A Complete Guide to ...

Statistics

Utilising the objectives as written in

MATHEMATICS in the New Zealand CURRICULUM

for

Level 4

This resource contains:

- ☑ Table of contents
- ☑ Teaching notes
- ☑ In class activity sheets involving
  - ▫ worked examples
  - ▫ basic skills
  - ▫ word problems
  - ▫ problem solving
  - ▫ group work
- ☑ Homework / Assessment activity sheets
- ☑ Answers

These resources are supplied as PHOTOCOPY MASTERS

Author: A. W. Stark

AWS Publications Ltd
Formerly *AWS* Teacher Resources

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L4MSt

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First Published March 1998

Formatting and publishing by
Andrew Stark

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Note from the author:

This resource ...

*A Complete Guide to Statistics

is one of a series of **FIVE** resources written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 4.

With my experiences as a specialist mathematics teacher, I enjoyed mathematics as a subject, but I am aware that not all teachers feel the same way about mathematics. It can be a difficult subject to teach, especially if you are unsure of the content or curriculum and if resources are limited.

This series of resources has been written with you in mind. I am sure you will find this resource easy to use and of benefit to you and your class.

Resources in this series:

A Complete Guide to Number
written utilising the objectives as stated in
Mathematics in the New Zealand Curriculum for Level 4
Resource Code: L4MN

A Complete Guide to Measurement
written utilising the objectives as stated in
Mathematics in the New Zealand Curriculum for Level 4.
Resource Code: L4MM

A Complete Guide to Geometry
written utilising the objectives as stated in
Mathematics in the New Zealand Curriculum for Level 4.
Resource Code: L4MG

A Complete Guide to Algebra
written utilising the objectives as stated in
Mathematics in the New Zealand Curriculum for Level 4.
Resource Code: L4MA

***A Complete Guide to Statistics**
written utilising the objectives as stated in
Mathematics in the New Zealand Curriculum for Level 4.
Resource Code: L4MSt

For more information about these and other resources, please contact ...

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Acknowledgement:

I would like to thank the staff and pupils of **Mairehau Primary School, Christchurch** for their assistance in making these resources possible.

This resource has been divided into EIGHT sections as listed below.

Although there are no page numbers, the sections follow in sequential order as listed.

Note: **'In-class' Worksheets Masters** are lesson by lesson reuseable worksheets that can be photocopied or copied on to an OHP.

Homework / **Assessment Worksheets Masters** can be used as homework to reinforce work covered in class or they can be used for pupil assessment.

1 Statistics

The following are the objectives for **Statistics**, **Level 4**, as written in the **MATHEMATICS** *in the New Zealand Curriculum* document, first published 1992. ***[REFER PAGE 142]***

Statistical investigations

Within a range of meaningful contexts, students should be able to:

- **S1** plan a statistical investigation arising from the consideration of an issue or an experiment of interest;
- **S2** collect appropriate data;
- **S3** choose and construct quality data displays (frequency tables, bar charts and histograms) to communicate significant features in measurement data;
- **S4** collect and display time-series data.

Interpreting statistical reports

Within a range of meaningful contexts, students should be able to:

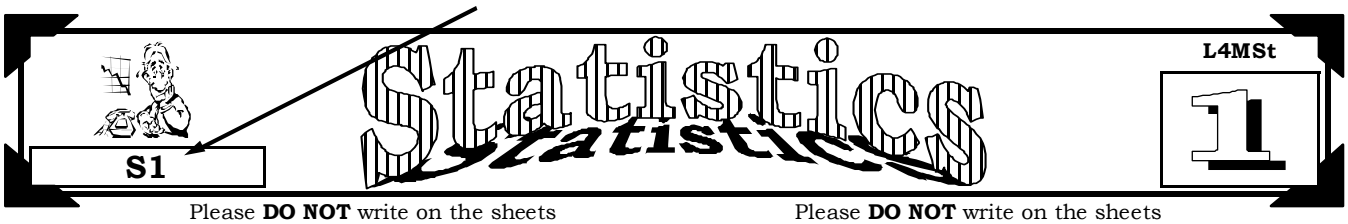
- **S5** report the distinctive features (outiers, cluster and shape of data distribution) of data displays;
- **S6** evaluate others' interpretations of data displays;
- **S7** make statements about implications and possible actions consistent with the results of a statistical investigation.

Exploring probability

Within a range of meaningful contexts, students should be able to:

- **S8** estimate the relative frequencies of events and mark them on a scale;
- **S9** find all possible outcomes for a sequence of events, using tree diagrams.

At the top of each **'In-class' worksheet** and **Homework / Assessment worksheet**, the Statistics objective(s) being covered has been indicated. *EXAMPLE:* **S1** means objective 1, **S2** means objective 2, etc.



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The **Mathematical Processes Skills:** **Problem Solving**, **Developing Logic & Reasoning,** **Communicating Mathematical Ideas,** are learned and assessed within the context of the more specific knowledge and skills of number, measurement, geometry, algebra and statistics. The following are the **Mathematical Processes Objectives** for **Level 4**.

Problem Solving Achievement Objectives ***[Refer page 24]***

- **MP1** pose questions for mathematical exploration;
- **MP2** effectively plan mathematical exploration;
- **MP3** devise and use problem-solving strategies to explore situations mathematically;
- **MP4** find, and use with justification, a mathematical model as a problem-solving strategy;
- **MP6** use equipment appropriately when exploring mathematical ideas.

Developing Logic and Reasoning Achievement Objectives ***[Refer page 26]***

- **MP8** classify objects, numbers and ideas;
- **MP9** interpret information and results in context;
- **MP10** make conjectures in a mathematical context;
- **MP15** use words and symbols to describe and generalise patterns.

Communicating Mathematical Ideas Achievement Objectives ***[Refer page 28]***

- **MP16** use their own language and mathematical language and diagrams to explain mathematical ideas;
- **MP17** devise and follow a set of instructions to carry out a mathematical activity;
- **MP20** record information in ways that are helpful for drawing conclusions and making generalisations;
- **MP21** report the results of mathematical explorations concisely and coherently.

Note:
The codes **MP1**, **MP2**, etc. have been created by numbering the **Mathematical Processes Achievement Objectives** in order as listed in the **MATHEMATICS** *in the New Zealand Curriculum* document. The numbering gaps occur as not all objectives are covered at **Level 4**.
[REFER TO PAGES 23 - 29 OF THE CURRICULUM DOCUMENT]

‘In-class’ Statistics Worksheets
Table of Worksheet Number / Objectives Covered

See the opposite page for details of each objective.

	Statistics Objectives									Mathematical Processes Objectives												
Worksheet Number	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	MP 1	MP 2	MP 3	MP 4	MP 6	MP 8	MP 9	MP 10	MP 15	MP 16	MP 17	MP 20	MP 21
1	✖									✖	✖	✖				✖	✖					
2	✖									✖	✖	✖				✖						
3		✖								✖						✖			✖		✖	
4		✖								✖	✖					✖			✖		✖	
5		✖	✖								✖					✖	✖		✖		✖	
6		✖	✖								✖					✖			✖		✖	
7		✖	✖								✖			✖		✖			✖	✖	✖	
8			✖							✖	✖					✖			✖		✖	
9			✖							✖	✖					✖			✖		✖	
10			✖							✖	✖					✖			✖		✖	
11			✖							✖	✖					✖			✖		✖	
12			✖							✖	✖					✖			✖		✖	
13			✖							✖	✖			✖		✖			✖		✖	
14				✖						✖	✖					✖			✖		✖	
15					✖					✖		✖				✖				✖		
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21								✖				✖				✖						
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23									✖	✖		✖				✖	✖				✖	
24									✖	✖		✖				✖	✖				✖	
25									✖	✖	✖	✖				✖	✖		✖		✖	

Table of Contents for the 'In-class' Worksheet Masters for Statistics, Level 4

Please **DO NOT** write on the sheets Please **DO NOT** write on the sheets

Introduction to statistical investigations:

If a crime is committed, the police will do an investigation, by asking questions of the people involved, to find out what happened. In a **statistical investigation** questions will also be asked and i**nformation** or **data** collected.
Example: "50% of the pupils at Carrington School bike to school", stated Kate.

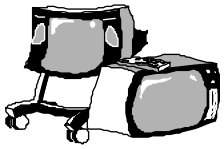
Discuss how Kate could have collected this information, to be able to make this statement. What questions would she have asked? Who would she have asked?

Task 1

Before conducting a statistical investigation, there are some **important statistical words** that need to be understood. **Copy** and **complete** sentences 1 to 7 by adding a **statistical word** from the list below.

random **population** **biased** **sample** **questionnaire** **representative sample** **survey**

1. In statistics, a group of anything such as the pupils at your school is called a ..... .
2. A .....is part of the population we are interested in.
3. If we wish to comment about a population, we often ..... a population or a sample of the population.
4. For the results of a survey to apply to that population, the sample must be a ..... .
5. A sample that is not a representative sample is called a ..... sample.
6. A ..... sample means that every person, or item, has an equal chance of being chosen.
7. A ..... is one way of obtaining people's opinions.
8. **List** 5 examples of **populations**, remembering that a population does not have to be people.
   Example: The trees in the school playground.
9. From your answers in question 8, **name** a **sample** of each population that could be surveyed.
   Example: The trees under 2 metres tall.
10. Why is it sometimes easier to **survey** a **sample** of a population, rather than the whole population?



At Carrington School, there are 100 boys and 80 girls. Only 10% of the pupils are chosen to answer a survey about their favourite televison programme.

11. How many boys and how many girls should be surveyed so that those pupils surveyed are a **representative sample** of this population?

As well as the 180 pupils, from 127 families, at Carrington School, there are 8 teachers, 1 principal, 2 office staff and a caretaker. The school uniform is going to be changed.

12. If only the teachers were asked about the uniform changes, why is this a **biased sample**?
13. Who should be asked about possible uniform changes, so that the opinions are not biased?
14. **List** 3 ways a **random sample** of the 180 Carrington School pupils could be selected.

Task 2

Working in a small group, decide on **5 important issues** that you could investigate.

Points to consider when carrying out an investigation:

- **A:** **Decide** on the purpose of your investigation.
- **B:** **Decide** what data needs to be collected and how it is going to be collected.
- **C:** **Collect** and **organise** the data.
- **D:** **Interpret** the data and draw conclusions from it.
- **E:** **Write** a **report** based on your investigation.

Discuss how you are going to **complete** the **first 3 points** above. **Compare** your methods with other groups.

Designing a questionnaire:

A **questionnaire** is used when we are asking opinions about an issue.
The **design** of a questionnaire, that is, the way the questions are worded, the way the answers are to be given and the overall look or layout of the questionnaire is most important.

Some **points** to consider about **designing a good questionnaire** would be ...

- ☑ What questions relating to the 'issue/s' are you going to ask?
- ☑ Do not ask questions that are not important to the issue.
- ☑ Make the questions clear and concise and not too many of them.
- ☑ How are these questions going to be answered?
  Example: multi-choice, single words, short answers or long answers.
- ☑ Have you allowed for every possible answer?
- ☑ Do you need to give instructions as to how the questionnaire has to be filled out?
- ☑ How are you going to organise and display the data you have collected?

Discuss other points that might be important when designing a questionnaire.

Task 3

A new teacher in Room 10 wanted to know more about the pupils in his class.
He asked pupils to answer the questions below, which require only **'Yes'** or **'No'** answers.
Record your answers to these questions.

1. *Were you born in New Zealand?*
2. *Have you lived in New Zealand all your life?*
3. *Can you speak more than one language?*
4. *Do you enjoy mathematics?*

5. **Make up** 5 more **'Yes'** or **'No'** questions that the teacher might ask.

He then asked some more questions that required answers other than 'Yes' or 'No'.
Record your answers to these questions.

6. *How old are you?*
7. *In which month is your birthday?*
8. *What is your favourite T.V. programme?*
9. *What is your favourite sport?*

For some questions, being given a choice of answers is a good idea. **Record** your answers to these questions.

10. *How do you travel to school?*

walk	bike	bus	car	other

11. *How far do you travel to school?*

less than 1 km	1 km to 2 km	2 km to 3 km	more than 3 km

12. **Make up** 5 more questions that cannot be answered by **'Yes'** or **'No'** answers.
Supply a choice of answers for your questions.

Task 4

Working in a small group, **choose one** of the **issues** you discussed in **Task 2, Worksheet 1**.

Who are you going to survey to gain opinions or ideas about the issue you are investigating?

Design a questionnaire for your sample population to fill out. How are you going to get them to fill it out?

Include questions in your questionnaire that require a **'Yes' / 'No'** answer, some **word answers** and / or answers where the **choices** are given.

Discuss how the data collected could be organised and presented.

Collecting and organising discrete data using a frequency table:

There are **two types** of data that can be collected, **discrete** data and **continuous** data.
A **frequency table** (tally chart) is a good way to organise both types of data as the data is being collected.

Discrete data is data that is **obtained by counting**.
Example: John records the number of people in cars as the cars go past the school gate.

Example: This frequency table shows the results of John's survey.

How many cars had only one person?

Answer: 10 cars.

Number of people	Tally	Frequency
1	𝍸 𝍸	10
2	𝍸 III	8
3	IIII	4
		22

The total of the **frequency column** is 22.

What does this tell us?

Answer: There were 22 cars in John's survey.

What other information is contained within this frequency table?

Continuous (measurement) **data** is **obtained by measuring** and will be looked at in **Task 11, Worksheet 7**.
Example: Amanda measured the height of her younger sister every week.

Task 5

The following data shows the number of spelling mistakes that pupils in Room 10 made in a spelling test of 20 words.

1, 2, 1, 0, 3, 4, 2, 1, 0, 0, 1, 2, 3, 1, 4, 2, 1, 2, 3, 4, 0, 2, 2, 1, 2, 2, 3, 1, 0, 3, 2, 3, 1

Number of spelling mistakes	Tally	Frequency
0		
1		
2		
3		
4		

1. **Copy** and **complete** the frequency table.
2. What was the most common number of mistakes made?
3. How many pupils sat the spelling test?

Pupils in Room 9 were surveyed to find out how they travelled to school and how far away from school they lived (measured to the nearest km). Below are the results of the survey.

walk 1km, bike 2km, car 5km, walk 2km, bike 3km, bus 7km, bus 5km, walk 1km, bike 2km, car 6km, walk, 2km, bike 3km, walk 1km, bus 4km, walk 2km, bike 2km, walk 1km, walk 1km, bike 3km, walk 2km, bus 6km, car 4 km, walk 2km, bike 3km, walk 1km, bus 7km, bike 5km, walk 2km, bus 6km, car 5km, bike 2km, walk 1km, bike 3km, walk 1km

4. **Organise** the results of this survey into **two frequency tables**.
5. How many pupils in Room 9?
6. **Study** the results in both frequency tables, then write a statement about the 'average' Room 9 pupil - how he/she travels to school and how far she/he has to travel.

7. **Conduct** a similar survey of the pupils of your class and organise and display your results in two frequency tables.

Task 6

Look at the **questions** in the questionnaire you created in **Task 4**, **Worksheet 2**.

For some of your questions, using a **frequency table** may be a good way to collect and organise the data.

Create frequency tables for those questions, then **collect** the **data** using your frequency tables.

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Organising grouped discrete data:

To avoid having too many rows in a frequency table, the data can be grouped into categories or **class intervals**. Usually 6 to 7 class intervals is the maximum number to have in any one frequency table.

Each category or **class interval** should be the **same width**.

Example: The number of toys sold each hour at a local toy shop has been recorded in this frequency table.

Number of toys sold each hour

Class Interval	Tally	Frequency
1 - 5	𝍸 II	7
6 - 10	𝍸 IIII	9
11 - 15	𝍸 III	8
16 - 20	𝍸	5
21 - 25	I	1
		30

Which numbers would be recorded in the class interval 6 - 10?

How many times were less than 11 toys sold in an hour?

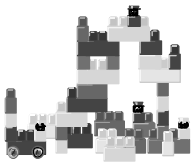
Answers: The numbers 6, 7, 8, 9 and 10 would go in the 6 - 10 class interval.
On 16 occasions, less than 11 toys were sold in an hour.

What other information is contained within this frequency table?

Task 7

The following data shows the number of Lego blocks used to create some models made by pupils in Room 7.

12, 26, 31, 28, 25, 19, 14,
11, 21, 29, 30, 24, 16, 18,
23, 14, 13, 31, 22, 29, 20,
23, 17, 12, 23, 29, 21, 34



Number of Lego blocks used

Class Interval	Tally	Frequency
11 - 15		
16 - 20		
21 - 25		
26 - 30		
31 - 35		

1. **Copy** and **complete** the frequency table, recording the numbers in the appropriate class interval.
2. What was the most common class interval?
3. How many pupils used less than 21 blocks in their models?
4. How many pupils used more than 25 blocks?
5. How many pupils in Room 7?

This data shows the points scored by the pupils in Room 8 in a school speech competition, entitled '*A famous person I admire*'.

15, 21, 18, 22,
29, 30, 18, 16,
23, 29, 24, 11,
19, 17, 22, 17,
11, 27, 26, 21,
23, 19, 18, 14

6. **Organise** this data in a frequency table using the class intervals 11 - 15, 16 - 20, 21 - 25 and 26 - 30.
7. What was the top mark in the speech competition?
8. How many pupils scored more than 20?
9. How many pupils entered the competition?

This data shows the number of trees planted in the gardens of houses along one street.

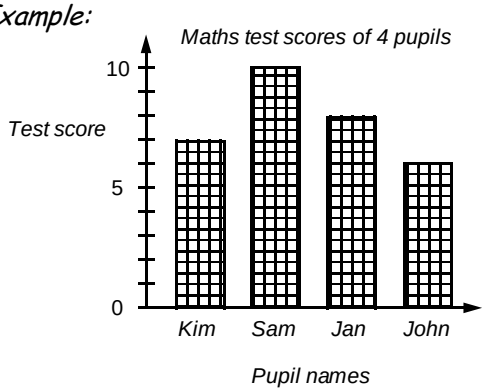
5, 12, 8, 18, 9,
17, 6, 9, 12, 17,
6, 13, 11, 3,
18, 14, 12, 20,
9, 9, 12, 17, 3,
8, 15, 9, 17, 9

10. **Organise** this data in a frequency table using 4 class intervals.
11. What was the most common class interval?
12. How many gardens had less than 11 trees?
13. How many gardens had more than 10 trees?
14. How many houses were surveyed?

Displaying ungrouped discrete data as a column graph:

Ungrouped discrete data, organised using a frequency table, can be displayed as a **column graph**.

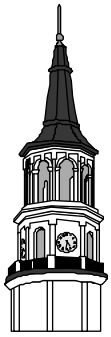
Example:



All column graphs should have ...

- ☑ a **title** or name,
- ☑ a **label** on each axis,
- ☑ a **scale** on the frequency axis (vertical axis),
- ☑ all **columns** should be the **same width**.

All column graphs MUST have gaps between the columns.



What other information is contained within this column graph?

Task 8

This frequency table shows the goals scored by 5 players in Western Soccer Club during one season.

Player's Name	Number of goals scored
Simon	7
Mark	3
Steven	9
Rangi	5
David	8

1. **Create** a **column graph** to display these results.
2. Who scored the most number of goals?
3. How many goals did Rangi score?
4. Who scored 3 goals?
5. How many goals did these 5 Western Soccer Club players score in this season?

Michelle asked pupils in her class three questions:

1. How many brothers and / or sisters do you have?
2. In which month of the year is your birthday?
3. If you had to make a choice between having a cat or a dog as a pet, which pet would you choose?

Below are the results of her survey, in the order the questions were asked.

6. How could Michelle improve the way she recorded this data?

2, September, cat	3, March, dog	1, January, cat	2, September, cat	0, May, dog	4, September, cat
3, June, cat	2, September, cat	1, August, dog	3, July, cat	4, March, cat	2, March, dog
2, December, dog	1, June, cat	0, March, cat	2, October, cat	0, May, cat	1, April, cat
2, August, dog	3, February, cat	2, November, cat	3, January, dog	2, July, cat	3, September, dog
2, October, dog	1, April, cat	2, August, dog	4, December, dog	2, May, cat	0, April, dog

7. **Reorganise** Michelle's survey results into **3 frequency tables**.
8. **Draw 3 column graphs** to display these results.
9. **Write several statements** about the pupils in Michelle's class, based on the data Michelle collected.

Task 9

Create column graphs from the frequency tables created in **Task 5, questions 1 and 4**, **Worksheet 3**.

Look back at the frequency tables you used to collect and organise data from your questionnaire.
Create column graphs from the frequency tables you created in **Task 6, Worksheet 3** (if appropriate).

Displaying grouped discrete data as a histogram:

Grouped discrete data, organised using a frequency table with class intervals, can be displayed as a **histogram**. A histogram is like a column graph without the gaps.

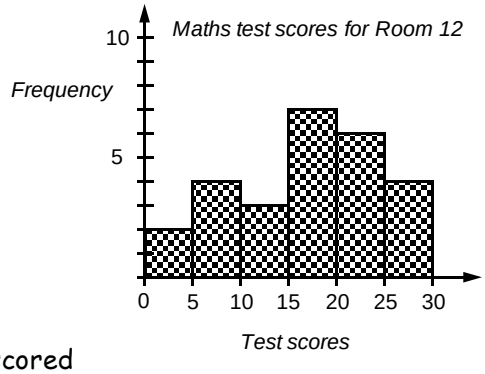
Continuous (measurement) **data** can also be displayed as a **histogram** (See **Task 11, Worksheet 7**).

Example: The results of a class test are shown in this **frequency table** and drawn as a **histogram**.

Test scores	Frequency
0 - 4	2
5 - 9	4
10 - 14	3
15 - 19	7
20 - 24	6
25 - 30	4
	26

How many pupils scored between 10 and 14 marks in the test?

How many pupils got exactly 23 in the test?



Answers: 3 pupils scored. It is impossible to tell if any pupils scored exactly 23. We can only say that 6 pupils scored between 20 - 24.

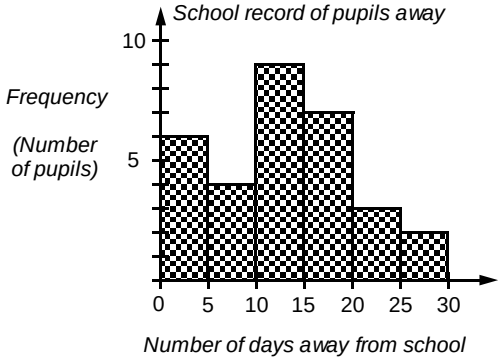
All histograms should have ...

- ☑ a **title** or name,
- ☑ a **label** on each axis,
- ☑ a **scale** on each axis,
- ☑ **class intervals** that have the same interval,
- ☑ all **columns** should be the **same width**.

A histogram DOES NOT have gaps between the columns.

Task 10

Every school has to keep a record of pupils who are absent from school.



This **histogram** shows the number of days pupils were away from school in one year, for a small country school.

1. How many pupils were away for less than 5 days?
2. How many pupils were away for more than 9 days but less than 15?
3. Which class interval shows that 9 pupils were away?
4. How many pupils were away for more than 20 days?

5. **Draw** a **histogram** from the **grouped data** contained in this frequency table.

Points scored in a test

Score	Frequency
1 - 10	5
11 - 20	6
21 - 30	10
31 - 40	7
	28

6. **Organise** this data into a frequency table using 4 class intervals of 10.

Points scored by Room 8 pupils in a speech competition

21, 35, 20, 40, 19, 41, 32, 28, 33, 24, 27, 17, 49, 23, 24, 47, 36, 24, 22, 37, 11, 24, 29, 45, 37, 20, 36, 17, 45, 29

7. **Draw** a histogram to display these results.
8. What were the top and bottom scores?
9. Which class interval was the most common?

10. **Collect** some grouped discrete data of your own and **draw histograms** to display your data.

Collecting and organising continuous data using a frequency table:

The second type of data that can be collected is called **continuous data**.

Continuous data is obtained by measuring. Because continuous data can take on any value, it is recorded in frequency tables that have **class intervals**, similar to frequency tables for grouped discrete data.

Example: The height of pupils in Room 8 are shown in this frequency table.

What range of heights would appear in the class interval 1.40m — ?

Answer: Any heights ranging from 1.40m to 1.499m, that is, just below 1.50m.

Although we know that 8 pupils were in the class interval 1.40m —, we do not know their exact heights.

Height of pupils in Room 8

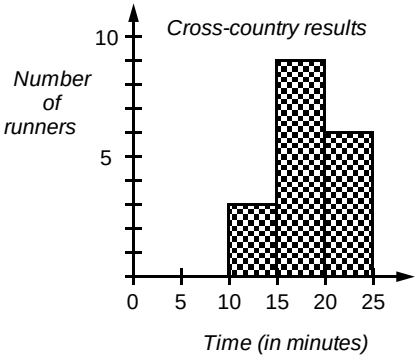
Height (m)	Tally	Frequency
1.30m —	𝍸 I	6
1.40m —	𝍸 III	8
1.50m —	𝍸 IIII	9
1.60 - 1.70m	𝍸 II	7
		30

What other information is contained within this frequency table?

Task 11

This **histogram** shows the results of a school cross-country race.

1. How many runners ran the course in under 15 minutes?
2. How many runners took longer than 20 minutes to run the race?
3. How many runners ran the race?



Each year there is a salmon fishing competition at the Rakaia river.
The data below shows the weight of each fish caught during the competition.

Fish weights for the Rakaia Salmon Competition (kg)

2.5, 1.8, 3.1, 2.7, 2.4, 1.6, 5.1, 4.6, 2.9, 3.7, 4.1, 3.0, 2.9, 1.7, 3.6, 2.1, 4.9, 5.3, 3.7, 4.2, 5.7, 1.9, 5.8, 4.7, 3.4, 2.1, 3.9, 3.8, 4.6, 1.7, 2.6, 3.2, 1.9, 4.3, 3.7, 1.2

4. **Organise** this data into a frequency table with class intervals 1.0kg —, 2.0kg —, 3.0kg —, 4.0kg — and 5.0kg — 6.0kg.
5. **Draw** a **histogram** to display this information.
6. What was the heaviest fish in the competition?
7. How many fish were lighter than 4.0kg?
8. How many fish were caught in this competition?
9. How many fish were heavier than 5.0kg?

Task 12

Collect some **continuous** (measurement) data of your own, recording the data in a frequency table.
Decide on no more than 7 appropriate **class intervals** for each set of data you collect.

Example: The height of pupils in your class.
The weight of various sizes of apples, fruit or vegetables.
The volume of water various containers will hold ... etc.

Try to obtain at least 20 measurements for each set of data.

Draw histograms to display your results.

Creating stem and leaf graphs:

Just as tally charts and frequency tables can be used to record data as it is being collected, so too can a **stem and leaf graph** be used this way.

Example: Pupils in Martin's class were asked the day of the month that their birthdays were on. As they called out the dates, Martin recorded the dates using a stem and leaf graph.

Birthday dates for pupils in Martin's class

0	8, 9, 4, 3, 1, 7
1	9, 8, 2, 0, 6, 7, 6
2	8, 4, 3, 1, 6, 7, 2, 0
3	0, 1, 0, 1

The numbers 0, 1, 2 and 3 written between the parallel lines, form the **stem** part of the graph.

The numbers outside the parallel lines form the **leaf** part of the graph. **Leaf numbers** are usually written as single digits.

The first row of numbers shown by this graph are 8, 9, 4, 3, 1 and 7.
The fourth row of numbers are 30, 31, 30 and 31.

List the numbers that are in the 20's. Answer: 28, 24, 23, 21, 26, 27, 22 and 20.

A **back-to-back** stem and leaf graph has **'leaf'** numbers on both sides of the **'stem'** numbers. This type of graph can be used when comparing two sets of scores.

Task 13

List the numbers that are represented in these **stem & leaf graphs**, then answer the questions below.

1. *Test results for Room 9 pupils*

4	4, 1, 5, 9, 5, 0
5	0, 2, 8, 7, 2, 9, 1
6	2, 5, 1, 8, 7, 1, 6, 1
7	8, 2, 3, 7

2. *Cost of buying lunch ($)*

0	8, 9, 7, 6
1	5, 3, 9, 1, 3, 8, 0, 8
2	9, 0, 3, 4, 5, 7, 3
3	1, 0, 4, 5

3. *Time taken to run a race (seconds)*

10	4, 8, 9
11	1, 5, 7, 8, 9
12	1, 2, 2, 6, 7, 8, 9
13	3, 4, 5, 7, 9, 9

4. How many pupils sat the test in Room 9?
5. What were the most expensive and the least expensive lunches bought?
6. Convert the fastest and slowest times for this race into minutes / seconds.

Pupils in Room 10 had their heights measured in metres. The results are shown in Box A.

Box A

1.35, 1.27, 1.41, 1.19, 1.23, 1.34, 1.37, 1.27, 1.26, 1.29, 1.46, 1.15, 1.37, 1.42, 1.37, 1.32, 1.29, 1.43, 1.21, 1.19

7. **Create** a stem & leaf graph, using the numbers 1.1, 1.2, 1.3 and 1.4 as the stem numbers, to display these results.
8. What were the tallest and shortest heights?
9. How many pupils were measured?

Pupils in Room 7 sat an English test and a Mathematics test. Both tests were marked out of 50. The results are shown below.

10. **Organise** this data as a **back-to-back** stem & leaf graph.

English test results

45, 32, 9, 13, 26, 45, 37, 15, 50, 38, 31, 27, 8, 14, 49, 41, 30, 29, 19, 17, 22, 9, 27, 25, 44, 28

Mathematics test results

35, 17, 50, 44, 25, 47, 38, 39, 21, 50, 9, 22, 49, 30, 24, 8, 20, 23, 45, 49, 31, 32, 47, 35, 43, 50

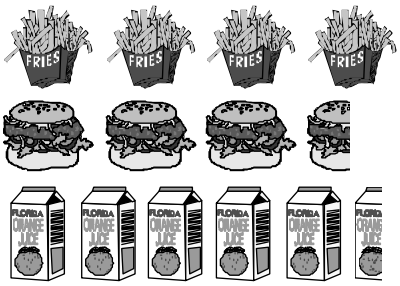
11. Look at the stem & leaf graph you have created and comment about the results of the two tests.

12. **Collect** your own data and present your data as **stem & leaf graphs**.

Creating pictograms:

Discrete data that has been collected using frequency tables can be represented as **pictograms**.
Example: This pictogram shows the number of each food item sold during one lunchtime at a local shop.

Food items sold



Key
= fries
= hamburgers
= juice
Each picture = 10 items

Pictograms represent data with pictures.

All **pictograms** should have …

- a title or name,
- a key,
- a scale stating the value of each picture.

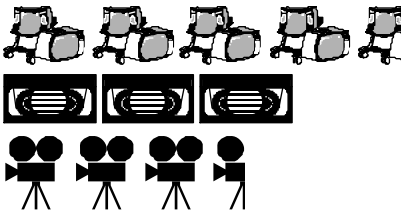
From this pictogram we can work out that 40 cartons of fries were sold.
Were there 25, 35 or 45 hamburgers sold? Answer: 35 hamburgers

What other information is contained in this pictogram?

Task 14

A survey was conducted to find out if people preferred to watch TV, watch a video or go to the movies. This pictogram displays the results.

What people perferred to watch



Key
= television
= videos
= movies
Each picture = 12 people

1. How many people does each picture represent?
2. How many people preferred to watch a video?
3. How many people preferred to go to the movies?
4. How many people were surveyed?

A second survey 6 months later was conducted, with the following results. 72 people preferred watching TV, 42 people preferred watching videos and 66 people preferred to go to the movies.

5. **Draw** a **pictogram** to display these results.
6. How many people were surveyed this time?

Draw pictograms for the data contained in these frequency tables. **Comment** about each graph.

7. Survey on pupils' shoe sizes

Shoe size	F
6	18
7	24
8	12
9	9

8. Weather conditions recorded for 50 days

Weather	F
sunny	16
cloudy	20
raining	12
snowing	2

9. Number of each type of book sold

Type of book	F
adventure	80
nature	120
fiction	140
travel	60

10. **Collect** your own data and present your data as **pictograms**.

Task 15

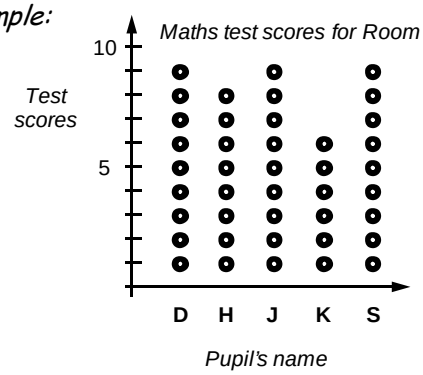
Create pictograms from the frequency tables created in **Task 5, questions 1 and 4**, **Worksheet 3**.

Look back at the frequency tables you created to collect and organise data from your questionnaire.
Create pictograms from the frequency tables you created in **Task 6, Worksheet 3** (if appropriate).

Creating dot plot graphs:

Just as tally charts, frequency tables and stem & leaf graphs can be used to record data as it is being collected, so too can a **dot plot graph** be used this way. A new dot can be added at any time.

Example:



All **dot plot** graphs should have …

- a title,
- a label on each axis,
- a scale on the frequency axis.

From this graph we can read the scores as follows …
(D) David scored 9, (H) Helen scored 8, (J) John scored 9, (K) Ken scored 6 and (S) Sam scored 9.

Task 16

Draw dot plot graphs for the data contained in these frequency tables. **Comment** about each graph. Remember to choose an appropriate scale on the frequency (vertical) axis.

1. Number of pupils away

Day	F
Monday	5
Tuesday	9
Wednesday	3
Thursday	8
Friday	4

2. Number of cars of each colour sold

Colour	F
red	50
white	100
blue	70
grey	90
yellow	30

3. Pupils' scores in a Maths test

Name	Score
David	10
Jason	8
Karen	6
Jackie	9
Andrew	7

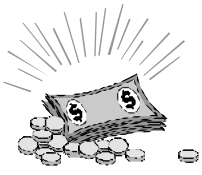
At a local restaurant orders were being taken for dinner using the menu below.

(S) Soup	$4.50
(G) Garlic Bread	$2.95
(C) Chicken	$11.95
(P) Pork	$12.95
(F) Fish	$10.95
(A) Apple Pie	$6.50
(I) Ice-cream	$3.95

The orders are shown in this table below.

S, G, P, I	**G, C, A, I**	**S, G, F, I**	**S, P, A, I**	**G, F, A, I**
S, G, F, I	**S, C, I**	**S, G, C, A**	**S, F, A, I**	**S, F, I**
G, C, A	**G, P, A, I**	**S, G, P, A**	**S, C, A**	**G, F, A, I**
S, G, C, I	**S, G, F, A**	**S, P, A, I**	**G, C, A, I**	**S, G, C, I**
G, P, I	**S, G, C, A**	**S, G, F, I**	**S, G, P, I**	**G, C, A, I**

4. **Organise** this data into a **dot plot graph**.
5. How many people ordered chicken?
6. What was the most popular food item ordered ?
7. How many people ordered pork?
8. Jan has $40.00 If she ordered **S, G, C, A** and **I** what would it cost her and how much money would she have left?
9. List what you would order and how much it would cost.
10. **Collect** your own data and present your data as **dot plot graphs**.



Task 17

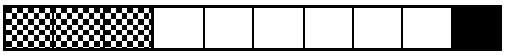
Create dot plot graphs from the frequency tables created in **Task 5, questions 1 and 4, Worksheet 3**.

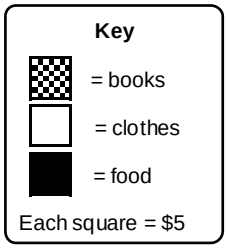
Look back at the frequency tables you created to collect and organise data from your questionnaire.
Create dot plot graphs from the frequency tables you created in **Task 6, Worksheet 3** (if appropriate).

Creating strip graphs / percentage bar graphs:

In a **strip graph**, all the data is contained in a single **strip** or **bar**.
The strip graph is divided into different sized sections, based on the data involved.
A **strip graph** can also be called a **bar graph** or **percentage bar graph**.
Example: Richard has $50. This strip graph shows what he did with his money.

How Richard spent his money





All **strip graphs** or **percentage bar graphs** should have …

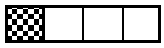
- a title or name,
- a key,
- a scale stating the value of each square or section, expressed as a percentage or as a number.

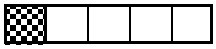
In this example, there are 10 squares, so each square equals 10%. 10% of $50 is $5, so each square represents $5.

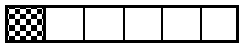
How much did Richard spend on books, clothes and food? Answers: $15, $30 and $5.

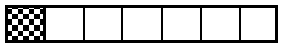
Task 18

Given the total for each **strip graph** below, **work out** what **one square** represents.

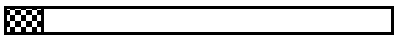
1. 
Total = $80.00

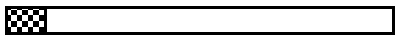
2. 
Total = 75 cm

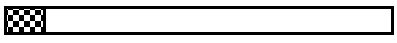
3. 
Total = 72 kg

4. 
Total = $59.50

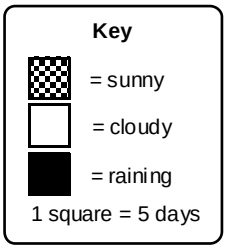
For each **strip graph** below **work out 10%** of each total.

5. 
Total = 24 kg

6. 
Total = $36.00

7. 
Total = 84 m

Weather conditions recorded daily

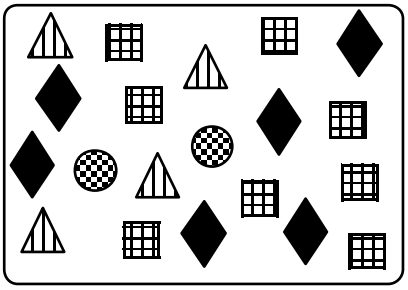


Jason recorded the daily weather conditions as mainly sunny, cloudy or raining. This **strip graph** shows the results.

8. How many days does each square of the strip graph represent?
9. For how many days did Jason record the weather conditions?
10. How many days was it raining?
11. Which weather condition occurred on 25 days?

In Karen's class there are 16 girls and 20 boys.

12. **Draw** a **strip graph** that is **nine** squares long and shade in the squares needed to display these results.



Peter has a collection of different mathematical shapes, as drawn.

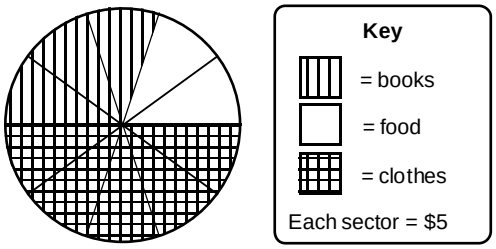
13. **Organise** this data into a **frequency table**.
14. **Draw** a **percentage bar graph** (10 squares) to display these results.
15. How many shapes are represented by 10%?
16. What percentage of the shapes are triangles?
17. What percentage of the shapes are squares?

18. **Collect** your own data and present your data as a **strip graph** or a **percentage bar graph**.

Understanding pie graphs:

A **pie graph** is a circle that has been divided into sectors, like cutting up a round pie.
Each sector represents a fraction or percentage of the total.
Example: Tracey has $50.00. This pie graph shows how she spent her money.

How Tracey spent her money



All **pie graphs** should have …

- a title or name,
- a key,
- a scale stating the value of each sector, expressed as a fraction, a percentage or as a number.

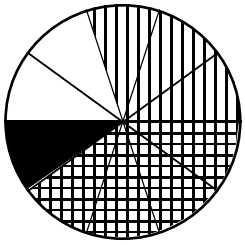
In this example, there are 10 sectors, so each sector equals $^1/_{10}$ or 10% or $5.00, ($50.00 ÷ 10 = $5.00).

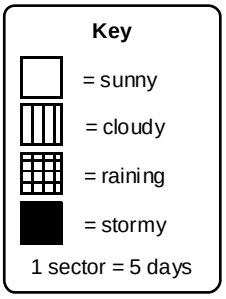
What fraction of her money did Tracey spend on books? Answer: $^3/_{10}$
What percentage of her money did she spend on clothes? Answer: 50%
How much did Tracey spend on food? Answer: $10.00

Task 19

Julie recorded the daily weather conditions as mainly sunny, cloudy, raining or stormy. This **pie graph** shows the results.

Weather conditions recorded daily





1. How many sectors in this pie graph?
2. What fraction does each sector represent?
3. How many days does each sector represent?
4. On how many days was it stormy?
5. For what fraction of the days was it sunny?
6. On how many days was it sunny?
7. For what fraction of the days was it raining?
8. On how many days was it raining?
9. What weather condition occurred $^3/_{10}$ of the time?
10. What time of the year do you think Julie collected this data? Explain your answer.

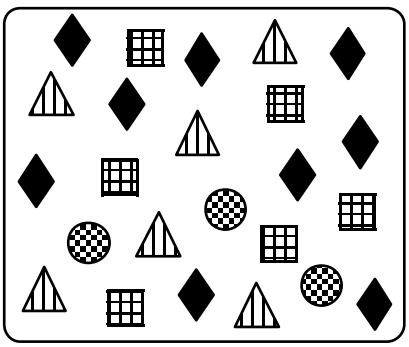
In Siona's class there are 12 girls and 20 boys.

11. **Draw** a **pie graph** that has **eight** sectors.
12. How many pupils are represented by each sector?
13. **Shade** in the sectors to display this data.

Linda spent $40 on some new clothes, banked $60 and spent $20 on a birthday present.

14. **Draw** a **pie graph** that has 12 sectors and state how much each sector is worth.
15. **Shade** in the sectors to display this data.

Robin has a collection of different mathematical shapes, as drawn.

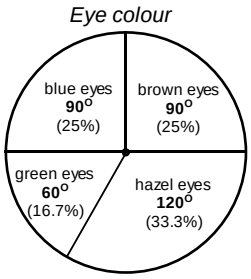


16. **Organise** this data into a **frequency table**.
17. How many shapes are there altogether?
18. How many shapes are represented by one sector?
19. **Draw** a **pie graph** with **8 sectors** to display these results.
20. What fraction of the shapes are diamonds?
21. What fraction of the shapes are squares?
22. Which shape makes up $^3/_{24}$ or $^1/_8$ of the total number?
23. **Collect** your own data and present your data as a **pie graph**.

Creating pie graphs using a protractor:

By using a **protractor**, a pie graph can be divided into sectors to represent the data. To draw a pie graph we must first calculate the angles needed to be able to divide the pie graph into sectors.

Example: This table shows the eye colours of pupils in Room 4.



Eye colour	F
blue	9
hazel	12
brown	9
green	6
	36

Follow these steps to calculate the pie graph sector angles.

Step 1: **Add** up the frequency column. *Example:* 36

Step 2: **Divide** the number of degrees in a circle (360°) by the frequency total. *Example:* 360° ÷ 36 = 10°. This means that each person is represented by a 10° angle sector in the pie graph.

Step 3: **Multiply** each group of data by your answer in Step 2. *Example:* blue eyes is 9 × 10° = 90°, hazel eyes colour is 12 × 10° = 120°, brown eyes is 9 × 10° = 90°, green eyes is 6 × 10° = 60°

Step 4: **Draw** a circle with a compass, **draw** in one radius, then **draw** the **sectors** using your angle answers from Step 3, using a protractor.

Task 20

1. **Draw** a pie graph with sector angles of 80°, 160° and 120°.
2. **Draw** a pie graph with sector angles of 45°, 125°, 60° and 130°.

Calculate the **sector angles** required to draw pie graphs for the data in these frequency tables, following the steps outlined above.

3. Survey on pupils' shoe sizes

Shoe size	F
6	16
7	24
8	12
9	8
	60

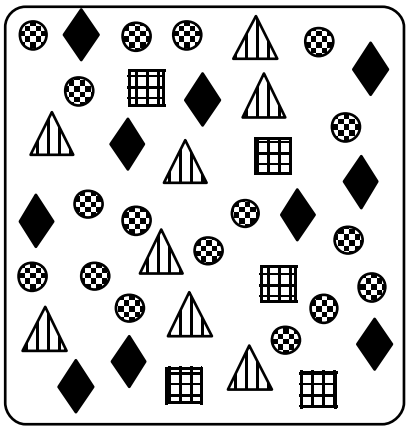
4. Weather conditions recorded for 45 days

Weather	F
sunny	15
cloudy	20
raining	8
snowing	2
	45

5. Number of each type of book sold

Type of book	F
adventure	70
nature	110
fiction	130
travel	50
	360

Andrew has a collection of different mathematical shapes, as drawn.



6. **Organise** this data into a **frequency table**.
7. How many shapes are there altogether?
8. What percentage of the shapes are triangles?
9. What fraction of the shapes are circles?
10. Which shape makes up $^{5}/_{40}$ or $^{1}/_{8}$ of the total number?
11. Which shape makes up 25% of the total number?
12. **Calculate** a **sector angle** for each mathematical shape.
13. To display this data, **draw** a **pie graph** using a compass, protractor and the sector angles calculated in question 12.
14. **Collect** your own data and present your data as a **pie graph**.

Task 21

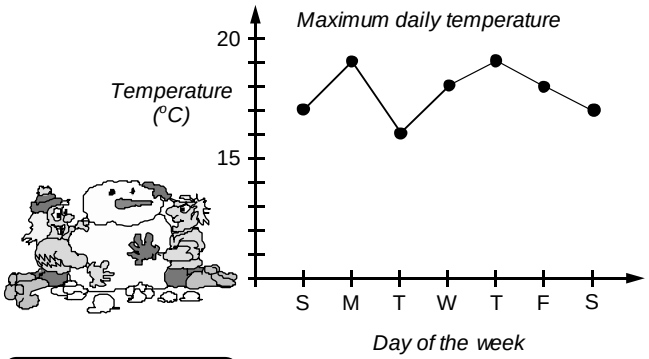
Create pie graphs from the frequency tables created in **Task 5, questions 1 and 4, Worksheet 3**.

Look back at the frequency tables you used to collect and organise data from your questionnaire. **Create pie graphs** from the frequency tables you created in **Task 6, Worksheet 3** (if appropriate).

Creating time-series data:

Data that changes with time can be graphed as a time-series graph. Time-series graphs will always have time on the horizontal axis. This may be in years, months, weeks, days, minutes or seconds.

Example: Jeremy recorded the maximum daily temperatures for one week.



All **time-series** graphs should have ….

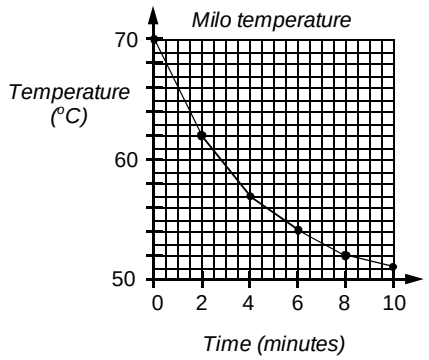
- a title or name,
- time on the horizontal axis,
- a label and scale on each axis,
- ● or X to mark each point, joined by lines.

In this example, the maximum temperature on Sunday was 17°C. List the maximum temperatures for the other days of the week, in order.

Answers: 19°C, 16°C, 18°C, 19°C, 18°C and 17°C

Task 22

Martin made himself a cup of milo, but it was too hot to drink.
The time-series graph below shows the temperature of the milo as it cooled.



1. What was the temperature after 2 minutes?
2. After how many minutes was the temperature 54°C?
3. What was the temperature of the milo at the start?
4. How much did the temperature drop in the first 6 minutes?
5. Use the graph to estimate what the temperature of the milo was after 7 minutes.

Mr Jones has been training each day for a running race.
He runs the same distance each day and this table shows how long it takes him, with time recorded in minutes.

Day	M	T	W	T	F	S	S
Time (m)	23	21	27	20	17	22	19

6. **Draw** a **time-series graph** to display this data.
7. On which day did he run the fastest time?
8. On which day was he feeling really tired?
9. What is the difference between his fastest and slowest training times?
10. For how many minutes has Mr Jones been training so far?

Rainfall is collected in a rain gauge and is measured in millimetres.
This table shows the volume of rainfall that fell, collected in Sam's rain gauge.

Week	1	2	3	4	5	6	7	8	9	10
Rainfall (mm)	8	14	3	20	15	9	17	6	12	10

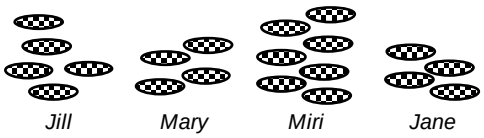
11. How often is the rainfall measured?
12. **Draw** a **time-series graph** to display this data.
13. In which week did it rain the most?
14. In which week was there the least rain?
15. How much rain fell in the 8th week?
16. In which week did 14mm of rain fall?
17. How much rain fell altogether?

18. **Collect** your own time-series data and present your data as a **time-series graph**.

Calculating the mean (average score):

A data display can tell you a lot about the data just by looking at it, but there are various calculations that can be done that will also provide some useful information.

Example: Four girls have some chocolates as shown.



If these chocolates are to be shared equally amongst the four girls, how many will each girl have? Answer: 5

By doing this calculation, you are finding the '**average**' or **mean** number of chocolates that each girl would have.

To find the mean for a list of scores (numbers), there are two steps.

Step 1: **Add** up all the scores.

Step 2: **Divide** this total by the number of scores you added up.

Example: Find the mean of 8, 10, 6, 7 and 9.

The working is as follows …

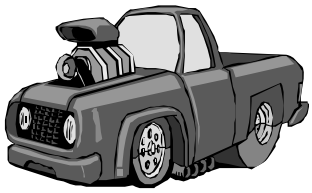
Add 8 + 10 + 6 + 7 + 9 = 40. There are 5 scores, so 40 ÷ 5 = 8. The **mean** of these numbers is **8**.

Task 23

Calculate the **mean** (average) for each list of scores.

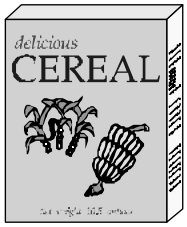
1.	10, 8, 9	2.	9, 7, 6, 10	3.	12, 16, 14
4.	11, 6, 8, 7	5.	12, 4, 7, 9, 13	6.	9, 6, 12, 15, 7, 11
7.	5, 9, 3, 0, 8	8.	9, 7, 6, 11, 6	9.	5.3, 4.7, 2.9
10.	1.2, 3.4, 2.3, 2.7	11.	9.2, 10.5, 18.1	12.	126, 165, 117, 158
13.	$2.40, $5.60, $5.95	14.	$9.70, $1.25, $4.30, $6.35	15.	$1.27, $2.38, $5.43, $3.96

James has been playing a computer car racing game. He recorded the time taken to complete each race several times. The times are recorded in seconds.



45, 53, 42, 55, 49, 58, 46, 50, 52

16. How many times did James play this car racing game?
17. Find the **mean** time taken for these races.
18. What was the difference between the fastest and slowest times?



As cereal boxes are filled, they are weighed in grams by a machine.

705, 698, 701, 695, 692, 714, 703, 699, 704, 709

19. How many boxes of cereal have been filled so far?
20. Calculate the **mean** weight for these cereal boxes.
21. What was the difference between the lightest and the heaviest cereal box?

Jeremy listed the price of cars in a local car sales yard.

$8500, $9300, $10200, $7500, $8900, $11200, $14500, $19900

22. How many cars are in this car sales yard?
23. Calculate the **mean** cost for these cars.
24. What is the difference between the cheapest and the most expensive car?

25. **Create** your own list of scores or numbers, then **calculate** the **mean** value for each list.

Calculating the median (middle score):

A second type of 'average' that can be found for a list of scores is called the **median**.

The **median** is the middle score, once the scores have been placed in order from smallest to largest.

Example: Find the median for each list of scores.

List A 18, 11, 4, 15, 7, 6, 8, 10, 3 ***List B*** 2, 18, 4, 17, 6, 15, 9, 10, 12, 14

To find the **median**, list the scores in order.

Then, start counting one off from each end until there is only one number left in the middle.

Example: ***List A*** 3, 4, 6, 7, 8, 10, 11, 15, 18

Answer: median for ***List A*** = 8

However, in ***List B*** there are two numbers left in the middle. The median would be the 'average' or **mean** of these two numbers in the middle.

Example: ***List B*** 2, 4, 6, 9, 10, 12, 14, 15, 17, 18

Answer: median for ***List B*** = (10 + 12) ÷ 2 = 11

Task 24

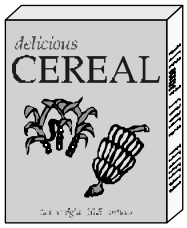
Calculate the **median** (middle score) for each list of scores. To help, **rewrite** the scores in order.

1.	5, 9, 12, 14, 19, 21, 23	2.	9, 12, 14, 15, 19, 21, 23	3.	8, 9, 13, 15
4.	9, 14, 16, 19, 21, 25	5.	6, 3, 9, 14, 8, 0	6.	6, 14, 2, 10, 9, 7, 6, 4, 11
7.	6, 9, 4, 10, 14, 8	8.	1.3, 1.9, 1.7, 1.6, 1.9	9.	2.4, 2.9, 2.3, 2.1, 2.7
10.	0.4, 3.4, 1.9, 0.6	11.	6.1, 7.6, 5.0, 8.9	12.	14.3, 12.6, 11.7, 19.4
13.	141, 129, 139, 117, 129, 132	14.	12.6, 5.6, 3.7, 14.6, 7.6, 11.9	15.	3.04, 3.45, 3.95, 3.64, 3.08

Rangi has been training for the school cross-country race later this term. Below are the distances he has been running in training.

1.4km, 1.9km, 1.6km, 1.8km, 2.4km, 1.5km

16. How many times has Rangi been out training?
17. Find the **median** distance of his training runs.
18. What was the difference between the shortest and the longest run?



As cereal boxes are filled, they are weighed in grams by a machine.

995, 1009, 995, 1012, 1008, 999, 1014, 996, 1009, 1006

19. How many boxes of cereal have been filled so far?
20. Calculate the **median** weight for these cereal boxes.
21. What was the difference between the lightest and the heaviest cereal box?

Jeremy likes playing golf and below are his scores for each hole for his latest round of golf.

4, 5, 8, 7, 4, 5, 5, 3, 8, 7, 6, 6, 5, 4, 3, 5, 6, 7

22. How many holes of golf did he play?
23. Calculate the **median** number of shots taken during this round.
24. What is the difference between the best and the worst hole score?
25. What was Jeremy's total score for this round of golf?

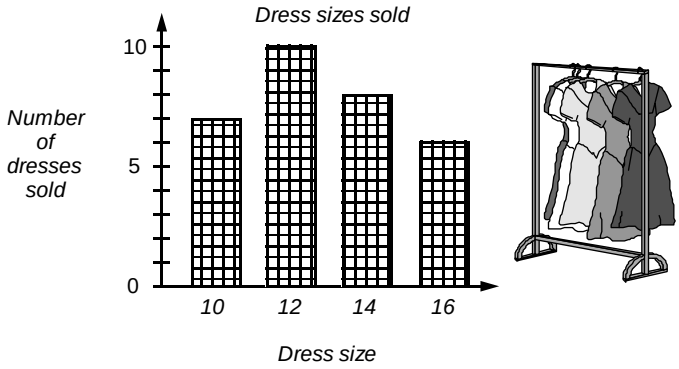
25. ***Create*** your own list of scores or numbers, then **calculate** the **median** value for each list.

Finding the mode (most common score):

A third type of 'average' that can be found for a list of scores is known as the **mode**.
The mode can often be worked out by looking at a data display.

> The most common score is known as the **mode**.
> There may be **more than one** mode or no mode, if all scores are different.

Example: What is the most popular dress size sold during one day.



Looking at this graph, we can see that a size 12 dress was the most common dress size sold.

Find the mode for these scores.

5, 9, 12, 9, 6, 5, 3, 7
Answer: Both 5 and 9 are modes.

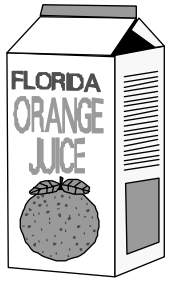
2, 3, 9, 6, 7, 4, 5, 0
Answer: There is no mode.

Task 25

Find the **mode** (most common number) for each list of scores.

1.	5, 6, 9, 8, 4, 5, 9, 7	2.	6, 8, 6, 7, 2, 10	3.	3, 1, 6, 8, 3, 4, 2, 1, 3, 6, 2
4.	9, 10, 5, 6, 8, 7, 0, 2	5.	23, 14, 15, 23, 17, 15	6.	9, 14, 23, 14, 9, 5, 7, 9, 2, 9
7.	10, 9, 6, 8, 10, 9, 8, 5	8.	14, 23, 27, 31, 29, 20, 16	9.	45, 12, 35, 64, 25, 14, 35
10.	1.3, 1.6, 1.3, 1.4, 1.3, 1.9	11.	2.3, 5.6, 4.2, 1.2, 2.3, 4.2	12.	126, 165, 117, 158, 156, 161
13.	12.01, 12.10, 12.01, 12.00	14.	1, 2, 1, 2, 1, 4, 1, 2, 1, 3, 2	15.	3, 6, 2, 1, 3, 2, 1, 4, 2, 3, 1, 2

At a local supermarket, juice cartons come in three sizes, 250mL, 600mL and 1000mL. The number of each size container sold is recorded below.



> 250, 600, 250, 1000, 1000, 600, 250, 600, 250, 1000, 600, 250, 250, 250, 600, 1000
> 250, 600, 600, 1000, 1000, 600, 250, 250, 600, 250, 600, 1000, 1000, 600, 250, 250

16. **Organise** this data into a **frequency table**.
17. From your frequency table, state the **mode** or most common size sold.
18. How many juice cartons were sold altogether?

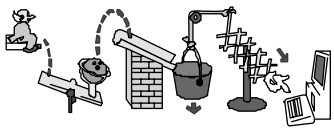
In the evenings and weekend, telephone calls cost only $5.00 and you can talk for as long as you like. The length of some telephone calls is shown below, recorded in minutes.

> 15, 18, 19, 16, 20, 15, 16, 18, 19, 12, 15, 14, 15, 14, 12, 19, 19, 15,
> 16, 17, 20, 20, 18, 15, 14, 13, 19, 12, 16, 15, 20, 17, 12, 19, 17, 15

19. **Organise** this data into a **frequency table**.
20. From your frequency table, state the **mode** or most common length of telephone call.
21. How many telephone calls were made altogether?

22. ***Create*** your own list of scores or numbers, then **state** the **mode** value for each list.

Calculating the range (spread):



Finding the mean, median or mode for a list of scores can tell us a lot about the scores, but consider these two lists ...

List A 11, 23, 34, 42, 50

List B 25, 28, 34, 36, 37

Both of these sets of scores have a mean of 32 and a median of 34, but the highest and lowest scores from List A are quite different to the highest and lowest scores of List B.

How spread out the scores are is called the **range**. **Range = highest score – lowest score**

Find the range for List A and List B above. Answer: List A, 50 – 11 = 39 List B, 37 – 25 = 12

Task 26

Calculate the **range** (spread) for each list of scores.

1.	6, 8, 13, 15, 18, 22, 25	2.	7, 11, 18, 13, 8, 32, 14	3.	7, 8, 15, 13
4.	7, 13, 19, 17, 28, 31	5.	7, 2, 14, 19, 7, 0	6.	6, 13, 2, 11, 9, 6, 3, 2, 15
7.	9, 1, 4, 17, 19, 7	8.	1.2, 1.9, 1.1, 1.7, 1.8	9.	2.2, 2.8, 2.9, 2.3, 2.5
10.	0.7, 3.3, 1.7, 0.2, 2.9	11.	6.3, 7.1, 4.0, 8.7	12.	14.1, 12.9, 11.9, 19.1
13.	142, 117, 137, 116, 124, 139	14.	12.2, 5.4, 3.9, 14.4, 7.2, 11.8	15.	3.09, 3.65, 3.87, 3.42, 3.07

Jackie has been looking at buying a new bicycle. She has been around several shops looking at the prices of bicycles. Below is a list of the prices she saw.

$195, $235, $295, $175, $320

16. How many bicycles did Jackie look at?
17. Calculate the **range** of prices for these bicycles.
18. Calculate the **mean** price of these bicycles.

As cans of baked beans are filled, they are weighed in grams by a machine.

333g, 338g, 330g, 338g, 335g, 339g, 334g, 332g, 337g, 334g

19. How many cans of baked beans have been filled so far?
20. Calculate the **range** of weights for these baked bean cans.
21. Find the **median** weight of these baked bean cans.

Jeremy likes playing golf and below are his scores for each hole, for his latest round of golf.

5, 6, 7, 8, 5, 4, 4, 7, 3, 4, 7, 5, 6, 5, 4, 4, 7, 5

22. How many holes of golf did he play?
23. Calculate the **range** for the number of shots taken per hole during this round.
24. What was the **mode** or most common score that Jeremy got?
25. What was Jeremy's total for this round of golf?

26. If the highest score is 123 and the range is 39, calcluate the lowest score.
27. If the lowest score is 58 and the range is 47, calculate the highest score.
28. If the range is 26 and the score 34 is exactly in the middle, calculate the lowest and highest scores.

25. ***Create*** your own list of scores or numbers, then **calculate** the **range** value for each list.

Interpreting data display:

The purpose of drawing various graphs and working out means, medians, modes and ranges is to be able to answer questions that have been raised by an investigation.
The ability to interpret a data display is an important skill.

Example: Billy scored 45%, 45%, 87%, 75% and 69% in her exams, but said, "I didn't do very well because my most common mark was only 45%!" Was she right?

Answer: While the mode was 45%, her other three scores were all good, so she did quite well.

Task 27

Look at each data display. **Read** the comments written beside them.
Are the comments correct? **Explain** your answers.

1. Car colour

Colour	Frequency
white	11
black	9
red	7
blue	8
	35

Anna recorded the colour of cars in the school car park. Kevin said, "Most teachers have white coloured cars."

Is his statement correct?

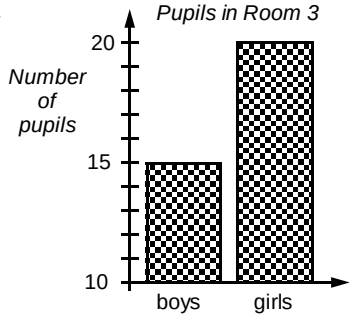
2.

Test scores for Room 4		*Test scores for Room 5*
8, 9, 7, 7, 6, 7	0	8, 9, 7
0, 6, 7, 6	1	9, 8, 5, 9, 6, 6, 6
0, 0, 0	2	0

This is a back-to-back stem and leaf graph showing test scores for two classes. David, who is in Room 4 said, "We are the top class as three pupils scored 20 out of 20."

Is his statement correct?

3.

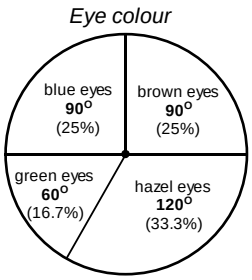


This column graph shows the number of boys and girls in Room 3.
Sally said, "Because the column for girls is twice as tall as the column for boys, there must be twice as many girls as boys in this class."

Is her statement correct?

4. This pie graph shows the colour of Room 7 pupil's eyes.
Tony said, "Most pupils have hazel coloured eyes."

Is his statement correct?



5. Look back at the data displays you and your classmates created as a result of your investigations. **Compare** your displays with classmates and **comment** about the features of your displays.

Task 28

Collect some **frequency tables /data displays** from the newspaper or some magazine.

Look at each table / data display and **talk** about the features that make the data displays stand out.

Statistics

Creating statistical reports:

Working in small groups of 2 or 3, your task is to **create** a **statistical report**.

Organise the data into various tables and displays, perform calculations such as finding the **mean**, **median**, **mode** and **range**, as you try to prove or disprove the statement written beside the data.

Remember to **finish** your report with a **conclusion**.

Task 29

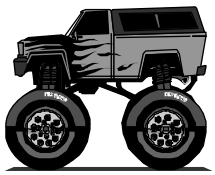
John and Rangi like playing a computer car racing game. They have turns (1, 2, 3, 4 & 5) playing the game and they record the time in seconds taken to drive around each of the three courses (A, B, & C).

John's lap times

	A	B	C
1	66	124	46
2	59	129	44
3	69	137	41
4	71	115	55
5	63	127	43

Rangi's lap times

	A	B	C
1	62	119	50
2	64	126	36
3	60	135	42
4	70	117	48
5	63	130	43



John believes he is the better driver as he has the faster lap times. Is he correct?

Task 30

At a local restaurant, records are kept about people who attend the restaurant.

Key for main meals

C = chicken
F = fish
B = beef
P =pork

Size of group	Choice for main meal	Total cost of meal	Time spent at restaurant
3 people	**C, C, F**	$48.00	2½ hrs
5 people	**F, F, P, C, C**	$96.00	4 hrs
2 people	**C, B**	$37.50	1½ hrs
4 people	**B, B, C, F**	$86.50	4 hrs
2 people	**B, C**	$34.50	3½ hrs
5 people	**P, B, C, C, F**	$127.50	3 hrs
6 people	**C, F, P, P, B, B**	$142.00	5 hrs
3 people	**C, F, B**	$73.00	4½ hrs

The owner of the restaurant believes that ...

- average group size is about 3 people,
- most people like fish best,
- the average price per meal is $20.00 per person,
- people stay for about 3 hours.

Is the owner correct?

Task 31

By now you know how to

- ☑ plan an investigation, write a questionnaire / conduct a survey,
- ☑ collect and display data,
- ☑ perform calculations on this data
- ☑ make predictions and write a conclusion based on the results of the investigation.

Conduct an investigation to demonstrate the above skills.

Understanding probability words:

Probability is a measure of how likely it is that an event will happen.

The likelihood of an event or something happening could be described by using one of the following words …

certain, possible, impossible.

Other words that could be used are …

certain, likely, unlikely, impossible

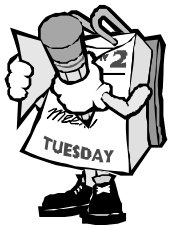
or **certain, good chance, even chance, poor chance, impossible.**

Task 32

1. Use the words …

   certain, likely, unlikely and **impossible**,

   to **write** statements about events that you know of, that could be described by using these words. *Example:* There is a good chance it will rain tomorrow.



2. Arrange these events in order of likelihood, starting with the most likely event first.

   A If you roll a die (dice) the number 4, 5 or 6 will come up.

   B The Prime Minister will visit your school tomorrow.

   C Someone in New Zealand will win 1st prize in lotto this week.

   D If today is Monday, tomorrow will be Tuesday.

   E A glass jar will break when dropped.

Decide if these events are **certain**, **likely**, **unlikely**, **possible** or **impossible**.

3. Today it will be dark at 7:00 p.m.
4. I will win the school cross-country race.
5. Tomorrow I will go to the doctor.
6. 10 pupils in your class will be away sick tomorrow.
7. It will snow on Christmas day this year.
8. It is your birthday tomorrow.
9. The sun will rise tomorrow.
10. There will be a February 29th this year.
11. You will get a job when you leave school.
12. New Year's day is the 1st January.

Use **even chance**, **good chance** or **poor chance** to describe the likelihood of the following events happening.

13. A coin is tossed and a tail comes up.
14. Two coins are tossed, one is a tail and one is a head.
15. Two coins are tossed and two heads come up.
16. A die (dice) is rolled and an odd number comes up.
17. A die is rolled and a number less than 4 comes up.
18. A die is rolled and a six comes up.
19. A die is rolled and a 1, 3 or 5 comes up.
20. A card is drawn from a deck of cards and it is an ace of spades.
21. A card is drawn from a deck of cards and it is a heart.
22. A card is drawn from a deck of cards and it is a black card.

Calculating relative frequency / probability scales:

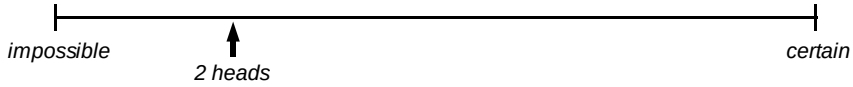
The **relative frequency** of an **event** occurring is the fraction or proportion of times the event occurs. Relative frequency could also be known as **experimental probability**.

Example: In an experiment, two coins are tossed 50 times (50 **trials**).
The **event** that Kaye recorded is, '*how many times two heads occur*'. This occurred 12 times.

Relative frequency = $\frac{\textbf{Number of times the event occurs}}{\textbf{Total number of trials}}$

In Kaye's **experiment** the number of **trials** was 50, and the number of times the **event** occurred was 12, therefore the **relative frequency** of this event was $^{12}/_{50}$.

This event could be marked on a probability scale.



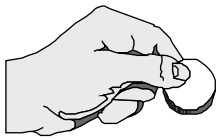
Task 33

Below is a frequency table recording the results of an experiment where two coins were tossed.

1. **Copy** this frequency table and **complete** the frequency column.

Event	Tally	F
HH	𝍸 𝍸 III	
HT	𝍸 𝍸 𝍸 II	
TH	𝍸 𝍸 𝍸 IIII	
TT	𝍸 𝍸 I	

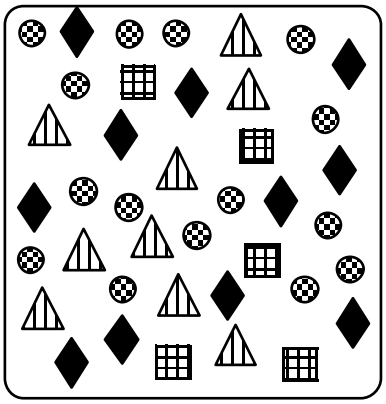
2. How many trials were there in this experiment?
3. **Calculate** the relative frequency for the event head / head.
4. Which event had a relative frequency of $^{11}/_{60}$?
5. **Calculate** the relative frequency for the event tail / head, in any order.
6. **Draw** a probability scale and **mark** on the scale where these three events would be ... HH, TT and HT / TH combined.



Working in small groups, repeat the above experiment of tossing two coins.

7. **Record** your results in a **frequency table**,
8. Work out the **relative frequency** of all events.
9. **Mark** the results of your experiment on a **probability scale**.

Inside a container are the mathematical shapes shown in this diagram.



10. **Organise** the data in a **frequency table**.
11. If a shape is selected at random from the container, work out the relative frequencies that it could be ...
    a circle, a square, a triangle or a diamond.
12. **Draw** and **mark** on a **probability scale** these events ...
    Event A: a square is selected from the container.
    Event B: a diamond is selected from the container.
    Event C: a mathematical shape is selected from the container.
    Event D: a hexagon is selected from the container.

Working in small groups, place up to 20 coloured blocks, preferably all the same size, in a container or bag, noting how many of each coloured block you have.

13. **Select** a block from your container and record which one. Replace the block and repeat 50 times.
14. Based on your results, work out the **relative frequency** of selecting each different coloured block.
15. **Mark** the results of your experiment on a **probability scale**.

Finding outcomes using grids:

All possible results of an experiment are called **outcomes**. When James is thirsty he will have a drink. If he can have either a drink of water or a drink of juice, the choice is easy. His two choices of water or juice are called **outcomes**.

Finding all possible outcomes is not always easy.

Example: A coin and a die are thrown at the same time. List all possible outcomes.
One way to find the outcomes is to use a grid or box.

coin \ 6 sided die	1	2	3	4	5	6
H	H1	H2	H3	H4	H5	H6
T	T1	T2	T3	T4	T5	T6

The outcomes can be obtained from the grid …

(H,1), (H,2), (H,3), (H,4), (H,5), (H,6),
(T,1), (T,2), (T,3), (T,4), (T,5), (T,6) …

where (H,1) means heads on the coin and a '1' on the die came up.

Task 34

Pupils in Room 7 can choose (C) cricket, (Sb) softball or (T) tennis as their summer sport. In winter they can choose (R) rugby or (Sc) soccer. Pupils can play only one summer and one winter sport.

	C	Sb	T
R			
Sc			

1. **Copy** and **complete** this **grid** to help work out the combinations of sports that pupils can play.
2. **List** all the possible outcomes or choices that the pupils have.

Alex has two bags containing different coloured beads. Bag A has some (R) red, (B) blue and (G) green beads. **Bag B** has some (P) purple, (Y) yellow and (O) orange beads.

3. Alex picks one bead from each bag. Use a **grid** to help work out all possible combinations of coloured beads she could select.

4. **List** all the possible outcomes or combinations of coloured beads.

Alex adds some (W) white and (Bl) black beads to Bag A and some (Br) brown beads to Bag B.

5. **Draw** a **grid** to help work out the new combinations of coloured beads that Alex could select if she selects one bead from each bag.
6. How many possible outcomes are there altogether?

'Breakfast Menu'	
(B) Bacon & Eggs	$4.60
(T) Toast & Jam	$3.50
(C) Cereal	$4.00

'Drinks'	
(M) Milo	$1.20
(F) Fruit juice	$0.90
(H) Hot chocolate	$1.50

For breakfast, Miri has a choice of one of the three *'Breakfast Menu'* items and one of the *'Drinks'*.

7. **Draw** a **grid** to help work out all the possible choices Miri has.
8. **List** all possible breakfast combinations.
9. If Miri had bacon & eggs and fruit juice, what would it cost her?
10. If she paid for breakfast with a $20.00 note, what change did she receive?

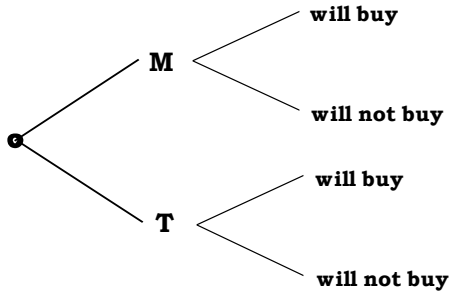
11. If her breakfast cost $4.70, what did she have to eat and drink?

During the holidays, Martin has a choice of going to the (M) movies, hiring a (V) video, going to the (P) park to play or going to a (F) friend's place. He is allowed to do one of the above activities, but only on one day of the week.

12. **Draw** a **grid** to work out all possible combinations of these activities on the days of the week.
13. How many possible outcomes are there altogether?
14. If Martin cannot go out on Monday or Wednesday, how does this alter the number of possible outcomes?

Finding outcomes using tree diagrams:

A **tree diagram**, so named because of its shape, is another way of working out all possible outcomes.
Example: Jack will go shopping on Monday or Tuesday and might buy a new toy.



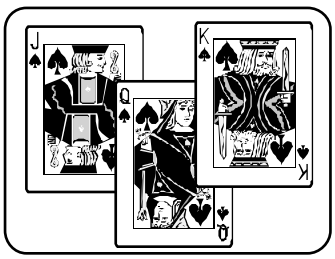
To find all possible outcomes, follow each branch of the tree diagram.
There are four branches so there will be four outcomes.

The outcomes would be ...
(Monday, will buy), (Monday, will not buy)
(Tuesday, will buy), (Tuesday, will not buy).

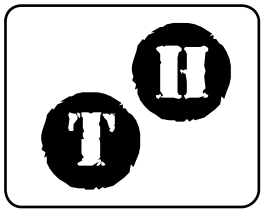
Task 35

Michelle is going to select a picture card, toss a coin and select a numbered ball from a bag.

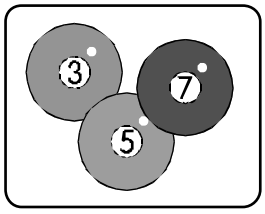
Cards: Jack, Queen or King



Coin: Heads or Tails



Numbered balls: 3, 5, or 7



1. **Draw** a tree diagram to help work out all possible combinations, as Michelle selects a card, tosses a coin and selects a numbered ball, in that order.
2. Use your tree diagram to list all possible outcomes.
3. How many outcomes include the King of spades?
4. How many outcomes include a coin showing heads?
5. How many outcomes include a ball with the number 7 showing?
6. Michelle changes the order to tossing a coin, selecting a ball and then selecting a card. **Draw** a new tree diagram to show this combination.

Breakfast Menu	
(B) Bacon & Eggs	$4.60
(T) Toast & Jam	$3.50
(C) Cereal	$4.00

Fruit	
(O) Orange	$0.50
(K) Kiwi fruit	$0.30
(A) Apple	$0.40

Drinks	
(M) Milo	$1.20
(F) Fruit juice	$0.90
(H) Hot chocolate	$1.50

For breakfast, John has a choice of one of the three *'Breakfast Menu'* items, a piece of '*Fruit*' and one of the *'Drinks'*.

7. **Draw** a **tree diagram** to help work out all the possible combinations that John could have.
8. How many outcomes are there altogether?
9. If John does not like bacon & eggs, how many combinations does he have to choose from?
10. If John had some toast, an orange and a drink of milo for breakfast, how much did it cost?

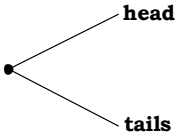
11. If John paid for his breakfast with a $20.00 note, how much change did he receive?
12. If his breakfast cost $5.90, what did he have to eat and drink?

13. Think of some events in your life. **Create** your own **grid diagrams** or **tree diagrams** as above to work out all possible outcomes for these events.

Using probability to predict outcomes:

Data that has been collected can be used to make predictions.

Example: A coin is tossed 100 times. How many times would you expect 'heads' to come up?



For a coin, the probability or chance of getting heads is '1 out of 2' or $\frac{1}{2}$ or 50%.

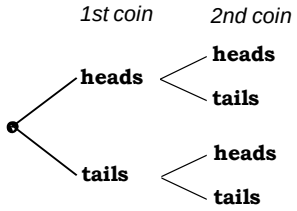
If a coin is tossed 100 times, you could expect heads to occur 50 times ($100 \times \frac{1}{2} = 50$).

How many times would you expect tails to occur if a coin is tossed 200 times?

Answer: $200 \times \frac{1}{2} = 100$ times.

Task 36

This tree diagram shows the possible outcomes when two coins are tossed.



1. List all possible outcomes.
2. What is the probability or chance that two heads come up?
3. What is the probability or chance that two tails come up?
4. What is the probability that a head and a tail, in any order come up?
5. If the two coins are tossed 100 times, how many times would you expect HH to come up?
6. If HT and TH came up 150 times altogether, how many times do you think the two coins were tossed?

A six sided die (dice) is rolled several times.

7. What is the probability that it lands showing the number 6?
8. What is the probability that it lands showing a number less than 4?
9. What is the probability that it lands showing the number 2 or 4?
10. If a die is rolled 60 times, how many times would you expect the number 5 to occur?
11. If a die is rolled 200 times, how many times would you expect a number greater than 3 to occur?

A local shop-keeper kept a record of the number of different drinks that he sold to pupils in one day. This table shows the result.

Drink	*Number sold*
Coca Cola	50
Fanta	30
Flavoured milk	20
Fruit juice	15
Ginger beer	5

12. How many drinks has he sold altogether?
13. What is the probability that a pupil had a drink of Coca Cola?
14. What is the probability that a pupil had a drink of fruit juice?
15. 20 out of 120 pupils chose which drink?
16. If 240 pupils ordered drinks, how many Fanta drinks would the shop-keeper expect to sell?
17. If 360 pupils ordered drinks during the week, how many Ginger beer drinks would the shop-keeper expect to sell?

A radio station surveyed 40 people, asking them to name their favourite style of music, given a choice between, rock (R), jazz (J), country & western (W) and classical (C).

18. **Organise** this data into a **frequency table**.
19. What was the probability that a person liked rock music?
20. What was the probability that a person liked classical music?
21. Based on these survey results, predict how many people would like each style of music if 400 people were surveyed.

Music survey results

R, C, C, W, J, R, J, C,
W, J, R, R, J, C, W, W,
C, J, R, C, R, W, R, R,
C, J, R, C, R, W, J, W,
R, C, C, W, R, J, J, C

22. **Make up** some frequency tables as above and use your information to work out the probability of each outcome. Then use your probability values to make predictions for larger populations.

'In-class' Worksheet

Teaching Notes & Answers

How to use this section:
Teaching notes are enclosed in a box with a 'push-pin' at the top left corner. The teaching notes precede the answers for each worksheet / task. The teaching notes have been included to provide assistance and background information about each topic or unit of work.

Introduction:

The topic of **Statistics** is concerned with the planning of investigations, providing an opportunity to study issues that are important to the pupils at your school. The ability to collect the appropriate data and to display the data in various tables or graphs to communicate the results of the investigation is an important skill. From the displays, distinctive features can be highlighted and further calculations can be performed, to interpret the data to support the investigation. From these interpretations, statements and conclusions can be made that are consistent with the results of the statistical investigation.

Exploring probability is also investigated through the use of relative frequency tables and tree diagrams.

Worksheets 1 & 2

Introduction to statistical investigation:
Designing a questionnaire:

In **Task 1** pupils are introduced to important statistical words and their meanings.

Key **statistical words** are listed below:

Survey: A **survey** is a brief or detailed study, whereby data that is collected can be used to draw various statistical graphs, interpret the information and make conclusions or predictions based on the evidence of the survey.

Questionnaire: A **questionnaire** is one way of surveying a population when you are asking for an opinion about an issue. A good questionnaire has questions that are clear and concise, but not too many questions.

Population: In everyday language the word **'population'** refers to the number of people in a town, city or country. In statistics, a 'population' can refer to a group of not just people or animals, but a group of anything. *Example:* a population of trees, a population of books, etc.

Sample: A **sample** is part of a population you are interested in. A sample of a population is used if the population is very large or if it is not necessary to survey the whole population.

Representative sample: When we want to make statements about a population, using a survey to sample the population, the sample should be a **representative sample**.
Example: 10% of the pupils at a school are to be surveyed. If there are 200 pupils, 10% would be 20 pupils. If there are 90 boys and 110 girls and 10% are to be surveyed, for the sample to be a representative sample, there would be 9 boys and 11 girls surveyed, giving us a total of 20 pupils.

Random sample: Choosing at **random**, means that every person, or item, has an equal chance of being chosen.

Biased sample: A sample that is not a representative sample is called a **biased sample**.
Example: In a class of 15 girls and 15 boys, if 10 boys and 5 girls were surveyed about what sport they wanted to play at lunchtime, the pupils surveyed would be a biased sample as more boys were asked than girls.

In **Task 2** pupils are to work in small groups and decide on any important issues that they could investigate. The main features of an investigation are listed with the task.

In **Task 3** pupils are to consider what type of questions they would use when designing a questionnaire, given points about what makes a good questionnaire. Questions are to have 'yes' / 'no' answers and pupils are to create similar questions. Other questions are to be answered and created where choices for answers are given.

In **Task 4** pupils are to look back at the issues they considered investigating in Task 2, Worksheet 1 and design a suitable questionnaire. Having designed the questionnaire, pupils are to decide what is the best way the data can be collected and organised.

Task 1

1. population 2. sample 3. survey 4. representative sample 5. biased 6. random 7. questionnaire 8. - 9. - 10. The population may be too large to survey. It is quicker to do. 11. 10% of 180 pupils is 18. 10% of 100 boys is 10 and 10% of 80 girls is 8, therefore 10 boys surveyed and 8 girls surveyed, gives a total of 18 pupils. 12. Teachers are a small percentage of the whole population and could be a biased sample. 13. All interested parties, pupils, parents / caregivers, teachers and principal 14. Choose 10% of the pupils in each class, draw 50 family names from the school records at random, ask every 5th pupil / parent coming through the school gate in the morning, etc.

Worksheets 3 & 4

Collecting and organising discrete data using a fequency table:
Organising grouped data:

The are two types of data, **discrete** and **continuous** data. **Discrete** data is any data that has been collected by **counting**. **Continuous** data is any data that has been collected by **measuring**.

The use of a **frequency table** (or tally chart) is an effective way to collect data that is randomly being collected, called out or presented as a random list. Encourage pupils to count in 'fives' as this makes it easier when adding up. Marking data in the appropriate row as you go, rather than searching for all the same data at once, will make it less likely that data items are overlooked. By adding up the frequency column, the number of data items collected can be found.

To use a frequency table to collect discrete data that is well spread out, the data can be **grouped**. Grouping data avoids having too many rows in the frequency table and the grouped data is easier to display. Each grouping or category is called a **class interval**. Class intervals should be the same widith or size.
Example: The class interval 1 - 5 includes the numbers 1, 2, 3, 4 & 5 The class interval 6 - 10 includes the numbers 6, 7, 8, 9, 10. Both class intervals are made up of five numbers.

The only disadvantage with grouped data is that you do not know exactly what the number is, once the number has been recorded, only that it falls within a certain class interval.
Example: There are 5 numbers in the class interval 6 - 10, but are the numbers 6's, 7's, 8's , 9's or 10's?

In **Task 5** pupils are to organise discrete data in a frequency table, utilising a tally column, marking off in fives. The number of items collected is found by adding up the frequency column. By studying the frequency tables created, pupils are to write a statement about the data.

In **Task 6** pupils are to create frequency tables for any appropriate questions that were created in Task 4, Worksheet 2. Having created the frequency tables, pupils are to collect the data, recording the responses in the frequency table.

In **Task 7** pupils are given data that is to be recorded in frequency tables that have class intervals already given. In later questions, pupils are decide on the class intervals that will be used. As a general rule, somewhere between 5 and 7 equal class intervals is usually enough.

Task 5

1.

No. of mistakes	Tally	F
0	𝍸	5
1	𝍸 IIII	9
2	𝍸 𝍸	10
3	𝍸 I	6
4	III	3
		33

4.

Travel	Tally	F
walk	𝍸 𝍸 IIII	14
bike	𝍸 𝍸	10
bus	𝍸 I	6
car	IIII	4
		34

Distance	Tally	F
1	𝍸 III	8
2	𝍸 𝍸	10
3	𝍸	5
4	II	2
5	IIII	4
6	III	3
7	II	2
		34

5. 34 pupils

2. 2 mistakes 3. 33 pupils

6. The most common way pupils in Room 9 travel to school is by walking, followed by biking to school. The most common distance that pupils live away from the school is 2km, followed closely by 1km distance.

Task 7

1. *Number of Lego blocks used*

C I	Tally	F
11 - 15	𝍸 I	6
16 - 20	𝍸	5
21 - 25	𝍸 III	8
26 - 30	𝍸 I	6
31 - 35	III	3
		28

6. *Speech competition scores*

C I	Tally	F
11 - 15	IIII	4
16 - 20	𝍸 III	8
21 - 25	𝍸 II	7
26 - 30	𝍸	5
		24

10. *Number of trees per garden*

C I	Tally	F
1 - 5	III	3
6 - 10	𝍸 𝍸	10
11 - 15	𝍸 III	8
16 - 20	𝍸 II	7
		28

2. 21 - 25 3. 11 pupils 4. 9 pupils 5. 28 pupils 7. 30 8. 12 pupils 9. 24 pupils 11. 6 - 10
12. 13 gardens 13. 15 gardens 14. 28 houses

Worksheets 5 to 7

Displaying ungrouped discrete data as a column graph:
Displaying grouped discrete data as a histogram:
Collecting and organising continuous data using a frequency table:

To avoid confusion I would suggest that **column graphs** are always referred to as column graphs and are not called bar graphs. A bar graph is a different type of graph and is referred to in more detail in Worksheet 11, Creating strip graphs /Percentage bar graphs.

A **column graph** is used to display **ungrouped discrete data**, that is, data that has been collected by counting. All column graphs should have …

- a title or name
- a label on each axis
- a scale on the vertical axis, usually starting from zero
- **gaps between columns**
- all columns should be the same width

The gaps occur between the columns because the data is ungrouped **discrete**, discrete meaning separate. *Example:* A column graph displaying the number of cars of each colour in the staff car park has gaps because each column represents a different colour.

If a **column graph** is drawn **without gaps** between the columns it is called a **histogram**. A histogram is used to display **grouped discrete data** or **continuous data**. Within each column there will be various scores represented. The 'groupings' are called **class intervals**. All class intervals on the same graph should be the same width, just as they are for frequency tables. The features of histograms are the same as for column graphs, except there are no gaps between the columns.

In **Task 8** pupils are to **create column graph**s, given data presented in a frequency table. Data is also presented in a table, from which frequency graphs can be created, followed by the drawing of a column graphs. Remind pupils to present the graph neatly, with all necessary labels etc.

In **Task 9** pupils are to **create column graphs** from frequency tables created in Task 5, Worksheet 3 and from data collected in their investigations. Having created the column graphs, pupils are to write statements about the data. Remind pupils that the whole purpose of drawing any form of graph is to 'tell a story about the data', so presentation is important.

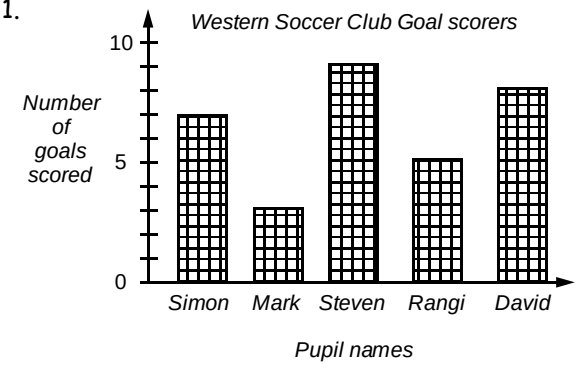
In **Task 10** pupils are to interpret information displayed as a histogram, create histograms from grouped discrete data and from frequency tables created in Task 7, Questions 6 & 7.

In **Task 11** pupils are to create **histograms** from **continous data** displayed in frequency tables. Pupils are also to organise data into frequency tables before drawing more histograms.

In **Task 12** pupils collect their own continuous data, utilising frequency tables and then draw histograms to display the data.

Task 8

1.



2. Steven 3. 5 goals 4. Mark 5. 32 goals

6. Michelle could have set up a frequency table and recorded the pupil's responses in them directly, rather than in the table she used.

Birthday months

Month	Tally	F
J	II	2
F	II	1
M	IIII	4
A	III	3
M	III	3
J	II	2
J	II	2
A	III	3
S	𝍸	5
O	II	2
N	I	1
D	II	2
		30

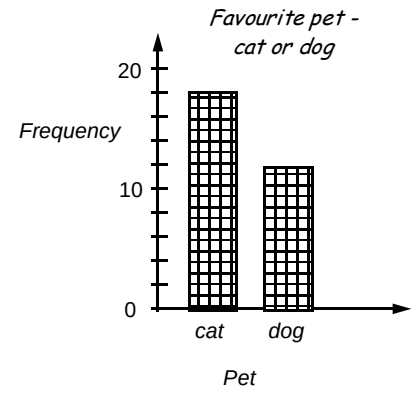
Favourite pet

Pet	Tally	F
cat	𝍸 𝍸 𝍸 III	18
dog	𝍸 𝍸 II	12
		30

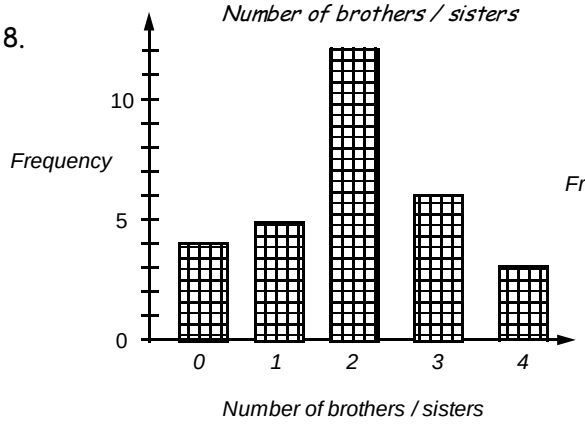
7.

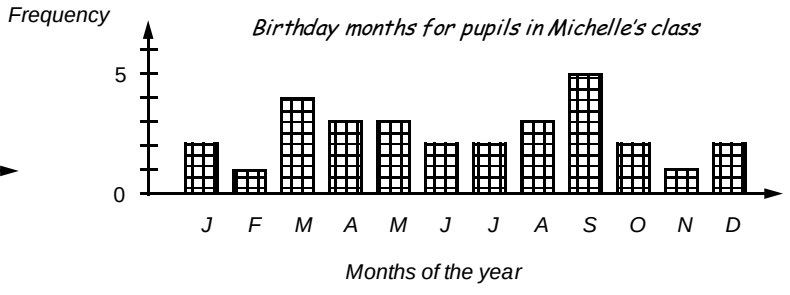
Number of brothers / sisters

Number	Tally	F
0	IIII	4
1	𝍸	5
2	𝍸 𝍸 II	12
3	𝍸 I	6
4	III	3
		30



8.

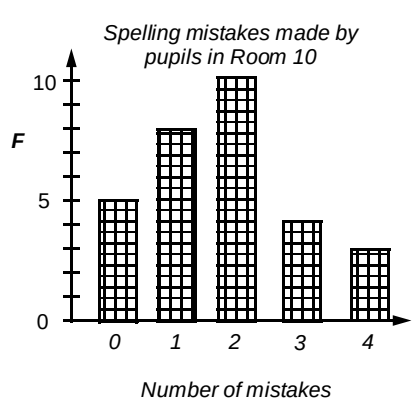


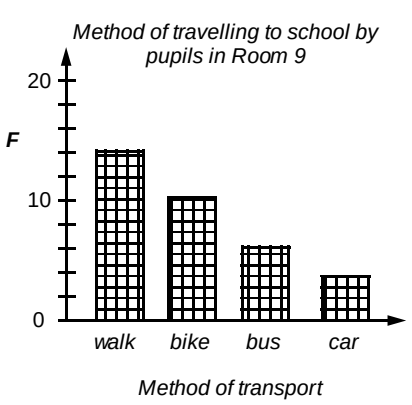


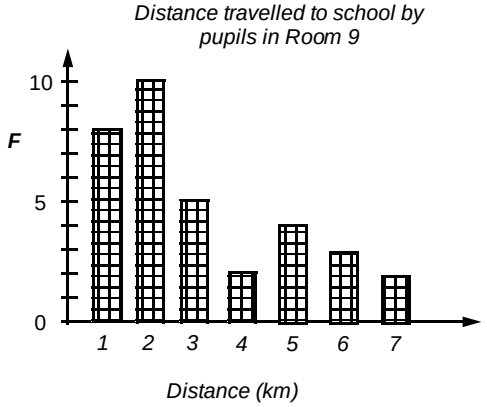
9. Examples of possible statements:
More pupils in Michelle's class have 2 brothers and / or sisters. The most common month for a birthday was September. More pupils prefer cats as pets than dogs as pets.

Task 9

Column graphs using the data from Task 5, Questions 1 and 4.



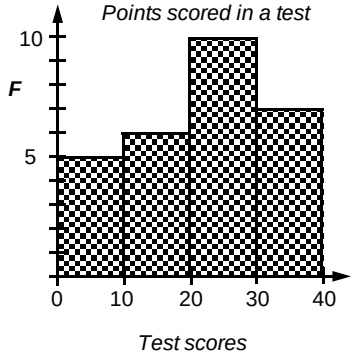




Task 10

1. 6 pupils 2. 9 pupils 3. 10 - 15 4. 5 pupils

5.

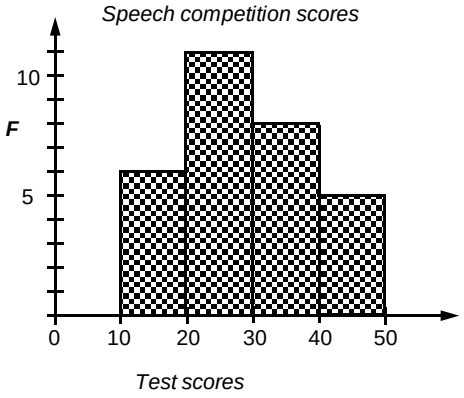


6.

Speech competition scores

C I	Tally	F
11 - 20	𝍸 I	6
21 - 30	𝍸 𝍸 I	11
31 - 40	𝍸 III	8
41 - 50	𝍸	5
		30

7.



8. 49 and 11 9. 21 - 30

Task 11

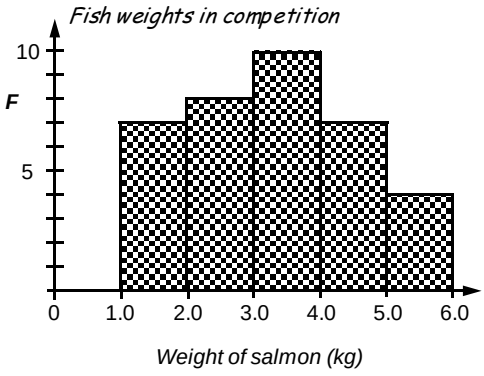
1. 3 runners 2. 6 runners 3. 18 runners

4.

Fish weights in competition

Weights	Tally	F
1.0 -	𝍸 II	7
2.0 -	𝍸 III	8
3.0 -	𝍸 𝍸	10
4.0 -	𝍸 II	7
5.0 - 6.0	IIII	4
		36

5.



6. 5.7kg 7. 25 fish 8. 36 fish 9. 4 fish

Worksheet 8

Creating stem and leaf graphs:

A **stem & leaf** graph is so called because of its shape. Stem & leaf graphs can be used to collect data in the same way as a frequency table can be used. Visually stem & leaf graphs can be useful when displaying two sets of similar data, when you want to compare results. When drawn this way, it is called a back-to-back stem & leaf graph. Stem & leaf graphs should have a title.

In **Task 13** pupils are to interpret the data displayed as a stem & leaf graph and create graphs given the data. Pupils are to collect and present data as stem & leaf graphs.

Task 13

1. 44, 41, 45, 49, 45, 40, 50, 52, 58, 57, 52, 59, 51, 62, 65, 61, 68, 67, 61, 66, 61, 78, 72, 73, 77
2. 8, 9, 7, 6, 15, 13, 19, 11, 13, 18, 10, 18, 29, 20, 23, 24, 25, 27, 23, 31, 30, 34, 35
3. 104, 108, 109, 111, 115, 117, 118, 119, 121, 122, 122, 126, 127, 128, 129, 133, 134, 135, 137, 139, 139
4. 25 pupils 5. $35, $6 6. 1 min 44 sec, 2 min 19 sec

7. *Heights of pupils in Room 10*

1.1	9, 5, 9
1.2	7, 3, 7, 6, 9, 9, 1
1.3	5, 4, 7, 7, 7, 2
1.4	1, 6, 2, 3

8. 1.46m & 1.15m 9. 20 pupils

10.

English test results		*Mathematics test results*
9, 8, 9	0	9, 8,
7, 8, 4, 5, 3	1	7,
8, 5, 7, 2, 9, 7, 6	2	5, 1, 2, 4, 0, 3
0, 1, 8, 7, 2	3	5, 8, 9, 0, 1, 2, 5,
4, 1, 9, 5, 5	4	4, 7, 9, 5, 9, 7, 3
0	5	0, 0, 0

11. In both tests the lowest mark was 8 and the highest mark was 50. However, in the Mathematics test there were three pupils who scored 50, whereas only one pupil scored 50 in the English test. Overall there were more scores in the 30's and 40's in the Mathematics test, than in the English test.

Worksheet 9

Creating pictograms:

As the name implies, **pictograms** are created using pictures to represent data. All pictogram should have …

- a title or name
- a key
- a scale stating how much each picture is worth

Each picture represents a certain number of data items and part pictures can also be used, therefore the number of pictures drawn for pictogram questions will vary depending on the value of each picture.

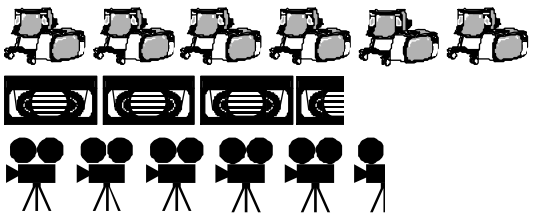
In **Task 14** pupils are to interpret the data displayed as a pictogram and create graphs given the data. Pupils are to collect and present data as pictograms.

In **Task 15** pupils are to create pictograms from the frequency tables created in Task 5, Questions 1 & 4, Worksheet 3. Pupils are to look back at the data they collected during their investigation and graph appropriate data as a pictogram.

Task 14

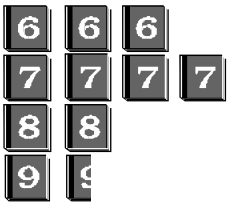
1. 12 people 2. 36 people 3. 42 people 4. 132 people 6. 180 people

5. *What people perferred to watch*



Key
= television
= videos
= movies
Each picture = 12 people

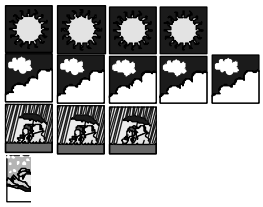
7. *Survey on pupils' shoe sizes*



Each picture = 6 pupils

Key	
6	= size 6
7	= size 7
8	= size 8
9	= size 9

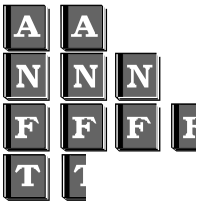
8. *Weather conditions recorded for 50 days*



Each picture = 4 days

Key	
	= sunny
	= cloudy
	= raining
	= snowing

9. *Number of each type of book sold*



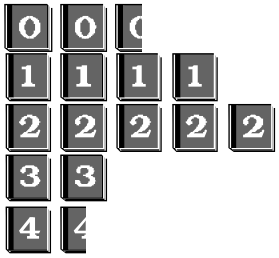
Each picture = 40 books

Key	
A	= adventure
N	= nature
F	= fiction
T	= travel

Task 15

Pictograms using the data from Task 5, Questions 1 and 4.

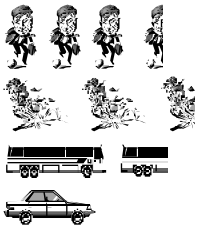
1. *Spelling mistakes made by pupils in Room 10*



Each picture = 2 pupils

Key	
0	= 0 mistakes
1	= 1 mistake
2	= 2 mistakes
3	= 3 mistakes
4	= 4 mistakes

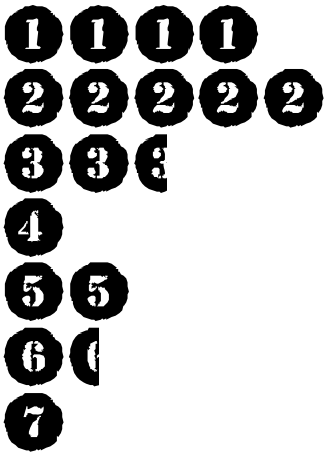
4. *Method of travelling to school by pupils in Room 9*



Each picture = 4 pupils

Key	
	= walk
	= bike
	= bus
	= car

Distance travelled to school by pupils in Room 9, in kilometres



The numbers refer to distance, measured in km.
Each number = 2 pupils

Worksheet 10

Creating dot plot graphs:

A **dot plot graph** is basically the same as a column graph, where the columns have been replaced by dots. Like the frequency table and stem & leaf graphs, items of data can be added to the graph at any time, in any order, once the axes have been drawn up.

All dot plot graphs should have …

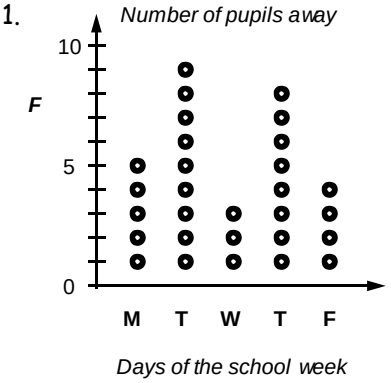
- a name or title
- a label oneach axis
- a scale on the vertical axis
- gaps between the dots
- all dots should be the same size.

In **Task 16** pupils are to organise data and create dot plot graphs, plus answer questions related to the data. Having collected their own data, pupils are to create their own dot plot graphs.

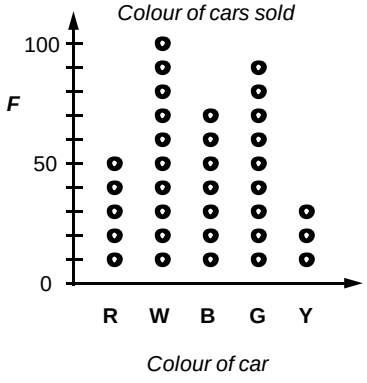
In **Task 17** pupils are to create dot plot graphs from the frequency tables created in Task 5, Questions 1 & 4, Worksheet 3. Pupils are to look back at the data they collected during their investigation and graph appropriate data as dot plot graphs.

Task 16

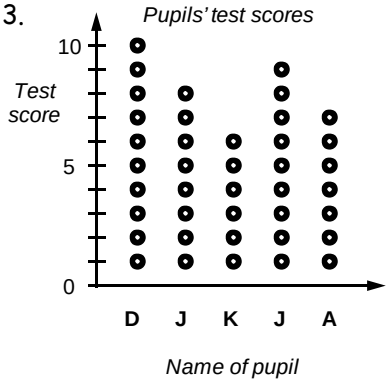
1.



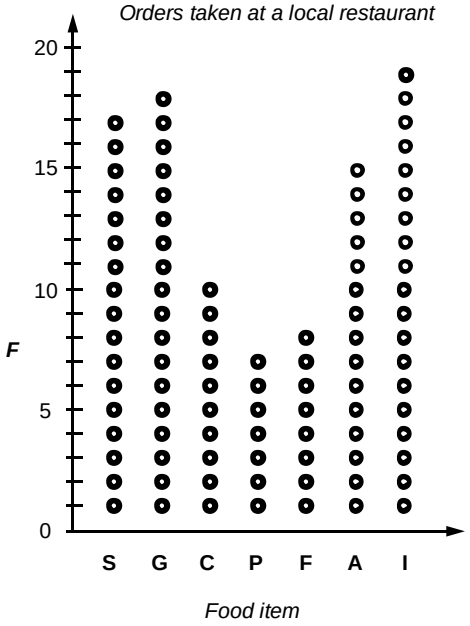
2.



3.



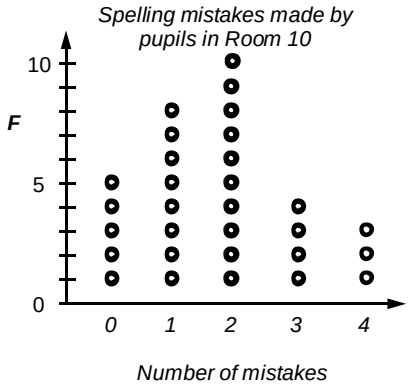
4.

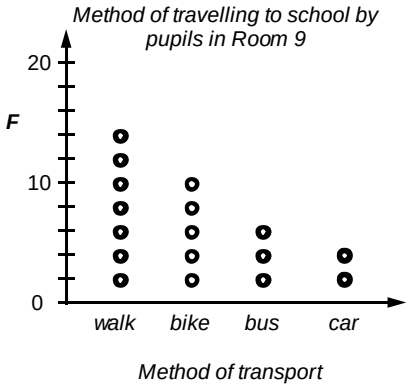


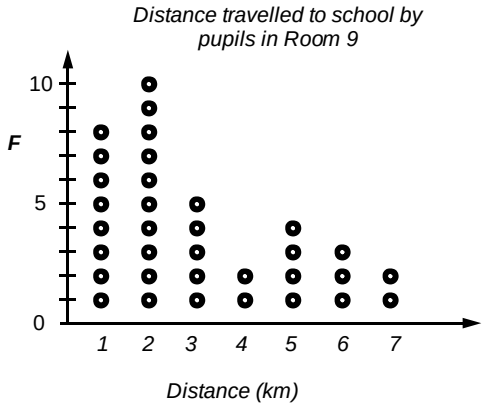
5. 10 people 6. ice-cream 7. 7 people
8. $29.85, change $10.15

Task 17

Dot plot graphs using the data from Task 5, Questions 1 and 4.







Worksheet 11

Creating strip graphs / percentage bar graphs:

A **strip graph** is also known as a **bar graph** or **percentage bar graph**. The strip graph can be divided into squares, where the squares represent a known number of items.
Example: A strip graph made of 8 squares, where each square represents 20 items.

All strip graphs or percentage bar graphs should have ...
- ▫ a title or name
- ▫ a key
- ▫ a scale stating how much each square is worth (optional)

If a **percentage bar graph** is being created, the strip is divided into sections based on the percentage of each data item that is being represented. A percentage bar graph could be divided into 10 squares where each square represents 10% of the total.
Example: With a score of 120, each square represents 10% of 120 = 12.

If the data is not conveniently worked out to fit neatly into a known number of squares, a percentage bar graph can be created using percentages. Follow these steps.

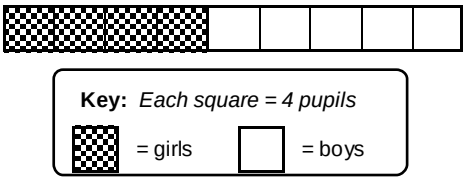
Step 1: Work out what percentage each group of data is of the total.
Example: 20 out of 80 pupils play soccer. (20 ÷ 80 × 100% = 25%)
Repeat this calculation for all groups of data.
Step 2: Draw a strip of known length. *Example:* 10cm long
Step 3: Divide the strip up using the percentages calculated in step 1.
Example: 10cm × 25% = 2.5cm

In **Task 18** pupils are to calculate how much each shaded square of a strip graph is worth, given a strip that is divided into squares and the total for all squares. Pupils are to calculate what 10% of a strip graph total is and interpret information displayed as strip graphs. Having learnt these skills, pupils are to create strip and percentage bar graphs from data that is first organised into a frequency table.

Task 18

1. $20.00 2. 15cm 3. 12kg 4. $8.50 5. 2.4kg 6. $3.60 7. 8.4m 8. 5 days 9. 50 days 10. 10 days 11. sunny

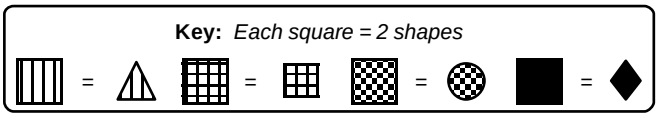
12. *Number of boys and girls in Karen's class*



13. *Mathematical shapes*

Shape	Tally	F
	IIII	4
	𝍸 III	8
	II	2
	𝍸 I	6
		20

14. *Mathematical shapes*



15. 2 shapes 16. 20% 17. 40 %

Worksheets 12 & 13

Understanding pie graphs:
Creating pie graphs using a protractor:

A **pie graph** that is divided into sectors is very similar to a strip graph that has been divided into squares. Each sector, just like each square, will represent a certain amount of data. Simple pie graphs can be created this way. All pie graphs should have …

- a title or name
- a key
- a scale stating how much each sector is worth, given as a number, a fraction, a percentage or in degrees

For data that cannot be conveniently divided up, calculations can be done to work out what fraction or percentage of the whole pie graph is required to be shaded to represent the data. The steps to work this out are outlined at the top of Worksheet 13.

In **Task 19** pupils are to interpret information displayed in a pie graph divided into sectors. Pupils are required to create simple pie graphs, given the number of sectors required for each graph and to answer questions related to the data. Pupils can collect and graph their own data.

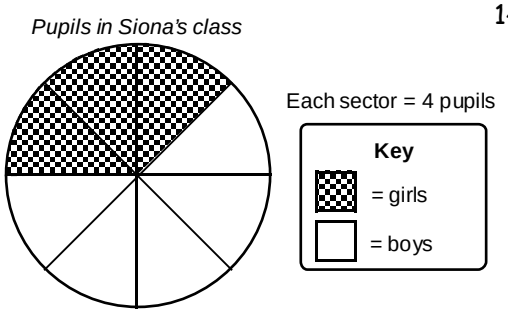
In **Task 20** pupils are to draw accurate pie graphs using protractors to create the sector sizes following the steps outlined at the top of Worksheet 13. Having created the pie graphs, pupils are to answer questions related to the information displayed.

In **Task 21** pupils are to create pie graphs from the frequency tables created in Task 5, Questions 1 & 4, Worksheet 3. Pupils are to look back at the data they collected during their investigation and graph appropriate data as pie graphs.

Task 19

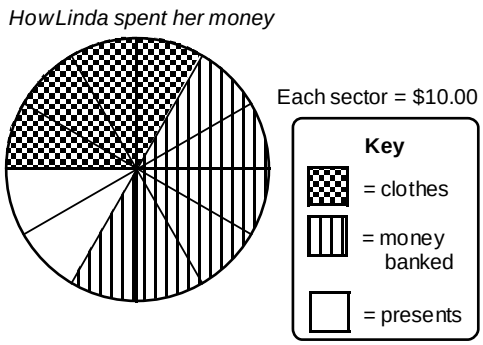
1. 10 sectors 2. $^1/_{10}$ 3. 5 days 4. 5 days 5. $^2/_{10}$ or $^1/_5$ 6. 10 days 7. $^4/_{10}$ or $^2/_5$ 8. 20 days
9. cloudy 10. winter, because 50% of the time it was raining or stormy

11. & 13.



12. 4 pupils

14. & 15.



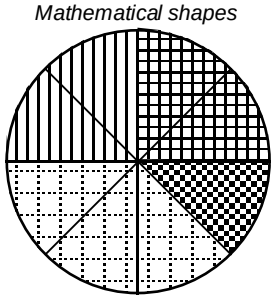
16.

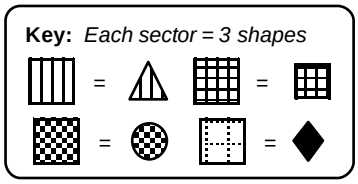
Mathematical shapes

Shape	Tally	F
△	𝍸 I	6
▦	𝍸 I	6
●	III	3
◆	𝍸 IIII	9
		24

17. 24 shapes 18. 3 shapes

19.

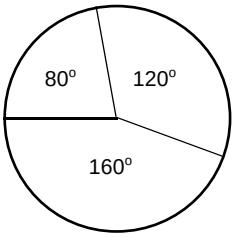




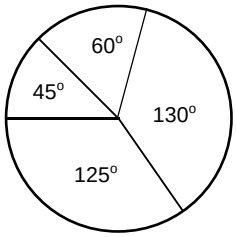
20. $^9/_{24}$ or $^3/_8$ 21. $^6/_{24}$ or $^1/_4$
22. circles

Task 20

2.



2.



3. Total of 60 pupils surveyed. Therefore 360° ÷ 60 = 6°,
sector angles: 16 × 6° = 96°, 24 × 6° = 144°, 12 × 6° = 72°
8 × 6° = 48°

4. Total of 45 days surveyed. Therefore 360° ÷ 45 = 8°,
sector angles: 15 × 8° = 120°, 20 × 8° = 160°, 8 × 8° = 64°
2 × 8° = 16°

5. Total of 360 pupils surveyed. Therefore 360° ÷ 360 = 1°,
sector angles: 70 × 1° = 70°, 110 × 1° = 110°, 130 × 1° = 130°, 50 × 1° = 50°

6.

Mathematical shapes

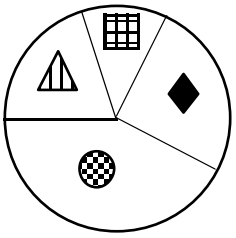
Shape	Tally	F
△	𝍸 III	8
▦	𝍸	5
●	𝍸 𝍸 𝍸 II	17
◆	𝍸 𝍸	10
		40

7. 40 shapes 8. 20% 9. $^{17}/_{40}$
10. squares 11. diamonds

12. Total of 40 shapes. Therefore 360° ÷ 40 = 9°,
sector angles: triangles = 8 × 9° = 72°, square = 5 × 9° = 45°,
circle = 17 × 9° = 153°, diamond = 10 × 9° = 90°

13.

Andrew's collection of mathematical shapes



Task 21

Below in the tables are the sector angle calculations, but the pie graphs have not been drawn.

1. F = 30, 360° ÷ 30 = 12°

No.	F	sector angles
0	5	5 × 12° = 60°
1	8	8 × 12° = 96°
2	10	10 × 12° = 120°
3	4	4 × 12° = 48°
4	3	3 × 12° = 36°
	30	

4. F = 34, 360° ÷ 34 = 10.6°

T	F	sector angles
walk	14	14 × 10.6° = 148.4°
bike	10	10 × 10.6° = 106°
bus	6	6 × 10.6° = 63.6°
car	4	4 × 10.6° = 42.4°
	34	

D	F	sector angles
1	8	8 × 10.6° = 84.8°
2	10	10 × 10.6° = 106°
3	5	5 × 10.6° = 53°
4	2	2 × 10.6° = 21.2°
5	4	4 × 10.6° = 42.4°
6	3	3 × 10.6° = 31.8°
7	2	2 × 10.6° = 21.2°
	34	

Worksheet 14

Time-series graphs:

As the name implies, **time-series graphs** are used to display data that has been collected over time. *Example:* temperature, height or weight changes, etc. This type of data is often continuous data as it is obtained by measuring.

All time-series graphs should have …

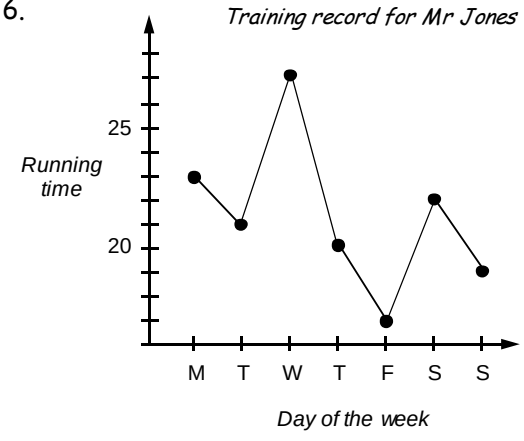
- a title or name
- a scale on the vertical frequency axis
- time on the horizontal axis
- a label on each axis
- dots or X to mark points, joined by lines

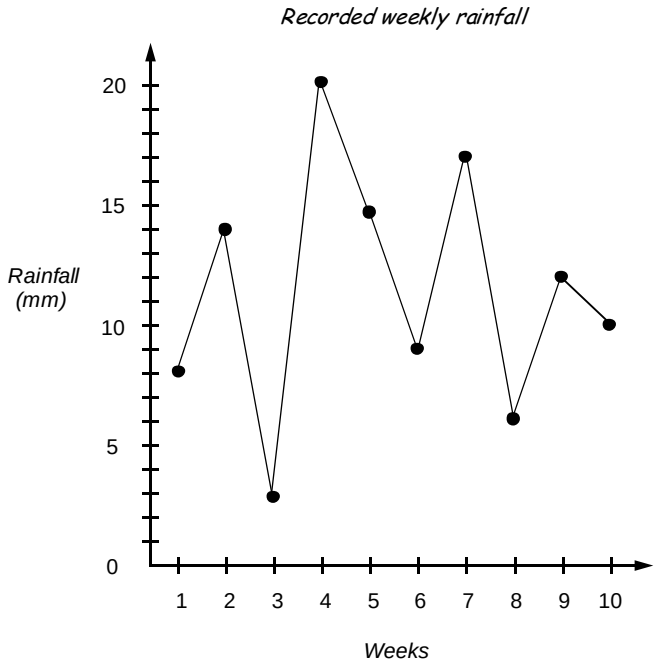
In **Task 22** pupils are to interpret a time-series graph, create graphs given the data, and answer questions using the data display. Pupils are to collect and graph their own time-series data.

Task 22

1. 62°C 2. 6 minutes 3. 70°C 4. 70 - 54 = 16°C 5. 53°C

6.





7. Friday 8. Wednesday 9. 10 minutes
10. 149 minutes
11. Once a week
13. week 4 14. week 3 15. 6mm
16. week 2 17. 114mm

Calculating the mean (average):
Calculating the median (middle score):
Finding the mode (most common score):
Calculating the range (spread):

There are three different 'averages' that can be worked out, depending on the data and what you are trying to find out.

The **mean** is commonly known as the '**average**'. To find the mean, add up all the scores and divide by the total number of scores, including any zeros that are among the scores.

The **median** is the middle score or half way between the two scores in the middle, once the scores have been placed in numerical order from smallest to largest.

The **mode** is the most common score. There can be more than one mode or no mode at all.

The **range** is a measure of how spread out the scores are. It is calculated by finding the difference between the highest and the lowest scores.

In **Task 23** pupils are to calculate the **mean**, given a list of scores, and solve word problems involving finding the mean.

In **Task 24** pupils are to calculate the **median**, given a list of scores, and solve word problems involving finding the median.

In **Task 25** pupils are find the **mode**, given a list of scores, and solve word problems involving finding the mode.

In **Task 26** pupils are to calculate the **range**, given a list of scores, and solve word problems involving finding the range.

Task 23

1. 9 2. 8 3. 14 4. 8 5. 9 6. 10 7. 5 8. 7.8 9. 4.3 10. 2.4 11. 12.6 12. 114.5
13. $4.65 14. $5.40 15. $3.26 16. 9 turns 17. 50 seconds 18. 16 seconds 19. 10 boxes
20. 702g 21. 22g 22. 8 cars 23. $11250 24. $12400

Task 24

1. 14 2. 15 3. 11 4. 17.5 5. (0, 3, 6, 8, 9, 14) 7 6. (2, 4, 6, 6, 7, 9, 10, 11, 14) 7
7. (4, 6, 8, 9, 10, 14) 8.5 8. (1.3, 1.6, 1.7, 1.9, 1.9) 1.7 9. (2.1, 2.3, 2.4, 2.7, 2.9) 2.4
10. (0.4, 0.6, 1.9, 3.4) 1.25 11. (5.0, 6.1, 7.6, 8.9) 6.85 12. (11.7, 12.6, 14.3, 19.4) 13.45
13. (117, 129, 129, 132, 139, 141) 130.5 14. (3.7, 5.6, 7.6, 11.9, 12.6, 14.6) 9.75
15. (3.04, 3.08, 3.45, 3.64, 3.95) 3.45 16. 6 runs 17. (1.4, 1.5, 1.6, 1.8, 1.9, 2.4) 1.7km
18. 1km 19. 10 boxes 20. (995, 995, 996, 999, 1006, 1008, 1009, 1009, 1012, 1014) 1007
21. 19g 22. 18 holes 23. (3, 3, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6, 6, 7, 7, 7, 8, 8) 5 24. 5 stokes 25. 98

Task 25

1. 5, 9 2. 6 3. 3 4. no mode 5. 15, 23 6. 9 7. 8, 9, 10 8. no mode 9. 35 10. 1.3
11. 2.3, 4.2 12. no mode 13. 12.01 14. 1 15. 2

16.

Juice cartons sold

Volume	Tally	F
250mL	𝍸 𝍸 III	13
600mL	𝍸 IIII	11
1000mL	𝍸 III	8
		32

17. 250mL cartons 18. 32 cartons

19.

Length of telephone toll call (minutes)

Time	12	13	14	15	16	17	18	19	20
F	4	1	3	8	4	3	3	6	4

20. 15 minutes 21. 36 calls

Task 26

1. 19 2. 25 3. 8 4. 24 5. 19 6. 13 7. 18 8. 0.8 9. 0.7 10. 3.1 11. 4.7
12. 7.2 13. 26 14. 10.5 15. 0.8 16. 5 bicycles 17. $145 18. $244 19. 10 cans
20. 9g 21. (330, 332, 333, 334, 334, 335, 337, 338, 338, 339) 334.5g 22. 18 holes 23. 5
24. 4, 5 25. 96 shots 26. 84 27. 105 28. 21 and 47

Worksheets 19 to 21

Interpreting data displays:
Creating a statistical report:
Misleading data displays:

The whole purpose of creating a data display, doing calculations using the data, is to convey a message or prove or disprove a statement. A data display tells a story about the data and being able to interpret that story is an important skill.

Task 27 is a revision exercise where pupils are to interpret various data displays.

In **Task 28** pupils are to look at and talk about data displays that have been collected from newspapers or magazines, discussing the features that make the displays stand out.

In **Tasks 29 to 31** pupils are presented with some data. Using all the skills they have previously learnt about creating data displays and doing calculations using the data, pupils are to create a statistics report to prove or disprove a statement about the data.

Task 27

1. 11 teachers do have white cars and while it was the most common car colour, 24 teachers did not have white cars. It is therefore incorrect for Anna to say that 'most' teachers have white cars as 11 out of 35 only 31.4% of teachers.
2. David is correct in that three pupils in his class did score 20, whereas only one from Room 5 scored 20. The range for both classes is also the same (20 - 7 = 13). However, looking at the distribution of scores, Room 5 had more pupils score in the 10's than Room 4 did. The mean for Room 4 marks was 11.2 (1 dp) and the mean for Room 5 was 14.8 (1 dp), further proving that David's statement is incorrect.
3. Sally's statement is incorrect. The scale on the vertical axis does not start at zero, but starts at 10. From the graph we can see that there are 15 boys and 20 girls.
4. For similar reasons as in question 1 above, most pupils do not have hazel eyes as only 33.3% of all pupils have hazel eyes. That means that 66.6% do not. In Room 7, hazel is the most common eye colour, but that does not mean that 'most' pupils have hazel coloured eyes.

Task 29

For this task various graphs and calculations could be done; below are some examples.
John does have the faster lpas times for all three courses, but does that make him a better driver.
Calculating the **range** and **mean** would be useful.

Range for John's lap times
Course A: 71 - 59 = 12 sec
Course B: 137 - 115 = 22 sec
Course C: 55 - 41 = 14 sec

Mean for John's lap times
Course A: 65.6 sec
Course B: 126.4 sec
Course C: 45.8 sec

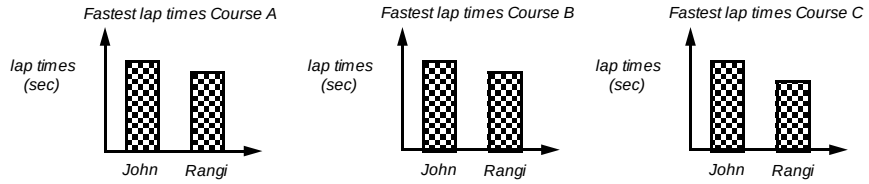
Range for Rangi's lap times
Course A: 70 - 60 = 10 sec
Course B: 135 - 117 = 18 sec
Course C: 50 - 36 = 14 sec

Mean for Rangi's lap times
Course A: 63.8 sec
Course B: 125.4 sec
Course C: 43.8 sec

Looking at the range values, Rangi's is the more consistent driver as his range values are less than those for John's lap times. Also Rangi's mean lap times for all courses are better than those of Rangi.

Who is the 'better' driver?

This data could be displayed as column graphs (not drawn to scale), such as ....



Similar column graphs could be drawn to display mean lap times and range values.

Conclusion: While John does have the faster lap times for all courses, Rangi has the more consistent lap times has his range values are narrower and his mean lap times are fastest. Based on these calculations, John's statement is incorrect, therefore Rangi is the better driver.

Task 30

Possible displays and calculations that could be done, as you consider the restaurant owner's statements:

Group size: Organise data into a frequency table and then draw a graph.
Calculate the mean, median and mode for group size.
Mean = 30 ÷ 8 = 3.75 people, Median (2, 2, 3, 3, 4, 5, 5, 6) = 3.5 people, Mode = 2, 3 & 5

Choice of main meal: Organise data into a frequency table and then draw a graph.

Meal	F
chicken	11
fish	7
beef	8
pork	4

Cost per meal per person: Calculate the mean cost of a meal.
Total cost of all meals = $645. Total number of meals = 30
Mean cost = $645 ÷ 30 = $21.50

Length of time spent at the restaurant: Draw column or dot plot graph.
Calculate the mean, median and mode times.
Mean = 28hrs ÷ 8 = 3.5hrs, Median ($1\frac{1}{2}$, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, 4, $4\frac{1}{2}$, 5) = $3\frac{3}{4}$hrs, Mode = 4hrs

Conclusion: To summarise the results, the average number of people per group is 3.5, the most popular main meal is chicken. The average cost per person is $21.50 and the groups stay for an mean (average) time of 3.5 hours. Based on these results, the restaurant owner was about right for group size, cost per person per meal and length of stay, but was incorrect in his choice of the most popular main meal.

Worksheets 21 to 25

Understanding probability words:
Calculating relative frequency / probability scales:
Finding outcomes using grids:
Finding outcomes using tree diagrams:
Using probability to predict outcomes:

Probability is a measure of the chance of how likely something will happen. Different words can be used to describe the chance of something happening and there are several probability calculations that can be performed. Some important probability words include **experiment, trial, outcome** & **event.**

The rolling of a die, the drawing of a card are called **experiments**. When a die is rolled it is called a **trial**. An **outcome** is the result of an experiment. Finding all possible outcomes can be a challenge. An **event** is one of the possible outcomes.

In **Task 32** pupils are to use probability words to describe the likelihood of events happening.

In **Task 33** pupils are to calculate the **relative frequency** of something happening. Relative frequency can also be known as experimental probability. The relative frequency is worked out on actual results of an experiment.

$$\text{Relative frequency} = \frac{\text{Number of times the event occurs}}{\text{Total number of trials}}$$

Having calculated the relative frequencies of various events, these results are to be displayed on a probability scale.

In **Tasks 34 & 35** pupils are to work out all possible outcomes for an experiment or situation in a systematic way using a simple grid or tree diagram. Pupils are to use information they have calculated to work out various questions associated with the data.

In **Task 36** pupils are to work out the probability of events happening, based on data contained in tree diagrams, frequency tables or lists. Having worked out the probability values, pupils are to use this information to predict what they would expect to happen, given a larger population.

Task 32

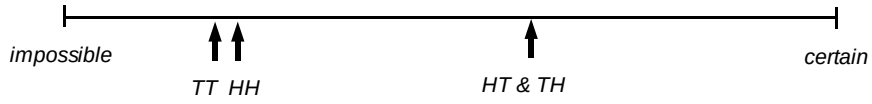
2. D, E, A, C, B .

For questions 3 to 22, some answers will vary depending on the pupils and the time of the year, therefore no answers have been given. Discuss each question with your class, explaining why different answers are acceptable.

Task 33

1. HH = 13, HT = 17, TH = 19, TT = 11 2. 60 trials 3. $^{13}/_{60}$ 4. TT 5. $^{36}/_{60}$ or $^{3}/_{5}$

6.



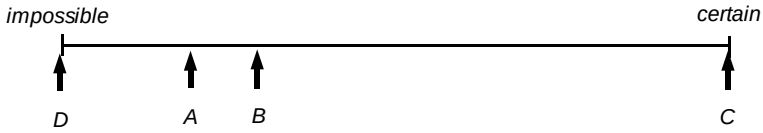
10.

Mathematical shapes

Shape	Tally	F
▲	𝍸 IIII	9
▦	𝍸	5
◉	𝍸 𝍸 𝍸	15
◆	𝍸 𝍸 I	11
		40

11. circle = $^{15}/_{40}$, square = $^{5}/_{40}$, triangle = $^{9}/_{40}$, diamond = $^{11}/_{40}$.

12.



Task 34

1.

	C	Sb	T
R	RC	RSb	RT
Sc	ScC	ScRb	ScT

3.

	R	B	G
P	PR	PB	PG
Y	YR	YB	YG
O	OR	OB	OG

5.

	R	B	G	W	Bl
P	PR	PB	PG	PW	PBl
Y	YR	YB	YG	YW	YBl
O	OR	OB	OG	OW	OBl
Br	BrR	BrB	BrG	BrW	BrBl

2. (rugby, cricket), (rugby, softball), (rugby, tennis), (soccer, cricket), (soccer, softball), (soccer, tennis).

4. (purple, red), (purple, blue), (purple, green), (yellow, red), (yellow, blue), (yellow, green), (orange, red), (orange, blue), (orange, green)

6. (purple, red), (purple, blue), (purple, green), (purple, white), (purple, black), (yellow, red), (yellow, blue), (yellow, green), (yellow, white), (yellow, black), (orange, red), (orange, blue), (orange, green), (orange, white), (orange, black), (brown, red), (brown, blue), (brown, green), (brown, white), (brown, black) 20 outcomes

7.

	M	F	H
B	BM	BF	BH
T	TM	TF	TH
C	CM	CF	CH

8. (bacon & eggs, milo), (bacon & eggs, fruit juice), (bacon & eggs, hot choc), (toast & jam, milo), (toast & jam, fruit juice), (toast & jam, hot choc), (cereal, milo), (cereal, fruit juice), (cereal, hot choc)

9. $5.50 10. $14.50 11. Toast & jam, milo

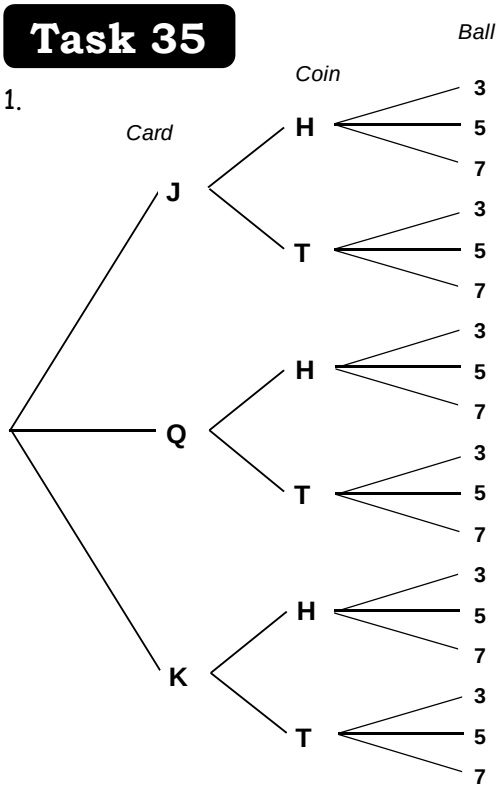
12.

	M	T	W	T	F	S	S
M	MM	MT	MW	MT	MF	MS	MS
V	VM	VT	VW	VT	VF	VS	VS
P	PM	PT	PW	PT	PF	PS	PS
F	FM	FT	FW	FT	FF	FS	FS

13. 28 outcomes 14. reduces the outcomes by 8, therefore only 20 outcomes

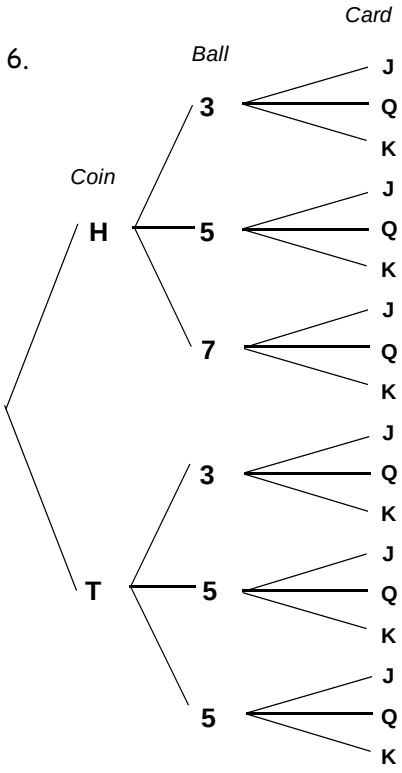
Task 35

1.

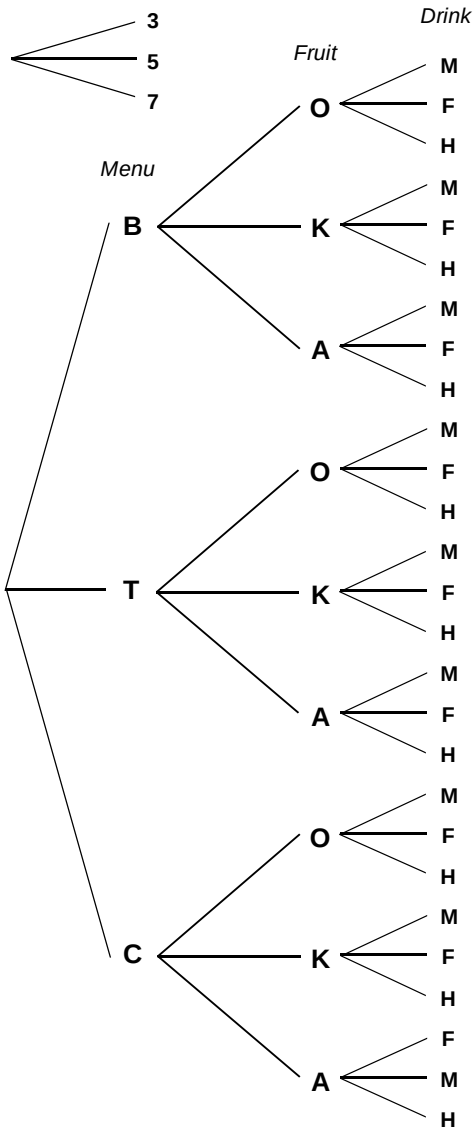


2. (J, H, 3), (J, H, 5), (J, H, 7), (J, T, 3), (J, T, 5), (J, T, 7), (Q, H, 3), (Q, H, 5), (Q, H, 7), (Q, T, 3), (Q, T, 5), (Q, T, 7) (K, H, 3), (K, H, 5), (K, H, 7), (K, T, 3), (K, T, 5), (K, T, 7)
3. 6 outcomes
4. 9 outcomes
5. 6 outcomes

6.



7.



8. 27 outcomes or choices
9. 18 combinations
10. $5.20
11. $14.80
12. bacon & eggs, an apple, fruit juice

Task 36

1. (H,H), (H,T), (T,H), (T,T) 2. 1 out of 4 or $^1/_4$ 3. 1 out of 4 or $^1/_4$ 4. 2 out of 4 or $^1/_2$
5. $\frac{1}{4}$ of 100 = 25 times 6. 300 times 7. 1 out of 6 or $^1/_6$ 8. 3 out of 6 or $\frac{1}{2}$ 9. 2 out of 6 or $^1/_3$
10. $^1/_6$ of 60 = 10 times 11. $^1/_2$ of 200 = 100 12. 120 drinks 13. $^{50}/_{120}$ or $^5/_{12}$ 14. $^{15}/_{120}$ or $^1/_8$
15. flavoured milk 16. 60 Fanta drinks 17. 15 ginger beer drinks

18.

Music choices	Tally	F
rock	𝍸 𝍸 II	12
jazz	𝍸 𝍸	9
country & western	𝍸 𝍸	8
classical	𝍸 𝍸 I	11
		40

19. $^{12}/_{40}$ or $^3/_{10}$ 20. $^{11}/_{40}$
21. rock = 120, jazz = 90, country & western = 80, classical = 110

Table of Contents for the Homework / Assessment Worksheet Masters for Statistics, Level 4

Statistics

L4MSt

S1

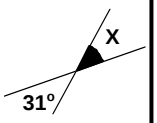
Homework / Assessment Worksheet

1

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. $7 + 4 \times 9 + 5 =$ .....
2. Calculate $15^2 =$ .....
3. Find the next four numbers of the sequence 3, 9, 15, ...
4. Convert $\frac{3}{4}$ to a percentage .....
5. Find the missing angle X



X = ...

6. Find $\frac{1}{4}$ of \$36.80 .....
7. Estimate 398.86 ÷ 3.95 by rounding first ..... ÷ ..... = ...
8. Shade in 66.6·% of these circles ◯ ◯ ◯
9. 9.3 ÷ 1000 = ...
10. If the perimeter of a square is 36cm, how long is each side? .....

B: Statistical words

Complete these sentences, using the words listed in the box.

1. In statistics, a group of anything such as the trees in your garden is called a .....
2. A ..... is part of the population we are interested in.
3. If we wish to comment about a population, we often ..... a population or a sample of the population.
4. For the results of a survey to apply to the whole population, the sample must be a ....
5. A sample that is not a representative sample is called a ..... sample.
6. A ..... sample means that every person, or item, has an equal chance of being chosen.
7. A ..... is one way to obtain people's opinions.

sample	**questionnaire**	**population**	**survey**
random	**biased**	**representative sample**	

C: Designing a questionnaire

A questionnaire is used when we are asking opinions about an issue. The design of a questionnaire is important. **List 4 points** that you should consider when designing a questionnaire.

1. .....
2. .....
3. .....
4. .....

A new teacher wants to find out more about the pupils in his /her class.
Write three questions that this teacher might ask, that require a 'yes / 'no' answer.

5. .....
6. .....
7. .....

Write a question that this teacher might ask , that requires a choice of answers. Include the choice of answers for your question.

8. .....

D: What would you investigate?

What issues in your school, community, town, city or country are you interested in or worried about?

List three issues you are concerned about in order of most important first.

.....
.....
.....
.....
.....
.....
.....

Comments: .....

Please sign:
Parent / Caregiver

.....

AWS

Statistics

L4MSt

S2 / S3

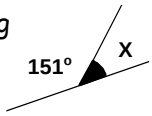
Homework / Assessment Worksheet

2

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 15 – 3 × 4 + 9 = ...
2. Convert 435mm to cm .
   .....
3. Change 15:45 in 24hr time to a.m or p.m. time
   .....
4. Calculate 2^3 .....
5. Find the missing angle X
   X = ...



6. Find ½ of $39.50
   .....
7. Estimate 97.56 × 10.53 by rounding first
   ..... ÷ ..... = ...
8. Shade in 33.3·% of these circles ◯ ◯ ◯
9. 5.7 × 100 = ...
10. Circle the digit that represents the tenths in the number ... 15.67

B: Types of data / frequency tables

There are two types of data that can be collected, **discrete** data and **continuous** data. Complete these sentences using these words.

1. Data that is obtained by **counting** is called ..... data.
2. Data that is obtained by **measuring** is called ..... data.

Sally recorded the number of library books each pupil in Rooms 4 and 5 read in one week.

Number of books each pupil reads

1, 3, 4, 2, 3, 1, 2, 4, 3,
2, 4, 3, 1, 3, 2, 4, 3, 2,
1, 3, 2, 4, 3, 3, 2, 1, 1,
2, 3, 4, 3, 1, 2, 3, 2, 1,
2, 3, 2, 1, 2, 3, 2, 1, 3,
2, 4, 2, 3, 2, 3, 2, 4, 1,
2, 3, 2, 4, 3, 2, 1, 2, 4

3. **Organise** this data in the frequency table below.

Number of books	Tally	F
1		
2		
3		
4		

4. What was the most common number of books read?
   .....

5. How many pupils read at least 3 books? .....
6. How many pupils in Rooms 4 and 5? .....

C: More frequency tables

When there is large range of data scores, data can be grouped to avoid having too many rows in the frequency table.

The following data shows the number of Lego blocks used to create some models.

9, 12, 23, 28, 32, 19, 39,
10, 21, 34, 8, 29, 37, 21,
39, 26, 11, 38, 9, 29, 26,
18, 16, 24, 35, 40, 16, 26,
13, 24, 36, 34, 26, 27, 18,
9, 23, 27, 34, 40, 16, 21,
18, 11, 26, 13, 24, 8, 38

Number of blocks	Tally	F
1 -10		
11 - 20		
21 - 30		
31 - 40		

1. **Organise** the data into the frequency table.
2. What numbers occur in the class interval or group 11 to 20? .....
3. How many Lego models had at least 21 blocks? .....
4. How many Lego models had no more than 30 blocks? .....
5. How many Lego models were made altogether?.....

D: Collecting data

If you are at school or at home, collect this data about these objects in your house or your classroom.

Number of ...	Tally	F
windows		
doors		
tables		
chairs		
light bulbs		
televisions		
radios		

What was the most common object you counted?

.....

Comments: .....

.....

.....

Please sign:
Parent / Caregiver

AWS

S3

Statistics

Homework / Assessment Worksheet

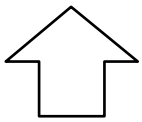
L4MSt

3

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

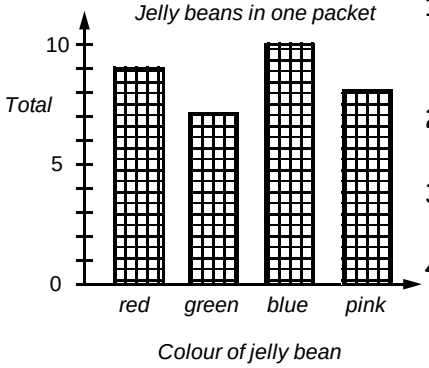
1. 8 + 24 ÷ 6 – 5 = ...
2. 230cm = ... m
3. Find the next four numbers of the sequence 7, 12, 17, ...
4. Convert 4:25 p.m. to 24hr time .....
5. Draw in the line(s) of symmetry



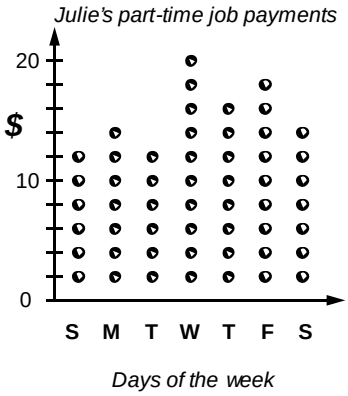
6. Find $\frac{1}{4}$ of $24.80 .....
7. Estimate 504.9 + 897.9 by rounding first ..... + ... = ...
8. Shade in 75% of these circles ◯ ◯ ◯ ◯
9. 8.3 ÷ 1000 = ...
10. If the area of a square is 49cm^2, how long is each side? .....

B: Interpreting column & dot plot graphs

Study each graph then answer the questions.



1. What does this graph show? .....
2. How many red jelly beans? .....
3. There were 7 of which colour jelly bean? .....
4. How many jelly beans in this packet? .....



5. What does this graph show? .....
6. How much did Julie earn on Monday? .....
7. On which day did she earn $16.00? .....
8. How much did Julie earn in this week? .....

C: Creating a column graph

Carl recorded his test scores for the '10 Quick Questions' for one week.

Draw a column graph to display his results.

Day	Test scores
Monday	9
Tuesday	6
Wednesday	7
Thursday	5
Friday	8

D: Creating a dot plot graph

Carl recorded the number of books Rooms 3 & 4 pupils read in one week.

Draw a dot plot graph to display this data.

1, 2, 5, 6, 4, 2, 1, 4, 0, 5, 3, 2, 6, 4, 5, 1, 4, 3, 6, 2, 3, 1, 4, 4, 1, 2, 3, 6, 4, 1, 3, 5, 4, 3, 1, 2, 3, 5, 0, 4, 1, 6, 5, 0, 3,

AWS

Comments: .....

.....

.....

Please sign: Parent / Caregiver .....

Statistics

L4MSt

S3

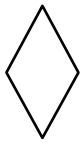
Homework / Assessment Worksheet

4

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

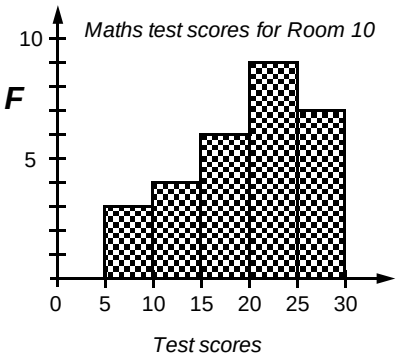
1. 3 × 7 + 6 × 2 = ...
2. 5600m = ...km
3. Find the next four numbers of the sequence 6, 13, 20, ...
4. Convert 40% to a decimal .....
5. Draw in the lines of symmetry

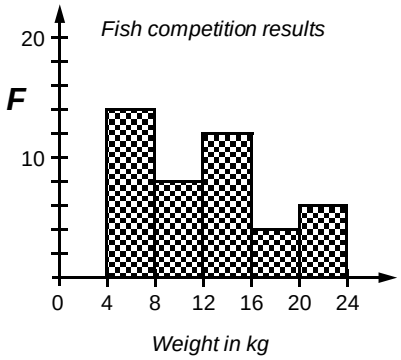


6. Solve the equation 2y + 7 = 23 y = ...
7. Estimate 605.32 × 1.97 by rounding first ..... × ..... = ...
8. Place the sign < or > in the gap 12.56 ..... 12.74
9. 5.7 ÷ 100 = ...
10. Circle the digit that represents the units in the number ... 39.62

B: Understanding histograms

1. What does this graph show?
   .....
   .....
2. What scores are represented in the class interval 10 - 14?
   .....
3. How many pupils scored less than 10? .....
4. How many pupils scored more than 20? .....
5. How many pupils in Room 10 sat the test? .....





6. What does this graph show?
   .....
   .....
7. What scores are represented in the class interval 12 - 16?
   .....
8. How many fish weighed less than 12kg? .....
9. How many fish were caught altogether? .....

C: Creating a histogram



A local toy shop had a sale. The owner recorded data about the price of the toys sold and this is shown below.

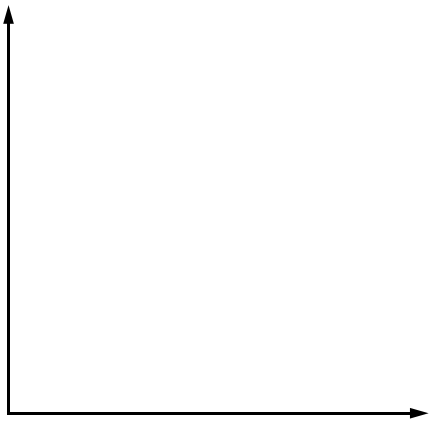
Price of toys sold

$6.35, $12.70, $21.50, $9.50, $4.60, $19.80, $22.50, $11.65, $13.40, $7.95, $21.25, $14.95, $22.75, $14.90, $9.90, $1.25, $7.65, $11.95, $17.80, $19.95, $15.60, $9.80, $6.40, $12.95, $13.75

1. **Organise** this data using the frequency table.

Price paid	Tally	Frequency
$0 - $4.99		
$5.00 - $9.99		
$10.00 - $14.99		
$15.00 - $19.99		
$20.00 - $24.99		

2. **Draw** a **histogram** to display this data.



Comments: .....

.....

.....

Please sign:
Parent / Caregiver

AWS

Statistics

L4MSt

S3

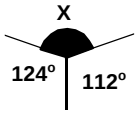
Homework / Assessment Worksheet

5

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 5 × 8 – 7 × 4 = ...
2. Calculate $\sqrt{225}$ = ...
3. Round $16.76 to the nearest dollar .....
4. If the perimeter of a square is 12cm, what is the area? .....
5. Find the missing angle X
   X = ...



6. Solve the equation
   3y – 5 = 13 y = ...
7. Change 09:25 in 24hr time to a.m or p.m. time
   .....
8. Place the sign < or > in the gap 17.075 ..... 17.079
9. 1.2 × 0.9 = ...
10. Measure the length of this line to the nearest mm .....

B: Understanding stem & leaf graphs

1. What does this graph show?
   .....
   .....
2. What was the top mark in this test? .....
3. List the scores represented by this graph.
   ....., ..., ..., ..., ..., ..., ..., ...,
   ....., ..., ..., ..., ..., ..., ..., ...,
   ....., ..., ..., ..., ..., ..., ...

Test results for pupils in Room 7

1	2, 3, 9, 8, 3, 1
2	7, 3, 7, 9, 4, 7, 2
3	8, 4, 3, 1, 6, 7, 2, 0
4	0, 0

4. How many pupils scored above 20? .....
5. How many pupils in Room 7? .....

Lap times for a car race (seconds)

23	6, 3, 8, 1, 0, 9, 3
24	3, 6, 8, 5, 1
25	3, 6, 9
26	6, 3, 0, 8, 9

6. What does this graph show?
   .....
   .....
7. What was the fastest lap time? .....
8. What was the slowest lap time? .....
9. Convert the fastest and slowest lap times to minutes and seconds. fastest time = ..., slowest time = ...
10. How many cars in this race? .....

C: Creating a stem & leaf graph

Pupils in Room 7 had an English test and a Mathematics test last week.
The tests were marked out of 50 and scores are shown below.

English test scores

19, 26, 38, 41, 50, 50, 48, 36, 24, 18, 18, 29, 31, 42, 46, 35, 24, 29, 28, 24, 31

Mathematics test scores

19, 27, 25, 39, 37, 42, 50, 27, 26, 39, 31, 49, 42, 38, 50, 26, 39, 47, 41, 16, 50

1. **Organise** this data as a **back-to-back** stem & leaf graph.
2. What are the highest and lowest scores for each test?
   English: ....., ...
   Mathematics: ....., ...
3. **Look** at the stem & leaf graph you have created and **comment** about the results of the tests.
   .....
   .....
   .....
   .....
   .....
   .....
   .....
   .....

.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver

AWS

Statistics

L4MSt

S3

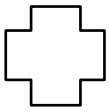
Homework / Assessment Worksheet

6

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

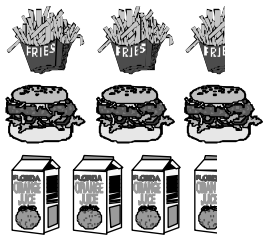
1. 6 × 7 + 9 × 2 = ...
2. 6300mL = ...L
3. Find the next four numbers of the sequence 2, 11, 20, ...
4. Convert 60% to a decimal .....
5. Draw in the lines of symmetry



6. Solve the equation 5h + 11 = 41 h = ...
7. Estimate 498.32 × 10.53 by rounding first ..... × ..... = ...
8. Place the sign < or > in the gap 14.850 ..... 14.851
9. 24.6 ÷ 0.5 = ...
10. Circle the digit that represents the tenths in the number ... 2.368

B: Understanding pictograms

Food items sold in a day



Key

= fries

= hamburgers

= juice

Each picture = 8 items

1. How many of each item were sold?

fries .....

hamburgers .....

juice .....

C: Understanding pie graphs and strip graphs

Key

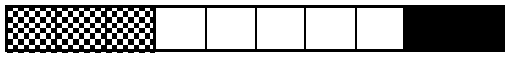
= sunny

= cloudy

= raining

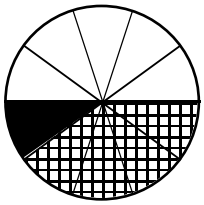
1 square / sector = 5 days

Weather conditions in two cities



The pie graph and strip graph show the weather conditions in two cities.

1. **Work out** the number of days it was sunny, cloudy or raining in each city.



Pie graph	*Strip graph*
sunny = ... days	sunny = ... days
cloudy = ... days	cloudy = ... days
raining = ... days	raining = ... days

2. The weather conditions were recorded for ..... days.

D: Creating a pictogram, a strip graph and a pie graph

Katie recorded the number of each type of book she has read.

Number of each type of book read

Type of book	F
adventure	8
nature	12
fiction	16
travel	4
	40

Use this data to create ...

a pictogram

a strip graph

and a pie graph.

Remember to have a key, stating how many books each picture, square or sector represents.

Key

= .....

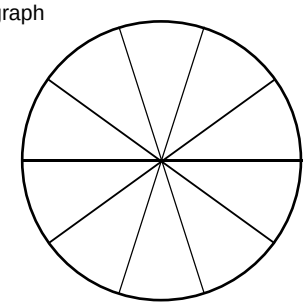
= .....

= .....

= .....

1 picture / square / sector = ... books

Pie graph



Strip graph

Pictogram

Comments: .....

.....

.....

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AWS

L4MSt

S3

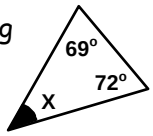
Statistics

Homework / Assessment Worksheet

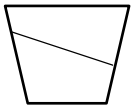
Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 15 – 21 ÷ 7 + 6 = ...
2. Calculate 20^2 = ...
3. What would nine books at $7.65 each cost?
   .....
4. Convert 0.25 to a percentage .....
5. Find the missing angle X
   X = ...



6. Find 10% of $132.50
   .....
7. Mark the obtuse angles in this diagram



8. Solve the equation
   4y – 7 = 21 y = ...
9. 4.5km = ...m
10. If the temperature is 3°C then drops 7°C, the new temperature is .....

B: Creating percentage bar graphs

For each **percentage bar graph**, work out 10% of the total.

1. Total = $120 — 10% = ...
2. Total = 63kg — 10% = ...
3. Total = 1500m — 10% = ...
4. Total = $25.60 — 10% = ...
5. Total = 185mm — 10% = ...

Shelley spent 20% of her money on food, 50% she saved and 30% she spent on a birthday present.

6. **Complete** this **percentage bar** graph to display this data.

What Shelley did with her money

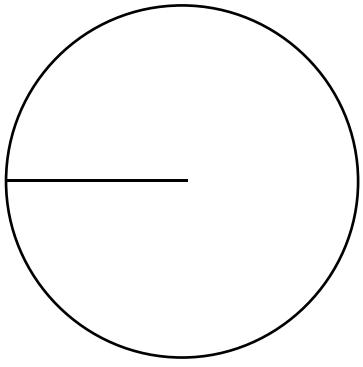
Key

= .....
= .....
= .....

7. If Shelley had $65.00, how much does 10% represent? .....
8. Starting with $65.00, Shelley spent $..... on food, saved $..... and spent $..... on a birthday present.

C: Pie graph calculations

1. **Draw** a pie graph with the sector angles of 40°, 150° and 170°.



If one degree represents $5.00, how much does each sector equal?

2. 40° = $.....
3. 150° = $.....
4. 170° = $.....

D: Creating a pie graph using a protractor

This frequency table shows the weather conditions recorded daily.

Weather conditions recorded for 60 days

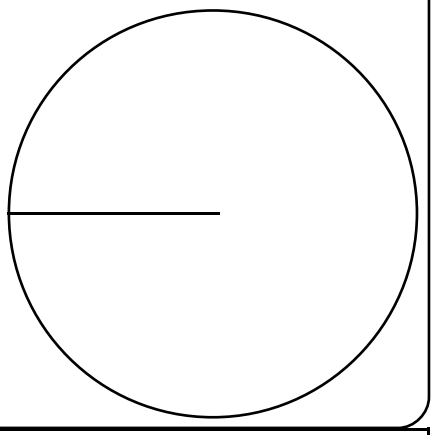
Weather	F
sunny	28
cloudy	16
raining	12
snowing	4
	60

Key

= .....
= .....
= .....
= .....

1 day = ... degrees

1. **Calculate** how many degrees represents one day.
   360° ÷ ..... = ...
2. **Calculate** the sector angles.
   sunny = ...
   cloudy = ...
   raining = ...
   snowing = ...
3. **Complete** the **key**, and **pie graph** using a protractor.



Comments: .....
.....
.....

Please sign:
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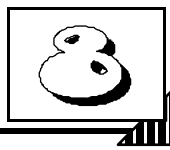
Statistics

S4

Homework / Assessment Worksheet



Name: **Class:** **Complete by:**

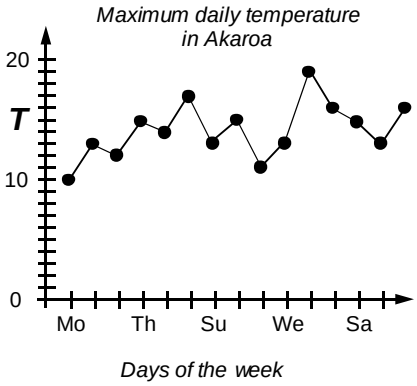
A: 10 'Quick Questions'

1. 8 × 9 – 6 × 7 = ...
2. 5.625g = ...mg
3. Find the next four numbers of the sequence 3, 11, 19, ...
4. Convert 80% to a decimal .....
5. Draw in the line(s) of symmetry

6. Solve the equation 6h + 13 = 49 h = ...
7. Estimate 987.32 ÷ 10.53 by rounding first ..... ÷ ..... = ...
8. Convert 3:40 p.m. to 24hr time .....
9. 48.8 ÷ 0.5 = ...
10. Circle the digit that represents the tens in the number ... 15.69

B: Understanding time-series graphs

1. What does this graph show? .....
2. For how many days was the temperature recorded? .....
3. What was the temperature on the 1st Monday? .....
4. On which day was the temperature 11°C? .....
5. What was the temperature on the 2nd Friday? .....
6. On how many days was the temperature 13°C? .....
7. What was the temperature on the 1st Thursday? .....
8. For how many days was the temperature 16°C? .....



C: Creating a time-series graph

Record how long it takes you to **complete** each set of '10 Quick Questions'. **Display** your results on a time-series graph.

Set A

9 + 13 = ...
23 + 9 = ...
21 – 8 = ...
42 – 9 = ...
5 × 8 = ...
6 × 7 = ...
4 × 9 = ...
32 ÷ 8 = ...
49 ÷ 7 = ...
36 ÷ 4 = ...
Time taken:

Set B

8 + 17 = ...
24 + 7 = ...
33 – 9 = ...
57 – 8 = ...
6 × 9 = ...
7 × 8 = ...
9 × 5 = ...
48 ÷ 6 = ...
54 ÷ 9 = ...
28 ÷ 4 = ...
Time taken:

Set C

7 + 29 = ...
38 + 5 = ...
32 – 10 = ...
53 – 12 = ...
7 × 10 = ...
8 × 9 = ...
5 × 10 = ...
56 ÷ 8 = ...
35 ÷ 7 = ...
111 ÷ 3 = ...
Time taken:

Set D

59 + 6 = ...
8 + 47 = ...
30 – 9 = ...
72 – 21 = ...
9 × 7 = ...
6 × 8 = ...
9 × 9 = ...
64 ÷ 8 = ...
63 ÷ 7 = ...
68 ÷ 4 = ...
Time taken:

Set E

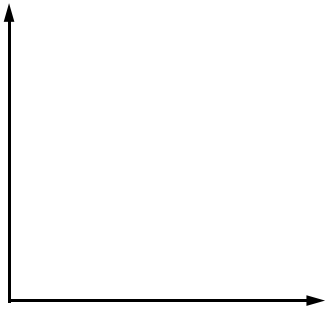
7 + 16 = ...
45 + 8 = ...
36 – 9 = ...
53 – 22 = ...
9 × 7 = ...
8 × 5 = ...
6 × 9 = ...
56 ÷ 7 = ...
72 ÷ 8 = ...
48 ÷ 3 = ...
Time taken:

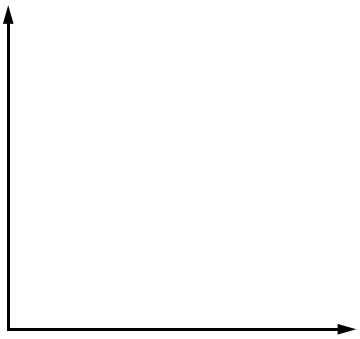
D: Collecting data

Select a town or city and record the daily maximum temperature for 5 days, or make up some temperatures.

Day	M	T	W	T	F
°C					

Graph your results below.





Comments: .....

.....

.....

Please sign:
Parent / Caregiver

AWS

Statistics

L4MSt

S5

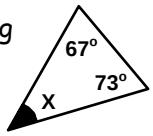
Homework / Assessment Worksheet

9

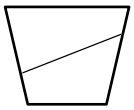
Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 21 – 36 ÷ 4 + 9 = ...
2. Calculate 1.2^2 = ...
3. What would 12 books at $4.95 each cost?
   .....
4. Convert 0.65 to a percentage .....
5. Find the missing angle X
   X = ...



6. Find 20% of $147.50
   .....
7. Mark in the acute angles in this diagram



8. Solve the equation
   9y – 12 = 24 y = ...
9. 5265g = ...kg
10. If the temperature is 8°C then drops 10°C, the new temperature is .....

B: Mean, median, mode & range

Fill in the missing words from the box, to complete these sentences.

1. To find the 'average' or ..... for a list of scores, first **add** up all the scores, then **divide** by the number of scores you added up.
2. The middle score, once the scores are placed in order from smallest to biggest, is called the ..... .
3. The most common score is called the ..... . There may be more than one or none at all.
4. The highest score — lowest score is called the ..... .

range **mode** **median** **mean**

C: Finding the mean

Find the **mean** for each list of scores.

1.	8, 10, 12	2.	7, 7, 10, 12 .....
3.	4, 9, 5, 6, 8, 4	4.	5, 8, 6, 4, 3, 5, 4 .....
5.	14, 12, 11, 17	6.	7, 104, 66, 33 .....

D: Finding the median

Find the **median** for each list of scores.
Remember the scores must be in order.

1.	7, 9, 11, 13, 15	2.	5, 8, 10, 15, 18 .....
3.	9, 12, 16, 17	4.	13, 19, 21, 25 .....

5. 6, 18, 21, 11, 13 ....., ..., ..., ..., ... median = ...
6. 7, 3, 11, 5, 9, 12 ....., ..., ..., ..., ..., ... median = ...

E: Finding the mode

Find the **mode** for each list of scores.

1.	4, 4, 6, 8, 10, 9	2.	8, 7, 5, 8, 6, 7 .....
3.	4, 12, 11, 7, 3	4.	3, 8, 10, 5, 6, 8, 6 .....
5.	5, 5, 7, 8, 9, 11, 7	6.	3, 8, 9, 4, 5, 11, 9 .....

F: Finding the range

Find the range for these lists of scores.

1.	2, 5, 8, 12, 14 .....
2.	17, 3, 11, 1, 9 .....
3.	8, 0, 12, 21, 4 .....
4.	13, 27, 41, 34, 9 .....

5. Five houses were sold for the following prices:
   $152000
   $198500
   $156900
   $147990
   $178500

   Calculate the range of the house prices .....
6. If the dearest house sold for $205400 and the range was $67900, what would the cheapest house sell for? .....

G: Word Problems

In the first nine holes of golf, Greg recorded the following scores. 4, 5, 4, 7, 8, 4, 3, 4, 6

1. Find his mean score. .....
2. What was the range of his scores? .....
3. What was the mode score? .....
4. List the scores from lowest to highest.
   ....., ..., ..., ..., ..., ..., ..., ..., ...
5. What was the median for his golf scores? .....

In the next nine holes, Greg recorded the following scores.

4, 3, 7, 7, 3, 5, 6, 4, 5

6. Combine the two sets of nine scores to find the new median.
   ....., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ... New median = ...

Comments: .....

Please sign:
Parent / Caregiver

AWS

S6 / S7

Statistics

Homework / Assessment Worksheet

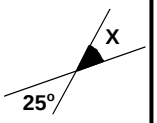
L4MSt

10

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

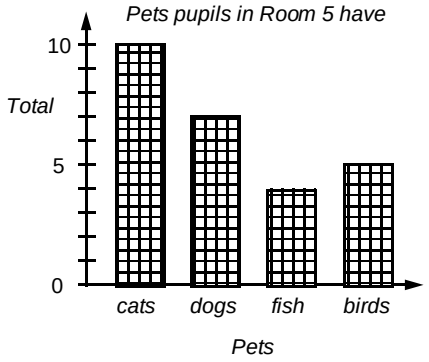
1. 5 + 3 × 7 + 6 = ...
2. Convert 9:35 a.m. to 24hr time .....
3. Solve the equation 6h + 13 = 49 h = ...
4. Convert 75% to a fraction .....
5. Find the missing angle X
   X = ...



6. Find $\frac{3}{4}$ of $36.80
   .....
7. Estimate 502.98 ÷ 9.86 by rounding first
   .....÷ ..... = ...
8. Shade in 20% of these circles ◯◯◯◯◯
9. 8.9 ÷ 10000 = ...
10. If the perimeter of a square is 48cm, how long is each side? .....

B: Interpreting data displays

1. The **column graph** below shows the number of each type of pet that pupils in Room 5 have.



Sally said, *"Most pupils have pet cats."*
Is her statement correct?
.....
.....
.....
.....
.....
.....

2. During the cricket season two players scored many runs. "I'm a better batsman as I have a top score of 59." said Richard. Is this statement correct?

Richard's scores
28, 59, 14, 23, 28, 16

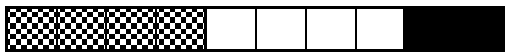
David's scores
41, 45, 36, 42, 32, 26

.....
.....
.....
.....
.....
.....

C: Creating a statistical report

This **strip graph** shows the daily weather conditions in Christchurch during June. Use this display to write a report about the weather conditions.

Daily weather conditions in Christchurch



Key
= sunny
= cloudy
= raining
1 square = 3 days

1. .....
.....
.....
.....

Competition results

4	4, 6, 9, 7,
5	6, 3, 0, 8, 9, 1
6	3, 6, 9, 5, 2
7	3, 4, 8, 9, 2

This **stem & leaf graph** shows the distance a frisbee was thrown in a competition. The distances in this graph are in metres.
Use this display to write a report about the competition.

2. .....
.....
.....
.....
.....
.....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver
.....

AWS

Statistics

L4MSt

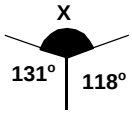
S8

Homework / Assessment Worksheet

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 9 × 7 – 8 × 6 = ...
2. Calculate $\sqrt{169}$ = ...
3. Round $29.86 to the nearest dollar .....
4. If the perimeter of a square is 20cm, what is the area? .....
5. Find the missing angle X



X = ...

6. Solve the equation 6y – 11 = 25 y = ...
7. Change 14:35 in 24hr time to a.m or p.m. time .....
8. Convent 40% to a decimal .....
9. 3.6 × 0.8 = ...
10. Measure the length of this line to the nearest mm .....

B: Relative frequency / probability scales

The **relative frequency** of an event is the proportion or fraction of times the event occurs.

A die is rolled 150 times and the results are shown in this table.

Number	F
1	23
2	25
3	28
4	21
5	27
6	26

1. Find the relative frequency of each number occurring.
   1 = ... 2 = ...
   3 = ... 4 = ...
   5 = ... 6 = ...

This frequency table was used to record the results as two coins were tossed.

Event	Tally	F
HH	𝍸 𝍸 𝍸 II	
HT	𝍸 𝍸 𝍸 I	
TH	𝍸 𝍸 𝍸 III	
TT	𝍸 𝍸 𝍸 IIII	

2. **Complete** the frequency column in the table.
3. How many times were the coins tossed? .....
4. What is the relative frequency of the event 'TT'? .....
5. Which event had a relative frequency of $^{17}/_{70}$? .....
6. What is the relative frequency of the events 'HT' and 'TH' combined? .....

7. **Mark** on the **probability scale** below the events 'TT', 'HH' and 'HT' / 'TH' combined.

impossible *certain*

Michelle has a bag of Lego blocks containing different coloured blocks. This table shows how many of each coloured Lego block is in the bag.

(R) red	(W) white	(B) blue	(G) green	(Y) yellow
25	40	15	20	100

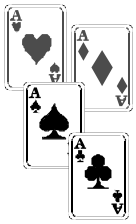
8. How many Lego blocks does Michelle have? .....
9. If a block is selected from the bag, **calculate** the **relative frequency** of selecting each colour of block.
   red = ... white = ...
   blue = ... green = ...
   yellow = ...
10. If the relative frequency of selecting a ball is 10%, which colour ball has been selected? .....
11. **Mark** on the **probability scale** below the events of choosing each colour of Lego block.

impossible *certain*

C: Experiment & investigation

Select a card from a pack of cards 30 times, replacing the card each time. **Record** the results in the table below.

heart	
diamond	
spade	
clubs	



Based on your results, what is the relative frequency of selecting each suit?

hearts = ...

diamonds = ...

spades = ...

clubs = ...

Comments: .....

.....

.....

Please sign: Parent / Caregiver

AWS

Statistics

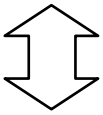
S9

Homework / Assessment Worksheet

12

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 7 × 11 – 9 × 4 = ...
2. 247cm = ...m
3. Find the next four numbers of the sequence 1, 13, 25, ...
4. Convert 45% to a decimal .....
5. Draw in the line(s) of symmetry 
6. Solve the equation 9h + 21 = 66 h = ...
7. Estimate 449.53 × 1.98 by rounding first ..... × ..... = ...
8. Convert 6:52 a.m. to 24hr time .....
9. 27.8 ÷ 0.5 = ...
10. Circle the digit that represents the tenths in the number ... 138.95

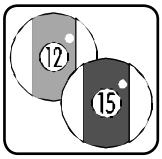
B: Listing outcomes

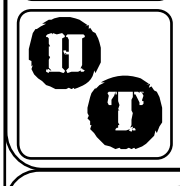
Rebecca has a choice of one breakfast food and a drink.
Use the tree diagram to work out all possible combinations or outcomes she has.

1. .....
   .....
   .....
   .....
   .....
2. How many outcomes are there altogether? .....

C: Creating a tree diagram

1. **Draw** a tree diagram to show all possible outcomes if you select a card, a numbered ball and toss a coin.





2. How many possible outcomes are there? .....

D: More outcomes

Karen has a choice of wearing a (Sk) skirt, (J) jeans or (Sh) shorts, with a choice of (Ts) t-shirt, (B) blouse or (Tt) tank-top. This grid shows all possible combinations she could wear.

	Ts	B	Tt
Sk	SkTs	SkB	SkTt
J	JTs	JB	JTt
Sh	ShTs	ShB	ShTt

1. What does SkTs mean?
   .....
   .....
2. What does ShTt mean?
   .....
   .....
3. How many combinations does Karen have? .....

E: Creating a 'grid' diagram

Two six-sided dice are rolled on the table.

1. **Draw** a 'box' diagram to show all possible outcomes.

2. How many possible outcomes were there? .....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver

AWS

L4MSt

Statistics

S9

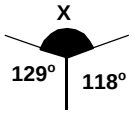
Homework / Assessment Worksheet

13

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 8 × 9 – 7 × 5 = ...
2. Calculate $\sqrt{196}$ = ...
3. Round $59.51 to the nearest dollar .....
4. If the area of a square is 49cm^2, what is the perimeter? .....
5. Find the missing angle X
   X = ...



6. Solve the equation
   9y – 23 = 49 y = ...
7. Change 18:15 in 24hr time to a.m or p.m. time
   .....
8. Convent 65% to a decimal .....
9. 4.8 × 0.9 = ...
10. Measure the length of this line to the nearest cm .....

B: Using probability to predict outcomes

A six-sided die (dice) is rolled several times.

1. What is the probability that it lands showing a 5? .....
2. What is the probability that it lands showing a 2 or 3? .....
3. What is the probability that it lands showing a number less than 4? .....
4. If a die is rolled 120 times, how many times would you expect it to land showing a 6? .....
5. If a die is rolled 240 times, how many times would you expect it to land showing a number greater than 4? .....

A local shop-keeper kept a record of the number of different drinks that he sold to pupils in one day. This table shows the result.

Drink	*Number sold*
Coca Cola	30
Fanta	50
Flavoured milk	15
Fruit juice	20
Ginger beer	5

6. How many drinks has he sold altogether? .....
7. What is the probability that a pupil had a drink of Coca Cola? .....
8. What is the probability that a pupil had a drink of fruit juice? .....
9. 5 out of 12 pupils chose which drink? .....
10. If 60 pupils ordered drinks, how many Fanta drinks would the shop-keeper expect to sell? .....
11. If 360 pupils ordered drinks, how many fruit juice drinks would the shop-keeper expect to sell? .....

Jim wants to go to the movies.
The tree diagram below shows the choices he has to make.

12. How many outcomes does Jim have to choose from? .....
13. What is the probability that Jim goes to the movies on Friday? .....
14. What is the probability that Jim goes to a comedy movie? .....
15. What is the probability that Jim goes to a horror movie on a Saturday? .....
16. What is the probability that Jim goes to an action movie on Friday, Saturday or Sunday? .....

C: Probability

The calendar below is for June.

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Mary is going to go to the movies in June.

1. What is the probability she will go on a Monday or on a Wednesday?
   Mon ..... Wed .....
2. What is the probability that she will go during the second week? .....
3. What is the probability she will go in the weekend? .....

Comments: .....

Please sign:
Parent / Caregiver

.....

.....

AWS

Homework / Assessment Worksheet

Answers

Worksheet 1

A:

1. 48 2. 225 3. 21, 27, 33, 39 4. 75% 5. 31^{o} 6. $9.20 7. 400 ÷ 4 = 100 8. ○●● 9. 0.0093 10. 9cm

B:

1. population 2. sample 3. survey 4. representative sample 5. biased 6. random 7. questionnaire

C:

Possible answers for questions 1 to 4.

- ☑ What questions relating to the 'issue/s' are you going to ask?
- ☑ Do not ask questions that are not important to the issue.
- ☑ Make the questions clear and concise and not too many of them.
- ☑ How are these questions going to be answered?
  Example: multi-choice, single words, short answers or long answers.
- ☑ Have you allowed for every possible answer?
- ☑ Do you need to give instructions as to how the questionnaire has to be filled out?
- ☑ How are you going to organise and display the data you have collected?

Worksheet 2

A:

1. 12 2. 43.5cm 3. 3:45 p.m. 4. 8 5. 29^{o} 6. $19.75 7. 100 × 10 = 1000 8. ○○● 9. 5700 10. circle the digit '6'

B:

1. discrete 2. continuous

3.

Number of books	Tally	F
1	𝍸 𝍸 II	12
2	𝍸 𝍸 𝍸 𝍸 II	22
3	𝍸 𝍸 𝍸 IIII	19
4	𝍸 𝍸	10
		63

4. 2 books
5. 29 pupils
6. 63 pupils

C:

1.

Number of blocks	Tally	F
1 - 10	𝍸 I	6
11 - 20	𝍸 𝍸 II	12
21 - 30	𝍸 𝍸 𝍸 III	18
31 - 40	𝍸 𝍸 III	13
		49

2. 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
3. 21 models
4. 13
5. 49 models

Worksheet 3

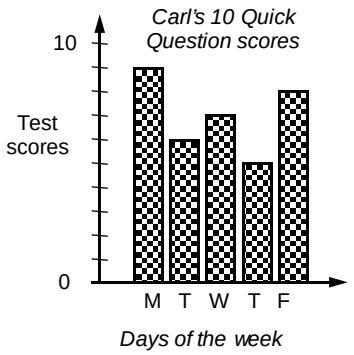
A:

1. 7 2. 2.3m 3. 22, 27, 32, 37 4. 16:25 5.  6. $6.20 7. 500 + 900 = 1400 8. ○●●● 9. 0.0083 10. 7cm

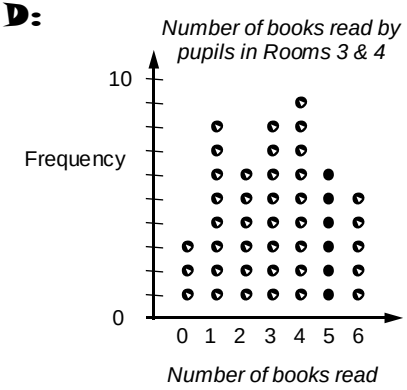
B:

1. The number of each colour of jelly beans in one jacket. 2. 9 red 3. green 4. 34 jelly beans 5. Money Julie earned from a part-time job. 6. $14 7. Thursday 8. $106

C:

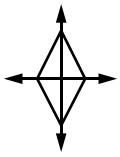


D:



Worksheet 4

A:

1. 33 2. 5.6km 3. 27, 34, 41, 48 4. 0.40 5.  6. y = 8 7. 600 × 2 = 1200 8. <
9. 0.057 10. circle the digit 9

B:

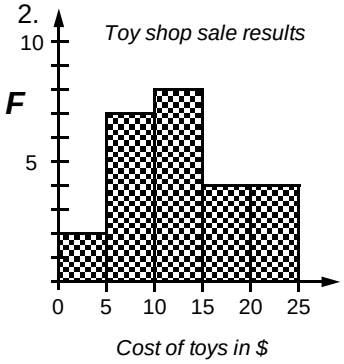
1. Maths test scores for Room 10 pupils 2. 10, 11, 12, 13, 14 3. 3 pupils 4. 16 pupils 5. 29 pupils
6. Weights of fish in a fishing competition 7. 12.00kg to 15.99kg 8. 22 fish 9. 44 fish

C:

1.

Price paid	Tally	Frequency
\$0 - \$4.99	II	2
\$5.00 - \$9.99	𝍸 II	7
\$10.00 - \$14.99	𝍸 III	8
\$15.00 - \$19.99	IIII	4
\$20.00 - \$24.99	IIII	4
		25

2.



Worksheet 5

A:

1. 12 2. 15 3. \$17 4. 9 cm^2 5. 124^0 6. y = 6 7. 9:25 a.m. 8. < 9. 1.08 10. 43mm

B:

1. Test results for pupils in Room 7 2. 40 3. 12, 13, 19, 18, 13, 11, 27, 23, 27, 29, 24, 27, 22, 38, 34, 33, 31,
36, 37, 32, 30, 40, 40 4. 17 pupils 5. 23 pupils
6. Lap times for a car race recorded in seconds 7. 230 seconds 8. 269 seconds
9. fastest time = 3 min 50 sec, slowest time = 4 min 29 sec 10. 20 cars

C:

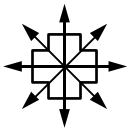
1.

English test scores		Maths test scores
8, 8, 9	1	9, 6
4, 8, 9, 4, 9, 4, 6	2	7, 5, 7, 6, 6
1, 5, 1, 6, 8	3	9, 7, 9, 1, 8, 9
6, 2, 8, 1	4	2, 9, 2, 7, 1
0, 0	5	0, 0, 0

2. English: 50 & 18, Mathematics: 50 & 16
3. 3 pupils scored 50 out ot 50 for the mathematics test, whereas only one pupil got 50 in the English test. Overall, the Mathematics were better than the English scores as there were more Mathematics scores in the 30's, 40's and 50's.

Worksheet 6

A:

1. 60 2. 6.3L 3. 29, 38, 47, 56 4. 0.60 5.  6. h = 6 7. 500 × 10 = 5000 8. <
9. 49.2 10. circle the digit 3

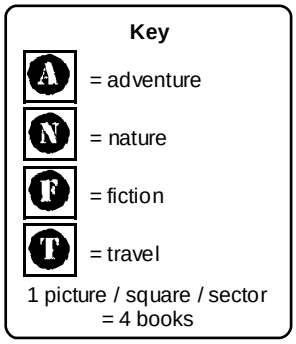
B:

1. fries = 20 items, hamburgers = 24 items, juice = 28 items

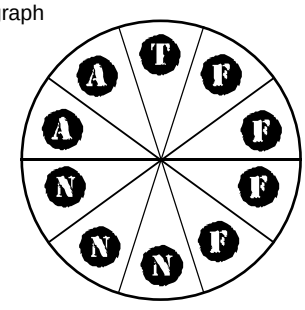
C:

1. Pie graph: sunny = 20 days, cloudy = 25 days, raining = 5 days
Strip graph: sunny = 15 days, cloudy = 25 days, raining = 10 days 2. 50 days

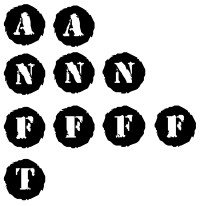
D:



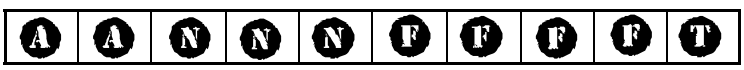
Pie graph



Pictogram

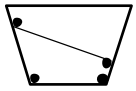


Strip graph



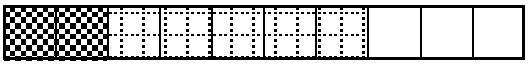
Worksheet 7

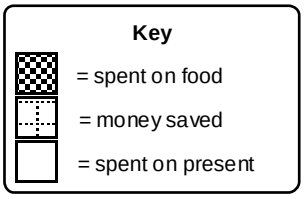
A:

1. 18 2. 400 3. $68.85 4. 25% 5. 39° 6. $13.25 7.  8. y = 7 9. 4500m
10. -4°C

B:

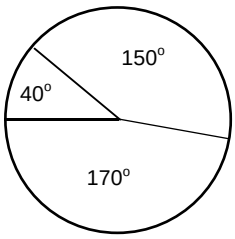
1. $12 2. 6.3kg 3. 150m 4. $2.56 5. 18.5mm
6.





7. $6.50
8. food = $13.00
   money saved = $32.50
   birthday present = $19.50

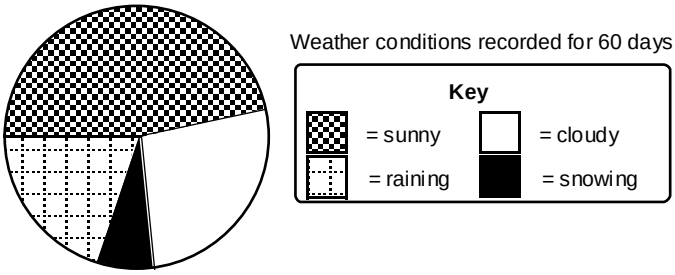
C:

1. 

2. $200 3. $750 4. $850

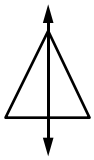
D:

1. 360° ÷ 60 = 6°, 1 day = 6° 2. sector angles, sunny = 168°, cloudy = 96°, raining = 72°, snowing = 24°



Worksheet 8

A:

1. 30 2. 5625mg 3. 27, 35, 43, 51 4. 0.80 5.  6. h = 6 7. 1000 ÷ 10 = 100
8. 15:40 9. 97.6 10. circle the digit 1

B:

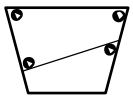
1. Maximum daily temperature in Akaroa 2. 15 days 3. 10°C 4. 2nd Tuesday 5. 16°C 6. 4 days
7. 15°C 8. 2 days

C:

Set A	Set B	Set C	Set D	Set E
9 + 13 = 22	8 + 17 = 25	7 + 29 = 36	59 + 6 = 65	7 + 16 = 23
23 + 9 = 32	24 + 7 = 31	38 + 5 = 43	8 + 47 = 55	45 + 8 = 53
21 – 8 = 13	33 – 9 = 24	32 – 10 = 22.	30 – 9 = 21	36 – 9 = 27
42 – 9 = 33	57 – 8 = 49	53 – 12 = 41	72 – 21 = 51	53 – 22 = 31
5 × 8 = 40	6 × 9 = 54	7 × 10 = 70	9 × 7 = 63	9 × 7 = 63
6 × 7 = 42	7 × 8 = 56	8 × 9 = 72	6 × 8 = 48	8 × 5 = 40
4 × 9 = 36	9 × 5 = 45	5 × 10 = 50	9 × 9 = 81	6 × 9 = 54
32 ÷ 8 = 4	48 ÷ 6 = 8	56 ÷ 8 = 7	64 ÷ 8 = 8	56 ÷ 7 = 8
49 ÷ 7 = 7	54 ÷ 9 = 6	35 ÷ 7 = 5	63 ÷ 7 = 9	72 ÷ 8 = 9
36 ÷ 4 = 9	28 ÷ 4 = 7	111 ÷ 3 = 37	68 ÷ 4 = 17	48 ÷ 3 = 16
Time taken:	Time taken:	Time taken:	Time taken:	Time taken:

Worksheet 9

A:

1. 21 2. 1.44 3. \$59.40 4. 65% 5. 40^o 6. \$29.50 7.  8. y = 4 9. 5.265kg 10. -2^oC

B:

1. mean 2. median 3. mode 4. range

C:

1. 10 2. 9 3. 6 4. 5 5. 13.5 6. 52.5

D:

1. 11 2. 10 3. 14 4. 20 5. 6, 11, 13, 18, 21, median = 13 6. 3, 5, 7, 9, 11, 12, median = 8

E:

1. 4 2. 7, 8 3. no mode 4. 6, 8 5. 5, 7 6. 9

F:

1. 14 - 2 = 12 2. 17 - 1 = 16 3. 21 - 0 = 21 4. 41 - 9 = 32 5. \$198500 - \$147990 = \$50510
6. \$205400 - \$67900 = \$137500

G:

1. 5 2. 8 - 3 = 5 3. 4 4. 3, 4, 4, 4, 4, 5, 6, 7, 8 5. 4
6. 3, 3, 3, 4, 4, 4, 4, 4, 4, 5, 5, 5, 6, 6, 7, 7, 7, 8 median = 4

Worksheet 10

A:

1. 32 2. 09:35 3. h = 6 4. ¾ 5. 25^o 6. \$27.60 7. 500 ÷ 10 = 50 8. 
9. 0.00089 10. 12cm

B:

1. Cats are the most popular choice of pets that pupils in Room 5 do have, however only 10 of the 26 pupils in Room 5 have a cat as a pet. Therefore, Sally's statement is incorrect as more pupils have pets that are not cats.
2. Consider Richard's scores: highest score = 59, lowest score = 14, therefore the range is 45
   mean = 27, median = 25.5, mode = 28
   Consider David's scores: highest score = 45, lowest score = 26, therefore the range is 19
   mean = 37, median = 38.5, mode = no mode
   While Richard did have the highest score, David's scores were better overall, therefore Richard's statement is incorrect.

C:

1. The strip graph shows the weather conditions for June. Each square represents 3 days. During June it was sunny for 12 days, cloudy for 12 days and raining on 6 days. Quite a good month as there was little rain.
2. In this frisbee throwing competition, 20 people took part. The best throw was 79 metres and the worst throw was 44 metres, therefore there was a range of 35 metres. The mean throw was 60.7 metres, with a median throw of 60.5. A good competition.

Worksheet 11

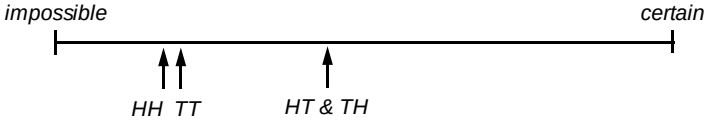
A:

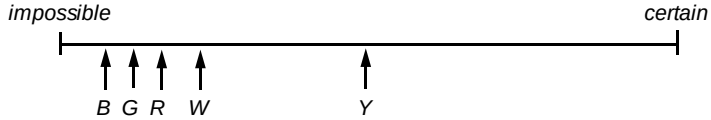
1. 15 2. 13 3. \$30 4. $25cm^2$ 5. 111^o 6. y = 6 7. 2:35 p.m. 8. 0.40 9. 2.88 10. 34mm

B:

1. 1 = $^{23}/_{150}$, 2 = $^{25}/_{150}$, 3 = $^{28}/_{150}$, 4 = $^{21}/_{150}$, 5 = $^{27}/_{150}$, 6 = $^{26}/_{150}$
2.

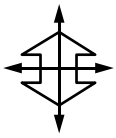
Event	Tally	F
HH	𝍸 𝍸 𝍸 II	17
HT	𝍸 𝍸 𝍸 I	16
TH	𝍸 𝍸 𝍸 III	18
TT	𝍸 𝍸 𝍸 IIII	19

3. 70 times 4. $^{19}/_{70}$ 5. HH 6. $^{34}/_{70}$
7. 

8. 200 Lego blocks 9. red = $^{25}/_{200}$, white = $^{40}/_{200}$, blue = $^{15}/_{200}$, green = $^{20}/_{200}$, yellow = $^{100}/_{200}$ 10. green
11. 

Worksheet 12

A:

1. 41 2. 2.47m 3. 37, 49, 61, 73 4. 0.45 5.  6. h = 5 7. 450 × 2 = 900 8. 06:52
9. 55.6 10. circle the digit 9

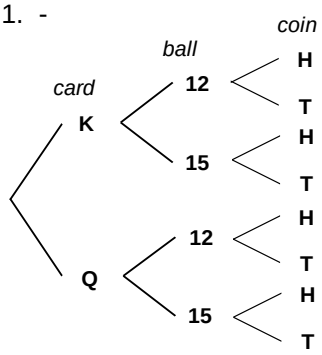
B:

Let T = toast, C = cereal, F = fruit. Mo = milo, Mi = milk, J = juice

1. (T,Mo), (T,Mi), (T,J), (C,J),(C,Mo), (C,Mi), (C,J),(F,Mo), (F,Mi), (F,J) 2. 9 outcomes

C:

1. - 2. 8 outcomes



D:

1. Karen wears a skirt and t-shirt 2. Karen wears shorts and a tank-top 3. 9 combinations

E:

1. 2. 36 outcomes

	1	2	3	4	5	6
1	1,1	1,2	1,3	1,4	1,5	1,6
2	2,1	2,2	2,3	2,4	2,5	2,6
3	3,1	3,2	3,3	3,4	3,5	3,6
4	4,1	4,2	4,3	4,4	4,5	4,6
5	5,1	5,2	5,3	5,4	5,5	5,6
6	6,1	6,2	6,3	6,4	6,5	6,6

Worksheet 13

A:

1. 37 2. 14 3. $60 4. 28cm 5. 113° 6. y = 8 7. 6:15 p.m. 8. 0.65 9. 4.32 10. 5cm

B:

1. $^1/_6$ 2. $^2/_6$ or $^1/_3$ 3. $^3/_6$ or $^1/_2$ 4. $^1/_6$ of 120 = 20 times 5. $^1/_3$ of 240 = 80 times 6. 120 drinks
7. $^{30}/_{120}$ or $^1/_4$ 8. $^{20}/_{120}$ or $^1/_6$ 9. Fanta 10. 25 Fanta drinks 11. 60 fruit juice drinks 12. 9 outcomes
13. $^1/_3$ 14. $^1/_3$ 15. $^1/_9$ 16. $^3/_9$ or $^1/_3$

C:

1. Monday = $^4/_{30}$ or $^2/_{15}$ Wednesday = $^5/_{30}$ or $^1/_6$ 2. $^7/_{30}$ 3. $^8/_{30}$ or $^4/_{15}$

Tracking Sheet: 'In-class' Activity Sheets

Statistics

Name

Comments

Worksheet	Objectives														
13	S3														
12	S3														
11	S3														
10	S3														
9	S3														
8	S3														
7	S2 / S3														
6	S2 / S3														
5	S2 / S3														
4	S2														
3	S2														
2	S1														
1	S1														

Tracking Sheet: ‘In-class’ Activity Sheets

Worksheet	Objectives	Comments														
25	S9															
24	S9															
23	S9															
22	S8															
21	S8															
20	S7															
19	S6															
18	S5															
17	S2 / S5															
16	S5															
15	S5															
14	S4															
Statistics	Name															

Tracking Sheet: Homework / Assessment Worksheets

Worksheet	Objectives	Comments														
13	S9															
12	S9															
11	S8															
10	S6 / S7															
9	S5															
8	S4															
7	S3															
6	S3															
5	S3															
4	S3															
3	S3															
2	S2 / S3															
1	S1															
Statistics		Name														