Part 3

Forces – Types of force

3.1 Force

The definition of force will be given in part 5 of this book.

People can exert forces, such as pushing, pulling, twisting and squeezing. Force is a vector quantity, which is stated in terms of magnitude and direction. The magnitude of force is measured in units called newtons, which are given the symbol N.

Types of force which you will meet in mechanics are described here.

3.2 Weight

Weight, which acts on all bodies on the earth, is the gravitational attraction between a body and the earth. Weight always acts vertically downwards.

The weight W newtons of a mass m kilograms is often written as

$$W = mg$$

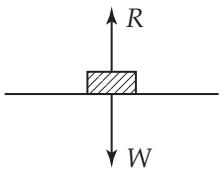
where g is the acceleration due to gravity and is taken to be approximately $9.8\,\text{ms}^{-2}$ in this book.

3.3 Normal Reaction

If an object touches a surface the surface exerts a reaction force on the object. Since the reaction is perpendicular to the surface, it is called the normal reaction.

For example, if a book lies on a horizontal desk, the desk exerts a force on the book, otherwise the book would fall.

The forces acting on the book are weight (W) and normal reaction (R).



3.4 Tension

If a body is attached to a taut string, there is a force on the body due to the tension in the string.

For example, if a body hangs at the end of a string, the tension in the string exerts a force on the body otherwise the body would fall freely. The forces acting on the body are weight (W) and tension (T).