



Year: 11

Topic: 6.1 Distance speed acceleration

Knowledge and Understanding to be developed:

This topic introduces the ideas of distance, speed, velocity, acceleration and their definitions. Learners will use velocity-time graphs to determine the acceleration of a moving body, and the distance the body travels in a given time. These basic principles will be applied to the safe stopping distances of vehicles and the factors upon which this depends.

There are a number of opportunities for the development of mathematical skills in this topic. These include making calculations using ratios and proportional reasoning to convert units and compute rates; relating changes and differences in motion to appropriate distance-time and velocity-time graphs; interpreting enclosed areas of such graphs; applying formulae relating distance, time and speed for uniform motion; estimating how the distances required for road vehicles to stop in an emergency varies over a range of typical speeds. These topics afford learners the opportunity to use expressions in decimal form; to use ratios, fractions and percentages; to make estimates of the results of simple calculations, without using a calculator; to change the subject of an equation; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to solve simple algebraic equations; to translate information between graphical and numeric form; to understand that $y = mx + c$ represents a linear relationship; to plot two variables from experimental or other data; to interpret the slope of a linear graph; to understand the physical significance of the area between a curve and the x-axis and to measure it by counting squares as appropriate

Key Terms to be learned this topic:

deceleration motion
speed velocity
acceleration

**Learning Objectives and Outcomes:
Students should be able to :**

- (a) motion using speed, velocity and acceleration
- (b) speed-time and distance-time graphs
- (c) the equations: = distance speed time
and () = change in velocity acceleration or deceleration time
- (d) velocity-time graphs to determine acceleration and distance travelled
- (e) the principles of forces and motion to the safe stopping of vehicles, including knowledge of the terms reaction time, thinking distance, braking distance and overall stopping distance and discuss the factors which affect these distances
- (f) the physics of motion together with presented data and opinions to discuss traffic control arising from the above, e.g. the need for speed limits and seat belts