Level 4: Speed, distance and time

1) In Level 3 we learned how to calculate the speed, distance or time for a journey, for example:-

a) A tractor travels 28 miles in two hours. Calculate its average speed.

$$S = \frac{D}{T} = \frac{28}{2} = 14\text{mph}$$

b) A car travels at an average speed of 47mph for 4 hours. How far does it travel?

$$D = S \times T = 47 \times 4 = 188\text{miles}$$

c) How long will it take a bus to travel 135miles at an average speedof 45mph?

$$T = \frac{D}{S} = \frac{135}{45} = 3 \text{ hours}$$

2) In Level 3 we learned to used decimal fractions for 15, 30 or 45 minutes, for example: -

$$15 \text{ minutes} = \frac{1}{4} \text{ of an hour} = 0.25 \text{ hours}$$

$$30 \text{ minutes} = \frac{1}{2} \text{ of an hour} = 0.5 \text{ hours}$$

$$45 \text{ minutes} = \frac{3}{4} \text{ of an hour} = 0.75 \text{ hours}$$

a) A train travels at an average speed of 88mph for 3 hours 45 minutes. How far does it go?

3 hours 45 minutes = 3.75hours

$$D = S \times T = 88 \times 3.75 = 330\text{miles}$$

b) A car travels at 60mph. How long will it take to complete a journey of 135miles? Give your answer in hours and minutes.

$$T = \frac{D}{S} = \frac{135}{60} = 2.25 \text{ hours} = 2 \text{ hours } 15 \text{ minutes}$$

3) In Level 4 we will learn how to express any number of hours and minutes (or just minutes) as a decimal fraction and any decimal fraction of an hour as a number of minutes for example: -

$$21 \text{ minutes} = \frac{21}{60} = 0.35 \text{ hours}$$

$$17 \text{ minutes} = \frac{17}{60} = 0.28333333\ldots\ldots \text{ hours}$$

(Round off to at least three decimal places for accuracy or use $\boxed{\text{ANS}}$ on your calculator)

$$0.65 \text{ hours} = 0.65 \times 60 = 39 \text{ minutes}$$

4) In Level 4 we will learn how to calculate the speed, distance or time for a journey involving a time in hours and minutes.

a) A motorcycle travels 10 miles in 8 minutes. Calculate its average speed in mph.

$8 \text{ minutes} = \frac{8}{60} = 0.133333\ldots\ldots \text{ hours}$ (0.133 hours to 3 decimal places)

$S = \frac{D}{T} = \frac{8}{0.133} = 60.1503\ldots\ldots\ldots$mph (60.2mph to one decimal place)

b) A truck travels at an average speed of 43mph for 5 hours and 23minutes. How far does it travel?

$23 \text{ minutes} = \frac{23}{60} = 0.383333\ldots\ldots$ (0.383 hours to 3 decimal places)

5 hours 23 minutes = 5.383 hours

$D = S \times T = 43 \times 5.383 = 231.469$ (231.5 miles to one decimal place)

c) An aeroplane flies from Edinburgh to London, a distance of 321 miles, at an average speed of 270mph. How long does this journey take – give your answer in hours and minutes.

$T = \frac{D}{S} = \frac{321}{270} = 1.188888\ldots\ldots$hours

$0.189 \times 60 = 11.34$ minutes

Journey takes 1 hour and 11 minutes (to the nearest minute)

5) Solve problems by calculating speed, distance or time.

a) James aims to drive 50 miles in exactly one hour. After 43 minutes he has only managed 31 miles. Can he meet his target without breaking the speed limit of 60mph?

b) An airline is planning a new schedule. They have a take-off time of 6:25am for the first flight of the day from Edinburgh to Paris. If the length of the flight is 544 miles, their plane flies at an average speed of 320mph and they allow and extra 15 minutes for getting to the terminal in Paris after landing, what time should they say the flight will arrive?

c) Alison walks to the bus stop at 4mph. This takes 20 minutes. She gets on a bus to the station and travels at an average speed of 28mph for 17minutes. At the station she gets a train which travels at and average speed of 64mph for 3 hours and 42 minutes. How far has she travelled altogether? Give your answer to the nearest mile.

REMEMBER TO SHOW ALL YOUR WORKING
AND EXPLAIN YOUR ANSWER FULLY!