This topic is concerned with the use of mathematics to solve travel problems.

The main theme of the topic is the use and interpretation of a variety of tables – tables for costs, tables for times, tables for data; but all are either directly or indirectly related to travel.

You might well require further more relevant information to replace that on some of the sheets. Prices and times vary, and many of the situations are improved by using local data (e.g. for timetables and distances).

The unit is most closely related to the **Handling Data** Attainment Target, but it brings in elements of other Programmes of Study from the **Number** Attainment Target. In particular, the complete unit will provide opportunities to cover and assess the *Yearly Teaching Programmes* in the National Numeracy Framework as given in the chart below

Topic	Sheet number	National Numeracy Framework reference
Introduction	**0**	
Travelling to school	**1**	4/E1 and A3
Shortest journeys	**2**	4/B4 and C1
A day out	**3**	5/D1 and C3
Value for money	**4**	6/C3, E1 and A3
Maps, compass points	**5**	4/D2 and 6/A3
American dollars	**6**	5/C3 and D2
Rates of exchange	**7**	5/C3 and 6/B6 and A3
Renting a holiday home	**8**	4/E1 and 5/C3
Going abroad	**9**	5/D1 and C3
Train speeds	**10**	6/C3, E1 and B7
Solutions		

When you travel to school in the morning do you get there by walking, by bus, by train, by car or do you cycle?

What method of transport do most children use to get to your school?

How do you know?

To be sure, you need to do a survey.

Activity

Construct a tally chart to show your results. To make the chart , represent each answer to your question with a line in the correct section. In each case, the fifth line is placed so that it crosses the previous four. It is now easy to count up the total number for each option.

Ask as many children as you can how they travelled to school today and use the chart to record your results.

*Example of part of a completed tally chart*

Walk	ⅠⅠⅠⅠ ⅠⅠ
Bus	ⅠⅠⅠⅠ ⅠⅠⅠⅠ ⅠⅠⅠ

You could use a tally chart like this one
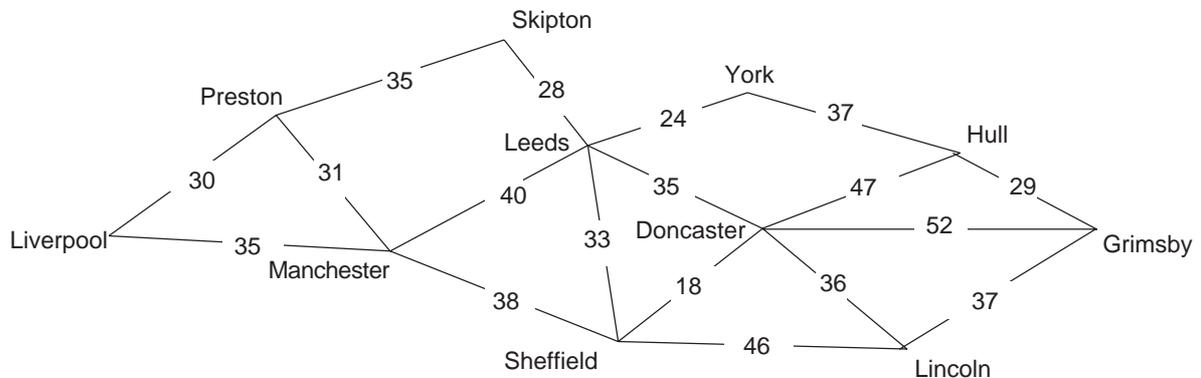
Walk	
Bus	
Car	
Cycle	

Problems

After you have done your survey, use the data to answer the questions below.

1. What is the most common form of transport?

2. What is the least used form of transport?

3. How many children came to school by bus?

4. What fraction of the total number you asked came by cycle?
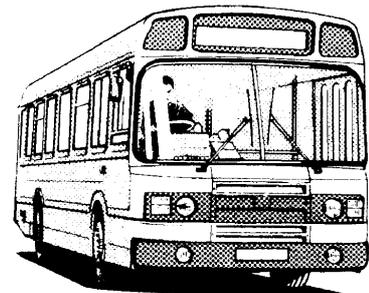
The map above shows main road connections between several towns. The distances in miles between the towns are shown by the numbers marked on the roads. The map is not drawn to scale.

Problems

1.　What is the distance between

　(i)　Manchester and Leeds

　(ii)　Sheffield and Doncaster?

2.　How far is it to go from Lincoln to Hull via Grimsby?

3.　Is it shorter to go from Lincoln to Hull via Doncaster?
　How much shorter or longer is it?

4.　If you wanted to travel from York to Lincoln by the
　shortest route, what route would you take and how long is it?

5.　What is the shortest route from Preston to Grimsby?

The timetable of a minibus which runs between a town called Rockston and surrounding villages is shown below.

Rockston	8.15 a.m.	11.00 a.m.	2.15 p.m.	5.00 p.m.
Littlecreek	8.32	11.17	2.32	5.17
Bedlington	8.50	11.35	2.50	5.35
Penhurst	9.08	11.53	–	6.53
Camford	9.22	12.07	3.10	6.07

Camford	9.30 a.m.	12.30 p.m.	3.30 p.m.	6.30 p.m.
Penhurst	9.44	12.44	–	6.44
Bedlington	10.02	1.02	3.50	7.02
LIttlecreek	10.20	1.20	4.08	7.20
Rockston	10.47	1.27	4.25	7.47

Use the timetable to answer the following questions.

Problems

1. What time bus should you catch from Rockston so as to be in Camford before mid-day?

2. How many minutes does this journey take?

3. What time is the latest bus you should catch from Camford in order to be back in Rockston by 5 p.m?

4. How many minutes does this return journey take?

5. How long was your stay in Camford in Problems 1 to 4?

6. Assume the minibus runs continually between Rockston and Camford. Do not include the time when the bus is waiting at Camford or Rockston for the next journey. For how many hours does the minibus run each day?

7. The minibus has a major service after 200 hours of driving. After how many days will a service be needed?

A coach firm is offering special day return rates for trips to some towns and cities .

To			
	London	£16.00	*Children under*
	Oxford	£15.00	*12*
	Bristol	£10.70	*Half-fare*
	Penzance	£14.50	

The distances to the towns and cities are

London 200 miles,	Oxford 150 miles,
Bristol 85 miles,	Penzance 110 miles.

Problems

Give answers to 2 decimal places, where appropriate.

1. How much will it cost to go to London for the day for the Smith family which consists of two adults and three children whose ages are 9, 11 and 14 years?

2. What will it cost if the Smith family goes to Penzance?

3. The total distance to Bristol and back is 170 miles.

    Use a calculator to work out the average cost per mile in pence for the trip to Bristol for one adult.

4. Calculate the average cost per mile in pence for each of the other return trips.

5. Which trip do you think offers the best value for money? Why?

6. There is a 20% reduction in the price of the trip to Bristol.

   Does this make the Bristol trip the best value now?
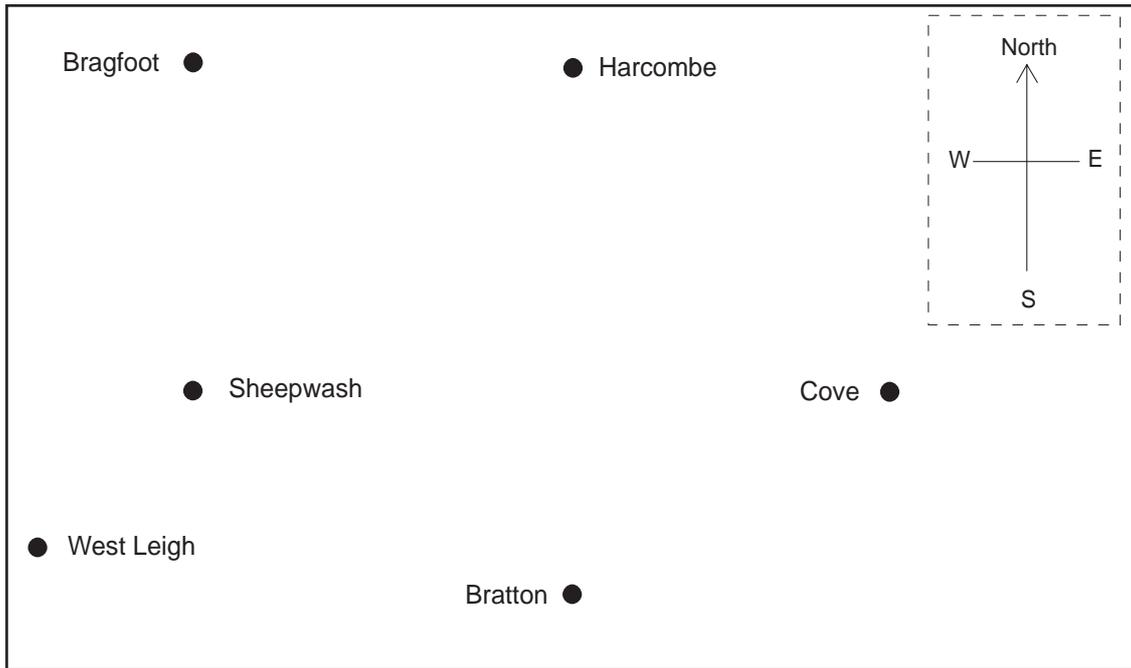
The map shows the positions of some villages. Compass points are shown at the top of the map.

Problems

1. Which village is due *north* of Sheepwash?

2. Which village is due *west* of Cove?

3. What is the compass direction of Sheepwash from West Leigh?

The map is drawn to a scale of 2 miles to 1 cm.

4. How many miles is

    (i) Bratton from Cove

    (ii) Harcombe from Bragfoot?

5. Make a tracing of the map and mark the positions of

    (i) Darley, which is 3 miles due *south* of Harcombe

    (ii) Lee, which is 4 miles *south east* of Bragfoot.

US dollars $

UK pounds £
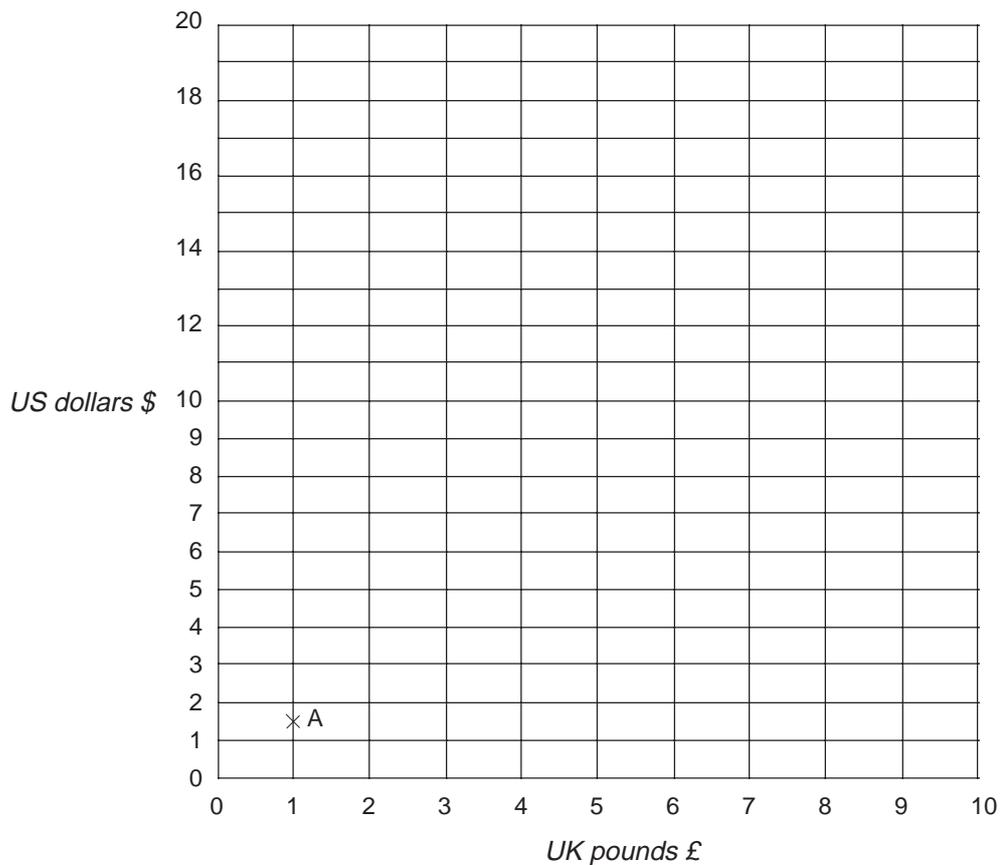
On the graph above £1 is shown to be worth 1 dollar 50 cents (1.50 dollars).

This is shown at the point marked A.

Problems

1. Mark with an X the point which represents the value in dollars of £10.

2. How can you complete the graph to show the value in dollars of any number of £'s up to £10?

3. Complete the graph.

4. Use your graph to calculate

   (i)   the value of £2.50 in dollars

   (ii)   the value of $9 in £'s

   (iii) the value of $15 in £'s.

If you go on holiday abroad you will probably take some foreign currency with you.

The amount of foreign currency you will get from your bank or travel agent for every pound you change varies according to the **exchange rates** on that particular day. (You would have to pay commission charges for changing your money, but we will ignore these charges in our calculations.)

The exchange rates offered by a bank for you to buy some foreign currencies on a particular day in January 2002 are given below.

Country	Currency	Rate per £(sterling)
Australia	Australian dollar	2.75
Canada	Canadian dollar	2.25
* EMU countries	euro	1.50
Israel	shekel	6.00
Malta	Maltese lira	0.60
New Zealand	New Zealand dollar	3.50
Norway	krone	12.50
Singapore	Singapore dollar	2.50
United States	US dollar	1.50

Use this information to answer the following questions. The word 'sterling' means 'British money'.

Problems

1. How many Israeli shekels would you receive for £1?

2. What currency would you need for a holiday in Germany?

3. If you exchanged £2 for a certain currency you would receive 1.20 units. Which currency is this?

4. What is 1 Singapore dollar worth in pence?

5. How many Norwegian krone are worth 50p?

6. If you changed 700 New Zealand dollars into pounds sterling, how many pounds would you receive?

    Now change this amount into Australian dollars; how many Australian dollars would you have?

* The euro is the currency of Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain.

An estate agent advertises fully furnished houses to let as holiday homes. The charges per week vary according to the time of year. The advertisement is shown below.

HOLIDAY HOMES TO LET

FULLY EQUIPPED AND FULLY FURNISHED SEASIDE HOUSES

		Time of year - rent per week in £'s		
Name of house	Number of beds	May and June	July and Aug	Sept and Oct
Tudor House	4	275	400	200
Severn Cottage	5	290	500	250
Poole Lodge	6	350	775	370
Hill View	8	500	700	400

In May and June it costs £275 per week to rent Tudor House.

Problems

1. What is the charge for renting Poole Lodge for two weeks in September?

2. In addition to these rents the estate agent adds an extra £3.20 per day for electricity and cleaning.

   If you and your family went on holiday for one week in July, choose which house you would rent and calculate the cost, including electricity and cleaning.

3. Mr and Mrs Brown estimate that it costs about £28 a day to buy food for themselves and their two children. They are going to rent Severn Cottage from 10th August to the 24th August.

   Approximately how much will it cost the Browns to rent the house and pay for electricity, cleaning and food?

4. What other costs should the Browns include in estimating the cost of the holiday?

You are planning a short holiday in Paris for your grandparents, your teenage brother and yourself. You plan to leave London on a Saturday morning and return on the following Thursday evening. The times of the train services are shown in the table.

	①		②		②	③	①	②
London Waterloo	0515	0619	0653	0753	0753	0853	0923	0953
Paris Gare du Nord	0923	1023	1059	1123	1157	1253	1323	1353

	①	③						④
Paris Gare du Nord	1443	1519	1607	1710	1743	1819	1919	2007
London Waterloo	1643	1709	1813	1909	1943	2009	2113	2213

① Not running on Saturdays	② Running Saturdays only
③ Runs Mondays, Fridays and Saturdays only	④ Fridays and Saturdays only

Problems

1. Which train should you catch from London on Saturday morning to arrive in Paris before 10.30 a.m?

2. What is the earliest time you can arrive in Paris if you cannot leave London before 9.00 a.m on Saturday?

3. If you need to be back in London by 9.30 p.m, which is the latest train you can catch on Thursday evening?

4. Using the table below, work out the cheapest total cost of return tickets for your group.

5. How much more would it cost if you booked tickets 7 days in advance?

Fares from London Waterloo

To	Return ticket booked 7 days in advance Adult	Return ticket booked 14 days in advance Adult	Return ticket Under 26 yrs	Return ticket Under 11 yrs
Paris	£95	£70	£75	£60

Activity

Plan a short holiday in Paris for yourself and your family. Decide what time train to catch and where to stay. What is the total of the travel costs?

You could also find out about hotel costs from a travel agent or from the internet, and work out the total cost of the holiday.

	Time	*Distance*
London to Reading	31 minutes	35 miles
Reading to Taunton	104 minutes	106 miles
Taunton to Exeter	34 minutes	35 miles
Exeter to Plymouth	63 minutes	46 miles
Plymouth to Truro	74 minutes	52 miles
Truro to Penzance	37 minutes	25 miles

The times shown above were taken by an InterCity 125 Express train to run from London to Penzance.

Problems

1. What is the distance travelled between London and Exeter?

2. What is the distance travelled between Truro and Taunton?

3. How long in hours and minutes did the whole journey take from London to Penzance?

The average speed in miles per minute is given by the formula

> average speed = (distance in miles) ÷ (time in minutes)

4. Using a calculator work out the train's average speed in miles per minute between

    (i) Reading and Taunton

    (ii) Exeter and Plymouth

    (iii) Truro and Penzance.

5. On which part of the journey did the train travel

    (i) fastest   (ii) slowest?

Travel : 2 **Problems** **1.** **(i)** 40 **(ii)** 18 **2.** 66

3. No ; 17 miles longer

4. York–Leeds–Doncaster–Lincoln ; 95 miles

5. Preston–Manchester–Sheffield–Doncaster–Grimsby

Travel : 3 **Problems** **1.** 8.15 am **2.** 67 **3.** 3.30 pm **4.** 55

5. 6 hrs 8 mins **6.** 8 hrs 42 mins **7.** 22 days

Travel : 4 **Problems** **1.** £64.00 **2.** £58.00 **3.** 6.29p (to 2 d.p.)

4. London 4.00p ; Oxford 5.00 ;
Penzance; 6.59p (to 2 d.p.)

5. London – cheapest cost per mile

6. No – Bristol will cost 5.04p per mile (to 2 d.p.)

Travel : 5 **Problems** **1.** Bragfoot **2.** Sheepwash **3.** NE

4. **(i)** 10 miles **(ii)** 10 miles

Travel : 6 **Problems** **4.** **(i)** 3.75 dollars **(ii)** £6 **(iii)** £10

Travel : 7 **Problems** **1.** 6 Israeli shekels **2.** euro

3. Maltese lira **4.** 40 pence

5. 6.25 Norwegian krone **6.** £200; 550 Australian dollars

Travel : 8 **Problems** **1.** £740 **2.** Depends on number of people in family
3. £1436.80 **4.** e.g. outings, travel costs, entertainment

Travel : 9 **Problems** **1.** 0619 **2.** 1353 **3.** 1919

4. (3 × £70) + £60 = £270

5. £55 more; (2 × £95) + £75 + £60 = £325

Travel : 10 **Problems** **1.** 176 miles **2.** 133 miles **3.** 5 hrs 43 mins

4. **(i)** 1.02 **(ii)** 0.73 **(iii)** 0.68

5. **(i)** London and Reading **(ii)** Truro and Penzance