

Andhra Pradesh SSC Class 10th Maths Question Paper 1 With Solution 2017

QUESTION PAPER CODE 15E(A)

SECTION - I

(4 * 1 = 4)

Question 1: Find the value of $\log_2 512$.

Solution:

512 is 2^9 .

$$\Rightarrow \log_2(512) = \log_2(2^9)$$

By the power Rule, bring the 9 to the front of the log.

$$= 9 \log_2(2)$$

The logarithm of a to the base a is always 1.

$$\log_2(2) = 1$$

$$= 9$$

Question 2: Write $A = \{1, 4, 9, 16, 25\}$ in set builder form.

Solution:

$A = \{x : x \text{ is the square of a natural number}\}$

$A = \{x : x = n^2, \text{ where } n \in \mathbb{N}\}$

Question 3: Two angles are complementary and one angle is 18° more than the other, then find the angles.

Solution:

Let one angle be x and another angle be $x + 18$.

Since the angles are complementary,

$$\angle A + \angle B = 90^\circ$$

$$x + x + 18^\circ = 90^\circ$$

$$2x = 90^\circ - 18^\circ$$

$$2x = 72^\circ$$

$$x = 36^\circ$$

The two angles are

$$\angle A = 36^\circ$$

$$\angle B = 36 + 18 = 54^\circ$$

Question 4: Find the total surface area of a hemisphere of radius 7cm.

Solution:

$$\text{Total surface area of a hemisphere} = 3\pi r^2$$

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

$$= 3 * (22 / 7) * 7 * 7$$

$$= 3 * 22 * 7$$

$$= 21 * 22$$

$$= 462 \text{ sq.cm}$$

SECTION - II

(5 * 2 = 10)

Question 5: Find the zeroes of the quadratic polynomial $x^2 - 2x - 8$ and verify the relationship between zeroes and coefficients.

Solution:

$$P(x) \Rightarrow x^2 - 2x - 8$$

$$\Rightarrow x^2 - 4x + 2x - 8$$

$$\Rightarrow x(x - 4) + 2(x - 4)$$

$$\Rightarrow (x - 4)(x + 2) = 0$$

$$\Rightarrow (x - 4) = 0 \text{ or } (x + 2) = 0$$

$$\Rightarrow x = 4 \text{ or } x = -2$$

4 and -2 are the two zeroes of the polynomial $x^2 - 2x - 8$.

The relation between the zeroes and coefficients:

$$\text{Sum of zeroes} = \alpha + \beta$$

$$\begin{aligned}
&= 4 + (-2) \\
&= 4 - 2 \\
&= 2 / 1 \\
&= \text{coefficient of } x / \text{coefficient of } x^2.
\end{aligned}$$

$$\begin{aligned}
\text{Product of zeroes} &= \alpha \times \beta \\
&= 4 \times -2 \\
&= -8 / 1 \\
&= \text{constant term} / \text{coefficient of } x^2
\end{aligned}$$

Question 6: Which term of AP 21, 18, 15, is -81?

Solution:

$$\text{Let } a_n = -81$$

$$d = 18 - 21 = -3$$

$$a = 21$$

The general formula of AP is $a_n = a + (n - 1)d$

$$-81 = 21 + (n - 1) - 3$$

$$-81 - 21 = (n - 1) - 3$$

$$-102 / -3 = n - 1$$

$$34 = n - 1$$

$$n = 35$$

Hence -81 is 35th term of an AP.

Question 7: The curved surface area of a cone is 4070 cm² and its diameter is 70cm. What will be its slant height?

Solution:

Given that curved surface area of the cone is 4070cm²

Diameter of cone = 70cm

Radius of cone = $d / 2 = 70 / 2 = 35\text{cm}$

Curved surface area of cone = $\pi r l$

$$\pi r l = 4070$$

$$(22 / 7) * 35 * l = 4070$$

$$22 * 5 * l = 4070$$

$$1101 = 4070$$
$$l = 4070 / 110$$
$$l = 37 \text{ cm}$$

Question 8: Find the discriminant of $2x^2 - 4x + 3 = 0$ and discuss the nature of its roots.

Solution:

The given equation is of the form $ax^2 + bx + c = 0$, where

$$a = 2$$

$$b = -4$$

$$c = 3$$

Therefore, the discriminant is

$$D = b^2 - 4ac$$

$$= (-4)^2 - (4 \times 2 \times 3)$$

$$= 16 - 24$$

$$= -8 < 0$$

Since, $D < 0$, the equation has no real roots.

Question 9: Express as algebraic expressions of the following:

[a] Five times of a number, when increased by 10 gives 20.

[b] The digits in ones and tens place of a two-digit number are x and y , then find the number.

Solution:

$$[a] 5x + 10 = 20$$

[b] Since, a number is written as the sum of all the place value of all digits in the number,

So, a two-digit number can be written as,

$$10 \times (\text{tens place digit}) + \text{ones place digit},$$

Here, ones place digit = X and the tens place digit = Y ,

Thus, the required two-digit number is,

$$10 \times Y + X = 10Y + X$$

SECTION - III

(4 * 4 = 16)

Question 10:

[a] Solve the following pair of equations by reducing them to a pair of linear equations.

$$(5 / [x - 1]) + (1 / [y - 2]) = 2, (6 / [x - 1]) - (3 / [y - 2]) = 1.$$

OR

[b] A well of diameter 14m is dug 15m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 7m to form an embankment. Find the height of the embankment.

Solution:

$$[a] (5 / [x - 1]) + (1 / [y - 2]) = 2 \text{ ---- (1)}$$

$$(6 / [x - 1]) - (3 / [y - 2]) = 1 \text{ ----- (2)}$$

Let $1 / [x - 1] = u$ [from (1)]

$1 / [y - 2] = v$ [from (2)]

The equations become,

$$5u + v = 2 \text{ ---- (3)}$$

$$6u - 3v = 1 \text{ ----- (4)}$$

From (3), $5u + v = 2$

$$v = 2 - 5u$$

Putting the value of v in (4),

$$6u - 3v = 1$$

$$6u - 3 * (2 - 5u) = 1$$

$$6u + 15u = 7$$

$$21u = 7$$

$$u = 1 / 3$$

On putting $u = (1 / 3)$ in (3),

$$5 * (1 / 3) + v = 2$$

$$v = 1 / 3$$

To find the values of x and y , substitute u and v in (1) and (2),

$x = 4, y = 5$ is the solution.

[b] Inner Diameter of the well= 14 m

Inner Radius of the well (r) = $14 / 2 \text{ m} = 7 \text{ m}$

Height of the well (h) = 15 m

The volume of the earth taken out of the well = $\pi r^2 h$

$$= (22 / 7) \times (7)^2 \times 15$$

$$= 22 \times 7 \times 15$$

$$= 2310 \text{ m}^3$$

Width = 7m

Outer radius of the embankment R = inner radius + width

$$\text{Outer radius (R)} = 7 + 7 = 14\text{m}$$

The embankment is in the form of cylindrical shell, so the area of embankment

Area of embankment = outer area - inner area

$$= \pi R^2 - \pi r^2 = \pi (R^2 - r^2)$$

$$= (22 / 7) (14^2 - 7^2)$$

$$= 22 / 7 (196 - 49)$$

$$= 22/7 \times 147$$

$$= 22 \times 21$$

$$= 462 \text{ m}^2$$

The volume of embankment = volume of earth taken out on digging the well

Area of embankment \times height of embankment = volume of earth dug out

Height of embankment = volume of earth dug out / area of the embankment

$$\text{Height of the embankment} = 2310 / 462$$

$$\text{Height of embankment} = 5 \text{ m}$$

Hence, the height of the embankment so formed is 5 m.

Question 11:

[a] Show that the cube of any positive integer is of the form $9m$ or $9m + 1$ or $9m + 8$, where m is an integer.

OR

[b] If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$; then check whether $A \cup B = B \cup A$ and $A - B = B - A$.

Solution:

[a] Let a be any positive integer and $b = 3$
 $a = 3q + r$, where $q \geq 0$ and $0 \leq r < 3$
 $\therefore r = 0, 1, 2$

Therefore, every number can be represented as these three forms.

There are three cases.

Case 1: When $a = 3q$,

Where m is an integer such that $m =$

Case 2: When $a = 3q + 1$,

$$a = (3q + 1)^3$$

$$a = 27q^3 + 27q^2 + 9q + 1$$

$$a = 9(3q^3 + 3q^2 + q) + 1$$

$$a = 9m + 1 \text{ [where } m = 3q^3 + 3q^2 + q \text{].}$$

Case 3: When $a = 3q + 2$,

$$a = (3q + 2)^3$$

$$a = 27q^3 + 54q^2 + 36q + 8$$

$$a = 9(3q^3 + 6q^2 + 4q) + 8$$

$$a = 9m + 8$$

Where m is an integer such that $m = (3q^3 + 6q^2 + 4q)$

Therefore, the cube of any positive integer is of the form $9m$, $9m + 1$, or $9m + 8$.

$$[b] A \cup B = \{3, 4, 6, 8, 9, 12, 15, 16, 18, 20, 21\}$$

$$B \cup A = \{3, 4, 6, 8, 9, 12, 15, 16, 18, 20, 21\}$$

$B \cup A = A \cup B$ is the same.

$$A - B = \{3, 6, 9, 15, 18, 21\}$$

$$B - A = \{4, 8, 16, 20\}$$

$A - B$ is not the same as $B - A$.

Question 12:

[a] A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the 7th year. Assuming that the production increases uniformly by a fixed number every year, find

[i] The production in the 1st year.

[ii] Total production in the 10th year.

[iii] Total production in the first seven years.

OR

[b] There is a motorboat, whose speed in still water is 18km/h. It takes 1 hour more to go 24km upstream than to return downstream to the same spot. Find the speed of the stream.

Solution:

[a] Let the number of sets produced in 1st year be 'a' and 'd' be the increase in the production every year.

$$a + 2d = 600 \text{ ----- (1)}$$

$$a + 6d = 700 \text{ ----- (2)}$$

Subtracting equation (1) from (2),

$$4d = 100 \text{ or } d = 25$$

Substituting $d = 25$ in equation (1),

$$a = 550$$

$$(a) \text{ Production in the first year} = a = 550$$

$$(b) \text{ Production in } 10^{\text{th}} \text{ year} = a + 9d = 550 + 9 \times 25 = 775$$

$$(c) \text{ Total production in first 7 years} = a + (a + d) + (a + 2d) + \dots + (a + 6d)$$

$$= (7 / 2) (2 * 550 + (7 - 1) 25)$$

$$= 4375$$

Question 13:

[a] Solve the quadratic polynomial $x^2 - 3x - 4$ by graphical method.

OR

[b] Half of the perimeter of a rectangular garden, whose length is 4m more than its width, is 36m. Find the dimensions of the garden.

Solution:

[a]

If $x = 0$,

$$\Rightarrow y = 0^2 - 3(0) - 4 = -4$$

If $x = 1$

$$\Rightarrow y = 1^2 - 3(1) - 4 = -4 = 1 - 3 - 4 = -6$$

If $x = -1$

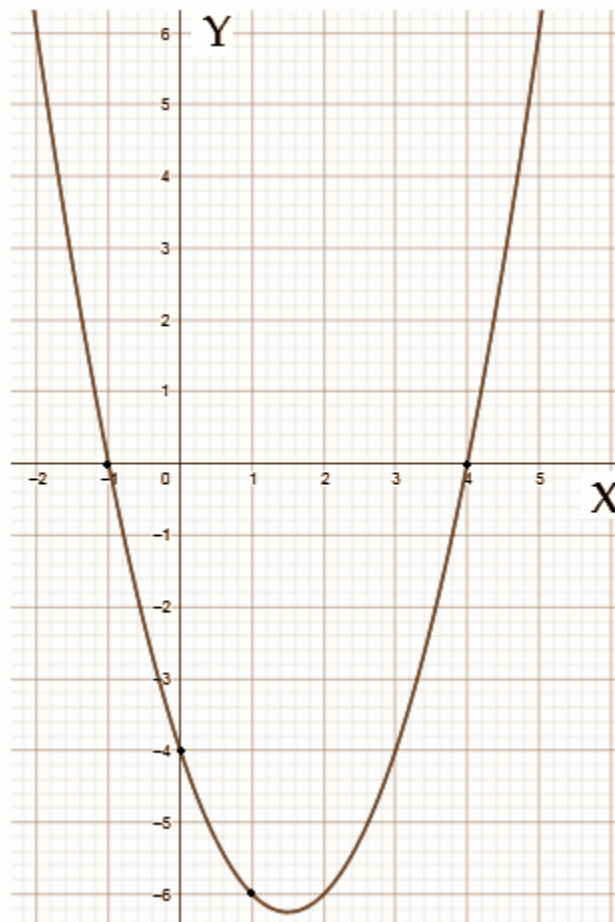
$$\Rightarrow y = (-1)^2 - 3(-1) - 4 = 1 + 3 - 4 = 0$$

If $x = 4$

$$\Rightarrow y = (-1)^2 - 3(4) - 4 = 16 - 12 - 4 = 0$$

The coordinate points of the given equation are

x	0	1	-1	4
y	-4	-6	0	0



[b] Perimeter = $2(l+b)$

half of the perimeter = $36\text{m} = (l+b)$

Let breadth = x , length = $4x$

$$\text{Perimeter} = 2 \times 36 = 72\text{m}$$

$$\text{Perimeter} = 2(l+b)$$

$$72 = 2(4 + x + x)$$

$$36 = 4 + 2x$$

$$36 - 4 = 2x$$

$$32 = 2x$$

$$32 / 2 = x$$

$$16 = x$$

$$\text{Breadth} = 16$$

$$\text{Length} = x + 4 = 16 + 4 = 20$$

SECTION - IV

(20 * 0.5 = 10)

Question 14: A rational number that equals to $2.\overline{6}$ is

- (A) $7/3$ (B) $8/3$ (C) $16/7$ (D) $17/7$

Answer: B

Question 15: The value of $\log_{25} 5$ is

- (A) $1/2$ (B) 2 (C) 5 (D) 25

Answer: A

Question 16: If '4' is one of the zeroes of $p(x) = x^2 + kx - 8$, then the value of k is

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

Answer: C

Question 17: If the pair of equations $2x + 3y + k = 0$, $6x + 9y + 3 = 0$ having infinite solutions, the value of k is _____

- (A) 2 (B) 3 (C) 0 (D) 1

Answer: D

Question 18: If the roots of $x^2 + 6x + 5 = 0$ are a and b, then a + b is

- (A) 5 (B) -6 (C) 6 (D) -1

Answer: B

Question 19: Which term of GP 3, $3\sqrt{3}$, 9 equals to 243?

- (A) 6 (B) 7 (C) 8 (D) 9

Answer: D

Question 20: If $n(A) = 12$ and $n(A \cap B) = 5$, then $n(A - B) =$

- (A) 4 (B) 7 (C) 17 (D) 0

Answer: B

Question 21: If x , $x + 2$, $x + 6$ are three consecutive terms in GP, find the value of x .

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

Answer: C

Question 22: A quadratic equation, whose roots are $2 + \sqrt{3}$ and $2 - \sqrt{3} =$

- (A) $x^2 - x - 4 = 0$
(B) $x^2 - 4x + 1 = 0$
(C) $x^2 + 4x + 3 = 0$
(D) $x^2 + x - 3 = 0$

Answer: B

Question 23: If $a_n = n(n + 3) / (n + 2)$, then find a_{17} .

- (A) $340 / 20$ (B) $341 / 19$ (C) $340 / 19$ (D) $341 / 20$

Answer: C

Question 24: The curved surface area of a sphere will be ____ whose radius is 10cm.

- (A) 239π (B) 400π (C) 221π (D) 129π

Answer: B

Question 25: The volume of a cube will be ____ if the total surface area is 216cm^2 .

- (A) 216 (B) 196 (C) 212 (D) 144

Answer: A

Question 26: A famous book was written by ancient mathematician Aryabhata is

- (A) Arya tharkam
(B) Aryabhatteeyam
(C) Siddhanta Shiromani
(D) Karana Kuthuhalam

Answer: B

Question 27: The degree of the polynomial $\sqrt{2x^2 - 3x + 1}$ =

- (A) $\sqrt{2}$ (B) 3 (C) 1 (D) 2

Answer: C

Question 28: Which of the following equations has the solution of (2, -3)?

- (A) $2x - 3y = 10$ (B) $2x + 3y = 13$ (C) $2x - 3y = 13$ (D) $2x + 3y = -13$

Answer: The set of equations should be two.

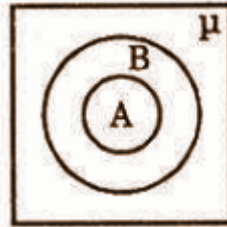
Question 29: If $A = \{x : x \text{ is the letter of the word HEADMASTER, then its roster form is}$

- (A) $A = \{h, e, a, d, m, a, s, t, e, r\}$

- (B) $A = \{h, e, a, d, m, s, t, r\}$
- (C) $A = \{h, e, a, d, m, s, t, e, r\}$
- (D) $A = \{h, e, a, d, m, a, s, t, r\}$

Answer: B

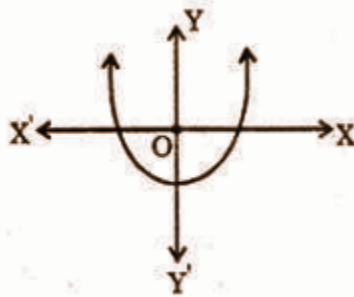
Question 30: The following Venn diagram indicates



- (A) $A \subset B$
- (B) $B \subset A$
- (C) A, B are disjoint sets
- (D) $\mu \subset B$

Solution: B

Question 31:

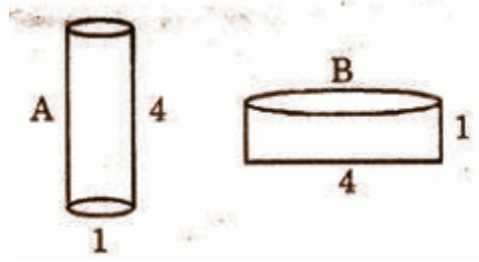


The above diagram shows

- (A) $b^2 - 4ac > 0$
- (B) $b^2 - 4ac = 0$
- (C) $b^2 - 4ac < 0$
- (D) None of the above

Solution: A

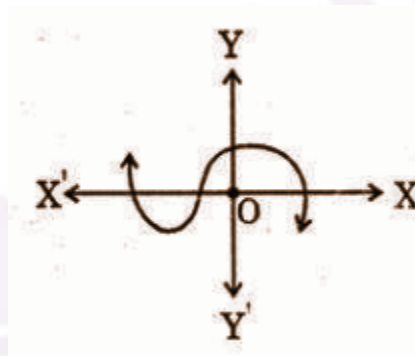
Question 32: Which of the following vessels can be filled with more water (A, B are in cylindrical shape)?



- (A) A
- (B) B
- (C) Both
- (D) cannot be determined

Answer: B

Question 33:



The number of zeroes can be identified by the adjacent figure.

- (A) 0
- (B) 1
- (C) 2
- (D) 3

Answer: D