

*Interacting with mathematics
in Key Stage 3*

*Year 8 handling data: notes for
departmental meetings*

Introduction

These notes can be used to guide your department through an exploration of the sample unit on handling data. They have been structured to make best use of time and resources. Your usual departmental meetings may have an informal meeting style, but it is important to consider the benefits of structured group study promoted in these notes, whilst maintaining the ethos of the department. The following programme of action may help:

- Read the notes carefully in advance and consider sharing the management of the meetings with a colleague.
- Consider handing out copies of the unit plan in advance, with the expectation that everyone will read it before the first meeting.
- Make it clear to colleagues that you want to work to certain timings in order to ensure that all issues are covered effectively in the time available – the sessions are timed at 75 minutes, but could be expanded to 90 minutes.

After working with one mini-pack you may decide to continue with the second pack at a suitable time, as well as evaluating your approach to planning other units in your scheme of work. The mini-packs have been produced in a ringbinder to allow you to incorporate notes of your own and the additional mini-packs that will be produced during 2002/3.

Year 8 handling data: meeting 1

Objectives

- To reflect on current teaching of handling data in Year 8 in the department
- To consider pupils' responses to test questions and the implications for teaching and learning
- To explore how the sample unit fits into the plan for the year and how it is organised to address the objectives
- To examine the unit in more detail, including some of the data files provided

Resources

- Equipment: video player, flipchart or whiteboard, computers
- Video sequence 1, 'Test questions on handling data'
- Data library CD-ROM ('data CD' for short) set up on computers (one between four teachers)
- Prepared OHT (or appropriate number of paper copies) of the two tables from the data CD, M1 Five hypotheses and data, example 2 (cycling)
- For each teacher, unless indicated otherwise:
 - *Year 8 handling data: mini-pack* (shared if necessary)
 - *Framework for teaching mathematics: Years 7, 8 and 9*
 - Handout HD 1.1, 'Reflecting on pupils' responses to Key Stage 3 test questions' (one between two or three teachers)
 - Handout HD 1.2, 'Pupils' written responses to Key Stage 3 test questions' (one between two or three teachers)
 - Current scheme of work for Year 8, including notes for handling data units (but excluding probability)

Session outline

75 minutes

Oral and mental starter A warm-up activity on interpreting data	Discussion	5 minutes
Reflecting on current teaching of handling data Introducing the sessions and reviewing the strengths and weaknesses of current work	Talk and discussion	10 minutes
Discussing pupils' responses to test questions Considering some questions on handling data from the 2001 Key Stage 3 test papers	Video and discussion	25 minutes
Outlining the Year 8 unit on handling data Exploring the organisation and focus of the unit	Talk	10 minutes
Examining the content of the unit Looking in detail at the unit and some of the associated data files	Work in pairs or small groups	25 minutes

Oral and mental starter

5 minutes

Say that you will explain the purpose of the meeting in a few minutes, but you would like to start with a short mathematical discussion.

Show the **OHT** of the two tables from the data CD, M1 Five hypotheses and data, example 2 (cycling). Alternatively, give out the paper copies. Read out the hypothesis:

Males who cycle to school are taller than those who don't.

Pose these questions:

- Are the collected data sufficient to test the stated hypothesis?
- If so, what features would help to support our conclusions?
- If not, what else would be needed?

Allow a few moments thinking time and then take responses. The following are possible responses:

- The number of males in each group who do not cycle could be calculated.
- There are differences in the totals – only about one third of the population cycle – this makes it difficult to compare.
- The average heights for cyclists and non-cyclists could be compared.
- The average height of cyclists could be compared to that of the whole population.
- Two distributions could be drawn.

Do not get distracted into a long discussion about the activity. For now simply note the depth of discussion possible without the need to perform calculations and draw graphs. Also highlight the importance of whole-group discussion and interaction in stimulating mathematical thinking. Say that the activity is drawn from phase of the unit of work on handling data.

Reflecting on current teaching of handling data

10 minutes

Explain that the mathematics strand of the Key Stage 3 Strategy is producing materials to support mathematics departments in their planning for Year 8. The focus is on collaborative planning of a unit of work designed to engage and challenge pupils across a wide range of attainment.

Key aspects of the curriculum have been identified where, if pupils do not grasp the underlying ideas in Year 8, it will be more difficult to raise standards of attainment by the end of the key stage. The first two aspects chosen are handling data, particularly interpretation and inference, and multiplicative relationships, particularly understanding of ratio and proportion.

Explain that this is the first of two departmental meetings to discuss a handling data unit in Year 8. These meetings aim to:

- review current approaches in the department;
- consider strengths and weaknesses in pupils' learning, particularly in interpreting data and drawing inferences;
- examine teaching styles and consider how pupils can be actively engaged;

- explore a sample unit and related data files from the Key Stage 3 mathematics strategy;
- consider how to use these materials – whether to adopt as a unit or as a source of ideas for adapting existing units.

Spend a couple of minutes discussing current departmental work on handling data in Year 8 (excluding probability):

- What do we currently do in Year 8?
- What goes well with different groups?
- What goes less well?

After brief discussion of these points, ask everyone to scan the handling data objectives in the Year 8 teaching programme on **page 9** in section 3 of the Framework.

Give everyone a few minutes to reflect on:

- the objectives emphasised in our current planning;
- the strengths and weaknesses in terms of pupils' learning.

Ask for brief comments on these under the headings:

Specifying a problem, planning and collecting data

Processing and representing data

Interpreting and discussing results

Discussing pupils' responses to test questions

25 minutes

Explain that you are going to spend about half an hour examining the teaching and learning issues arising from pupils' responses to three questions on handling data in the 2001 national test at Key Stage 3. You will use video clips from discussions by pupils who achieved level 6 or level 7 in the test. Although this is only a small sample of responses, the issues raised are likely to apply to pupils in many schools, including pupils whose attainment is lower than those on the video.

Distribute **handouts HD 1.1** and **HD 1.2**. Handout HD 1.1 provides the focus for each of the video clips on test questions.

For each test question you will need to guide everyone through the following stages:

- becoming familiar with the question;
- considering pupils' written responses;
- watching the video of the pupils explaining their solutions and discussing the implications for teaching;
- (for two of the test questions) exploring the principle of adapting questions in order to extend or support thinking.

Additional notes are given below. These may help you to guide the discussion of the video.

2001 Tier 5–7, Paper 1 Question 3 (Sunshine charts)

Note in discussion after the video that small differences in the words used by pupils can make their meaning much more precise.

For example:

- Lee states 'there are **more**'.
- Catherine states '**most** of the days'.

Note that additional questions could be used to extend pupils' thinking beyond the scope of the original question.

2001 Tier 5–7, Paper 2 Question 10 (Pie charts of books)

In discussion after the video draw out these points:

- from part (a), the important role of language – being able to reflect and crystallise one's thoughts at each stage of a problem;
- from part (b), the ability to take an overview and monitor what one is doing, identifying potential inaccuracy or inefficiency in a strategy.

Note the teaching value of pupils hearing different explanations and approaches from other pupils. Also, note how the teacher can intervene instructively in the stages of an explanation by asking questions such as 'Why has he done that?' or 'What is he calculating?'

2001 Tier 5–7, Paper 2 Question 13 (Scatter graph of goldcrests)

Note that this question is closer to level 7 than level 5. It is interesting, however, that some of the difficulties emerging are also encountered by pupils working at level 5, for example understanding of scales on axes.

After the video ask everyone to consider again the reasons pupils gave for the choices they made in part (c). What are the implications for teaching? Note that when asked to give a reason, we usually begin by trying to explain to ourselves. How do we help our pupils to do this? How can they learn from others?

An underlying difficulty can be understanding the data that is presented. With this question, it would be useful to ask supplementary questions in order to help pupils to interpret the scatter diagram, or to simplify and make it accessible at a lower level. Consider the suggestions on handout HD 1.1.

Finally, summarise important teaching points identified in your discussions of the three test questions. These might include:

- the importance of getting pupils to share explanations with the whole class, with appropriate teacher intervention, to draw out their thinking and develop their skills of reasoning, interpretation and use of language;
- the value of using a question as a starting point for class discussion, adapting and asking supplementary questions in order to give pupils access to the question and to the underlying mathematics or extend their thinking.

These approaches will be exemplified in the second meeting, using a video sequence from a Year 8 lesson.

Outlining the Year 8 unit on handling data

10 minutes

Distribute copies of *Year 8 handling data: mini-pack*. Allow a few moments for everyone to read the introduction. Draw attention to the points made after the paragraph beginning 'The unit overview on page 7 shows . . .' and to the unit overview itself.

Point out these features:

- The unit addresses the handling data cycle ('HD cycle' for short) in a novel way, placing the main focus of teaching on interpretation and inference.
- The whole of the HD cycle is made explicit to pupils through the structure of the unit.
- The stages of the cycle are developed in the main parts of the lessons and revisited as starters in subsequent lessons.
- Aspects of collecting data are considered as part of each main teaching section.
- The plenary is used to refocus on the HD cycle.
- The unit represents six hours of lesson time.
- The objectives of the unit are listed on page 5 and referenced by letter in the unit plan.

Ask everyone to scan **pages 18 and 19** of the Guide to the Framework, noting particularly the HD cycle and the distinctive features of handling data in Key Stage 3.

Now ask everyone to turn to **page 49** of the Guide to the Framework. This gives an example of a planning chart for Year 8. Use this chart along with the bullet points given on page 4 of the introduction to the sample unit. Together these should give you an idea of how the unit fits into the overall plan for Year 8 and the adjustments made to content and sequences of other units in the Year 8 plan.

Examining the content of the unit

25 minutes

Say that you will now take a detailed look at the unit plan. Some of this detail is elaborated through the examples in the files on the data CD. This also uses ideas from the Framework's supplement of examples.

Ask everyone to turn to pages 8–9 of the mini-pack. Read through the plan by tracking the stages of the HD cycle:

- **specify and plan** in the phase 1 main teaching and the phase 2 starters;
- **process and represent** in the phase 2 main teaching and the phase 3 starters;
- **interpret and discuss** in the phase 3 main teaching and plenary;
- issues involved in **collecting data** running through all three main teaching phases.

Now gather in pairs or small groups at computers set up with the data CD. Choose one or two of the above stages and examine the suggested activities and files in the data library. Think about:

- the questions you could ask to draw out the important aspects of this stage of the cycle;
- the way you could organise groups or pairs of pupils to give the greatest opportunity to exchange ideas.

After **20 minutes** or so, draw things to a close by telling everyone that in the next meeting you will use a video to discuss strategies for engaging pupils in whole-class discussion and developing their skills of interpreting data and explaining their reasoning. The rest of the second meeting will be spent discussing practical steps towards implementing the unit and any general issues that affect the work of the department. In the meantime, some people may be able to give more time to examining the data files and sections of the unit that were not covered in this meeting.

Reflecting on pupils' responses to Key Stage 3 test questions

2001 Tier 5–7, Paper 1 question 3 (Sunshine charts)

The diagrams show the number of hours of sunshine in two different months.

Number of hours of sunshine in month A

Hours of sunshine	Number of days
less than 4	20
4 to 8	6
more than 8	3

Number of hours of sunshine in month B

Key:

- number of days with less than 4 hours
- number of days with 4 to 8 hours
- number of days with more than 8 hours

(a) How many days are there in month A?
 28 29 30 31 not possible to tell

(b) How many days are there in month B?
 28 29 30 31 not possible to tell

(c) Which month had more hours of sunshine?
 month A month B

Explain how you know.

- Start by answering the question thinking about likely approaches by pupils. Note that parts (a) and (b) require interpretation of a frequency diagram and a pie chart. Part (c) is more demanding because it requires comparing the charts, thinking in proportional terms and explaining.
- Consider the written responses of the Year 9 pupils (handout HD 1.2).
- Watch the first video clip (1 minute), in which Lee and Catherine explain their answers to part (c) of the question. Discuss the two explanations, noting the language used. What are the implications for teaching, in order to help pupils develop the skills they need?
- Explore alternative approaches to the handling data situation in this question. For example, you could ask pupils:

- What would the frequency diagram have to look like if month A were to have more hours of sunshine than month B?
- What would the frequency diagram have to look like for it to be impossible to tell which of months A and B had more hours of sunshine?
- Discuss briefly how pupils might answer these questions and what teaching points you would draw out to develop their skills of interpretation.

2001 Tier 5–7, Paper 2 question 10 (Pie charts of books)

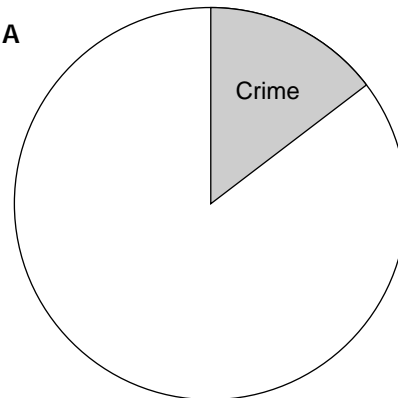
A teacher asked two different classes: 'What type of book is your favourite?'

(a) Results from class A (total 20 pupils):

Type of book	Frequency
Crime	3
Non-fiction	13
Fantasy	4

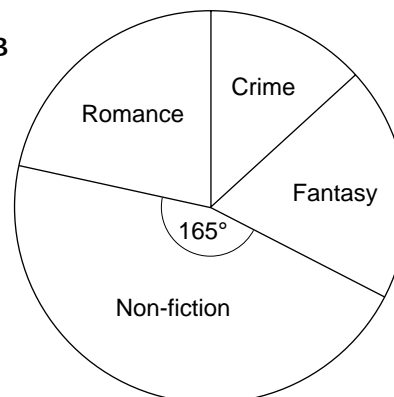
Complete the pie chart to show this information.
Show your working and draw your angles accurately.

Class A



(b) The pie chart below shows the results from all of class B.
Each pupil had only one vote.

Class B



The sector for Non-fiction represents 11 pupils.
How many pupils are in class B?
Show your working.

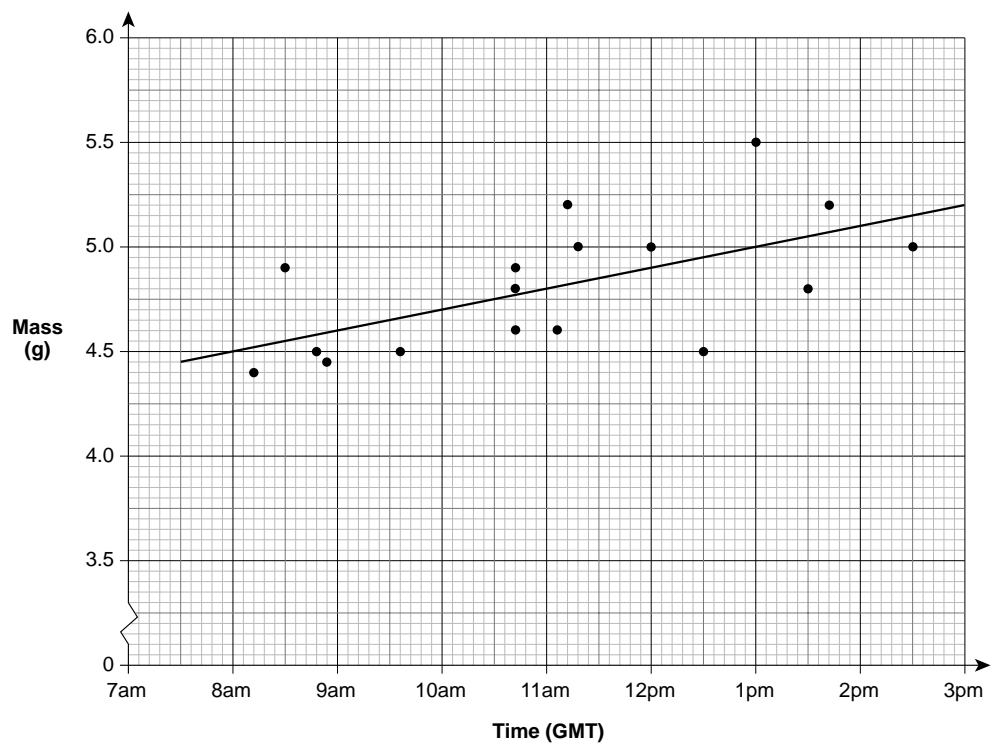
- Answer the question thinking about likely approaches by pupils.
- Consider the written responses of the Year 9 pupils (handout HD 1.2).
- Watch the second video clip (3 minutes), in which these three pupils reflect on their solutions. When watching the video look for:
 - in part (a), the different explanations from Andrew and Paul – Andrew using more precise language, Paul less clearly expressing what he has found at each stage;
 - in part (b), the clear explanation of the steps by Linsey, and a different strategy from Paul, with an error.

2001 Tier 5–7, Paper 2 question 13 (Scatter diagram of goldcrests)

The goldcrest is Britain's smallest species of bird.

On winter days, a goldcrest must eat enough food to keep it warm at night. During the day, the mass of the bird increases.

The scatter diagram shows the mass of goldcrests at different times during winter days. It also shows the line of best fit.



- Estimate the mass of a goldcrest at 11:30 am.
- Estimate how many grams, on average, the mass of a goldcrest increases during one hour.
- Which goldcrest represented on the scatter diagram is least likely to survive the night if it is cold?

Show your answer by circling the correct point on the scatter diagram, then explain why you chose that point.

- Answer the question thinking about likely approaches by pupils.
- Consider the written responses of the Year 9 pupils (handout HD 1.2). Briefly discuss the correctness of these explanations and the quality of expression.
- Watch the third video clip (2 minutes), which includes the four pupils whose written explanations have been discussed. Note in particular the pupils' reflections on how well they have recorded their understanding of the data.
- Explore alternative approaches to the handling data situation in this question. For example, leave out the line of best fit and ask questions such as:
 - Indicate two points at different times but with the same mass. Is this the same bird or is it two different birds?
 - Choose two points in the diagram. In terms of survival chances, which of these two birds would we be more concerned about?
- Consider briefly how these and similar questions could be used to help pupils to develop their interpretative skills.

Pupils' written responses to Key Stage 3 test questions

2001 Tier 5–7, Paper 1 question 3 (Sunshine charts)

Catherine

Lee

2001 Tier 5–7, Paper 2 question 10 (Pie charts of books)

Andrew

Paul

Linsey

2001 Tier 5–7, Paper 2 question 13 (Scatter diagram of goldcrests)

Catherine

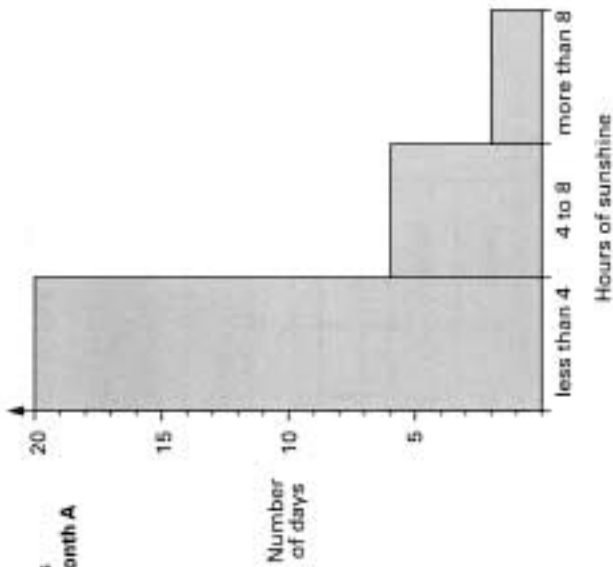
Lee

Candy

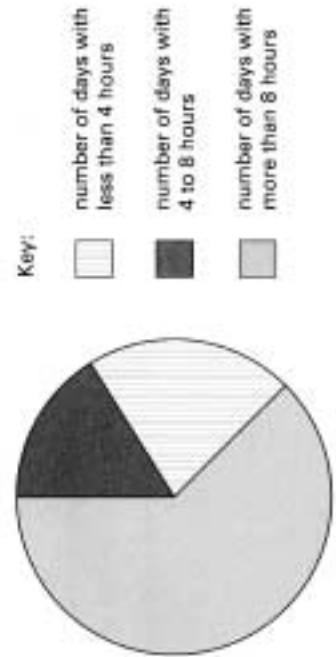
Samuel

The diagrams show the number of hours of sunshine in two different months.

Number of hours of sunshine in month A



Number of hours of sunshine in month B



(a) How many days are there in month A?

Tick (✓) the correct box.

28 29 30 31 not possible to tell

(b) How many days are there in month B?

Tick (✓) the correct box.

28 29 30 31 not possible to tell

(c) Which month had more hours of sunshine?

Tick (✓) the correct box.

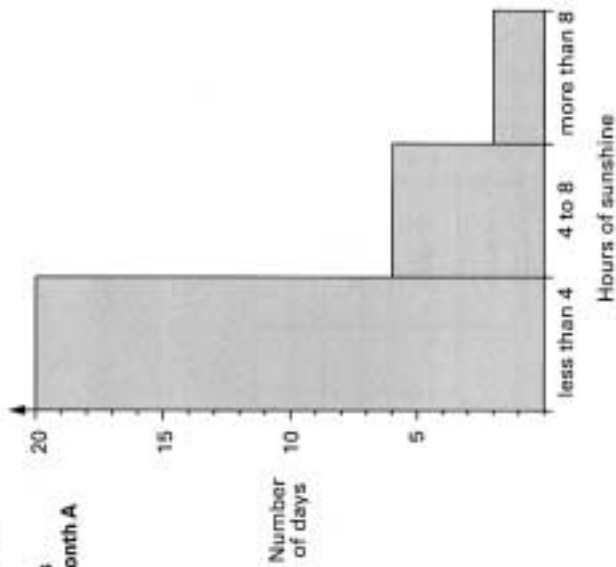
month A month B

Explain how you know.

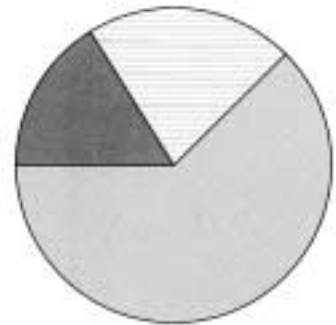
Month A most of the days have less than 4 hours of sunshine and on month B most of the days have more than 8 hours of sunshine.

The diagrams show the number of hours of sunshine in two different months.

Number of hours of sunshine in month A



Number of hours of sunshine in month B



Key:

- number of days with less than 4 hours
- number of days with 4 to 8 hours
- number of days with more than 8 hours

(a) How many days are there in month A?

Tick (✓) the correct box.

28 29 30 31 not possible to tell

(b) How many days are there in month B?

Tick (✓) the correct box.

28 29 30 31 not possible to tell

(c) Which month had more hours of sunshine?

Tick (✓) the correct box.

month A month B

Explain how you know.

because there is more, more than 8 hours in graph B than there is in graph A.

A teacher asked two different classes:

"What type of book is your favourite?"

(a) Results from class A (total 20 pupils):

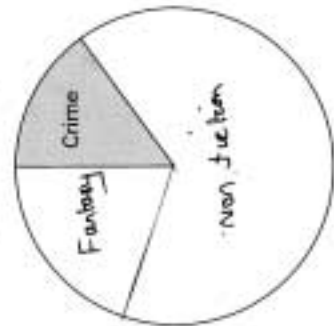
Type of book	Frequency
Crime	3
Non-fiction	13
Fantasy	4

Complete the pie chart to show this information.

Show your working and draw your angles accurately.

$$20 \sqrt{360}$$

Class A



(b) The pie chart below shows the results from all of class B. Each pupil had only one vote.

Class B



The sector for Non-fiction represents 11 pupils.

How many pupils are in class B?

Show your working.

$$11 \sqrt{105}$$

$$11 \times 15 = 165$$

$$165 \sqrt{360}$$

24 pupils

A teacher asked two different classes:

"What type of book is your favourite?"

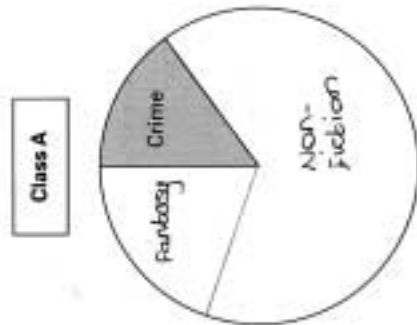
(a) Results from class A (total 20 pupils):

Type of book	Frequency
Crime	3
Non-fiction	13
Fantasy	4

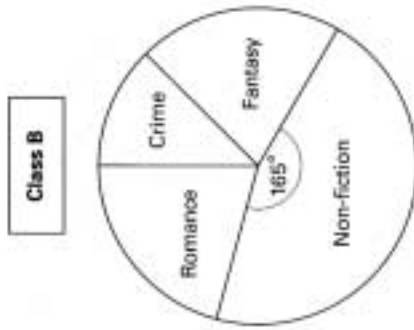
Complete the pie chart to show this information.

Show your working and draw your angles accurately.

~~B = 100%~~ ~~13~~ ~~13~~ ~~13~~ ~~x~~
 $13 \times 5 = 65\%$ $360 \div 100 = 3.6$
 $65 \times 3.6 = 234$



(b) The pie chart below shows the results from all of class B. Each pupil had only one vote.



The sector for Non-fiction represents 11 pupils.

How many pupils are in class B?

Show your working.

$165 \div 11 = 15$
 Romance = 75° $75 \div 15 = 5$
 crime = 45° $45 \div 15 = 3$
 Fantasy = 75° $75 \div 15 = 5$

$$\begin{array}{r} 15 \\ + 5 \\ + 3 \\ + 5 \\ \hline 28 \end{array}$$

28 pupils

A teacher asked two different classes:

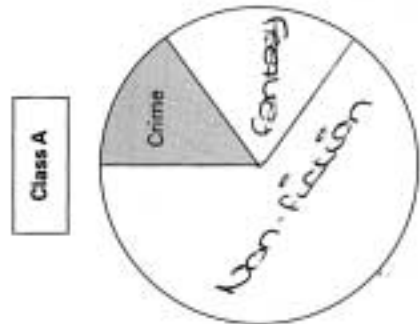
"What type of book is your favourite?"

(a) Results from **class A** (total 20 pupils):

Type of book	Frequency
Crime	3
Non-fiction	13
Fantasy	4

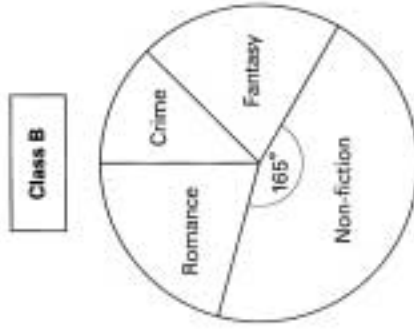
Complete the pie chart to show this information.

Show your working and draw your angles accurately.



(b) The pie chart below shows the results from all of **class B**.

Each pupil had only one vote.



The sector for **Non-fiction** represents **11 pupils**.

How many pupils are in class B?

Show your working.

$$360 - 165 = 195$$

$$165 \div 11 = 15$$

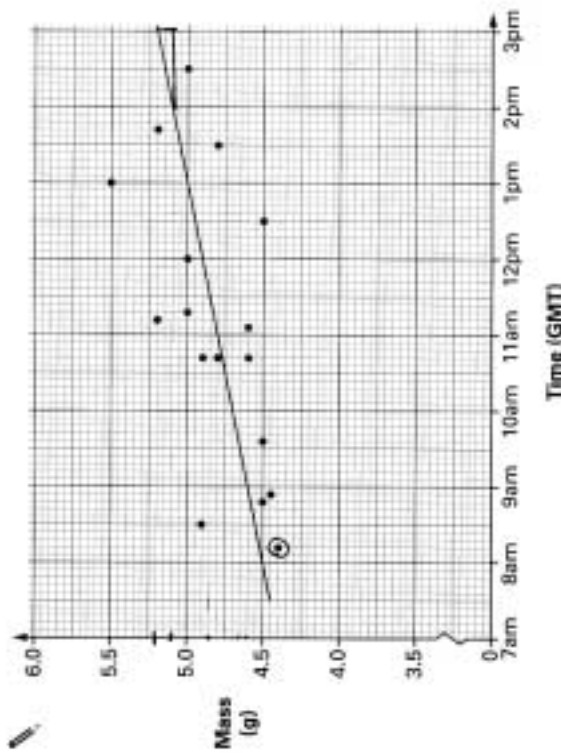
$$360 \div 15 = 24$$

24 pupils

The goldcrest is Britain's smallest species of bird.

On winter days, a goldcrest must eat enough food to keep it warm at night. During the day, the mass of the bird increases.

The scatter diagram shows the mass of goldcrests at different times during winter days. It also shows the line of best fit.



(a) Estimate the mass of a goldcrest at 11:30 am.

4.7 g

(b) Estimate how many grams, on average, the mass of a goldcrest increases during one hour.

0.2 g

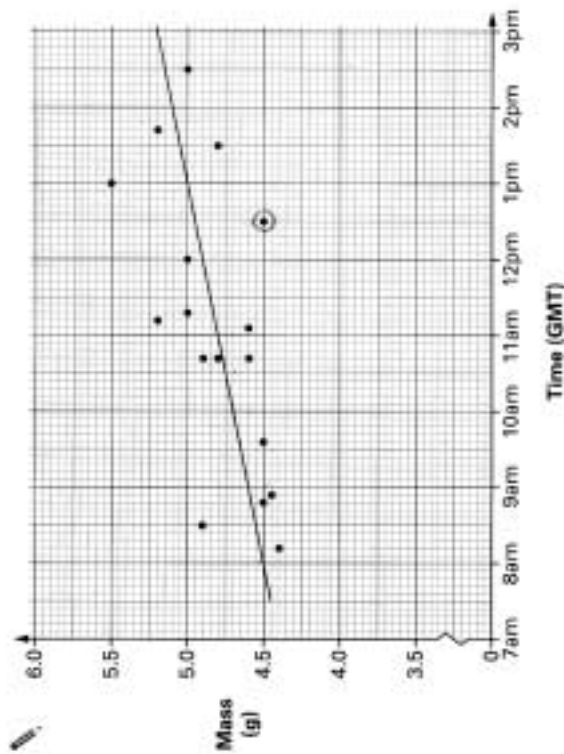
(c) Which goldcrest represented on the scatter diagram is least likely to survive the night if it is cold?

Show your answer by circling the correct point on the scatter diagram, then explain why you chose that point.

One seen at 8:20 am
 Because it was the least mass
 so it will be smaller.

2001 Tier 5-7, Paper 2 question 13: Lee's response

The goldcrest is Britain's smallest species of bird.
 On winter days, a goldcrest must eat enough food to keep it warm at night. During the day, the mass of the bird increases.
 The scatter diagram shows the mass of goldcrests at different times during winter days. It also shows the line of best fit.



(a) Estimate the mass of a goldcrest at 11:30 am.

47.9

(b) Estimate how many grams, on average, the mass of a goldcrest increases during one hour.

0.1 g

(c) Which goldcrest represented on the scatter diagram is least likely to survive the night if it is cold?

Show your answer by circling the correct point on the scatter diagram, then explain why you chose that point.

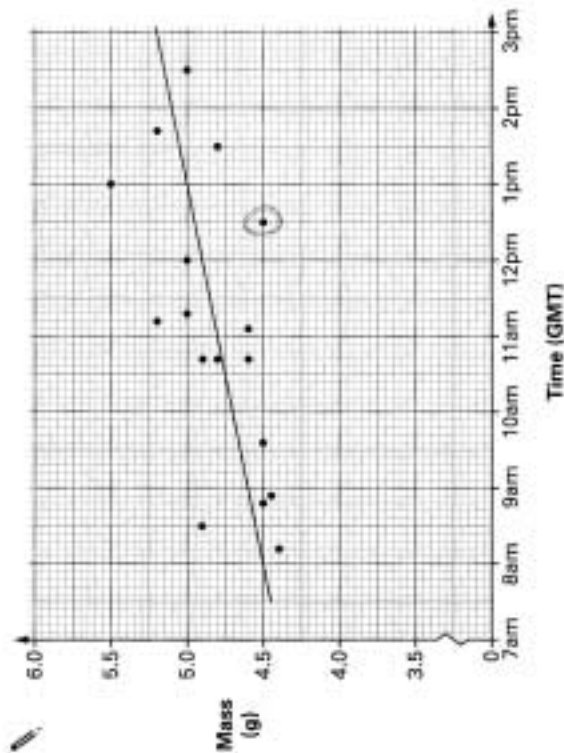
because it is 0.45 grams too

2001 Tier 5-7, Paper 2 question 13: Candy's response

The goldcrest is Britain's smallest species of bird.

On winter days, a goldcrest must eat enough food to keep it warm at night. During the day, the mass of the bird increases.

The scatter diagram shows the mass of goldcrests at different times during winter days. It also shows the line of best fit.



(a) Estimate the mass of a goldcrest at 11:30 am.

5.0 g

(b) Estimate how many grams, on average, the mass of a goldcrest increases during **one hour**.

0.5 g

(c) Which goldcrest represented on the scatter diagram is **least likely** to survive the night if it is cold?

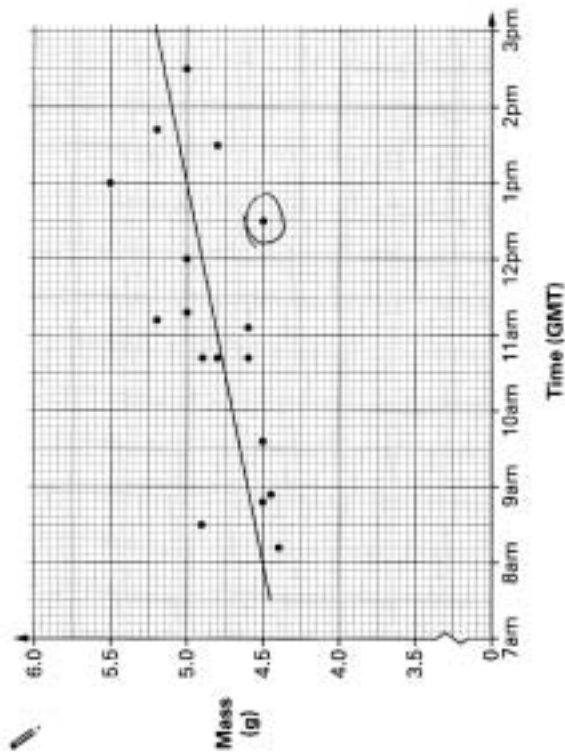
Show your answer by circling the correct point on the scatter diagram, then explain why you chose that point.

Because it's half way through the day and weighs what is should have the beginning of the day.

The goldcrest is Britain's smallest species of bird.

On winter days, a goldcrest must eat enough food to keep it warm at night. During the day, the mass of the bird increases.

The scatter diagram shows the mass of goldcrests at different times during winter days. It also shows the line of best fit.



(a) Estimate the mass of a goldcrest at 11:30 am.

5.0 g

(b) Estimate how many grams, on average, the mass of a goldcrest increases during one hour.

0.5 g

(c) Which goldcrest represented on the scatter diagram is least likely to survive the night if it is cold?

Show your answer by circling the correct point on the scatter diagram, then explain why you chose that point.

Because it has a lot longer to catch up

Year 8 handling data: meeting 2

Objectives

- To examine teaching that engages the whole class in discussing and interpreting data and drawing inferences
- To review current teaching approaches in the department, identifying changes that might be made and how they can be supported
- To decide on practical steps needed to implement the unit, including adaptations to the materials to meet the needs of different groups of pupils
- To discuss any general implications for the work of the department

Resources

- Equipment: video player, flipchart or whiteboard, computers
- Video sequence 2, 'Episodes from a lesson on interpreting data'
- Data CD set up on computers (one between four teachers)
- OHTs M3.2, M3.3a, M3.3b, P2
- For each teacher, unless indicated otherwise:
 - *Year 8 handling data: mini-pack* (shared if necessary)
 - *Framework for teaching mathematics: Years 7, 8 and 9*
 - Handout HD 2.1, 'Notes for viewing Episodes from a lesson on interpreting data'
 - Current scheme of work for Year 8, including notes for handling data units

Session outline

75 minutes

Teaching style and interaction Discussing teaching approaches and considering possible developments	Video and discussion	35 minutes
Planning the way forward Considering how to use the prepared unit and develop the key ideas	Discussion	30 minutes
Conclusion Considering some general issues arising from the meetings on handling data	Discussion	10 minutes

Teaching style and interaction

35 minutes

Remind everyone of the key points from the last meeting:

- Pupils often encounter difficulties in handling data, such as reading scales, solving problems with several stages, interpreting data and explaining their reasoning.
- The sample unit addresses the whole of the HD cycle, placing emphasis on weaker aspects. For example, the collection of data is addressed in an efficient way, so that more time can be given to interpretation.

Outline the plans for this meeting. As a department you will:

- consider what the sample unit offers in terms of teaching style and interaction, to develop pupils' thinking skills and help them to use and apply mathematics;
- identify practical steps towards implementation;
- reflect on any general implications for the department.

Say that as well as *what* you teach, an important consideration is *how* you teach. A key question is:

How can we engage the whole class in discussion, in order to develop pupils' skills of interpretation and inference?

Explain that in the first part of the meeting you will watch and discuss a video of teaching episodes from a Year 8 lesson. The lesson was from the second week of a unit on handling data. It is a middle set; most of the pupils will be aiming for level 5 in the Key Stage 3 tests the following year.

Distribute **handout HD 2.1** to focus viewing and discussion of the video. Prepare to show **OHTs M3.2, M3.3a, M3.3b** and **P2** during the viewing.

Make notes of key issues that arise during the discussion in order to inform the second part of the meeting.

Planning the way forward

30 minutes

Introduce a discussion with the department as to how you will move forward, including any adaptations to the unit and development of teaching style.

Note the various possibilities for adaptation:

- Use the unit without adaptation.
- Use the unit but adapt the data files to your pupils.
- Use the structure of the unit but incorporate some effective ideas for teaching activities from the department.
- Use the structure of an existing departmental unit but incorporate some ideas from this unit.

Ask the department to explore implications for teaching that emerged from the discussion of the video. Refer to your notes of key issues from the discussion. Questions to consider are:

- How does it compare to our teaching?
- In what ways might we adapt our teaching?
- Is this different for different groups of pupils?

- What are the implications for the department in implementing and supporting these changes?

Say that the department may wish to consider trialing the materials or aspects of teaching style with specific classes before making them available to the whole department. In many schools a key group of pupils are those being targeted to achieve level 5 in the Key Stage 3 tests in Year 9. This group should certainly be included in any trials.

Finally, agree details of any practical tasks that need to be completed:

- concerning the **planning** – for example, files to be prepared, sheets to be duplicated, notes to be adapted;
- concerning the **teaching** – for example, paired teaching, lesson observation;
- concerning the way the unit will be **evaluated** and **reviewed**.

Decide what needs to be done, who will do it and by what date.

If your department has support from a mathematics consultant, you will also want to think about how he or she will contribute to the development.

Conclusion

10 minutes

Allow a few minutes to pick up general points from your meetings. In particular:

- Has video sequence 1 (viewed in the first meeting) stimulated ideas about how pupils' outcomes may be used as evidence for future reviews and auditing?
- Has video sequence 2 (viewed in the second meeting) suggested a model of how to work collaboratively as a department to review teaching styles?

Notes for viewing Episodes from a lesson on interpreting data

Previous work with the class shown in this video sequence has focused on speaking and listening skills. In the lesson from which the following clips were taken the teacher, Andrew, seeks to develop these skills further. For each topic below you will need to:

- look at the resources used;
- watch the video clip, using the prompts as a guide;
- share responses with colleagues.

Making conjectures

Look at OHT M3.2. Watch the first video clip (10 minutes), in which Andrew uses these pie charts with the whole class. Look for explicit strategies used to engage pupils in whole-class discussion, including:

- setting up and managing a 'hide and reveal' activity that uses a sequence of questions to foster conjecture;
- adopting an open questioning style – for example, *Does anybody want to add anything to that? Say a bit more? Any other suggestions?*;
- allowing thinking time and short paired discussion – for example, *Just talk about that for 30 seconds . . .*;
- valuing all contributions and encouraging further conjecture;
- encouraging challenge and debate – for example, *Do you agree? Does anyone disagree?*;
- allowing pupils to repeat and reprocess responses, including introduction of key vocabulary.

Facilitating group work

Look at OHT M3.3a, which forms the basis of a group activity. Watch the second clip (3 minutes), in which Andrew organises the group work. This clip includes some pupils briefly discussing question 1 (Greece v England), and a short episode showing how a group response to question 2 (Shopping centre) is shared with the whole class. Consider this as one way to structure effective group work.

Watch for strategies that:

- encourage collaboration;
- allow risk taking and reprocessing of ideas;
- give practice writing a mathematical argument;
- facilitate quick and effective feedback.

Reflecting on learning

Look at OHT P2. This chart is used in the plenary to the lesson (and can be found on the data CD, Source library / Mobile phones). Watch the third clip (5 minutes), which shows the plenary. Notice how Andrew:

- draws the lesson together and reinforces the use of key words;
- places the lesson within the context of the HD cycle.

Note: The video you have watched is related to a main activity outlined in phase 3 of the unit plan. Video sequence 4, 'Making conjectures using bar charts', shows Andrew working with the same class. This sequence is extra material to be viewed on another occasion. It shows the management of the questioning sequence outlined in phase 3 of the unit plan, for data CD, M3.1 Weather (see OHT M3.1).