

ISBN-10: 1-874428-41-7

ISBN-13: 978-1-874428-41-1

Y8 Yerwat Sample Resources

from the

Y8 Teachers' Resource and Assessment Pack

The topic **“Working with Data”** can be downloaded from the website www.mathsisjugglers.com

You have permission to print this topic for use with your students.

This pack contains the **Teachers' Resources and Assessments** for the topic **“Working with Data”** in the Y8 Framework. **You have permission to print these for use with your students.**



Yerwat

CONTENTS OF THE PACK

Contents and information about the course/material	p2-5
Teachers' Notes and Star Challenge Answers	p6-11
High Level Challenge Answers	p11-12
Worksheets	p13-14
Revision Sheet (<i>The student can check this using the answers on the back.</i>)	p15-16
Assessment (<i>with spaces for answers on the sheet</i>)	p17-18
Assessment Answers and Mark Schemes (<i>Answers are given on a copy of the test itself – this makes marking much quicker</i>)	p19-20
Can-Do Sheet (<i>optional, but it can be a useful two way communication between school and parents</i>)	p21
For many of the Y8 Y8 Framework Topics, there is also an optional Extension Test for able students - these topics are marked E on the CONTENTS list on p2 of each topic.	
Sample EXTENSION TEST (for Topic 5: Working with Numbers)	p22



THE YERWAT GUIDE

For each of the 8 long topics, there is a revision sheet and an assessment in the Teachers' Resource and Assessment Pack - topics marked A. Topics marked E have an optional Extension Test (for able students).

Topic 1: Number Techniques	(12 sections)	07 – 48	A E
Topic 2: Geometry Is ...	(13 sections)	49 – 96	A E
Topic 3: Sequences, Functions and Graphs	(9 sections)	97 – 124	A E
Topic 4: How Likely Is It ?	(4 sections)	125 – 142	
Topic 5: Working with Numbers	(11 sections)	143 – 182	A E
Topic 6: Skills in Algebra	(9 sections)	183 – 214	A E
Topic 7: Areas, Volumes and Other Measures	(9 sections)	215 – 244	A E
Topic 8: Fractions, Decimals and Percentages	(11 sections)	245 – 280	A E
Topic 9: Measurement Skills	(8 sections)	281 – 312	A
Topic 10: Working with Data	SAMPLE	(11 sections) 313 – 344	
Topic 11: Miscellaneous High Level Challenges		345 – 364	
ANSWERS		365 – 382	

97 sections/lessons altogether (+ 8 possible assessments)

Scheduling note: When there is time available at the end of some of the topics, students could go back and do any Star Challenges that they have missed or work on High Level Challenges.

CHOOSE YOUR OWN ORDER OF WORKING THROUGH THE TOPICS

THE YERWAT GUIDE

Each topic is delivered in one-lesson sections with Star Challenges for faster students and/or for homeworks. Any techniques which are mental/oral starters, or those which need teaching, are at the beginning of the section.

At the end of each topic is a section of **HIGH LEVEL CHALLENGES.**

Able students are expected to tackle these Challenges when they have finished a section (rather than moving onto the next section).

They can also do them in their own time.

Some of these challenges have section labels. These indicate which section should have been completed before that challenge should be attempted.

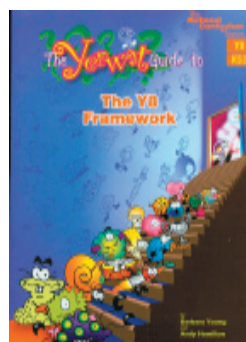
At the end of the book is a section of **MISCELLANEOUS HIGH LEVEL CHALLENGES.**

They are not linked to any topics in the book and can be done at any times and in any order. They range from short problems to fairly lengthy problems, to linked sets of problems.

There are two versions of our Y8 Framework Mathematics Course.

The mainstream course (*The Yerwat Guide*) is suitable for the upper 60% of students.

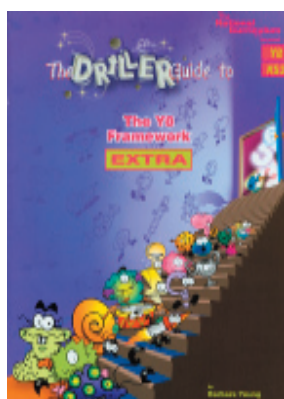
For able students, the *Yerwat Guide* contains **High Level Challenges**, which are linked to the topics being studied, and the **Miscellaneous High Level Challenges**, which are independent of the topics being studied.



A5 text

ISBN-10: 1-874428-41-7

ISBN-13: 978-1-874428-41-1



A4 text

ISBN-10: 1-874428-40-9

ISBN-13: 978-1-874428-40-4

The **EXTRA** course (*The Driller Guide*) is suitable for the lower 50% of students.

For low attainers, the *Driller Guide* develops one idea at a time, before combining several ideas that have just been learnt. It also contains **EXTRA** rote practice exercises.

The Mental Arithmetic Course

At the beginning of each topic is a list of mental/oral techniques to be taught/reviewed alongside the topic.

The techniques taught/reviewed should be repeated regularly over the weeks following their introduction.

Regular mental arithmetic practice makes a very positive start to the lesson – and builds up self-confidence quickly.

The **High Level Challenges** were first used in the highly successful predecessor to *Headbanger*, the *Big Edd Guide*.

At Tarporley High School, students in our two top sets loved them. Almost all top set students did every High Level Challenge. Many completed all 152 of them before the end of the year, and came back and asked for more. (So there are now 200 in *Headbanger*.)

But, unexpectedly, many of the students in our two second sets tackled a lot of these problems with great enthusiasm. These students had successes with puzzles and problems that we had thought well beyond them. Confidence and motivation soared and, later, so did exam results.

Other schools using this material report similar reactions.

Order a **half price** copy of Y8 Yerwat
using the **Special Offer form**
which can be downloaded
from the website
www.mathsisjugglers.co.uk

The DRILLER Guide **EXTRA**

An unusual approach to Mathematics for Low Attainers – that works !!

Students in our lower sets said

“We don’t want a course that only does the easy stuff (a ‘dumbo’ course).

We want to do the same work as everyone else.

- So, will you please:
- make the instructions and explanations clearer
 - introduce ideas more slowly and put in extra steps
 - put in extra practice
 - make the work interesting”

SO WE DID !



Our EXTRA texts for LOW ATTAINERS do not follow the route of so many other texts for these students.

Instead of giving them lots of easy material, we took the syllabus and delivered it in such a way that LOW ATTAINERS could understand and cope with the ideas and techniques.

We gave them what they had asked for !!

But we couldn’t have produced these texts had it not been for the active help of the students themselves. We started with the mainstream texts and students really enjoyed finding out what didn’t work for them - but, more importantly, WHY!! They quickly became expert at pinpointing where the material didn’t work for them and helping to find what would work for them.

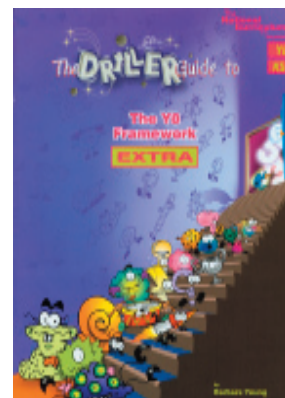
Devising ways that would work took a lot of working/trialling with LOW ATTAINERS, but we ended up with the EXTRA texts – which work exceptionally well, particularly with bottom sets, disaffected students and students at Pupil Referral Units.

This **EXTRA** course :

- has been specially developed for low attainers
- is a version of the Y8 Framework course
- has lots of EXTRA practice on all techniques
- can be run alongside the mainstream course
- can stand on its own
- is suitable for the lower 50% of the ability range

Each student:

- takes responsibility for his/her own learning
- can decide how much practice (s)he needs to do for each technique
- can try Star Challenges when (s)he feels ready for them
- will be capable of taking the mainstream tests



ISBN-10: 1-874428-40-9

ISBN-13: 978-1-874428-40-4

The authors firmly believe that all students can tackle the material in the mainstream course.

However, some students need :

- more time to get to grips with the ideas and techniques involved
- lots of EXTRA practice
- one idea at a time introduced step-by-step
- to meet ideas and techniques over and over again

Most students in lower sets are underachieving.

This course aims to raise the level of achievement of these students.

Students can transfer to or from the mainstream course.

How does the Star Challenge system work ?

The number of stars is a measure of the difficulty of the Challenge.

So, one star denotes a basic fairly easy challenge.

However, students should not be discouraged from attempting any Challenges.

For example, students may earn fewer stars from many two or three star challenges, with partially correct answers.

Students of lower ability can amaze you with what they can achieve, if they really want to tackle problems that you might think beyond them.

A true cautionary tale

Three very low ability students were working together. They had to. Mark was severely dyslexic - he could not read at all. Jason could read very well, but could make no sense of what he was reading. Matthew was very slow at everything. Between them, they could tackle problems.

Jason would read the question. Mark would explain what it was all about. Together the three of them would work out how to solve the problem.

One day they had done all the one star problems. They asked me if they could try the three star problem - The Chest of Drawers. It contained a mixture of fractions and decimals and both cm and mm. My first reaction was to tell them that it was too difficult for them - but I said they could try it, provided they accepted that they might not be able to do it.

About ten minutes later, they brought me the correct answer. I couldn't believe that they had solved such a complex problem. I changed the data (marked below in blue). They were back a few minutes later with the correct answer. Then I made a big mistake. I asked them to tell me how they had worked it out. I couldn't follow their explanation at all !!

From then on I never restricted the choice of Star Challenges of even the least able students.

Star Challenge

The chest of drawers

A chest of drawers 84 cm high has a 42.5 mm top and a 90 mm base. Four identical drawers fit in between, with 22.5 mm between each drawer.

Work out the height of each drawer in cm.

If the 22.5 mm gaps were reduced to 12.5 mm each, what would be the height of each drawer then?

The diagram shows a chest of drawers with a total height of 84 cm. It has a top panel of $4\frac{1}{4}$ cm and a base of 9 cm. There are four drawers in between. The gap between the top panel and the first drawer is $2\frac{1}{4}$ cm. The gap between the last drawer and the base is $2\frac{1}{4}$ cm. A double-headed arrow with a question mark indicates the height of one of the drawers.

What do schools do with the stars students earn for Star Challenges ?

One school:

- gives a house point for each star.
- has a commendation system and awards a commendation for so many stars. They also award stars for effort when the books are taken in each fortnight.
- gives a smiley face for 5 stars
- gives a Mars Bar for 10 stars
- gives a copy of one of a group of Chaos posters for 20 stars (very popular with low attainers)
-

It doesn't matter what you do. It is the sense of achievement that is most important.

However, a system that awards something for so many stars, then starts them collecting the next set of stars, means that students keep track of how many stars they have and how many more they need towards the next 'prize' – instead of (possibly invidious) comparisons of the total number of stars each student has.

Topic 10: Working with Data

Printing List	Page in text	Pack page
D3.1-3.3: Constructing pie charts	321-322	206
D6.3 & *Ch 11: Continuous data	331-332	207

Any techniques which are mental/oral starters, or those WHICH NEED TEACHING, are at the beginning of the section.

Mental arithmetic techniques

Each lesson should start with a brief mental/oral session. As well as developing mental arithmetic expertise and agility, it provides a very positive start for the lesson.

SUGGESTED MENTAL/ORAL TOPICS

The better students should not need to do the easier exercises. For these students, a brief resumé of a technique, done as an oral starter, is all that is required.

For more able students, it should be sufficient just to do orally questions like those in the exercise *or* questions from the exercise.

For less able students, it is suggested that you start orally with questions like those in the exercise, *then* set the students to do the questions in the exercise.

Below is a list of mental techniques that should be practised in mental/oral slots in this topic. Other mental techniques met in this topic will be listed for practice in mental/oral slots in later topics.

1. Mean and range of small sets of data
2. Mode and median of small sets of data
3. Using an assumed mean
4. Maximum and minimum measurements implied by “to the nearest cm” etc
5. Problems involving time, days, weeks ...
6. Simple word problems
7. How many years ago was it in ... and in how many years will it be ... ?

Mental arithmetic techniques should be repeated regularly over the weeks following their review/introduction.

Yerwat direct teaching points

Each section should be delivered in one lesson. Students who complete the section should tackle some of the high level challenges at the end of the topic.

Section 1: Interpreting tables and diagrams

D1.1: Information from pie charts

D1.2: Two way tables

D1.3: Population pyramids

Teaching points : For most students, all three exercises should be self-explanatory.

However, **D1.3** is excellent as the basis of a class discussion.

Both **D1.2** and **D1.3** will probably be new to students.



Compound bar charts

20-21 marks = 2 stars
17-19 marks = 1 star

ERROR: Q6 should be Design and Realisation (not Technology)

1. 10 2. Food Technology 3. 54 4. 59

5. Subject	D & R	IT	Food Tech.	Bus. St.	Textiles
Boys	12	10	12	14	6
Girls	10	10	12	12	15
Pupils	22	20	24	26	21

6. Boys 7. Textiles 8. Business Studies 9. No 10. Business Studies



Temperature-rainfall diagram

All correct = 1 star
Clear explanations 1 star

- Diagram A: Dover High summer temperatures and some rain all year.
 Diagram B: Fort William Most rain of the four charts.
 Diagram C: Newquay Warm summers and mild winters. Rain all year.
 Diagram D: Peterhead Lowest temperatures and relatively dry all year.

Section 2: Constructing tables and diagrams

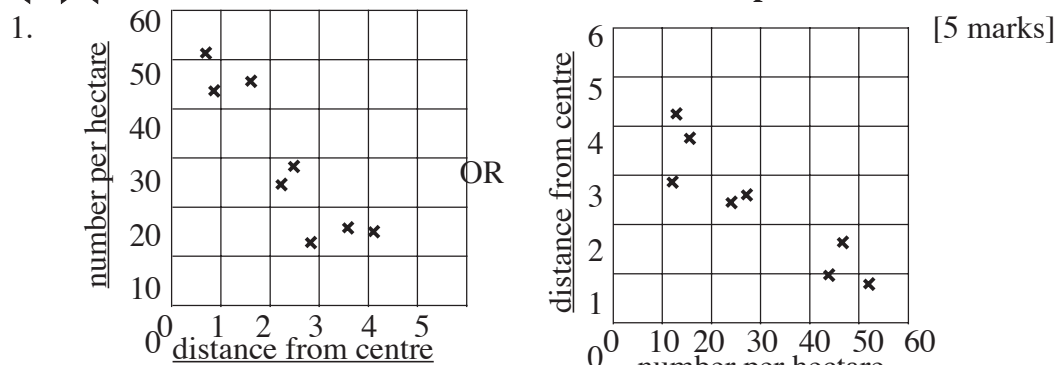
D2.1: Meet the scatter graph

Teaching points : Scatter graphs are unlikely to have been met before this. Suggestion: let the students decide on which labels go where, individually and follow it up with a class discussion of possible explanations. Two way tables (Star Challenge 4) were met in Section 1.



Is there a relationship ?

8 marks = 2 stars
6-7 marks = 1 star



2. Negative correlation [1 mark]
 3. The further you go out from the centre of the city, the less people there are per hectare. [2 marks]

4

Design two-way tables

All correct = 1 star

1.

		Make					
		Ford	Honda	Vauxhall	
colour	silver						
	white						
	red						
						

Each table could also be the other way round.

2.

		Grade							
		A*	A	B	C	D	E	F	G
students	Boys								
	Girls								

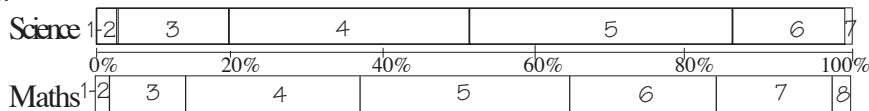
5 5

From one compound bar chart to another

Task 1 correct = 1 star

Task 2 correct = 1 star

Task 1:



The students have been asked to copy the Science chart and DRAW the Maths chart..

Task 2: A is True B is False C is False D is False E is True F is True

Section 3: Constructing pie charts

D3.1: Recognising pie charts

D3.2: Working out simple angles

D3.3: Working out more difficult angles

D3.4: But what if the number doesn't divide into 360 ?

Teaching points : There is a worksheet for **D3.1**, **D3.2**, **D3.3**, which is a structured approach to calculating angles in pie charts. Abler students ought to be able to work through it on their own.

Some students may need to be taught the technique for **D3.3**.

D3.4 extends the techniques to cases where the number doesn't divide into 360. This will need to be taught to most students – and may need to be omitted for less able students.

ERRATA: Question for both Cand D should read "Level 5" not "Level 4".

6 6

The worst joke teller

1 star for questions 1 & 2

1 star for correct pie chart

1. 6.8°

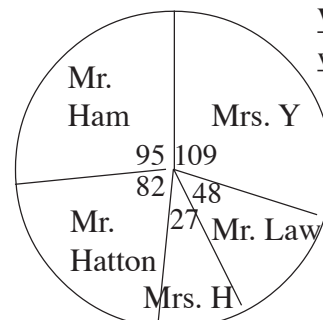
2. Last column is

109°
95°
82°
48°
27°

3.

Pie chart must :

- be accurate
- have angles in sectors
- have sector labels
- have a title



Who tells the worst jokes

Section 8: Displays using ICT may be done any time before the project. Students do NOT need to have done Sections 3-7 before doing section 8.

Section 4: Calculating statistics 1

D4.1: Measures of data

D4.2: Average test marks

Teaching points : This review of finding averages and range should be accessible to most students without further teaching. Star Challenge 7 introduces the students to using working means.

7 **7**

A mean shortcut

8 correct = 2 stars
5-7 correct = 1 star

- (a) 6 (b) 26 (c) 106 2. add 50 to the mean of 4, 5, 6, 6, 9
[In Q 3 & 4, students are asked to show how to use the mean of one set of numbers to find the mean of a second set.]
- The mean of 7, 9, 2 is 6. So, the mean of 807, 809, 802 is $80 + 6 = 86$
- The mean of 5, 7, 8, 4 is 6. So, the mean of 235, 237, 238 and 234 is 236.
- (a) -1 (b) Mean = $100 - 1 = 99$

8 **8**

Passing the course

1 star for Q 1-3
1 star for Q4

- Zuk : 72 Sludge : 73 Gizmo : 69.9
- Only Zuk passed.
- Sludge : scored less than 50 in one exam Gizmo : Mean of 69.9 was below 70
- 77

Section 8: Displays using ICT may be done any time before the project.
Students do NOT need to have done Sections 3-7 before doing section 8

Section 5: Calculating statistics 2

D5.1: Frequency tables for large amounts of data

D5.2: Stem-and-leaf diagrams

Teaching points : Teach students how to find the mean, mode and range from a frequency table. Teach students how to make unordered and ordered stem-and-leaf diagrams. They are unlikely to have met these before.

9 **9**

Reading from stem-and-leaf diagrams

14 marks = 2 stars
10-13 marks = 1 star

- (a) 40-50 days or around 6 weeks [2 marks] (b) median = 42; range = 62 [2 marks]
- (a) 35 [1 mark] (b) 97 [1 mark] (c) Geometry test : more high marks [2 marks]
(d) Geometry test : 28 students End-of-year test : 31 students [2 marks]
(e) Geometry test : 80.5% End-of-year test : 72% [2 marks]
(f) 5 students [2 marks]

10 **10**

Back-to back stem-and-leaf diagrams

12 marks = 2 stars
9-11 marks = 1 star

- | Fathers' ages | Mothers' ages | Key: 3|4 = 34 |
|-----------------|-----------------|---------------|
| (5) 9 7 7 6 3 | 3 4 4 6 7 7 8 9 | (7) |
| (6) 7 3 2 2 2 1 | 4 2 2 3 4 6 9 | (6) |
| (3) 4 2 0 | 5 1 3 | (2) |
| (1) 0 6 | | (0) |
- Overall, the mothers are younger than the fathers. [2 marks]

Section 6: Continuous data

D6.1: What do you get ?

D6.2: Discrete or continuous data

D6.3: Grouping continuous data

Teaching points : For **D6.1**, students should do Task 1 for themselves and then there should be a class discussion of what they have found. Teach that continuous data is data that is measured.

The material on the worksheet (**D6.3** and **Star Challenge 11**) is self-explanatory.

11-11

Continuous challenge

1 star for a correct frequency table
1 star for a correct frequency diagram

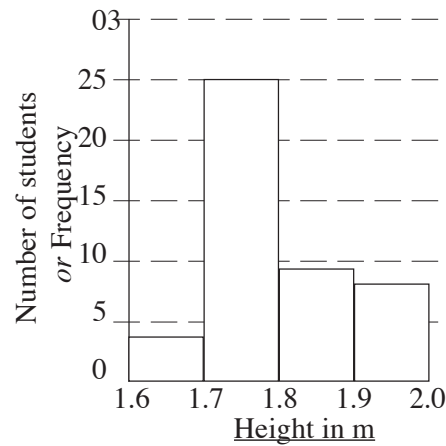
Task 1: (a) 1.62 (b) 1.99 (c)

1.60 → 1.70	3
1.70 → 1.80	20
1.80 → 1.90	9
1.90 → 2.00	8

Task 2:

The frequency diagram must have:

- equal width bars
- a CONTINUOUS SCALE across the bars
- accurate height bars
- sensible scale up the page
- labels on both axes
- title



Heights of students in Maths class

Section 7: Line graphs

D7.1: The temperature chart

D7.2: Water levels

D7.3: Cooling curves

D7.4: What is happening here ?

Teaching points : **D7.1** is a review of ideas met in previous years and should need no teaching.

Suggestion for **D7.2, D7.3, D7.4** : Let students do these exercises with no prior teaching and then discuss their results as a class.

12-12

Bathtime challenge

9-10 correct = 2 stars
7-8 correct = 1 star

Task 1: 1. Graph A 2. Graph D

Task 2: Case 1: G Case 2: D Case 3: C Case 4: B
Case 5: F Case 6: H Case 7: A Case 8: E

Section 8 : Displays using ICT

IMPORTANT : In **Section 8 : Displays using ICT** students display data using pie charts, scatter graphs, frequency diagrams and line graphs using the chart wizard on a computer.

THIS SECTION CAN BE DONE ANY TIME BEFORE THE PROJECT IS STARTED IN SECTION 9.
However, students do not need to have done Sections 3-7 before they do this.

Students will probably need to be taught how to draw to use the wizard to produce each kind of display. There also needs to be a discussion as to which charts can be used to display which of the various kinds of data.

Sections 9-11: The project

D9.1: Related questions is a class discussion.

Here we are setting out some of the basics that need to be addressed before they tackle the project.

The project : The instructions for the project and the mark scheme are clearly set out on page 338 of the text.

HIGH LEVEL CHALLENGES FOR TOPIC 10

Ch 1: Genetic and ordinary fingerprinting

7 correct = 2 stars
6 correct = 1 star

1. (a) 5 (b) none
2. (a) European and African Negro (b) European
(c) African Pygmy and Bushmen (d) Total is not 100%
(e) 15% arches, 35% whorls, 50% loops (f) African Pygmy and Bushmen

Ch 2: Blood typing

All correct = 1 star

- (a) possibly (b) possibly (c) no (d) possibly (e) no (f) possibly

Ch 3: Classifying hazards

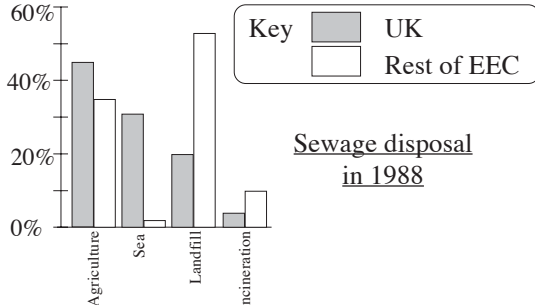
All correct = 1 star

ERRATA:	Storm	1	3	2	5	3
	Tsunami :	2	4	1	4	5

1. Landslide
2. Drought
3. Avalanche
4. Drought, earthquake, Tsunami
5. Characteristic score column: 10 13 11 14 13 16 18 13 16 15
6. Drought, Hurricane, Earthquake/Volcano/Flood, Storm, Landslide, Tsunami/Fire, Avalanche

Ch 4: How do we compare with the rest of Europe ?

1 star for question 1
1 star for question 2

1. (a)  (b) Pie charts should have the following angles:

	UK	Rest
Agriculture	162°	126°
Sea	112°	7°
Landfill	72°	191°
Incineration	14°	36°

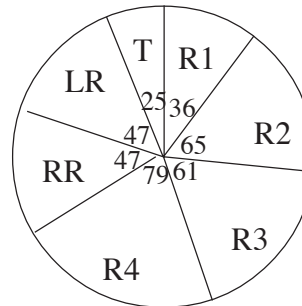
2. The student is asked to write a short paragraph quoting data from the diagrams to either justify or refute the statement: "Britain is the dirty man of Europe".
3. The student has been asked to find more up-to-date data on pollution in Europe and write an article suitable for inclusion in a newspaper on this topic. The article must include data displayed in the form of one or more diagrams.

Ch 5: Running costs of BBC radio in 1986-7

1 star for question 1
1 star for question 2

1. Service	R1	R2	R3	R4	Reg Radio	Local Radio	Transmission
Angle	36°	65°	61°	79°	47°	47°	25°

2. The pie chart must have:
- labels in sectors
 - angle sizes in sectors
 - accurately drawn angles
 - title



Running costs of BBC Radio in 1986-7

All correct = 1 star

Ch 6: Population pyramids for India and Japan

1. women 2. True 3. women 4. False
5. Japan 6. True 7. True 8. False

All correct = 1 star

Ch 7: Fishing for prizes

Kriss : 5.24 kg £5 Sue : 5.36 kg £30 Mark : 5.32 kg £10 Ellie : 5.2 kg £3

6 correct = 2 stars
5 correct = 1 star

Ch 8: Mean golf scores

1. $\frac{3}{9}$ or $\frac{1}{3}$ 2. (a) +9 (b) +12 3. $\frac{12}{18}$ or $\frac{2}{3}$

13-14 marks = 2 stars
10-12 marks = 1 star

Ch 9: Which form pays the best wages ?

1. Best Butties : Mean = £202.50 Range = £45
Super Sarnies: Mean = £205.00 Range = £60 (4 marks)
2. Best Butties (2 marks)
3. (a) Yes, it is close to most of the wages paid. (2 for answer and 2 for explanation)
(b) No, the one very high wage distorts the mean making it much higher than the majority of the wages paid. (2 for answer and 2 for explanation)

5-6 correct = 1 star

Ch 10: Means and medians of grouped data

Task 1: 2.6 Task 2: 3 Task 3: 1) 1 2) 2 3) 8 4) 1.5

6-7 correct = 1 star

Ch 11: Multiple graph

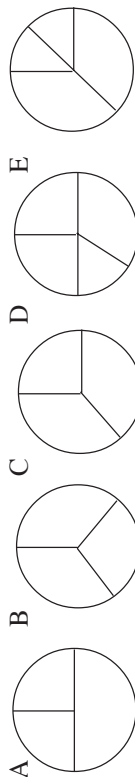
1. Graph A 2. around 50 cm 3. around 4 kg 4. 15-16 years old
5. 6-7 & 12-13 years old 6. She stopped getting taller 7. It should stay level

Section 3: Constructing pie charts

In this section you will find out how to construct pie charts.

DEVELOPMENT

D3.1: Recognising pie charts



Say which pie chart could show each set of information:

- 3 red
3 white
3 blue
pie chart ...
- 3 black
3 white
2 grey
pie chart ...
- 4 black
4 white
8 orange
pie chart ...
- 1 black
3 white
1 green
3 blue
pie chart ...
- 4 black
3 white
3 green
2 yellow
pie chart ...

• Check your answers.

D3.2: Working out simple angles

EXAMPLE 3 red and 1 green



Full circle = 360°

What are the angles for each colour on the pie chart?

Work out the angle for each colour:

- | Colour | Number | Angle |
|--------|--------|-------|
| Black | 1 | ..... |
| Purple | 1 | ..... |
| Red | 1 | ..... |
- | Colour | Number | Angle |
|--------|--------|-------|
| White | 1 | ..... |
| Black | 1 | ..... |
| Orange | 1 | ..... |
| Grey | 1 | ..... |
- | Colour | Number | Angle |
|--------|--------|-------|
| Red | 2 | ..... |
| Green | 2 | ..... |
| Blue | 4 | ..... |
- | Colour | Number | Angle |
|--------|--------|-------|
| Red | 1 | ..... |
| Green | 1 | ..... |
| Blue | 2 | ..... |
| Yellow | 4 | ..... |
- | Colour | Number | Angle |
|--------|--------|-------|
| Orange | 3 | ..... |
| Lemon | 3 | ..... |
| Lime | 6 | ..... |
- | Colour | Number | Angle |
|--------|--------|-------|
| Red | 4 | ..... |
| Purple | 4 | ..... |
| Green | 4 | ..... |
| Pink | 4 | ..... |
- | Colour | Number | Angle |
|--------|--------|-------|
| Yellow | 6 | ..... |
| Green | 6 | ..... |
| Blue | 12 | ..... |

• Check your answers.

D3.3: Working out more difficult angles

EXAMPLE Work out the angles in the pie chart.

Blue	16 pupils
Green	12 pupils
White	8 pupils
Total	36 pupils

1 pupil = $360^\circ \div 36 = 10^\circ$

B: 16 pupils = 160°
 G: 12 pupils = 120°
 W: 8 pupils = 80°

Full circle = 360°

Step 1: Find total number of pupils
 Step 2: Find angle for one pupil
 Step 3: Find angles for each set of pupils

Work out the angles in each pie chart. Fill in the gaps.

- | | |
|--------------|--------------------------------|
| Blue | 20 pupils |
| Orange | 10 pupils |
| Yellow | 6 pupils |
| Total |pupils |
| 1 pupil | $360^\circ \div \dots = \dots$ |
| B: 20 pupils | = |
| O: 10 pupils | = |
| Y: 6 pupils | = |
- | | |
|--------------|--------------------------------|
| Green | 10 pupils |
| Yellow | 8 pupils |
| Total |pupils |
| 1 pupil | $360^\circ \div \dots = \dots$ |
| G: 10 pupils | = |
| Y: 8 pupils | = |
- | | |
|--------------|------------------------------|
| Lemon | 15 pupils |
| Orange | 3 pupils |
| Total |pupils |
| 1 pupil | $= \dots \div \dots = \dots$ |
| L: 15 pupils | = |
| O: 3 pupils | = |
- | | |
|-------------|------------------------------|
| Oak | 3 pupils |
| Elm | 3 pupils |
| Beech | 4 pupils |
| Total |pupils |
| 1 pupil | $= \dots \div \dots = \dots$ |
| O: 3 pupils | = |
| E: 3 pupils | = |
| B: 4 pupils | = |
- | | |
|-------------|------------------------------|
| Trout | 3 pupils |
| Cod | 2 pupils |
| Haddock | 1 pupil |
| Total |pupils |
| 1 pupil | $= \dots \div \dots = \dots$ |
| T: 3 pupils | = |
| C: 2 pupils | = |
| H: 1 pupil | = |
- | | |
|-----------|----------|
| Yes | 7 pupils |
| No | 5 pupils |
| Maybe | 8 pupils |
| Sometimes | 4 pupils |
| Y: | = |
| N: | = |
| M: | = |
| S: | = |

• Check your answers.

D6.3: Grouping continuous data

A golfer hits 60 shots. The distances in metres that he hits each are given below:

104.7 101.1 122.4 103.6 111.2 102.8 105.7 102.4 101.3 124.2
 103.9 112.7 110.0 100.7 105.6 106.2 103.7 113.1 101.8 102.5
 111.6 104.5 105.8 121.0 103.9 104.6 101.3 123.3 101.6 110.0
 102.2 104.8 124.1 141.9 143.1 115.7 141.9 110.7 140.0 113.4
 115.7 146.4 121.9 125.1 123.5 122.2 126.9 121.5 124.8 123.6
 124.3 121.5 122.4 123.9 121.6 122.7 125.8 122.0 121.6 124.7

Task 1: Put this raw data into the grouped frequency table below.

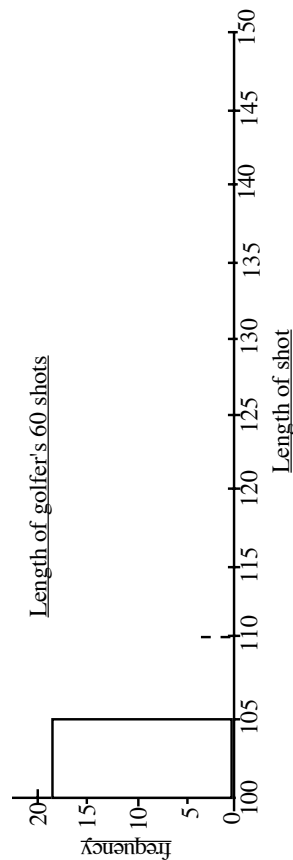
You may cross out each distance after you have put it into the table.

Length of shot	Tally	Frequency
100 --> 105		
105 --> 110		
110 --> 115		
115 --> 120		
120 --> 125		
125 --> 130		
130 --> 135		
135 --> 140		
140 --> 145		
145 --> 150		

READ THIS FIRST!

The top measurement in each group interval is NOT included in the interval.
 105 is in the second interval
 — not the first.
 100 ---> 105 ---> 110 --->
 1st interval | 2nd interval | 3rd ...

Task 2: Draw a frequency diagram for your frequency table, on the diagram below.



Important: For continuous data, the labels do NOT go in the centre of each bar. They make a continuous scale along the axis. This kind of chart is called a **frequency diagram**.

Task 3:

A Y3 class measures how long each child can hold his/her breath.

Length of time in seconds	Tally	Frequency
0 --> 10	||||	4
10 --> 20	|||||	9
20 --> 30	|||||	11
30 --> 40	||||	3

Draw a frequency diagram to show this data. Use the axes below.

Make sure the scale across the page is continuous.

• Check your answers:

Star Challenge

1 star for a correct frequency table
 1 star for a correct frequency diagram.

Continuous challenge

The heights of a class of 40 Mathematics students was measured in metres as:

1.98 1.76 1.83 1.92 1.91 1.74 1.83 1.86 1.99 1.90
 1.79 1.91 1.84 1.81 1.92 1.87 1.78 1.86 1.82 1.69
 1.81 1.78 1.71 1.65 1.73 1.93 1.71 1.77 1.75 1.76
 1.73 1.73 1.71 1.74 1.75 1.62 1.73 1.78 1.71 1.73

Task 1: (a) The lowest height is (b) The tallest height is

(c) Organise this data into a grouped frequency table WITH 4 GROUPS.

Height	Tally	Frequency

Task 2: Draw a frequency diagram to display this data.

Working with Data

REVISION

Name :

Attempt all questions.

WRITE THE ANSWERS ON THIS SHEET.

Sections 1 & 2 (Driller & Yerwat)

1. Whynot School is next year going to add two novelty races to its Sports Day programme.

Each pupil in Y8 can vote for two of these five events:

- Egg and spoon race
- Sack race
- 3-legged race
- Wheelbarrow race
- Backwards race

(a) Which race was the least popular ?

(b) Which two races were the most popular ?

(c) Which tutor group had the most votes for the 3-legged race ?

(d) Which race was the least popular in 8M ?

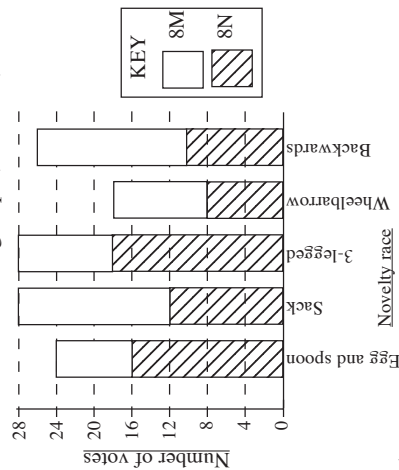
2. The votes of tutor group 8P are shown in the pie chart.

(a) Which race is the most popular with 8P ?

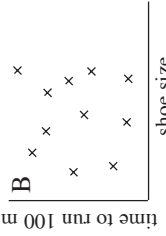
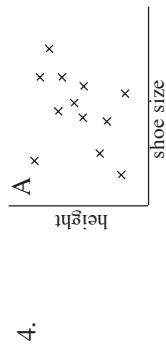
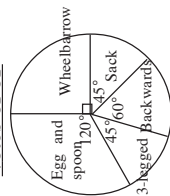
(b) Which two races were equally popular ?

(c) Which race was chosen by a quarter of the pupils of 8P ?

Votes of two tutor groups (8M & 8N)



Votes of 8P



(a) Is there a positive correlation, a negative correlation or no correlation between the shoe size and height ?

(b) Is there a positive correlation, a negative correlation or no correlation between the shoe size and time to run 100 m ?

Section 3 (Driller & Yerwat)

Colour of doors	Frequency
red	2
blue	4
green	5
yellow	7

This information is to be shown on a pie chart. Work out the angle for each colour.

- red =°
- blue =°
- green =°
- yellow =°

Section 4 (Driller & Yerwat)

6. The pocket money of five children in one week was 60p 65p 75p 75p £1

- (a) Mode =
- (b) Median =
- (c) Range =
- (d) Mean =

Section 5 (Driller & Yerwat)

Maths test marks	Key: 611 = 61%
6	1 3 4 8 (4)
7	0 1 2 2 4 9 (...)
8	0 2 3 5 6 7 8 9 (10)
9	0 0 1 1 3 4 7 8 9 (...)

7. (a) Put in the two missing values in the stem-and-leaf diagram.

(b) What was the median mark ?

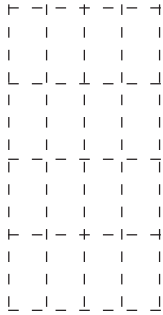
(c) What was the range of marks ?

- (d) How many students took the test ?
- (e) How many students scored less than 75 ?

Section 6 (Driller & Yerwat)

8. The distances thrown in the Y8 Shot Putt on Sports Day

Distance in cm	Frequency
150 →→ 200	1
200 →→ 250	6
250 →→ 300	3
300 →→ 350	2



Draw and label a frequency diagram for this data.

Section 7 (Driller) & Section 4 (Yerwat)

9. Annie and Meera are good 100 m runners. They have both run five races this season.

	Mean time	Range of times
Annie	13.5 s	2.8 s
Meera	13.8 s	1.3 s

- (a) Who is the faster runner ?
 (b) Who is the more consistent runner ?
 What tells you this, the mean or the range ?

Section 8 (Driller) & Section 5 (Yerwat)

Score in football matches	Frequency
0	15
1	23
2	19
3	7
4	3
5	1
6	0
7	1

- (a) What is the modal score ?
 (b) What is the range of scores ?
 (c) Show how to work out the mean score, to 2 d.p.

Mean score

Section 3 (Yerwat only)

11. Rita kept a record of the drinks she had in a school week.

Kind of drink	Number of drinks
Fizzy drink	4
Tea	8
Coffee	2
Milk	5
Water	9

Rita wants to show this information on a pie chart.
 Calculate the angle for each kind of drink, to the nearest degree.

ANSWERS

1. (a) Wheelbarrow race (b) sack race and 3-legged race (c) 8N
 2. (a) Egg and spoon (b) sack race and 3-legged race (c) Wheelbarrow race
 3.

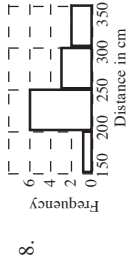
	8M	8N	8P
Egg and spoon race			
Sack race			
3-legged race			
Wheelbarrow race			
Backwards race			

 4. (a) positive correlation (b) no correlation
 5.

red 40°	blue 80°
green 100°	yellow 140°

 6. (a) £1 (b) 75p (c) 40p (d) 80p

7. (a) 6 & 9 (b) 75 (c) 38 (d) 29 (e) 9



8.
 9. (a) Annie (b) Meera ; range
 10. (a) 1 (b) 7 (c) Mean = $106 \div 69 = 1.54$ (to 2 d.p.)
 11. Fizzy 51° Tea 103° Coffee 26° Milk 64° Water 116°

Working with Data

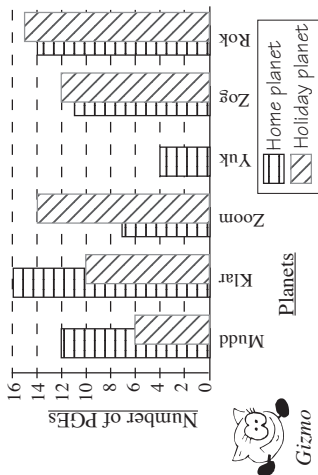
Name:

Attempt all questions.

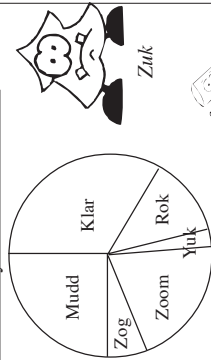
WRITE THE ANSWERS ON THIS SHEET.

Foundation Section: Basic techniques

Survey of home planets and favourite holiday planets



Where would you like to retire to ?



1. These two surveys were done with a group of Pair-Galactic Explorers (PGEs).

- (a) How many Explorers came from Mudd ? (1 mark)
- (b) How many PGEs came from Zoom ? (1 mark)
- (c) Which planet did nobody go to on holiday ? (1 mark)
- (c) Which was the favourite holiday planet ? (1 mark)
- (d) Which was the most popular place to retire to ? (1 mark)
- (e) How many PGEs came from Zog ? (1 mark)
- (f) How many PGEs went on holiday to Rok ? (1 mark)
- (g) Planets to retire to, in order of popularity (most popular first):
 (3 marks)

2. Design a two way table that could be used to get the information used in the two surveys in question 1.



F: %
F+H: %

ASSESSMENT



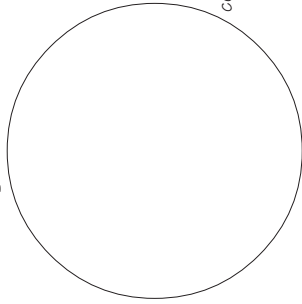
3. Ten PGEs were on their first trip. On the first planet they visited, they saw some really weird animals.

Which animal did you think was the most weird ?



Animal	Yluf	Gzoom	Mara	Jeek
Frequency	1	2	3	6

You are going to show this information on a pie chart. Calculate the angle for each animal (and show working). Draw and label the pie chart. Write the angle sizes on the pie chart.



4 marks for correct angles
2 marks for working
2 marks for correct pie chart

4. Galacton is a very popular board game on Starship 322. This table gives the number of wins last week of the best six Galacton players.

PGE	Idea	Dwork	Fission	Chyyps	Apul	Crumb
Wins	9	3	11	5	5	3

Mode = Median =
Range = Mean =

5. Pair-Galactic Explorers have regular tests to measure their reaction times.

PGE	Sureshot	Spoton	Spottee
Mean reaction time	1.5 s	1.35 s	1.42s
Range of times	0.04 s	0.06 s	0.02 s

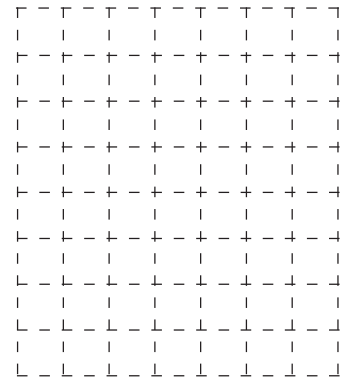


Who has the fastest reaction time ?
What tells you this, the mean or the range ?
Who is the most consistent ?

6 marks

8. The Pan-Galactic Explorers from Klar are very tall. On Starship 322, there are 21 PGEs from Klar.

Height in metrons	Frequency
2.0 → 2.2	4
2.2 → 2.4	5
2.4 → 2.6	7
2.6 → 2.8	4
2.8 → 3.0	1



Draw and label a frequency diagram for this data.

8 marks

9. Music survey on Starship 322

Favourite kinds of music on SS 322	Spark	Folk Funk	Techno Groove	Wild Beat
Number of PGEs	17	13	22	16

Imagine that you are going to display the survey results on a pie chart. Calculate the angle, to the nearest degree, on the pie chart for each kind of music. Show how you work the angles out.

4 marks for correct answers
2 marks for clear working
2 marks for correct rounding

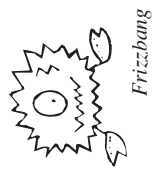
Spark	.....
Folk Funk	.....
Techno Groove	.....
Wild Beat	.....

Higher Section Total = /66 = %

10 marks

6. Targ is a very popular computer game on board Starship 322. Survey: How many games of Targ did you play last week?

Results of survey	Key	112 = 12 games
0	0	3
1	0	1
2	1	3
3	0	1



- (a) Put the correct figures into the brackets. (4 marks)
- (b) How many PGEs took part in the survey?
- (c) How many of these PGEs did not play Targ last week?
- (d) How many played 30 or more games?
- (e) What was the modal number of games?
- (f) What was the median number of games?
- (g) What was the range of number of games?

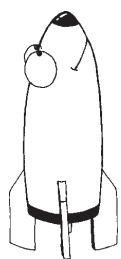
Foundation Section Total = /44 = %

Higher Section: More difficult questions

8 marks

7. Number of trips on Starship 322

Number of trips	Number of PGEs
2	10
3	25
4	21
5	11
6	15
7	20
10	2
12	3



6 marks for correct answers
2 marks for clear working

- (a) Range of number of trips =
- (b) Modal number of trips =
- (c) Mean number of trips = (to 2 d.p.)

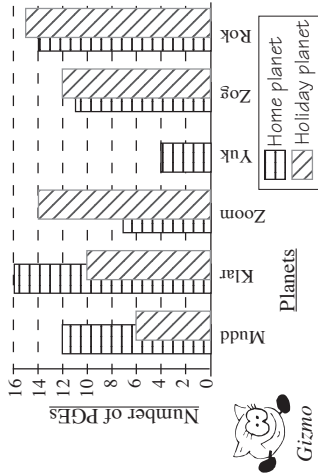
Working with Data

ASSESSMENT ANSWERS

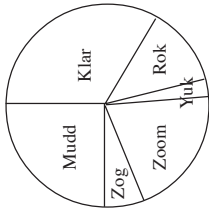
Attempt all questions.
WRITE THE ANSWERS ON THIS SHEET.

Foundation Section: Basic techniques

Survey of home planets and favourite holiday planets



Where would you like to retire to ?



1. These two surveys were done with a group of Pan-Galactic Explorers (PGEs).

- How many Explorers came from Mudd ? **12** (1 mark)
- How many PGEs came from Zoom ? **7** (1 mark)
- Which planet did nobody go to on holiday ? **Yulk** (1 mark)
- Which was the favourite holiday planet ? **Rok** (1 mark)
- Which was the most popular place to retire to ? **Klar** (1 mark)
- How many PGEs came from Zog ? **11** (1 mark)
- How many PGEs went on holiday to Rok ? **15** (1 mark)
- Planets to retire to, in order of popularity (most popular first): **Klar, Mudd, Zoom, Rok, Yulk** (3 marks)

2. Design a two way table that could be used to get the information used in the two surveys in question 1.

	Planets					
	Klar	Mudd	Zoom	Rok	Zog	Yulk
Home planet						
Holiday planet						
Retire to						



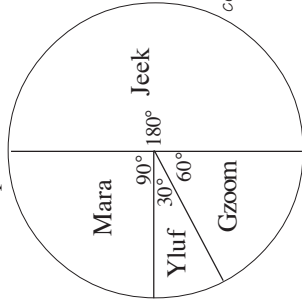
3. Ten PGEs were on their first trip. On the first planet they visited, they saw some really weird animals.

Which animal did you think was the most weird ?



Animal	Yluf	Gzoom	Mara	Jeek
Frequency	1	2	3	6

You are going to show this information on a pie chart. Calculate the angle for each animal (and show working). Draw and label the pie chart. Write the angle sizes on the pie chart.



12 PGEs
 $1 \text{ PGE} = 360^\circ \div 12 = 30^\circ$
 $\text{Yluf} = 1 \times 30^\circ = 30^\circ$
 $\text{Gzoom} = 2 \times 30^\circ = 60^\circ$
 $\text{Mara} = 3 \times 30^\circ = 90^\circ$
 $\text{Jeek} = 6 \times 30^\circ = 180^\circ$

4 marks for correct angles
 2 marks for working
 2 marks for correct pie chart.

Weird animals

4. Galacton is a very popular board game on Starship 322. This table gives the number of wins last week of the best six Galacton players.

PGE	Idea	Dwork	Fission	Chypps	Apul	Crumb!
Wins	9	3	11	5	5	3

Mode = **3 and 5** Median = **5**
 Range = **8** Mean = $36 \div 6 = 6$

5. Pan-Galactic Explorers have regular tests to measure their reaction times.

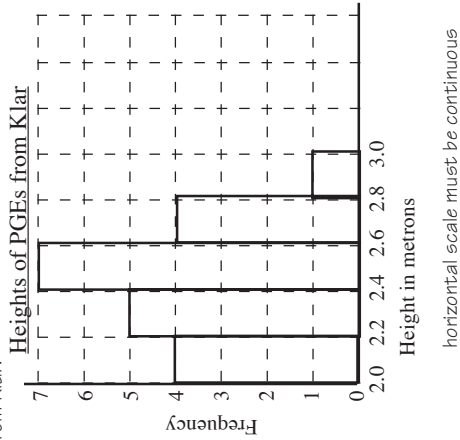
PGE	Sureshot	Spoton	Spottee
Mean reaction time	1.5 s	1.35 s	1.42 s
Range of times	0.04 s	0.06 s	0.02 s

- Who has the fastest reaction time ? **Spoton**
 What tells you this, the mean or the range ? **Mean**
 Who is the most consistent ? **Spottee**



8. The Pan-Galactic Explorers from Klar are very tall. On Starship 322, there are 21 PGEs from Klar.

Height in metrons	Frequency
2.0 → 2.2	4
2.2 → 2.4	5
2.4 → 2.6	7
2.6 → 2.8	4
2.8 → 3.0	1



Draw and label a frequency diagram for this data.

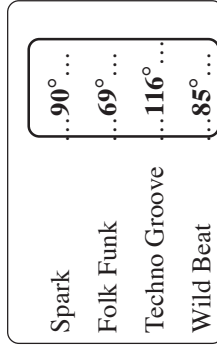
9. Music survey on Starship 322

Favourite kinds of music on SS 322	Spark	Folk Funk	Techno Groove	Wild Beat
Number of PGEs	17	13	22	16

Imagine that you are going to display the survey results on a pie chart. Calculate the angle, to the nearest degree, on the pie chart for each kind of music. Show how you work the angles out.

4 marks for correct answers
2 marks for clear working
2 marks for correct rounding

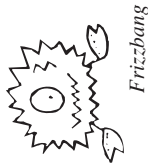
Total number of PGEs = 68
Angle for one PGE = $360^\circ \div 68 \approx 5.29^\circ$
Spark = $17 \times 5.29^\circ \approx 89^\circ$
Folk Funk = $13 \times 5.29^\circ \approx 69^\circ$
Techno Groove = $22 \times 5.29^\circ \approx 116^\circ$
Wild Beat = $16 \times 5.29^\circ \approx 85^\circ$



Higher Section Total = /66 = %

6. Targ is a very popular computer game on board Starship 322. Survey: How many games of Targ did you play last week?

Results of survey	Key	1/2 = 12 games
0	0	3
1	0	1
2	1	3
3	0	0



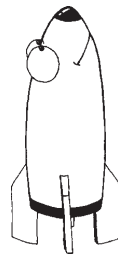
- (a) Put the correct figures into the brackets. (4 marks)
- (b) How many PGEs took part in the survey? **(7)**
- (c) How many of these PGEs did not play Targ last week? **(8)**
- (d) How many played 30 or more games? **(12)**
- (e) What was the modal number of games? **(6)**
- (f) What was the median number of games? **(33)**
- (g) What was the range of number of games? **(2)**
- (6)**
- (26)**
- (23)**
- (34)**

Foundation Section Total = /44 = %

Higher Section: More difficult questions

7. Number of trips on Starship 322

Number of trips	Number of PGEs
2	10
3	25
4	21
5	11
6	15
7	20
10	2
12	3
	107



8 marks for correct answers
2 marks for clear working

- (a) Range of number of trips = **10**
- (b) Modal number of trips = **3**
- (c) Mean number of trips = $520 \div 107 \approx 4.86$ (to 2 d.p.)

Working with Data

Date Name.....

I can do the following :

- read data from charts
- design a two-way table
- calculate angles in pie charts
- work out range and averages
- use mean and range to make comparisons
- read information from stem-and leaf diagrams

	I need	My score	✓
Q1	5/10		
Q2	3/5		
Q3	4/8		
Q4	4/8		
Q5	2/3		
Q6	5/10		

I can do the following :

- read data from charts
- design a two-way table
- calculate angles in pie charts
- work out range and averages
- use mean and range to make comparisons
- read information from stem-and leaf diagrams

	I need	My score	✓
Q1	5/10		
Q2	3/5		
Q3	4/8		
Q4	4/8		
Q5	2/3		
Q6	5/10		

Framework
page reference

p263
p255
p263
p259
p257
p259

Graded by difficulty

Higher Section: Q7

Tick if half
marks, or more,
are achieved.

	fairly difficult	difficult	very difficult	extremely difficult
Q7				
Q8				
Q9				

Title of project:

Mark for project:.....

Pupil's comment:

Teacher's comment:

Parent's comment (optional):

Marks

F: %
F+H: %

signed

signed

Working with Data

Date Name.....

I can do the following :

- read data from charts
- design a two-way table
- calculate angles in pie charts
- work out range and averages
- use mean and range to make comparisons
- read information from stem-and leaf diagrams

	I need	My score	✓
Q1	5/10		
Q2	3/5		
Q3	4/8		
Q4	4/8		
Q5	2/3		
Q6	5/10		

Framework
page reference

p263
p255
p263
p259
p257
p259

Graded by difficulty

Higher Section: Q7

Tick if half
marks, or more,
are achieved.

	fairly difficult	difficult	very difficult	extremely difficult
Q7				
Q8				
Q9				

Title of project:

Mark for project:.....

Pupil's comment:

Teacher's comment:

Parent's comment (optional):

Marks

F: %
F+H: %

signed

signed

