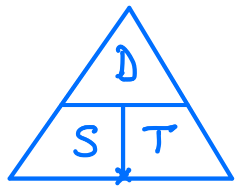
Compound Measures

Speed

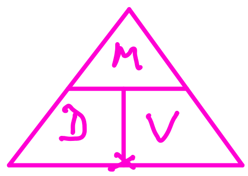


$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

Density

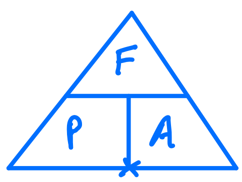


$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Volume} = \frac{\text{Mass}}{\text{Density}}$$

$$\text{Mass} = \text{Density} \times \text{Volume}$$

Pressure



$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Area} = \frac{\text{Force}}{\text{Pressure}}$$

$$\text{Force} = \text{Pressure} \times \text{Area}$$

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

Example

John drives for 2 hours at 40 km/hr from A to B. He then drives 120 km from B to C at 30 km/hr.

What is John's average speed for the whole journey from A to C?

	Speed	Time	Distance
A to B	40 km/h	2 hrs	80 km
B to C	30 km/h	4 hrs	120 km
		6 hrs	200 km

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}} = \frac{200}{6}$$

$$33\tfrac{1}{3} \text{ km/hr}$$

Ex 2 Bill travels 100 km from P to Q at 25 km/h. He then travels for 3 hours at 30 km/h from Q to R. He then travels from R to S at 40 km/h for $1\frac{1}{2}$ hrs.

Work out his average speed from P to S.

	Speed	Time	Distance
P to Q	25 km/h	4 hrs	100 km
Q to R	30 km/h	3	90 km
R to S	40 km/h	$1\frac{1}{2}$	60 km
		$8\frac{1}{2}$ hrs	250 km

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}} = \frac{250}{8.5}$$

29.4 km/hr

Density , Mass, Volume

A has density 4 g/cm^3

B has density 6 g/cm^3

A compound C is made from 200 cm^3 of A and 150 cm^3 of B. Find the density of C

	Density	Mass	Volume
A	4 g/cm^3	800g	200 cm^3
B	6 g/cm^3	900g	150 cm^3
		1700g	350 cm^3

$$\text{Density of C} = \frac{\text{Total Mass}}{\text{Total Volume}} \qquad \frac{1700}{350}$$

$$= 4.86 \ g/cm^3$$

Ex 2 T is made from P, Q, R

P has density 7 g/cm^3 and mass 56g

Q has density 10 g/cm^3 and volume of 8 cm^3

R has mass of 80g and volume 16 cm^3

Find the density of T

	Density	Mass	Volume
P	$7 g/cm^3$	56g	$8 cm^3$
Q	$10 g/cm^3$	80g	$8 cm^3$
R		80g	$16 cm^3$
		216g	$32 cm^3$

$$\text{Density of } T = \frac{\text{Total Mass}}{\text{Total Volume}} = \frac{216}{32}$$

$$= 6.75 \ g/cm^3$$

Exercise 22.1S (Pink Book Page 465)

1 a) 100m in 13s = 7.7 m/s

1 b) 200m in 28s = 7.1 m/s

1 c) 400m in 58.4s = 6.8 m/s

1 d) 1500m in 4min 52s = 5.1 m/s
1500m in 292s

2 a) 2 hrs at 80 km/h = 160 km

2 b) 7 hrs at 23 mph = 161 miles

2 c) 6 sec at 9 m/s = 54 m

2 d) 1 day at 12 mph = 24×12 = 288 miles