This Question Paper contains 4 Printed Pages.

New Pattern

15E(A)

MATHEMATICS, Paper - I

(English version)

(Parts A and B)

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

Instructions :

1. *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 write visibly and neatly.*
6. *There is an internal choice in section - III of **Part-A**.*

Part - A

Time : 2 Hours ***Marks : 30***

SECTION - I

(Marks : 4×1=4)

Note :

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

*(ii) Each question carries **1** mark.*

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

2. Write A = {1, 4, 9, 16, 25} in set-builder form.

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

4. Find the total surface area of a hemisphere, whose radius is 7 cm.

SECTION - II

(Marks : 5×2=10)

Note :

(i) Write answers to all questions.

*(ii) Each question carries **2** marks.*

5. Find the zeroes of the quadratic polynomial $x^2 - 2x - 8$ and verify the relationship between zeroes and co-efficients.

6. Which term of A.P. 21, 18, 15, ... is '– 81' ?

7. The curved surface area of a cone is 4070 cm^2 and its diameter is 70 cm.

   What will be its slant height?

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

9. Express as Algebraic expressions of the following.

   (i) Five times of a number, when increased by 10 gives 20.

   (ii) The digits in ones and tens places of a two digit number are 'x' and 'y'; then find the number.

SECTION - III

(Marks : 4×4=16)

Note :

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

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

10. *(a)* Solve the following pair of equations by reducing them to a pair of linear equations.

$$\frac{5}{x-1}+\frac{1}{y-2}=2, \quad \frac{6}{x-1}-\frac{3}{y-2}=1$$

OR

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

11. *(a)* Show that the cube of any positive integer is of 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 $A - B = B - A$.

12. *(a)* A manufacturer of TV sets produced 600 sets in the 3rd 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) The production in the 10 year.

(iii) Total production in first seven years.

OR

(b) There is a motor-boat, whose speed in still water is 18 km/h. It takes 1 hour more to go 24 km upstream than to return down-stream to the same spot. Find the speed of the stream.

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 4 m more than its width, is 36 m. Find the dimensions of the garden. (use graph).

This Question Paper contains 4 Printed Pages.

New Pattern

15E(B)

MATHEMATICS, Paper - I

(English version)

(Parts A and B)

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

Instructions : *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***

(i) *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.*

(ii) *Marks are* ***not*** *awarded for overwritten answers.*

(iii) *All questions carry equal marks.*

SECTION - IV *(Marks : 20 × ½ = 10)*

Note :

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

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

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

(A) $\frac{7}{3}$ (B) $\frac{8}{3}$

(C) $\frac{16}{7}$ (D) $\frac{17}{7}$

15. The value of $\log_{25} 5$ = ... [ ]

(A) $\frac{1}{2}$ (B) 2

(C) 5 (D) 25

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

(A) 1 (B) -1

(C) 2 (D) -2

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

18. If the roots of $x^2 + 6x + 5 = 0$ are α and β, then $\alpha + \beta$ = ... [ ]

(A) 5 (B) -6

(C) 6 (D) -1

19. Which term of G.P. 3, $3\sqrt{3}$, 9, ... equals to 243 ? [ ]

(A) 6 (B) 7

(C) 8 (D) 9

20. If $n(A) = 12$ and $n(A \cap B) = 5$, then find $n(A - B)$ = ... [ ]

(A) 4 (B) 7

(C) 17 (D) 0

21. If x, $x + 2$, $x + 6$ are three consecutive terms in G.P., find the value of 'x'. [ ]

(A) 3 (B) 4

(C) 2 (D) 1

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

23. If $a_n = \frac{n(n+3)}{n+2}$, then find a_{17}. [ ]

(A) $\frac{340}{20}$ (B) $\frac{341}{19}$

(C) $\frac{340}{19}$ (D) $\frac{341}{20}$

24. The curved surface area of a sphere will be ...., whose radius is 10 cm. [ ]

(A) $239\ \pi$ (B) $400\ \pi$

(C) $221\ \pi$ (D) $129\ \pi$

25. The volume of a cube will be ..... (in cm^3), whose total surface area is $216\ cm^2$. [ ]

(A) 216 (B) 196

(C) 212 (D) 144

26. A famous book written by ancient mathematician Aryabhata is ... [ ]

(A) Arya Tharkam (B) Aryabhatteeyam

(C) Siddhantha Siromani (D) Karana Kuthuhalam

27. The degree of the polynomial $\sqrt{2}\,x^2 - 3x + 1 =$ ..... [ ]

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

(C) 1 (D) 2

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) $2x + 3y = -13$

29. If $A = \{x : x$ is a letter in the word HEADMASTER$\}$; then its Roster form is ..... [ ]

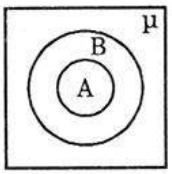
(A) $A = \{h, e, a, d, m, a, s, t, e, r\}$

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

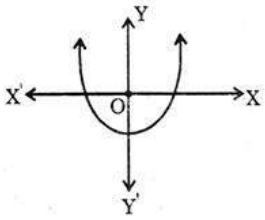
(C) $A = \{h, e, a, d, m, s, t, e, r\}$

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

30. The following Venn diagram indicates ..... [ ]



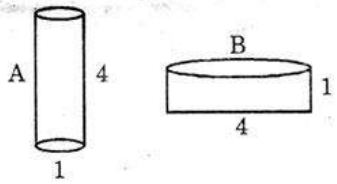
(A) $A \subset B$
(B) $B \subset A$
(C) A, B are disjoint sets.
(D) $\mu \subset B$

31. 

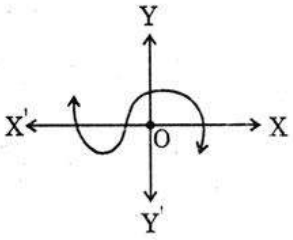
The adjacent diagram indicates .... [ ]

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

32. Which of the following vessel can be filled with more water (A, B are in cylindrical shape) ? [ ]



(A) A
(B) B
(C) Both are equal.
(D) can not be determined.

33. 

Number of zeroes can be identified by the adjacent figure. [ ]

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

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 is th

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

Question 3: Two angles are complementary and one angle is 18^o 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° - 18°
2x = 72°
x = 36°
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:
Total surface area of a hemisphere = $3\pi r^2$
Radius = 7 cm
= 3 * (22 / 7) * 7 * 7
= 3 * 22 * 7
= 21 * 22
= 462 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) => $x^2 - 2x - 8$
=> $x^2 - 4x + 2x - 8$
=> x (x - 4) + 2 (x - 4)
=> (x - 4) (x + 2) = 0
=> (x - 4) = 0 or (x + 2) = 0
=> x = 4 or x = -2
4 and -2 are the two zeroes of the polynomial $x^2 - 2x - 8$.

The relation between the zeroes and coefficients:

Sum of zeroes = $\alpha + \beta$

= 4 + (-2)
= 4 - 2
= 2 / 1
= coefficient of x / coefficient of x^2.

Product of zeroes = $\alpha \times \beta$
= 4 × -2
= -8 / 1
= constant term / coefficient of x^2

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

Solution:
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 35^{th} term of an AP.

Question 7: The curved surface area of a cone is 4070 cm^2 and its diameter is 70cm. What will be its slant height?

Solution:
Given that curved surface area of the cone is 4070cm^2
Diameter of cone = 70cm
Radius of cone = d / 2 = 70 / 2 = 35cm
Curved surface area of cone = πrl
$\pi rl = 4070$
(22 / 7) * 35 * l = 4070
22 * 5 * l = 4070

110 l = 4070
l = 4070 / 110
l = 37 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 × (tens place digit) + ones place digit,
Here, ones place digit = X and the tens place digit = Y,
Thus, the required two-digit number is,
10 × 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 ---- (1)
(6 / [x - 1]) - (3 / [y - 2]) = 1 ----- (2)
Let 1 / [x - 1] = u [from (1)]
1 / [y - 2] = v [from (2)]
The equations become,
5u + v = 2 ---- (3)
6u - 3v = 1 ----- (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 m = 7 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 m^3
Width= 7m
Outer radius of the embankment R = inner radius + width
Outer radius (R)= 7 + 7 = 14m
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)
= $22/7 \times 147$
= 22×21
= 462 m^2

The volume of embankment= volume of earth taken out on digging the well
Area of embankment × height of embankment= volume of earth dugout
Height of embankment= volume of earth dug out/area of the embankment
Height of the embankment = 2310 / 462
Height of embankment= 5 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 U B = B U 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,

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

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

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

$a = 9m + 1$ [where $m = 3q^3 + 3q^2 + q$).

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] AUB = {3, 4, 6, 8, 9, 12, 15, 16, 18, 20, 21}

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

B U A = A U 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 7^{th} year. Assuming that the production increases uniformly by a fixed number every year, find

[i] The production in the 1^{st} year.

[ii] Total production in the 10^{th} 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.

$a + 2d = 600$ ----- (1)

$a + 6d = 700$ ----- (2)

Subtracting equation (1) from (2),

$4d = 100$ or $d = 25$

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

$a = 550$

(a) Production in the first year = $a = 550$

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

(c) Total production in first 7 years = $a + (a + d) + (a + 2d) + ... + (a + 6d)$

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

$= 4375$

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

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

If x = -1

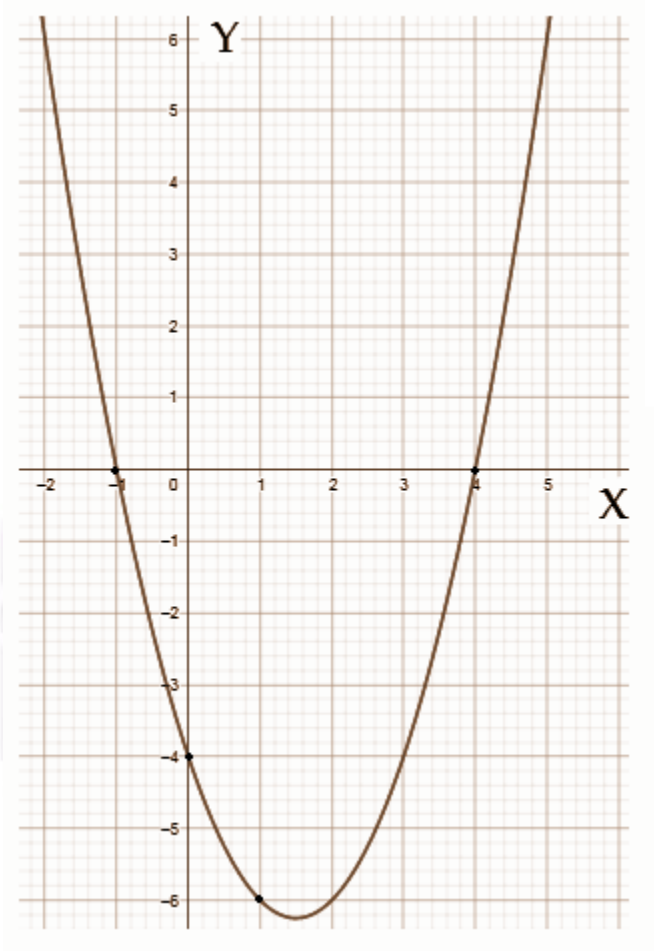
⇒ $y = y= (-1)^2 - 3(-1) - 4 = 1+3 - 4 = 0$

If x = 4

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

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 = 36m = (l+b)

Let breadth = x, length= 4x

Perimeter = 2 × 36 = 72m

Perimeter = 2 (l+b)

72 = 2 (4 + x + x)
36 = 4 + 2x
36 - 4 = 2x
32 = 2x
32 / 2 = x
16 = x
Breadth = 16
Length = x + 4 = 16 + 4 = 20

SECTION - IV

(20 * 0.5 = 10)

Question 14: A rational number that equals to (2.6[bar]) 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√3, 9 …… equals to 243?

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

Answer: D

Question 20: If n(A) = 12 and n(A ∩ 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 + √3 and 2 − √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 $\sqrt{2}x^2 - 3x + 1$ =
(A) √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

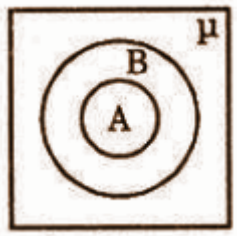
Answer: The set of equations should be two.

Question 29: If A = {x : x 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

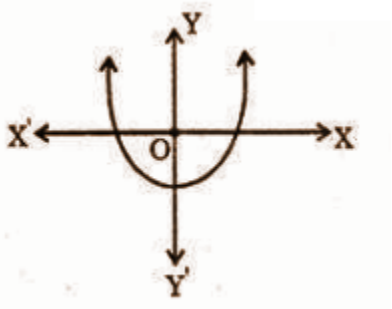
Question 30: The following Venn diagram indicates



(A) A ⊂ B
(B) B ⊂ A
(C) A, B are disjoint sets
(D) μ ⊂ B

Solution: B

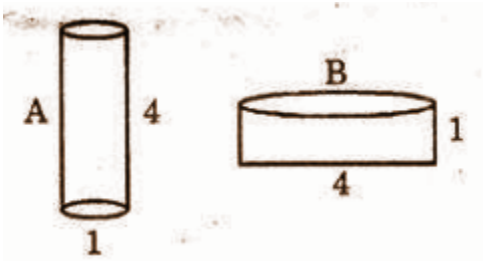
Question 31:



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

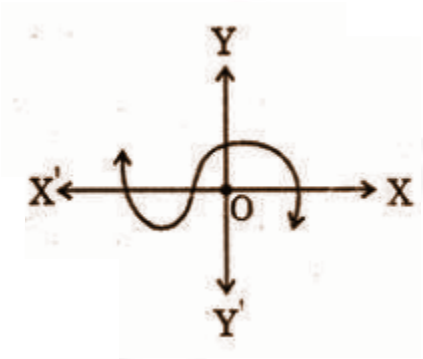
Question 32: Which of the following vessels can be filled with more water (A, B are in cylindrical shape)?



(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