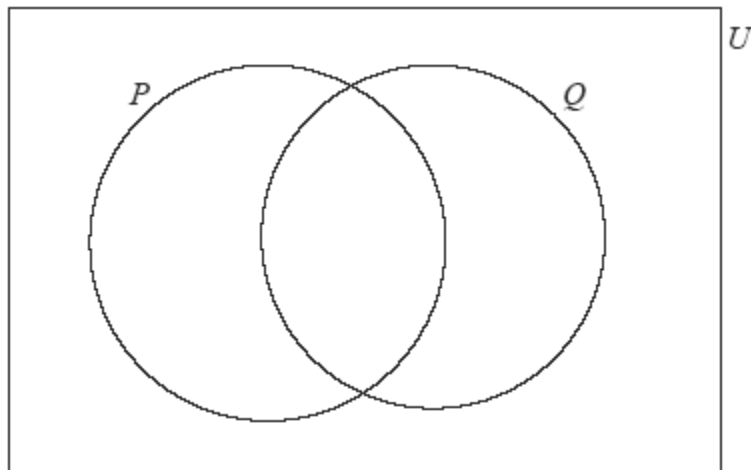


## Notation / Venn dia 2 Sets

46 min  
54 marks

1. The sets  $P$ ,  $Q$  and  $U$  are defined as

$U = \{\text{Real Numbers}\}$ ,  $P = \{\text{Positive Numbers}\}$  and  $Q = \{\text{Rational Numbers}\}$ .



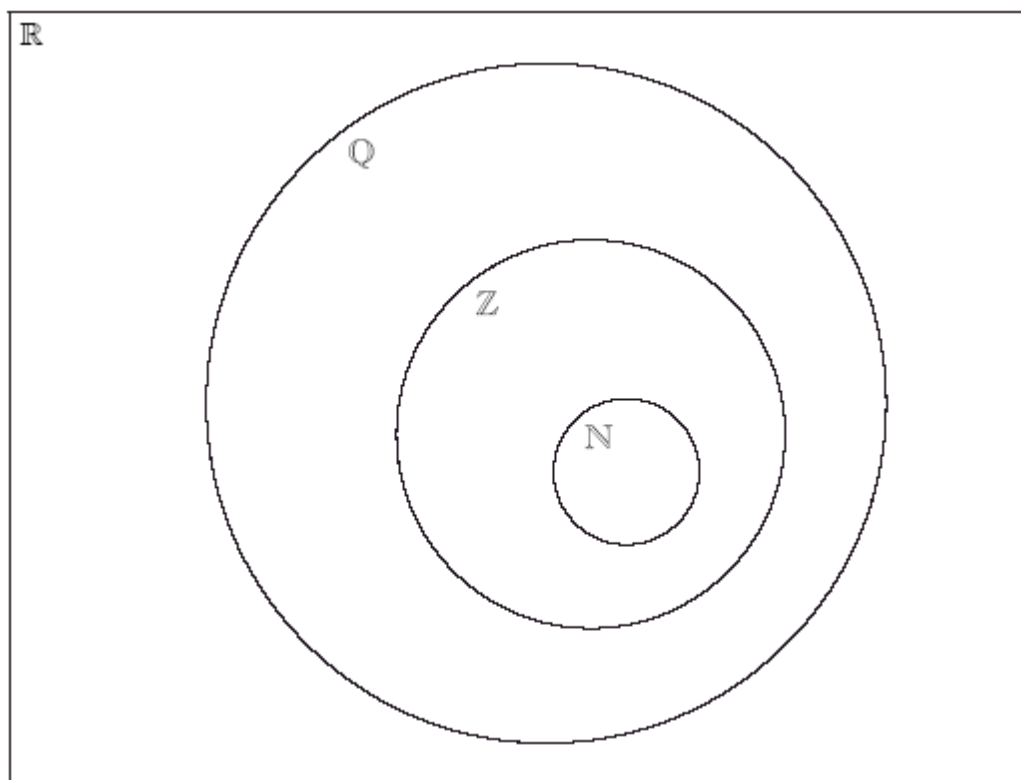
Write down in the correct region on the Venn diagram the numbers

$\frac{22}{7}$ ,  $5 \times 10^{-2}$ ,  $\sin(60^\circ)$ ,  $0$ ,  $\sqrt[3]{-8}$ ,  $-\pi$

(Total 6 marks)

2. The Venn diagram shows the number sets  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$  and  $\mathbb{R}$ . Place each of the following numbers in the appropriate region of the Venn diagram.

$$\frac{1}{4}, -3, \pi, \cos 120^\circ, 2.7 \times 10^3, 3.4 \times 10^{-2}$$



(Total 6 marks)

3. Let  $U = \{-4, -\frac{2}{3}, 1, \pi, 13, 26.7, 69, 10^{33}\}$ .

$A$  is the set of all the integers in  $U$ .

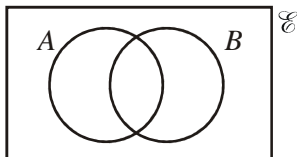
$B$  is the set of all the rational numbers in  $U$ .

- (a) List all the prime numbers contained in  $U$ .
- (b) List all the members of  $A$ .
- (c) List all the members of  $B$ .
- (d) List all the members of the set  $A \cap B$ .

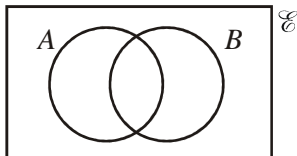
**(Total 8 marks)**

4. In each of the Venn diagrams, shade the region indicated.

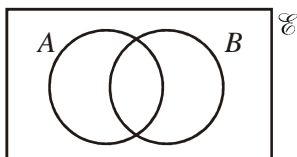
- (a)  $A \cap B$



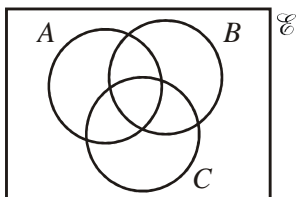
- (b) The complement of  $(A \cap B)$



- (c) The complement of  $(A \cup B)$

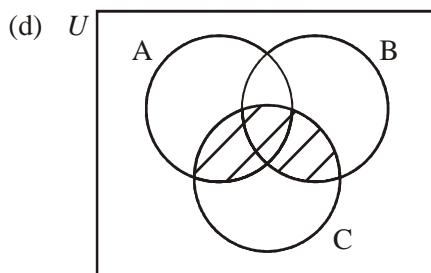
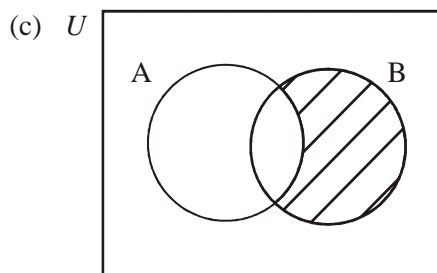
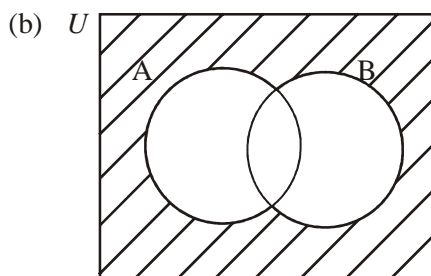
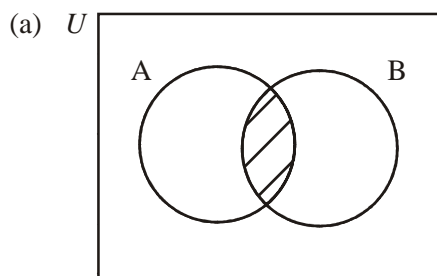


(d)  $A \cup (B \cap C)$



(Total 4 marks)

5. Write down an expression to describe the shaded area on the following Venn diagrams:

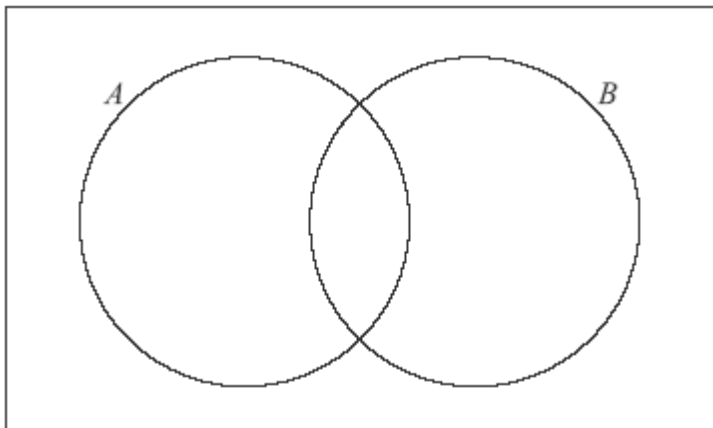


(Total 8 marks)

6. A group of 30 students were asked about their favourite topping for toast.

18 liked peanut butter ( $A$ )  
 10 liked jam ( $B$ )  
 6 liked neither

- (a) Show this information on the Venn diagram below.



(2)

- (b) Find the number of students who like both peanut butter and jam.

(2)

- (c) Find the probability that a randomly chosen student from the group likes peanut butter, given that they like jam.

(2)

**(Total 6 marks)**

7. Let

$$\mathcal{U} = \{\text{positive integers less than 15}\};$$

$$X = \{\text{multiples of 2}\};$$

$$Y = \{\text{multiples of 3}\}.$$

- (a) Show, in a Venn diagram, the relationship between the **sets**  $\mathcal{U}$ ,  $X$  and  $Y$ . (1)
- (b) List the elements of:
- (i)  $X \cap Y$  (1)
- (ii)  $X \cap \mathcal{C}Y$ . (2)
- (c) Find the **number of elements** in the complement of  $(X \cup Y)$ . (2)
- (Total 6 marks)**

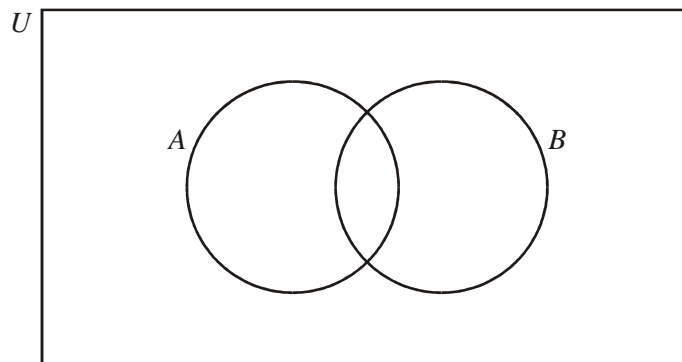
8. The universal set  $U$  is defined as the set of positive integers less than 10. The subsets  $A$  and  $B$  are defined as:

$$A = \{\text{integers that are multiples of 3}\}$$

$$B = \{\text{integers that are factors of 30}\}$$

- (a) List the elements of
- (i)  $A$ ;
- (ii)  $B$ .

- (b) Place the elements of  $A$  and  $B$  in the appropriate region in the Venn diagram below.



**(Total 4 marks)**

9. The universal set  $U$  is the set of integers from 1 to 20 inclusive.

$A$  and  $B$  are subsets of  $U$  where:

$A$  is the set of even numbers between 7 and 17.

$B$  is the set of multiples of 3.

List the elements of the following sets:

- (a)  $A$ ; **(1)**
- (b)  $B$ ; **(1)**
- (c)  $A \cup B$ ; **(2)**
- (d)  $A \cap B'$ . **(2)**

**(Total 6 marks)**