Chapter 17

Time money rates speed and distance

Learn the ideas below, follow each worked example, then attempt the practice before checking the answers.

17.1 Time units and clock notation

One minute has 60 seconds and one hour has 60 minutes. A day has 24 hours. In 24 hour notation, afternoon hours run from 13 to 23. Midnight is 00:00 and noon is 12:00. Convert minutes to a fraction of an hour before using hourly rates.

Worked example 2 hours 45 minutes = $2 + \frac{45}{60}$ = 2.75 hours. The time 7:25 pm is 19:25, while 07:25 is 7:25 am.

17.2 Elapsed time and timetables

Find elapsed time by counting through convenient points such as the next hour or midnight. Include any stops or waiting time specified. If an arrival is on the next day, add the time remaining to midnight to the time after midnight.

Worked example A journey starts at 22:40 and ends at 01:15 the next day. From 22:40 to midnight is 1 hour 20 minutes. Add 1 hour 15 minutes to obtain 2 hours 35 minutes.

17.3 Money budgets and change

Write money to the appropriate currency precision, usually two decimal places for rupees and paise. Total the costs before finding change or remaining budget. Use rates provided in a question for currency conversion; real exchange rates vary. Round money at the final stated stage.

Worked example Four books at 68.50 rupees each cost 274.00 rupees. Change from 500.00 rupees is 226.00 rupees. At a stated rate of 1 unit = 80 rupees, 25 units are worth 2,000 rupees.

17.4 Rates and best value

A rate compares different units, such as rupees per kilogram or litres per minute. Divide by the number of units to find a unit rate. Compare unit prices only when quality and relevant conditions are comparable. Constant rates allow direct scaling.

Worked example A 3 kg pack costs 216 rupees, so its unit price is 72 rupees per kg. A 5 kg pack costs 350 rupees, so it costs 70 rupees per kg and has the lower unit price.

17.5 Speed distance and time

Average speed = distance ÷ elapsed time. Rearranging gives distance = speed × time and time = distance ÷ speed. Use compatible units. To convert m/s to km/h multiply by 3.6; to convert km/h to m/s divide by 3.6. Average speed for a whole trip uses total distance and total time.

Worked example A car travels 150 km in 2.5 hours. Average speed = 150 ÷ 2.5 = 60 km/h. A speed of 72 km/h equals 72 ÷ 3.6 = 20 m/s.

Chapter 17 practice

Work in your notebook. Show your method and include units where needed.

1. Convert 3 hours 18 minutes to hours.

2. Find the elapsed time from 09:48 to 12:15.

3. Six pens cost 17.50 rupees each. Find change from 200 rupees.

4. A cyclist travels at 18 km/h for 40 minutes. Find the distance.

5. A trip covers 60 km in 1 hour and 40 km in 1 hour. Find average speed.

Answers with methods

1. $3 + \frac{18}{60}$ = 3.3 hours.

2. 12 minutes to 10:00, 2 hours to 12:00, then 15 minutes: 2 hours 27 minutes.

3. Cost = 105 rupees. Change = 95 rupees.

4. 40 minutes = $\frac{2}{3}$ hour. Distance = $18 \times \frac{2}{3}$ = 12 km.

5. Total distance 100 km divided by total time 2 hours gives 50 km/h.

Common mistake to avoid

1 hour 30 minutes is 1.5 hours, not 1.30 hours. The hour uses 60 minutes, not 100.