



Activity description

In this activity, students match descriptions of a variety of real scenarios involving motion with the corresponding velocity–time and displacement–time graphs.

Suitability

Level 3 (Advanced)

Time

15–60 minutes depending on how much time is spent on the introduction and class discussion

Resources and equipment

Student information sheet

6 sets of cards to be copied and laminated for each student or group of students, perhaps using different colours for each page of cards

Optional: slideshow, active board

Key mathematical language

Distance, displacement, speed, velocity, displacement–time graph, distance–time graph, velocity–time graph, speed–time graph, gradient

Notes on the activity

There are a variety of ways in which this set of resources can be used.

The student information sheet gives a summary of the main points – this can be discussed and given to students before or after they try to match the cards.

The slideshow includes the contents of the cards. It can be used with or without the information sheet to introduce the activity (perhaps just using the first slide). The slideshow could also support discussion about the relationship between the graphs after the students have tried the activity.

Alternatively the information sheet and the slideshow can be used on their own to revise the main points.

Cards to be copied, laminated, and cut out: at the end of these notes are cards for students to match. Each set consists of three cards showing a scenario involving motion, a displacement–time graph and a velocity–time graph. You could use all three cards in each set, or just two of them.

During the activity

Students can work individually or in pairs or small groups. Individual work would check each student's understanding, whilst paired or group work would encourage discussion about the models.

Points for discussion

- the difference between scalar and vector quantities (distance/displacement and speed/velocity)
- how to model motion (graphs and/or functions)
- connections between each displacement–time graph and the corresponding velocity–time graph:
- the gradient of the displacement–time graph gives the velocity
the area between the velocity–time graph and the time axis gives the displacement
- how to find the area of a triangle and trapezium
- how realistic or unrealistic the graphs are – in particular whether vehicles are likely to travel at the constant speeds suggested by the models and whether they would be able to change velocities as abruptly as some of the graph suggest. Encourage students to describe or sketch more realistic graphs for these examples.

Extensions

Ask students to suggest their own scenarios and sketch the corresponding velocity–time and displacement–time graphs. They could do this in pairs, with each person sketching graphs for the scenario suggested by the other person.

Consider introducing the modelling cycle shown below. This is also used in the *Runaway train* activity – see www.fsmq.org.

