This Question Paper contains 4 Printed Pages.

16E(A)

MATHEMATICS, Paper - II

(English version)

(Parts A and B)

Time : 2 hrs. 45 min.] ***[Maximum Marks : 40***

Instructions :

1. *Read all questions. 15 minutes of time is allotted exclusively for reading the Question Paper and 2.30 hours for writing the answers.*
2. ***Part - A** answers should be written in separate answer book.*
3. *There are **three** sections in **Part-A**.*
4. *Answer **all** questions.*
5. *Every answer should be written visibly and clearly.*
6. *There is internal choice in section - III.*

Part - A

Time : 2 hours ***Marks : 30***

SECTION - I

(Marks : 4×1=4)

Note : *(i) Answer **all** the questions.*

(ii) Each question carries 1 mark.

1. In ΔABC, LM // BC and $\frac{AL}{LB} = \frac{2}{3}$, AM = 5 cm, find AC.

2. Evalute $\sin 15^\circ \cdot \sec 75^\circ$.

3. A box contains 3 blue and 4 red balls. What is the probability that the ball taken out randomly will be red ?

4. The mean for a grouped data is calculated by $\bar{x} = a + \frac{\Sigma f_i d_i}{\Sigma f_i}$.

What do the terms 'f_i' and 'd_i' represent in the above formula ?

SECTION - II

(Marks : 5×2=10)

Note : *(i)* ***Answer all*** *questions.*

(ii) *Each question carries 2 mark*

5. If the distance between two points (x, 1) and (–1, 5) is '5', find the value of 'x'.

6. Find the length of the tangent from a point 13 cm away from the centre of the circle of radius 5 cm.

7. If $\cos A = \frac{7}{25}$, then find sin A and cosec A.

What do you observe ?

8. Rehman observed the top of a temple at an angle of elevation of 30°, when the observation point is 24 m. away from the foot of the temple. Find the height of the temple.

9. Write mid-values of the following frequency distribution.

Class interval	8-11	12-15	16-19	20-23	24-27	28-31	32-35
Frequency	4	4	5	13	20	14	8

SECTION - III

(Marks : 4×4=16)

Note : *(i) Answer* ***all*** *the questions.*

(ii) Choose any ***one*** *from each question.*

(iii) Each question carries ***4*** *marks.*

10. *(a)* Prove that $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.

OR

(b) ABC is a right angled triangle, right angled at C. Let BC= a, CA = b, AB = c and let p be the length of perpendicular from C on AB.

Prove that *(i)* $pc = ab$ and *(ii)* $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

11. *(a)* Find the median of the following data.

Class interval	11-15	16-20	21-25	26-30	31-35	36-40
Frequency	3	5	9	12	7	4

OR

(b) In what ratio, does the point (– 4, 6) divide the line segment joining the points A(– 6, 10) and B(3, – 8) ?

12. *(a)* Two dice are thrown at the same time. What is the probability that the sum of two numbers appearing on the top of the dice is *(a)* 10, *(b)* less than or equal to 12, *(c)* a prime number, *(d)* multiple of '3' ?

OR

(b) A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground by making 30° angle with the ground. The distance between the foot of the tree and the top of the tree on the ground is 6 m. Find the height of the tree before falling down.

13. *(a)* Construct a triangle PQR, where QR = 5.5 cm, $\angle Q = 65^\circ$ and PQ = 6 cm. Then draw another triangle, whose sides are $\frac{2}{3}$ times of the corresponding sides of ΔPQR.

OR

(b) Draw a circle of radius 4 cm and draw a pair of tangents to the circle, which are intersecting each other 10 cm away from the centre.

This Question Paper contains 4 Printed Pages.

16E(B)

MATHEMATICS, Paper - II

(English version)

(Parts A and B)

Time : 2 hrs. 45 min.] ***[Maximum Marks : 40***

Instruction : *Write the answers to the questions in this* ***Part-B*** *on the Question paper itself and attach it to the answer book of* ***Part-A.***

Part B

Time : 30 minutes ***Marks : 10***

SECTION - IV *(Marks : 20 × ½ = 10)*

Note :

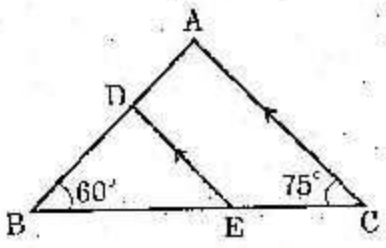
(i) *Answer* ***all*** *the questions.*

(ii) *Each question carries* $\frac{1}{2}$ *mark.*

(iii) *Marks will* ***not*** *be awarded in any case of over-written, rewritten or erased answers.*

(iv) *Each question has four options. Write the CAPITAL LETTERS (A, B, C, D) showing the correct answer for the following questions in the brackets provided against them.*

14. In the figure, ∠BDE = ... [ ]



(A) 45°

(B) 65°

(C) 75°

(D) 60°

15. $\cos 60° + \sin 30°$ value is .... [ ]

(A) $\sqrt{3}/2$ (B) 1

(C) $\cos 90°$ (D) B and C

16. X-coordinate of intersecting point of two ogives, represents .... [ ]

(A) Mean (B) Median

(C) Range (D) Mode

17. Centroid of a triangle, whose vertices are $(-a, 0)$, $(0, b)$ and $(a, 0)$ is ... [ ]

(A) (a, b) (B) $\left(a/3, 0\right)$

(C) $\left(0, b/3\right)$ (D) $\left(a/3, b/3\right)$

18. The formula to find the area of a triangle is ..... [ ]

(A) $\Delta = \frac{1}{2}bh$ (B) $\Delta = \sqrt{(s-a)(s-b)(s-c)}$

(C) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$ (D) A and C

19. The theorem applied to divide the line segment in the given ratio is .... [ ]

(A) Pythagorus theorem (B) Thales theorem

(C) Euclid's theorem (D) Brahmagupta theorem

20. The number of tangents drawn at the end points of the diameter is .... [ ]

(A) 1 (B) 2

(C) 3 (D) Infinite

21. If $\sec A + \tan A = 1/5$, then $\sec A - \tan A$ = ... [ ]

(A) 5 (B) $1/5$

(C) $4/5$ (D) $2/5$

22. The length of shadow of a pole is equal to the length of the pole, then the angle of the elevation of the Sun is .... [ ]

(A) 15° (B) 30°

(C) 45° (D) 60°

23. Angle in a semi-circle is .... [ ]

(A) 60° (B) 90°

(C) 180° (D) 270°

24. The probability that the sum of two numbers appearing on the top of the dice is 13, when two dice are rolled at the same time is ..... [ ]

(A) –1 (B) 1

(C) 0 (D) 2

25. If P(E) = 0.05, then P(~E) = ... [ ]

(A) 0.5 (B) 0.95

(C) 9.5 (D) 0.095

26. The mode of the data 5, 6, 9, 10, 6, 11, 4, 6, 10, 4 is .... [ ]

(A) 4 (B) 5

(C) 6 (D) 10

27. Reciprocal of $\tan\theta$ is ... [ ]

(A) $\sec\theta$ (B) $\cot\theta$

(C) $\operatorname{cosec}\theta$ (D) $-\tan\theta$

28. $(\sec^2\theta - 1)(\operatorname{cosec}^2\theta - 1) =$ .... [ ]

(A) 0 (B) 1

(C) $\tan^2\theta$ (D) $\cot^2\theta$

29. The centre of the circle is (2, 1) and one end of the diameter is (3, – 4). Another end of the diameter is ..... [ ]

(A) (1, 6) (B) (–1, – 6)

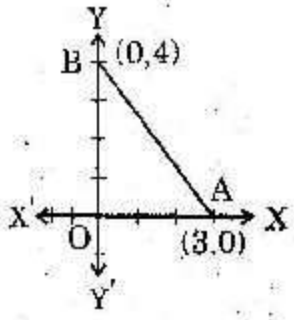
(C) (1, – 6) (D) (–1, 6)

30. The letter that represents $\frac{x_i - a}{h}$, which is used in measuring mean is .... [ ]

(A) d_i (B) f_i

(C) u_i $\bar{x}$

31. In the given figure, area of ΔOAB is ..... [ ]



(A) 12 sq.u. (B) 6 sq.u.

(C) 24 sq.u. (D) 18 sq.u.

32. Which of the following be the probability of an event ? [ ]

(A) – 1.5 (B) 2.4

(C) 0.7 (D) 115%

33. $\sin(90 - A) = \frac{1}{2}$, then A = ... [ ]

(A) 30° (B) 45°

(C) 60° (D) 90°

Andhra Pradesh SSC Class 10th Maths Question Paper 2 With Solution 2019

QUESTION PAPER CODE 16E(A)

SECTION - I

(4 * 1 = 4)

Question 1: In △ABC, LM || BC and [AL / LB] = [2 / 3], AM = 5cm, find AC.

Solution:

AL / LB = AM / MC

2 / 3 = 5 / MC

MC = 15 / 2

= 7.5 cm

AC = AM + MC

= 5 + 7.5

= 12.5 cm

Question 2: Evaluate $\sin 15^o * \sec 75^o$.

Solution:

$\sin 15^o * \sec 75^o$

$= \sin 15^o * \sec (90^o - 15^o)$

$= \sin 15^o * \text{cosec } 15^o$

$= \sin 15^o * (1 / \sin 15^o)$

$= 1$

Question 3: A box contains 3 blue and 4 red balls. What is the probability that the ball taken out randomly will be red?

Solution:

Total number of balls = 3 + 4 + 7 = 14
Total number of possible outcomes = 7
Favourable outcomes that the ball will be a red ball = 4
Probability for the ball drawn to be red = 4 / 7

Question 4: The mean of a grouped data is calculated by $\underline{x} = a + \Sigma fd / \Sigma f$. What do the terms 'f' and 'd' represent in the above formula?

Solution:

$$\underline{x} = a + \Sigma fd / \Sigma f$$

f = frequency of the class
d = deviation = x_i - a

SECTION - II

(5 * 2 = 10)

Question 5: If the distance between 2 points (x, 1) and (-1, 5) is 5. Find the value of x.

Solution:

Distance between 2 points = $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
Distance between (x, 1) and (-1, 5) = 5
$\sqrt{(x - [-1])^2 + (1 - 5)^2} = 5$
$\sqrt{(x + 1)^2 + (-4)^2} = 5$
$x^2 + 1 + 2x + 16 = 25$
$x^2 + 2x - 8 = 0$
$(x + 4)(x - 2) = 0$
$x = -4, 2$

Question 6: Find the length of the tangent from a point 13cm away from the centre of the circle of radius 5cm.

Solution:

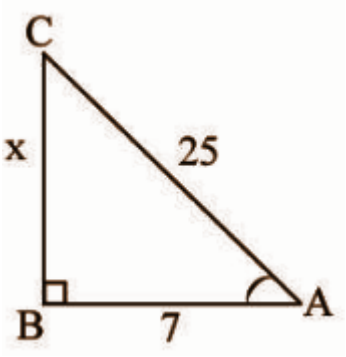
The radius of the circle = 5cm
Distance between the centre and the external point (d) = 13cm

Length of the tangent = $\sqrt{d^2 - r^2}$

= $\sqrt{13^2 - 5^2}$
= $\sqrt{169 - 25}$
= $\sqrt{144}$
= 12 cm

Question 7: If cos A = 7 / 25, then find sin A and cosec A. What do you observe?

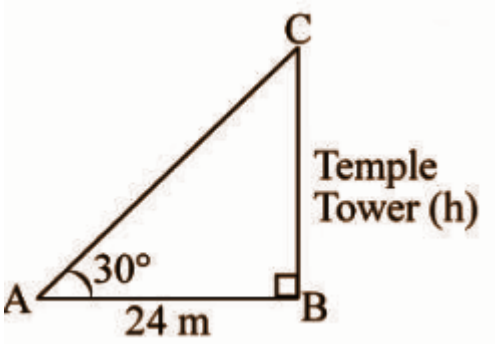
Solution:
In right-angled triangle ABC,



cos A = 7 / 25 [AB / CA]
$x^2 + 7^2 = 25^2$
$x^2 = 25^2 - 7^2$
$x^2 = 625 - 49$
$x^2 = 576$
x = 24
sin A = 24 / 25
cosec A = 25 / 24
It is observed that sin A = 1 / cosec A

Question 8: Rehman observed the top of a temple at an angle of elevation of 30^o when the observation point is 24m away from the foot of the temple. Find the height of the temple.

Solution:



Distance between the observer and the foot of the tower = 24m
Height of the temple tower = 'h' m
$\Theta = 30^o$
From triangle ABC,
$\tan 30^o = BC / AB$
$1 / \sqrt{3} = h / 24$
$\sqrt{3}h = 24$
$h = 24 / \sqrt{3}$
$h = 8\sqrt{3}$ m
Height of the tower = $8\sqrt{3}$ m

Question 9: Write the mid values of the following frequency distribution.

CI	8 - 11	12 - 15	16 - 19	20 - 23	24 - 27	28 - 31	32 - 35
f	4	4	5	13	20	14	8

Solution:

CI	8 - 11	12 - 15	16 - 19	20 - 23	24 - 27	28 - 31	32 - 35
f	4	4	5	13	20	14	8
Mid values	9.5	13.5	17.5	21.5	25.5	29.5	33.5

Question 10:
[a] Prove that $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

OR

[b] ABC is a right angled triangle, which is right angled at C. Let BC = a, CA = b, AB = c and let p be the length of the perpendicular form C on AB.
Prove that:
[i] pc = ab

[ii] $1 / p^2 = 1 / a^2 + 1 / b^2$

Solution:
[a] $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$
Consider LHS = $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2$
$= \sin^2 A + \operatorname{cosec}^2 A + 2 \sin A \operatorname{cosec} A + \cos^2 A + \sec^2 A + 2 \cos A \sec A$
$= (\sin^2 A + \cos^2 A) + 2 (1) + \operatorname{cosec}^2 A + 2 (1) + \sec^2 A$
$= 1 + 2 + 1 + \cot^2 A + 2 + 1 + \tan^2 A$
$= 7 + \cot^2 A + \tan^2 A$

[b] CD ⊥ AB and CD = p
Area of △ABC = (1 / 2) * AB * CD
= (1 / 2) * cp ---- (1)
Area of △ABC = (1 / 2) * BC * AC
= (1 / 2) * ab ---- (2)
From the equations (1) and (2),
(1 / 2) * cp = (1 / 2) * ab
cp = ab
c = ab / p
In △ABC the right angle is at C.
$AB^2 = BC^2 + AC^2$
$c^2 = a^2 + b^2$
$(ab / p)^2 = a^2 + b^2$
$a^2 b^2 / p^2 = a^2 + b^2$
$1 / p^2 = a^2 + b^2 / a^2 b^2$
$1 / p^2 = a^2 / a^2 b^2 + b^2 / a^2 b^2$
$1 / p^2 = 1 / b^2 + 1 / a^2$

Question 11: Find the median of the following data.
[a]

CI	**11 - 15**	**16 - 20**	**21 - 25**	**26 - 30**	**31 - 35**	**36 - 40**
f	**3**	**5**	**9**	**12**	**7**	**4**

OR

[b] In what ratio does the point (-4, 6) divide the line segment joining the points A (-6, 10) and B (3, -8)?

Solution:
[a]

CI	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40
f	3	5	9	12	7	4
Cf	3	8	17	29	36	40

n = 40
(n / 2) = 40 / 2 = 20
l = 25.5
f = 12
cf = 17
h = 5
Median = l + {[(n / 2) - cf] / [f]} * h
= 25.5 + {[20 - 17] / 12} * 5
= 26.75

[b] Let (-4, 6) divide the line segment joining the points A (-6, 10) and B (3, -8) in the ratio $m_1:m_2$
$(x, y) = (m_1x_2 + m_2x_1) / (m_1 + m_2) , (m_1y_2 + m_2y_1) / (m_1 + m_2)$
$(-4, 6) = (3m_1 - 6m_2) / (m_1 + m_2) , (-8m_1 + 10m_2) / (m_1 + m_2)$
$-4 = 3m1 - 6m2 / (m_1 + m_2)$ and $6 = (-8m1 + 10m2) / (m_1 + m_2)$

$-4 = 3m1 - 6m2 / (m_1 + m_2)$
$-4m_1 - 4m_2 = 3m_1 - 6m_2$
$-4m_1 - 3m_1 = -6m_2 + 4m_2$
$-7m_1 = -2m_2$
$m_1 / m_2 = 2 / 7$
$m_1 : m_2 = 2 : 7$
The point (-4, 6) divides the line segment joining the points A (-6, 10) and B (3, -8) in the ratio 2:7.

Question 12:
[a] Two dice are thrown at the same time. What is the probability that the sum of two numbers appearing on the top of the dice is
[i] 10
[ii] less than or equal to 12
[iii] a prime number
[iv] multiple of 3

OR

[b] A tree breaks due to a storm and the broken part bends so much that the top of the tree touches the ground by making 30º angle with the ground. The distance between the foot of the tree and the top of the tree on the ground is 6m. Find the height of the tree before falling down.

Solution:
[a] The possible outcomes when two dice are thrown simultaneously.
(1, 1)(1, 2)(1, 3)(1, 4)(1, 5)(1, 6)
(2, 1)(2, 2)(2, 3)(2, 4)(2, 5)(2, 6)
(3, 1)(3, 2)(3, 3)(3, 4)(3, 5)(3, 6)
(4, 1)(4, 2)(4, 3)(4, 4)(4, 5)(4, 6)
(5, 1)(5, 2)(5, 3)(5, 4)(5, 5)(5, 6)
(6, 1)(6, 2)(6, 3)(6, 4)(6, 5)(6, 6)
Total possible outcomes = 6 * 6 = 36

[i] Favourable outcomes for the sum to be 10 = (4, 6), (5, 5) and (6, 4)

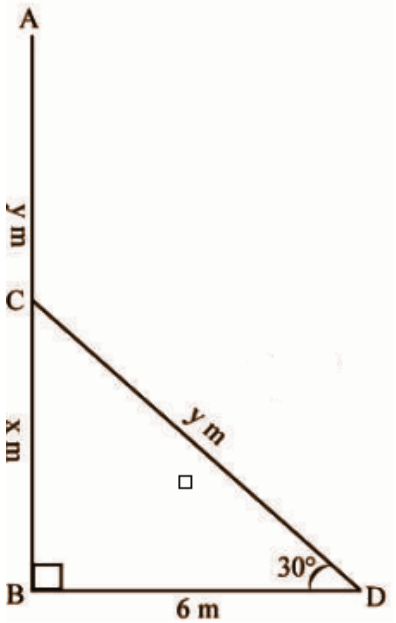
Number of favourable outcomes for the sum to be 10 = 3
P(E) = Number of favourable outcomes / Total number of outcomes
= 3 / 36
= 1 / 12

[ii] Number of favourable outcomes for the sum to be less than or equal to 12 = 36
P(sum ≦ 12) = 36 / 36 = 1

[iii] Favourable outcomes for the sum to be a prime number = (1, 1), (1, 2), (1, 4), (1, 6), (2, 1), (2, 3), (2, 5), (3, 2), (3, 4), (4, 1), (4, 3), (5, 2), (5, 6), (6, 1), (6, 5)
Number of favourable outcomes for the sum to be a prime number = 15
P(E) = 15 / 36
= 5 / 12

[iv] Favourable outcomes for the sum to be a multiple of 3 = (1, 2), (1, 5), (2, 1), (2, 4), (3, 3), (3, 6), (4, 2), (4, 5), (5, 1), (5, 4), (6, 3), (6, 6)
Number of favourable outcomes for the sum to be a multiple of 3 = 12 / 36 = 1 / 3

[b]



Let the height of the tree before the fall be AB = (x + y) m
BD = 6cm
The tree is broken at C.

Its top A touches the ground at D.
AC = CD = y m
The angle of elevation = $\angle BDC = 30^o$
BC = x m
In the right-angled triangle CBD,
$\tan 30^o = BC / BD$
$1 / \sqrt{3} = x / 6$
$\sqrt{3}x = 6$
$x = 6 / \sqrt{3} = 2\sqrt{3}$ m
$\cos 30^o = BD / CD$
$\sqrt{3} / 2 = 6 / y$
$\sqrt{3}y = 12$
$y = 12 / \sqrt{3}$
$= 4\sqrt{3}$ m
Height of the tree before falling = $2\sqrt{3} + 4\sqrt{3} = 6\sqrt{3}$ m

Question 13:

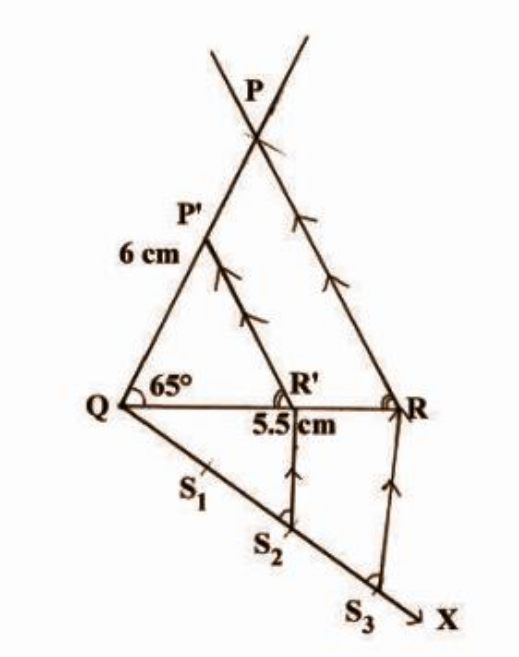
[a] Construct a triangle PQR, where QR = 5.5cm, $\angle Q = 65^o$ and PQ = 6cm. Then draw another triangle whose sides are 2 / 3 times of the corresponding sides of triangle POR.

OR

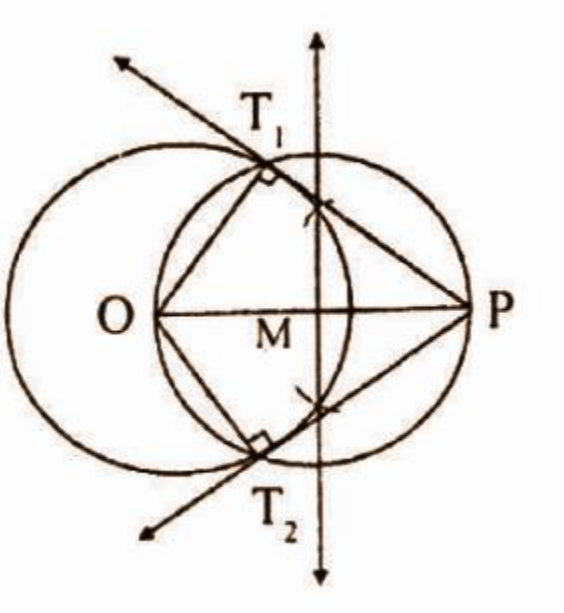
[b] Draw a circle of radius 4cm and draw a pair of tangents to the circle, which are intersecting each other 6cm away from the centre.

Solution:

[a]



[b]



SECTION - III

(20 * 0.5 = 10)

Question 14: In the figure, ∠BDE = ____

(A) 45º **(B) 65º** **(C) 75º** **(D) 60º**

Answer: A

Question 15: cos 60º + sin 30º value is

(A) √3 / 2 (B) 1 (C) cos 90º (D) B and C

Answer: B

Question 16: x-coordinate of the intersecting point of two ogives represents _____

(A) Mean (B) Median (C) Range (D) Mode

Answer: B

Question 17: Centroid of a triangle, whose vertices are (-a, 0), (0, b) and (c, 0) is

(A) (a, b) (B) (a / 3, 0) (C) (0, b / 3) (D) (a / 3, b / 3)

Answer: C

Question 18: The formula to find the area of a triangle is

(A) A = (1 / 2)bh (B) △ = √(s − a)(s − b)(s − c)

(C) △ = √s (s − a) (s − b) (s − c) (D) A and C

Answer: D

Question 19: The theorem applied to divide the line segment in the given ratio is _____.

(A) Pythagoras (B) Thales (C) Euclid's (D) Brahmagupta

Answer: B

Question 20: The number of tangents drawn at the endpoints of the diameter is ____

(A) 1 (B) 2 (C) 3 (D) 5

Answer: B

Question 21: If sec A + tan A = 1 / 5, then sec A - tan A = _____
(A) 5 (B) (1 / 5) (C) (4 / 5) (D) (2 / 5)

Answer: A

Question 22: The length of the shadow of a pole is equal to the length of the pole, then the angle of elevation of the sun is
(A) 15^{o} (B) 30^{o} (C) 45^{o} (D) 60^{o}

Answer: C

Question 23: Angle in a semi-circle is _____
(A) 60^{o} (B) 90^{o} (C) 180^{o} (D) 270^{o}

Answer: B

Question 24: The probability that the sum of 2 numbers appearing on the top of the dice is 13 when two dice are rolled at the same time is ____
(A) -1 (B) 1 (C) 0 (D) 2

Answer: C

Question 25: If P(E) = 0.05, then P(E bar) = _____
(A) 0.5 (B) 0.95 (C) 9.5 (D) 0.095

Answer: D

Question 26: The mode of the data 5, 6, 9, 10, 6, 11, 4, 6, 10, 4 is _____
(A) 4 (B) 5 (C) 6 (D) 10

Answer: C

Question 27: Reciprocal of tan a is _____

(A) sec a **(B) cot a** **(C) cosec a** **(D) -tan a**

Answer: B

Question 28: (sec^2a - 1) ($cosec^2a$ - 1) = _____

(A) 0 **(B) 1** **(C) -1** **(D) 2**

Answer: B

Question 29: The centre of the circle is (2, 1) and one end of the diameter is (3, -4). Another end of the diameter is ____

(A) (1, 6) **(B) (-1, -6)** **(C) (1, -6)** **(D) (-1, 6)**

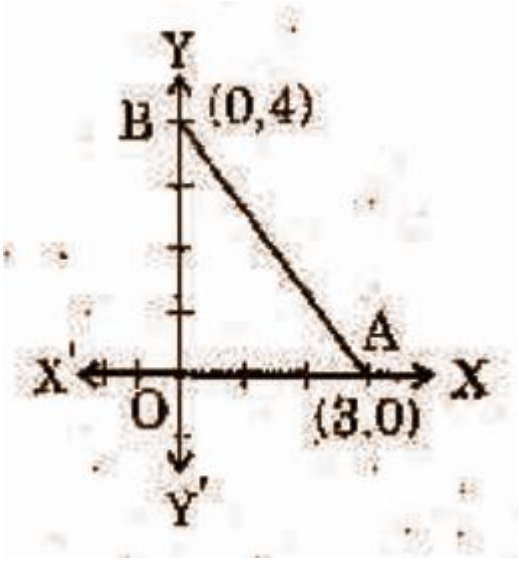
Answer: A

Question 30: The letter that represents (x - a) / h, which is used in measuring

(A) d **(B) f** **(C) u** **(D) (x bar)**

Answer: C

Question 31: In the given figure, the area of triangle AOB is _____ square units.



(A) 12 **(B) 6** **(C) 24** **(D) 18**

Answer: B

Question 32: Which of the following is an example of the probability of an event?

(A) -1.5 **(B) 2.4** **(C) 0.7** **(D) 115%**

Answer: C

Question 33: sin (90 - A) = (1 / 2), then A = ?

(A) 30^{o} **(B) 45^{o}** **(C) 60^{o}** **(D) 90^{o}**

Answer: C