Lesson 4

GCSE Mathematics

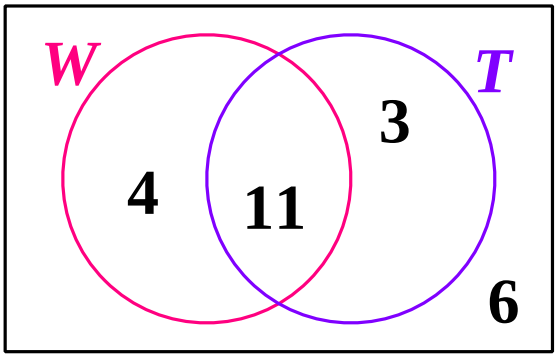
Set Theory I

4.1 Notation : Intersection, NOT

Are you a Star Wars or a Star Trek fan ?

Here is a Venn Diagram that shows how a class of 24 pupils answered that question.
In the diagram

- W is the hoop containing fans of Star Wars
- T is the hoop containing fans of Star Trek



Here is a list of what a question may ask you for;

- $n(W)$ number of pupils who are fans of Star Wars
- $n(T)$ number of pupils who are fans of Star Trek
- $n(W')$ number of pupils who are NOT fans of Star Wars
- $n(T')$ number of pupils who are NOT fans of Star Trek

- $n(W \cap T)$ number of pupils who are fans of Star Wars and Star Trek
- $n(W \cap T')$ number of pupil who are fans of Star Wars but are NOT of Star Trek
- $n(W' \cap T)$ number of pupils who are NOT fans of Star Wars but are of Star Trek
- $n(W' \cap T')$ number of pupils who are NOT fans of Star Wars and NOT of Star Trek

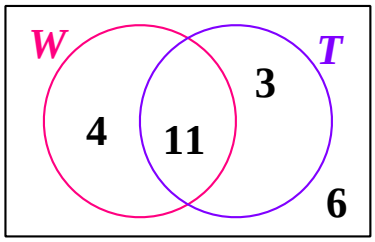
4.2 Example

Teaching Video : http://www.NumberWonder.co.uk/v9003/5.mp4

Complete the question as you watch the video

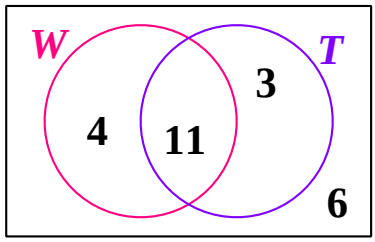
In each Venn Diagram, shade in the region specified and hence give the total number of pupils in that region,

(i)



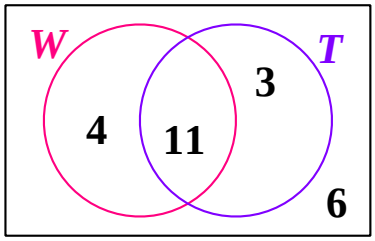
$n(W) =$

(ii)



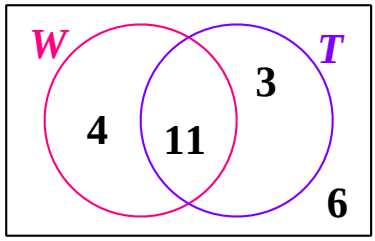
$n(W') =$

(iii)



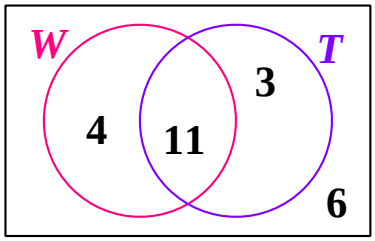
$n(T) =$

(iv)



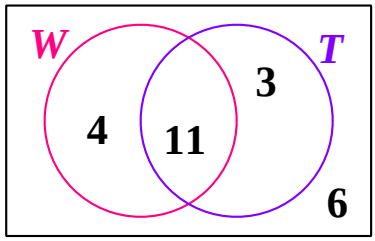
$n(T') =$

(v)



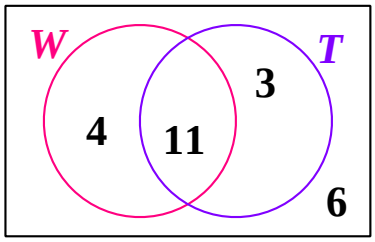
$n(W \cap T) =$

(vi)



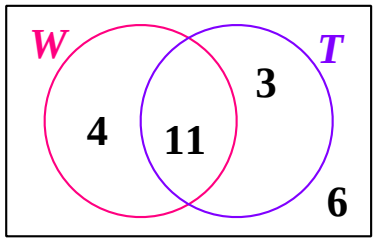
$n(W \cap T') =$

(vii)



$n(W' \cap T) =$

(viii)



$n(W' \cap T') =$

[16 marks]

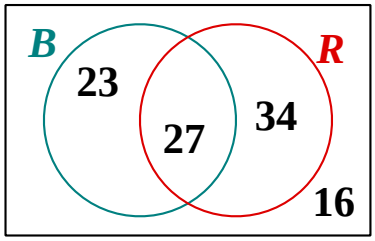
4.3 You Try

Are you a fan of The Beatles or The Rolling Stones ?
Here is a Venn Diagram that shows how 100 sixth form students responded.

- B is the hoop containing Beatles fans
- R is the hoop containing Rolling Stones fans

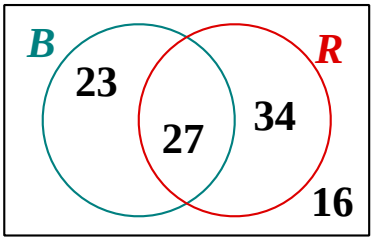
In each Venn Diagram, shade in the region specified and hence give the total number of sixth form students in that region.

(i)



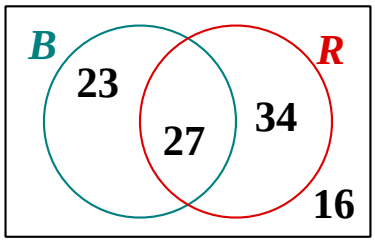
$n(B \cap R) =$

(ii)



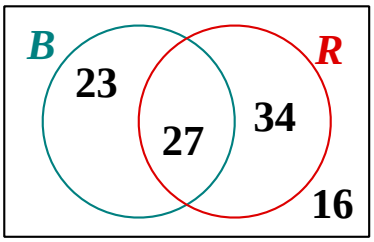
$n(R) =$

(iii)



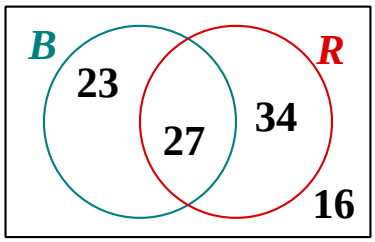
$n(B' \cap R') =$

(iv)



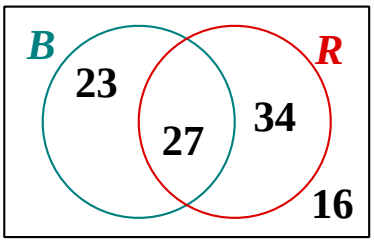
$n(R') =$

(v)



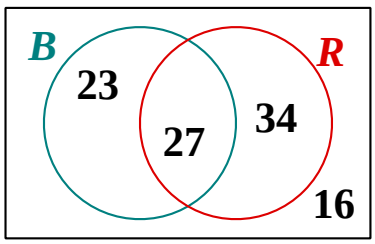
$n(B' \cap R) =$

(vi)



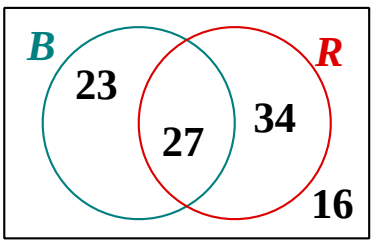
$n(B) =$

(vii)



$n(B \cap R') =$

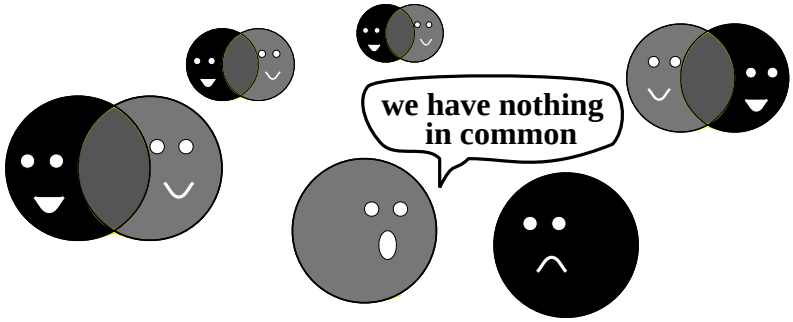
(viii)



$n(B') =$

[16 marks]

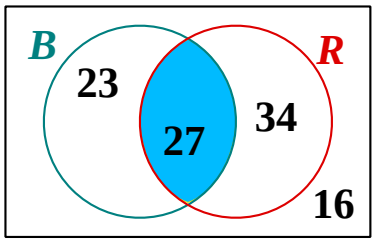
4.4 Venn Diagram Joke !



Harold had to face the painful truth ; He and Daisy were never going to be a Venn diagram.

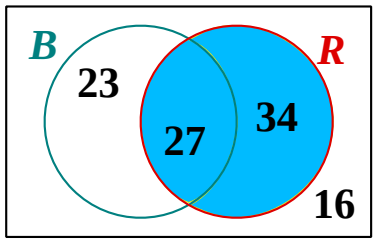
4.5 You Try Answers

(i)



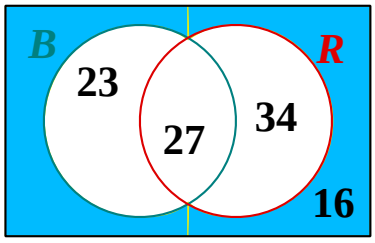
$n(B \cap R) = 27$

(ii)



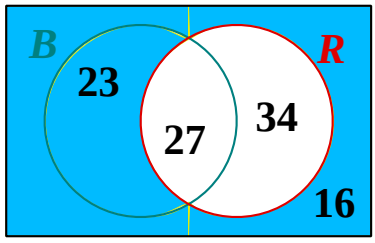
$n(R) = 61$

(iii)



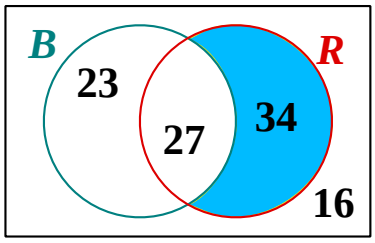
$n(B' \cap R') = 16$

(iv)



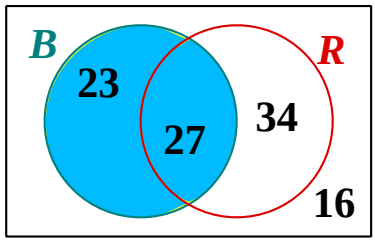
$n(R') = 39$

(v)



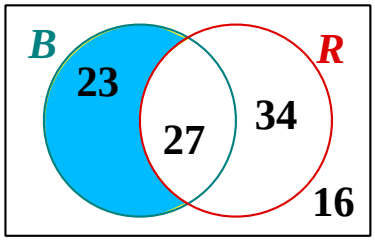
$n(B' \cap R) = 34$

(vi)



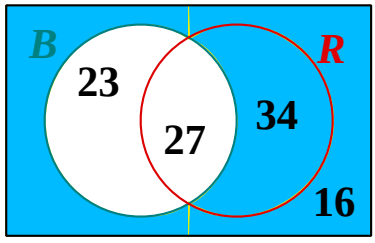
$n(B) = 50$

(vii)



$n(B \cap R') = 23$

(viii)



$n(B') = 50$

How did you do ? **[16 marks]**

Tick the box that applies: ☐ Ace ☐ One Hiccup ☐ Com Si Com Sa ☐ Pants

4.6 Exercise

Marks Available : 24

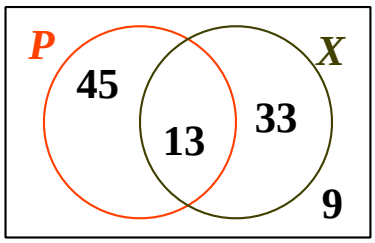
Question 1

Are you an enthusiast of Play Station 5 or XBOX series X ?
Here is a Venn Diagram that shows how 100 teenagers responded.

- P is the hoop containing Play Station 5 enthusiasts
- X is the hoop containing XBOX series X enthusiasts

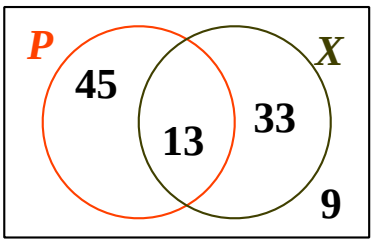
In each Venn Diagram, shade in the region specified and hence give the total number of teenagers in that region.

(i)



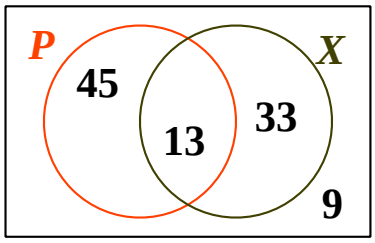
$n(X) =$

(ii)



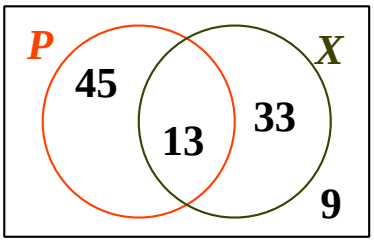
$n(P' \cap X) =$

(iii)



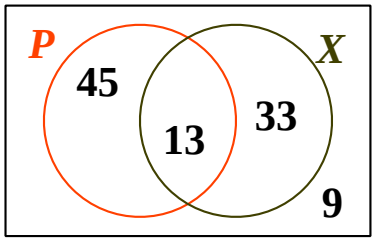
$n(P \cap X') =$

(iv)



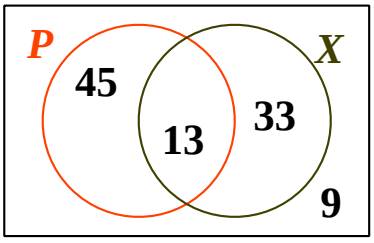
$n(P) =$

(v)



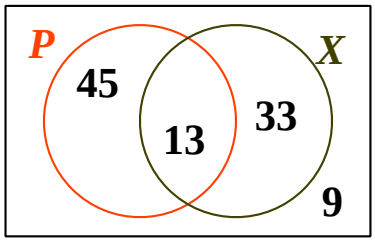
$n(P') =$

(vi)



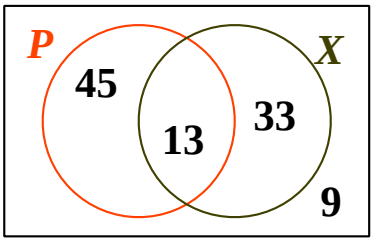
$n(P' \cap X') =$

(vii)



$n(X') =$

(viii)



$n(P \cap X) =$

[16 marks]

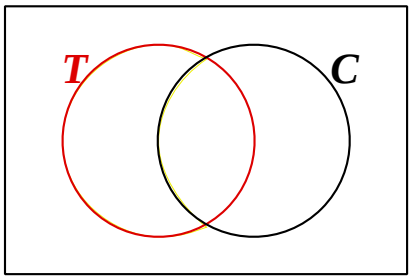
Question 2

On the Venn Diagrams below, shade the part that represents;

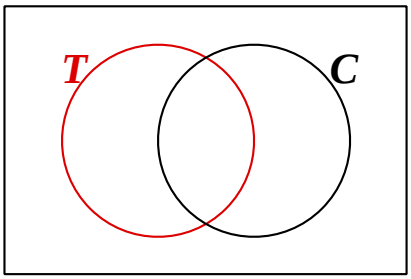
(i) C **(ii)** C'

(iii) $C \cap T$ **(iv)** $(C \cap T)'$

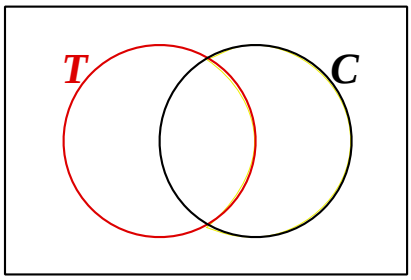
(i)



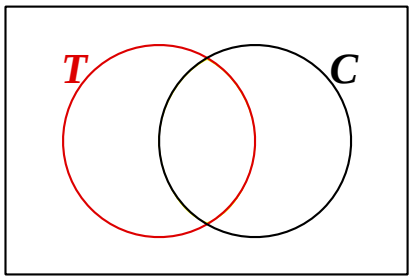
(ii)



(iii)



(iv)



[4 marks]

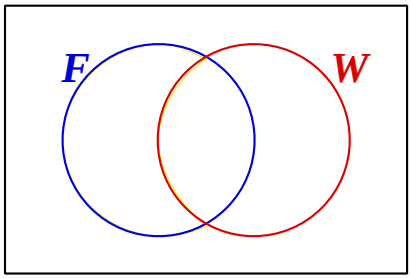
Question 3

On the Venn Diagrams below, shade the part that represents;

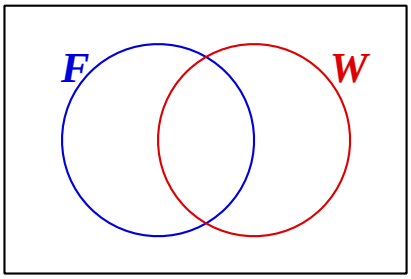
(i) F' **(ii)** $F' \cap W$

(iii) $F' \cap W'$ **(iv)** $(F' \cap W')'$

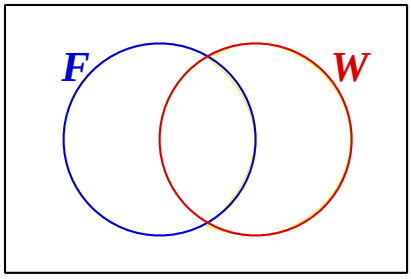
(i)



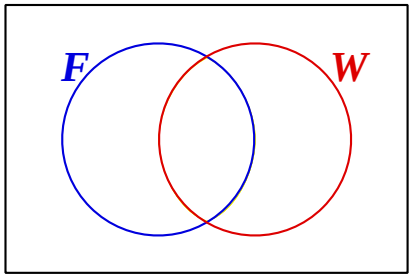
(ii)



(iii)



(iv)



[4 marks]