

Andhra Pradesh SSC Class 10th Maths Question Paper 1 With Solution 2016

QUESTION PAPER CODE 15E(A)

SECTION - I
GROUP - A

(5 * 2 = 10)

Answer ANY 5 Questions choosing two from each of the following groups.

Question 1: Expand $\log \frac{343}{125}$

Solution:

Logarithmic rules:

i) $\log (x / y) = \log x - \log y$

ii) $\log a^n = n \log a$

$$\log (343 / 125)$$

$$= \log (7^3 / 5^3)$$

$$= \log (7 / 5)^3$$

$$= 3 \log (7 / 5)$$

$$= 3 [\log 7 - \log 5]$$

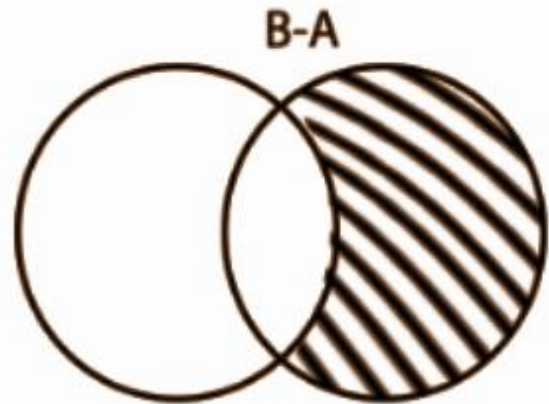
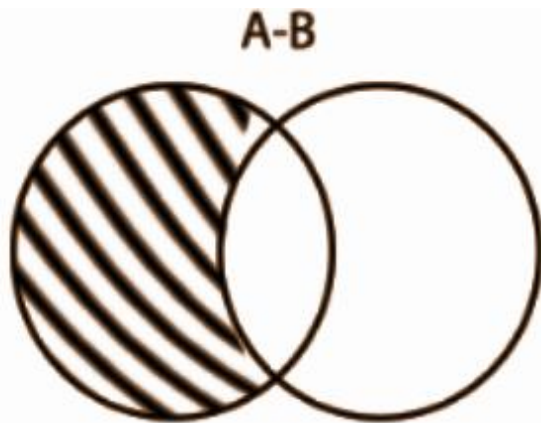
$$= 3 \log 7 - 3 \log 5$$

$$= 3 \log 7 / 3 \log 5$$

$$= \log 7 / \log 5$$

Question 2: Draw the Venn diagrams of the sets (A – B), (B – A).

Solution:



Question 3: Find a quadratic polynomial, if the zeroes of it are 2 and -1 respectively.

Solution:

$$\text{Quadratic} = x^2 - (\text{sum})x + \text{product} = 0$$

$$\text{Sum} = 2 + (-1) = 1$$

$$\text{Product} = 2 * -1 = -2$$

$x^2 - x - 2 = 0$ is the quadratic polynomial.

Question 4: Find the roots of equation $2x^2 + x - 6 = 0$ by factorisation.

Solution:

Given the quadratic equation: $2x^2 + x - 6 = 0$

Splitting the middle term,

$$2x^2 + 4x - 3x - 6 = 0$$

$$\Rightarrow 2x(x + 2) - 3(x + 2) = 0$$

$$\Rightarrow (x + 2)(2x - 3) = 0$$

Therefore ,

$$x + 2 = 0 \text{ or } 2x - 3 = 0$$

$$x = -2 \text{ or } x = 3/2$$

GROUP - B

Question 5: 10 students of class X took part in a mathematics quiz. If the number of girls is four more than the number of boys; then find the number of boys and the number of girls, who took part in the quiz.

Solution:

Let the number of boys be x .

The number of girls is $10 - x$.

The number of girls = 4 + number of boys

$$10 - x = 4 + x$$

$$6 = 2x$$

$$x = 3$$

Number of boys = 3

Number of girls = 7

Question 6: Find the number of terms in the following AP. 7, 13, 19,, 205

Solution:

A.P. 7, 13, 19,, 205

$$a = 7$$

$$d = 13 - 7 = 6$$

$$A_n = 205$$

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

$$205 = 7 + (n - 1) 6$$

$$\Rightarrow 205 - 7 = (n - 1) 6$$

$$\Rightarrow 198 = (n - 1) 6$$

$$\Rightarrow n - 1 = 198 / 6$$

$$\Rightarrow n - 1 = 33$$

$$\Rightarrow n = 33 + 1$$

$$\Rightarrow n = 34$$

Thus, the total number of terms is 34.

Question 7: Find the coordinates of the point, which divides the join of (-1, 7) and (4, -3) in the ratio 2 : 3.

Solution:

$$m : n = 2 : 3$$

$$(x, y) = (mx_2 + nx_1) / (m + n), (my_2 + ny_1) / (m + n)$$

$$= (2 * 4 + 3 * [-1]) / [2 + 3], (2 * [-3] + 7 * 3) / [2 + 3]$$

$$= (5 / 5), (-6 + 21 / 5)$$

$$= 1, 3$$

Question 8: Find the area of the triangle, whose vertices are (2, 0), (1, 2), (-1, 6). What do you observe?

Solution:

$$\text{Area of the triangle} = |2(2 - 6) - 0(1 + 1) + 1(6 + 2)|$$

$$= |(-8) + 0 + 8|$$

$$= 0$$

If the area of triangle = 0, then the three points are collinear.

SECTION - II

(4 * 1 = 4)

Answer ANY 4 questions of the following six questions.

Question 9: Find the value of $\log_{81} 3$.

Solution:

$$\log_{81} 3 = x$$

Rewrite as an exponential. In this case, x is the exponent, and 81 is the base.

$$81^x = 3$$

Find a common base for both sides, which is 3.

$$81 = 3^4$$

$$(3^4)^x = 3$$

Use the exponent rule $(x^a)^b = x^{ab}$

$$3^{4x} = 3^1$$

$$4x = 1$$

$$x = 1 / 4$$

Question 10: List all the subsets of the following set $B = \{p, q\}$.

Solution:

All subsets of B are $\{\}, \{p\}, \{q\}, \{p, q\}$.

Question 11: Write the following set $\{x : x = 2n + 1 \text{ and } n \in \mathbb{N}\}$ in roster form.

Solution:

$$\{3, 5, 7, 9, 11, 13, \dots\}$$

Question 12: If $p(x) = x^2 - 5x - 6$, then find the value of $p(3)$.

Solution:

$$p(x) = x^2 - 5x - 6$$

$$p(3) = 3^2 - 3 \cdot 5 - 6$$

$$= 9 - 15 - 6$$

$$= -12$$

Question 13: Find the common ratio of GP $2, 2\sqrt{2}, 4, \dots$

Solution:

$$r = \frac{2\sqrt{2}}{2}$$

$$= \sqrt{2}$$

So, the common ratio is $\sqrt{2}$.

Question 14: Find the midpoint of the line segment joining the points $(2, 7)$ and $(12, -7)$.

Solution:

Given points are

$$(2, 7) = (x_1, y_1)$$

$$(12, -7) = (x_2, y_2)$$

$$\text{mid point} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\Rightarrow \left(\frac{2 + 12}{2}, \frac{7 + (-7)}{2} \right)$$

$$\Rightarrow \left(\frac{14}{2}, \frac{0}{2} \right)$$

$\Rightarrow (7, 0)$ is the midpoint.

(4 * 4 = 16)

Answer ANY 4 questions, choosing at least TWO from each of the following groups.

GROUP - A

Question 15: Show that $5 - \sqrt{3}$ is irrational.

Solution:

Assume that $5 - \sqrt{3}$ is a rational number such that a, b exists, where a and b are two co-prime numbers.

$$= 5 - \sqrt{3} = a / b$$

$$= \sqrt{3} = 5 - a / b$$

=> a and b are integers.

So, $(5 - a / b)$ is rational.

There arises a contradiction with our assumption that $5 - \sqrt{3}$ is a rational number.

Hence, $5 - \sqrt{3}$ is an irrational number.

Question 16: If $A = \{1, 2, 3, 4\}$, $B = \{1, 2, 3, 5, 6\}$, then find

(i) $A \cap B$,

(ii) $B \cap A$

(iii) $A - B$,

(iv) $B - A$, and what do you observe?

Solution:

(i) $A \cap B \rightarrow \{1, 2, 3\}$

(ii) $B \cap A \rightarrow \{1, 2, 3\}$

(iii) $A - B \rightarrow \{4\}$

(iv) $B - A \rightarrow \{5, 6\}$

Question 17: Find the zeroes of the polynomial $p(x) = x^2 - 4x + 3$ and verify the relationship between zeroes and coefficients.

Solution:

$$x^2 - 4x + 3 = 0$$

$$x^2 - 3x - x + 3 = 0$$

$$x(x - 3) - 1(x - 3) = 0$$

$$(x - 3)(x - 1) = 0$$

$$x = 3, 1$$

$$\text{Sum of the roots} = (\alpha + \beta) = 3 + 1 = 4 = -(-4) / 1 = -4 = (-b / a)$$

$$\text{Product of the roots} = (\alpha * \beta) = 3 * 1 = 3 = (3 / 1) = (c / a)$$

Question 18: Solve the quadratic equation $2x^2 + x - 4 = 0$ by completing the square.

Solution:

$$(a + b)^2 = a^2 + 2ab + b^2$$

To find the value of x, use the above formula,

To bring the given equation to that form $a^2 + 2ab + b^2$ for some value a & b.,

$$\Rightarrow 2x^2 + x - 4 = 0$$

$$\Rightarrow x^2 + (x / 2) - 2 = 0 \text{ [Dividing both the sides by } 1 / 2]$$

$$\Rightarrow x^2 + 2 * (1 / 4) x - 2 = 0$$

Multiplying & dividing the middle term by 2 to get the term 2ab (here a = x, b = 1 / 2)

$a^2 + 2ab + c$ (for some value c, here it is - 4), we need b^2 to bring this equation to that form,

By adding $(1 / 4)^2$ both the sides,

$$\Rightarrow x^2 + 2 * (1 / 4) x + (1 / 4)^2 - 2 = (1 / 4)^2$$

It can be, reduced to the form $(a + b)^2$

$$\Rightarrow (x + [1 / 4])^2 - 2 = 1 / 16$$

$$\Rightarrow x + (1 / 4)^2 = [1 / 16] + 2$$

$$\Rightarrow (x + [1 / 4])^2 = 33 / 16$$

By moving the square from LHS to RHS, we get,

$$\Rightarrow x + [1 / 4] = \sqrt{33 / 16}$$

$$\Rightarrow x = [\sqrt{33} - 1 / 4] \text{ or } [\sqrt{-33} - 1 / 4]$$

GROUP - B

Question 19: Solve the equations: $10 / [x + y] + 2 / [x - y] = 4$, $15 / [x + y] - 5 / [x - y] = -2$.

Solution:

$$\text{Let } 1 / [x + y] = k$$

$$1 / [x - y] = m$$

$$10k + 2m = 4 * 5$$

$$15k - 5m = -2 * 2$$

$$50k + 10m = 20$$

$$30k - 10m = -4$$

$$80k = 16$$

$$k = 16 / 80 = 1 / 5$$

$$1 / [x + y] = 1 / 5$$

$$x + y = 5 \text{ ----- (1)}$$

$$m = [4 - 10k] / 2 = [4 - 2] / 2 = 1$$

$$1 / [x - y] = 1$$

$$x - y = 1$$

$$x + y = 5$$

$$2x = 6$$

$$x = 3$$

$$y = 5 - x$$

$$y = 2$$

Question 20: Solve the pair of equations by elimination method: $2x + y - 5 = 0$, $3x - 2y - 4 = 0$.

Solution:

$$2x + y = 5 * 2$$

$$3x - 2y = 4$$

$$4x + 2y = 10$$

$$3x - 2y = 4 \text{ (on adding)}$$

$$\begin{aligned}
 7x &= 14 \\
 x &= 14 / 7 = 2 \\
 y &= 5 - 2x \\
 &= 5 - 2 * 2 \\
 &= 1
 \end{aligned}$$

Question 21: If the sum of the first 7 terms of an AP is 49 and that of 17 terms is 289; find the sum of the first n terms.

Solution:

$$\text{Sum} = [n / 2] * [2a_0 + [n - 1] d]$$

$$49 = (7 / 2) [2a_0 + 6d]$$

$$14 = 2a_0 + 6d$$

$$7 = a_0 + 3d \text{ ---- (1)}$$

$$289 = 17 / 2 * [2a_0 + 16d]$$

$$34 = 2a_0 + 16d$$

$$17 = a_0 + 8d \text{ ---- (2)}$$

$$7 = a_0 + 3d$$

$$17 = a_0 + 8d$$

$$10 = 5d$$

$$d = 10 / 5 = 2$$

$$a_0 = 7 - 3d = 7 - 3 * 2 = 1$$

$$\text{Sum of first n terms} = [n / 2] * [2a_0 + [n - 1] d]$$

$$= (n / 2) (2 + 2n - 2)$$

$$= (n / 2) * (2n)$$

$$= n^2$$

Question 22: Find the area of the triangle formed by joining the midpoints of the sides of the triangle, whose vertices are (0, -1); (2, 1) and (0, 3). Find the ratio of this area to the area of the given triangle.

Solution:

$$D = [0 + 2] / [2], [-1 + 1] / [2]$$

$$= (1, 0)$$

$$E = [2 + 0] / [2], [1 + 3] / [2]$$

$$= (1, 2)$$

$$F = [0 + 0] / [2], [3 - 1] / [2]$$

$$= (0, 1)$$

$$\text{Area of triangle} = (1 / 2) (0 [1 - 3] + 2 [3 + 1] + 0 [-1 - 1])$$

$$= (1 / 2) * 8$$

$$= 4$$

$$\text{Area of midpoint triangle} = (1 / 2) (1 [2 - 1] + 1 [1 - 0] + 0 [0 - 2])$$

$$= (1 / 2)$$

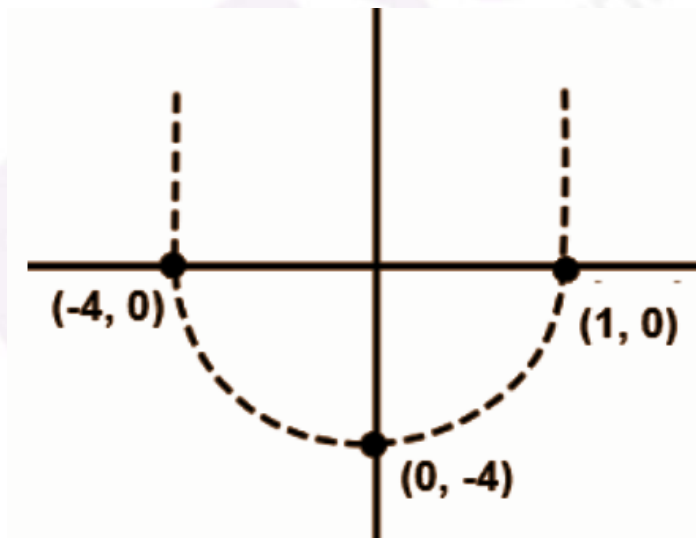
SECTION - IV

(1 * 5 = 5)

Answer any ONE question.

Question 23: Draw the graph of $p(x) = x^2 + 3x - 4$ and find zeroes. Verify the zeroes of the polynomials.

Solution:



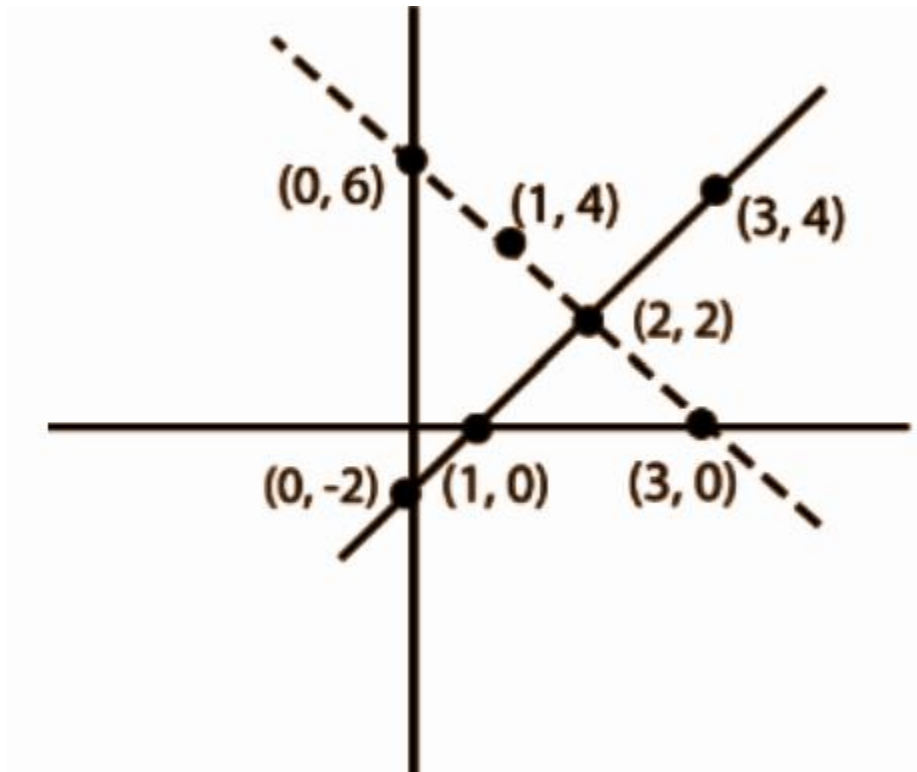
The graph is an upward parabola as it is a quadratic equation.

The curve passes through $(-4, 0)$ and $(1, 0)$.

The zero of the polynomial is where the curve cut the x-axis. i.e. the zero of the polynomial is -4 and 1 .

Question 24: Solve the following equations graphically. $3x - y = 7$, $2x + 3y = 1$.

Solution:



PART - B

(10 * 0.5 = 5)

Question 1: If p is prime, then \sqrt{p} is

- (A) Composite number**
- (B) Rational number**
- (C) Positive integer**
- (D) Irrational number**

Answer: D

Question 2: Exponential form of $\log_4 8$ is

- (A) $x^8 = 4$**
- (B) $x^4 = 8$**
- (C) $4^x = 8$**
- (D) $8^x = 4$**

Answer: C

Question 3: If $\log 625 = k \log 5$, then the value of k is

- (A) 5 (B) 4 (C) 3 (D) 2

Answer: B

Question 4: p / q form of 0.0875 is

- (A) $7/2^4 * 5$ (B) $7/2 * 5^4$ (C) $7/2^4 * 5^4$ (D) $5^3 * 7/2^3 * 5^4$

Answer: A

Question 5: If $A \subset B$, $n(A) = 5$ and $n(B) = 7$, then $n(A \cup B) =$

- (A) 5 (B) 7 (C) 2 (D) 12

Answer: D

Question 6: If 2 and 3 are two zeroes $x^3 - 5x^2 + 6x$, then find the third zero.

- (A) 1 (B) 4 (C) 5 (D) 0

Answer: D

Question 7: Which is not a linear equation of the following

- (A) $5 + 4x = y + 3$
(B) $x + 2y = y - x$
(C) $3 - x = y^2 + 4$
(D) $x + y = 0$

Answer: C

Question 8: Two angles are complementary. If the larger angle is twice the measure of the smaller angle, then smaller is

- (A) 30 (B) 45 (C) 60 (D) 15

Answer: A

Question 9: The common difference of AP 1, -1, -3, is
(A) -1 (B) 2 (C) -2 (D) 1

Answer: C

Question 10: Distance between (0, 7) and (-7, 0) is
(A) $2\sqrt{7}$ (B) $7\sqrt{2}$ (C) $\sqrt{14}$ (D) 1

Answer: B

Fill in the blanks.

Question 11: The decimal form of $36 / 2^3 * 5^3$ is _____ (0.036)

Question 12: If LCM and HCF of two numbers are 108 and 9 respectively and one of them is 54, then the other number is _____ (18)

Question 13: If $\log_2 x = 3$, then $x =$ _____ (8)

Question 14: If $52 / 160 = 13 / 2^n * 5^m$, then $m + n$ is _____ (4)

Question 15: If the polynomial $p(x) = x^2 - 8x + k$ is divided by $(x - 1)$, the remainder comes out to be '6', then k is _____ (13)

Question 16: The discriminant of the quadratic equation $px^2 + qx + r = 0$ is _____ ($D = \sqrt{q^2 - 4pr}$)

Question 17: The first negative number of AP 14, 11, 8, is _____ term (6th)

Question 18: The intersecting point of $x + y = 6$, $x - y = 4$ is _____. (5, 1)

Question 19: (-2, 8) lies in _____ quadrant (second)

Question 20: Slope of the y-axis is _____ (undefined)

Question: [i] Find the correct answer for the given question under group - A selecting from group - B. (10 *

0.5 = 5)

(i) Group - A

Group - B

21. The zero of linear polynomial $ax - b = \dots\dots$

[]

(A) 0

(B) -2

22. If the product of zeroes is '0' of the polynomial $ax^2 + bx + c$, then the value of c is

[]

(C) $\frac{b}{a}$

23. Product of the zeroes of the polynomial $2x^2 - 3x + 6$ is

[]

(D) $\frac{a}{b}$

(E) 2

24. Sum of the zeroes of the polynomial $bx^2 + ax + c = \dots\dots$

[]

(F) $-\frac{a}{b}$

25. α, β, γ are the zeroes of the polynomial $x^3 + 3x^2 - x + 2$, then $\alpha\beta\gamma$ is

[]

(G) $-\frac{b}{a}$

(H) 3

Answer:

21 - (C)

22 - (A)

23 - (H)

24 - (F)

25 - (B)

[ii]

(ii) **Group - A**

Group - B

26. Distance between X-axis and $(-4, 3)$ is

[]

(I) $\sqrt{5}$

(J) $(1, 1)$

27. Distance between origin and $(2, 3)$ is

[]

(K) 3

28. Distance between Y-axis and $(4, 0)$ is

[]

(L) 2

(M) 4

29. Mid point of line joining the points $(2, 3)$ and $(-2, 3) = \dots\dots$

[]

(N) $\sqrt{13}$

30. Centroid of a triangle, whose vertices are $(0, 3)$; $(3, 0)$; $(0, 0)$ is

[]

(O) $(0, 0)$

(P) $(0, 3)$

26 - (K)

27 - (N)

28 - (M)

29 - (P)

30 - (J)