3. Data Handling

Simple Probability - **Note**: You should always give your answer in its **simplest form**

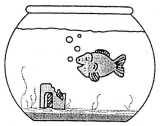
1. A bag contains **red**, **green**, **blue**, **yellow** and **white** balls.
There are 10 of **each** colour, numbered from 1 to 10.
The balls are placed in a drum and one is drawn out.

   a) What is the probability that it is a **7** ? 1 KU

   b) What is the probability it is a **blue 7** ? 1 KU

2. Roy and Zara go to the fairground.

   A stall has a card game where a goldfish can be won if anyone can turn over a face card from a pack of 52 cards which are placed face down.



   Calculate the probability, in its simplest form, of Zara winning the goldfish. 3 KU

3. A box contains **5 red, 6 green, 7 blue and 2 yellow** coloured pencils.
Jenny picks one out of the box

   a) What is the probability that it is a **green pencil** 1

   b) She does **NOT** replace the pencil, but draws another one
   What is the probability that this is a blue pencil 2

4. A bag contains **10 red, 25 green, 9 blue and 6 yellow** marbles.

   Sam picks one out of the bag, **replaces** it and then picks another one.

   What is the probability that he picked a **Green** marble followed by a **Red** one 3

5. Michelle estimates that the probability that her hockey team will win their next game is 0.2, and the probability they will draw is 0.5

   a) Calculate P(Win or Draw) 1

   b) Calculate P(Lose) 1

6. Robin is the member of an archery club. On average 80% of his shots hit the target.

   What is the probability that:

   a) He misses the target 1

   b) He hits the target 3 times in a row 1

   c) He hits the target with the first shot, and misses with the next two shots. 1

7. When microprocessors are made, it is known that in any batch, 15% are defective.

   a) What is the probability of picking a microprocessor that is **NOT** defective 1

   b) A batch of 5000 microprocessors are produced. How many would be expected to have **NO** defects. 2

8. Three new students are about to join a class. Assuming that P(male) = ½

a) What is the probability that all three will be boys ? 1

b) If you are told that one is a boy, what is the probability now, that all three will be boys. 2

Probability from relative Frequency

1. A garage carried out a survey on 600 cars. The results are shown in the table below:

Engine size (cc)

Age	0 – 1000	1001 – 1500	1501 – 2000	2001 +
Less than 3 years	50	80	160	20
3 years or more	60	100	120	10

a) What is the probability that a car chosen at random, is less than 3 years old? 1 KU

b) In a sample of 4200 cars, how many would be expected to have an engine size greater than 2000cc **and** be 3 or more years old. 2 KU

2. The National Tourist Association carried out a survey amongst 500 adults from the UK to find out what would influence them most when choosing a holiday.

The results of the survey are shown in the table below.

Age	**Price**	**Weather**	**Facilities**	**Scenery**
35 and under	190	65	23	7
Over 35	95	35	12	73

a) What is the probability that any adult chosen at random would have scenery as their main priority when choosing a holiday ? 1 KU

b) A 25 year old adult is chosen at random. What is the probability that the facilities is his/her main concern when choosing a holiday ? 2 KU

c) What is the probability that any adult chosen at random **will not** have cost as their main concern when choosing a holiday ? 2 KU

3. A group of people who admitted to drinking bottled water were asked if they preferred FIZZY water or STILL water.

The results are shown in this table.

	FIZZY	STILL
aged 10 to 20	65	5
aged over 20	10	30

What is the probability that:

a) a person chosen at random **from this sample** will prefer STILL water. 1 KU

b) the person chosen will be over 20 years old **and** prefer FIZZY water. 2 KU

Note: to gain full credit in this question, both answers must be in their simplest form.

4. Smiley's Garage was asked to supply information on last month's sales. They were asked to identify the number of used and new cars purchased. The results are shown in the table.

	new car	used car
aged 18 to 40	17	30
aged over 40	23	50

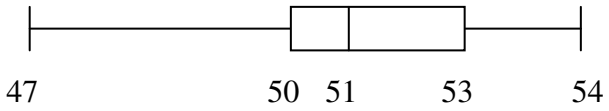
What is the probability that a person chosen at random **from this sample** will

a) have bought a new car ? 1 KU

b) be between 18 and 40 years old **and** have bought a used car ? 1 KU

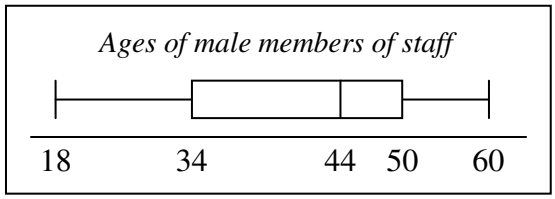
Statistical Diagrams

1. A random check is carried out on the contents of a number of matchboxes.
A summary of the results is shown in the boxplot below.



What percentage of matchboxes contains fewer than 50 matches. 1 RE

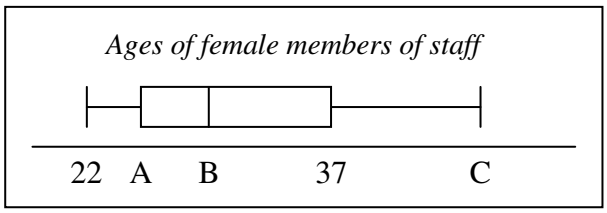
2. The ages of the male members of staff in a school were recorded and a box plot was drawn to show the results.



When the same study was carried out for the female members of staff in the same school, another box plot was drawn.

It was found that:

- the **range** of the ladies' ages was **half** that of the range of the mens'.
- the ladies' **median** age was **15 years less** than the men's median age.
- the **semi-interquartile range** of the ladies' was **three quarters** that of the men's.



Make a copy of the above females' box plot and complete it to show which ages are represented by the letters **A**, **B** and **C**. 3 RE

3. Fifteen medical centres each handed out a questionnaire to fifty patients.
The numbers who replied to each centre are shown below.

11	19	22	25	25
29	31	34	36	38
40	46	49	50	50

Also, they each posted the questionnaires to another fifty patients.
The numbers who replied to each centre are shown below.

15	15	21	22	23
25	26	31	33	34
37	39	41	46	46

Draw an appropriate statistical diagram to compare these two sets of data. 3 RE

4. A furniture maker investigates the delivery times, in days, of two local wood companies and obtains the following data.

Company	*Minimum*	*Maximum*	*Lower Quartile*	*Median*	*Upper Quartile*
Timberplan	16	56	34	38	45
Allwoods	18	53	22	36	49

a) Draw an appropriate statistical diagram to illustrate these two sets of data. 3 RE

b) Given that consistency of delivery is the most important factor, which company should the furniture maker use? Give a reason for your answer. 1 RE

5. Jamie conducted a survey.

He asked his classmates how they had travelled to school that day.

Here are their replies.

Walk	13
Bus	9
Car	6
Cycle	2

Draw an appropriate statistical diagram to illustrate this information 4 RE

6. The stem and leaf diagram shows a sample of 50 scores in a boy's golf tournament.

Golf Scores

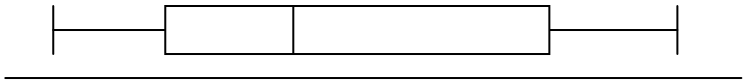
6	3 4
6	5 5 5 6 6 6 6 7 7 8 9 9 9
7	0 0 0 0 0 1 1 2 3 3
7	5 6 6 6 7 8
8	0 0 1 1 2 2 3
8	5 6 6 6 7 8 9
9	2 3 4
9	7 8

8 | 0 represents a score of 80

a) Write down the **median** golf score. 1 KU

b) Calculate the **semi-interquartile range** for these scores. 3 KU

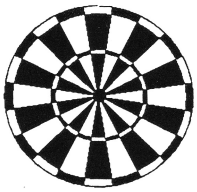
c) Sketch this boxplot and fill in the correct values to illustrate the golf scores in this sample.



2 KU

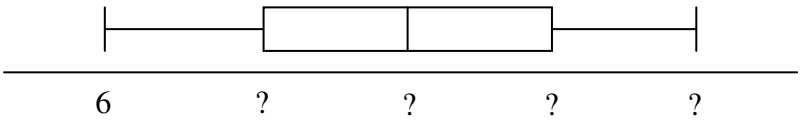
7. In a tournament, 13 men throw one dart each at a dart board and their scores are noted.

Alex	16	Nick	20	Steve	28
Norrie	6	George	9	Brian	18
Ted	24	James	22	Graeme	18
Tom	12	John	13	Tony	7
George	9				



a) Find the **median** and the upper and lower quartiles. 3 KU

b) Make a neat sketch of the following box plot and fill in all the missing values. 2 KU



Standard Deviation

1. Fiona checks out the price of a litre of milk in several shops.

   The prices in pence are:

   49 44 41 52 47 43

   a) Find the mean price of a litre of milk. 1 KU

   b) Find the standard deviation of the prices. 2 KU

   c) Fiona also checks out the price of a kilogram of sugar in the same shops and finds that the standard deviation of the prices is 2.6.
   Make one valid comparison between the two sets of prices. 1 RE

2. A group of fifth year students from Alloa High School were asked how many hours studying they did in the week prior to their exams.

   The results are shown below.

   14 7 9 12 19 10 16 15

   (a) Use an appropriate formula to calculate the mean and standard deviation of these times. 3 KU

   (b) A similar group of students from Alloa Academy were asked the same question
   The mean number of hours studied was 16 and the standard deviation was 2·2.

   How did the number of hours studied by students from Alloa High School compare with the number of hours studied by students from Alloa Academy ? 2 RE

3. The Mobile Phone Shop is advertising their five latest mobile phones on their website.

   Their prices are:

   £120 £135 £75 £235 £185

   Use an appropriate formula to calculate the mean and standard deviation of these prices.

   (Show all working) 4 KU

4. The price, in pence per litre, of petrol at 10 city garages is shown below:

84.2	84.4	85.1	83.9	81.0
84.2	85.6	85.2	84.9	84.8

   a) Calculate the mean and standard deviation of these prices. 3 KU

   b) In 10 rural garages, the petrol prices had a mean of 88.8 and a standard deviation of 2.4

   How do the rural prices compare with the city prices ? 2 RE

5. Jim typed six pages on his computer using his word processor.

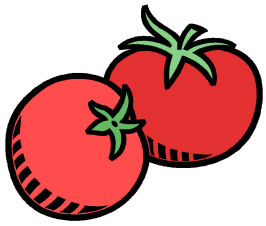
He did a "spell check" and discovered that he had made the following numbers of errors on the 6 pages.

page one - 4 errors
page two - 1 errors
page three - 7 errors
page four - 13 errors
page five - 6 errors
page six - 5 errors

a) Calculate the mean number of errors 1 KU

b) Calculate the standard deviation. 4 KU

6. After trying a new fertilizer on one of his tomato plants, a grower counted the number of tomatoes on each of its six bunches.



The number of tomatoes was:

8, 14, 9, 16, 13, 18

a) Calculate the mean number of tomatoes. 1 KU

b) Construct a table and use it to calculate the standard deviation. 4 KU