Speed Time Distance

Distance = Speed × Time

Speed = Distance / Time

Time = Distance / Speed

Exercise 14.4S

1 a)

Distance = 20km

Time = 1hr 30min = $\frac{3}{2}$ hrs

Speed = $\frac{\text{Distance}}{\text{Time}} = \frac{20}{\frac{3}{2}} = 20 \times \frac{2}{3} = \frac{40}{3} = 13\frac{1}{3}$ km/h

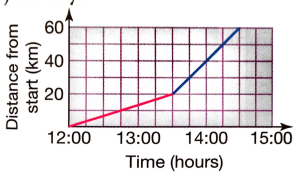
≈ 13.3 km/h

b) Dist = 40km

Time = 1 hr

Speed = 40 km.p.h.

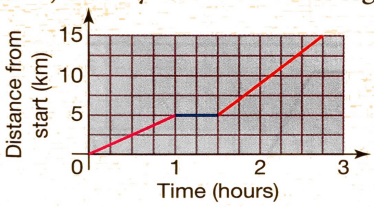
1 This distance–time graph shows Lisa's coach journey.



a What is the speed between 12:00 and 13:30?

b What is the speed between 13:30 and 14:30?

2 Tamera is riding a bike. Information about her journey is shown in this graph.



Tamera's journey starts at 8 am.

a What is her average speed for the whole ride?

b What is her speed between 10:00 and 10:30?

a) Avge Speed = Total Dist / Total Time

= 15 km / $2\frac{3}{4}$

= $15 \div \frac{11}{4}$ = $15 \times \frac{4}{11}$

= $\frac{60}{11}$ = $5\frac{5}{11}$ km/h

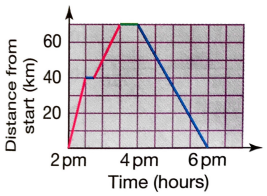
= 5.45 km/h

b) Dist 13-8 = 5km

Time $\frac{1}{2}$ hr

Speed = 10 km/hr

3 Mark sets off from home in his car at 2 pm. He stops to get petrol and then continues on his journey.
Mark returns home later in the afternoon.
The distance–time graph shows more information about this journey.



a Between which times was Mark travelling fastest? Explain how you know.

b What was Mark's overall average speed on the outward journey?

c What was Mark's average speed on the homeward journey?

d The gradient of the line after 4 pm is negative. What does this tell you about the velocity?

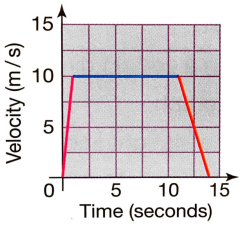
a) 2pm to 2.30 pm
steepest gradient

b) $\frac{\text{Tot Dist}}{\text{Total Time}}$ $\frac{70}{\frac{3}{2}} = 70 \times \frac{2}{3} = \frac{140}{3}$
$= 46\frac{2}{3}$ km/h

c) $\frac{70}{2} = 35$ km/h

d) opposite direction
therefore coming home

4 The velocity–time graph shows information about a runner in a race.



a What is the speed at 12 seconds?

b At what times is the speed 6 m/s?

c What is the acceleration during the first second?

d Find the overall distance travelled.

a) 6 m/s

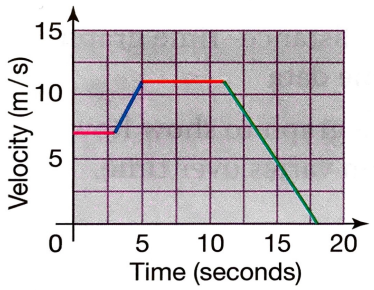
b) 1 s and 12 s

c) 10 m/s^2

d) Distance = Area under graph

Trapezium
Area $= \frac{(a+b)}{2} \times h$
$= \frac{(13+10)}{2} \times 10$
$= 115$ m

5 The diagram shows a velocity–time graph.



a What is the acceleration between 3 and 5 seconds?

b What is the distance travelled between 3 and 5 seconds?

c What is the overall distance travelled?

a) $\text{acc} = \frac{\text{change in velocity}}{\text{time}}$

$= \frac{11-7}{2} = \frac{4}{2}$

$= 2\ ms^{-2}$

b) Area under graph

$= \frac{(7+11)}{2} \times 2$

$= 18\ m$

c) Area under whole graph

= rect + little trap + big trapezium

$= \overset{7\times3}{21} + 18 + \frac{(13+6)}{2} \times 11$

$= 21 + 18 + 104.5$

$= 143.5\ m$