Q.1: How many elements are there in the complement of set A?

A. 0

B. 1

C. All the elements of A

D. None of these

Answer: A. 0

Explanation: The complement of a set A will contain the elements that are not present in set A.

Q.2: Empty set is a _____.

A. Infinite set

B. Finite set

C. Unknown set

D. Universal set

Answer: B. Finite set

Explanation: The cardinality of the empty set is zero, since it has no elements. Hence, the size of the empty set is zero.

Q.3: The number of elements in the Power set P(S) of the set S = {1, 2, 3} is:

A. 4

B. 8

C. 2

D. None of these

Answer: B. 8

Explanation: Number of elements in the set S = 3

Number of elements in the power set of set S = {1,2,3} = 23

= 8

Q.4: Order of the power set P(A) of a set A of order n is equal to:

A. n

B. 2n

C. 2n

D. n2

Answer: C. 2n

Explanation: The cardinality of the power set is equal to 2n, where n is the number of elements in a given set.

Q.5: Which of the following two sets are equal?

A. $A = \{1, 2\}$ and $B = \{1\}$

B. $A = \{1, 2\}$ and $B = \{1, 2, 3\}$

C. $A = \{1, 2, 3\}$ and $B = \{2, 1, 3\}$

D. $A = \{1, 2, 4\}$ and $B = \{1, 2, 3\}$

Answer: C. $A = \{1, 2, 3\}$ and $B = \{2, 1, 3\}$

Explanation: Two sets are said to be equal if they both have the same elements.

Q.6: Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, P = {1, 2, 5}, Q = {6, 7}. Then $P \cap Q'$ is :

A. P

B. Q

C. Q'

D. None

Answer: A. P

Explanation: Given,

U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

P = {1, 2, 5}

Q = {6, 7}

Q' = {1, 2, 3, 4, 5, 8, 9, 10}

Hence,

$P \cap Q' = \{1, 2, 5\} = P$

Q.7: The cardinality of the power set of {x: $x \in N, x \leq 10$} is _____.

A. 1024

B. 1023

C. 2048

D. 2043

Answer: A. 1024

Explanation: Given,

Set X = {x: $x \in N, x \leq 10$}

X = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

Number of elements of power set of X, P(X) = 210 = 1024

Q.8: Write X = {1, 4, 9, 16, 25,...} in set builder form.

A. X = {x: x is a set of prime numbers}

B. X = {x: x is a set of whole numbers}

C. X = {x: x is a set of natural numbers}

D. X = {x: x is a set of square numbers}

Answer: D. X = {x: x is a set of square numbers}

Explanation: Given,

X = {1, 4, 9, 16, 25,...}

X = {12, 22, 32, 42, 52, ...}

Therefore,

X = {x: x is a set of square numbers}

Q.9: If A, B and C are any three sets, then $A \times (B \cup C)$ is equal to:

A. $(A \times B) \cup (A \times C)$

B. $(A \cup B) \times (A \cup C)$

C. $(A \times B) \cap (A \times C)$

D. None of the above

Answer: A. $(A \times B) \cup (A \times C)$

Explanation: Given,

A, B and C are any three sets.

Now, $A \times (B \cup C) = (A \times B) \cup (A \times C)$

Q.10: The range of the function $f(x) = 3x - 2$, is:

A. $(-\infty, \infty)$

B. $R - \{3\}$

C. $(-\infty, 0)$

D. $(0, -\infty)$

Answer: A. $(-\infty, \infty)$

Hint:

Let the given function be

$y = 3x - 2$

$\Rightarrow y + 2 = 3x$

$\Rightarrow x = (y + 2)/3$

Since, for all values of y, x has different values. Thus, values of x and y can range from $-\infty$ to ∞.

So, Range$\{f(x)\} = R = (-\infty, \infty)$.

11. What is the sum of the digits in the two-digit number?

A. 6

B. 12

C. 18

D. 24

Answer: B. 12

12. If the sum of the digits of a two-digit number is 10, and the difference between the digits is 3, what could be the number?

A. 37 or 73

B. 24 or 42

C. 68 or 86

D. 55 or 55

Answer: A. 37 or 73

13. If the sum of the digits of a two-digit number is 15, and the difference between the digits is 9, what is the number?

A. 69

B. 96

C. 24

D. 51

Answer: B. 96

14. If the sum of the digits of a two-digit number is 8, and the difference between the digits is 4, what are the possible numbers?

A. 26 or 62

B. 35 or 53

C. 47 or 74

D. 59 or 95

Answer: A. 26 or 62

15. If the sum of the digits of a two-digit number is 11, and the difference between the digits is 5, what is the number?

A. 24

B. 86

C. 62

D. 53

Answer: C. 62

16. What is the difference between the digits of a two-digit number if the sum of the digits is 7 and the number is greater than 70?

A. 1

B. 2

C. 3

D. 4

Answer: B. 2

17. If the sum of the digits of a two-digit number is 13, and the difference between the digits is 7, what are the possible numbers?

A. 46 or 64

B. 29 or 92

C. 58 or 85

D. 73 or 37

Answer: A. 46 or 64

18. If the sum of the digits of a two-digit number is 9, and the difference between the digits is 3, what is the number?

A. 63

B. 72

C. 45

D. 54

Answer: B. 72

19. If the sum of the digits of a two-digit number is 14, and the difference between the digits is 8, what is the number?

A. 51

B. 59

C. 86

D. 95

Answer: D. 95

20. What is the sum of the digits of a two-digit number if the difference between the digits is 1 and the number is less than 50?

A. 5

B. 6

C. 7

D. 8

Answer: C. 7

21. If the sum of the digits of a two-digit number is 16, and the difference between the digits is 6, what are the possible numbers?

A. 37 or 73

B. 89 or 98

C. 24 or 42

D. 51 or 15

Answer: B. 89 or 98

23. If the sum of the digits of a two-digit number is 10, and the difference between the digits is 2, what is the number?

A. 28

B. 37

C. 46

D. 55

Answer: A. 28

24. What is the sum of the digits of a two-digit number if the difference between the digits is 4 and the number is greater than 60?

A. 9

B. 8

C. 7

D. 6

25. What is $A \times (B \cup C)$ equivalent to?

A. $(A \times B) \cup (A \times C)$

B. $(A \cup B) \times (A \cup C)$

C. $(A \times B) \cap (A \times C)$

D. None of the above

Answer: A

26. If $A = \{1, 2\}$, $B = \{2, 3\}$, and $C = \{3, 4\}$, what is $A \times (B \cup C)$?

A. $\{(1, 2), (1, 3), (1, 4), (2, 2), (2, 3), (2, 4)\}$

B. $\{(1, 2), (2, 3), (3, 4)\}$

C. $\{(1, 3), (2, 4)\}$

D. $\{(1, 1), (2, 2), (3, 3), (4, 4)\}$

Answer: A

27. What does the Cartesian product $A \times (B \cup C)$ represent in set theory?

A. The intersection of sets A and $B \cup C$

B. The union of sets A and $B \cup C$

C. The set of all possible ordered pairs where the first element is from set A and the second element is from either B or C.

D. The complement of sets A, B, and C

Answer: C

28. If $A = \{a, b\}$ and $B = \{b, c\}$ and $C = \{c, d\}$, what is $A \times (B \cup C)$?

A. $\{(a, b), (a, c), (a, d), (b, b), (b, c), (b, d)\}$

B. $\{(a, b), (b, c), (c, d)\}$

C. $\{(a, c), (b, d)\}$

D. $\{(a, a), (b, b), (c, c), (d, d)\}$

Answer: A

29. Which set operation is equivalent to $A \times (B \cup C)$?

A. $A \times B \cup A \times C$

B. $A \times (B \cap C)$

C. $(A \times B) \cap (A \times C)$

D. $(A \cup B) \times (A \cup C)$

Answer: A

30. If A contains n elements, B contains m elements, and C contains p elements, how many elements will be in the set $A \times (B \cup C)$?

A. $n \times m + n \times p$

B. $n \times (m + p)$

C. $n \times (m + p) \times 2$

D. $n + m + p$

Answer: B

31. What is the cardinality of the set $A \times (B \cup C)$ in terms of the cardinalities of A, B, and C?

A. $|A \times (B \cup C)| = |A| \times |B \cup C|$

B. $|A \times (B \cup C)| = |A| + |B \cup C|$

C. $|A \times (B \cup C)| = |A| \times (|B| + |C|)$

D. $|A \times (B \cup C)| = |A| \times |B| \times |C|$

Answer: C

wer: C

32. If $A = \{1, 2, 3\}$, $B = \{3, 4\}$, and $C = \{4, 5\}$, what is $A \times (B \cup C)$?

A. $\{(1, 3), (1, 4), (1, 5), (2, 3), (2, 4), (2, 5), (3, 3), (3, 4), (3, 5)\}$

B. $\{(1, 4), (2, 3), (3, 5)\}$

C. $\{(1, 3), (2, 4), (3, 5)\}$

D. $\{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5)\}$

Answer: A

33. What is the relationship between $A \times (B \cup C)$ and $(A \times B) \cup (A \times C)$?

A. They are equal.

B. They are disjoint sets.

C. $A \times (B \cup C)$ is a subset of $(A \times B) \cup (A \times C)$.

D. $(A \times B) \cup (A \times C)$ is a subset of $A \times (B \cup C)$.

Answer: A

34. If A contains no elements ($A = \emptyset$), what is $A \times (B \cup C)$?

A. $\emptyset$

B. $A \times B \cup A \times C$

C. $B \cup C$

D. $A \times (B \cup C)$

Answer: A

35. Given sets $A = \{p, q, r\}$, $B = \{r, s\}$, and $C = \{s, t\}$, what is $A \times (B \cup C)$?

A. $\{(p, r), (p, s), (p, t), (q, r), (q, s), (q, t), (r, r), (r, s), (r, t)\}$

B. $\{(p, r), (q, s), (r, t)\}$

C. $\{(p, s), (q, t)\}$

D. $\{(p, p), (q, q), (r, r), (s, s), (t, t)\}$

Answer: A

Answer: A

36. What is the set operation that represents the set of all possible ordered pairs where the first element is from set A and the second element is from either B or C?

A. $A \times (B \cup C)$

B. $(A \times B) \cup (A \times C)$

C. $(A \cup B) \times (A \cup C)$

D. $A \times (B \cap C)$

Answer: A

Mathematics Education:

37. If A represents the set of math textbooks, B represents the set of science textbooks, and C represents the set of literature textbooks in a library, what does A × (B ∪ C) represent?

A. Math and science textbooks

B. Math textbooks borrowed with either science or literature textbooks

C. The intersection of math textbooks and science or literature textbooks

D. None of the above

Answer: B

Market Analysis:

38. In market analysis, A represents the set of customers interested in product A, B represents the set of customers interested in product B, and C represents the set of customers interested in product C. What does $A \times (B \cup C)$ represent in this context?

A. Customers interested in product A or B

B. Customers who have purchased both product A and either product B or C

C. Customers who have purchased product A, and some of them may have purchased either product B or C

D. None of the above

Answer: B

E-commerce:

39. Suppose A represents a set of online shoppers, B represents a set of shoppers who prefer credit card payments, and C represents a set of shoppers who prefer PayPal. What does $A \times (B \cup C)$ represent in the context of an e-commerce platform?

A. Online shoppers who prefer credit card or PayPal payments

B. Online shoppers who have made a purchase using either a credit card or PayPal

C. Online shoppers who have made a purchase using a credit card, and some may have used PayPal

D. None of the above

Answer: B

Answer: B

Academic Courses:

40. In a university's course offerings, if A represents the set of mathematics courses, B represents the set of computer science courses, and C represents the set of elective courses, what does $A \times (B \cup C)$ represent?

A. Math and computer science courses

B. Math courses combined with either computer science or elective courses

C. The intersection of math courses and computer science or elective courses

D. None of the above

Answer: B