg

Calculate the increase in pressure on the swimmer.

Give the unit.

Use an equation from the Physics Equation Sheet.

[4 marks]

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Increase in Pressure = ... Unit = ...

FEEDBACK

Overall Mark:	**/29**	**GRADE ACHIEVED:**	
		9 ☐	**5** ☐
		8 ☐	**4** ☐
		7 ☐	**3** ☐
		6 ☐	**U** ☐
Section A: Mark	/11		
Section B: Mark	/11		
Section C: Mark	/7		

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

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☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response:

EQUATIONS SHEET

AQA
Realising potential

GCSE Physics Equation Sheet

1	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength (g)**	$p = h \rho g$
2	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
3	**force = change in momentum / time taken**	$F = \frac{m \Delta v}{\Delta t}$
4	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
5	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
6	$\text{period} = \frac{1}{\text{frequency}}$	
7	$\text{magnification} = \frac{\text{image height}}{\text{object height}}$	
8	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$F = B I l$
9	thermal energy for a change of state = mass × specific latent heat	$E = m L$
10	**potential difference across primary coil / potential difference across secondary coil = number of turns in primary coil / number of turns in secondary coil**	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
11	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	$V_s I_s = V_p I_p$
12	For gases: pressure × volume = constant	$p V = constant$

Acknowledgements

This document has been produced by Mr J Turnbull.

All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the AQA GCSE Physics Specification.