

# 2

## The cost of driving



My name is Sharon. My two children often go to after-school activities. It is very difficult to take them on the bus because they go to different places. I have just passed my driving test. Now I need to look for a car. Before I buy a car I need to find out how much it will cost me to buy and run.

### Talk about it

Do you drive?

Do you have a car?

Have you ever tried to work out how much it costs to run a car?

### These are the skills you will practise in this unit.

Which are the most useful for you? Tick the boxes.

- Working with numbers
- Understanding the connection between fractions, decimals and percentages
- Working with decimals
- Understanding and working with percentages
- Knowing how to use a calculator
- Knowing how to work with money
- Knowing how to work out distances

### Skill code

- N1/L1.1
- N2/L1.3
- N2/L1.4, 7
- N2/L1.8, 9, 10
- N2/L1.11
- MSS1/L1.1
- MSS1/L1.5

# Who drives?

*I have just passed my driving test.  
I have to exchange my provisional licence for a full licence.*



## Activity 1

How much will my driving licence cost?

My provisional licence cost £29.00.

I have to pay £12.00 to change it to a full licence.

Provisional licence £29.00

Change provisional licence to a full licence £12.00

My driving licence will have cost

### Remember

To add money, use a place value table:

H	T	U	•		
1	0	3	•	0	5
	2	6	•	2	3
1	2	9	•	2	8

I wanted to find out how many people have a driving licence.

I asked 10 men and 10 women whether they had a driving licence.

I used a table to record my results.

	Driving licence	No driving licence
Men	8	2
Women	7	3

## Activity 2

These results can be written as fractions, decimals, and percentages.

8 out of 10 is

Fraction	Decimal	Percentage
$\frac{8}{10}$	0.8	80%

This is how  $\frac{8}{10}$  changes to 80%.

The fraction changes to a decimal:  $8 \div 10 = 0.8$

### Tip

#### Dividing by 10 and 100

- When dividing by 10, the digits move 1 place to the right  $8 \div 10 = 8.0 \div 10 = 0.8$
- When dividing by 100, the digits move 2 places to the right  $8 \div 100 = 8.0 \div 100$

The decimal changes to a percentage:  $0.8 \times 100 = 80\%$

### Tip

#### Multiplying by 10 and 100

- When multiplying by 10, the digits move 1 place to the left  $0.8 \times 10 = 8.0 \times 10 = 80.0$
- When multiplying by 100, the digits move 2 places to the left  $0.8 \times 100 = 8.0 \times 100 = 800.0$

The fraction changes to a percentage:  $\frac{8}{10} \times 100$   
 $= 8 \div 10 \times 100$   
 $= 0.8 \times 100 = 80\%$

### Remember

To change from fraction to decimal, divide the top (the numerator) number in the fraction by the bottom number (the denominator). You may need to use a calculator.

To change from a decimal to a percentage, just multiply the decimal by 100.

To change from a fraction to a percentage, change it to a decimal first, then multiply this by 100.

1 Write 7 out of 10 as a

Fraction	Decimal	Percentage

2 Write 3 out of 10 as a

Fraction	Decimal	Percentage

### Activity 3

80 per cent = 80%. This means 80 out of 100.

Change 80% to a fraction by writing it as  $\frac{80}{100}$ .

The fraction can be simplified because both the numerator (80) and the denominator (100) can be divided by 10.

Numerator  $80 \div 10 = 8$       Denominator  $100 \div 10 = 10$

Therefore,  $\frac{80}{100} = \frac{8}{10}$ .

This can be simplified even further because both 8 and 10 can be divided by 2.

Numerator  $8 \div 2 = 4$     Denominator  $10 \div 2 = 5$       therefore,  $\frac{8}{10} = \frac{4}{5}$

So  $80\% = \frac{80}{100} = \frac{8}{10} = \frac{4}{5}$ .

### Remember

To change a percentage to a fraction, write the percentage as a fraction with a denominator of 100.

Then simplify the fraction if possible.

- 1 Change 20% into a fraction. Simplify the fraction. ....
- 2 Change 30% into a fraction. Simplify the fraction. ....

80% can be changed to a decimal by dividing 80 by 100.  $80 \div 100 = 0.8$

**Tip**

- The word 'per cent' means 'in every hundred'.
- To change a percentage to a decimal, just divide by 100.

- 3 Change 70% to a decimal. ....
- 4 Change 20% to a decimal. ....

 **Activity 4**

I can use a place value table to change a decimal to a fraction.

Change 0.7, 0.17 and 0.493 to fractions.

Units	•	Tenths	Hundredths	Thousandths
0	•	7	0	0
0	•	1	7	0
0	•	4	9	3

0.7 is 7 tenths, 0 hundredths, 0 thousandths =  $\frac{7}{10}$

0.17 is 1 tenth, 7 hundredths, 0 thousandths =  $\frac{17}{100}$

0.493 is 4 tenths, 9 hundredths and 3 thousandths =  $\frac{493}{1000}$

0.493 is the same as the fraction  $\frac{493}{1000}$

Use the place value table below to change decimals to fractions.

- 1 0.4 is the same as the fraction
- 2 0.62 is the same as the fraction
- 3 0.125 is the same as the fraction

Units	•	Tenths	Hundredths	Thousandths
0	•			
0	•			
0	•			

Simplify the fraction where necessary.

 **Activity 5**

National statistics show that about 80% of men hold a driving licence. If there are approximately 125 200 men in a town, how do you work out how many have a driving licence?

**Remember**

**Finding a percentage of a number – the 10% method**

$10\% = \frac{10}{100} = \frac{1}{10}$  so 10% is one tenth.

To work out  $\frac{1}{10}$  divide by 10.

Use 10% to find 20%, 30%, ... and so on.

e.g. 10% of 150 is  $\frac{1}{10}$  of 150 =  $150 \div 10 = 15$

so 5% of 150 is  $15 \div 2 = 7.5$

20% of 150 is  $2 \times 15 = 30$

30% of 150 is  $3 \times 15 = 45$

40% of 150 is  $4 \times 15 = 60$

Use the 10% method to work out 80% of 125 200

10% of 125 200 is .....

80% of 125 200 is  $8 \times$  .....

so approximately ..... men in the town have driving licences

Here are some figures about car ownership in the United Kingdom.

- 10% of households do not have a car.
- 65% of households have one car.
- 25% of households have two or more cars.

There are 375 600 households in my town.

1 How many households do not have a car? .....

2 How many households have one car? .....

60% of 375 600 = .....

5% of 375 600 = .....

3 The number of households with two or more cars is .....

4 25% is the same as a simple fraction. What fraction is the same as 25%?

Use this information to check your answers to question 3. Show how you did this.

.....

My friend lives in a large town. There are 768 500 households in her town.

5 How many households do not have a car? .....

6 How many households have one car? .....

## Does size really matter?

The first thing I have to do is to decide what size car I can afford to buy. I want to know whether a small car will be cheaper than a large car. I need to find out whether size really matters.

I need a car that is not too expensive to buy, is not too expensive to insure and will not be too expensive to tax!



### Activity 6

The table shows the engine size and price of six cars. Engine sizes are measured in litres (l) or sometimes in cubic centimetres (cc).

#### Remember

1000 cc = 1 litre

Engine Size (l)	2.0	1.4	1.8	1.6	1.2
Price	£12633	£8947	£11604	£10624	£6999

It is easier to compare the cars if the information is rearranged in order of price, starting with the dearest. Use a place value table to sort the numbers.

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units
	1	2	6	3	3
		8	9	4	7

12633 is 1 ten thousand, 2 thousands, 6 hundreds, 3 tens and 3 units.

8947 is 8 thousands, 9 hundreds, 4 tens and 7 units.

£12633 is bigger than £8947.

The most expensive car costs £12633. The engine size is 2.0 litres.

This information has been entered into the last column in the table below.

- 1 Arrange the cars in order of price, starting with the cheapest. Write the price and engine size in the table.

Look at the table. It will help you to answer these questions.

Price					£12633
Engine size					2.0

2 How much does the most expensive car cost?

3 What is the engine size of the highest priced car?

4 What is the lowest price?

5 What is the engine size of the lowest priced car?

6 How much does the 1.6 litre car cost?

7 Does engine size affect the price of a car?

### Activity 7

*I shall have to have insurance for my car. Does engine size affect the cost of the insurance?*

Here are some figures for the cost of car insurance by driver's age and gender for a year. The costs are for insuring cars in city centres. City centres are classed as 'high risk' areas, so insurance premiums are high.

Work out the difference in annual insurance for the different sizes of engines.

Age	Gender	Engine capacity (cc)	
		Below 1550	1550 and over
20	Female	£2196	£4688
20	Male	£3193	£5984
30	Female	£1097	£1564
30	Male	£1309	£1872



Use your calculator to subtract these large numbers.

Do it like this                      (1550 cc and over) – (Below 1550 cc)                      Difference in cost

20-year-old female:                      £4688 – £2196                      £2492

1 20-year-old male:                      .....                      .....

2 30-year-old female:                      .....                      .....

3 30-year-old male:                      .....                      .....

4 Give the age and gender of the person with the biggest difference in cost.

.....

5 Who will pay the lowest insurance?

Age  Gender  Engine size

6 Who will pay the highest insurance?

Age  Gender  Engine size

## Activity 8

Car tax, formerly known as road fund tax, must be paid for every car on the road. You can pay the tax once a year or once every six months.

Engine size	12-month rate (£s)	6-month rate (£s)
Under 1550 cc	105.00	57.75
1550 cc and over	160.00	88.00

- 1 What is the difference in tax for cars with engines under and over 1550 cc for 12 months?

Work it out like this.

Engine size over 1550 cc      – £160.00

Engine size under 1550 cc      – £105.00

Saving

2

*I shall buy a car with an engine of less than 1550 cc because it will be cheaper to tax. I am not sure if I shall be able to afford to pay car tax at the 12-month rate.*

How much will it cost to tax the car for 6 months?

- 3 How much will it cost to tax the car for 12 months if you pay at the 6-month rate?

- 4 How much will you save in a year if you pay at the 12-month rate?

Answer questions 5 to 7 for a car with an engine over 1550 cc.

- 5 How much will it cost to tax this car for 6 months?

- 6 How much will it cost to tax the car for 12 months at the 6-month rate?

- 7 How much will be saved in a year if tax is paid at the 12-month rate?



# How much will it cost?



*I have saved some money to buy a car. I do not have enough money to buy the car that I want, so I need to borrow some more money.*

## Activity 9

*Banks, building societies and finance companies advertise personal loans. I could borrow money from one of these institutions to pay for my car.*

*I shall need to have a loan that I can pay back over 5 years, which is 60 months, so that I can afford the monthly payments.*

*I shall need to use a calculator to work out the cost of borrowing.*

As well as paying back the money borrowed, you have to pay interest to the bank.

How much interest will be paid on a loan of £5000 taken over 60 months?

A finance company tell Sharon that if £5000 is borrowed, the repayments will be £113.99 a month for 60 months.

$$60 \times \pounds 113.99 = \pounds 6839.40$$

That means Sharon will have repaid the finance company £6839.40.

How much interest will Sharon pay?

**Remember**  
**Calculating interest**  
 Interest = total amount paid – amount of loan  
 $\pounds 6839.40 - \pounds 5000 = \pounds 1839.40$

1 If Sharon borrows £5000 from a building society, she will have to pay £102.81 a month (for 60 months).

- a How much will she pay the building society? .....
- b How much interest will she pay? .....

2 If Sharon borrows £5000 from a bank she will have to pay £107.29 a month (for 60 months).

- a How much will she pay the bank? .....
- b How much interest will she pay? .....

3 Write the loans in order of cost, starting with the cheapest.

Cost of loan			
Lender			

## Activity 10

If I buy a car from a garage, I could apply for a car loan through the garage. This is part of an advertisement that was in my local paper.

- Cash price: £5995.00
- Deposit: £1000
- Followed by 35 monthly payments of £119.08
- Followed by final payment of £2478.33
- A £95.00 acceptance fee is payable with the first monthly payment and a £40.00 credit facility fee is payable with the last payment.

This is how Sharon worked out the cost.

Deposit	£1000.00
Acceptance fee	£95.00
35 × £119.08	£4167.80
Final payment	£2478.33
Credit facility fee	£40.00
<b>Total payment</b>	<b>£7781.13</b>

She worked out the interest.

Interest = total payment – cash price

Interest = £7781.13 – £5995.00 = £1786.13

1 a How much will this car cost?

<b>Cash Price</b>	<b>£5999.00</b>
<b>Deposit</b>	<b>£500.00</b>
<b>60 monthly payments of £123.73</b>	
<b>£144.00 documentation fees</b>	

Deposit

60 × £123.73

Documentation fees

Total

b How much interest will be paid?

– £5999.00 =

2 a How much will this car cost?

<b>Cash Price</b>	<b>£10 200</b>
<b>Deposit</b>	<b>£0</b>
<b>60 monthly payments of £170.00</b>	

Deposit

60 × £170.00

Total

b How much interest will be paid?

– £10 200 =

# Percentage rises and falls

## Activity 11

I have found a second-hand car. It costs £1600. I have to pay a deposit of 20%.



How do I work out how much I must pay as a deposit?

$$10\% \text{ of } 1600 = 1600 \div 10 = 160$$

$$20\% \text{ of } 1600 = 2 \times 160 = 320$$

What percentage of the price is left to pay?

$$100\% - 20\% = 80\%$$

How much is left to pay?

$$£1600 - £320 = £1280$$

The rest can be paid in equal amounts over 8 months.

How much will have to be paid each month?

$$£1280 \div 8 = £160.00$$

Here are details of some cars I have seen.

Car	Cash	Pay over ..... months	Deposit	Left to pay	Payment each month
Fiesta	1700	10	$2 \times \dots = \dots$	$1700 - \dots = \dots$	$\dots \div 10 = \dots$
Clio	1900	8			
Ka	2250	9			
Micra	1870	10			
Punto	2340	6			

Each car requires a 20% deposit. The rest can be paid off over the number of months shown.

Work out the deposit, what I still have to pay and how much I will have to pay each month.

I have saved £400 for the deposit. Does this influence which car I choose?

.....

## Activity 12

*My neighbour, Mick, is a car mechanic. He buys cars and does them up. He adds on a percentage, which depends on how long the work takes him.*

*He needs to know how to work out the percentage increase.*

*He uses the 10% method to find percentages.*

- 1 On one car he spent £840 and he decided to add 20%. Fill in the blanks

10% of £840 = .....

20% of £840 is  $2 \times$  ..... = .....

Mick will add ..... to the cost of the car,

He will sell it for ..... + ..... = .....

(cost)                      (increase)

- 2 Mick bought a used car at a car auction for £715.00. He spent £385.00 on parts to repair the car. He makes a 20% profit on his total costs when he sells the car.

### Car costs

Purchase price .....

Parts cost .....

How much money does Mick spend on this car? .....

He decides to charge 20% for his work.

How much did Mick charge for his work?

.....  
.....

Mick will sell the car for .....

- 3 Mick has to spend a lot of time on another car, although the parts for it were not as expensive. He decided to charge 35% for his work. He bought the car for £675 and the parts came to £185.

How much did Mick spend on this car?

.....  
.....

How much did Mick charge for his work?

.....  
.....

How much did Mick sell the car for? .....

## Activity 13

*I know that, when I have a car, I ought to have some kind of breakdown cover. I have been finding out about the breakdown recovery services.*

At college I used the Internet and found one service offering a percentage reduction if I join on-line.

	Normal price	On-line reduction
Roadside	£64.00	45%
Recovery	£100.00	15%
Comprehensive	£150.00	20%

10% of £64 is .....

5% of £64 is .....

You can work out the percentage reduction for roadside cover like this.

$$45\% \text{ of } £64 = 4 \times \dots + \dots$$

$$= \dots \text{ (reduction)}$$

£64 - ..... = .....

So the reduced cost is .....

£64 reduced by 45% is £35.20

1 Work out the on-line cost for **recovery** cover.

.....  
 .....

2 Work out the on-line cost for **comprehensive** cover.

.....  
 .....

3 Which type of cover has the largest percentage reduction?

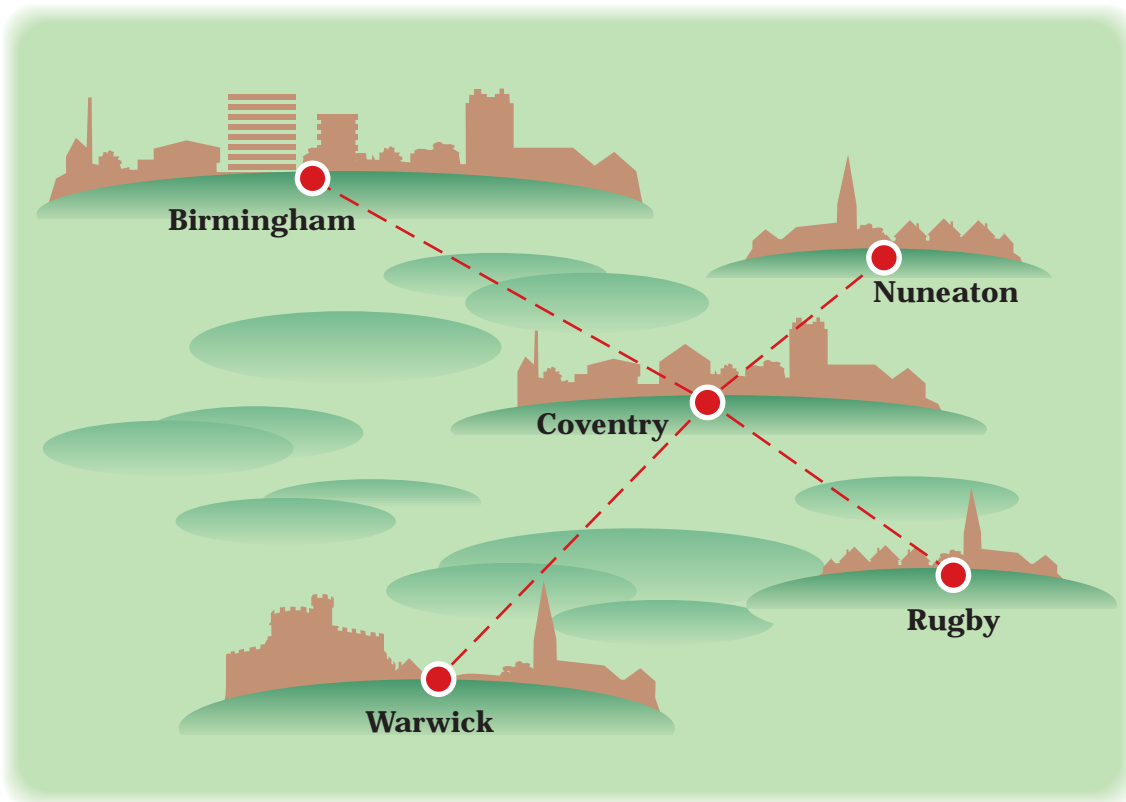
.....

# How far is it?



## Activity 14

*I want to find out how far it is from Coventry to places I need to drive to. It will help me to estimate how many miles I drive in a year.*



Scale: 1 cm to 3 miles.

*I use this map to work out distances.*

*My children want to visit the castle in Warwick. How many miles is it from Coventry to Warwick?*

Use a ruler marked in centimetres to measure the distance from Coventry to Warwick.

Coventry to Warwick is 5 cm.

Work out the actual distance like this.

1 cm = 3 miles, so work out how many miles it is to Warwick. This is how you work it out.

5 cm =  $5 \times 3$  miles = 15 miles.

It is 15 miles from Coventry to Warwick.

Use a ruler marked in centimetres to measure the distances on the map.

Work out the actual distances in miles.

1 I drive to Nuneaton to see a friend.

The distance on the map is ..... cm.

The actual distance is ..... miles.

2 I drive my parents to Birmingham New Street Station to catch a train.

The distance on the map is ..... cm.

The actual distance is ..... miles.

3 I drive to Rugby to visit my brother.

The distance on the map is ..... cm.

The actual distance is ..... miles.

### Activity 15

A road distance chart is useful when trying to work out long journeys.

#### Distance in miles

London								
109	Birmingham							
153	102	Cardiff						
56	64	105	Oxford					
274	200	298	247	Newcastle				
184	79	171	142	128	Manchester			
394	287	370	350	143	211	Glasgow		
196	127	229	172	82	64	207	York	

Distance charts do not include every city and town. I live in Coventry but Coventry is not on the distance chart. Birmingham is quite close to Coventry so I can look up distances from Birmingham.

**Tip**  
**Using a distance chart**  
To find the distance between London and Newcastle, look down the column labelled London until you reach the row labelled Newcastle.  
Read the value: 274 miles.

I have friends and relations in different parts of the country. It would be great to be able to visit them.

- 1 My aunt lives in Cardiff.  
The distance between Birmingham and Cardiff is  miles.
- 2 My sister lives in Glasgow.  
The distance between Birmingham and Glasgow is  miles.
- 3 My friend lives in York.  
The distance between Birmingham and York is  miles.
- 4 We go to Manchester in the summer.  
The distance between Birmingham and Manchester is  miles.
- 5 Use the distance chart to work out the total distance of the following trip.  
Birmingham to York to Manchester to Birmingham is .....  
This is a total of  miles.
- 6 Plan a route between some of the towns and cities in the table.  
Write it down and work out the total distance.  
.....  
.....



# Feeding the beast



## Activity 16

Petrol consumption figures are given in miles per gallon (mpg). Petrol is now sold in litres.

Here's how to convert (approximately) from miles per gallon to miles per litre (mpl):

1 litre is approximately equal to 0.22 gallons.

Miles per gallon  $\times$  0.22 = miles per litre

30.4 mpg =  $30.4 \times 0.22 = 6.688$  mpl = 6.7 mpl (to 1 decimal place)

so 30.4 mpg is approximately the same as 6.7 mpl.

Work out the petrol consumption for each car in miles per litre.

### Remember

#### Rounding decimals

to one decimal place: 23.453  $\rightarrow$  23.5

to one decimal place: 23.435  $\rightarrow$  23.4

Annotations:  
 - For 23.453: 2nd decimal place 5 or more  $\rightarrow$  round up  
 - For 23.435: 2nd decimal place 4 or less  $\rightarrow$  leave digit alone

Write your answer to one decimal place.

Engine size (cc)	Miles per gallon (mpg)	Miles per litre (mpl)
1 1.0	37.9 mpg	<input type="text"/>
2 1.6	32.7 mpg	<input type="text"/>
3 2.0	29.5 mpg	<input type="text"/>

## Activity 17

I want to work out how many litres of petrol different cars will use in a year. I estimate that I will drive around 10 000 miles each year.

### Tip

Litres used = total number of miles driven in a year  $\div$  number of miles per litre.

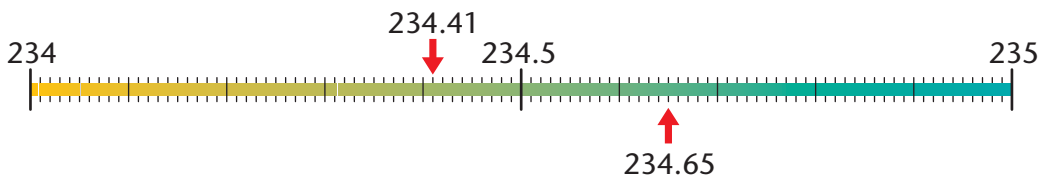
Work out the number of litres of petrol used in a year. Give the answer to the nearest whole number of litres.

### Remember

#### Rounding to the nearest whole number

If the first digit after the decimal point is less than 5, it is nearer to the whole number that is written. For example,  $234.41 = 234$  to the nearest whole number.

If the first digit after the decimal point is 5 or more, it is nearer to the next whole number. For example  $234.65 = 235$  to the nearest whole number.



The car does approximately 6.7 miles to the litre.

Number of miles per litre = 6.7.

Total number of miles driven in a year = 10 000

Number of litres used  $10\,000 \div 6.7$  litres = 1492.5373 litres

Answer to the nearest whole number of litres = 1493 litres

Imagine that you drive around 10 000 miles each year and answer the questions.

1 How many litres of petrol will each car use? Give your answer to the nearest litre.

Engine size (litres)	Miles per litre	Number of litres
1.3	8.8	
1.6	6.6	
2.0	6.5	

2 Which car will be the most economical to run?

## Activity 18

You want to find out how much a year's supply of unleaded 95 octane petrol will cost.

You also want to work out how much of this the Inland Revenue will take in tax! You can choose to buy your petrol at a garage or at a big supermarket.

	Average price per litre	Tax
Garages	74.9p	75%
Supermarkets	73.2p	77.5%

You can work out how much 1135 litres of petrol will cost if you buy it at a garage.

Garage petrol costs      74.9 pence a litre

1135 litres costs       $1135 \times 74.9\text{p} = 85011.5\text{p}$

It is easier to understand the cost if you divide by 100 to change it from pence to pounds.

$85011.5 \div 100 = \text{£}850.115$     which is  $\text{£}850.12$  to the nearest penny.

- 1 Work out the cost of petrol for the cars in Activity 17 at garage prices. Fill in the table.

Engine size (litres)	Miles per litre	Number of litres	Cost (to nearest penny)
1.3	8.8		
1.6	6.6		
2.0	6.5		

How much of this will the Inland Revenue take in tax?

Here are two ways of working out 75%. If I want to know how much the Inland Revenue gets when I buy petrol at a garage, I can do:

### A the 10% method

$$10\% \text{ of } \text{£}850 = \text{£}850 \div 10 = \text{£}85$$

$$\begin{aligned} 75\% \text{ of } \text{£}850 &= 7 \times \text{£}85 + \frac{1}{2} \text{ of } \text{£}85 \\ &= \text{£}595 + \text{£}42.50 \\ &= \underline{\underline{\text{£}637.50}} \end{aligned}$$

### B using known percentages

75% is 50% + 25%

$$\begin{aligned} 75\% \text{ of } \text{£}850 &= 50\% \text{ of } \text{£}850 + 25\% \text{ of } \text{£}850 \\ &= \frac{1}{2} \text{ of } \text{£}850 + \frac{1}{4} \text{ of } \text{£}850 \\ &= \text{£}425 + \text{£}212.50 = \underline{\underline{\text{£}637.50}} \end{aligned}$$

2 Assume you use about 1200 litres of petrol each year. Work out the cost of the petrol in pounds, from the garage, to the nearest penny. Then find out how much of this money the Inland Revenue will take in tax.

1200 litres of petrol @ .....p each litre costs .....p = £.....

**10% method**

10% of £.....

$$75\% \text{ of } £..... = 7 \times ..... + \frac{1}{2} \text{ of } .....$$

$$= ..... + .....$$

$$= £.....$$

Check your answer, using 50% and 25%.

50% of £..... = .....

25% of £..... = .....

75% of £..... = .....

3 a My local garage charges 78.9p a litre for unleaded 95 octane petrol.

How much will it cost to buy a year's supply of petrol (1200 litres) from that garage?

..... £

b Tax is 75%. How much tax will I pay?

..... £

Check your answers by using another method.

.....  
 .....