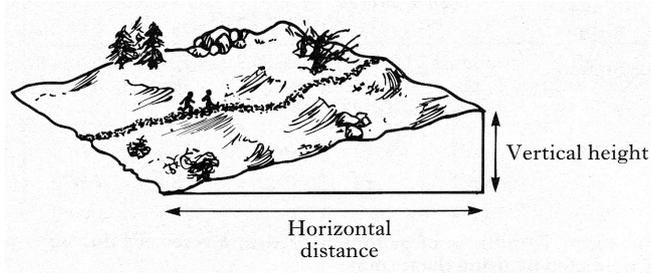


13. Making and Using Formulae

Modelling using formulae 1
 Substituting into formulae, making formula from information in tables 1
 Making and using formulae derived from geometric shapes 1

25. The total time a walk takes in hillwalking depends on the horizontal distance covered (h kilometres) and the vertical height climbed v metres.



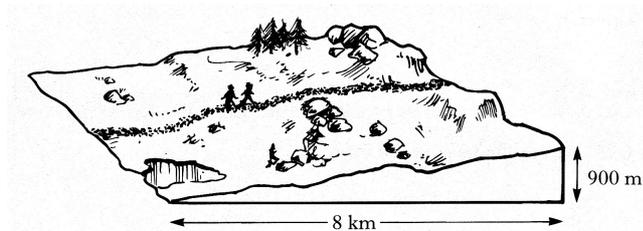
For **each kilometre** of horizontal distance, 12 minutes should be allowed.

- a) i) Write down the time which should be allowed for h kilometres of horizontal distance. 1 KU
- ii) for **each 100 metres** of vertical height, 10 minutes should be allowed. Write down the time which should be allowed for v metres of vertical height. 2 RE
- iii) Show that the **total** time T hours which should be allowed for the walk is given by the formula

$$T = \frac{120h + v}{600} \quad \text{3 RE}$$

b) For safety reasons, hillwalkers should be off the hills by 1900 hours.

Would it be safe to start the walk shown at 1300 hours?



3

27. Mr and Mrs Paton want to have their house valued before putting it up for sale. The fee they have to pay for having this done depends on the value of their house. The fee is calculated as follows

| Value of house | Fee to be paid |
|-----------------------------------|-----------------|
| First £2000 of value | £5.00 |
| Each additional £500 up to £15000 | £1.00 per £500 |
| Each additional £1000 over £15000 | £1.00 per £1000 |

- a) The Paton's house is valued at £33 000. What fee will they have to pay? 4 RE
- b) Write down a formula to find the total fee payable when a house is valued at £ P thousand, where P is a whole number greater than 15. 3 RE

26. The mass, M grams, of a given radio-active isotope decreases with time according to the formula

$$M = 80(2)^{-t}$$

where t is the time in years.

- a) The isotope weighs 80 grams at the start.

Show on the grid below, how the mass of this isotope changes over the following 4 years.

- b) Calculate how many years it takes for an isotope weighing 80 grams to decrease to a weight of $\frac{5}{8}$ of a gram.

