CBSE Class 10 Mathematics Basic Solution 2024 (Set 3- 430/1/3)

Section - A

1. If $\sin\theta = 1/3$ then $\sec\theta$ is equal to:

(a) $2\sqrt{2}/3$
(b) $3/2\sqrt{2}$
(c) 3
(d) $1/\sqrt{3}$

Ans. (b)
Explanation: Given $\sin\theta = 1/3$

$\sin^2\theta + \cos^2\theta = 1$
$\cos^2\theta = 1 - (1/3)^2$
$\cos\theta = 2\sqrt{2}/3$

$\sec\theta = 1/\cos\theta$
$= 1/(2\sqrt{2}/3)$

$\sec\theta = 3/2\sqrt{2}$

2. If the roots of quadratic equation $4x^2 - 5x + k = 0$ are real and equal, then value of k is:

(a) $5/4$
(b) $25/16$
(c) $- 5/4$
(d) $- 25/16$

Ans. (b)

Explanation: $4x^2 - 5x + k = 0$

For equal and real roots, $D = 0$

$D = b^2 - 4ac$

$D = (5)^2 - 4(4)(k) = 0$

$K = 25/16$

3. If a certain variable x divides a statistical data arranged in order into two equal parts, then the value of x is called the:

(a) mean
(b) median
(c) mode
(d) range

Ans. (b)

Explanation: A median is the value of the observation which divides the data into two equal parts, when the data is arranged in ascending (or descending) order.

4. The curved surface area of a right circular cone of radius 7 cm is 550 sq cm. The slant height of the cone is:

(a) 24 cm
(b) 25 cm
(c) 22 cm
(d) 20 cm

Ans. (b)

Explanation: radius of the cone (r) = 7 cm

Curved surface area (CSA) = 550 cm^2

CSA = πrl

Slant height (l) = CSA/ πr

= 550 / (22/7)(7)

l = 25 cm

5. The distance between the points (2, -3) and (-2, 3) is:

(a) 2√13 units
(b) 5 units
(c) 13√2 units
(d) 10 units

Ans. (a)

Explanation: the distance formula (d) = $\sqrt{(x2 - x1)^2 + (y2 - y1)^2}$

Here, (x1,y1) = (2, -3) and (x2,y2) = (-2,3)

d = $\sqrt{(-2 - 2)^2 + (3 - (3))^2}$

d = $\sqrt{(-4)^2 + (6)^2}$

d = √52

d = 2√13 units

6. The mid-point of the line segment joining the points (-1, 3) and (8, 3/2)

(a) (7/2, - 3/4)
(b) (7/2, 9/2)
(c) (9/2, - 3/4)
(d) (7/2, 9/4)

Ans. (d)

Explanation: mid-point formula (M) = ((x1+x2)/2, (y1+y2)/2)

Given points - (-1,3) and (8,3/2)

M = ((-1+8)/2, (3+3/2)/2)

M = (7/2, 9/4)

7. The mean and median of a statistical data are 21 and 23 respectively. The mode of the data is:

(a) 27
(b) 22
(c) 17
(d) 23

Ans. (a)
Explanation: Mode = 3 Median - 2 Mean
Median = 23 and Mean = 21

Mode = 3*23 - 2*21
Mode = 69 - 42
Mode = 27

8. The value of k for which the pair of linear equations 5x + 2y - 7 = 0 and 2x + ky + 1 = 0 don't have a solution, is:

(a) 5
(b) 4/5
(c) 5/4
(d) 5/2

Ans. (b)
Explanation: Slope of 1st equation (m1):
y = (-5/2)x + 7/2
m1 = -5/2

Slope of 2nd equation(m2):
y = (-2/k)x - 1/k

m2 = -2/k
For the lines to be parallel m1 = m2
-5/2 = -2/k
k = 4/5

9. If HCF (96, 404) = 4 then LCM (96, 404) is:

(a) 9600
(b) 96 * 404
(c) 404
(d) 9696

Ans. (d)
Explanation: Given HCF(96, 404) = 4
Formula : LCM(a,b) * HCF(a,b) = a * b

LCM(96,404) *4 = 96 * 404
LCM(96,404) = 9696

10. The height and radius of a right circular cone are 24 cm and 7 cm respectively. The slant height of the cone is:

(a) 24 cm
(b) 31 cm
(c) 26 cm
(d) 25 cm

Ans. (d)
Explanation: Given radius (r) = 7cm and height (h) = 24 cm
Slant height (l) = $\sqrt{r^2 + l^2}$
l = $\sqrt{7^2 + 24^2}$
l = 25cm

11. For what value of θ, $\sin^2 θ + \sin θ + \cos^2 θ$ is equal to 2?

(a) 45°
(b) 0°
(c) 90°
(d) 30°

Ans. (c)
Explanation : $\sin^2 θ + \cos^2 θ = 1$
Applying this,
$1 + \sin θ = 2$
$\sin θ = 1$
$θ = 90°$

12. In an A.P., if a = 8 and a_{10} = - 19 then value of d is:

(a) 3
(b) 11/9
(c) - 27/10
(d) -3

Ans. (d)
Explanation: $a_n = a + (n-1)d$
$a_{10} = a + 9d$
$-19 = 8 + 9d$
$9d = -27$
$d = -3$

13. Which of the following cannot be the probability of an event?

(a) 52%
(b) (1/3)%

(c) 0.99
(d) 1/0.99

Ans. (d)
Explanation: All values are less than 1 other than 1/0.99
Therefore, the probability that cannot be an event is 1/0.99

14. The diameter of a circle is of length 6 cm. If one end of the diameter is (-4, 0), the other end on x-axis is at:

(a) (0,2)
(b) (6,0)
(c) (2,0)
(d) (4,0)

Ans. (c)
Explanation: Given length of diameter (l) = 6 cm
One end point : (-4,0)

The other end point is on x axis so the coordinates will be (x1,0)

$l = \sqrt{(x1+(-4))^2 + (0 + 0)^2} = 6$
-x1 - 4 = -6
x1 = 2

15. Two dice are rolled together. The probability of getting at least one 6 is:

(a) 1/3
(b) 11/36
(c) 1/6
(d) 10/36

Ans.(b)

Explanation: If two dice are thrown, the total number of sample space = 6^2
= 36
The probability of getting at least 6 = 1 - the probability of not getting 6

The probability of getting 6 = 1/6

Therefore, the probability of not getting 6 on dice 1 = 5/6

The probability of not getting 6 on dice 2 = 5/6

The digit 6 will not show in both the dice = (5/6)(5/6) = 25/36

Hence, The probability of getting at least 6 = 1 - the probability of not getting 6
= 1 - (25/36)
= 11/36

16. A card is drawn from a well shuffled deck of 52 playing cards. The probability that drawn card is a red queen is:

(a) 1/13
(b) 2/13
(c) 1/52
(d) 1/26

Ans. (d)
Explanation: There are 52 cards so total number of possible outcomes = 52
There are red Queens so P(red Queen) = 2/52 = 1/26

Section - B

17. A bag contains 4 red, 5 white and some yellow balls. If probability of drawing a red ball at random is 1/5, then find the probability of drawing a yellow ball at random.

Ans. Let T be the total balls
T = red balls + white balls + yellow balls
T = 4 + 5 + y = 9 + y

P(Red) = 1/5 = (number of red balls) / T

1/5 = 4/T
T = 20
y = 20 - 9 = 11

P(Yellow) = 11/20

18. Show that 11 * 19 * 23 + 3 * 11 is not a prime number.

Ans. Taking 11 as a common factor
= 11(19 * 23 + 3)
Since 11 is a positive integer and (19*23+3) also a large positive integer which shows that this expression has factors other than 1 and itself. So, this expression is not a prime number.

19. If sin A = 1/2 and cos B = 1/(sqrt(2)), then find the value of sin A * sin B + cos A * cos B.

Ans. $\sin^2 A + \cos^2 A = 1$
$1/2 + \cos^2 A = 1$
$\cos A = \pm\sqrt{3}/2$

Similarly, $\sin B = \pm\sqrt{1/2}$

sin A * sin B + cos A * cos B = $1/2 * 1/\sqrt{2} + \sqrt{3}/2 * 1/\sqrt{2}$
= $(1 \pm\sqrt{3})/2\sqrt{2}$

Section - C

20. A juice glass is cylindrical in shape with hemi-spherical raised up portion at the bottom. The inner diameter of glass is 10 cm and its height is 14 cm. Find the capacity of the glass. (use π = 3.14)

Ans. base radius of cylinder = the base radius of hemisphere, r = 10/2 = 5 cm
Now,
The apparent capacity of the glass = Volume of the cylinder = π * r ^ 2 * h
= 3.14 * 5 * 5 * 14
= 1099 cm^3
Also,
The actual capacity of the glass = Volume of cylinder Volume of hemisphere = 1099 - 2/3 * π * r ^ 3
= 1099 - 2/3 * 3.14 * 5 * 5 * 5 = 837.333

Capacity of the glass is 837.33 cm^3

21. Two alarm clocks ring their alarms at regular intervals of 20 minutes and 25 minutes respectively. If they first beep together at 12 noon, at what time will they beep again together next time?

Ans. They will ring together after,
LCM of 20 and 25 mins
LCM = 100 mins
They will beep together at 1:20.

22. The greater of two supplementary angles exceeds the smaller by 18°. Find measures of these two angles.

Ans. Let the angles be x and y

So $x + y = 180^0$

$x = y + 18$

$= y + 18 + y = 180$
$y = 81^0$
$x = 99^0$

Section - D

23. In an A.P. of 50 terms, the sum of first 10 terms is 250 and the sum of its last 15 terms is 2625. Find the AP so formed.

Ans. Sum of first n terms is given by
$S_n = n[2a + (n-1)d]/2$

Putting n = 10,
$S_{10} = 5[2a + 9d] = 250$
$2a + 9d = 50$ —-- (1)

Sum of last 15 terms is 2625
 Sum of the first 50 terms - sum of the first 35 terms = 2625
$S_{50} - S_{35} = 2625$
$5(2a + 49d) - 7/2 (2a + 34d) = 525$
$10a + 245d - 7a + 119d = 525$
$3a + 126d = 525$ —--- (2)

Solving (1) and (2) we get
a = 8 and d = 4