OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE PHYSICS

(9203)
Outline Schemes of Work – review version

For teaching from September 2016 onward
For International GCSE exams in June 2018 onwards

This scheme of work suggests possible teaching and learning activities for each section of the specification. There are far more activities suggested than it would be possible to teach. It is intended that teachers should select activities appropriate to their students and the curriculum time available. The first two columns summarise the specification references, whilst the Learning Outcomes indicate what most students should be able to achieve after the work is completed. The Resources column indicates resources commonly available to schools, and other references that may be helpful. The timings are only suggested, as are the Possible Teaching and Learning Activities, which include references to experimental work. Resources are only given in brief and risk assessments should be carried out.

Spec Reference	Summary of the Specification Content	Learning Outcomes *What most students should be able to do*	Suggested timing (lessons)	Possible Teaching and Learning Activities *Homework*	Resource	Examination 'hints and tips' *Students should:*
3.1 Forces and their effects						
3.1.1 Forces and their interactions						
3.1.1a	Objects interact by non-contact (field) forces (including gravity, electrostatics, magnetism) and by contact forces (including friction, air resistance, tension and normal contact force).	Recall and describe the effects of forces in terms of changing the shape and/or motion of objects. Give examples of contact and non-contact forces. Describe examples of contact forces explaining how the force is produced. Describe examples of non-contact forces and state how the force is produced, eg gravitational force caused by two objects with mass exerting an attractive force on each other.	0.5	**Activity:** Investigate contact and non-contact forces. This can include magnets, friction along a surface eg when a shoe is pulled along it. You can change the surface to explore how this changes the amount of force required to move the shoe. You could also add a lubricant eg water/oil to the surface. **Activity:** To illustrate static electricity as a non-contact force pupils could rub a polythene rod with a duster and then use the charged rod to attract small pieces of paper (eg from a hole punch) or bend water.		
3.1.1b	Friction is a force between two surfaces, which impedes motion and may result in heating. Air resistance is a form	Recall the meaning of friction. Explain the effect of friction on objects.	1	**Activity:** Make parachutes of different sizes, eg 10x10cm and one 50x50cm, and then drop it from a height. **Activity:** Time how long it takes to fall and then discuss the change in		

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	of friction.			forces.		
3.1.1c	Pairs of objects interact to produce a force on each other, which can be represented as vectors.		1	**Activity:** Measuring the size of a force using a Newtonmeter. **Activity:** Sort quantities into vectors and scalars. **Activity** Draw vector diagrams for vectors where the size and direction of the arrow represents the size and direction of the vector.		
3.1.1d	Scalars are quantities that have magnitude only. Vectors are quantities that have direction as well as a magnitude. A vector quantity may be represented by an arrow. The length of the arrow represents the magnitude and the direction of the arrow represents the direction of the vector quantity.	Understand the difference between scalar and vector quantities and give examples of both. Students should be aware that distance, speed and time are examples of scalars and displacement; velocity, acceleration, force and momentum are examples of vectors.		**Activity:** Pupils could model displacement vectors by sketching a scale drawing for displacement vectors, eg 3m East followed by 5m North in the playground. Then back in the classroom get them to draw a scale diagram (ie 1m = 1cm) of this using the arrow notation.		Know some examples of both scalars and vectors.

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3.1.1e	Weight is the force acting on an object due to gravity. 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 (N) = mass (kg) × gravitational field strength (N/kg) $W = m \times g$	Recall 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. Understand the difference between mass and weight. Apply the formula to calculate weight.	1	**Activity:** Discuss how weight of a mass on different planets varies. **Activity:** Pupils can model what a 1kg mass would weigh on different planets using tin cans filled with sand. **Activity:** Show that a feather and coin fall at the same rate in an evacuated tube.		Rearrange formula, convert units, carry out calculations.
3.1.1f	When more than one force is applied to an object they may cause a change in the shape of the object, by stretching, bending or compressing.	Explain how forces can change an objects shape.		**Activity:** Discuss why deforming a material can only occur if more than one force is acting on the object. If only one force was acting the object would just move in the direction of the force. **Activity:** Give examples of objects being stretched, bent or		

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	After elastic distortions an object returns to its original shape when the forces are removed. After inelastic distortions an object does not return to its original shape.			compressed by forces. Draw force diagrams to show how the forces are acting on the object and how the stretching, bending or compressing occurs.		
3.1.1g	A force applied to an elastic object such as a spring will result in the object stretching and storing elastic potential energy.	Recall the effect of applying force to a spring. Investigate what makes the best catapult.	2	**Activity:** Investigate the effect of forces on the extension of a spring. **Demonstration:** Stretch warm strip of toffee to show inelastic distortion. **Practical and enquiry skills:** Investigate the effect of stretching elastic band catapults by different amounts on the distance a fired paper pellet travels. **Homework:** Students research toys they have had that have worked using stored potential energy, eg pull back 'motor' cars.		
3.1.1h	For an object behaving elastically, the extension is directly	Know the relationship between the force, *F*, and the extension, *e*.		**Activity:** Investigate the effect of loading and unloading springs		Rearrange formula, convert units, carry out

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	proportional to the force applied, provided that the limit of proportionality is not exceeded. The relationship between the force, *F*, and the extension, *e*, is: $F = k \times e$ where k is a constant.			stretched up to and beyond their elastic limits. Add a force of 1N (100g mass) at a time and measure the extension of the spring. Continue until the spring is clearly stretched beyond its elastic limit and then remove 1N at a time, recording the extension each time. **Activity:** Find the spring constant of a spring by experiment. **Activity:** Sketch and describe the force and extension curve of an elastic material (eg elastic band or spring) when not stretched beyond its elastic limit. **Activity:** Sketch and describe the force and extension curve of an elastic material when stretched beyond its elastic limit. **Activity:** Interpret data from an investigation of the relationship between force and extension. Describe the difference between a linear and non-linear relationship. **Research**: uses of springs in compression and tension.		calculations.