

2003 Sample Paper

Question 2

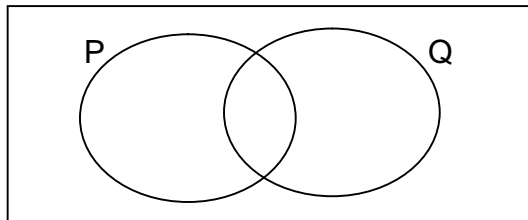
Q2 (a) (i) List all the divisors of 20.

(ii) $D = \{1, 2, 3, 4, 6, 12\}$ and $P = \{2, 3, 5, 7\}$.

List the elements of $D \cup P$ and $D \cap P$.

(c) (i) 100 questions were asked in a table quiz. Team P had 64 correct answers and team Q had 49 correct answers. There were 20 questions which neither team P nor team Q answered correctly.

Copy the Venn diagram into your answerbook and complete it to show the number of elements in each part of each set.



(ii) U is the universal set and A and B are two subsets of U .
 $\#U = u$, $\#A = a$, $\#B = b$, $\#(A \cap B) = x$, $\#((A \cup B)) = y$.

Represent this information on a Venn diagram and hence express y in terms of u , a , b and x .

Show that if $a < b$, then the maximum possible value of y is $u - b$.

[Hint: the number of elements in a set can never be less than zero]

Solution

Q2 (a) (i) List all the divisors of 20.

(ii) $D = \{1, 2, 3, 4, 6, 12\}$ and $P = \{2, 3, 5, 7\}$.

List the elements of $D \cup P$ and $D \cap P$.

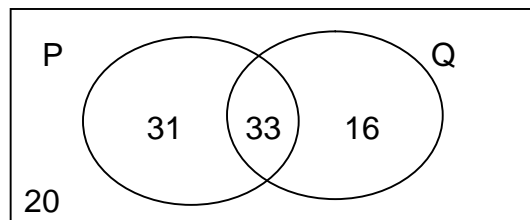
(i) $20 = \{1, 2, 4, 5, 10, 20\}$

(ii) $D \cup P = \{1, 2, 3, 4, 5, 6, 7, 12\}$

$$D \cap P = \{2, 3\}$$

(c) (i) 100 questions were asked in a table quiz. Team P had 64 correct answers and team Q had 49 correct answers. There were 20 questions which neither team P nor team Q answered correctly.

Copy the Venn diagram into your answerbook and complete it to show the number of elements in each part of each set.



Fill in the middle first $64 + 49 - 80 = 33$

P only $64 - 33 = 31$

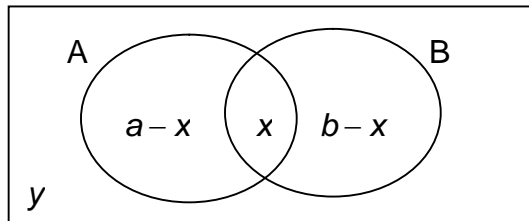
Q only $49 - 33 = 16$

- (ii) U is the universal set and A and B are two subsets of U .
 $\#U = u$, $\#A = a$, $\#B = b$, $\#(A \cap B) = x$, $\#((A \cup B)) = y$.

Represent this information on a Venn diagram and hence express y in terms of u , a , b and x .

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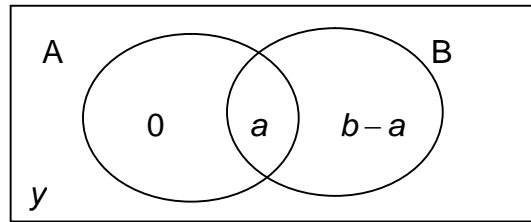
$$u = a - x + x + b - x + y$$

$$u = a + b - x + y$$

$$a + b - x + y = u$$

$$y = u - a - b + x$$

If $a < b$, then the maximum possible value we can put in the middle is a



$$u = a + b - a + y$$

$$u = b + y$$

$$b + y = u$$

$$y = u - b$$