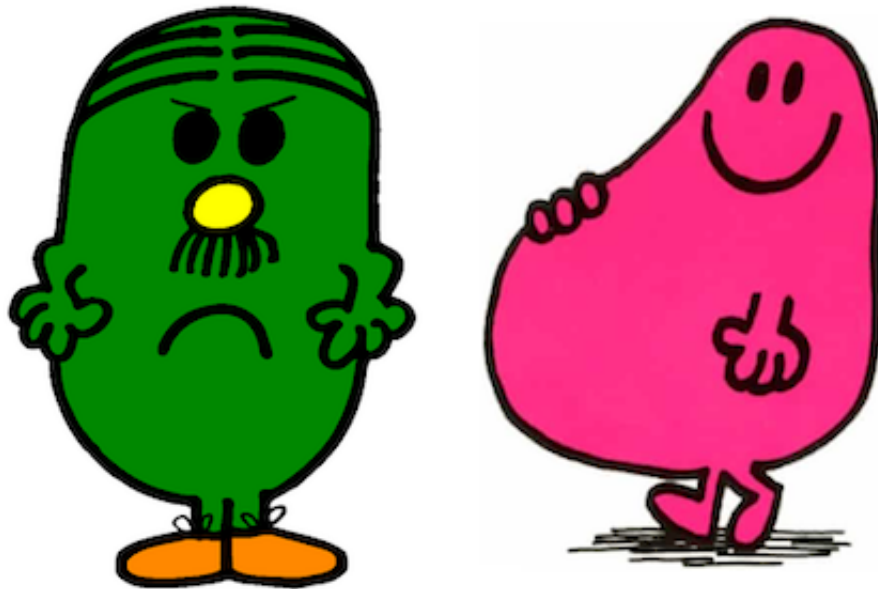


SET THEORY II



$$A \cap B$$

$$A \cup B$$

The images of Mr Fussy & Mr Greedy are by Roger Hargreaves
They help illustrate the difference between the intersection of two sets (Mr Fussy)
and the union of two sets (Mr Greedy)

Lesson 1

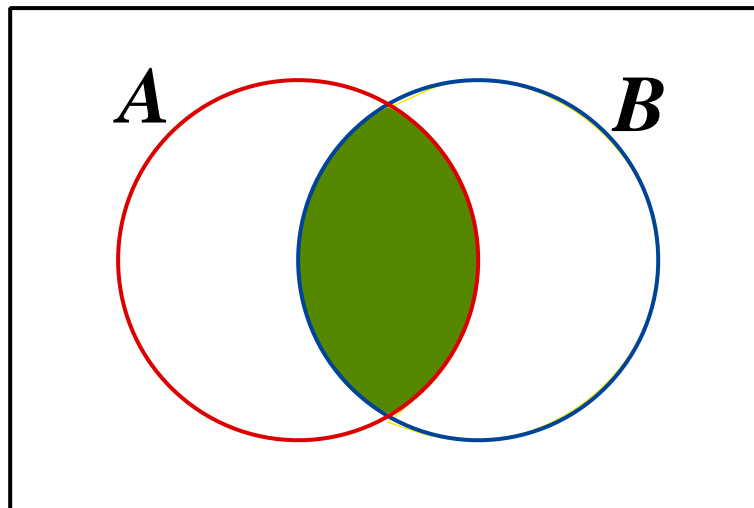
GCSE Mathematics Set Theory II

1.1 Mr Fussy

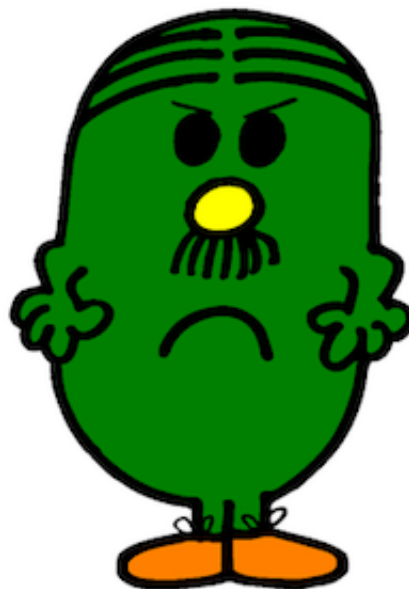
In Set Theory I, we considered the intersection of sets.

The symbol for an intersection is \cap and when we write $A \cap B$ we are referring to that part of A that is also in B . Equivalently, this is the part of B that is in A .

An intersection can be thought of as Mr Fussy; the elements in an intersection have to be in both A and in B to be wanted by Mr Fussy



$$A \cap B$$



Notice that Mr Fussy has a mouth in the shape of the intersection symbol, \cap

1.2 Mr Greedy

Mr Fussy has a friend called Mr Greedy.

Mr Greedy grabs what he can as soon as he sees it and once he has grabbed something he never, ever, gives it back.

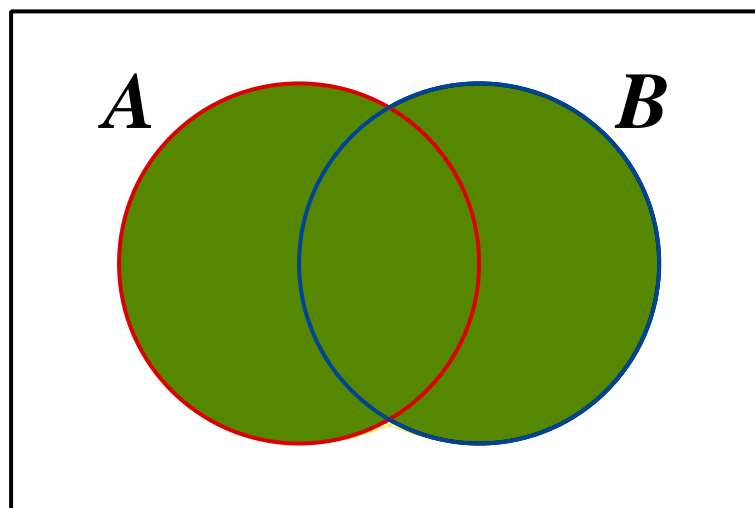
Mr Greedy has a mouth in the shape of the Set Theory symbol for union, \cup



The union of A and B is written $A \cup B$ and it is all the elements in set A merged with all the elements in set B .

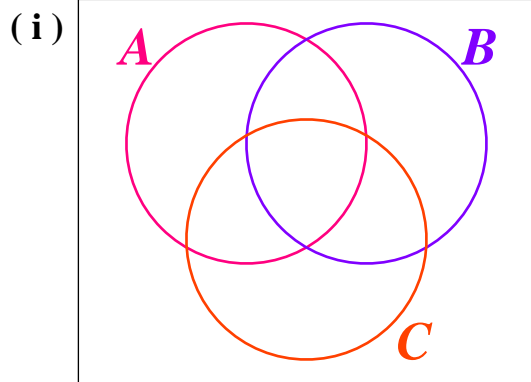
When Mr Greedy looks at $A \cup B$ his eye first of all sees the A and he grabs all of that and will now never, ever, give any of it back. He then moves on to see more stuff; set B and he grabs all of that as well.

No wonder his tummy is so big !

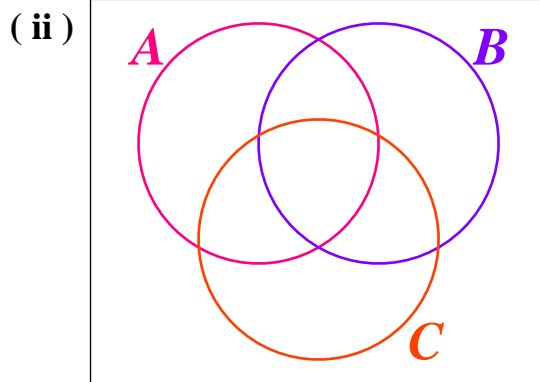


$$A \cup B$$

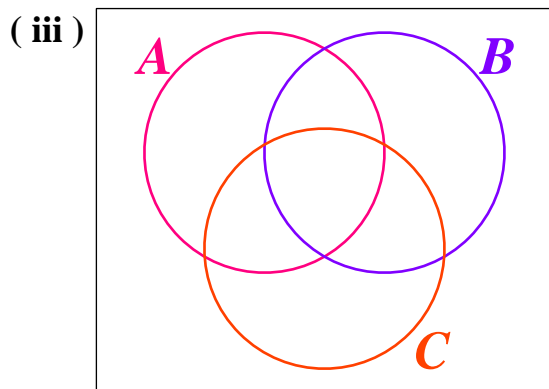
1.3 Example



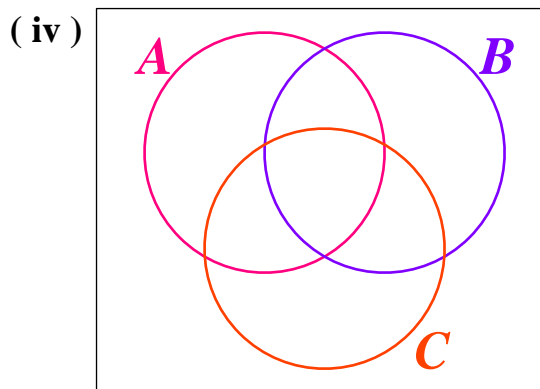
Shade $A \cap B$
The part of A that is also in B



Shade $A \cup B$
Merge all A with all B



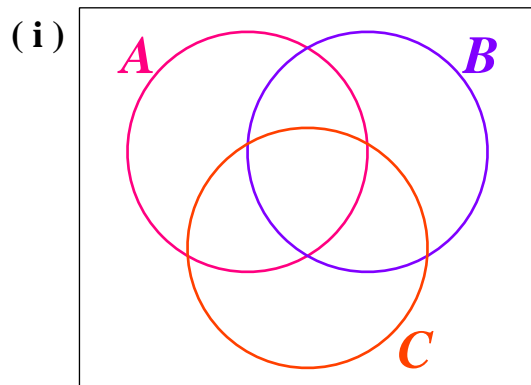
Shade $A \cap B'$
The part of A not in B



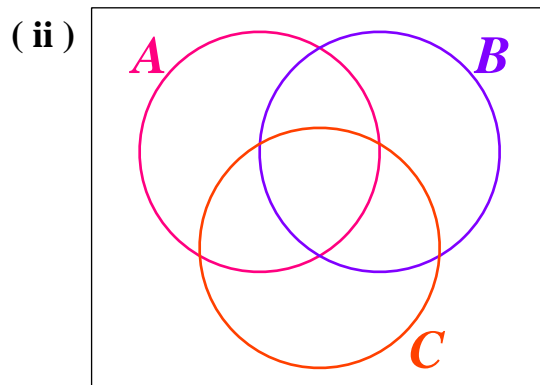
Shade $A \cup B'$
Merge all A with everything not in B

[4 marks]

1.4 You Try



Shade $A \cap C$
The part of A that is also in C

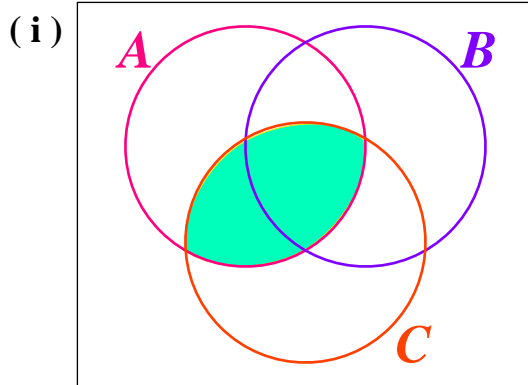


Shade $A \cup C$
Merge all A with all C

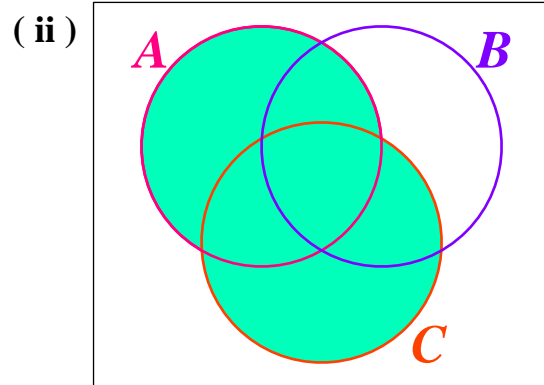
[2 marks]

The answer is over the page so that you can see if you got it right or not

1.5 You Try Answer



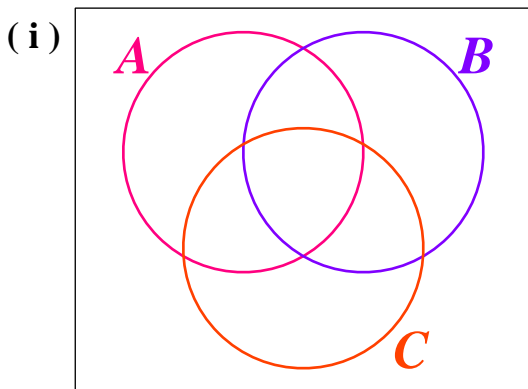
Shade $A \cap C$
The part of A that is also in C



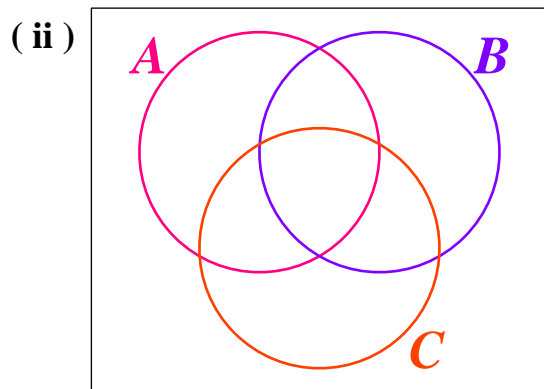
Shade $A \cup C$
Merge all A with all C

[2 marks]

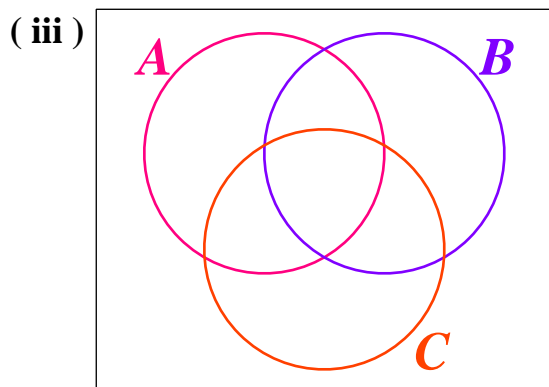
1.6 You Try Two



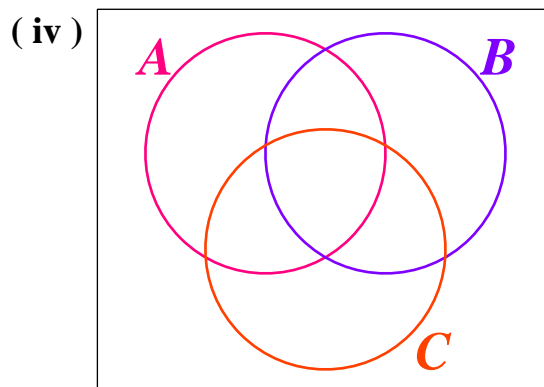
Shade $B \cap C$
The part of B that is also in C



Shade $B \cup C$
Merge all B with all C



Shade $B \cap C'$
The part of B not in C



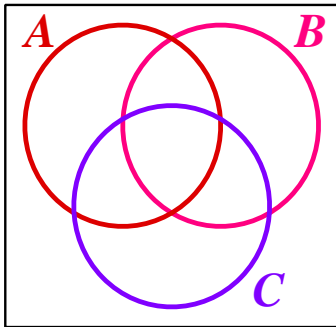
Shade $B \cup C'$
Merge all B with everything not in C

[4 marks]

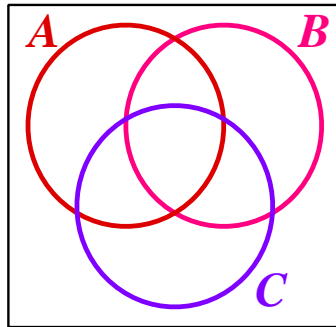
1.7 Exercise

Marks Available : 30

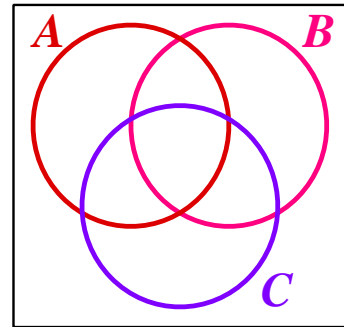
Question 1



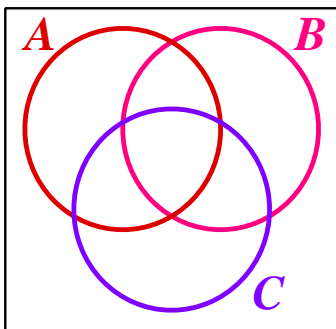
Shade : $A \cap B$



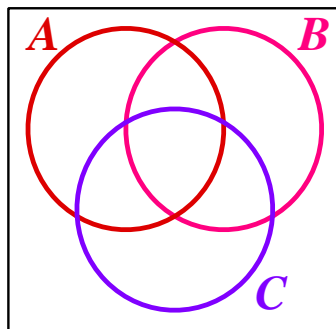
Shade : $A \cup B$



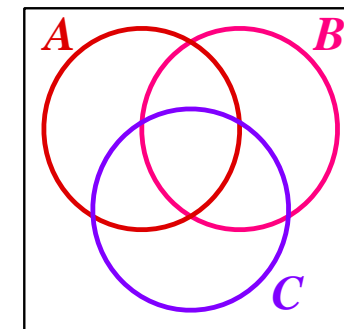
Shade : $A \cup C$



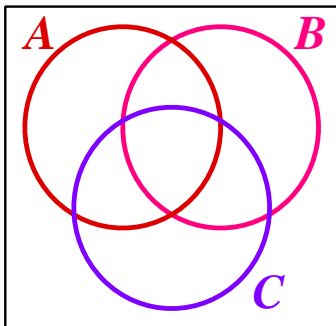
Shade : B



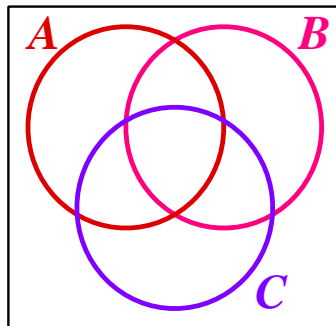
Shade : B'



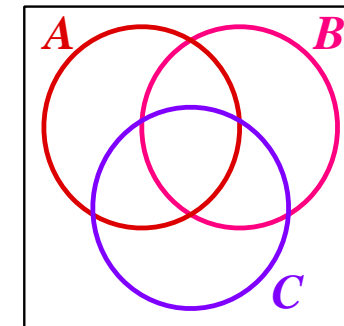
Shade : $(A \cup B)'$



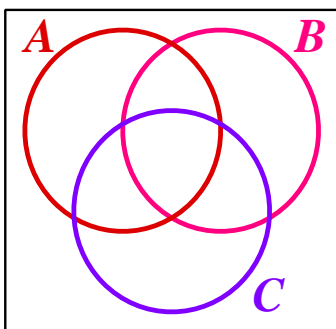
Shade : $B \cap C$



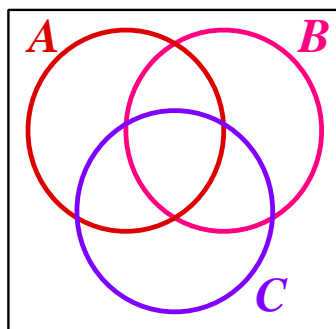
Shade : $(B \cap C)'$



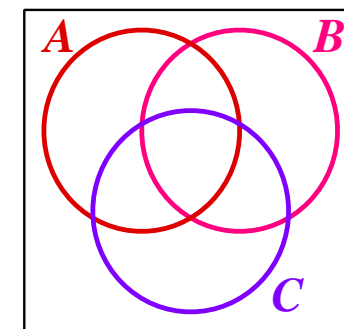
Shade : $B \cup C$



Shade : $(B \cup C)'$



Shade : $A \cap B \cap C$



Shade : $A \cup B \cup C$

[12 marks]

Question 2

Let the sets T and F be,

$$T = \{ \text{factors of } 21 \}$$

$$F = \{ \text{factors of } 14 \}$$

- (i) List the elements of the two sets below,

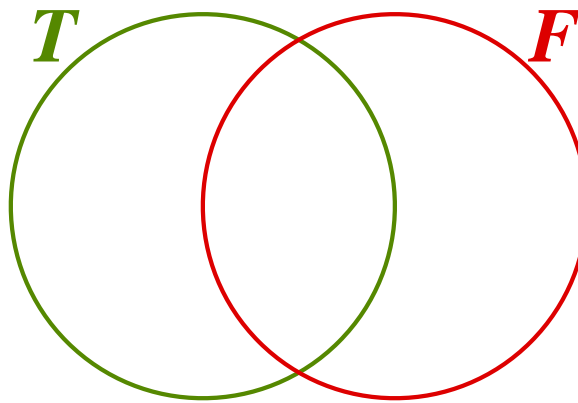
$$T = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$$

[1 mark]

$$F = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$$

[1 mark]

- (ii) On the Venn Diagram show the relationship between the sets T and F



[2 marks]

(iii) $T \cap F = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$

[2 marks]

(iv) $T \cup F = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$

[2 marks]

Question 3

Consider the two sets A and B where,

$$A = \{ \Delta, \times, O, \square \}$$

$$B = \{ \diamond, \square, \pi, \times \}$$

List the elements of,

(i) $A \cap B =$

[2 marks]

(ii) $A \cup B =$

[2 marks]

Question 4

Let the sets S and M be,

$$S = \{ \text{first 4 square numbers} \}$$
$$M = \{ \text{first four multiples of 4} \}$$

- (i) List the elements of the two sets below,

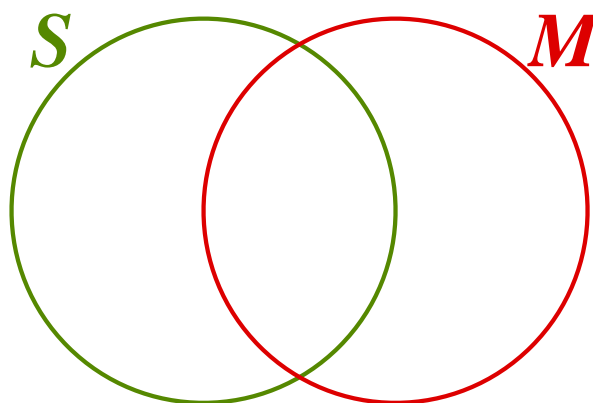
$$S = \{ \text{ ______ , ______ , ______ , ______ } \}$$

[1 mark]

$$M = \{ \text{ ______ , ______ , ______ , ______ } \}$$

[1 mark]

- (ii) On the Venn Diagram show the relationship between the sets S and M



(iii) $S \cap M = \{ \text{ ______ , ______ } \}$

[2 marks]

(iv) $S \cup M = \{ \text{ ______ , ______ , ______ , ______ , ______ , ______ } \}$

[2 marks]