

Part 1: Multiple Choice. 10 marks

___ / 25 = ___ %

Place the letter of the correct response in the space provided at the right.

1. Given $A = \{1, 3, 6, 8, 9, 12, 15\}$ and $B = \{6, 9, 12\}$, which is TRUE?

1. D

- A) B is the complement of A
- B) $A \cap B = \emptyset$
- C) A and B are disjoint sets
- D) $B \subset A$

2. Which is an example of disjoint sets?

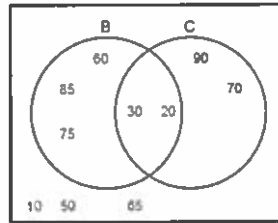
2. C

- A) $A = \{\text{multiples of two}\}$ and $B = \{\text{multiples of three}\}$
- B) $C = \{\text{whole numbers}\}$ and $D = \{\text{rational numbers}\}$
- C) $E = \{\text{even numbers}\}$ and $F = \{\text{odd numbers}\}$
- D) $G = \{\text{multiples of five}\}$ and $H = \{\text{multiples of ten}\}$

3. What is the complement of B union C, $(B \cup C)'$?

3. B

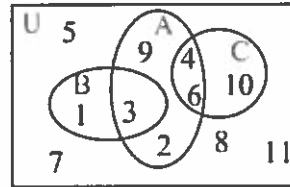
- A) $\{20, 30\}$
- B) $\{10, 50, 65\}$
- C) $\{10, 50, 65, 60, 70, 75, 85, 90\}$
- D) $\{20, 30, 60, 70, 75, 85, 90\}$



4. Which sets are disjoint?

4. D

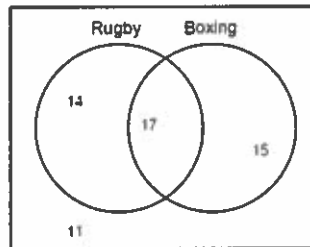
- A) A and B
- B) A and C
- C) A and U
- D) B and C



5. How many elements are in R union B, $n(R \cup B)$?

5. C

- (Note: R = Rugby and B = Boxing)
- A) 11
 - B) 17
 - C) 46
 - D) 57



6. If $A = \{0, 2, 3, 4, 9, 11\}$ and $B = \{2, 3, 6, 8, 9, 10\}$ what is A minus B, $A \setminus B$?

6. B

- A) $\{0, 2, 3, 4, 8, 9, 10, 11\}$
- B) $\{0, 4, 11\}$
- C) $\{2, 3, 9\}$
- D) $\{6, 8, 10\}$

7. The Diagrams below represents a class of children. G is the set of girls and F the set of children who like fencing. Which diagram is the shading that represents boys who like fencing?

7. A

- A) Diagram A
- B) Diagram B
- C) Diagram C
- D) Diagram D

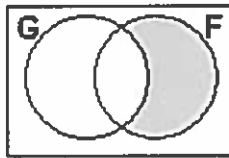


Diagram A

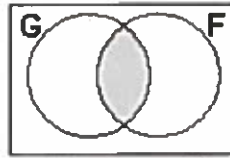


Diagram B

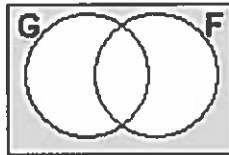


Diagram C

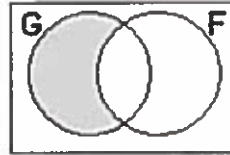


Diagram D

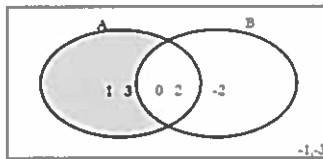
8. There are 25 elements in a universal set. If $n(A) = 14$, $n(B) = 15$ and $n(A \cap B) = 6$, what is the number of elements in A union B, $n(A \cup B)$?

8. C

- A) 2
- B) 19
- C) 23
- D) 29

9. Which of the following represents the shaded area in the Venn diagram below?

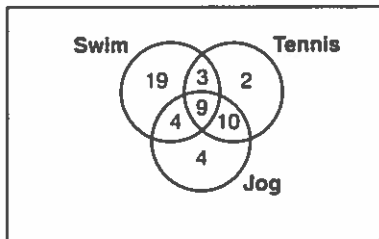
9. D



- A) B'
- B) A
- C) $B \setminus A$
- D) $A \setminus B$

10. What is the value of $n((S \cup T) \setminus V)$ in the following diagram?

10. A



- A) 24
- B) 32
- C) 47
- D) 51

Part 2: Long Answer Questions. 15 marks

Answer the following questions in the space provided.

Show all necessary workings to receive full credit.

1. A surveyed was conducted at Holy Spirit High school where 50 students were randomly chosen and asked whether they liked apples or bananas. Of the 50, 36 students said they like apples, 30 students like bananas and 5 students do not like either apples or bananas.

$A \cap B$

___/3

- a) How many students like both apples and bananas?

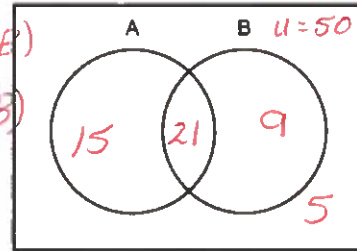
$50 - 5 = 45$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$n(A \cap B) = n(A) + n(B) - n(A \cup B)$$

$$= 36 + 30 - 45$$

$$= 21$$



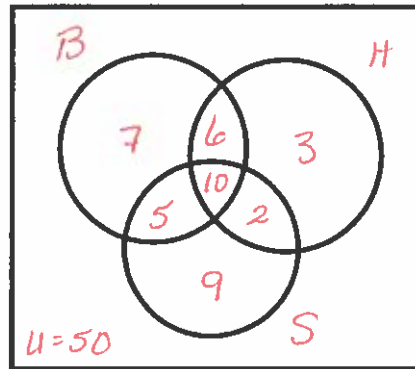
①

- b) How many students like only apples or only bananas?

$n(A \cup B) = 15 + 9 = 24$ ①

2. 50 students at Holy Spirit High were interviewed to determine what sports they played, if any, and the results were as follows:

- 28 play basketball
- 21 play hockey
- 26 play soccer
- 16 play basketball and hockey
- 12 play hockey and soccer
- 15 play basketball and soccer
- 10 play all three sports



②

- a) How many students play none of these sports?

$50 - 42 = 8$ ①

- b) How many students only play basketball?

___/5

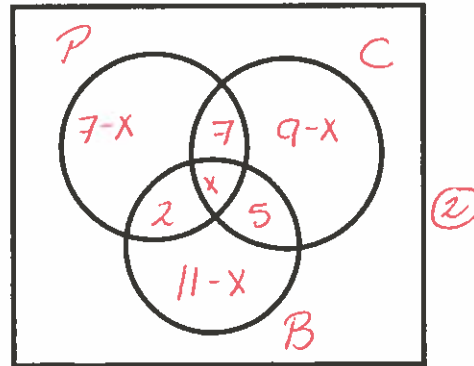
7 ①

- c) How many play hockey and soccer but not basketball?

2 ①

3. All 35 students in Ms. Windsor's math class are taking at least one science course of Physics, Chemistry or Biology.

- 16 take Physics
- 18 take Biology
- 21 take Chemistry
- 7 takes Physics and Chemistry but not Biology
- 5 takes Biology and Chemistry but not Physics
- 2 takes Physics and Biology but not Chemistry



a) How many students take all three subjects?

$$\begin{aligned}
 (11-x) + x + (7-x) + (9-x) + 14 &= 35 \quad \textcircled{1} \\
 41 - 2x &= 35 \\
 41 - 35 &= 2x \\
 6 &= 2x \\
 3 &= x \quad \textcircled{1}
 \end{aligned}$$

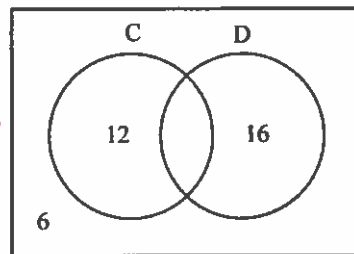
b) How many students are only taking one science course? _ / 5

$$\begin{aligned}
 &(7-x) + (9-x) + (11-x) \\
 &= (7-3) + (9-3) + (11-3) \\
 &= 4 + 6 + 8 \\
 &= 18 \quad \textcircled{1}
 \end{aligned}$$

4. Ms. Sheppard asked her 30 Math 3201 students who owned a pet. 16 students own a dog, 12 students have a cat and 6 students did not have a cat or a dog. Thomas wrote the information in a Venn diagram but made an error. _ / 2

a) Explain where the error occurred. \textcircled{1}

He placed 12 in the space that represents the people who like cats but not dogs. The 12 include those students who like cats but not dogs and those students who like cats and dogs. Similarly for the 16.



b) Redraw the Venn Diagram correctly. \textcircled{1}

$$\begin{aligned}
 30 - 6 &= 24 \\
 16 + 12 &= 28 \\
 \therefore n(C \cap D) &= 4
 \end{aligned}$$

