STATS

Summer Term

Probability 1

Topics

- Frequency Tables
- Frequency Polygons

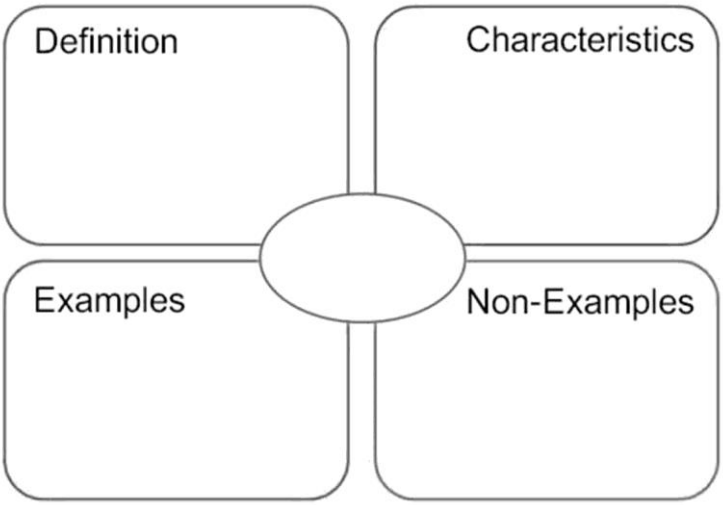
What do I need to be able to do?

- Be able to construct and read a frequency table
- Be able to construct and read a frequency polygon

Career Links

Being able to confidently work with data is a great skill to have and has lots of links with a number of careers such as:

- Statistician
- Business Analyst
- Biostatistician
- Healthcare



Frequency Table

Tally marks are used to help count things. Each vertical line represents one unit. The fifth tally mark goes down across the first four to make it easier to count. The frequency column is completed after all the data has been collected.

You must represent 5 like this.

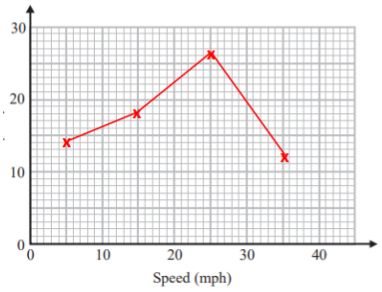
Eye Colour	Tally	Frequency
brown	𝍸 |	6
blue	𝍸 |||	8
green	|||	3
grey	||||	4
hazel	𝍸	5

Drawing Frequency Polygons

This table gives information about the speeds of 70 cars.

Speed (s mph)	Frequency (f)	Midpoint
$0 < L \leq 10$	14	5
$10 < L \leq 20$	18	15
$20 < L \leq 30$	26	25
$30 < L \leq 40$	12	35

a) Draw a frequency polygon for this information.

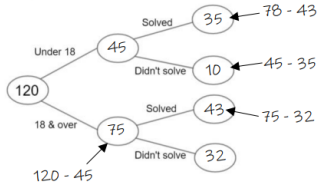


Step 1 – Find the midpoint of each class interval
Step 2 – Label your axes and choose an appropriate scale
Step 3 – Plot each point at the midpoint for that interval
Step 4 – Connect each point with a straight line

Do not extend the line beyond the points you have

Frequency trees

e.g. 120 people were given 3 minutes to solve a puzzle. 45 of the people who tried to solve the puzzle were under 18 years old. 78 of the people solved the puzzle. 32 of the people aged 18 and over did not solve the puzzle. Complete the frequency tree below.



The information given in the question determines the order of working. Here, we need to find the 75 first.

Key Vocabulary

Frequency	How many pieces of data there are
Discrete	Data that can only be set values e.g. you cannot have half of a person so counting people would be discrete data
Continuous	Data that can be any value e.g. height and time.
Extrapolate	Predict values from outside the range of data
Frequency polygon	A graph made by joining the middle-top points of the columns of a frequency histogram
Frequency table	Another name for frequency distribution

STATS

Summer Term

Probability 2

Topics

- Product rule
- Randomness/fairness
- Probability scale
- Probability of events
- Relative frequency

What do I need to be able to do?

- Be able to apply the product rule to find the number of outcomes
- Use keywords to describe outcomes
- Calculate simple probabilities
- Predict the number of outcomes
- Draw and interpret relative frequency tables

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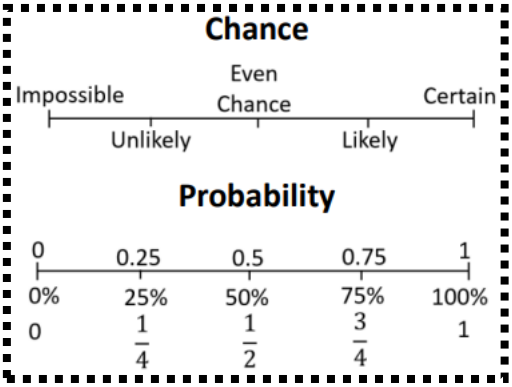
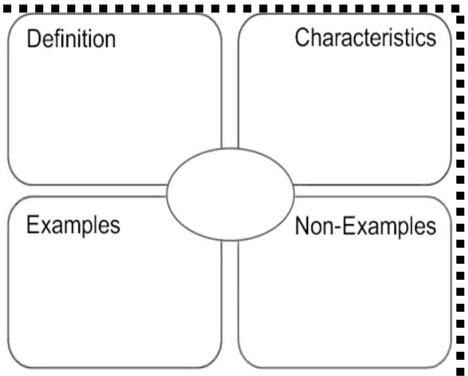




Starter	Main
Fishcake Melon	Lasagne Beef Salmon

List all of the combinations possible when one starter and one main are chosen.

F, L M, L
F, B M, B
F, S M, S

Note: You can write the initials of each option in a test. You do not need to write out the full word.

Product rule for counting

The number of total outcomes is the number of choices in set 1 multiplied by the number of choices in set 2

Key Vocabulary

Probability	The chance of something happening
Impossible	Cannot happen
Certain	Will definitely happen
Even chance	Two outcomes have the same chance of happening
Expectation	The amount of times you expect an outcome to happen
Relative frequency	How often something happens divided by all the outcomes

Colour	red	blue	white	black
Prob	x	0.2	0.3	x

A spinner is spun, it has four colours on it.
The relative frequencies of each colour are recorded.
The relative frequency of red and black are the same.

a) What is the relative frequency of red?

$1-(0.2+0.3)=0.5$

$x=\frac{0.5}{2}=0.25$

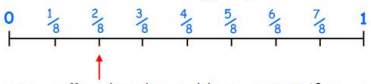
b) If the spinner is spun 300 times, how many times do you expect it to land on white?

$0.3\times 300=90$

1) What is the probability that a bead chosen will be **yellow**.
Show the answer on a number line.

$$Probability=\frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes}$$

$$P(Yellow)=\frac{2}{8}=\frac{1}{4}$$



2) How many **yellow** beads would you **expect** if you pulled a bead out and replaced it 40 times?

$\frac{1}{4}\times 40=\frac{1}{4}of 40=10$

Year 8 – Knowledge Organiser

STATS

Summer Term

Probability 3

Topics

- Sample spaces
- Venn Diagrams
- Two Way Tables

What do I need to be able to do?

- Calculate the probability of multiple events using a sample space
- Fill in a Venn diagram
- Interpret a Venn diagram
- Use a two way table

Career Links

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Key Vocabulary

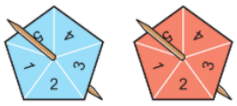
Probability	The chance of something happening
Sample Space	A way of recording all the outcomes of two events
Venn Diagram	Shows the relationship between two or more finite sets
Mutually exclusive	Cannot happen at the same time
Independent	One event does not affect the probability of another event
Dependent	One outcome affects the other

A **sample space diagram** shows all the possible outcomes of two events.

Example 1

Two fair five-sided spinners are spun and the results are added together.

a Draw the sample space diagram to show all the possible outcomes.
b Work out the probability of getting a total of 2.
c Work out the probability of getting a total of 6.
d Work out the probability of getting a total that is a prime number.



a

Blue spinner \ Red spinner	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10

Add the number on the red spinner to the number on the blue spinner.

b $P(2) = \frac{1}{25}$

c $P(6) = \frac{5}{25} = \frac{1}{5}$

d $P(\text{prime}) = \frac{11}{25}$

number of ways of scoring 2 / total number of scores

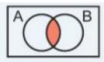
The outcomes that are prime numbers are 2, 3, 5 and 7.

Venn diagrams:

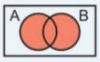
$A \cap B \cap C$ means the **intersection** of A, B and C.
$A \cup B \cup C$ means the **union** of A, B and C.
$P(A \cap B \mid B)$ means the probability of A and B given B.

Curly brackets { } show a set of values.
$\in$ means 'is an element of'.

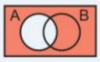
$A \cap B$ means 'A intersection B'. This is all the elements that are in A *and* in B.



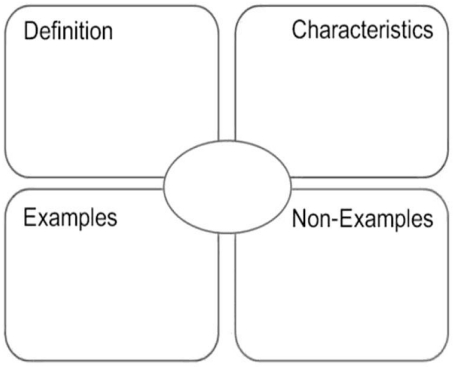
$A \cup B$ means 'A union B'. This is all the elements that are in A *or* B *or* both.

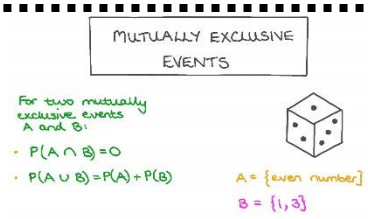


A' means the elements *not* in A.



$\mathscr{E}$ means the universal set – all elements being considered.





Two Way Tables

A table that organises data around two categories.

Fill out the information step by step using the information given:

Question: Complete the 2 way table below.

	Left Handed	Right Handed	Total
Boys	10		58
Girls			
Total		84	100

Both need to add to make 100 so the missing number is 16.

Answer: Step 1, fill out the easy parts (the totals)

	Left Handed	Right Handed	Total
Boys	10	*48*	58
Girls			*42*
Total	*16*	84	100

Both need to add to make 100 so the missing number is 42.

Answer: Step 2, fill out the remaining parts

	Left Handed	Right Handed	Total
Boys	10	*48*	58
Girls	*6*	*36*	*42*
Total	*16*	84	100

Both need to add to make 16 so the missing number is 6.

Both need to add to make 42 so the missing number is 36.

Year 8 – Knowledge Organiser