

SECTION-A

1. The probability that a number selected at random from the number 1,2,3,.....15. is a multiple of 4 is

- (A)  $\frac{4}{15}$       (B)  $\frac{2}{15}$       (C)  $\frac{1}{5}$       (D)  $\frac{1}{3}$

Ans:  $\frac{1}{5}$

2. The angle of depression of car parked on the road from the top of a 150m high tower is  $30^\circ$ . The distance of the car from the tower in m meter is

- (A)  $50\sqrt{3}$       (B)  $150\sqrt{3}$       (C)  $50\sqrt{2}$       (D) 75

Ans: (B)  $150\sqrt{3}$

3. Two circle touches externally at P. AB is common tangent to the circle touching them at A and B. The value of  $\angle APB$  is

- (A)  $30^\circ$       (B)  $45^\circ$       (C)  $60^\circ$       (D)  $90^\circ$

Ans: (D)  $90^\circ$

4. If  $k, 2k - 1$  and  $2k + 1$  are three consecutive term of AP then value of k is

- (A) 2      (B) 3      (C) -3      (D) 5

Ans: (B) 3

5. A chord of a circle of radius 10 cm subtends a right angle at its centre. The length of chord is

- (A)  $5\sqrt{2}$       (B)  $10\sqrt{2}$       (C)  $5/\sqrt{2}$       (D)  $10\sqrt{3}$

Ans: (B)  $10\sqrt{2}$

6. ABCD is a rectangle whose three vertices are B(4,0), C(4,3) and D(0,3). The length of one of its diagonal is

- (A) 5      (B) 4      (C) 3      (D) 25

Ans: (D) 25

7. In a right triangle ABC, right angled at B,  $BC = 12\text{cm}$  and  $AB = 5\text{cm}$ . The radius of circle inscribe in the triangle (in cm) is

- (A) 4      (B) 3      (C) 2      (D) 1



Ans: (C) 2

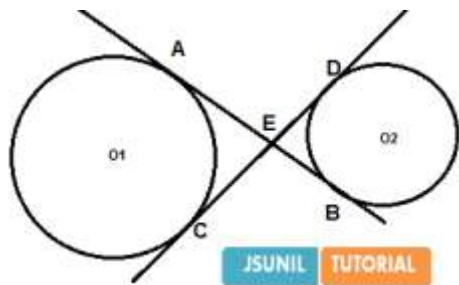
8. In a family of 3 children, the probability of having at least one boy is

- (A)  $\frac{7}{8}$       (B)  $\frac{1}{8}$       (C)  $\frac{5}{8}$       (D)  $\frac{3}{4}$

Ans: (A) 7/8

### SECTION-B

9. In fig-01, common tangent AB and CD to the circles with centers O<sub>1</sub> and O<sub>2</sub> intersect at E. Prove that AB=CD



Solution:

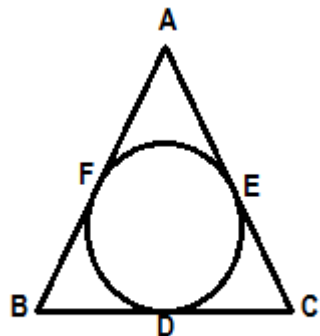
$$AE = CE \text{ [tangent from E]} \text{ and } CE = ED \text{ [tangent from E]}$$

$$\text{Adding them we get } AE + CE = CE + ED$$

$$AB = CD$$

10. The incircle of an isosceles triangle ABC, in which AB=AC, touches side BC, CA and AB at D, E and F respectively. Prove that BD = CD

Solution:



$$AB = AC$$

$$BF + AF = AE + CE \text{ -----(i)}$$

$$BF = BD \text{ and } CE = CD \text{ [tangent from B and C]} \text{ -----(ii)}$$

using (i) and (ii)

$$BD + AE = AE + CD$$

$$BD = CD$$

11. Two different dice are tossed together. Find the probability

(i) that the number on each side is even

(ii) The sum of the number appear on two dice is 5

Solution:

(i) Total favorable outcomes are 22,42,62,24,44,64,26,46,66 = 9

Number of all possible outcomes = 36

$$P[E] = 9/36 = \frac{1}{4}$$

(ii) Total favorable outcomes are 41,32,23,14 = 4

Number of all possible outcomes = 36

$$P[E] = 4/36 = \frac{1}{9}$$

12. The total surface area of a solid hemisphere is  $462\text{cm}^2$ , find the volume?

Ans: Total surface area of solid hemisphere =  $3\pi r^2$

$$462 = 3 \times \frac{22}{7} \times r^2$$

$$r = 7\text{cm}$$

$$\text{Volume of solid hemisphere} = \frac{2}{3} \times \pi r^3 = \frac{2}{3} \times \left(\frac{22}{7}\right) \times 7 \times 7 \times 7 = \frac{2156}{3} = 718.66\text{cm}^3$$

13. Find the number of natural number between 101 and 999 which are by both 2 and 5.

Solution:

$$a_1 = 110 \quad \text{and} \quad d = 10 \quad a_n = 990$$

$$a_n = a + (n-1)d$$

$$990 = 110 + (n-1)10$$

$$(990 - 110) / 10 = n - 1$$

$$88 + 1 = n$$

$$n = 99$$

Hence, there are 9 natural number between 101 and 199 which are by both 2 and 5.

14. Find the value of k for which the quadratic equation  $9x^2 - 3kx + k$  has equal roots.

Solution:

For equal root:  $D = 0$

$$b^2 - 4ac = 0 \Rightarrow (-3k)^2 - 4 \times 9 \times k = 0 \Rightarrow 9k^2 = 36k$$

$$k = 4 \quad \text{Hence, Value of } k \text{ for which the quadratic equation } 9x^2 - 3kx + k \text{ has equal root} = 4$$

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