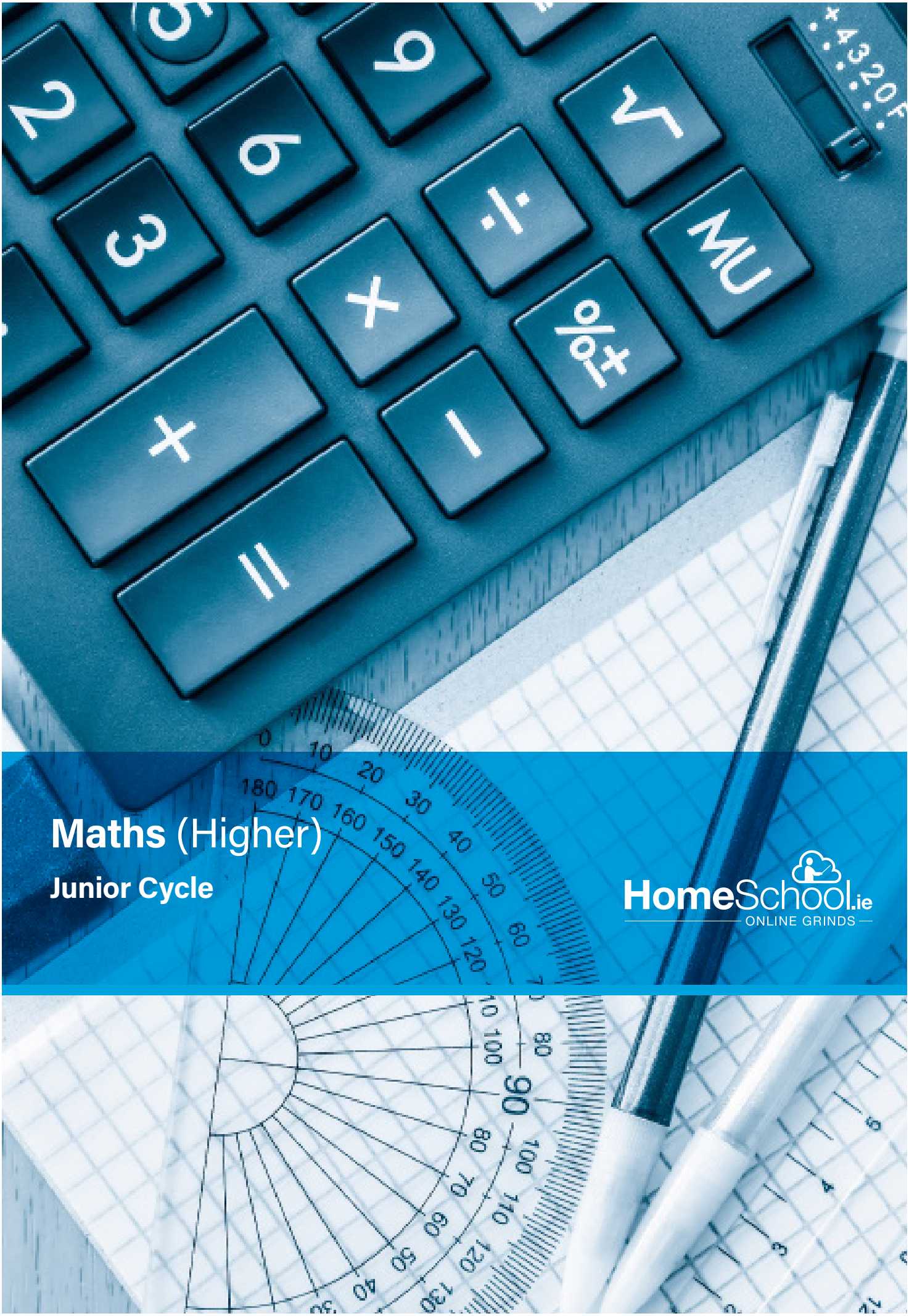


Maths (Higher)

Junior Cycle

HomeSchool.ie
ONLINE GRINDS

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Lesson 1: Set Notes

1.1 Learning Intentions

After this week's lesson you will be able to;

Define, list and label a set
Understand terminology and notation use including null set, Ø, subset, , complement, element, ∈, universal set, cardinal number, #, intersection, ∩, union, ∪, set difference, \ .
Create a 2 set and 3 set venn diagram

1.2 Specification

N.5
A.B.C.D.

1.3 The course

Introduction

The Junior Cycle is a three-year long cycle which has five different strands to focus on:

Topic: Numbers
Sets/Number systems/Indices, surds & roots/Applied arithmetic 1&2/Distance, speed & time

Topic: Geometry and trigonometry
Trigonometry/Co-ordinate Geometry/Area & volume 1&2/Geometry 1&2/ Transformations

Topic: Algebra and functions
Algebra 1-4/Functions 1&2/Patterns 1&2

Topic: Statistics and probability
Fundamental principle of counting and Probability/Statistics 1&2

The Assessment

The assessment for the cycle is made up of ;
Two-hour long exam worth 90% of your result at the end of 3rd year.
Further 10% relates to CBA 2 and assessment task.

1.4 Exercise

Tell me everything you know about the number 17

Definitions

Natural Numbers (N) - Any positive whole number
Integers (Z) – Any positive or negative whole number
Multiples – The different numbers one number divided into(example; multiples of 2 are 2, 4, 6, 8..., because 2 divides into all of those numbers)
Factors – Numbers that divide evenly into another number
Inclusive – To include (example: the numbers 1 to 5 inclusive will include 1 and 5)

Sets

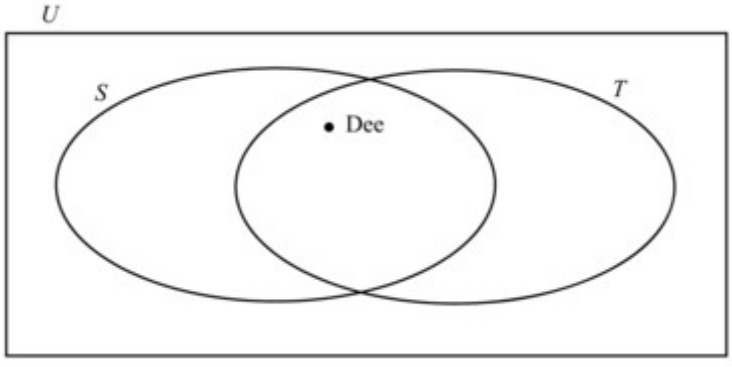
A set is a collection of people objects or numbers that have a common characteristic.

1.5 Exercise

Can you answer the following questions using true/false:
Is 2 Є {1, 2, 3, 4}?
Is T Є {T, E, A}?
Can you answer the following questions using the 'element' symbol or the 'not an element' symbol:
2 _ {Prime numbers less than 10}
17 _ {Composite numbers between 10 and 20 inclusive}

1.6 Exercise

Six students where asked if they liked to play sport or read books.
John, Sarah and Dee said they liked sports.
Michael, John, Dee and Hannah liked to read.
Claire did not like either.
Use the information to complete the Venn Diagram



1.7 Exercise

Draw a Venn Diagram when U={1-9}, with set A={2,4,6,8} and set B={2,3,5,7}

1.8 Exercise

Symbols and meanings

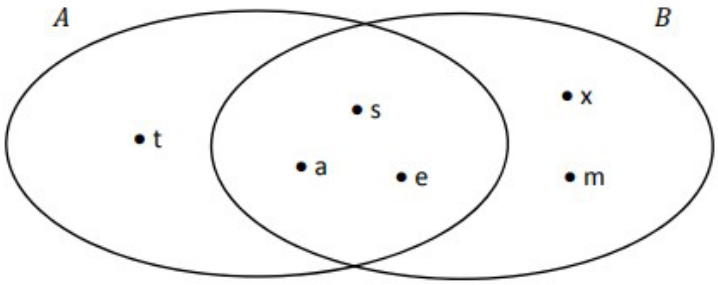
Symbol	Word	What it means
	Element/ Not an element	Is or is not a person, object or number from a se
	Intersection	The overlap of a and b
	Union	Both sets together
	Compliment	Everything except a
	A less B	Everything in a, get rid of b
	Cardinal number	The number of items in set a
	Subset/ Not a subset	Is or is not a part of a set
	Not equals to	Not equal to
	Null set	A set with nothing in it

Using notation to answer questions

1.9 Exercise

Question 9 **(Suggested maximum time: 10 minutes)**

(a) The Venn diagram below shows the sets A and B.



List the elements of each of the following sets.

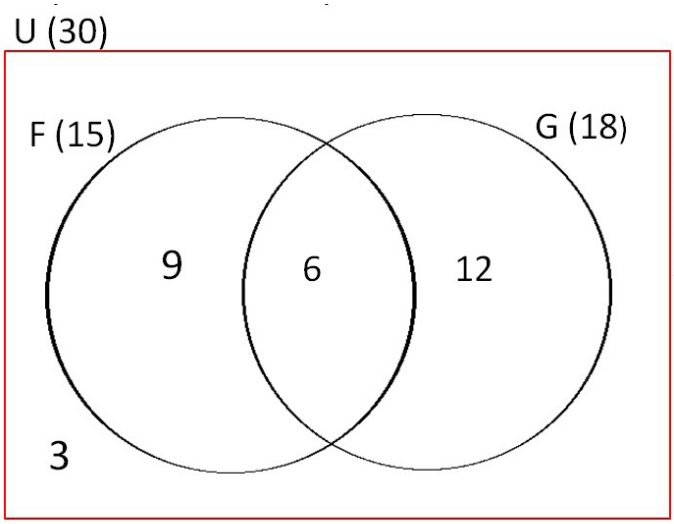
(i) $A =$ { }

(ii) $A \cap B =$ { }

(iii) $B \backslash A =$ { }

Other possible questions:
#A
#AuB
A\B
Is {a, m} a subset(c) of B
B′
(B\A)′
#(AnB)
If you can remove one letter, can you make a null set? How?

1.10 Exercise

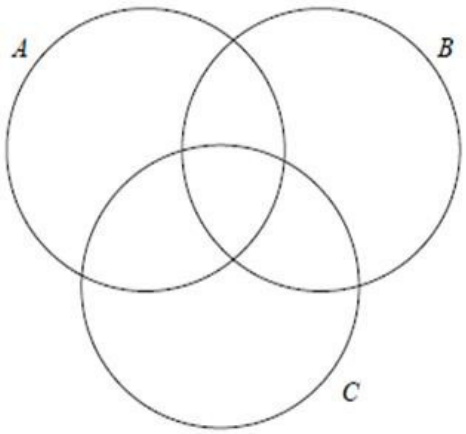


F n G =
F u G =
(F u G)′ =
F\G =
U\(F u G) =

Three Set Venn Diagrams

1.11 Exercise

Using what we have learnt can you fill in the following three set diagram?
The Sets A, B and C are as follows;
A = {1,2,3,5,6,7} B = {2,3,4,5,8,9} C = {1,4,5,10}



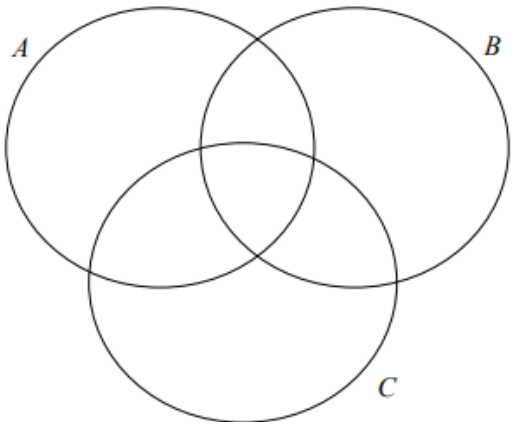
1.12 Exercise

Question 1 **(Suggested maximum time: 10 minutes)**

The sets A, B, and C are as follows:

$A = \{1, 2, 3, 5, 6, 7\}$ $B = \{2, 3, 4, 5, 8, 9\}$ $C = \{1, 4, 5, 10\}$.

(a) Complete the Venn diagram below.



(b) List the elements of each of the following sets.

$A \cup B =$ _____

$A \setminus C =$ _____

$A \cup (B \cap C) =$ _____

1.13 Exercise

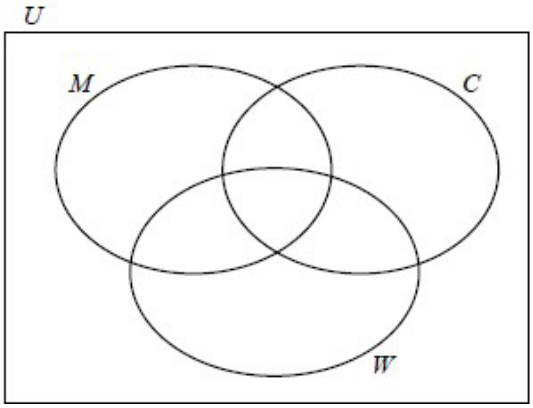
Question 10 **(Suggested maximum time: 10 minutes)**

A researcher has found old census data about Measles (M), Chickenpox (C), and Whooping cough (W) among 12-year-old children. In a group of 100 children:

31 had **none** of these diseases
2 had **all three** diseases
2 had Measles **and** Chickenpox, but **not** Whooping cough
6 had Whooping cough **and** Chickenpox
11 had **at least two** diseases
18 had Measles
40 had Chickenpox.

(a) Use this data to **fill in** the Venn diagram.





The table below shows 3 statements. Each statement is written in English and in set notation.

(c) Complete the table.

	English	Set notation
Statement 1	6 had Whooping cough **and** Chickenpox	$6 = \#(W \cap C)$
Statement 2		$36 = \#(C \setminus M)$
Statement 3	2 had Measles **and** Chickenpox but **not** Whooping cough	

1.14 Exercise

Max and Min problems

Question 13 **(Suggested maximum time: 10 minutes)**

Below are four statements about three **non-empty** sets P, Q, and R in a universal set U.

(a) Put a tick (✓) in the correct box in each case to show whether each statement is **always true**, **sometimes true**, or **never true**.

Note: P' is the complement of the set P.

	Statement	Tick **one** box only in each case		
		Always true	**Sometimes true**	**Never true**
1	$\#(P \cup Q) = \#(P) + \#(Q)$	☐	☐	☐
2	$P \setminus Q = P \cap Q$	☐	☐	☐
3	$(P \cap Q)' = P' \cup Q'$	☐	☐	☐
4	$P \cup (Q \cap R) = (P \cup Q) \cap (P \cup R)$	☐	☐	☐

For a maximum, the number in question must be as big as possible
For a minimum, the number in question must be as small as possible

1.15 Exercise

In a table quiz, 100 questions were asked. Team M answered 72 questions correctly. Team N answered 38 questions correctly.

I) Find, with the aid of a Venn diagram, the minimum number of questions answered correctly by both teams.

II) Find, with the aid of a Venn diagram, the maximum number of questions answered correctly by both teams.

1.6 Homework Task

2019 HL
Paper 1 Q5&8

Question 5 **(Suggested maximum time: 10 minutes)**

The sets A, B, and C are as follows:

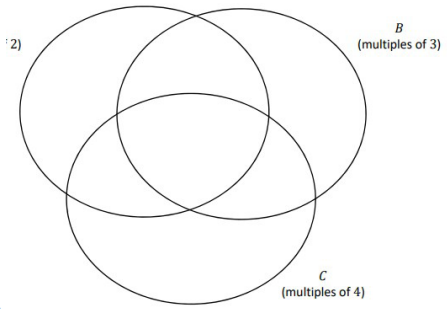
A is the set of multiples of $2 = \{2, 4, \ldots\}$
B is the set of multiples of $3 = \{3, 6, \ldots\}$
C is the set of multiples of $4 = \{4, 8, \ldots\}$.

(a) Write down a number that is in $A \cap B \cap C$.

Answer:

(b) Explain why C is a subset of A.

These sets A, B, and C are shown in the Venn diagram below.
There are 7 different regions in the Venn diagram.



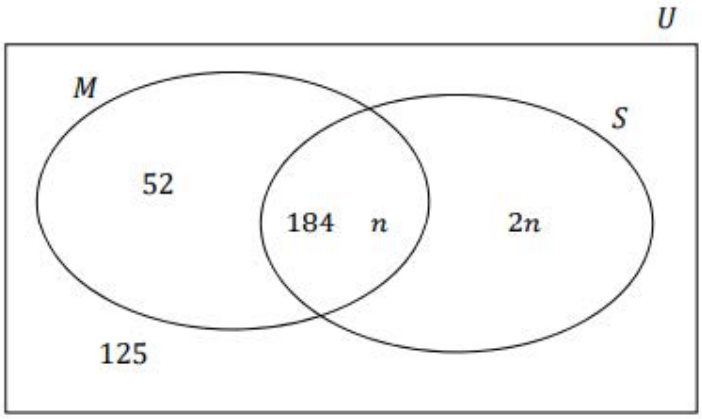
(c) Because C is a subset of A, there are two regions in the Venn diagram that have **no** elements. Write an **X** in each of these two regions in the Venn diagram above.

(d) Each of the other five regions in the Venn diagram has some elements.

In **each** of these five regions **in the Venn diagram above**, write one of the elements in that region.

Question 8 **(Suggested maximum time: 5 minutes)**

The Venn diagram below shows the number of people in a youth club (U) who play music (M) and sport (S), where $n \in \mathbb{N}$.



Work out the **maximum** number of people who could be in the youth club.

Answer: ☐

Notes

Notes