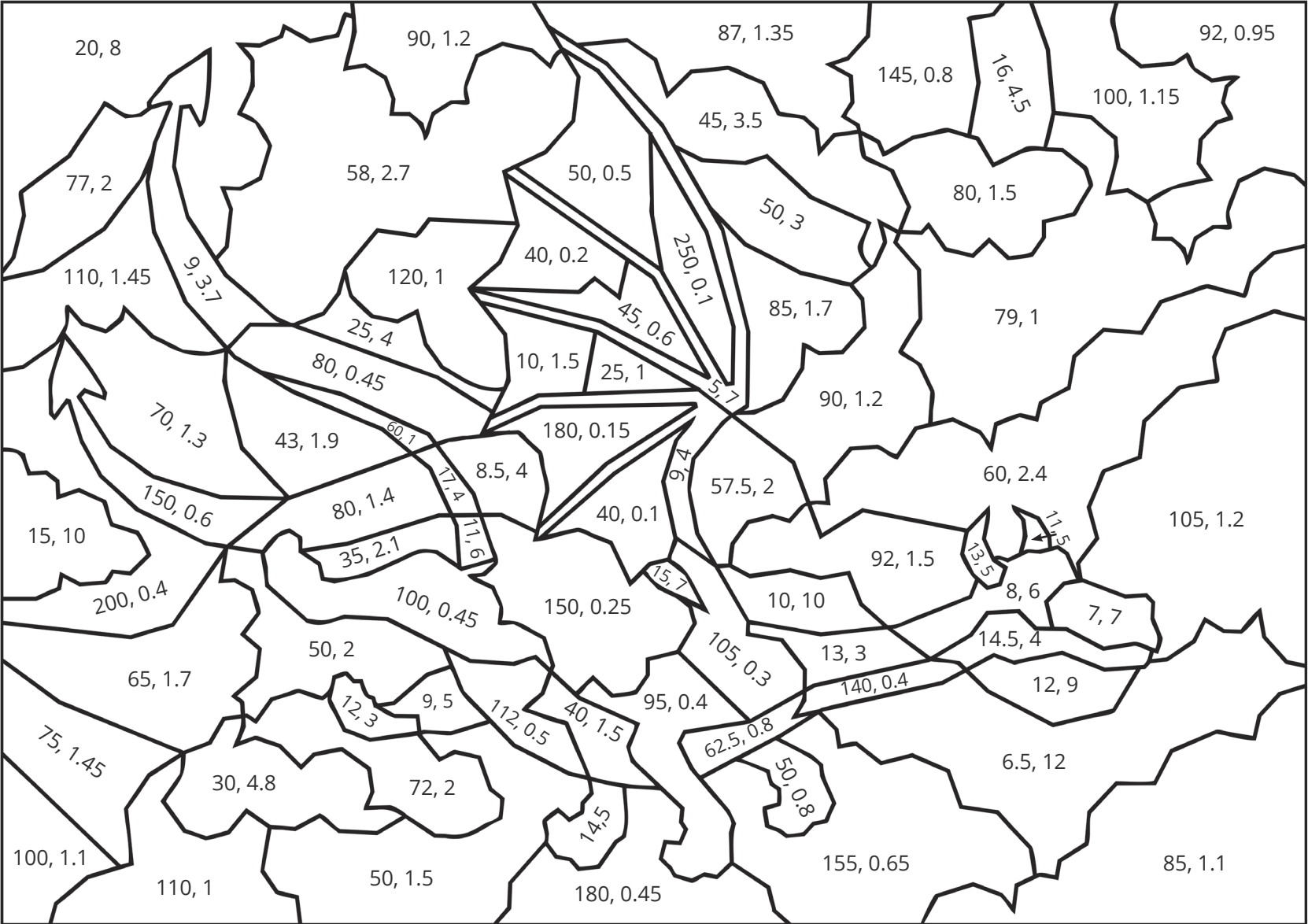


Calculating the Distance

Each question shows the average speed (km/h) followed by the duration (in hours) of a journey. For each question, calculate the distance travelled in km. Then use the key to shade the section in the correct colour.

For example, '50, 0.5' would mean that the average speed was 50km/h and the duration was 0.5 hours. To find the distance travelled, we would calculate 50×0.5 , giving us 25km. We would colour this section in red, according to the key below.

Red	$1 \leq d < 30$
Green	$30 \leq d < 50$
Yellow	$50 \leq d < 70$
Light Blue	$70 \leq d < 120$
White	$120 \leq d \leq 160$

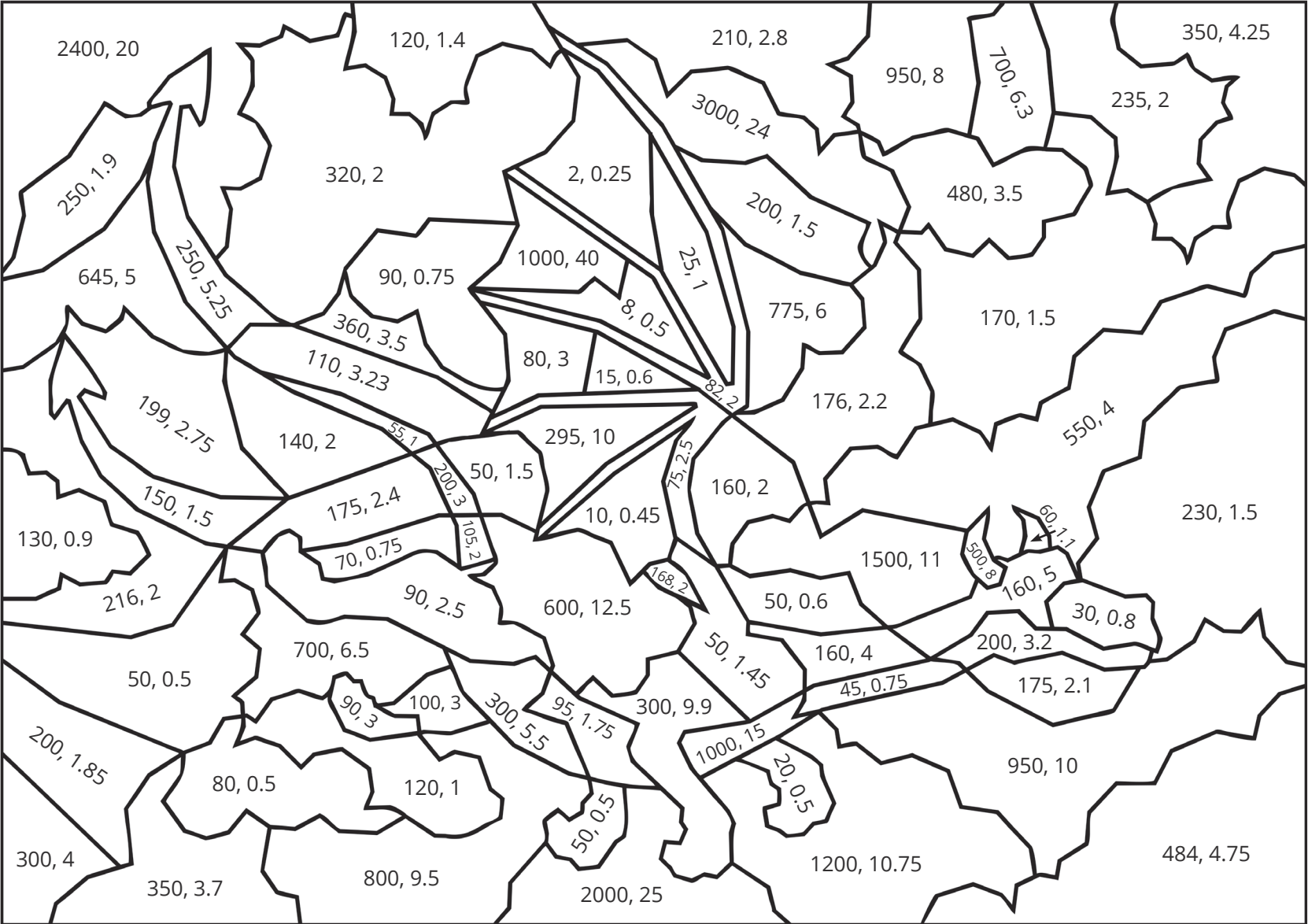


Calculating the Speed

Each question shows the distance travelled (km) followed by the duration (in hours) of a journey. For each question, calculate the average speed in km/h. Then use the key to shade the section in the correct colour.

For example, '50, 0.5' would mean that the distance travelled was 50km and the duration was 0.5 hours. To find the distance travelled, we would calculate $50 \div 0.5$, giving us 100km/h. We would colour this section in light blue, according to the key below.

Red	$1 \leq s < 30$
Green	$30 \leq s < 50$
Yellow	$50 \leq s < 70$
Light Blue	$70 \leq s < 120$
White	$120 \leq s \leq 160$

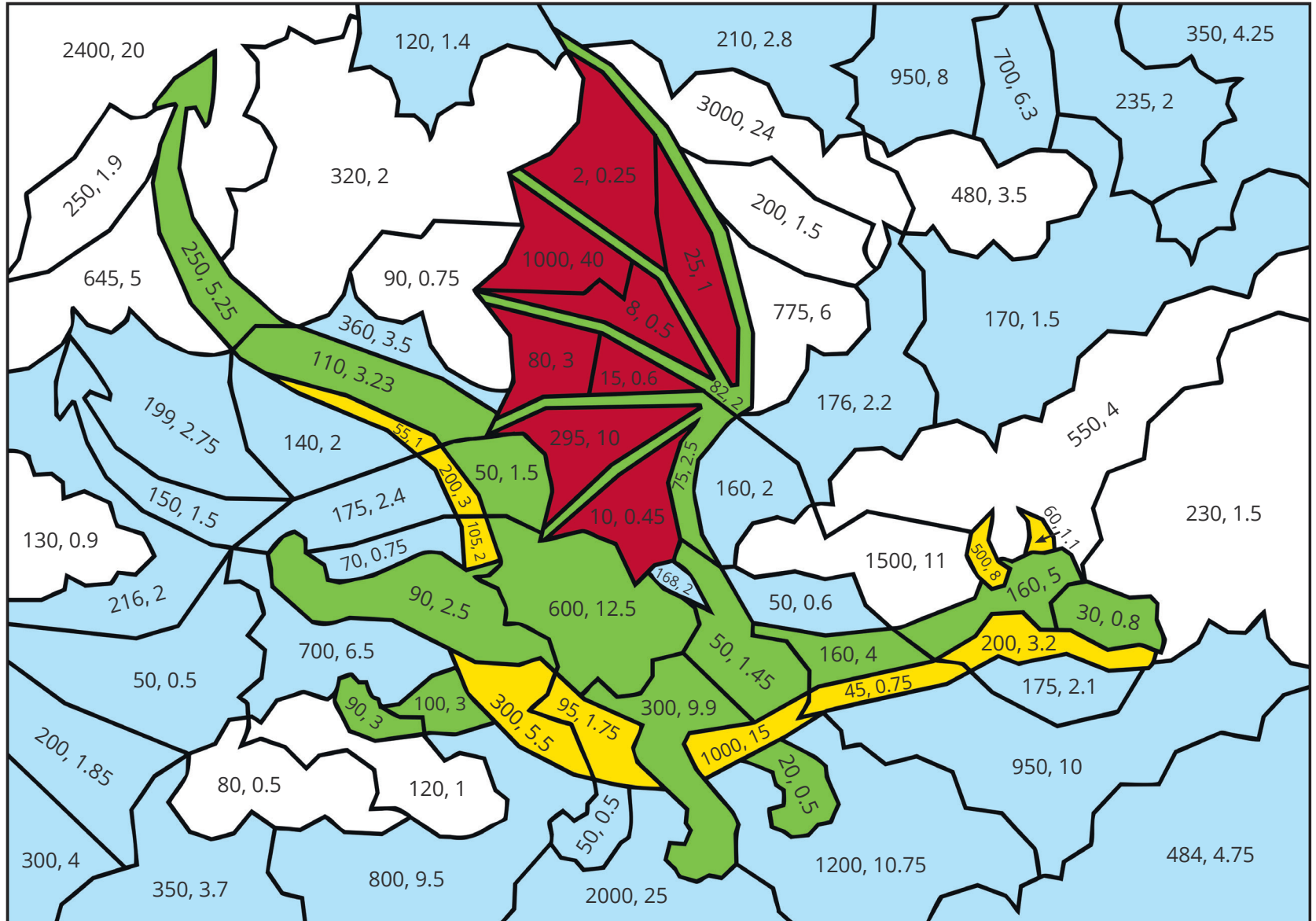


Calculating the Speed Answers

Each question shows the distance travelled (km) followed by the duration (in hours) of a journey. For each question, calculate the average speed in km/h. Then use the key to shade the section in the correct colour.

For example, '50, 0.5' would mean that the distance travelled was 50km and the duration was 0.5 hours. To find the distance travelled, we would calculate $50 \div 0.5$, giving us 100km/h. We would colour this section in light blue, according to the key below.

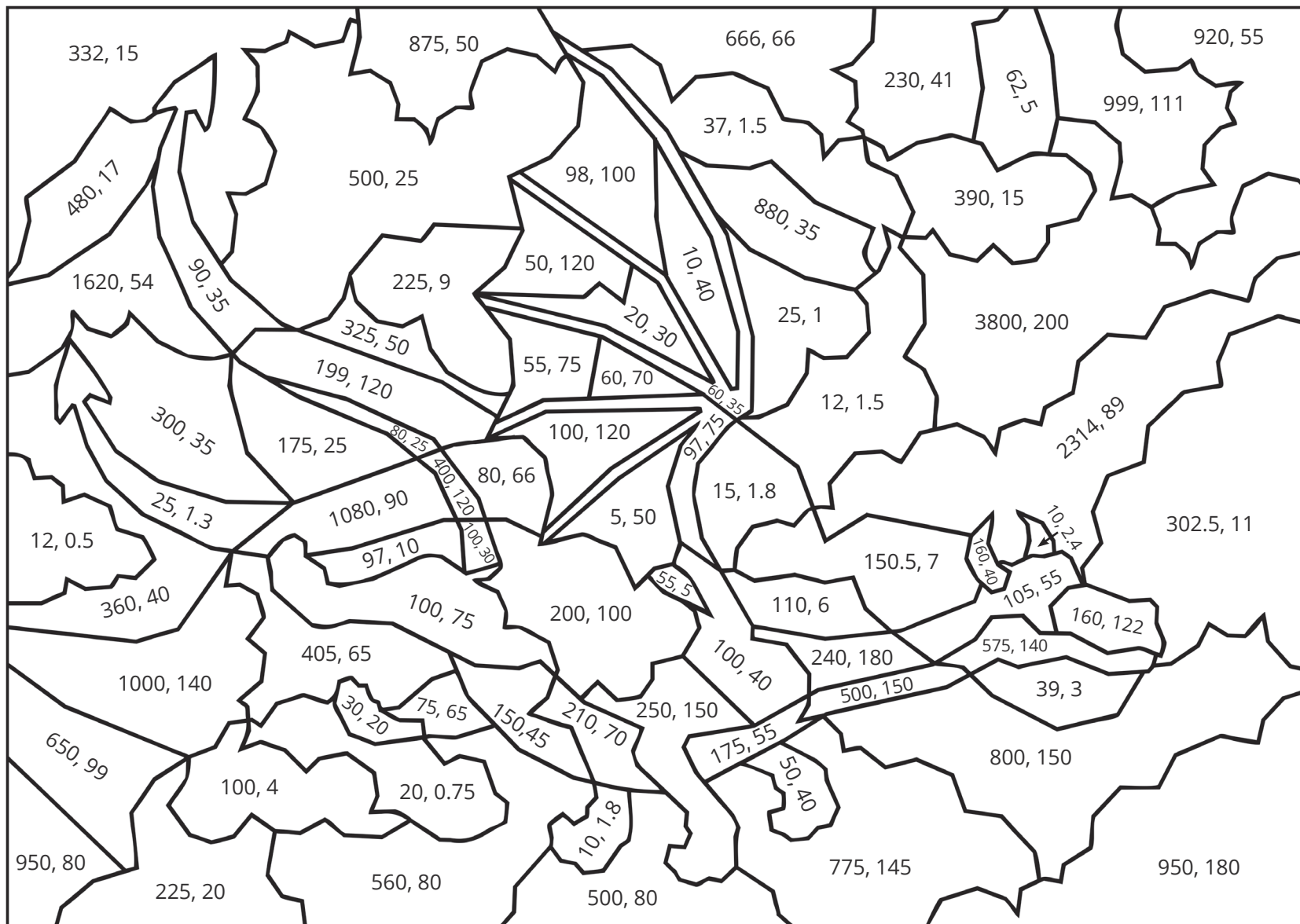
Red	$1 \leq s < 30$
Green	$30 \leq s < 50$
Yellow	$50 \leq s < 70$
Light Blue	$70 \leq s < 120$
White	$120 \leq s \leq 160$



Each question shows the distance (km) followed by the average speed (km/h) of a journey. For each question, calculate the time taken in hours. Then use the key to shade the section in the correct colour.

For example, '40, 50' would mean that the distance was 40km and the average speed was 50km/h. To find the time taken, we would calculate $40 \div 50$, giving us 0.8 hours. We would colour this section in red, according to the key below.

Red	$0 < t < 1$
Green	$1 \leq t < 3$
Yellow	$3 \leq t < 5$
Light Blue	$5 \leq t < 20$
White	$20 \leq t \leq 30$

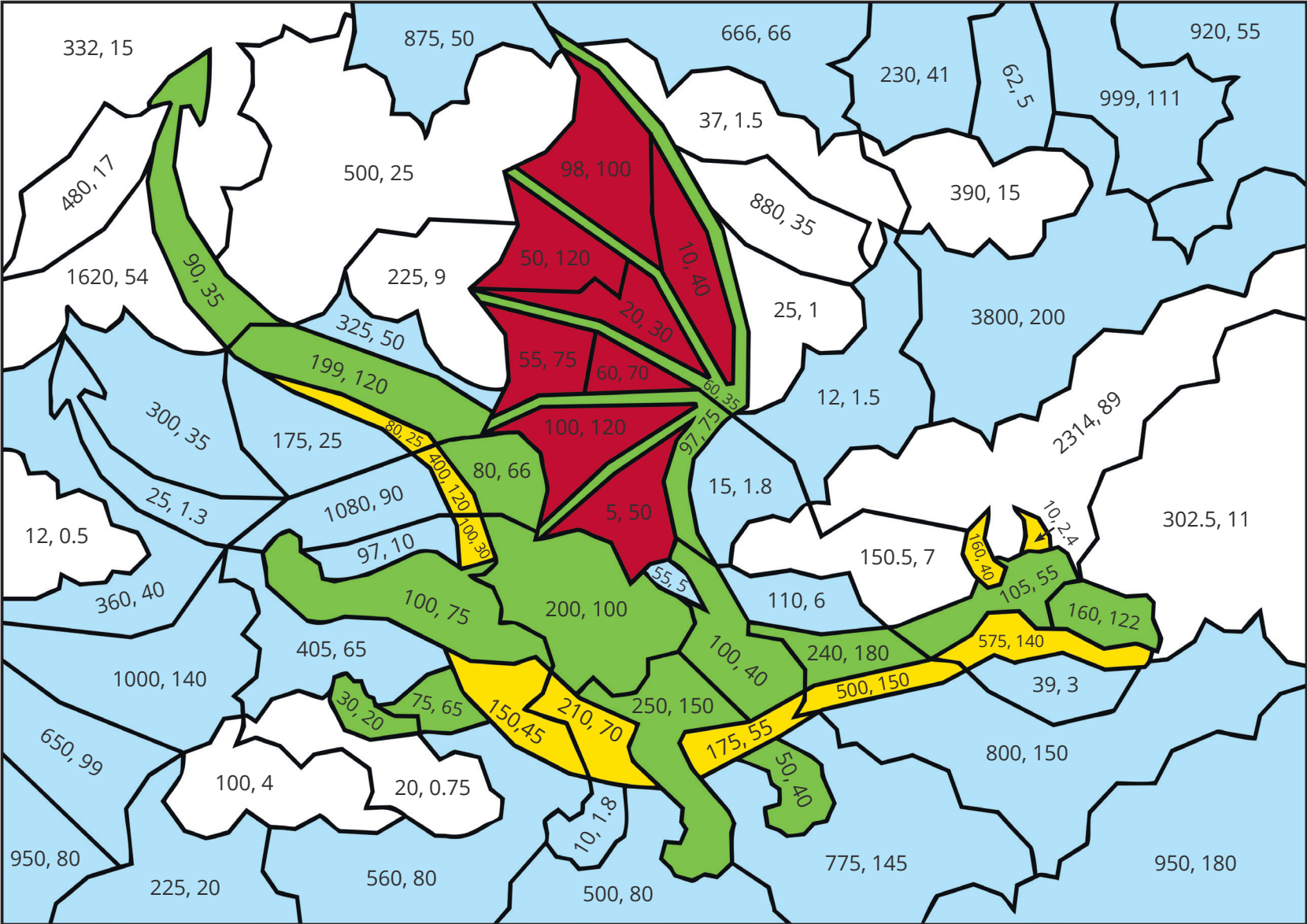


Calculating the Time Answers

Each question shows the distance (km) followed by the average speed (km/h) of a journey. For each question, calculate the time taken in hours. Then use the key to shade the section in the correct colour.

For example, '40, 50' would mean that the distance was 40km and the average speed was 50km/h. To find the time taken, we would calculate $40 \div 50$, giving us 0.8 hours. We would colour this section in red, according to the key below.

Red	$0 < t < 1$
Green	$1 \leq t < 3$
Yellow	$3 \leq t < 5$
Light Blue	$5 \leq t < 20$
White	$20 \leq t \leq 30$



Famous Mathematicians Top Maths Card Game Converting Units of Measure **Answers**

Bronze Cards	Pythagoras	Blaise Pascal	Fibonacci	Archimedes	Alan Turing	Ada Lovelace
A	10mm = 1 cm	100cm = 1 m	1km = 1000 m	1km = 100 000 cm	100mm = 10 cm	100m = 10 000 cm
B	500g = 0.5 kg	1000g = 1 kg	3kg = 3000 g	10kg = 10 000 g	1g = 1000 mg	2000mg = 2 g
C	5l = 5000 ml	10l = 10 000 ml	3000ml = 3 l	6500ml = 6.5 l	2l = 200 cl	500cl = 50 l
D	5 miles ≈ 8 km	1 foot ≈ 30 cm	1m ≈ 40 inches	1inch ≈ 2.5 cm	120 minutes = 2 hours	300 seconds = 5 minutes

Silver Cards	Pythagoras	Blaise Pascal	Fibonacci	Archimedes	Alan Turing	Ada Lovelace
A	50mm = 5 cm	800cm = 8 m	10km = 10 000 m	5km = 500 000 cm	80mm = 8 cm	12m = 1200 cm
B	1.05kg = 1050 g	3g = 0.003 kg	5370g = 5.37 kg	8.4kg = 8400 g	5g = 5000 mg	8000mg = 8 g
C	12l = 12 000 ml	100l = 100 000 ml	5500ml = 5.5 l	10 500ml = 10.5 l	2.5l = 250 cl	750cl = 7.5 l
D	50 miles ≈ 80 km	12 feet ≈ 360 cm	8m ≈ 320 inches	5 inches ≈ 12.5 cm	120 hours = 5 days	1 hour = 3600 seconds

Gold Cards	Pythagoras	Blaise Pascal	Fibonacci	Archimedes	Alan Turing	Ada Lovelace
A	500mm = 0.5 m	9000cm = 0.09 km	5.5km = 5500 m	2.5km = 250 000 cm	8.6m = 0.0086 km	12m = 1200 cm
B	1 $\frac{1}{4}$ kg = 1250 g	5 $\frac{1}{2}$ g = 0.0055 kg	82 000g = 82 kg	9 $\frac{3}{4}$ kg = 9750 g	2 $\frac{1}{5}$ g = 2200 mg	9250mg = 9.25 g
C	50l = 5000 cl	10cl = 100 ml	3500ml = 350 cl	8 $\frac{1}{2}$ l = 8500 ml	6 $\frac{2}{5}$ l = 640 cl	825cl = 8.25 l
D	1km ≈ $\frac{5}{8}$ or 0.625 miles	99cm ≈ 3.3 feet	120 inches ≈ 3 m	60cm ≈ 24 inches	1 week = 168 hours	72 000 seconds = 20 hours

Famous Mathematicians Top Maths Card Game

Converting Units of Measure

Instructions

You will need a set of cards per team. Students should play in pairs, although they could play in threes to absorb odd numbers.

This game can be played with all 18 cards or with two of the sets of six. The bronze cards are the easiest, followed by silver, with gold being the most difficult.

The cards are dealt out between the players and placed face down in piles in front of each player. Player One picks up their first card. They calculate the values for A, B, C and D. They should choose a value and announce it; for example, 'C is 7'.


The next player can now pick up their first card and then calculate their corresponding value; for example, 'C is 5'. If there is a third player, they would then have their turn. Whoever has the highest score wins the cards from the other players and puts them face down at the bottom of their pile. If the scores tied then each player keeps their own card. Player Two then picks up their uppermost card and calculates each value; play then continues in the same way, with each player taking a turn to go first.

The winner is the first person to win all the cards.

Students should check their partner's calculations after each turn. They should be encouraged to write their expressions and solutions in their books or on mini-white boards.



Famous Mathematicians Top Maths Card Game: Converting Units of Measure




Pythagoras

A	$10\text{mm} = x\text{cm}$
B	$500\text{g} = x\text{kg}$
C	$5\text{l} = x\text{ml}$
D	$5\text{ miles} \approx x\text{km}$

Bronze

Famous Mathematicians Top Maths Card Game: Converting Units of Measure



Blaise Pascal

A	$100\text{cm} = x\text{m}$
B	$1000\text{g} = x\text{kg}$
C	$10\text{l} = x\text{ml}$
D	$1\text{ foot} \approx x\text{cm}$

Bronze

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Fibonacci

A $1\text{km} = x\text{m}$

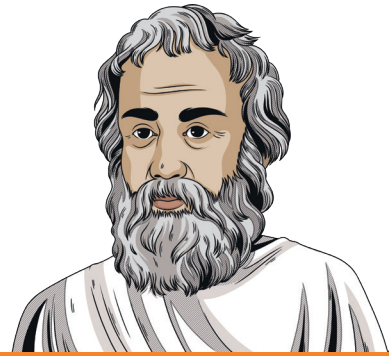
B $3\text{kg} = x\text{g}$

C $3000\text{ml} = x\text{l}$

D $1\text{m} \approx x \text{ inches}$

Bronze

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Archimedes

A $1\text{km} = x\text{cm}$

B $10\text{kg} = x\text{g}$

C $6500\text{ml} = x\text{l}$

D $1\text{inch} \approx x\text{cm}$

Bronze

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Alan Turing

A $100\text{mm} = x\text{cm}$

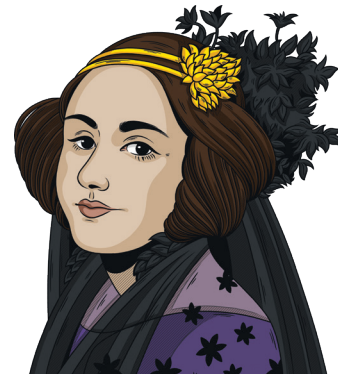
B $1\text{g} = x\text{mg}$

C $2\text{l} = x\text{cl}$

D $120 \text{ minutes} = x \text{ hours}$

Bronze

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Ada Lovelace

A $100\text{m} = x\text{cm}$

B $2000\text{mg} = x\text{g}$

C $500\text{cl} = x\text{l}$

D $300 \text{ seconds} = x \text{ minutes}$

Bronze

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Pythagoras

A 50mm = x cm

B 1.05kg = x g

C 12l = x ml

D 50 miles \approx x km

Silver

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Blaise Pascal

A 800cm = x m

B 3g = x kg

C 100l = x ml

D 12 feet \approx x cm

Silver

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Fibonacci

A 10km = x m

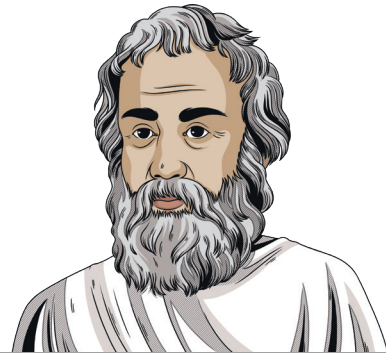
B 5370g = x kg

C 5500ml = x l

D 8m \approx x inches

Silver

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Archimedes

A 5km = x cm

B 8.4kg = x g

C 10 500ml = x l

D 5 inches \approx x cm

Silver

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Alan Turing

A 80mm = x cm

B 5g = x mg

C 2.5l = x cl

D 120 hours = x days

Silver

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Ada Lovelace

A 12m = x cm

B 8000mg = x g

C 750cl = x l

D 1 hour = x seconds

Silver

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Pythagoras

A 500mm = x m

B $1\frac{1}{4}$ kg = x g

C 50l = x cl

D 1km \approx x miles

Gold

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Blaise Pascal

A 9000cm = x km

B $5\frac{1}{2}$ g = x kg

C 10cl = x ml

D 99cm \approx x feet

Gold

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Fibonacci

A $5.5\text{km} = x\text{m}$

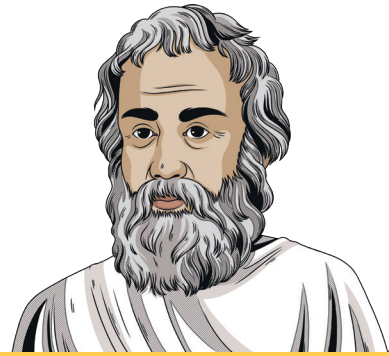
B $82\,000\text{g} = x\text{kg}$

C $3500\text{ml} = x\text{cl}$

D $120\text{ inches} \approx x\text{m}$

Gold

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Archimedes

A $2.5\text{km} = x\text{cm}$

B $9\frac{3}{4}\text{kg} = x\text{g}$

C $8\frac{1}{2}\text{l} = x\text{ml}$

D $60\text{cm} \approx x\text{ inches}$

Gold

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Alan Turing

A $8.6\text{m} = x\text{km}$

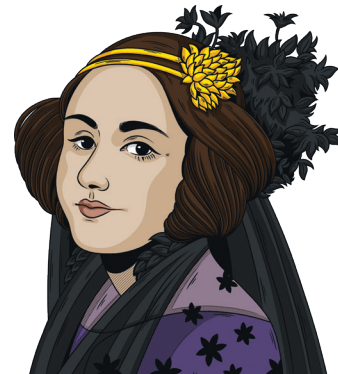
B $2\frac{1}{5}\text{g} = x\text{mg}$

C $6\frac{2}{5}\text{l} = x\text{cl}$

D $1\text{ week} = x\text{ hours}$

Gold

Famous Mathematicians Top Maths Card
Game: Converting Units of Measure



Ada Lovelace

A $12\text{m} = x\text{cm}$

B $9250\text{mg} = x\text{g}$

C $825\text{cl} = x\text{l}$

D $72\,000\text{ seconds} = x\text{ hours}$

Gold

Unit Pricing and
Compound Measures

Speed, Distance and Time



40

Learning Objective

To use and apply the speed, distance and time formulae.

Success Criteria

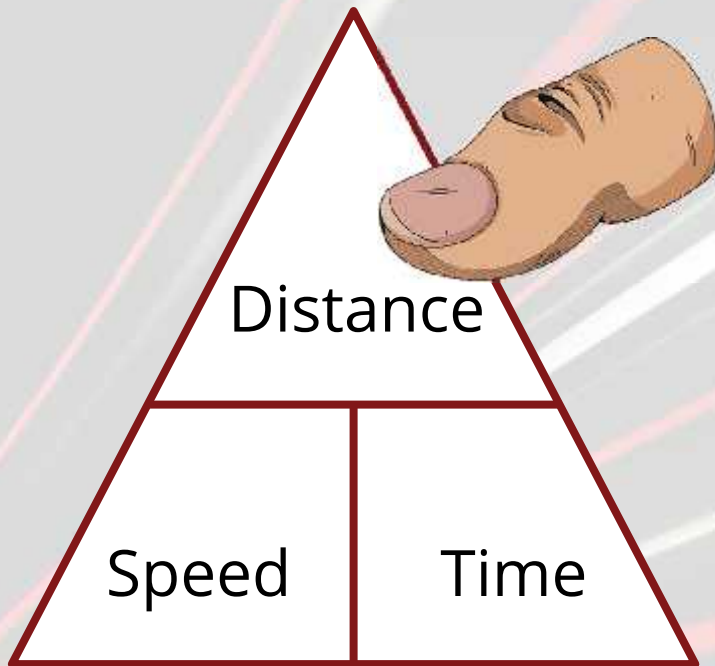
- To calculate speed, distance or time using a formula triangle.
- To interpret worded questions involving speed, distance and time.
- To apply the formulae and convert between units of measure.

Converting Units of Measure Top Card Game

- Deal out the cards equally between players. Each player places their stack of cards face down in front of them.
- Player 1 – pick up your first card and calculate the value for A, B, C or D.
- Player 2 – pick up your first card and calculate the same value.
- Whoever has the highest score wins the card(s) from the other player(s) and puts them face-down at the bottom of their pile.
- If the scores are a tie then each player keeps their own card.
- Player 2 – pick up your next card and continue play.
- The winner is the first person to win all the cards.



Calculating Distance



Use the formula triangle to help.

Cover up what you want to find (in this case, the distance). The parts that are left show you how to calculate it.

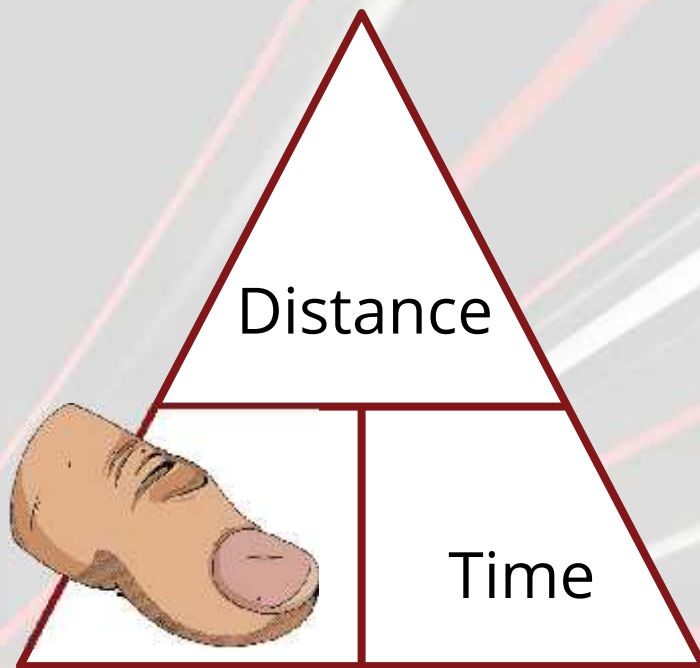
$$\text{Distance} = \text{Speed} \times \text{Time}$$

Example

50mph for 3 hours. Calculate the distance.

$$50 \times 3 = 150 \text{ miles}$$

Calculating Speed



Cover up speed. The parts that are left show you how to calculate it.

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

To calculate the average speed of a journey, you divide the distance travelled by the time taken.

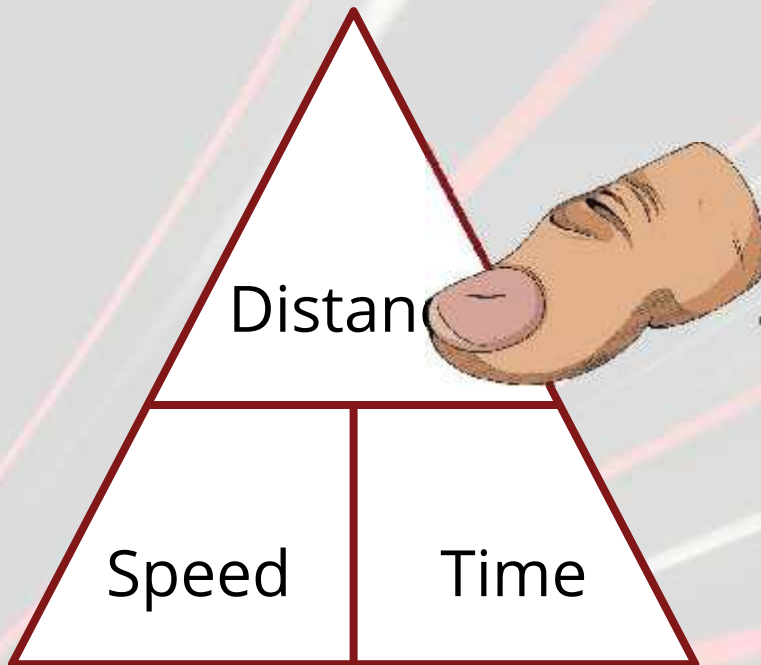
Example

2 hours to cover a distance of 5.8km. Calculate the speed.

$$\frac{5.8}{2} = 2.9\text{km/h}$$

Calculating Time

Cover up time. The parts that are left show you how to calculate it.



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

Example

100m travelled at a constant speed of 6.25m/s. Calculate the time taken.

$$\frac{100}{6.25} = 16 \text{ seconds}$$

Your Turn - Section 1

Questions

Calculate the distance travelled in each journey:

a. 3 hours at 40mph

Distance = _____

Distance = _____ miles

d. 5.25 hours at 50km/h

Distance = _____

Distance = _____ km

b. 55km/h for 3.5 hours

Distance = _____

Distance = _____ km

e. 30mph for 20 minutes

Distance = _____

Distance = _____ miles

c. 4 seconds at 3m/s

Distance = _____

Distance = _____ m

Your Turn - Section 1

Answers

Calculate the distance travelled in each journey:

a. 3 hours at 40mph

$$\text{Distance} = 3 \times 40$$

$$\text{Distance} = 120 \text{ miles}$$

b. 55km/h for 3.5 hours

$$\text{Distance} = 55 \times 3.5$$

$$\text{Distance} = 192.5 \text{ km}$$

c. 4 seconds at 3m/s

$$\text{Distance} = 4 \times 3$$

$$\text{Distance} = 12 \text{ m}$$

d. 5.25 hours at 50km/h

$$\text{Distance} = 5.25 \times 50$$

$$\text{Distance} = 262.5 \text{ km}$$

e. 30mph for 20 minutes

$$\text{Distance} = 30 \times \frac{20}{60}$$

$$\text{Distance} = 10 \text{ miles}$$

Your Turn - Section 2

Questions

Calculate the average speed of each journey:

a. 150 miles in 5 hours

Speed = _____

Speed = _____ mph

d. 87.5 miles in 3.5 hours

Speed = _____

Speed = _____ mph

b. 120 km in 3 hours

Speed = _____

Speed = _____ km/h

e. 9km in 45 minutes

Speed = _____

Speed = _____ km/h

c. 20m in 4 seconds

Speed = _____

Speed = _____ m/s

Your Turn - Section 2

Answers

Calculate the average speed of each journey:

a. 150 miles in 5 hours

$$\text{Speed} = \frac{150}{5}$$

$$\text{Speed} = \mathbf{30\text{mph}}$$

d. 87.5 miles in 3.5 hours

$$\text{Speed} = \frac{87.5}{3.5}$$

$$\text{Speed} = \mathbf{25\text{mph}}$$

b. 120 km in 3 hours

$$\text{Speed} = \frac{120}{3}$$

$$\text{Speed} = \mathbf{40\text{km/h}}$$

e. 9km in 45 minutes

$$\text{Speed} = 9 \div \frac{9}{45}$$

$$\text{Speed} = \mathbf{12\text{km/h}}$$

c. 20m in 4 seconds

$$\text{Speed} = \frac{20}{4}$$

$$\text{Speed} = \mathbf{5\text{m/s}}$$

Your Turn - Section 3

Questions

Calculate the time taken for each journey:

a. 150 miles at 50mph

Time = _____

Time = _____ hours

d. 5 miles at 50mph

Time = _____

Time = _____ minutes

b. 75km at 50km/h

Time = _____

Time = _____ hours

e. 1.5km at 2m/s

Time = _____

Time = _____ minutes

c. 25m at 2m/s

Time = _____

Time = _____ seconds

Your Turn - Section 3

Answers

Calculate the time taken for each journey:

a. 150 miles at 50mph

$$\text{Time} = \frac{150}{50}$$

$$\text{Time} = \mathbf{3} \text{ hours}$$

d. 5 miles at 50mph

$$\text{Time} = \frac{5}{50} \times 60$$

$$\text{Time} = \mathbf{6} \text{ minutes}$$

b. 75km at 50km/h

$$\text{Time} = \frac{75}{50}$$

$$\text{Time} = \mathbf{1.5} \text{ hours}$$

e. 1.5km at 2m/s

$$\text{Time} = \frac{1500}{2} \div 60$$

$$\text{Time} = \mathbf{12.5} \text{ minutes}$$

c. 25m at 2m/s

$$\text{Time} = \frac{25}{2}$$

$$\text{Time} = \mathbf{12.5} \text{ seconds}$$

Your Turn - Section 4

Questions

Complete the missing information in the table, include units of measure in your answers:

Speed	Distance	Time
70mph		2 hours
	55km	11 hours
200km/h		45 minutes
0.5m/s	350cm	
	357.5 miles	5 hours 30 minutes
12mph		2 hours 15 minutes

Your Turn - Section 4

Answers

Complete the missing information in the table, include units of measure in your answers:

Speed	Distance	Time
70mph	$70 \times 2 = 140$ miles	2 hours
$\frac{55}{11} = 5$ km/h	55km	11 hours
200km/h	$200 \times \frac{45}{60} = 150$ km	45 minutes
0.5m/s	350cm	$\frac{3.5}{0.5} = 7$ seconds
$\frac{357.5}{5.5} = 65$ mph	357.5 miles	5 hours 30 minutes
12mph	$12 \times 2.25 = 27$ miles	2 hours 15 minutes

Worded Problems

Alexandra is taking a day trip to her grandma's house. She sets off at 9:15a.m. and rides her moped for 50 miles. She arrives at 11:45 hours. What is her average speed for this journey?

Tackle worded problems by 'pulling out' the maths.

Write down what you know.

- distance travelled: 50 miles
- start time: 9:15a.m.
- finish time: 11:45a.m.

Write down what you need to find out.

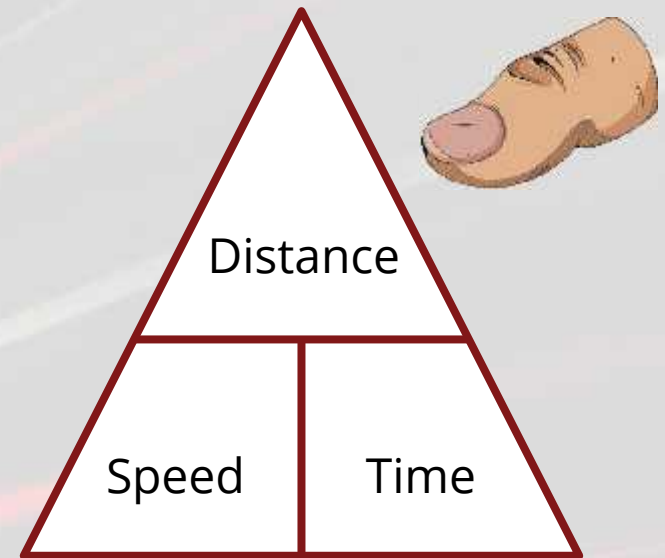
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

time taken: 2 hours 30 minutes = 2.5 hours

$$\text{speed} = \frac{50}{2.5} = 20$$

Remember to add the units to the answer.

speed = 20mph



Your Turn - Worded Problems Section 1

Questions

For each of the following questions, calculate the average speed of the journey and state the unit of measure.

- a. Jonti ran a distance of 200m in a time of 40 seconds. What was Jonti's average speed?
- b. Kevin cycled 35km in 2 hours. How fast did he cycle?
- c. Ms Patel took 3 hours and 30 minutes to drive a distance of 140 miles. What was her average speed for this journey?
- d. An international train took 300 minutes to travel a distance of 850km. Calculate the train's average speed for this journey in kilometres per hour.



Your Turn - Worded Problems Section 1

Answers

For each of the following questions, calculate the average speed of the journey and state the unit of measure.

- a. Jonti ran a distance of 200m in a time of 40 seconds. What was Jonti's average speed?

$$\frac{200}{40} = 5\text{m/s}$$

- b. Kevin cycled 35km in 2 hours. How fast did he cycle?

$$\frac{35}{2} = 17.5\text{km/h}$$

- c. Ms Patel took 3 hours and 30 minutes to drive a distance of 140 miles. What was her average speed for this journey?

$$\frac{140}{3.5} = 40\text{mph}$$

- d. An international train took 300 minutes to travel a distance of 850km. Calculate the train's average speed for this journey in kilometres per hour.

$$\frac{300}{60} = 5 \text{ hours}$$

$$\frac{850}{5} = 170\text{km/h}$$

Your Turn - Worded Problems Section 2

Questions

For each of the following questions, calculate the distance travelled and state the unit of measure.

- a. A coach travels at an average speed of 60mph for 4 hours. How long does the journey take?
- b. A car drives on a road for 2.5 hours at 50km/h. How far did the car travel?
- c. If a camel ran at a constant speed of 65km/h for 45 minutes, how far would you expect it to travel?
- d. If a snail travelled at a constant speed of 0.05km/h for 3 minutes, how many metres would it crawl?

Your Turn - Worded Problems Section 2

Answers

For each of the following questions, calculate the distance travelled and state the unit of measure.

- a. A coach travels at an average speed of 60mph for 4 hours. How long does the journey take?

$$60 \times 4 = 240 \text{ miles}$$

- b. A car drives on a road for 2.5 hours at 50km/h. How far did the car travel?

$$2.5 \times 50 = 125\text{km}$$

- c. If a camel ran at a constant speed of 65km/h for 45 minutes, how far would you expect it to travel?

$$65 \times \frac{45}{60} = 48.75\text{km}$$

- d. If a snail travelled at a constant speed of 0.05km/h for 3 minutes, how many metres would it crawl?

$$0.05 \times 1000 = 50\text{m/h}$$

$$50 \times \frac{3}{60} = 2.5\text{m}$$

Your Turn - Worded Problems Section 3

For each of the following questions, calculate the time taken to complete the journey and state the unit of measure. **Questions**

- a. A car travels a distance of 30 miles at a speed of 15mph. How long does the journey take?
- b. Bob cycles a short distance of 450 metres at a constant speed of 20m/s. How long does he cycle for?
- c. A horse goes for a gallop and covers a distance of 1000m. His average speed is 40km/h. How many minutes does he gallop for?
- d. Jamil and Karen go for a walk. They walk a distance of 5 miles at a speed of 3mph. They stop for lunch for 1 hour then jog the same route back home at a speed of 8mph. How long did their trip last? Give your answer in hours, minutes and seconds.

Your Turn - Worded Problems Section 3

For each of the following questions, calculate the time taken to complete the journey and state the unit of measure.

Answers

- a. A car travels a distance of 30 miles at a speed of 15mph. How long does the journey take?

$$\frac{30}{15} = \mathbf{2 \text{ hours}}$$

- b. Bob cycles a short distance of 450 metres at a constant speed of 20m/s. How long does he cycle for?

$$\frac{450}{20} = \mathbf{22.5 \text{ seconds}}$$

- c. A horse goes for a gallop and covers a distance of 1000m. His average speed is 40km/h. How many minutes does he gallop for?

$$\mathbf{1000m = 1km}$$

$$\frac{1}{40} \times 60 = \mathbf{1.5 \text{ minutes}}$$

- d. Jamil and Karen go for a walk. They walk a distance of 5 miles at a speed of 3mph. They stop for lunch for 1 hour then jog the same route back home at a speed of 8mph. How long did their trip last? Give your answer in hours, minutes and seconds.

$$\frac{5}{3} \times 60 = \mathbf{100 \text{ minutes}}$$

$$\frac{5}{8} \times 60 = \mathbf{37.5 \text{ minutes}}$$

$$\mathbf{100 + 60 + 37.5 = 197.5 \text{ minutes}}$$

$$\frac{197.5}{60} = \mathbf{3.291...}$$

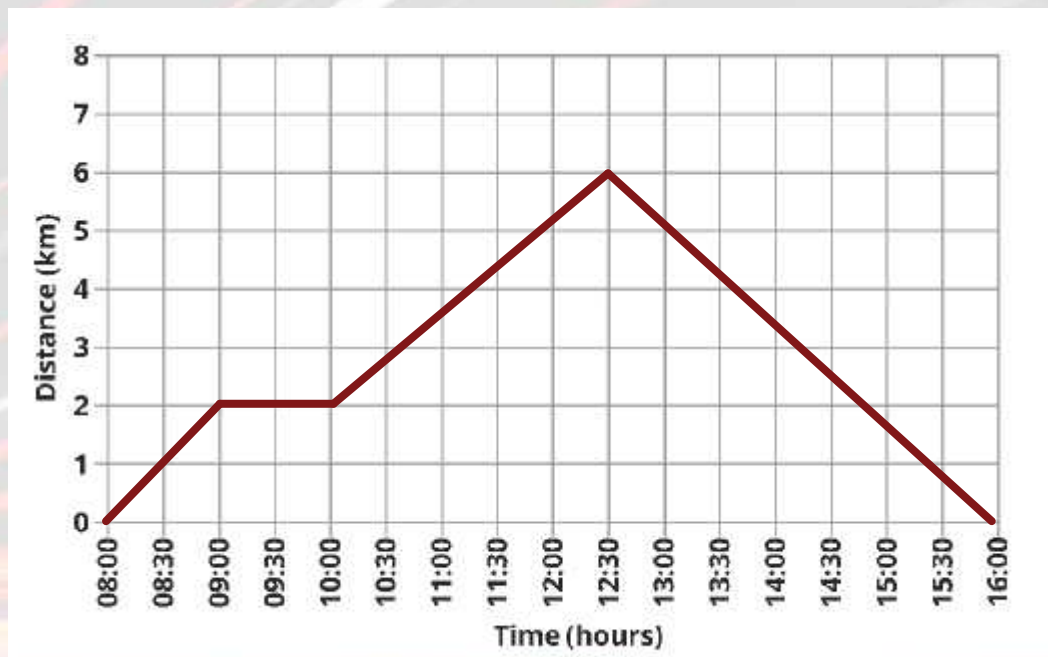
$$\mathbf{0.291... \times 60 = 17.5}$$

Total time = 3 hours 17 minutes 30 seconds.

Exam Question

The travel graph below represents Ricky's cycle journey from his house to his cousin Janine's house to drop off a parcel and then cycling back home again.

- Ricky stopped at a friend's house for breakfast. How long did he stop for?
- How far did Ricky travel in total?
- Based on the total amount of time he spent cycling, calculate Ricky's average speed for the journey. Give your answer correct to 1 decimal place.



Exam Question - Answers

The travel graph below represents Ricky's cycle journey from his house to his cousin Janine's house to drop off a parcel and then cycling back home again.

- a. Ricky stopped at a friend's house for breakfast. How long did he stop for?

1 hour or 60 minutes

- b. How far did Ricky travel in total?

6 + 6 = 12km

- c. Based on the total amount of time he spent cycling, calculate Ricky's average speed for the journey. Give your answer correct to 1 decimal place.

part a: 2km in 1 hour

part b: 4km in 2.5 hours

part c: 6km in 3.5 hours.

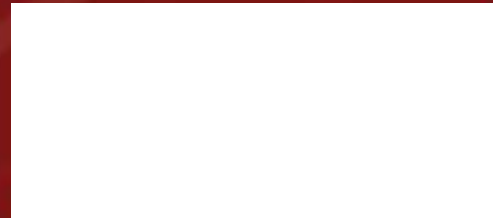
total distance = 12km,

total time cycling = 7 hours

speed = $\frac{12}{7}$

speed = 1.7km/h





40



KS3 Unit Pricing and Compound Measures Speed, Distance and Time

Teaching Ideas

Learning Objective:

To use and apply the speed, distance and time formulae.

Success Criteria:

- To calculate speed, distance or time using a formula triangle.
- To interpret worded questions involving speed, distance and time.
- To apply the formulae and convert between units of measure.

Context

This is the 2nd lesson working with speed, distance and time. It can be used as a standalone lesson or to follow on from the practical one on the same topic. Students should have a sound understanding of how to convert between metric units.

Resources

PowerPoint

Speed, Distance and Time Worksheet 1

Speed, Distance and Time Worksheet 2

Top Card Instructions

Top Card Maths Game

Speed, Distance and Time Colour by Numbers

Starter

Converting Units of Measure Top Card Game

You will need a set of cards per team. Students should play in pairs, although they could play in threes to absorb odd numbers. The game can be played with all 18 cards or with two of the sets of six.

Students must calculate one of the values: A, B, C or D. The student with the highest value wins their opponent's card.

If you want this to be a teacher-lead activity, you could split the class into two teams and students could hold up the answer for their team's card on mini-whiteboards.

If students are struggling to identify whether they should multiply or divide, encourage them to visualise what they are converting. For example, 8m can be visualised by the length of the classroom. You can multiply or divide 8 by 100 to obtain 800cm or 0.08cm. 0.08cm is too small to be the length of a classroom so the correct answer must be 800cm.

Main Activities

Calculating Distance, Speed and Time

Have students draw the distance, speed and time formula triangle in their books. They should practise covering the part of the triangle they want to find in order to find out what the corresponding calculation is. These slides demonstrate the three formulae with examples.

To calculate distance travelled, you multiply the speed by the time.

To calculate the average speed, you divide the distance by the time.

To calculate the time taken, you divide the distance by the speed.

Your Turn 1

Give the students time to practise calculating speed, distance and time. The same questions are also available on **Speed, Distance and Time Worksheet 1**. The answers for sections 1, 2 and 3 are available on the slides. Use the working time as an opportunity to walk around the class and check students are applying the formulae correctly. Students may need reminding that if the units are not the same in the question as the answer then they will need to convert the units. Watch out for common misconceptions, such as students putting 0.20 for 20 minutes instead of $\frac{20}{60}$. Try to pre-empt this by asking how many minutes are in an hour.

Speed, Distance and Time Colour by Number worksheets are also available if students need further practice. They could also be assigned as homework activities.

Worded Problems

Encourage students to tackle worded problems by 'pulling out' the maths. Ask them to write down speed, distance and time for each question and then fill in what they know from the question. Remind them to check for units in their answers, converting any if necessary.

Your Turn 2

Give students time to attempt the worded problems and, again, circle the classroom to help where needed. The same questions are also available on **Speed, Distance and Time Worksheet 2**.

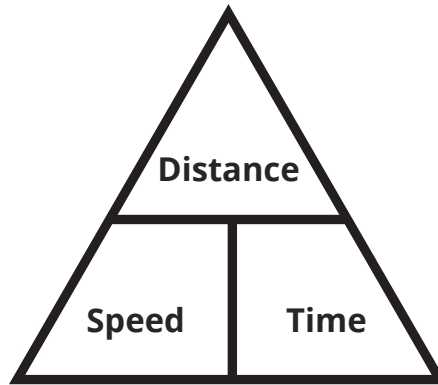
You may wish to remind the class about converting between hours and minutes. Emphasise using fractions of 60.

Plenary

Exam Question

A typical exam style question involving a travel graph. Explain to students that they need to read the information off the graph. They may need prompting to realise that you can calculate the speed by reading the distance and the time at set points on the graph. Ask them how they can calculate the speed from the graph. If necessary, remind them that speed is the distance travelled divided by the time taken.

Speed, Distance and Time Worksheet 1



Section 1

Calculate the distance travelled in each journey:

- a. 3 hours at 40mph

Distance = _____

Distance = _____ miles

- b. 55km/h for 3.5 hours

Distance = _____

Distance = _____ km

- c. 4 seconds at 3m/s

Distance = _____

Distance = _____ m

- d. 5.25 hours at 50km/h

Distance = _____

Distance = _____ km

- e. 30mph for 20 minutes

Distance = _____

Distance = _____ miles

Section 2

Calculate the average speed of each journey:

- a. 150 miles in 5 hours

Speed = _____

Speed = _____ mph

- b. 120 km in 3 hours

Speed = _____

Speed = _____ km/h

- c. 20m in 4 seconds

Speed = _____

Speed = _____ m/s

- d. 87.5 miles in 3.5 hours

Speed = _____

Speed = _____ mph

- e. 9km in 45 minutes

Speed = _____

Speed = _____ km/h

Section 3

Calculate the time taken for each journey:

a. 150 miles at 50mph

Time = _____

Time = _____ hours

d. 5 miles at 50mph

Time = _____

Time = _____ minutes

b. 75km at 50km/h

Time = _____

Time = _____ hours

e. 1.5km at 2m/s

Time = _____

Time = _____ minutes

c. 25m at 2m/s

Time = _____

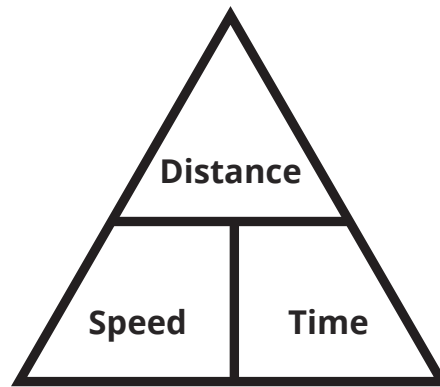
Time = _____ seconds

Section 4

Complete the missing information in the table. Include units of measure in your answers.

Speed	Distance	Time
70mph		2 hours
	55km	11 hours
200km/h		45 minutes
0.5m/s	350cm	
	357.5 miles	5 hours 30 minutes
12mph		2 hours 15 minutes

Speed, Distance and Time Worksheet 1 **Answers**



Section 1

Calculate the distance travelled in each journey:

- a. 3 hours at 40mph

$$\text{Distance} = 3 \times 40$$

$$\text{Distance} = 120 \text{ miles}$$

- b. 55km/h for 3.5 hours

$$\text{Distance} = 55 \times 3.5$$

$$\text{Distance} = 192.5 \text{ km}$$

- c. 4 seconds at 3m/s

$$\text{Distance} = 4 \times 3$$

$$\text{Distance} = 12 \text{ m}$$

- d. 5.25 hours at 50km/h

$$\text{Distance} = 5.25 \times 50$$

$$\text{Distance} = 262.5 \text{ km}$$

- e. 30mph for 20 minutes

$$\text{Distance} = 30 \times \frac{20}{60}$$

$$\text{Distance} = 10 \text{ miles}$$

Section 2

Calculate the average speed of each journey:

- a. 150 miles in 5 hours

$$\text{Speed} = \frac{150}{5}$$

$$\text{Speed} = 30 \text{ mph}$$

- b. 120 km in 3 hours

$$\text{Speed} = \frac{120}{3}$$

$$\text{Speed} = 40 \text{ km/h}$$

- c. 20m in 4 seconds

$$\text{Speed} = \frac{20}{4}$$

$$\text{Speed} = 5 \text{ m/s}$$

- d. 87.5 miles in 3.5 hours

$$\text{Speed} = \frac{87.5}{3.5}$$

$$\text{Speed} = 25 \text{ mph}$$

- e. 9km in 45 minutes

$$\text{Speed} = 9 \div \frac{45}{60}$$

$$\text{Speed} = 12 \text{ km/h}$$

Section 3

Calculate the time taken for each journey:

- a. 150 miles at 50mph

$$\text{Time} = \frac{150}{50}$$

$$\text{Time} = \mathbf{3 \text{ hours}}$$

- d. 5 miles at 50mph

$$\text{Time} = \frac{5}{50} \times 60$$

$$\text{Time} = \mathbf{6 \text{ minutes}}$$

- b. 75km at 50km/h

$$\text{Time} = \frac{75}{50}$$

$$\text{Time} = \mathbf{1.5 \text{ hours}}$$

- e. 1.5km at 2m/s

$$\text{Time} = \frac{1500}{2} \div 60$$

$$\text{Time} = \mathbf{12.5 \text{ minutes}}$$

- c. 25m at 2m/s

$$\text{Time} = \frac{25}{2}$$

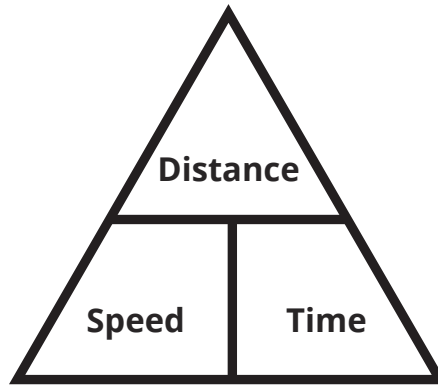
$$\text{Time} = \mathbf{12.5 \text{ seconds}}$$

Section 4

Complete the missing information in the table. Include units of measure in your answers.

Speed	Distance	Time
70mph	$70 \times 2 = 140 \text{ miles}$	2 hours
$\frac{55}{11} = 5\text{km/h}$	55km	11 hours
200km/h	$200 \times \frac{45}{60} = 150\text{km}$	45 minutes
0.5m/s	350cm	$\frac{3.5}{0.5} = 7 \text{ seconds}$
$\frac{357.5}{5.5} = 65\text{mph}$	357.5 miles	5 hours 30 minutes
12mph	$12 \times 2.25 = 27 \text{ miles}$	2 hours 15 minutes

Speed, Distance and Time Worksheet 2



Section 1

For each of the following questions, calculate the average speed of the journey and state the unit of measure.

- a. Jonti ran a distance of 200m in a time of 40 seconds. What was Jonti's average speed?

- b. Kevin cycled 35km in 2 hours. How fast did he cycle?

- c. Ms Patel took 3 hours and 30 minutes to drive a distance of 140 miles. What was her average speed for this journey?

- d. An international train took 300 minutes to travel a distance of 850km. Calculate the train's average speed for this journey in kilometres per hour.

Section 2

For each of the following questions, calculate the distance travelled and state the unit of measure.

- a. A coach travels at an average speed of 60mph for 4 hours. How far did it travel?

- b. A car drives on a road for 2.5 hours at 50km/h. How far did the car travel?

- c. If a camel ran at a constant speed of 65km/h for 45 minutes, how far would you expect it to travel?

- d. If a snail travelled at a constant speed of 0.05km/h for 3 minutes, how many metres would it crawl?

Section 3

For each of the following questions, calculate the time taken to complete the journey and state the unit of measure.

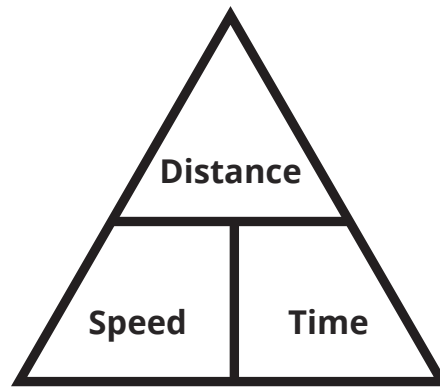
- a. A car travels a distance of 30 miles at a speed of 15mph. How long does the journey take?

- b. Bob cycles a short distance of 450 metres at a constant speed of 20m/s. How long does he cycle for?

- c. A horse goes for a gallop and covers a distance of 1000m. His average speed is 40km/h. How many minutes does he gallop for?

- d. Jamil and Karen go for a walk. They walk a distance of 5 miles at a speed of 3mph. They stop for lunch for 1 hour then jog the same route back home at a speed of 8mph. How long did their trip last? Give your answer in hours, minutes and seconds

Speed, Distance and Time Worksheet 2 **Answers**



Section 1

For each of the following questions, calculate the average speed of the journey and state the unit of measure.

- a. Jonti ran a distance of 200m in a time of 40 seconds. What was Jonti's average speed?

$$\frac{200}{40} = 5\text{m/s}$$

- b. Kevin cycled 35km in 2 hours. How fast did he cycle?

$$\frac{35}{2} = 17.5\text{km/h}$$

- c. Ms Patel took 3 hours and 30 minutes to drive a distance of 140 miles. What was her average speed for this journey?

$$\frac{140}{3.5} = 40\text{mph}$$

- d. An international train took 300 minutes to travel a distance of 850km. Calculate the train's average speed for this journey in kilometres per hour.

$$\frac{300}{60} = 5 \text{ hours}$$

$$\frac{850}{5} = 170\text{km/h}$$

Section 2

For each of the following questions, calculate the distance travelled and state the unit of measure.

- a. A coach travels at an average speed of 60mph for 4 hours. How far did it travel?

$$60 \times 4 = 240 \text{ miles}$$

- b. A car drives on a road for 2.5 hours at 50km/h. How far did the car travel?

$$2.5 \times 50 = 125\text{km}$$

- c. If a camel ran at a constant speed of 65km/h for 45 minutes, how far would you expect it to travel?

$$65 \times \frac{45}{60} = 48.75\text{km}$$

- d. If a snail travelled at a constant speed of 0.05km/h for 3 minutes, how many metres would it crawl?

$$0.05 \times 1000 = 50\text{m/h}$$

$$50 \times \frac{3}{60} = 2.5\text{m}$$

Section 3

For each of the following questions, calculate the time taken to complete the journey and state the unit of measure.

- a. A car travels a distance of 30 miles at a speed of 15mph. How long does the journey take?

$$\frac{30}{15} = 2 \text{ hours}$$

- b. Bob cycles a short distance of 450 metres at a constant speed of 20m/s. How long does he cycle for?

$$\frac{450}{20} = 22.5 \text{ seconds}$$

- c. A horse goes for a gallop and covers a distance of 1000m. His average speed is 40km/h. How many minutes does he gallop for?

$$1000\text{m} = 1\text{km}$$

$$\frac{1}{40} \times 60 = 1.5 \text{ minutes}$$

- d. Jamil and Karen go for a walk. They walk a distance of 5 miles at a speed of 3mph. They stop for lunch for 1 hour then jog the same route back home at a speed of 8mph. How long did their trip last? Give your answer in hours, minutes and seconds

$$\frac{5}{3} \times 60 = 100 \text{ minutes}$$

$$\frac{5}{8} \times 60 = 37.5 \text{ minutes}$$

$$100 + 60 + 37.5 = 197.5 \text{ minutes}$$

$$\frac{197.5}{60} = 3.291\dots$$

$$0.291\dots \times 60 = 17.5$$

Total time = 3 hours 17 minutes 30 seconds.