

Teaching Pack

Statistics

Cambridge IGCSE™

Mathematics 0580

This *Teaching Pack* can also be used with the following syllabuses:

- Cambridge IGCSE™ (9–1) Mathematics **0626**
- Cambridge IGCSE™ (9–1) Mathematics **0980**
- Cambridge IGCSE™ International Mathematics **0607**
- Cambridge O Level Mathematics **4024**



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Icons used in this pack:



Lesson



Video



Assessment opportunity

Introduction

This pack will help you to develop your learners' mathematical skills as defined by assessment objective 1 (AO1 Demonstrate knowledge and understanding of mathematical techniques) in the course syllabus.

Important note

Our *Teaching Packs* have been written by **classroom teachers** to help you deliver topics and skills that can be challenging. Use these materials to supplement your teaching and engage your learners. You can also use them to help you create lesson plans for other skills.

This content is designed to give you and your learners the chance to explore mathematical skills. It is not intended as specific practice for exam papers.

This is one of a range of *Teaching Packs*. Each pack is based on one mathematical topic with a focus on specific mathematical techniques. The packs can be used in any order to suit your teaching sequence.

In this pack you will find the lesson plans and worksheets for learners you will need to successfully complete the teaching of this mathematical skill.

Skill: Statistics

This *Teaching Pack* links to the following syllabus content (see syllabus for detail):

- C9.1 – C9.8
- E9.1 – E9.8

The pack covers the following mathematical skills, adapted from **AO1: Demonstrate knowledge and understanding of mathematical techniques** (see syllabus for assessment objectives):

- Collecting and collating data
- Drawing and interpreting graphs
- Drawing and interpreting statistical diagrams including (but not limited to) frequency tables, bar charts, histograms, pie charts, scatter graphs, box-and-whisker plots, pictograms, stem-and-leaf diagrams and back-to-back stem-and-leaf diagrams
- Calculating and interpreting mean, median, mode, range, interquartile range, outliers and the line of best fit

Prior knowledge

Knowledge from the following syllabus topics is useful.

- C1.8 Use the four rules for calculations with whole numbers, decimals and vulgar (and mixed) fractions, including correct ordering of operations and use of brackets.
- C1.12 Calculate a given percentage of a quantity. Express one quantity as a percentage of another. Calculate percentage increase or decrease.
- E1.12 Carry out calculations involving reverse percentages, e.g. finding the cost price given the selling price and the percentage profit.
- C1.13 Use a calculator efficiently. Apply appropriate checks of accuracy.
- C2.10 Interpret and use graphs in practical situations including travel graphs and conversion graphs. Draw graphs from given data.
- C3.1 Demonstrate familiarity with Cartesian coordinates in two dimensions.
- C3.2 Find the gradient of a straight line
- C4.2 Measure and draw lines and angles.
- C4.3 Read and make scale drawings.
- C8.4 Expected frequency of occurrences

Going forward

The knowledge and skills gained from this *Teaching Pack* can be used for when you teach learners about Probability.

- C8.4 Understand relative frequency as an estimate of probability.

Before you begin

This *Teaching Pack* includes a **Teacher Introduction** video to which you should refer before using the resources in this pack. The video is available to watch in Resource Plus within the topic section relevant to this *Teaching Pack*.



The video introduces the resources available for teaching this topic, and explains how they can be used to successfully deliver the topic to your learners. In particular, the video highlights typical learner misconceptions and common errors this *Teaching Pack* will help you to overcome.

Common misconceptions: Statistics

There is often confusion about the relationship between correlation and gradient. Learners can compartmentalise the different strands of mathematics, which prevents them making links between different mathematical elements. In lesson three we explore positive and negative correlation and whether the line of best fit is positive or negative. This should allow learners to make connections with their prior knowledge.

Learners may also struggle with data representations that they are not familiar with. For example, learners can find it difficult to grasp concepts such as back-to-back stem and leaf diagrams, 3D pie charts and plotting median. This *Teaching Pack* offers learners the opportunity to gain a better understanding of these topics.

An obstacle often faced by learners in statistics is the language used. Understanding specific mathematical vocabulary will help learners to successfully access the curriculum. In lesson two learners will play a game, which encourages them to not only reflect on what vocabulary they are comfortable with, but to engage with language that may be new to them.



Lesson 1: Predicting trends, considering data models and effective questioning

Resources

- Whiteboard
- Lesson 1 Presentation
- Worksheet 1a and Worksheet 1b

Learning objectives

By the end of the lesson:

- **all** learners should be able to draw and read a 2D pie chart
- **most** learners should be able to estimate values from a scatter diagram using the line of best fit
- **some** learners will be able to debate the pros and cons of using 2D and 3D pie charts

Timings

Activity



Starter / Introduction

Give learners [Worksheet 1a](#) as they come into the classroom. They should discuss the scatter diagram in pairs.

Once they have had time to have a look, develop a classroom discussion about the information. For example, you could ask: What happened in April? Why could this be? (There was a high amount of rainfall in March). Which month had the highest amount of rainfall? (December, month 12).

Following this, ask your learners to draw the line of best fit on their scatter diagram and use this information to predict how much rainfall would occur in January 2018 (month 13). The result of this is shown on the PowerPoint.



Main lesson

Ask learners to consider what they were doing when they drew their line of best fit.

Following this, discuss how predictions are used in statistics. Ask learners where they have seen predictions previously and add these to the mind map on the slide. You should explain that statistics is the analysis of data, which can then be used to predict future trends.



Having addressed what statistics is and its relationship with predictions, ask learners what data representations they know.

Ask your learners to rank the expenditures on the pie chart from 1 (highest percentage) to 6 (lowest percentage). When they have finished, reveal the percentages. Ask them to discuss the advantages / disadvantages of using 3D pie charts to represent data.



Go through an example of drawing and reading a pie chart before setting learners [Worksheet 1b](#).

Lesson 1: *Continued*



Plenary

As learners continue working on Worksheet 1B, introduce the homework task. It is important to ensure that learners have a few minutes to consider what they will ask and what makes a good question before the lesson ends.

They will need to bring their completed homework to the next lesson, as they will need to use it.



Lesson 2: Bar charts and histograms

Resources

- Whiteboard
- Lesson 2 Presentation

Learning objectives

By the end of the lesson:

- **all** learners should know the difference between a bar chart and a histogram
- **most** learners should be able to solve mean, median, mode and range questions in a logical order
- **some** learners will be able to define statistical vocabulary

Timings

Activity



Starter / Introduction

Feedback from homework task. Learners will ask their partner the questions they have written for their two questionnaires. They should offer each other feedback about what questions worked or didn't work and why.



Main lesson

Learners will play a game of which tests their statistical vocabulary and tackling any misconceptions they may have of certain definitions. One learner should stand facing the front of the class so they do not see the word that appears behind them. Show the rest of the class the word – their job is to get the learner at the front to guess the word by describing it, without using the word itself.

Decide with your class how long each learner will have on a definition and how they can score points. Will it be in pairs? In tables? In groups? Individually?

Possible answers / definitions are in the notes of each slide. The first one which is 'questionnaire' should be used as a demonstration.



Having addressed these definitions, you should recap mean, median, mode and range.



Following the recap, learners should explore these concepts further by considering the following question as a class:

There are five positive whole numbers that have a mean of 4, a median of 3 and a mode of 3. What could these numbers be?

Some solutions are:

- 1) 1, 2, 3, 3, 11
- 2) 1, 3, 3, 5, 8
- 3) 2, 3, 3, 3, 9

You could ask the class if there are any rules that can be followed to help solve this problem. For example, the third number will always be 3 with smaller and larger numbers either side as it is the median. As an extension you could ask the class how the question would change if the range was added in (for example, a range of 7).



Lesson 2: Continued



Learners will then embark on some arithmetic questions challenging their understanding of these words.



Ask your learners what the differences are between bar charts and histograms. You can record their ideas on the slide as a mind map. The obvious differences are that bar charts have spaces with equally wide bars and are usually used for qualitative and / or discrete data; and histograms do not have spaces, may have unequal bars and are usually used for quantitative and / or grouped data.

The main idea that learners should understand is that histograms display continuous data, or numbers between intervals.

Learners will engage in another game 'name that chart!' tackling their understanding of what these data representations look like.



Plenary

A graph of names of children and their height will be displayed and learners will be asked how to improve this chart. It is discrete data, which means a bar chart should be used but there are no spaces between the bars.

Learners should be reminded of their homework.



Lesson 3: Representations, restrictions and relationships between data

Resources

- Whiteboard
- Lesson 3 Presentation
- Worksheet 3a and Worksheet 3b

Learning objectives

By the end of the lesson:

- **all** learners should understand what makes certain data representations appropriate for certain sets of data
- **most** learners should be able to calculate the median, mode and range of stem-and-leaf diagrams
- **some** learners will be able to solve IQR questions

Timings	Activity
 15 min	Starter / Introduction Learners need to work in pairs and share their data presentations from their questionnaires. They could use the questions on the slide to help critique each other's work.
 10 min	Main lesson Following on from their work in pairs, use the large versions of each of the questions to have a class discussion about the two sets of data. Discuss what learners had to say about each other's work and consider what makes a good representation and what restrictions might occur when collecting data.
 5 min	Start a discussion on correlation by showing the 'spot the difference' slide and encouraging learners to think about the gradients and the effects these have on the lines. Following on from this, show your learners the scatter diagrams and ask them to describe the correlation types shown.
 15 min	Another way of showing related values is to use a stem-and-leaf diagram. Ask learners to recall what one of these looks like before revealing the one shown on the slide. Use the following slides to recap how we extract statistical data from stem-and-leaf diagrams. Once you have done this, give learners Worksheet 3a so they can check their understanding. The answers are shown on the following slides. Finding the range should be completed without a calculator.
 5 min	Discuss what the letters IQR stand for and what they mean.
 10 min	Plenary Having reminded learners what IQR means, work as a class to complete the IGCSE question on IQR. Finally ask learners to complete Worksheet 3b for homework.



Lesson 4: Cumulative frequency and box-and-whisker plots

Resources

- Whiteboard
- Lesson 4 Presentation
- Worksheet 4a and Worksheet 4b

Learning objectives

By the end of the lesson:

- **all** learners should understand what cumulative frequency is and how to answer questions on it
- **most** learners should be able to get the mean of a frequency table

Timings

Activity



Starter / Introduction

Ask your learners to consider the implications of using an unequal histogram.



Main lesson

In groups, learners should discuss how to calculate the mean from a frequency table. After a few minutes, you could pass out either the Hint or Next Steps card from [Worksheet 4a](#) to each group depending on how they are progressing. The answers are shown on the following two slides which you can discuss with your class as they check their understanding.



Learners will then engage in a game of true/false wherein they will explore cumulative frequency and how to approach questions on this topic. The answers for each are shown in the notes section at the bottom of each slide.



Go through the example displaying a cumulative frequency table and graph.



Remind your learners about box-and-whisker plots and show the solved question. You could ask your learners what the different parts of this graph mean and how they relate to the table of values given.



Plenary

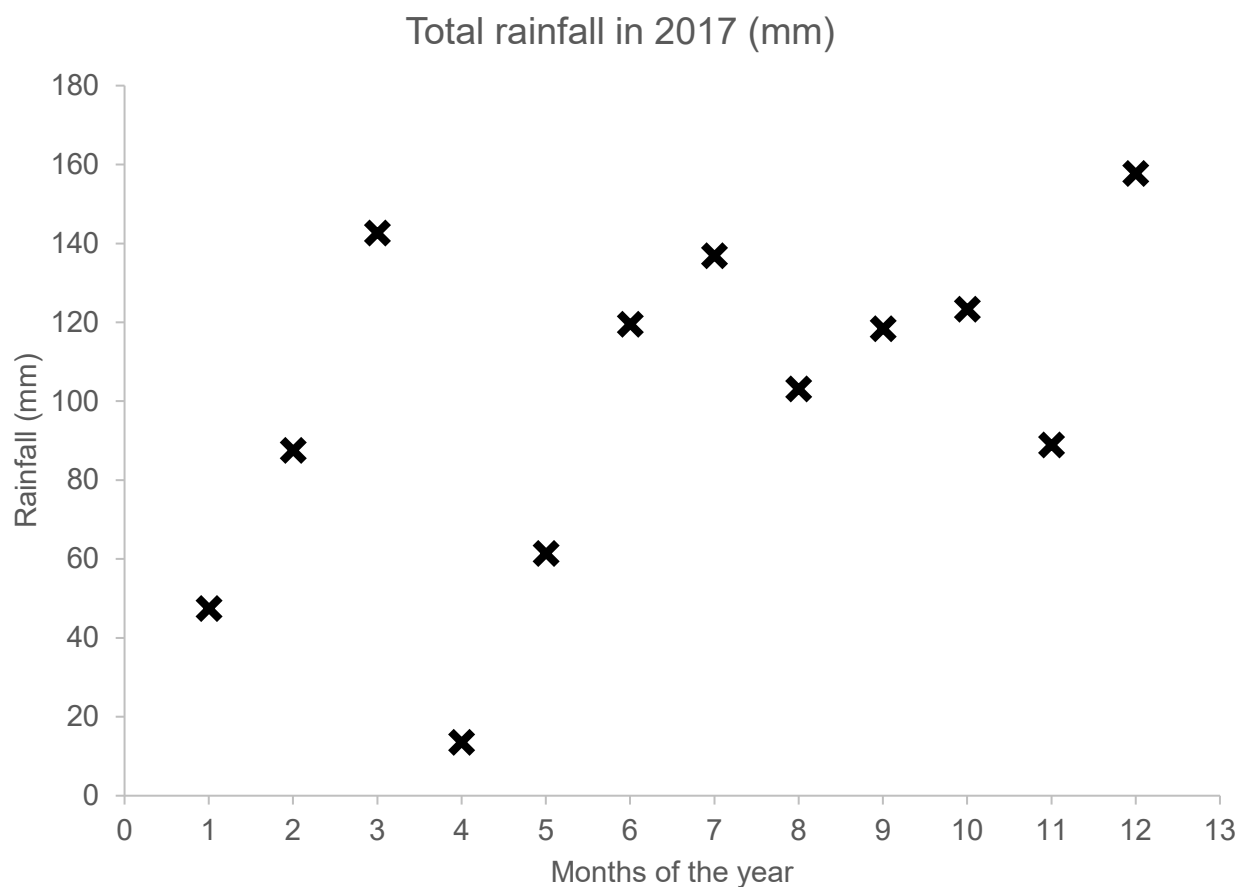
Learners can complete the questions on the slide on box-and-whisker plots before being set the homework on [Worksheet 4b](#).

Worksheets and answers

	Worksheets	Answers
For use in Lesson 1:		
1a: Scatter Diagram Starter	15	28
1b: 2D and 3D Pie Charts	16-19	29-32
For use in Lesson 3:		
3a: Stem-and-leaf practice	20-21	-
3b: IQR and Pictogram	22-24	33-35
For use in Lesson 4:		
4a: Hint and Next Steps Cards	25	36
4b: Cumulative frequency and box-and-whisker plots	26-27	37-38

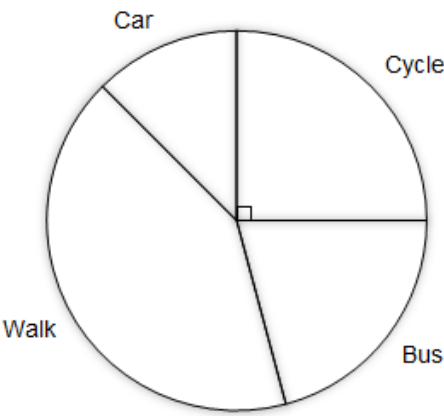
Worksheet 1a: Scatter diagram

Look at the scatter diagram and discuss with your partner what the data shows.



Worksheet 1b: 2D and 3D pie charts

1. Learners were asked how they travelled to school. The results are shown on the pie chart below.

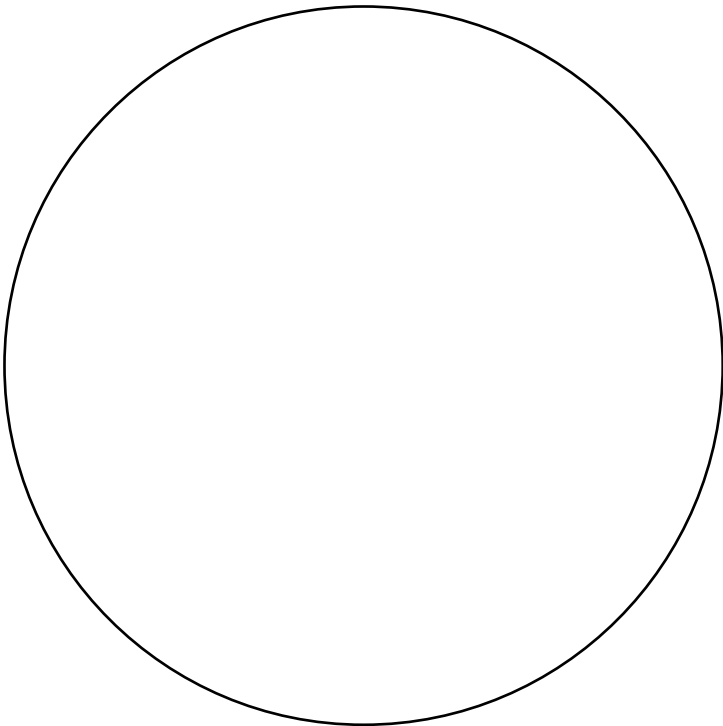


a) How did most of the learners travel to school?
.....

b) 24 learners were asked.
Work out the number of learners who cycled to school.

2. Sara recorded the musical instrument played by each of 30 learners in the school band. The table shows her results. Complete the pie chart to display this data.

Trumpet	12
Flute	5
Drums	1
Oboe	7
Saxophone	5



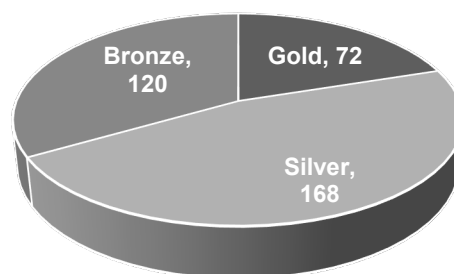
Worksheet 1b: *continued*

3. The pie charts show some information about the numbers of medals won by two countries at an athletics event.

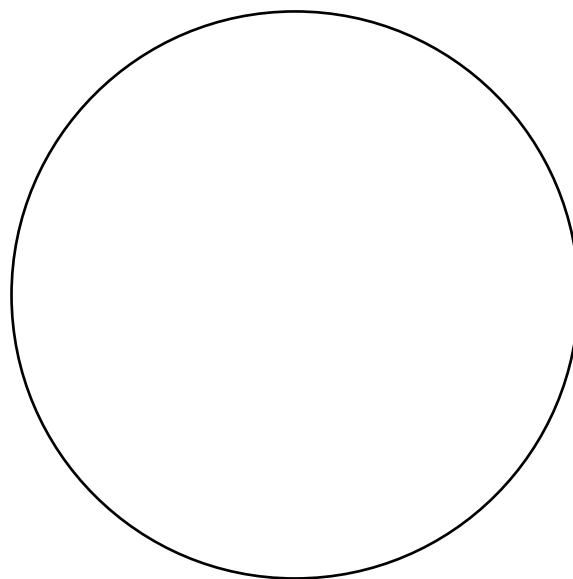
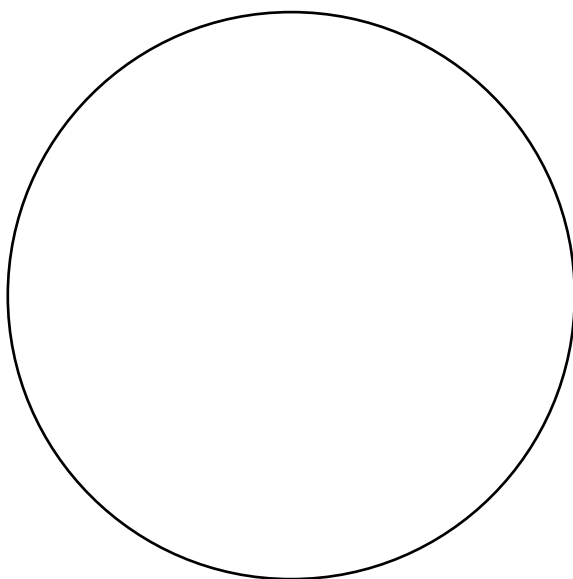
Medals won by Country A



Medas won by Country B



- a. Draw 2D pie charts of this data. Give two reasons that explain why using 2D pie charts are better to present this data.



Reason 1:

.....

.....

.....

Reason 2:

.....

.....

.....

Worksheet 1b: continued

b. Country A won 7 bronze medals. How many gold medals did they win?

.....

.....

.....

c. Josh says, 'The pie charts show that Country A won more gold medals than Country B'. Is Josh right? You must explain your answer.

.....

.....

.....

4. Some children were asked to name their favourite flavour of ice cream. Use the pie chart and information in the table to complete the missing sections.

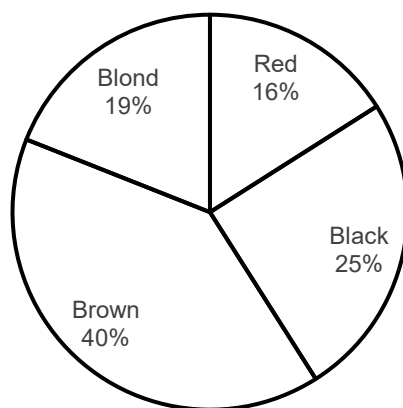


Flavour	Number of children	Angle of sector
Vanilla	12	90°
Mint		45°
Strawberry	14	
Chocolate		120°

Worksheet 1b: *continued*

5. The pie chart below shows the percentages of hair colour for a group of 200 people.

Hair colour for a group of 200 people



- a. How many people in this group have blond hair?

.....

.....

.....

- b. How many people in this group **do not** have brown hair?

.....

.....

.....

- c. How many people in this group have red or black hair?

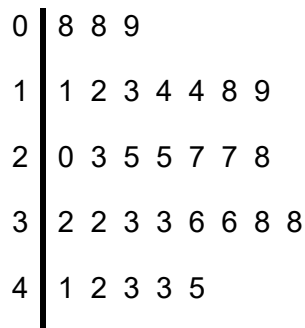
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Worksheet 3a: Stem-and-leaf practice

1. Manjit counted the number of letters in each of 30 sentences in the school newsletter. She showed her results in a stem-and-leaf diagram.



Key 4 | 1 stands for 41 letters

- a. Write down the number of sentences with 36 letters

.....

- b. Work out the range

.....

.....

.....

Manjit says “To find the median, you add all the results and divide by 15.”

- c. Manjit is wrong. Explain how to find the median

.....

.....

.....

- d. Work out the median

.....

.....

.....

Worksheet 3a: *continued*

2. A stem-and-leaf diagram has been drawn for a number of people entering a shop over a number of days.

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

Key: 1 | 3 means 13

- a. How many days did the people get counted?

.....

.....

- b. What is the modal number of people entering the shop?

.....

.....

- c. Find the median number of people entering the shop?

.....

.....

Worksheet 3b: IQR and Pictogram

1. Mateo records the distance a ball dropped from a fixed height bounced.

61, 48, 58, 35, 45, 72, 36, 56, 47, 58, 60, 59, 43, 38, 41, 67, 63, 54, 45, 39

For Mateo's results find:

- a. The median

.....

.....

- b. The range

.....

.....

2. Fatima records the distance a second ball dropped from a fixed height bounced.

58, 63, 38, 56, 41, 49, 52, 39, 73, 42, 58, 62, 75, 65, 38, 49, 51, 60, 63, 55

- a. Put the information into a stem-and-leaf diagram, **including** the data from Mateo too.

For Fatima's results, find

- b. The median

.....

.....

- c. The interquartile range

.....

.....

Worksheet 3b: *continued*

3. Work out the median and interquartile range of each of the following sets of data showing clearly all the steps in your working.
- a. 3, 9, 12, 15, 16, 18, 21
 - b. 152, 167, 159, 162, 140, 157, 163, 160, 155, 141, 158
 - c. 1.4, 2.7, 0.2, 3.5, 4.1, 2.3, 1.9, 2.2, 1.6, 2.0, 1.6, 2.6, 2.2, 1.8, 2.9, 3.0
 - d. 19, 11, 5, 16, 21, 16, 9, 13
 - e. 62, 51, 48, 55, 56, 43, 59, 48, 57, 60, 47, 55

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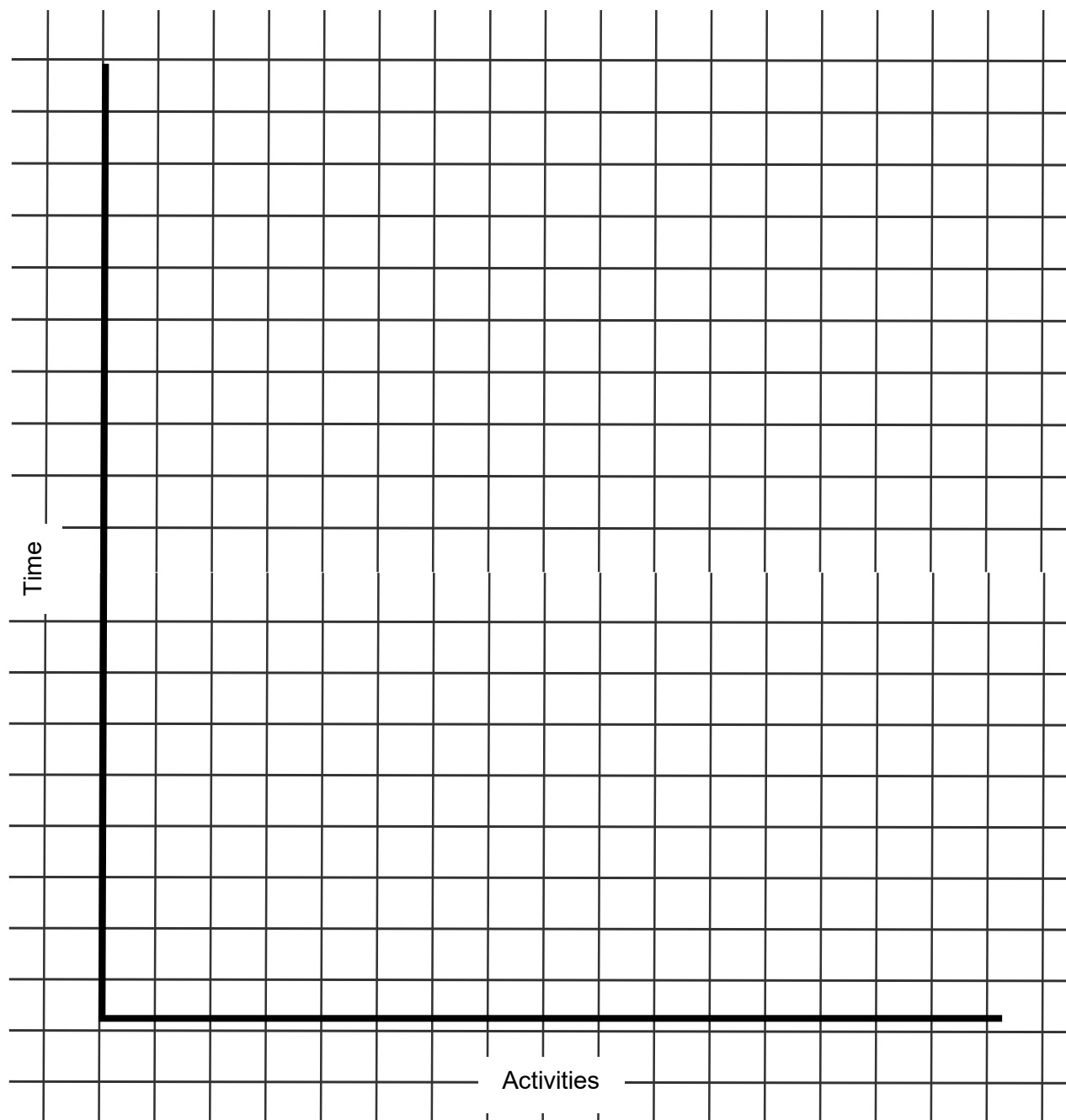
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Worksheet 3b: *continued*

4. Draw a pictogram of your typical weekday (see the images below for some ideas of the pictures you could use).



Sleep



School



Travel



Online



Shopping



Washing



Eating

Worksheet 4a: Hint and next steps cards

Hint Card

3 cars passing occurred 5 times, therefore there were 15 cars in total.

How many times did 4 cars passing occur?

Next Steps Card

Find the mean of the following:

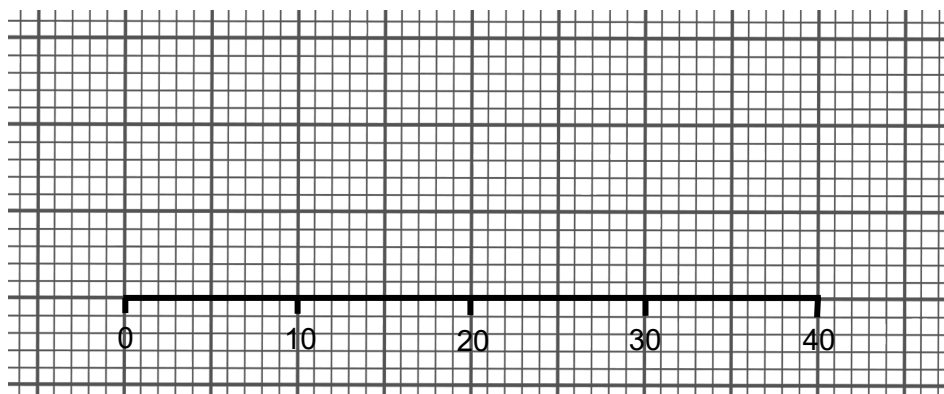
Cars passing	3	4	5	6
Frequency	5	10	28	36
?	15			

Worksheet 4b: Cumulative frequency and box-and-whisker plots

- 1) The times, in seconds, taken by 11 learners to finish a race are listed in order.

4, 12, 13, 17, 18, 20, 22, 24, 25, 30, 34

Draw a box-and-whisker plot for this data



- 2) This frequency table gives information about the ages of 60 office workers.

a. Complete the cumulative frequency column

Age (A) in years	Frequency	Cumulative frequency
$20 < A \leq 30$	12	
$30 < A \leq 40$	15	
$40 < A \leq 50$	18	
$50 < A \leq 60$	12	
$60 < A \leq 70$	3	

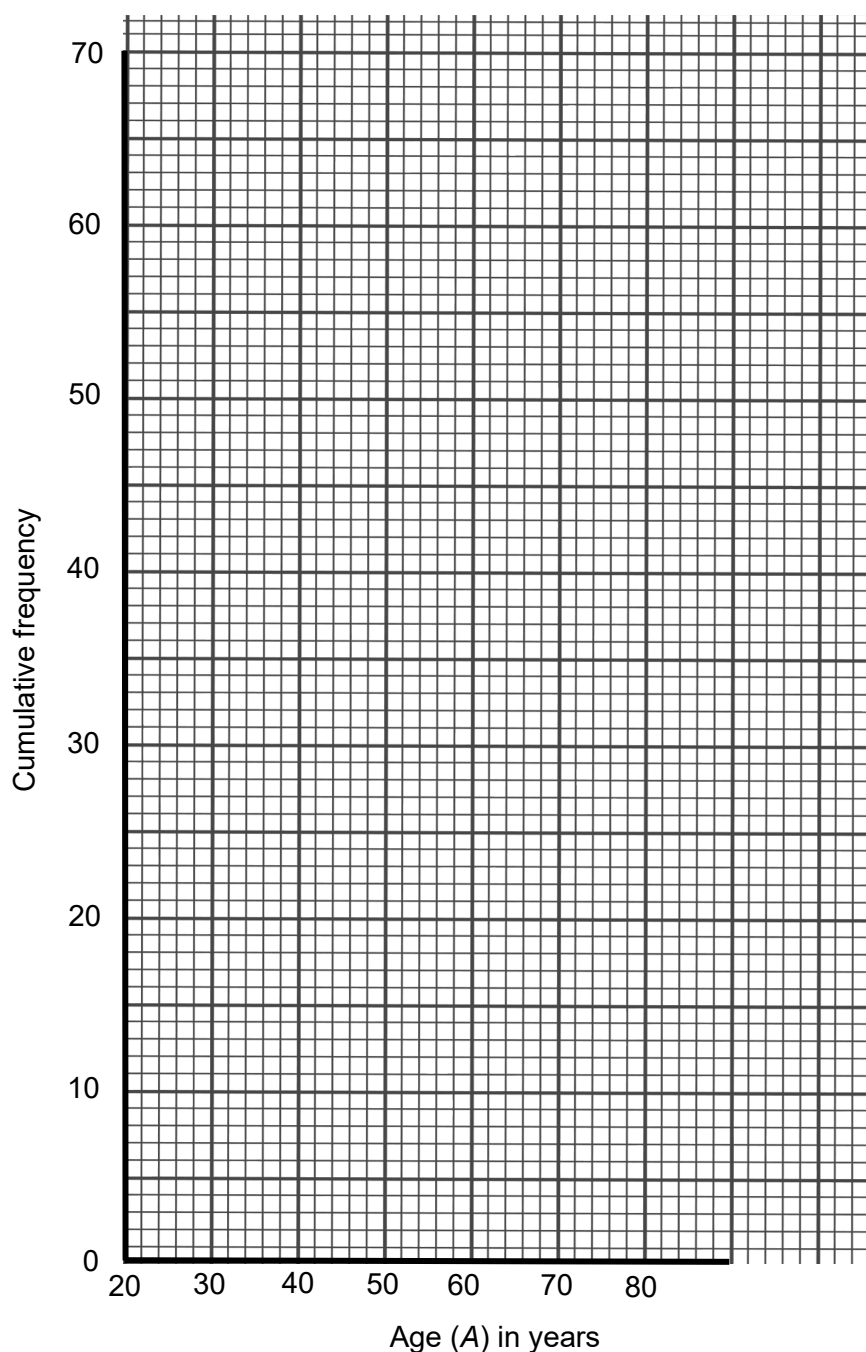
Worksheet 4b: *Continued*

- b. On the grid below, draw a cumulative frequency graph for this information.
- c. Use your cumulative frequency graph to find an estimate for the median age.

..... years

- d. Use your cumulative frequency graph to find an estimate for the number of workers older than 55 years.

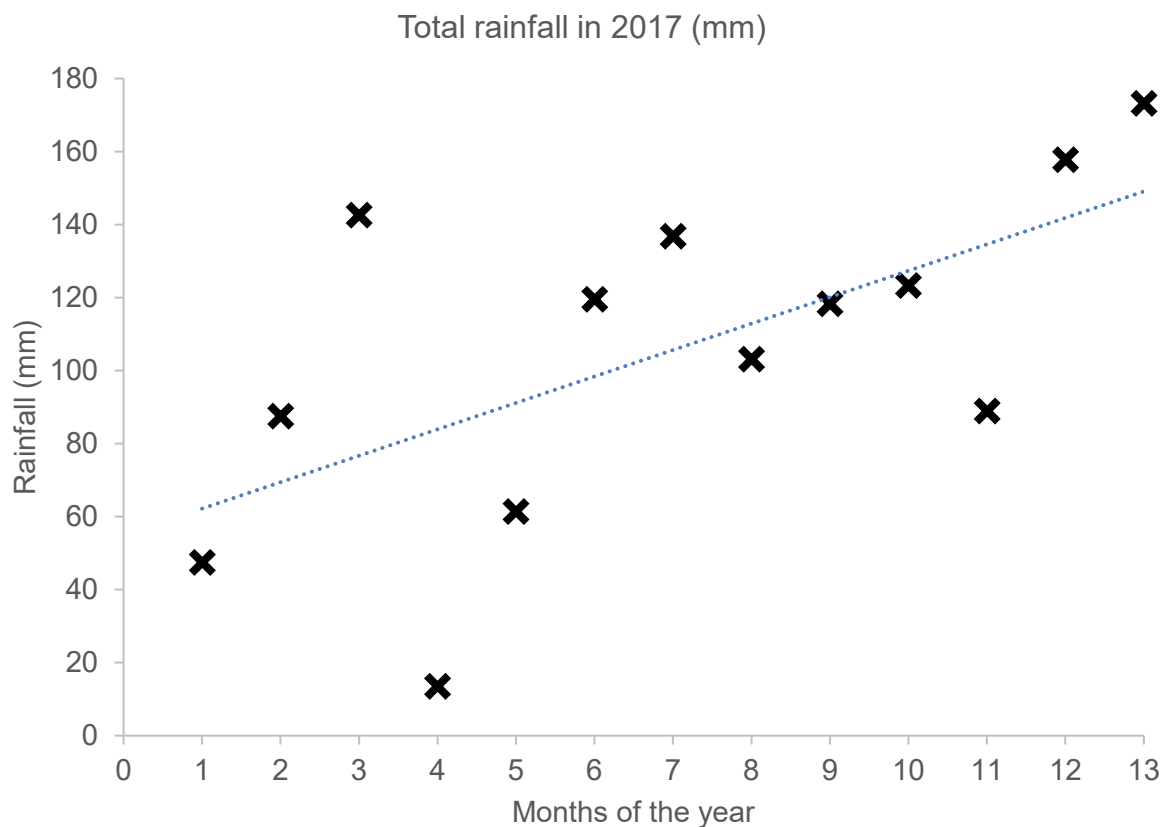
..... workers over 55 years of age



Worksheet 1a: Answers

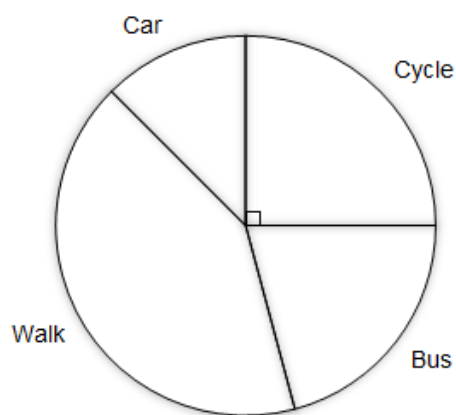
Learners should have drawn a line of best fit that resembles the one below. Their drawing should:

- a) be drawn with a pencil and ruler
- b) exclude the outlier
- c) have an approximately even amount of data on each side
- d) go beyond the scale drawn, to show that month 13 has rainfall exceeding 160mm



Worksheet 1b: Answers

1. Learners were asked how they travelled to school. The results are shown on the pie chart below.



- a) How did most of the learners travel to school?

Walk

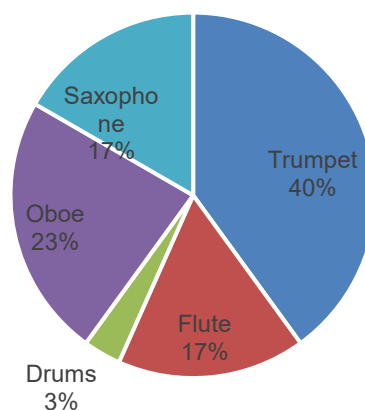
- b) 24 learners were asked.
Work out the number of learners who cycled to school.

$$24 \div 4 = 6$$

2. Sara recorded the musical instrument played by each of 30 learners in the school band. The table shows her results. Complete the pie chart to display this data.

Trumpet	12	$\frac{12}{30} \times 360 = 144^\circ$
Flute	5	$\frac{5}{30} \times 360 = 60^\circ$
Drums	1	$\frac{1}{30} \times 360 = 12^\circ$
Oboe	7	$\frac{7}{30} \times 360 = 84^\circ$
Saxophone	5	$\frac{5}{30} \times 360 = 60^\circ$

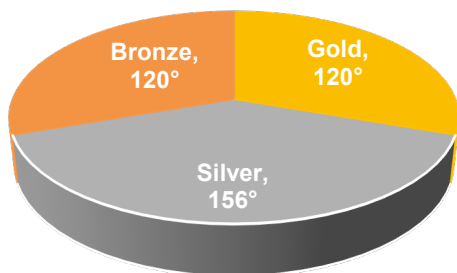
Instruments played by learners in the band



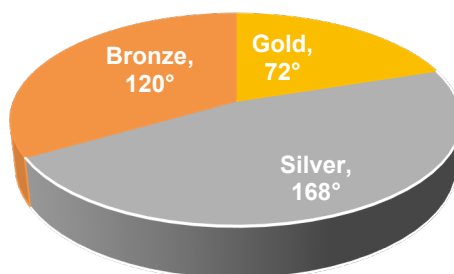
Worksheet 1b: Answers

3. The pie charts show some information about the numbers of medals won by two countries at an athletics event.

Medals won by Country A

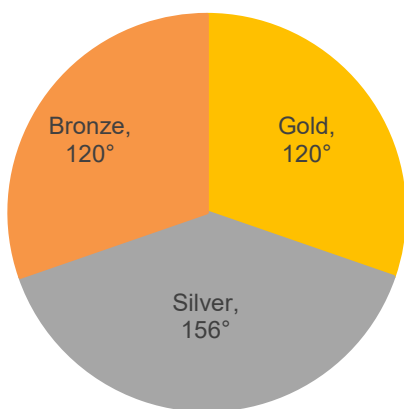


Medas won by Country B

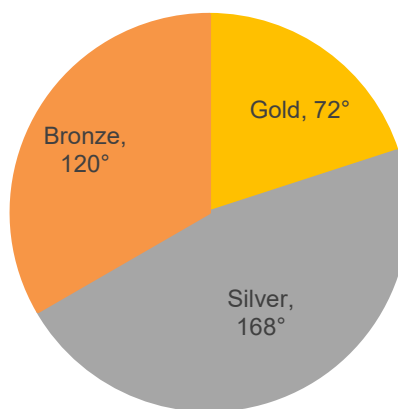


- a. Draw 2D pie charts of this data. Give two reasons that explain why using 2D pie charts are better to present this data.

Medals won by Country A



Medals won by Country B



Reason 1:

It is easier to read the data from a 2D pie chart

Reason 2:

The 2D pie charts make it clearer that both teams won the same number of bronze medals

Worksheet 1b: Answers

- b. If Country A won 7 bronze medals, how many gold medals did they win?

$120^\circ = 7 \text{ medals}$, so $360^\circ = 21 \text{ medals in total}$.

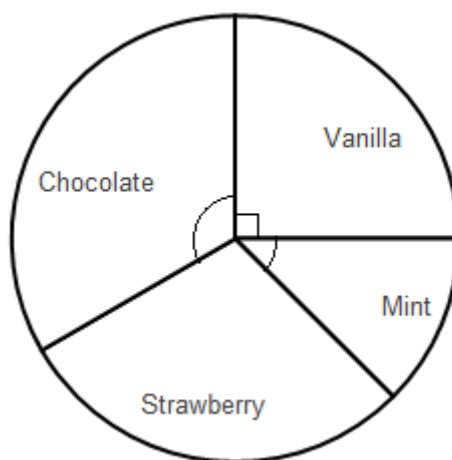
$$1^\circ = \frac{21}{360}$$

therefore, $156^\circ = \frac{21}{360} \times 156 = 9.1$, but as you cannot round medals up, Country A won 9 silver medals

- c. Josh says, 'The pie charts show that Country A won more gold medals than Country B'. Is Josh right? You must explain your answer.

We can't be sure as we don't know how many medals in total Country B won.

4. Some children were asked to name their favourite flavour of ice cream. Use the pie chart and information in the table to complete the missing sections.

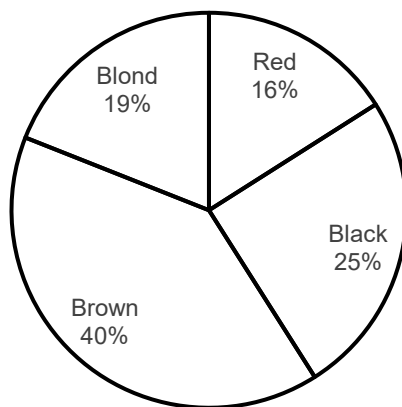


Flavour	Number of children	Angle of sector
Vanilla	12	90°
Mint	6	45°
Strawberry	14	105°
Chocolate	16	120°

Worksheet 1b: Answers

5. The pie chart below shows the percentages of hair colour for a group of 200 people.

Hair colour for a group of 200 people



- a. How many people in this group have blond hair?

16% of 200 people = 32 people

- b. How many people in this group **do not** have brown hair?

40% of 200 people = 80 have brown hair

Therefore, $200 - 80 = 120$ people do not have brown hair

- c. How many people in this group have red or black hair?

16% of 200 = 32 red

25% of 200 = 50 black

Therefore, $32 + 50 = 82$ have red or black hair

Worksheet 3b: Answers

1. Mateo records the distance a ball dropped from a fixed height bounced.

35, 36, 38, 39, 41, 43, 45, 45, 47, 48, 54, 56, 58, 58, 59, 60, 61, 63, 67, 72

For Mateo's results find:

- a. The median

$$48 + 54 = 102$$

$$102 \div 2 = 51$$

- b. The range

$$72 - 35 = 37$$

2. Fatima records the distance a second ball dropped from a fixed height bounced.

38, 38, 39, 41, 42, 49, 49, 51, 52, 55, 56, 58, 58, 60, 62, 63, 63, 65, 73, 75

- a. Put the information into a stem-and-leaf diagram, **including** the data from Mateo too.

Fatima		Mateo
9 8 8	3	5 6 8 9
9 9 2 1	4	1 3 5 5 7 8
8 8 6 5 2 1	5	4 6 8 8 9
5 3 3 2 0	6	0 1 3 7
5 3	7	2

Key 8 | 3 = 38

4 | 1 = 41

- b. $55 + 56 = 111$

$$111 \div 2 = 55.5$$

- c. $UQ = 62 + 63 = 125 \div 2 = 62.5$

$$LQ = 42 + 49 = 91 \div 2 = 45.5$$

$$IQR = UQ - LQ = 17$$

Worksheet 3b: Answers

3. Work out the median and interquartile range of each of the following sets of data showing clearly all the steps in your working.

a. $Median = 15$

$$UQ = 18$$

$$LQ = 9$$

$$IQR = UQ - LQ = 18 - 9 = 9$$

b. $140, 141, 152, 155, 157, 158, 159, 160, 162, 163, 167$

$$Median = 158$$

$$UQ = 162$$

$$LQ = 152$$

$$IQR = UQ - LQ = 162 - 152 = 10$$

c. $0.2, 1.4, 1.6, 1.6, 1.8, 1.9, 2.0, 2.2, 2.2, 2.3, 2.6, 2.7, 2.9, 3.0, 3.5, 4.1$

$$Median = 2.2 + 2.2 = 4.4 \div 2 = 2.2$$

$$UQ = 2.7 + 2.9 = 5.6 \div 2 = 2.8$$

$$LQ = 1.6 + 1.8 = 3.4 \div 2 = 1.7$$

$$IQR = UQ - LQ = 2.8 - 1.7 = 1.1$$

d. $5, 9, 11, 13, 16, 16, 19, 21$

$$Median = 13 + 16 = 29 \div 2 = 14.5$$

$$UQ = 16 + 19 = 35 \div 2 = 17.5$$

$$LQ = 9 + 11 = 20 \div 2 = 10$$

$$IQR = UQ - LQ = 17.5 - 10 = 7.5$$

e. $43, 47, 48, 48, 51, 55, 55, 56, 57, 59, 60, 62$

$$Median = 55 + 55 = 110 \div 2 = 55$$

$$UQ = 57 + 59 = 116 \div 2 = 58$$

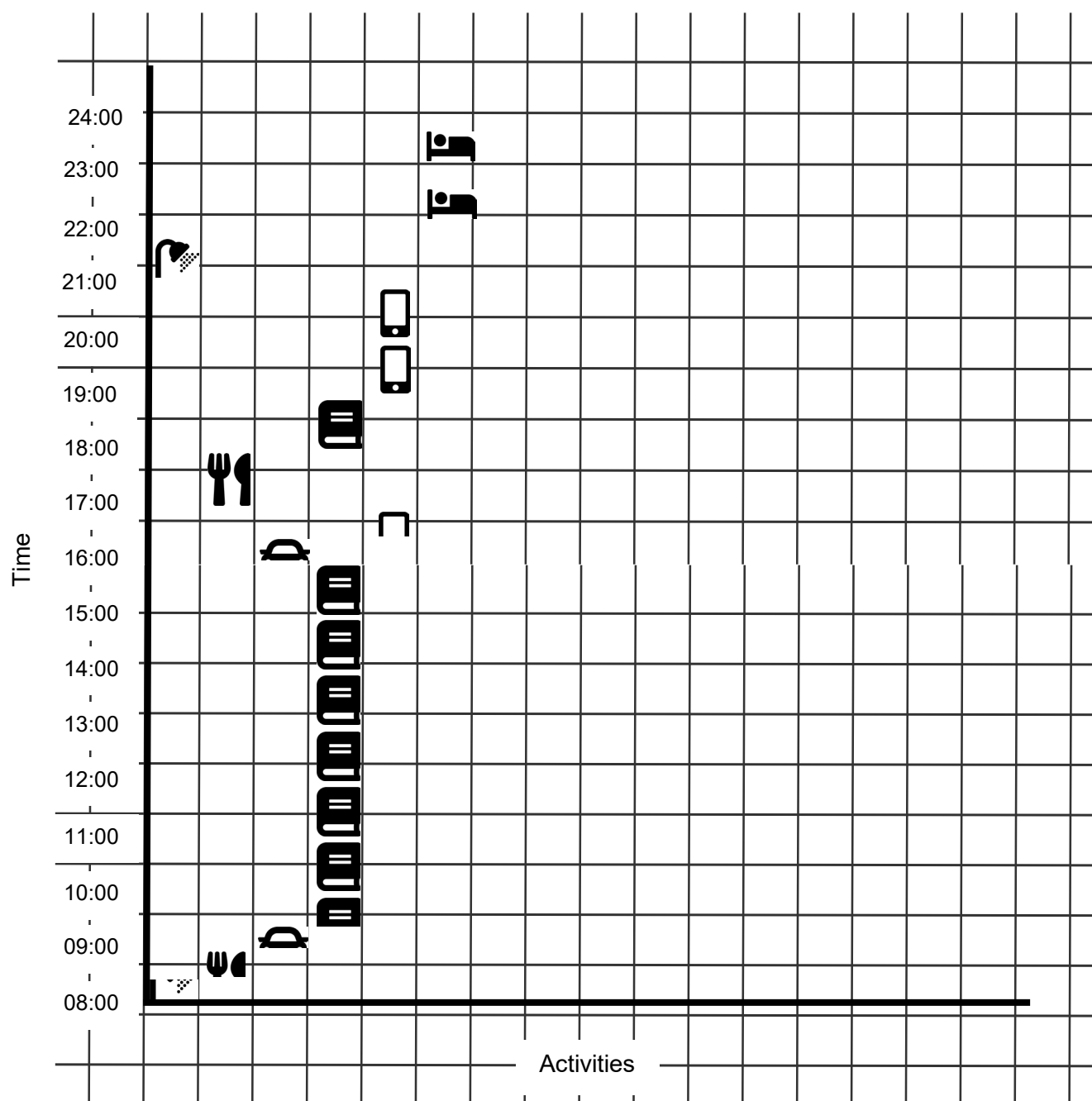
$$LQ = 48 + 48 = 96 \div 2 = 48$$

$$IQR = UQ - LQ = 58 - 48 = 10$$

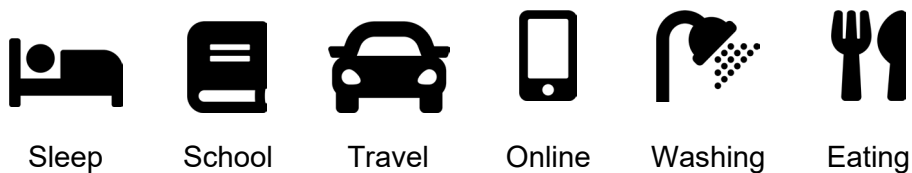
Worksheet 3b: Answers

4. Draw a pictogram of your typical weekday.

This diagram is just a suggestion.



Key:



Worksheet 4a: Answers

Hint Card

3 cars passing occurred 5 times, therefore there were 15 cars in total.

How many times did 4 cars pass?

10 times, thus 40 cars passing in total

Next Steps Card

Find the mean of the following:

Cars passing	3	4	5	6
Frequency	5	10	28	36
<i>Total?</i>	15	<i>50</i>	<i>140</i>	<i>216</i>

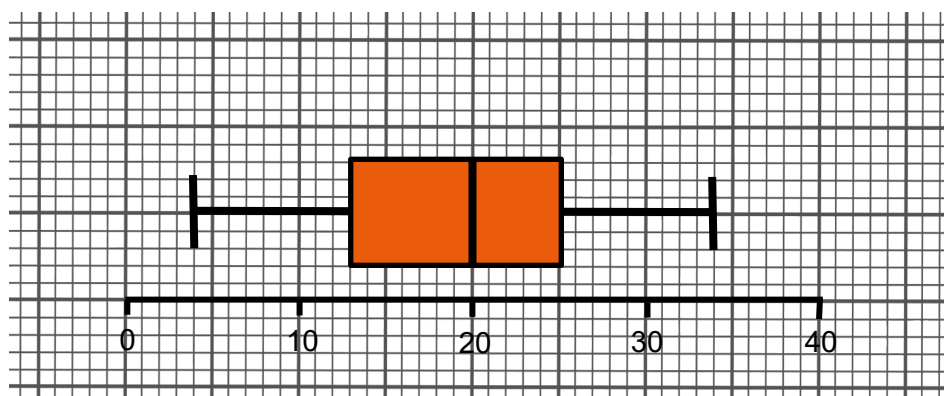
$$\frac{15+40+140+216}{7+10+28+36} = \frac{137}{27}$$

Worksheet 4b: Answers

- 1) The times, in seconds, taken by 11 learners to finish a race are listed in order.

4, 12, 13, 17, 18, 20, 22, 24, 25, 30, 34

Draw a box-and-whisker plot for this data



- 2) This frequency table gives information about the ages of 60 office workers.

- a. Complete the cumulative frequency column

Age (A) in years	Frequency	Cumulative frequency
$20 < A \leq 30$	12	12
$30 < A \leq 40$	15	27
$40 < A \leq 50$	18	45
$50 < A \leq 60$	12	57
$60 < A \leq 70$	3	60

Worksheet 4b: Answers

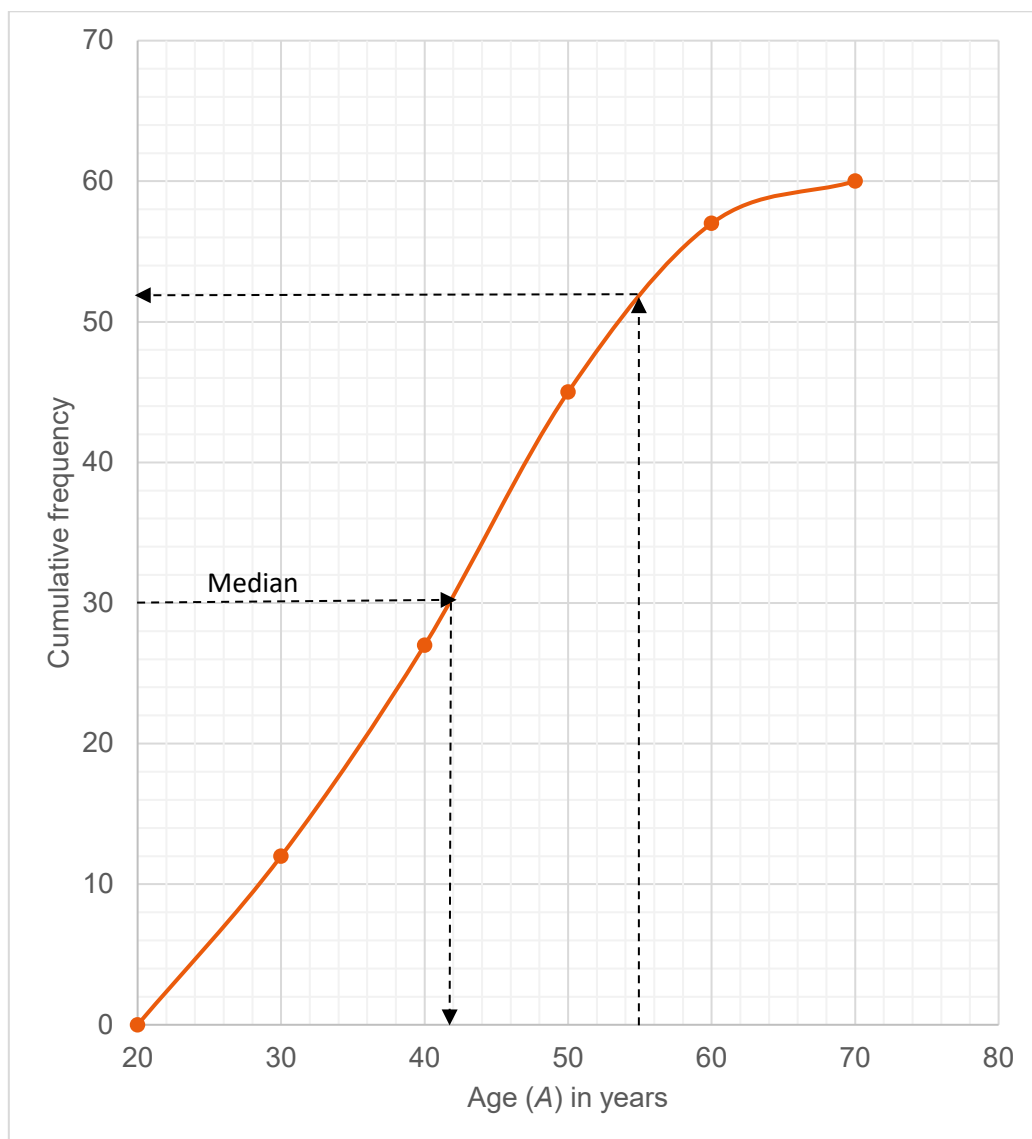
- b. On the grid below, draw a cumulative frequency graph for this information.
- c. Use your cumulative frequency graph to find an estimate for the median age.

42 years

- d. Use your cumulative frequency graph to find an estimate for the number of workers older than 55 years.

52 workers are less than 55 years old so:

$60 - 52 = 8$ workers over 55 years of age



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