Unit 13
Handling data

Year 4
Summer term

Five daily lessons

National
Numeracy *Strategy*

Unit Objectives
Year 4

- Solve a problem by collecting quickly, organising, representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer, for example:

  tally charts and frequency tables;

  pictograms – symbol representing 2, 5, 10 or 20 units; Page 116

  bar charts – intervals labelled in 2s, 5s, 10s or 20s;

  Venn and Carroll diagrams (two criteria). Page 114

Year 3 **Link Objectives** **Year 5**

- **Solve a given problem by organising and interpreting numerical data in simple lists, tables and graphs.**

- Solve a problem by representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer.

(Key objectives in bold)

This Unit Plan is designed to guide your teaching.

You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Activity sheet 13.1
- Activity sheet 13.2
- Activity sheet 13.3/OHT 13.4
- OHT 13.1
- OHT 13.2
- OHT 13.3
- Self-assessment sheet 13.1
- Sets of number cards (0–100)
- Sorting hoops
- 2-D/3-D shapes
- Whiteboards
- Maths dictionaries
- Acetate sheets
- Counting stick
- Triangle cards (×, ÷)
- Large sheet of paper
- Pack of cards
- Number fans

department for
education and skills

Planning sheet	Day One	Unit 13 *Handling data*	Term: *Summer*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary

Recall multiplication facts for × 2, × 3, × 4, × 5, × 10 tables and derive division facts.

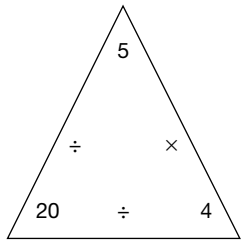
Begin to recall facts in × 6 and × 8 tables.

VOCABULARY
multiple
double
division
facts

RESOURCES
Counting stick
Triangle cards (×, ÷)

Teaching Activities

- Use counting stick to practise counting forwards and backwards in 2s, 3s, 4s, 5s and 10s.
- Derive × 6 table from the 3s and count forwards and backwards in 6s.
- Derive × 8 table from the 4s and count in 8s.
- Use triangle cards to derive division facts corresponding to multiples of 2, 3, 4, 5 and 10, i.e.



Main Teaching

Objectives and Vocabulary

Collect, classify, represent and interpret data in Venn diagrams (two criteria).

VOCABULARY
Venn diagram
sort
property
properties
multiple
digit
greater than
less than

RESOURCES
Sets of number cards (1–100)
Large sheets of paper
Sets of number properties
Sorting loops
OHT 13.1

Teaching Activities

- Lay a large sheet of paper on the floor where the children can see it, and place a label 'all numbers' just outside the sheet.

  Using large number cards, quickly agree with the children that they are all examples of the set of 'all numbers'.

  Now place a single sorting hoop on the sheet, labelled 'numbers less than 50'. Ask the children to come up and place cards either inside, or outside the hoop.

  Q What is the name of the region outside the hoop? (numbers 50 or more).

- Take off the label and the cards and replace 'numbers less than 50' with 'even numbers'. Repeat the exercise: agree the outer region is now 'not even numbers' (or, 'odd numbers').

  Remind the children that a one-criterion sort simply decides whether an item does, or does not, match the given property. Give the children examples of a criterion and ask for the name of the 'not' region, for example: red (not red); even (not even). Consider 10 or less.

  Q Can you describe the 'not' set?

- With the first loop still labelled 'even', place a second hoop on the sheet (not overlapping) and with it, the original 'numbers less than 50' label. With the children's agreement, place (say), 3, 17, 25 in that loop.

  Q Where am I going to place… 20?

  Agree that it matches both properties; and the only way to make it fit is to overlap the hoops and place it in the centre. Check that all the cards are in the correct position. Provide other numbers, so there are examples in all four regions, including the outer region.

  Q What is the name for this outer region? (not even, and not less than 50).

  Q Can you describe this outer region in another way?

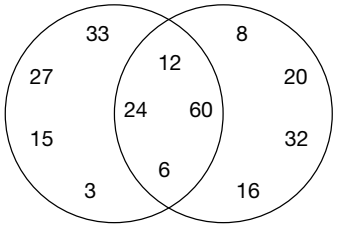
  Emphasise that this is the area where neither property is matched.

- Ask the children to draw on large paper a diagram to represent the two hoops and the sorted numbers. Invite the children to draw the Venn diagram with the correct title and labels.
- Sort the same numbers using different properties, e.g. 'multiples of 5' and 'multiples of 2'. Repeat similar questions to first example.
- The children work in pairs. Each pair is given a set of number cards. Display OHT 13.1 which gives a set of number properties. Children choose two properties at a time and draw a Venn diagram with one property for each circle. They then sort the number cards onto the diagram. Repeat with other number properties. Each pair decides on their favourite Venn diagram to show in plenary.

Plenary

Teaching Activities/Focus Questions

- Different groups show the Venn diagram they recorded and explain the reasoning they used when deciding where to place numbers.
- Show this Venn diagram on the board or on an OHT.



  Q Look at the right-hand circle. What could be the property deciding all the numbers in the right-hand circle?

- Take several answers, e.g. numbers less than 65. Repeat the question for the left-hand circle by itself. Now consider the two circles together.

  Q Which criteria are still possible?

  Establish that an example such as 'numbers less than 65' cannot be correct because there are examples in the other circle that match it.

  Q Where would the number 18 go?

  Q Where would the number 25 go?

- Reveal criteria as: 'multiple of 3' and 'even'.

By the end of the lesson the children should be able to:

- **Sort and classify numbers on a Venn diagram with two criteria.**
- **Solve problems involving Venn diagrams.**

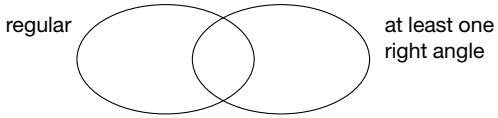
(Refer to supplement of examples, section 6, page 116.)

Planning sheet	Day Two	Unit 13 *Handling data*	Term: *Summer*	Year Group: *4*

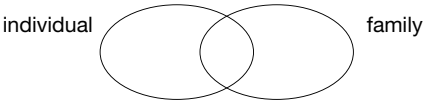
Oral and Mental

Objectives and Vocabulary	Teaching Activities
Describe and visualise 2-D and 3-D shapes, including the tetrahedron and heptagon. VOCABULARY: appropriate shape property RESOURCES: 2-D and 3-D shapes Whiteboards	• Hold up a 2-D shape, e.g. a hexagon and ask the children to write down one property of it on their whiteboards. • Pick out the different properties from what the children write. If any are missing ask the class to think again to identify the missing properties. • Repeat for other 2-D shapes and introduce 3-D shapes. • Ask the children to work in pairs and write down the names of four shapes that all have something in common. Show some of the lists to the class asking them to identify the common property.

Main Teaching

Objectives and Vocabulary	Teaching Activities
Solve a given problem by collecting, classifying, representing and interpreting data in Venn diagrams (two criteria). Classify polygons, using criteria such as number of right angles, whether or not they are regular, symmetry properties. VOCABULARY Venn diagram sort properties faces vertices edges regular RESOURCES 2-D and 3-D shapes for each group Activity sheet 13.1	• Jo says that most regular shapes have at least one right angle. **Q** How could we find out if she is right? Discuss with the class. Suggest that we could sort shapes on to a Venn diagram. **Q** How could we label the sets? Draw a Venn diagram on the board using properties of 'regular' and 'at least one right angle' (invite children to give a definition/example of 'regular').  **Q** What are the names of the two regions not labelled? Remind the children that the overlap area is the 'both' region and the area outside the circles is the 'neither' region. **Q** If Jo is right, where will most shapes go? Hold up a variety of 2-D shapes asking where they would go on the diagram. Invite the children to place them appropriately on the diagram using 'blu-tac'. Remind the children of the reason for the intersection. Invite the children to sketch additional shapes for each of the regions. A box manufacturer wants to make a box which has at least one triangular face, and an even number of vertices. **Q** How could we find out which 3-D shapes fit these criteria? Hold up a variety of 3-D shapes and discuss where they would go on the diagram. **Q** What do we do with the sphere, cone and cylinder? • The children work in pairs to sort 2-D and 3-D shapes on to Venn diagrams in a variety of ways. Use properties that relate to: number of sides, faces, edges, vertices, symmetry, right angles and regular shapes.

Plenary

Teaching Activities/Focus Questions
• Pose the problem 'the school photographer is coming to school' and we need to sort the children into: - children who are having individual photographs (Yusuf, Katy); - children who are having family photographs (Nick, David, Teri); - children who are having both (Jo, Kate, Ian); - children who are having neither (none). • Invite suggestions from the children on creating a Venn diagram to display all the children the information;      **Q** How many children had photographs taken altogether? **Q** How many children had individual photographs? **Q** How many children had family photographs? **Q** Tom and Anna are not in school today. Where will their names go? HOMEWORK – Hand out copies of Activity sheet 13.1. Talk through the homework activity and check that everyone understands the task. You may wish to get the children to write in their chosen properties as part of the lesson. **By the end of the lesson the children should be able to:** • **Sort and classify shapes on a Venn diagram with two criteria.** • **Solve problems involving Venn diagrams.** (Refer to supplement of examples, section 6, page 116.)

Planning sheet	Day Three	Unit 13 *Handling data*	Term: *Summer*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Recall multiplication facts in tables. RESOURCES Counting stick	• Use a counting stick to chant times tables, initially in order and backwards. • Indicate halfway on the stick and ask the children what 5 times whatever the table is. • Teach the children to use this as a marker for other tables so they don't always start at 1 ×, e.g. $7 \times 3 = (5 \times 3) + 3 + 3 = 21$ • Encourage the pupils to make these types of links to improve recall. • Practise tables or other counting which is appropriate to use in Carroll diagrams.

Main Teaching

Objectives and Vocabulary	Teaching Activities
• Represent, interpret data in a Carroll diagram (numerical). VOCABULARY Carroll diagram data survey represent RESOURCES Whiteboards and pens Maths dictionaries	**Q** What is a Carroll diagram? • Give the pupils maths dictionaries to find a definition. Discuss how it is used in data handling for sorting and representing information in rows and columns. • Draw a Carroll diagram on the board: |	In the × 4 table	Not in the × 4 table
---	---	---
Numbers that have three 10s		
Numbers that do not have three 10s			 Talk through the properties and 'not' properties for each category. Point out how the four regions represent one 'yes both' region, two 'one but not the other' regions and one 'not either' region. Write the numbers 24, 32, 36, 38, 16, 25, 33, 17, 38 on the board. Demonstrate to the children how to use the Carroll diagram to sort the numbers, talking through the criteria for selecting a particular box for a particular number. **Q** What other number could we put into the box that is in the × 4 table and has three 10s? Discuss why there are no other numbers to fit in. **Q** What number could I put into … this box? Point to any other box. • Change properties, e.g. to × 5 table and a number that is even or is odd. Can they sort related numbers, e.g. 20, 48, 30, 16, 53, 25, 40, 46, 38, 40? Use whiteboards to record. Discuss why they have put the numbers where they have. **Q** Why do none of the numbers in the '2 even numbers' and '× 5 table' box have a 5 digit at the end? • Allow the children the opportunity to decide their own properties in small groups and select the numbers, then give to another group to sort. Have a set of properties on the board for pupils to choose from e.g. four-digit, three-digit, two-digit numbers; multiples of 2, 10 or 5; greater or less than 83, etc.

Plenary

Teaching Activities/Focus Questions

- Choose a few different pairs and discuss their solutions.
- Write on the board the set of numbers 7, 9, 14, 21, 23, 25 and ask the children to draw quickly on their whiteboards a Carroll diagram for the criteria numbers that have two 10s numbers in the × 7 table.
- Check solutions and address errors.

By the end of the lesson the children should be able to:

- **Decide on properties for a Carroll diagram;**
- **Put numbers into the correct sections of a Carroll diagram.**

(Refer to supplement of examples, section 6, page 116.)

Planning sheet	Day Four	Unit 13 *Handling data*	Term: *Summer*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary

Visualise 2-D shapes.

Classify polygons using criteria such as number of right angles, whether or not they are regular, symmetry properties.

VOCABULARY
cube
cuboid
triangle
square
pentagon
hexagon
octagon
symmetry
right angle
regular

RESOURCES
A set of about six 2-D and 3-D shapes
Whiteboard and pens

Teaching Activities

- Play 'Give us a Clue!' using 2-D shapes. Secretly select a shape, e.g. rectangle and hold it behind a piece of A4 card. Slowly, reveal one part, e.g. a corner, and stop.

  Q What shape might it be?

- Give the children a clue, e.g. 'it's not regular'. Ask them to draw and name the shape on their whiteboards.

- Play again using harder shapes such as semicircle, right-angled triangle, etc.

Main Teaching

Objectives and Vocabulary

Collect, represent and interpret data in a Carroll diagram, and a Venn diagram.

VOCABULARY
criterion
criteria
region

RESOURCES
Activity sheet 13.2 (also on OHT 13.4)
Pack of cards
Self-assessment sheet 13.1

Teaching Activities

- Show the children a pack of cards. Remind them if necessary of the four suits, their names, and the 'royal' cards. Discuss and list on the board properties that could be used to sort them, for example:

  black (not black)
  royal (not royal)
  odd (not odd – decide if royal counts as not odd)
  less than 8 (8 or over)
  hearts (not hearts)

  Choose the two properties: black/not black, hearts/not hearts. On a large sheet of paper, draw the Carroll diagram and invite the children to choose cards and place them in the correct region.

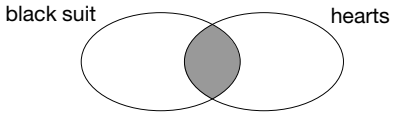
  Q Which region is getting no cards?

  Q Can you explain why?

  Point out how there cannot be a group with 'black hearts' in it. Shade it over.

	Black suits	Not black suits
Hearts		
Not hearts		

- Leave the paper where it is, and lay out a fresh sheet. Explain that the same sort is going to be used for a Venn diagram. Repeat the activity, placing cards into the correct regions. Shade over the 'overlap' region.



Q Which region is getting no cards? Why?

Point out that the four regions of the Carroll diagram are exactly the same as the four regions of a Venn diagram.

- Explain how the information they put in a Venn diagram can also fit into a Carroll diagram. Go through some of the children's completed homework examples and model/discuss how the information could be put on to a Carroll diagram.

  Q What are the four 'box' labels?

- Give the children a copy of Activity sheet 13.2/OHT 13.4. Discuss and complete.

  Q Are the numbers grouped the same way in the two diagrams?

  They should be! Discuss any that have gone astray on the children's sheets and check that the children can see what led to the mistake.

Plenary

Teaching Activities / Focus Questions

ASSESSMENT – The children complete Self-assessment sheet 13.1. Read the instructions to them if necessary and explain that the answers are written in the oval.

By the end of the lesson the children should be able to:

- **Explain what a Carroll diagram is and how to use it to sort information.**

(Refer to supplement of examples, section 6, page 116.)

Planning sheet	Day Five	Unit 13 *Handling data*	Term: *Summer*	Year Group: *4*

Oral and Mental

Objectives and Vocabulary	Teaching Activities
Choose and use appropriate number operations to solve problems. VOCABULARY add subtract multiply divide problem RESOURCES Number fans or whiteboards	• Ask single-step number problem such as: 'I think of a number, then add 21. The answer is 43. What was my number?' The children respond with number fans or whiteboard when you say 'show me'. **Q** How did you work out what number I started with? • Ask similar one-step questions involving +, –, × and ÷. • Move on to multi-step problems such as: 'I think of a number, add 3 then multiply by 2. The answer is 30. What was my number?' **Q** What two things did you have to do to get back to my number? • Repeat for other multi-step problems involving a variety of operations.

Main Teaching

Objectives and Vocabulary	Teaching Activities
Collect, classify, represent and interpret data in pictograms: symbol representing 2, 5, 10 or 20 units. VOCABULARY pictogram symbol represents RESOURCES OHT 13.2 OHT 13.3 Activity sheet 13.3 Acetate sheets	• Display the pictogram OHT 13.2, on books borrowed from library. Draw attention to the key showing one picture of a book represents ten books. **Q** How many books were borrowed on Monday? How do you know? **Q** On which day were most books borrowed? Why do you think this is? **Q** What do you think the 'half book' on Thursday represents? How many books were borrowed on Thursday? **Q** How many books were borrowed altogether over the week? • Show the children the data on OHT 13.3. Say you want to represent the data on a pictogram. **Q** What symbol could we use for the pizzas? **Q** How many pizzas should each symbol represent? **Q** How could we represent Wednesday and Thursday if one symbol represents 20? (demonstrate). **Q** Tell me one thing about 'Dial-a-Pizza'. • Give ready data (Activity sheet 13.3) to the children to represent as a pictogram on acetate sheets (some could use 'Dial-a-Pizza' data). Once they have drawn a pictogram, ask them to develop a series of questions to ask others.

Plenary

Teaching Activities/Focus Questions

- Display some of the pictograms drawn by the children on the OHP and get the children to ask some of their questions.
- Summarise key points of interpreting pictograms, i.e.
  – work out what each symbol represents;
  – work out what part symbols represent;
  – when drawing pictograms make sure that your symbols represent an appropriate number of objects.

By the end of the lesson the children should be able to:

- **Represent information in pictograms;**
- **Interpret information represented in pictograms.**

(Refer to supplement of examples, section 6, page 114.)

This homework activity is about sorting healthy things to eat using two criteria.

A list of possible foods and a list of possible properties are given.

- Choose two properties. Label the Venn diagram.
- Put the foods, and others if you wish, in the correct place according to the properties you have chosen.
- If you would like to do so, choose two different properties and draw another Venn diagram on the back.

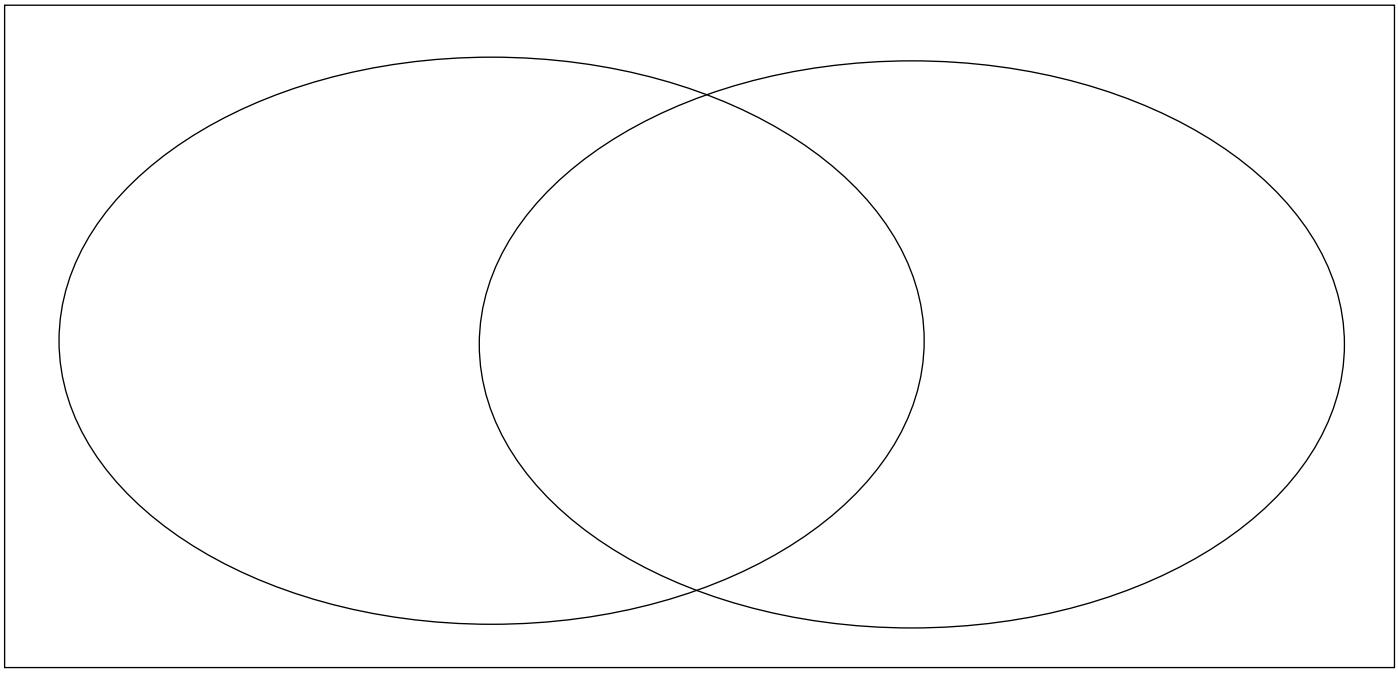
Possible properties

Can eat skins (can't eat skins)
Round shape (not round)
Sweet (not sweet)
I like (I don't like)
…likes (…doesn't like) (for example, mum likes (mum doesn't like))

Possible healthy things to eat

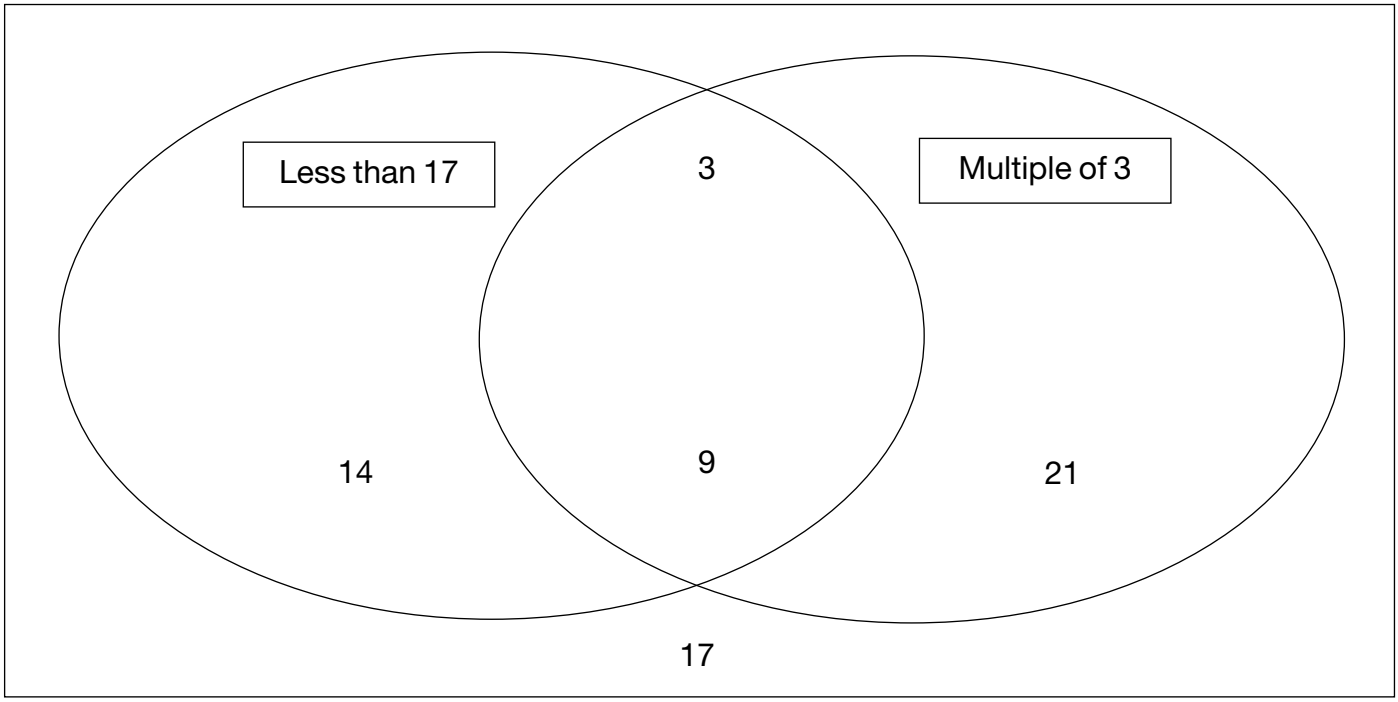
apples, bananas, grapes, plums, oranges, pears, potatoes, cucumber, tomatoes, cabbage, peas, carrots, onions, peanuts, walnuts, almonds.

A Venn diagram for:
Healthy things to eat



Write in all the numbers from 1–25 in this Venn diagram:

All Numbers from 1–25



Now label this Carroll diagram using the same properties, and put all the numbers in the correct place:

All Numbers from 1–25

		Not
Not		

Ready Data for Constructing Pictograms

1. Number of marbles each child has:

Sally	John	Tim	Karen	Luke
18	12	6	15	11

2. Number of CDs sold in a week:

Mon	Tues	Weds	Thurs	Fri	Sat
30	70	60	55	40	130

3. Cars passing school each hour:

9 until 10	10 until 11	11 until 12	12 until 1	1 until 2
25	15	21	55	10

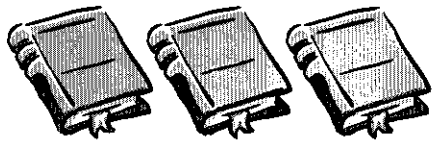
4. Favourite sandwiches in school:

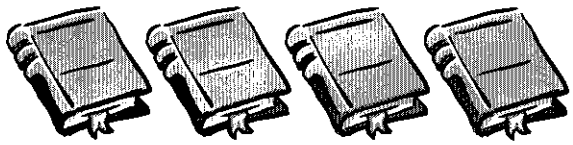
Ham	Cheese	Chicken	Salad	Jam
30	45	75	0	20

Possible Properties to Use for your Sort

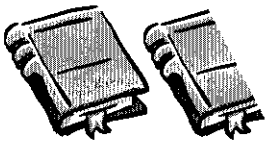
Odd	Even
Multiple of…	(Not multiple of…)
Greater than…	(Not greater than…)
Two-digit	(Not two-digit)
Has three 10s	(Does not have three 10s)

Books Borrowed from the School Library over a Week

Monday 

Tuesday 

Wednesday 

Thursday 

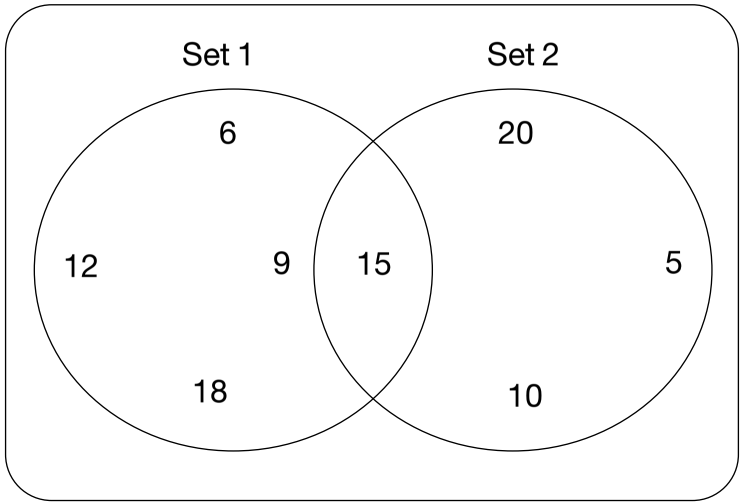
Friday 

 Represents 10 books

Pizzas Sold at Dial-a-Pizza

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
40	80	70	65	90	120	100

My Mathematics by .....



Write labels showing how the numbers are sorted in Set 1 and Set 2.

Add one more number to each set and one where the circles intersect.

I did these
on my own ☐
with help ☐

	even	not even
less than 20		
more than 20		

Place two numbers in each box.

I did these
on my own ☐
with help ☐