

# WJEC (Eduqas) Physics A Level

## SP1.5b - Investigation of the Force-Extension Relationship for Rubber

### Practical Flashcards

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Describe the bonds present in rubber.



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The structure of rubber consists primarily of weak (van der Waal) cross-bonds as well as a few stronger covalent bonds.



# What type of material is rubber?



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Rubber is an example of a polymer.



How will the force-extension graph for rubber differ from that for a spring?



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The rubber sample will form a more curved graph, and will only demonstrate direct proportionality between force and extension for very small loads.



How can the data to plot an unloading line be obtained?





How can the data to plot an unloading line be obtained?

The masses can be removed one-by-one and the extension measured each time.



How can the force applied by a mass be calculated?



How can the force applied by a mass be calculated?

The force will equal the weight of the  
mass:

$$F = mg$$



What, apart from the length of the band, should be initially measured and how can these parameters be measured?



What, apart from the length of the band, should be initially measured and how can these parameters be measured?

The initial width and thickness of the band should also be measured. These parameters can be measured using a micrometer. Take care not to squish the band in the micrometer's jaws.



Why is it important that the rubber band used has an appropriate width and thickness?



## Why is it important that the rubber band used has an appropriate width and thickness?

If the rubber band is too wide and thick, its extension over the range of hanging masses used may not be significant enough to observe a full range of behaviour. If the rubber band is too thin and narrow, its extension over the range of hanging masses may be too large. The acquired extension dataset may therefore be sparse.



What piece of apparatus can be used to improve the precision of length readings?





What piece of apparatus can be used to improve the precision of length readings?

An optical pin



# How do you calculate a sample's extension?



How do you calculate a sample's extension?

$$\text{Extension} = \text{Extended Length} - \text{Original Length}$$



What safety precautions should be taken when using hanging masses?



## What safety precautions should be taken when using hanging masses?

Never stand with your feet below the hanging masses in case the wire snaps and the masses fall.

It is good practice to place a padded bucket below them, in case the elastic band snaps. Eye protection should also be worn in case the elastic band snaps, potentially causing injury.



What safety precaution should be taken to ensure the apparatus doesn't fall over?



What safety precaution should be taken to ensure the apparatus doesn't fall over?

A G-clamp should be used to fasten the clamp-stand to the desk, ensuring that it does not topple over.

