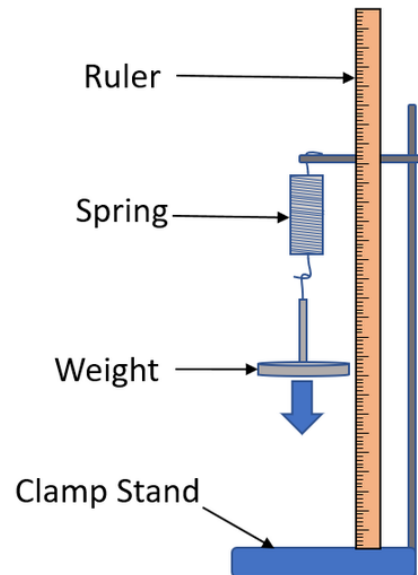
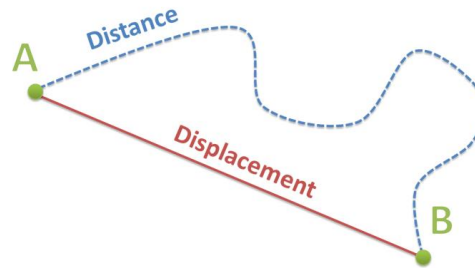
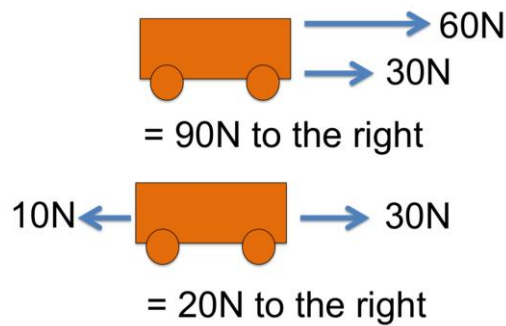


# KS4 Physics: Forces & Interactions

## Keywords/ Definitions

| Keyword           | Meaning                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------|
| Scalar            | A physical quantity that can be measured only has a magnitude or size.                       |
| Vector            | Describes a movement from one point to another that has both direction and magnitude (size). |
| Contact Force     | The forces that act between two objects that are touching                                    |
| Non-Contact Force | The forces between two objects that are not physically touching                              |
| Resultant Force   | A single force that has the same effect as two or more forces acting together.               |
| Magnitude         | The size of a physical quantity (normally shown as a number)                                 |
| Compression       | A shortening in length of an object                                                          |
| Extension         | Increase in length, e.g. as a result of being pulled.                                        |
| Spring Constant   | A measure of the stiffness of a spring up to its limit elasticity.                           |
| Displacement      | The distance from the start of the journey to the end in a straight line.                    |
| Speed             | The distance travelled in a known time period                                                |
| Proportional      | When two quantities have the same ratio or relative size (symbol $\propto$ )                 |



## Numeracy

### Equations

A bike travels 10m in a time of 5 seconds, what speed is it travelling?

$$v = s \div t \quad 10\text{meters} \div 5\text{seconds} = 2\text{m/s}$$

A force of 3 N is applied to a spring. The spring stretches reversibly by 0.15 m, calculate spring constant?

$$F = k \times e \rightarrow k = F \div e \rightarrow 3 \div 0.15 = 20\text{N/m}$$

A spring has a spring constant, (k), of 3 N/m. It is stretched until it is extended by 50 cm. Calculate the elastic potential energy?

$$E_e = \frac{1}{2} \times k \times e^2 \rightarrow E_e = \frac{1}{2} \times 3 \times 0.5^2 \rightarrow E_e = 1.5 \times 0.25 \rightarrow E_e = 0.375\text{J}$$

## Key Facts

- Forces are measured in Newtons (N)
- Inelastic deformation is when an object does not return to its original length after extension or compression.
- Elastic deformation is when an object returns to its original length after extension or compression.
- Limit of proportionality refers to the point beyond which Hooke's law is no longer true when stretching a material.
- A fluid can be a gas or a liquid.
- Work done on a spring equals the elastic potential energy ( provided the spring is not inelastically deformed).
- 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.