

TS EAMCET 2025 Mathematics Chapter-Wise Questions with Solutions PDF

Algebra

Q 1. If $A = \{1, 2, 3, 4, 5, 6\}$, then the number of subsets of A which contain at least two elements is:

- a) 64
- b) 63
- c) 57
- d) 58

Solution:

Total number of subsets of A is $2^n(A) = 2^6 = 64$

Number of subsets of A which contain at least two elements is

$$64 - ({}^6C_0 + {}^6C_1)$$

$$= 64 - (1 + 6)$$

$$= 57$$

Q 2. As per the principle of mathematical induction, for all $n \in \mathbb{N}$, the expression $3^{2n+2} - 8n - 9$ is divisible by:

- a) 9
- b) 8
- c) 7
- d) 5

Solution:

We can write,

$P(n) : 3^{2n+2} - 8n - 9$ is divisible by 8

We note that

$P(1) : 3^{2 \cdot 1 + 2} - 8 \cdot 1 - 9 = 3^4 - 8 - 9 = 81 - 17 = 64$, which is divisible by 8.

Thus $P(n)$ is true for $n = 1$

Let $P(k)$ be true for some natural number k .

i.e., $P(k) : 3^{2k+2} - 8k - 9$ is divisible by 8

We can write

$$3^{2k+2} - 8k - 9 = 8a \dots (1)$$

where $a \in \mathbb{N}$

Now, we will prove that $P(k+1)$ is true whenever $P(k)$ is true.

Now,

$$3^{2(k+1)+2} - 8(k+1) - 9$$

$$= 3^{2k+4} - 8k - 8 - 9$$

$$= 3^2 \cdot 3^{2k+2} - 8k - 17$$

$$= 3^2 (3^{2k+2} - 8k - 9 + 8k + 9) - 8k - 17 \text{ (added and subtracted } 8k \text{ and } 9)$$

$$= 3^2 (3^{2k+2} - 8k - 9) + 3^2 (8k + 9) - 8k - 17$$

$$= 3^2 \cdot 8a + 72k + 81 - 8k - 17 \dots \text{ [from (1)]}$$

$$= 9 \cdot 8a + 64k + 64$$

$$= 8(9a + 8k + 8)$$

From the last line, we see that
 $8(9a + 8k + 8)$ is divisible by 8.

Q 3. If $(24, 92) = 24m + 92n$, then (m, n) is

a) $(-4, 3)$

b) **$(4, -3)$**

c) $(4, -1)$

d) $(-1, 4)$

Solution:

$$\text{Since, } 92 = 3 \cdot 24 + 20$$

$$24 = 1 \cdot 20 + 4$$

$$20 = 4 \cdot 5 + 0$$

$$\therefore (24, 92) = 4$$

$$= 24 - 1 \cdot 20$$

$$= 24 - 1 \cdot (92 - 3 \cdot 24)$$

$$= 24 - 92 + 3 \cdot 24$$

$$= 4 \cdot 24 - 92 \dots (i)$$

$$\text{But } (24, 92) = 24m + 92n \dots (ii)$$

$\therefore$ From Eqs. (i) and (ii), we get

$$m = 4 \text{ and } n = -1$$

$$\therefore (m, n) = (4, -1)$$

Trigonometric Functions

Q 1. Find the values of the trigonometric functions in $\sin 765^\circ$.

a) **$1/\sqrt{2}$**

b) $1/\sqrt{6}$

c) $1/\sqrt{4}$

d) $1/\sqrt{3}$

Solution:

We know that the value of $\sin x$ repeats after an interval of 2π or 360° .

$$\sin (765^\circ) = \sin (2 \times 360^\circ + 45^\circ)$$

$$= \sin 45^\circ$$

$$= 1/\sqrt{2}$$

Q 2. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?

- a) In one second, the wheel will rotate an angle of 8π radians
- b) In one second, the wheel will turn an angle of 6π radians
- c) In one second, the wheel will spin an angle of 10π radians
- d) **In one second, the wheel will turn an angle of 12π radians**

Solution:

Given that a wheel makes 360 revolutions in one minute

Then, the number of revolutions in one second = $360/60 = 6$.

In 1 complete revolution the wheel turns $360^\circ = 2\pi$ radian.

So, In 6 revolutions, the wheel will turn $6 \times 2\pi$ radian = 12π radian.

Hence, in one second the wheel will turn an angle of 12π radian.

Q 3. Find the values of the trigonometric functions in $\cot(-15\pi/4)$.

- a) 2
- b) 1
- c) 5
- d) 7

Solution:

$A(-15\pi/4) = \cot(2 \times 2\pi - 15\pi/4) = \cot(16\pi - 15\pi/4) \cot = \cot \pi/4 = 1.$

Probability

Q 1. What is the probability of rolling a sum of 7 with two fair six-sided dice?

- a) **$1/6$**
- b) $1/12$
- c) $1/8$
- d) $1/36$

Solution:

Let A = sum of numbers is 7 = $\{(1, 6)(2, 5)(3, 4)(4, 3)(5, 2)(6, 1)\}$

$n(A) = 6$

$P(\text{Sum of numbers is 7}) = n(A) / n(S)$

$= 6/36 = 1/6$

Therefore, the probability of rolling two dice and getting a sum of 7 is $1/6$.

Q 2. In a deck of 52 playing cards, what is the probability of drawing a heart or a king?

- a) $13/52$

b) $17/52$

c) **$16/52$**

d) $14/52$

Solution:

Let A be the event of taking a heart.

Then $P(A) = 13/52$

Let B be the event of taking a queen card

Then $P(B) = 4/52$

No. of queen heart = 1 $\Rightarrow P(A \cap B) = 1/52$.

So, probability of taking heart or queen

$= P(A \cup B) = P(A) + P(B) - P(A \cap B) = 13/52 + 4/52 - 1/52$

$= 16/52$ or $4/13$.

Q 3. If you have 5 red balls and 3 blue balls in a bag, what is the probability of randomly drawing a red ball?

a) $3/8$

b) **$5/8$**

c) $1/2$

d) $3/5$

Solutions:

Correct option is A. 58

Total no. of balls is $5+3=8$

No. of red balls is 5

The probability is $5/8$

The Straight Lines

Q 1. Find the slope of the line passing through the points (2, 3) and (4, 7).

a) **2**

b) 3

c) 4

d) 5

Solution:

Given points are = A(4, 7) B(2, 3)

The slope = change in y coordinates/change in x coordinates

The formula to find the slope of the line is $m = (y_2 - y_1) / (x_2 - x_1)$

Substituting the given points

$$m = (3 - 7) / (2 - 4)$$

$$m = -4 / -2$$

$$m = 2$$

Q 2. What is the equation of the line that has a slope of -3 and passes through the point (1, 2)?

a) $y = -3x + 5$

b) **$y = -3x - 1$**

c) $y = -3x + 7$

d) $y = -3x - 4$

Solution:

The slope of line is 3

The point it passes through is (1,2)

The equation of line is $y - 2 = 3(x - 1)$

$$y - 2 = 3x - 3$$

$$3x - y - 1 = 0$$

$$y = -3x - 1$$

Q 3. If a line is perpendicular to the line with the equation $2x - 3y + 6 = 0$, what is the slope of the perpendicular line?

a) $3/2$

b) $-2/3$

c) $2/3$

d) **$-3/2$**

Solution:

$$y = 2/3x - 2$$

Using the slope-intercept form, the slope is $2/3$.

$$m = 2/3$$

The equation of a perpendicular line must have a slope that is the negative reciprocal of the original slope.

$$M^{\text{perpendicular}} = -1 / (2/3)$$

Simplify the result.

$$M^{\text{perpendicular}} = -3 / 2$$