UNIT 3

Deals on Wheels

Introduction

This task is about buying and selling scooters. Students are given a table of scooters for sale and have to select suitable scooters using given constraints. In subsequent questions students take on the role of garage owner to analyse garage stock, calculate a customer's deposit and finally take a look at European trends in scooter sales.

The task could be introduced by looking at cars or bikes for sale in a newspaper or free trade magazine. Creating a database of these adverts is covered in more detail in the suggestions for further development.

.

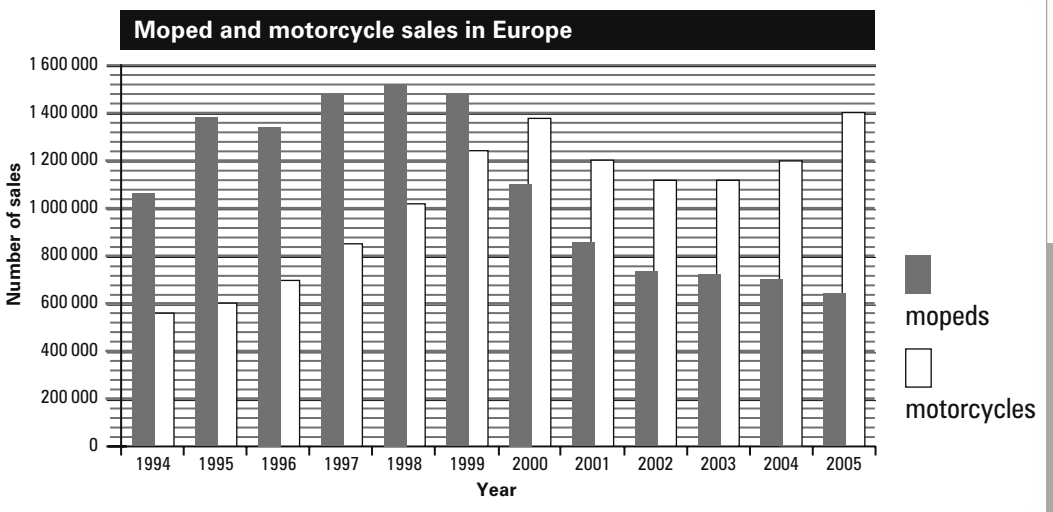
Curriculaum coverage	Functional standards
✔ Number and algebra ✔ Statistics	✔ Representing ■ Make an initial model of a situation ✔ Analysing ■ Use appropriate mathematical procedures ■ Change values to see the effects on answers in the model ■ Find results ✔ Interpreting ■ Interpret results
Cross-Curricular Links	**Every Child Matters**
✔ **ICT** – creating and interrogating a database ✔ **English** – selecting information from an advert	✔ Economic well-being ✔ Skills and knowledge for employment
Prior knowledge	**Vocabulary**
✔ Fractions ✔ Percentages ✔ Frequency tables ✔ Dual bar charts ✔ Range	✔ Difference ✔ Part exchange ✔ Deposit ✔ Range

Pre-release data sheet

This table shows the second-hand scooters for sale in a garage, Deals on Wheels.

Year	Make & Model	Engine Size *cc*	Mileage *miles*	Price £
2003	Italjet Jet-Set	125	19 155	595
2004	Piaggio Vespa	50	4 674	1 099
2006	Suzuki AY	50	2 000	1 499
2000	Aprilia Leonardo	250	3 278	1 295
2002	Gilera Runner	200	3 700	1 495
2003	Peugeot Elystar	125	2 000	695
2002	Yamaha Teos	125	4 600	1 499
2005	Vespa GT	200	450	2 399
2002	Peugeot Vivacity	100	8 608	599
2002	Piaggio NRG	50	3 055	650
2004	Yamaha CW	50	2 444	1 295
2005	Honda SCV	100	2 400	995
2006	Honda Lead	100	900	999
2004	Peugeot Speedfight	50	6 265	1 195
2001	Yamaha YP	125	28 661	1 195

This bar chart shows moped and motorcycle sales in Europe from 1994 to 2005.



Data Sheet Practice

Questions

Students will need to use the data sheet for **Deals on Wheels** to answer these questions.

1. Which is the oldest scooter?

2. What is the difference in price between the Yamaha Teos and the Honda SCV?

3. Lyndon wants to buy a scooter.
   - He wants the engine size to be less than 150 cc.
   - He wants the mileage to be less than 2500 miles.
   - He has up to £750 to spend.

   Which scooter should Lyndon buy?

e

4. Zoë is buying a scooter.
   - She wants a scooter made in 2003 or later.
   - She wants an engine size of 50 cc.
   - The mileage must be less than 2500 miles.
   - She doesn't want to spend more than £1300.

   Which scooter should Zoë buy?

5. a) In which year were sales of motorcycles least?

   b) How many were sold that year?

6. How many mopeds were sold in 1997?

7. How many more mopeds than motorcycles were sold in 1999?

8. What fraction of the scooters cost more than £1200?

   Write your fraction in its lowest terms.

9. What percentage of scooters were made in 2003 or later?

Answers

Aprilia Leonardo

$1499 - 995 = £504$

Peugeot Elystar

Yamaha CW

1994

560 000 motorcycles

1 480 000 mopeds

$1\,480\,000 - 1\,240\,000 = 240\,000$

$\frac{6}{15} = \frac{2}{5}$

$\frac{9}{15} \times 100 = 60\%$

Data Sheet Questions

e

1 Which scooter has done the least mileage? *(1 mark)*

2 Ben is buying a second-hand scooter from Deals on Wheels.

- He wants a scooter that was made in 2004 or later.
- It must have an engine size of at least 100 cc.
- The mileage must be no more than 2000 miles.
- The price must be less than £1000.

Which scooter should Ben buy? *(2 marks)*

Encourage students to work methodically down the list. They could put a cross next to each item as they rule it out. Experiment with different methods.

3 a The owner of Deals on Wheels makes a table showing how many of each type of scooter he has for sale.

Complete the table. *(3 marks)*

Again work methodically, maybe using a tally to start with.

Frequency table of scooters for sale						
Engine size (cc)	50	100	125	150	200	250
Frequency						

b Owners of scooters are charged road tax based on the size of the engine. The garage owner wants to promote all the scooters that cost the least tax.

Cost of road tax				
Size of engine (cc)	Not over 150	151 – 400	401 – 600	Over 600
Road tax	£15	£32	£47	£64

- This table shows the cost of road tax.
- What fraction of the scooters cost £15 for road tax?
- Write your fraction in its lowest terms. *(2 marks)*

4 Kasim is buying a new scooter from Deals on Wheels for £3995.

- He trades in his old scooter for £650 part exchange.
- He pays a deposit of 20% of the amount he owes.

How much is his deposit? *(3 marks)*

Discuss the meaning of part exchange and deposit.

5 The owner of Deals on Wheels looks at the bar chart of moped and motorcycle sales in Europe from 1994 to 2005.

He uses the information to decide whether to sell mopeds, motorcycles or a mixture of both in the future.

a In which year did sales of motorcycles exceed sales of mopeds for the first time? *(1 mark)*

b In which year were combined sales of mopeds and motorcycles greatest? *(1 mark)*

c Work out the difference between sales of mopeds and motorcycles in 2005. *(2 marks)*

d Comment on the different trends in moped and motorcycle sales between 1994 and 1995. *(1 mark)*

Students could look at differences in bar heights rather than reading off every total.

Care is needed with the scale.

Answers and mark scheme

Question	Answers	Marks	Comments
1	Vespa GT	D1	
2	Honda Lead	D2	Peugeot Elystar or Vespa GT or Honda SCV scores D1 for ¾ constraints met
3a	5, 3, 4, 0, 2, 1	B3	B2 for correct tallies B1 for ≥3 correct totals (not 0)
3b	$\frac{\text{their}(5+3+4)}{15}$	M1	oe
	$\frac{4}{5}$	A1	cao
4	3995 − 650	M1	
	$\frac{20}{100}$ × (their 3345)	M1dep	oe Build up method must be complete
	(£)669 (.00)	A1	SC2 (£)2676 SC1 (£)799
5a	2000	D1	
5b	1999	D1	
5c	1 400 000 and 640 000 seen	M1	Or 19 × 40 000 (if count graduations)
	760 000	A1	
5d	After an initial rise, sales of mopeds started to fall in 2000. Sales in motorcycles increased steadily until 2000, then after a dip in 2002/ 2003, sales have picked up once more.	B1	One appropriate comment

Common Errors

Look out for students who:

- get carried away with heavy crossing out so that data is unreadable making corrections difficult and the data impossible to use for subsequent questions
- find it difficult to work systematically, for example, by taking one constraint at a time and eliminating an item that does not satisfy it or by checking each item in turn against all the constraints
- cannot simplify a fraction
- when calculating percentages, use 100 in the wrong way, for example, to find 20% of 400 $\frac{20}{100} \times 400$ becomes $\frac{20}{400} \times 100$.

Extension Questions

1. What is the percentage increase in sales of motorcycles from 2004 to 2005?

2. From 1993 to 1994 sales of motorcycles increased by 5%.
   How many motorcycles were sold in 1993?
   Give your answer to three significant figures.

3. The table shows the quarterly profits for Deals on Wheels for 2005 and 2006.

Deals on Wheels Quarterly Profits

Year	2005				2006			
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Profit (£ thousand)	8.7	12.5	11.2	9.1	9.1	13.0	11.8	9.9

   a. Use the information to calculate the four-point moving averages.
   b. Show this information on a graph.
   c. What can you say about the trend?

Extension Answers

Question 1

Increase $= 1\,400\,000 - 1\,200\,000 = 200\,000$ ***or*** $5 \times 40\,000 = 200\,000$

Percentage increase $= \dfrac{200\,000}{1\,200\,000} \times 100 = 16.67\%$

Question 2

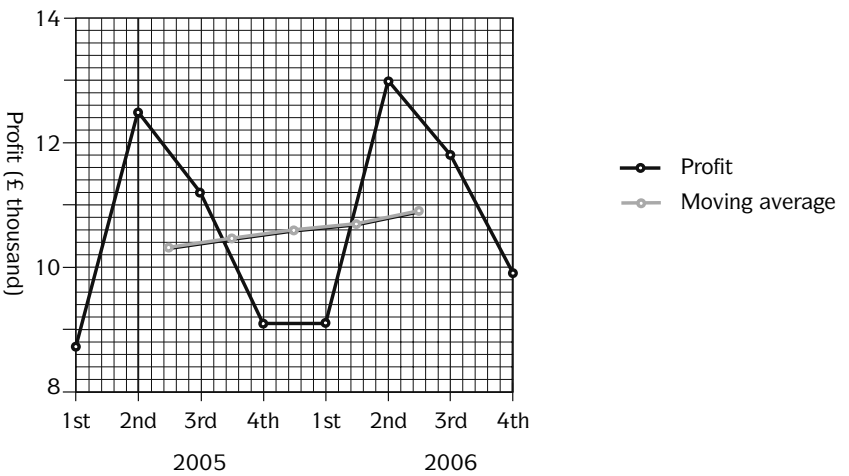
$560\,000 \times \dfrac{100}{105} = 533\,333.3\ldots = 533\,000$ (to 3 s.f.)

Question 3a

Deals on Wheels Quarterly Profits

Year	2005				2006			
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Profit (£ thousand)	8.7	12.5	11.2	9.1	9.1	13.0	11.8	9.9
Four-point moving average		10.375	10.475	10.6	10.75	10.95		

Question 3b



Question 3c

The trend is slightly upwards, so the profit is gradually increasing.

Further Development

1. As mentioned in the introduction, a good way to introduce and/or extend this task is to collect advertisements of cars or bikes for sale from newspapers or free trade magazines.

   Students could then make a table of vehicles for sale (as on the data sheet), add more categories as appropriate, and then devise sets of constraints to limit their choice of vehicle.

   This could become a cross-curricular activity with the ICT department with the data being used to create a database of vehicles for sale. Students could then learn how to interrogate the database.

   Suggested fields for the database could be Year, Make, Model, Engine size, Mileage, Price, Colour, Private/trade, Location etc.

   Searching across different fields could require the use of the commands $=$, $>$, $<$, $\geqslant$, $\leqslant$.

2. Find out about yearly sales of different cars using the internet. Most of the newspaper websites and the BBC website have articles about trends in car sales. Students could download graphs or use given figures to create their own charts and graphs. Then they could create sets of questions for each other based on the data.

3. Choose one of the scooters in the question (or a car or scooter for sale in a newspaper/magazine) and find out about the costs involved in owning it.

   How much road tax would they need to pay?

   Use the internet to get an insurance quote for owning the vehicle.

   Find out about breakdown cover.

4. Be an exam writer!

   Encourage students to use the given data sheet to write their own questions for each other.