

**REASONING***(Answers on page 2 - 4)***MATHEMATICAL VENN DIAGRAMS - 1****Questions 1 – 3:**

Subsidiary subjects opted by a batch of 60 students in HET University are given below. 25 students opted physics and 45 students opted geology. Each one of these 60 students opted either one of the subjects given above.

- 1) How many students opted only physics?  
a) 15                      b) 20                      c) 35                      d) 40
- 2) How many students opted both subjects?  
a) 60                      b) 70                      c) 10                      d) 25
- 3) How many students opted exactly one subject?  
a) 40                      b) 35                      c) 70                      d) 50
- 4) How many students opted only geology (in other words, how many did not opt physics)?  
a) 25                      b) 10                      c) 35                      d) None of these

**Questions 5 – 8:**

In a training program conducted for a total of 180 research scholars, 120 scholars trained on SPSS and 90 scholars on AMOS software. 10 scholars did not undergo any of these trainings.

- 5) How many scholars undergo exactly one training?  
a) 170                      b) 140                      c) 150                      d) 130
- 6) How many had at least one type of training?  
a) 160                      b) 100                      c) 170                      d) None of these
- 7) How many did not have at least one of the training?  
a) 140                      b) 10                      c) 130                      d) 160
- 8) How many had SPSS training or AMOS training?  
a) 180                      b) 160                      c) 140                      d) None of these

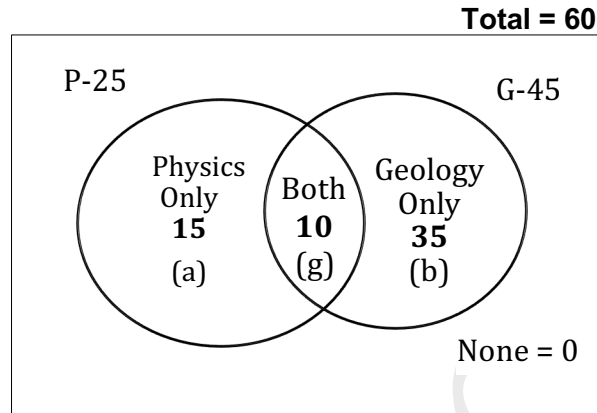
**Questions 9 – 12:**

Survey among 240 daily commuters about their mode of transport reveals the following information. 150 use Train, 95 use Ferry and 130 use Bus. 45 use Train and Ferry; 65 use Ferry and Bus; 75 use Train and Bus; and 20 use all the three modes of transport.

- 9) How many uses exactly two modes of transport?  
a) 175                      b) 125                      c) 210                      d) 180
- 10) How many uses none of the given modes of transport?  
a) 20                      b) 25                      c) 30                      d) None of these
- 11) How many uses exactly one mode of transport?  
a) 65                      b) 135                      c) 85                      d) 55
- 12) How many uses train but not ferry?  
a) 50                      b) 95                      c) 105                      d) None of these

**ANSWERS: 1 – 4:**

Subsidiary subjects opted by a batch of 60 students in HET University are given below. 25 students opted physics and 45 students opted geology. Each one of these 60 students opted either one of the subjects given above.



Step1:

Given information:

Each one of the students opted physics or geology means, None = 0  
(None means students who did not opt physics and geology)

25 opted Physics means,  $a + g = 25$  (Refer to the above diagram)

45 opted Geology means,  $b + g = 45$

Therefore,  $(a + g) + (b + g) = 25 + 45 = 70$

$$a + b + 2g = 70 \implies \text{Equation (1)}$$

On the other hand,  $a + b + g + n = 60$  (Total);  $n = 0$  (given)

$$a + b + g = 60 \implies \text{Equation (2)}$$

Compare Equation (1) & (2)

$$a + b + 2g = 70 \quad \text{Equation (1)}$$

$$a + b + g = 60 \quad \text{Equation (2)}$$

From equation (1) & (2)  $\implies g = 10$ ;

$$a + g = 25; \text{ therefore, } a = 15$$

$$b + g = 45; \text{ therefore, } b = 35$$

**Alternatively**,  $25 + 45 = 70$ , take the difference of 70 and 60 (Total). Difference is 10; therefore  $g = 10$  (It's possible only when None = 0)

1) a (15)

2) c (10)

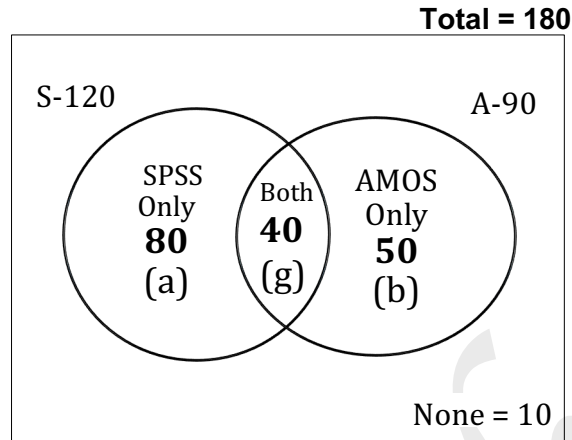
3) d (50)

4) c (35)

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## ANSWERS 5 – 8:

In a training program conducted for a total of 180 research scholars, 120 scholars trained on SPSS and 90 scholars on AMOS software. 10 scholars did not undergo any of these training.



(None means students who did not undergo training on SPSS or AMOS)

Given information:

$$\text{None} = 10$$

$$a + g = 120$$

$$b + g = 90$$

$$\begin{aligned} \text{This case, } g &= [(120 + 90) - \text{Total (180)}] + \text{None (10)} \\ &= [(120 + 90) - 180] + 10 \\ g &= 40 \end{aligned}$$

- 5) d (130)
- 6) c (170)
- 7) a (140)
- 8) d (None of these) (Actual answer is 170)

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## ANSWERS 9 – 12:

Survey among 240 daily commuters about their mode of transport reveals the following information. 150 use Train, 95 use Ferry and 130 use Bus. 45 use Train and Ferry; 65 use Ferry and Bus; 75 use Train and Bus; and 20 use all the three modes of transport.

Step 1:

Given information:

All the three,  $g = 20$

45 use train and ferry mean,  $d + g = 45$ ;  $d = 25$

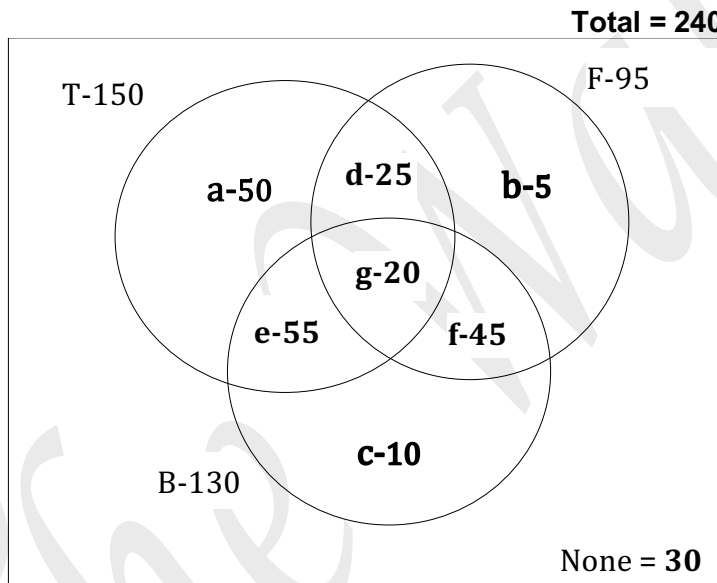
65 use ferry and bus mean,  $f + g = 65$ ;  $f = 45$

75 use train and bus mean,  $e + g = 75$ :  $e = 55$

Using the values of  $d$ ,  $e$ ,  $f$  and  $g$  in each circle, the values of  $a$ ,  $b$  and  $c$  can be calculated.  
(Look at the diagram)

Finally,

$a + b + c + d + e + f + g + n = 240$  (Total), is used to find  $n$  (None).  
 $n = 30$



a - Only Train

b - Only Ferry

c - Only Bus

d - Only Train and Ferry (Exactly Train and Ferry)

e - Only Train and Bus (Exactly Train and Bus)

f - Only Ferry and Bus (Exactly Ferry and Bus)

g - Train, Bus and Ferry (All the three or exact three)

9) b (125)

10) c (30)

11) a (65)

12) c (105)