(203 Questions)

Chapter 1 – Ratio, Proportion, Indices, Logarithm

RATIO & PROPORTION

Past Year Questions

PYQ May 18

(1) If $p : q$ is the sub-duplicate ratio of $p - x^2 : q - x^2$, then x^2 is

a. $\frac{p}{p+q}$ b. $\frac{q}{p+q}$

c. $\frac{qp}{p-q}$ d. None of these

PYQ Nov. 18

(2) $\frac{3x-2}{5x+6}$ the duplicate ratio of $\frac{2}{3}$ then find the value x:

a. 2 b. 6

c. 5 d. 9

PYQ Nov. 18

(3) If $x : y : z = 7 : 4 : 11$ then $\frac{x+y+z}{z}$ is

a. 2 b. 3

c. 4 d. 5

PYQ June 19

(4) If the ratio of two numbers is 7 : 11. If 7 is added to each number then the new ratio will be 2 : 3 then the numbers are.

a. 49,77 b. 42,45

c. 43,42 d. 39,40

PYQ Nov. 19

(5) ☆ The ratio of two numbers are 3 : 4. The difference of their squares is 28 greater no. is:

a. 8 b. 12

c. 24 d. 64

PYQ Nov. 19

(6) ☆ The price of scooter and moped are in the ratio 7 : 9. The price of moped is ₹ 1,600 more than that of scooter. Then the price of moped is:

a. ₹ 7,200 b. ₹ 5,600

c. ₹ 800 d. ₹ 700

PYQ Nov. 20

(7) If $a : b = 3 : 7$, then $3a + 2b : 4a + 5b = ?$

a. 23 : 47 b. 27 : 43

c. 24 : 51 d. 29 : 53

PYQ Nov. 20

(8) ☆ The ratio of number of boys and the number of girls in a school is found to be 15 : 32. How many boys and equal number of girls should be added to bring the ratio to 2/3?

a. 19 b. 20

c. 23 d. 27

PYQ Jan. 21

(9) In a certain business A and B received profit in a certain ratio B and C received profits in the same ratio. If A gets ₹ 1600 and C gets ₹ 2500 then how much does B get?

a. ₹ 2,000 b. ₹ 2,500

c. ₹ 1,000 d. ₹ 1,500

PYQ Jan. 21

(10) The ratio of two quantities is 15 : 17. If the consequent of its inverse ratio is 15, then the antecedent is;

a. 15 b. $\sqrt{15}$

c. 17 d. 14

PYQ July 21

(11) The salaries of A,B and C are in the ratio 2 : 3 : 5. If increments of 15%, 10% and 20% are allowed respectively to their salary, then what will be the new ratio of their salaries?

a. 23 : 33 : 60 b. 33 : 23 : 60

c. 23 : 60 : 33 d. 33 : 60 : 23

PYQ July 21

(12) If $A : B = 5 : 3$, $B : C = 6 : 7$ and $C : D = 14 : 9$ then the value of $A : B : C : D$ is:

a. 20 : 14 : 12 : 9 b. 20 : 9 : 12 : 14

c. 20 : 9 : 14 : 12 d. 20 : 12 : 14 : 9

PYQ July 21

(13) ☆ A vessel contained a solution of acid and water in which water was 64%. Four liters of the solution were taken out of the vessel and the same quantity of water was added. If the resulting solution contains 30% acid, the quantity (in liters) of the solution, in the beginning in the vessel, was

a. 12 b. 36

c. 24 d. 2

PYQ Dec. 21

(14) ☆ Incomes of R and S are in the ratio 7 : 9 and their expenditures are in the ratio 4 : 5. Their total expenditure is equal to income of R. What is the ratio of their savings?

a. 23 : 36 b. 28 : 41

c. 31 : 43 d. 35 : 46

PYQ Dec. 21

(15) ☆ A bag contains 105 coins containing some 50 paise, and 25 paise coins. The ratio of the number of these coins is 4 : 3. The total value (in ₹) in the bag is

a. 43.25 b. 41.25
c. 39.25 d. 35.25

PYQ Dec. 21

(16) In a department, the number of males and females are in the ratio 3 : 2. If 2 males and 5 females join the department, then the ratio becomes 1 : 1. Initially, the number of females in the department is

a. 9 b. 6
c. 3 d. 8

PYQ June 22

(17) A box contains 25 paise coins and '10' paise coins and 5 paise coins in ratios 3 : 2 : 1 and total money is ₹ 40. How many '5' paise coins are there?

a. 65 b. 55
c. 40 d. 50

PYQ June 22

(18) If $x : y = 4 : 6$ and $z : x = 4 : 16$ find Y?

a. 4 b. 6
c. 16 d. 1

PYQ Dec 22

(19) ☆ A group of 400 soldiers posted at border area had a provision for 31 days. After 28 days 280 soldiers from this group were called back. Find the number of days for which the remaining ration will be sufficient?

a. 3 b. 6
c. 8 d. 10

PYQ May 18

(20) The mean proportional between 24 and 54 is:

a. 33 b. 34
c. 35 d. 36

PYQ Nov 20

(21) If $a : b = 9 : 4$, then $\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}} = ?$

a. 3/2 b. 2/3
c. 6/13 d. 13/6

PYQ June 24

(22) A fraction becomes 1, when 3 are added to the numerator and 1 is added to the denominator, but when the numerator and denominator are decreased by 2 and 1, respectively, it becomes 1/2. The denominator of the fraction is:

a. 5 b. 6
c. 7 d. 8

PYQ June 24

(23) If the four number 1/4, 1/6, 1/10, and 1/x are proportional, then what is the value of x?

a. 14 b. 15
c. 10 d. 1/12

PYQ Sep 24

(24) The ratio of income of A and B is 5: 4 and their expenditure is 3 : 2. If at the end of the year each saves ₹ 1,600, then the income of A is:

a. ₹ 3,600 b. ₹ 3,400
c. ₹ 4,000 d. ₹ 4,400

PYQ Sep 24

(25) The mean proportional between $12x^2$ and $27y^2$ is:

a. 81xy b. 18xy
c. 8xy d. 19.5xy

Answer Key

1	d	2	b	3	a
4	a	5	a	6	a
7	a	8	a	9	a
10	c	11	a	12	d
13	c	14	d	15	b
16	b	17	c	18	b
19	d	20	d	21	d
22	c	23	b	24	c
25	b				

RATIO & PROPORTION

Mock Test Paper Questions

MTP May 18

(1) P, Q and R three cities. The ratio of average temperature between P and Q is 11: 12 and that between P and R is 9:8. The ratio between the average temperature Q and R

a. 22:27 b. 27:22
c. 32:33 d. None of these

MTP Nov 18

(2) ☆ For $p, q, r, s > 0$ the value of each ratio is

$$\frac{p}{q+r}=\frac{q}{r+s}=\frac{r}{s+p}=\frac{s}{p+q}$$

a. 1/2 b. 1/3
c. 1/4 d. 1

MTP Nov 18

(3) ☆ Let x, y and z are three positive numbers and $P=\frac{x+y+z}{2}$; if (p-x): (p-y): (p-z) = 3:5:7 then the ratio of x:y:z is

a. 4:5:6 b. 6:5:4
c. 3:5:7 d. 7:5:3

MTP May 19

(4) The ratio compounded of 2:3, 9:4, 5:6 and 8:10 is

a. 1: 1 b. 1:5
c. 3: 8 d. None of these

MTP May 19

(5) The sub-triplicate ratio of 8: 27

a. 27: 8 b. 24: 81
c. 2: 3 d. none of these

MTP May 19 Series II

(6) ☆ If x:y:z = 2: 3 : 5 if x + y + z = 60 ,then the value of z

a. 30 b. 15
c. 9 d. 12

MTP May 19 Series II

(7) The ratio of two numbers is 15:19. If a certain number is added to each term of the ratio it become 8:9. What is the number added to each of the ratio?

a. 6 b. 15
c. 17 d. 23

MTP Nov 19

(8) The ratio of the earnings of two persons 3:2. If each saves 1/5th of their earnings, the ratio of their saving

a. 2:3 b. 3:2
c. 4:5 d. 5:4

MTP Nov 19

(9) ☆ If x+y, y+z, z+x are in the ratio 6:7:8 and x + y + z =14 then the value of x is.

a. 6 b. 7
c. 8 d. 10

Note: None of the options given in MTP are correct. The right one is 14/3

MTP May 20

(10) ☆ The ratio of the prices of two houses was 16:23. Two years later when the price of the first has increased by 10% and that of the second by ₹477, the ratio of the prices becomes 11:20. Find the original prices of the two houses.

a. ₹ 848, ₹ 1,219
b. ₹ 838, ₹ 1,119
c. ₹ 828, ₹ 1,219
d. ₹ 848, ₹ 1,229

MTP May 20

(11) If a: b = 3:4, the value of (2a + 3b) : (3a + 4b) is

a. 54 : 25 b. 8 : 25
c. 17 : 24 d. 18 : 25

MTP Nov 20

(12) If x: y = 2: 3, then find (5x+2y): (3x-y)

a. 13/3 b. 16/3
c. 19/3 d. 7/3

MTP Nov 20

(13) ☆ A bag contains ₹187 in the form 1 rupee, 50 paise and 10 paise coins in the ratio 3:4:5. Find the number of each type of coins.

a. 102, 136, 170
b. 136, 102, 170
c. 170, 102, 136
d. None of these

MTP Nov 20

(14) ☆ The ratio of the speed of the two trains is 2: 5. If the distances they travel are in the ratio 5: 9, find the ratio of times taken by them.

a. 2:9 b. 18:25
c. 25:18 d. 10:45

MTP March 21

(15) Two nos. are in the ratio 7: 8 if 3 is added to each of them, ratio becomes 8:9, the no. are

a. 14,16 b. 24,27
c. 21,24 d. 16,18

MTP Apr 21

(16) The ratio of the number of boys and girls in a school is 2:5. if there are 280 students in the school, find number of girls in the school

a. 200 b. 250
c. 150 d. 100

MTP Apr 21

(17) ☆ If $\frac{p}{q}=-\frac{2}{3}$, then the value of $\frac{2p+q}{2p-q}$ is:

a. 1 b. -1/7
c. 1/7 d. 7

MTP Nov 21

(18) The salaries of A, B and C are of ratio 2:3:5. if the increments of 15%, 10% and 20% are done their respective salaries, then find new salaries.

a. 23: 33: 60 b. 33: 23: 60
c. 23: 60: 33 d. 33: 60: 23

MTP Nov 21

(19) The salary of P is 25% lower than that of Q and the salary of R is 20% higher than Q, the ratio of salary of R and P will be :

a. 5: 8 b. 8: 5
c. 5: 3 d. 3: 5

MTP Oct 21

(20) ☆ If $x: y = 3: 5$, then find $\left(\frac{1}{x}+\frac{1}{y}\right):\left(\frac{1}{x}-\frac{1}{y}\right)$

a. 2 b. 4
c. 6 d. 8

MTP Oct 21

(21) If A: B = 3: 4 and B: C= 7: 9, C: D = 2: 3 and D is 50% more than E, find the ratio between A and E

a. 2: 3 b. 7:12
c. 3: 5 d. 4: 5

MTP March 22

(22) If A: B = 2: 5, then (10A + 3B): (5A + 2B) is equal to

a. 7: 4 b. 7: 3
c. 6: 5 d. 7: 9

MTP March 22

(23) The ratio compounded of 4: 5 and sub-duplicate of a: 9 is 8: 15. Then value of "a" is

a. 2 b. 3
c. 4 d. 5

MTP March 22

(24) If $\frac{3x-2}{5x-6}$ is the duplicate ratio of 2/3 then the value of 'x ' is

a. 2 b. -6/7
c. 5 d. 9

MTP June 22

(25) If $x: y = 2: 3$, then $(5x+2y): (3x-y) =$

a. 19: 3 b. 16:3
c. 7:2 d. 7:3

MTP June 22

(26) A person has asset worth of ₹ 1,48,200. He wish to divide it amongst his wife, son and daughter in the ratio 3: 2: 1 respectively. From this assets share of his son will be:

a. ₹ 24,700 b. ₹ 49, 400
c. ₹ 74,100 d. ₹ 37,050

MTP June 22

(27) ☆ X, Y, Z together starts a business, if X invests 3 times as much as Y invests and Y invests two third of what Z invests, then the ratio of capitals of X, Y, Z is

a. 3: 9: 2 b. 6: 3: 2
c. 3: 6: 2 d. 6: 2: 3

MTP Dec 22 – Series I

(28) A bag contains 25 paise, 10 paise, and 5 paise in a ratio of 3: 2: 1. The total value of ₹ 40, the number of 5 paise coins is

a. 45 b. 48
c. 40 d. 20

MTP Dec 22 – Series I

(29) What must be added to each term of the ratio 49: 68. So that it becomes 3: 4?

a. 3 b. 5
c. 8 d. 9

MTP Dec 22 Series II

(30) The ratio of two numbers are 3: 4. The difference of their squares is 28. Greater number is:

a. 8 b. 12
c. 24 d. 64

MTP Dec 22 Series II

(31) ☆ The price of scooter and moped are in the ratio 7: 9. The price of moped is ₹ 1600 more than that of scooter. Then the price of moped is:

a. ₹ 7200 b. ₹ 5600
c. ₹ 800 d. ₹ 700

MTP June 2023 Series I

(32) Four persons A, B, C, D wish to share a sum in the ratio of 5:2:4:3. If D gets ₹ 1000 less than C, then the share of B?

a. 2000 b. 1200
c. 2400 d. 3000

MTP June 2023 Series II

(33) C The monthly incomes of A & B are in the ratio 4 : 5 are their monthly expenditures are in the ratio 5 : 7. If each saves ₹ 150 per month, find their monthly incomes.

a. (40, 50) b. (50, 40)

c. (400, 500) d. None of these

MTP June 2023 Series II

(34) ☆ Two vessels containing water and milk in the ratio 2 : 3 and 4 : 5 are mixed in the ratio 1 : 2. The ratio of milk and water in the resulting mixture.

a. 58 : 77 b. 77 : 58
c. 68 : 77 d. None of these

MTP June 2023 Series II

(35) If $(x-9):(3x+6)$ is the duplicate ratio of 4 : 9, find the value of x

a. $x=9$ b. $x=16$
c. $x=36$ d. $x=25$

MTP May 18

(36) The third proportional between (a^2-b^2) and $(a+b)^2$ is:

a. $\frac{a+b}{a-b}$ b. $\frac{a-b}{a+b}$
c. $\frac{(a-b)^2}{a+b}$ d. $\frac{(a+b)^3}{a-b}$

MTP May 19

(37) If $\frac{p}{q}=\frac{r}{s}=\frac{p-r}{q-s}$, the process is called

a. Subtrahendo b. Componendo
c. Alternendo d. none of these

MTP May 19 Series II

(38) If $\frac{a}{3}=\frac{b}{4}=\frac{c}{5}$ then $\frac{2a+3b+2c}{4a-b+2c}$ is

a. $\frac{11}{19}$ b. $\frac{17}{19}$
c. $\frac{14}{9}$ d. $\frac{19}{7}$

MTP Nov 19

(39) The third proportional to 15 and 20 is

a. 80/3 b. 80
c. 80/7 d. 120

MTP March 21

(40) Which of the numbers are not in proportions?

a. 6,8,5,7 b. 7,3,14,6
c. 18,27,12,18 d. 8,6,12,9

MTP Apr 21

(41) The third proportional to 9 and 25

a. 80/3 b. 80
c. 80/7 d. None of these

MTP Nov 21

(42) If A: B = 5: 3, B: C = 6: 7 and C: D = 14: 9 then the value of A: B: C: D

a. 20: 14: 12: 9 b. 20: 9: 12: 14
c. 20: 9: 14: 12 d. 20: 12: 14: 9

MTP Dec 22 – Series I

(43) If $\frac{p}{q}=\frac{2}{3}$ then the value of $\frac{2p+q}{2p-q}$

a. $\frac{1}{7}$ b. $-\frac{1}{7}$
c. 1 d. 7

MTP Dec 22 – Series II

(44) ☆ A sum of money is to be distributed among A, B, C, D in the proportion of 5: 2: 4: 3. If C gets ₹ 1,000 more than D, what is B's share?

a. ₹ 2,000 b. ₹ 1,500
c. ₹ 2,500 d. ₹ 1,000

MTP Jun 23 – Series I

(45) Four persons A, B, C, D wish to share a sum in the ratio of 5:2:4:3. If D gets ₹ 1000 less than C, then the share of B?

a. 2000 b. 1200
c. 2400 d. 3000

MTP Jun 23 – Series I

(46) The mean proportional between $12x^2$ and $27y^2$

a. 18 xy b. 81 xy
c. 8xy d. 9xy

MTP Jun 23 – Series II

(47) The monthly incomes of A & B are in the ratio 4 : 5 are their monthly expenditures are in the ratio 5 : 7. If each saves ₹ 150 per month, find their monthly incomes.

a. (40, 50) b. (50, 40)
c. (400, 500) d. None of these

MTP Jun 23 – Series II

(48) Two vessels containing water and milk in the ratio 2 : 3 and 4 : 5 are mixed in the ratio 1 : 2. The ratio of milk and water in the resulting mixture.

a. 58 : 77 b. 77 : 58
c. 68 : 77 d. None of these

MTP Jun 23 – Series II

(49) If $(x-9):(3x+6)$ is the duplicate ratio of 4 : 9, find the value of x

a. $x=9$ b. $x=16$
c. $x=36$ d. $x=25$

MTP Dec 2023 Series I

(50) What is the value of $\frac{p+q}{p-q}$ if $\frac{p}{q}=7$

a. 4/3 b. 2/3
c. 2/6 d. 7/8

MTP Dec 2023 Series I

(51) If $x/2=y/3=z/7$, ,then the value of $(2x-5y+4z)/2y$ is

a. 6/23 b. 23/6
c. 3/2 d. 17/6

MTP Dec 2023 Series II

(52) If four numbers $\frac{1}{2},\frac{1}{3},\frac{1}{5},\frac{1}{x}$ are proportional then x =

a. $\frac{6}{5}$ b. $\frac{5}{6}$
c. 15/2 d. None of these

MTP Dec 2023 Series II

(53) ☆ A box contains 276 coins of 5 rupees, 2 rupees and 1 rupee. The value of each kind of coins are in the ratio 2:3:5 respectively. The number of 2 rupees coin is

a. 52 b. 62
c. 76 d. 85

MTP Dec 2023 Series II

(54) What must be added to each term of the ratio 49 : 68, so that it becomes 3 : 4 ?

a. 3 b. 5
c. 8 d. 9

MTP June 24 Series I

(55) The students in three classes are in the ratio 2 : 3 : 5. If 40 students are increased in each class the ratio changes to 4 : 5 : 7. Originally the total number of students was

a. 180 b. 400
c. 100 d. 200

MTP June 24 Series I

(56) A bag contains coins of denominations 1 rupee, 2 rupee and 5 rupees. Their numbers are in the ratio 4:3:2. If bag has total of Rs. 1800 then find the number of 2 rupee coins?

a. 270 b. 230
c. 180 d. 210

MTP June 24 Series II

(57) The expenditures and savings of a person are in the ratio 4:1. If his savings are increased by 25% of his income, then what is the new ratio of his expenditure and savings ?

a. 11:9 b. 8:5
c. 7:5 d. 7:4

MTP June 24 Series III

(58) P, Q and R three cities. The ratio of average temperature between P and Q is 11: 12 and that between P and R is 9:8. The ratio between the average temperature Q and R

a. 22 : 27 b. 27 : 22
c. 32 : 33 d. None of these

MTP June 24 Series III

(59) The third proportional between (a^2-b^2) and $(a+b)^2$ is:

a. $\frac{a+b}{a-b}$ b. $\frac{a-b}{a+b}$
c. $\frac{(a-b)^2}{a+b}$ d. $\frac{(a+b)^3}{a-b}$

RTP Sep 24

(60) If 1/2, 1/3 ,1/5 and 1/x are in proportion, then the value of x will be

a. 15/2 b. 6/5
c. 10/3 d. 5/6

MTP Sep 24 Series I

(61) What is the value of $\frac{p+q}{p-q}$ if $\frac{p}{q}=7$

a. 2/3 b. 4/3
c. 2/6 d. 7/8

MTP Sep 24 Series I

(62) If four no. $\frac{1}{2},\frac{1}{3},\frac{1}{5},\frac{1}{x}$ are proportional then x =

a. $\frac{6}{5}$ b. $\frac{5}{6}$
c. $\frac{15}{2}$ d. None of these

MTP Sep 24 Series I

(63) The ratio of number of boys and number of girls in a school is found to be 15:32. How many boys and equal number of girls should be added to bring the ratio to 2/3?

a. 19 b. 20
c. 23 d. 27

MTP Sep 24 Series II

(64) ☆ A bag contains 23 number of coins in the form of 1 rupee, 2 rupee and 5 rupee coins. The total sum of the coins is ₹ 43. The ratio between 1 rupee and 2 rupees coins is 3 : 2, Then the number of 1 rupee coins.

a. 12 b. 8
c. 10 d. 16

Answer Key

1	b	2	a	3	b
4	a	5	c	6	a
7	c	8	b	9	b
10	a	11	d	12	b
13	a	14	c	15	c
16	a	17	c	18	a
19	b	20	b	21	b
22	a	23	c	24	b
25	b	26	b	27	d
28	c	29	c	30	a
31	a	32	a	33	c
34	b	35	d	36	d
37	a	38	c	39	a
40	a	41	d	42	d
43	d	44	a	45	a
46	a	47	c	48	b
49	d	50	a	51	d
52	c	53	b	54	c
55	d	56	a	57	a
58	b	59	d	60	a
61	b	62	c	63	a
64	a				

INDICES

Past Exam Questions

PYQ May 18

(1) ☆ $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n}$

a. $\frac{1}{2}$ b. $\frac{3}{2}$

c. $\frac{2}{3}$ d. $\frac{1}{3}$

PYQ Nov. 18

(2) ☆ $\frac{2^{m+1} \times 3^{2m-n+3} \times 5^{n+m+4} \times 6^{2n+m}}{6^{2m+n} \times 10^{n+1} \times 15^{m+3}}$

a. 3^{2m-2n} b. 6

c. 1 d. None of these

PYQ June 19

(3) If $2^{x^2} = 3^{y^2} = 12^{z^2}$ then

a. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{z^2}$ b. $\frac{1}{x^2} + \frac{2}{y^2} = \frac{1}{z^2}$

c. $\frac{2}{x^2} + \frac{1}{y^2} = \frac{1}{z^2}$ d. None of these

PYQ June 19

(4) If $P = x^{1/3} + x^{-1/3}$ then $P^3 - 3P =$

a. 3 b. $\frac{1}{2}\left(x + \frac{1}{x}\right)$

c. $\left(x + \frac{1}{x}\right)$ d. $2\left(x + \frac{1}{x}\right)$

PYQ Nov. 19

(5) ☆ Value of $\left[9^{n+\frac{1}{4}} \cdot \frac{\sqrt{3.3^n}}{3.\sqrt{3^{-n}}}\right]^{\frac{1}{n}}$

a. 9 b. 27

c. 81 d. 3

PYQ Nov. 19

(6) ☆ If $X = \sqrt{3} + \frac{1}{\sqrt{3}}$ then $\left(X - \frac{\sqrt{126}}{\sqrt{42}}\right)$

$\left(X - \frac{1}{x - \frac{2\sqrt{3}}{3}}\right) = ?$

a. 5/6 b. 6/5

c. 2/3 d. -3/5

PYQ Nov. 20

(7) Find the value of a from the following:

$\sqrt{(9)^{-5}} \times \sqrt{(3)^{-7}} - \sqrt{(3)^{-a}}$

a. 11 b. 13

c. 15 d. 17

PYQ Jan. 21

(8) Find the value of $3t^{-1} / t^{-1/3}$

a. $\frac{3}{t^{2/3}}$ b. $\frac{3}{t^{3/2}}$

c. $\frac{3}{t^{1/3}}$ d. $\frac{3}{t^2}$

PYQ July 21

(9) ☆ If $xy + yz + zx = -1$ then the value of $\left(\frac{x+y}{1+xy} + \frac{z+y}{1+zy} + \frac{x+z}{1+zx}\right)$ is:

a. xyz b. $\frac{-1}{yz}$

c. $\frac{1}{xyz}$ d. $\frac{1}{x+y+z}$

PYQ Dec. 21

(10) ☆ Let $a = (\sqrt{5}+\sqrt{3})/(\sqrt{5}-\sqrt{3})$ and $b=(\sqrt{5}-\sqrt{3})/(\sqrt{5}+(\sqrt{3})$. What is the value of a^2+b^2?

a. 64 b. 62
c. 60 d. 254

PYQ Dec. 21

(11) The value of $\frac{6^{n+4}+3^{n+3}\times 2^{n+3}}{5\times 6^n+6^n}$ is

a. 232 b. 242
c. 252 d. 262

PYQ Dec. 21

(12) ☆ If $\left(\frac{3a}{2b}\right)^{2x-4}=\left(\frac{2b}{3a}\right)^{2x-4}$, for some a and b, then the value of x is

a. 8 b. 6
c. 4 d. 2

PYQ Dec. 21

(13) The value of $\left(1-\sqrt[3]{0.027}\left(\frac{5}{6}\right)\left(\frac{1}{2}\right)^2\right)$ is

a. 11/16 b. 13/16
c. 15/16 d. 1

PYQ June 22

(14) If $(\sqrt{3})^{18}=(\sqrt{9})^x$, find x?

a. 18 b. 9
c. 8 d. 19

PYQ Dec 22

(15) By simplifying $(2a^3b^4)^6/\left[(4a^3b)^2\times(a^2b^2)\right]$, the answer will be:

a. $4a^2b^3$ b. $4a^6b^4$
c. $4a^{10}b^{10}$ d. $4a^{10}b^{20}$

PYQ Jun 23

(16) ☆ If $\sqrt[3]{a}+\sqrt[3]{b}+\sqrt[3]{c}=0$ then the value of $\left(\frac{a+b+c}{3}\right)^3$ is equal to

a. abc b. 9abc
c. 1/(abc) d. (1/9)abc

PYQ Jun 23

(17) If $x=y^a, y=z^b, z=x^c$, then the value of abc is

a. 1 b. 2
c. 3 d. 4

PYQ Dec 23

(18) ☆ If $2^x=4^y=8^z$ and $\frac{1}{2x}+\frac{1}{4y}+\frac{1}{6z}=\frac{24}{7}$, then the value of z is:

a. $\frac{7}{16}$ b. $\frac{7}{32}$
c. $\frac{7}{48}$ d. $\frac{7}{64}$

PYQ Dec 23

(19) If $\frac{9^n\times 3^5\times(27)^5}{3\times(81)^4}=27$, then the value of n is

a. 2 b. 0
c. 3 d. 4

PYQ Dec 23

(20) Given $x=\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ and $y=\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ Then find the value of $\frac{1}{x^2}+\frac{1}{y^2}$

a. 63 b. 61
c. 62 d. 60

PYQ June 24

(21) If $2^x=4^y=8^z$ and $\frac{1}{2x}+\frac{1}{4y}+\frac{1}{6z}=\frac{24}{7}$ then the value of z is:

a. 7/16 b. 7/32
c. 7/48 d. 7/64

PYQ Sep 24

(22) What is the value of $\left(\frac{x^b}{x^c}\right)^{(b+c-a)}\times\left(\frac{x^c}{x^a}\right)^{(c+a-b)}\times\left(\frac{x^a}{x^b}\right)^{(a+b-c)}$

a. $x^{(a+b+c)}$ b. x^{abc}
c. -1 d. 1

Answer Key

1	b	2	c	3	c
4	c	5	b	6	a
7	d	8	a	9	c
10	b	11	c	12	d
13	c	14	b	15	d
16	a	17	a	18	c
19	b	20	c	21	c
22	d				

INDICES

Mock Test Paper Questions

MTP Nov 18

(1) If $x=\sqrt{\sqrt{6}+6+\left(\sqrt{7+2\sqrt{6}}\right)}-\sqrt{6}$ then the value of x is

a. 1 b. 2
c. 3 d. 6

MTP May 19, ICAI SM

(2) The value of

$$\left(\frac{x^a}{x^b}\right)^{(a^2+ab+b^2)}\times\left(\frac{x^b}{x^c}\right)^{(b^2+bc+c^2)}\times\left(\frac{x^c}{x^a}\right)^{(c^2+ac+a^2)}$$

a. 1 b. 0
c. -1 d. None of these

MTP May 19 Series II

(3) Simplify $\frac{2^n+2^{n-1}}{2^{n+1}+2^n}=$

a. 2^{n+2} b. 2^n
c. 2 d. 1/2

MTP May 19 Series II

(4) If $2^a=3^b=12^c$ then $\frac{1}{a}+\frac{1}{b}=$

a. $\frac{1}{c}$ b. $\frac{1}{c}-\frac{1}{a}$
c. $-\frac{1}{c}$ d. 0

MTP Nov 19

(5) If $2^x=3^y=6^z$ then $\frac{1}{x}+\frac{1}{y}=$

a. $\frac{1}{z}$ b. $\frac{1}{z}-\frac{1}{x}$
c. $\frac{1}{z}+\frac{1}{x}$ d. 0

MTP May 20

(6) ☆ $5^{16}+125^5$ is divisible by which of the following

a. 5 b. 6
c. 8 d. 9

Note: Conceptually option a and b both are correct. As per answer key we will choose option b

MTP May 20

(7) ☆ If $pqr=a^x$, $qrs=a^y$ and $rsp=a^z$, then find the value of $(pqrs)^{1/2}$

a. $a^{(x+y+z)}$ b. $a^{\sqrt{(x+y+z)}}$
c. $a^{\sqrt[4]{(x+y+z)}}$ d. $\left(a^{(x+y+z)}\right)^{1/4}$

MTP Nov 20

(8) ☆ Find the value of $(x+y)$, if

$$\left(x+\frac{y^3}{x^2}\right)^{-1}-\left(\frac{x^2}{y}+\frac{y^2}{x}\right)^{-1}+\left(\frac{x^3}{y^2}+y\right)^{-1}=\frac{1}{3}$$

a. 1/3 b. 3
c. 1/2 d. 2

MTP March 21, PYQ May 18

(9) The Value of $\frac{2^n+2^{n-1}}{2^{n+1}-2^n}$ is

a. 1/2. b. 3/2
c. 2/3 d. 2

MTP March 21

(10) If $3^x=5^y=75^z$ then

a. $x+y-z=0$ b. $\frac{2}{x}+\frac{1}{y}=\frac{1}{z}$
c. $\frac{1}{x}+\frac{2}{y}=\frac{1}{z}$ d. $\frac{2}{x}+\frac{1}{z}=\frac{1}{y}$

MTP Dec 23 Series II

(11) If $(25)^{150}=(25x)^{50}$; then the value of x will be:

a. 5^3 b. 5^4
c. 5^2 d. 5

MTP Apr 21

(12) $\left(\frac{\sqrt{3}}{9}\right)^{5/2}\left(\frac{9}{3\sqrt{3}}\right)^{7/2}\times 9$ is equal to

a. 1 b. $\sqrt{3}$
c. $3\sqrt{3}$ d. $\frac{3}{9\sqrt{3}}$

MTP Oct 21

(13) Find the value of $\sqrt{6561}+\sqrt[4]{6561}+\sqrt[8]{6561}$

a. 81 b. 93
c. 121 d. 243

MTP Oct 21

(14) If $\frac{8^n\times 2^3\times 16^{-1}}{2^n\times 4^2}=\frac{1}{4}$ then the value of n

a. 1 b. 3
c. 3/2 d. 2/3

MTP March 22

(15) If $p = x^{1/3} + x^{-1/3}$ then find value of $3p^3 - 9p$

a. 3 b. $1/2(x+1/x)$

c. $3(x+1/x)$ d. $2(x+1/x)$

MTP March 22

(16) The value of $\frac{(3^{n+1}+3^n)}{(3^{n+3}-3^{n+1})}$ is equal to

a. 1/5 b. 1/6

c. ¼ d. 1/9

MTP March 22

(17) The value of

☆ $\frac{x^2-(y-z)^2}{(x+z)^2-y^2} + \frac{y^2-(x-z)^2}{(x+y)^2-z^2} + \frac{z^2-(x-y)^2}{(y+z)^2-x^2}$ is

a. 0 b. 1

c. -1 d. ∞

MTP March 22

(18) If $abc = 2$ then the value of

☆ $\frac{1}{1+a+2b^{-1}} + \frac{1}{1+\frac{1}{2}b+c^{-1}} + \frac{1}{1+c+a^{-1}}$ is

a. 1 b. 2

c. 3 d. 1/2

MTP June 22

(19) If $(25)^{150} = (25x)^{50}$, then the value of x will be:

a. 5^3 b. 5^4

c. 5^2 d. 5

MTP June 22

(20) The value of

$\left(\frac{y^a}{y^b}\right)^{a^2+ab+b^2} \times \left(\frac{y^b}{y^c}\right)^{b^2+bc+c^2} \times \left(\frac{y^c}{y^a}\right)^{c^2+ca+a^2}$ is

equal to

a. y b. -1

c. 1 d. none of these

MTP Nov 22 – Series I

(21) $\left(\frac{\sqrt{3}}{9}\right)^{5/2} \left(\frac{9}{3\sqrt{3}}\right)^{7/2} \times 9$ is equal to

a. 1 b. $\sqrt{3}$

c. $3\sqrt{3}$ d. $\frac{3}{9\sqrt{3}}$

MTP Nov 22 – Series I

(22) Find The value of $\frac{3t^{-1}}{t^{-\frac{1}{3}}}$

a. $\frac{3}{t^{\frac{2}{3}}}$ b. $\frac{3}{t^{\frac{3}{2}}}$

c. $\frac{3}{t^{\frac{1}{3}}}$ d. $\frac{3}{t^2}$

MTP Nov 22 – Series I

(23) If $2^x \times 3^y \times 5^z = 720$ then the value of x, y, z?

a. 4,2,1 b. 1,2,4

c. 2,4,1 d. 1,4,2

MTP Nov 22 Series II

(24) Value of $\left[9^{n+\frac{1}{4}} \frac{\sqrt{3.3^n}}{3.\sqrt{3^{-n}}}\right]^{\frac{1}{n}}$

a. 9 b. 27

c. 81 d. 3

MTP June 23 Series I

(25) The value of $\frac{64(b^4a^3)^6}{\left[4(a^3b)^2 \times (ab)^2\right]}$

a. $16a^{10}b^{20}$ b. $4a^{20}b^{10}$

c. $8a^{10}b^{20}$ d. $4a^{10}b^{20}$

MTP June 23 Series II

(26) Value of $\frac{(a^{1/8}+a^{-1/8})(a^{1/8}-a^{-1/8})\times}{(a^{1/4}+a^{-1/4})(a^{1/2}+a^{-1/2})}$ is:

a. $a+\frac{1}{a}$ b. $a-\frac{1}{a}$

c. $a^2+\frac{1}{a^2}$ d. $a^2-\frac{1}{a^2}$

MTP June 23 Series II

(27) If $(25)^{150} = (25x)^{50}$ then the value of x will be

a. 5^3 b. 5^4

c. 5^2 d. 5

MTP Dec 2023 Series I

(28) If $x:y = 3:4$, the value of $x^2y + xy^2 : x^3 + y^3$ is

a. 13:12 b. 12:13

c. 21:31 d. None of these

MTP Dec 2023 Series I

(29) If $a^x = b, b^y = c, c^z = a$, then xyz is

a. 1 b. 2

c. 3 d. None of these

MTP Dec 23 Series II

(30) If $x = 2+\sqrt{3}$ and $y = 2-\sqrt{3}$ then value of $x^2 + y^2 =$

a. 14 b. 4
c. 2 d. 6

RTP Sep 24

(31) If $p = x^{1/3} + x^{-1/3}$, then find value of $3p^3 - 9p$

a. 3 b. $1/2(x+1/x)$
c. $(x+1/x)$ d. $2((x+1/x))$

MTP Sep 24 Series I

(32) If $x = 2+\sqrt{3}$ and $y = 2-\sqrt{3}$ then value of $x^2 + y^2 =$

a. 14 b. 4
c. 2 d. 6

MTP Sep 24 Series II

(33) On Simplification

C $\frac{1}{1+z^{a-b}+z^{a-c}} + \frac{1}{1+z^{b-c}+z^{b-a}} + \frac{1}{1+z^{c-a}+z^{c-b}}$ would reduces to

a. $\frac{1}{z^2(a+b+c)}$ b. $\frac{1}{z(a+b+c)}$
c. 1 d. 0

MTP Sep 24 Series II

(34) $(18)^{3.5} \div (27)^{3.5} \times 6^{3.5} = 2^x$, then the value of x is:

a. 3.5 b. 4.5
c. 6 d. 7

MTP Sep 24 Series II

(35) The value of $\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$ is:

a. $\frac{3}{7}$ b. $\frac{7}{3}$
c. $1\frac{3}{7}$ d. $2\frac{2}{7}$

MTP Sep 24 Series II

(36) ☆ The number of prime factors in $\frac{6^{12} \times (35)^{28} \times (15)^{16}}{(14)^{12} \times (21)^{11}}$ is :

a. 56 b. 66
c. 112 d. None of these

Answer Key

1	a	2	a	3	d
4	b	5	a	6	b
7	d	8	b	9	b
10	c	11	b	12	a
13	b	14	c	15	c
16	b	17	b	18	a
19	b	20	c	21	a
22	a	23	a	24	b
25	a	26	b	27	b
28	b	29	a	30	a
31	c	32	a	33	c
34	d	35	a	36	b

LOGARITHM

Past Exam Questions

PYQ May 18

(1) ☆ The value of the expression :

$a^{\log_a b.\log_b c.\log_c d.\log_d t}$

a. t
b. abcdt
c. $(a+b+c+d+t)$
d. None of these

PYQ May 18

(2) The value of $\log_4 9.\log_3 2$ is

a. 3 b. 2
c. 9 d. 1

PYQ Nov. 18

(3) $\log_2 \log_2 \log_2 16 = ?$

a. 0 b. 3
c. 1 d. 2

PYQ June 19

(4) ☆ The value of

$\log_5\left(1+\frac{1}{5}\right) + \log_5\left(1+\frac{1}{6}\right) + - - - - - - + \log_5\left(1+\frac{1}{624}\right)$

a. 2 b. 3
c. 5 d. 0

PYQ June 19

(5) $\log_{2\sqrt{2}}(512) : \log_{3\sqrt{2}} 324 =$

a. 128 : 81 b. 2 : 3
c. 3 : 2 d. None of these

PYQ Nov. 19

(6) $\log_{0.01} 10{,}000 = ?$

a. 2 b. -2
c. 4 d. -4

PYQ Nov. 20

(7) If $\log_a \sqrt{3} = 1/6$ find the value of a:

a. 9 b. 81
c. 27 d. 3

PYQ Nov. 20

(8) $\log 9 + \log 5$ is expressed as:

a. $\log 4$ b. $\log 9/5$
c. $\log 5/9$ d. $\log 45$

PYQ Jan. 21

(9) ☆ If $\log_a(ab) = x$, then $\log_b(ab)$ is

a. $1/x$ b. $\frac{x}{1+x}$
c. $x/x-1$ d. None of these

PYQ July 21

(10) If $\log_4 x + \log_{16} x + \log_{64} x + \log_{256} x = \frac{25}{6}$ then the value of x is

a. 64 b. 4
c. 16 d. 2

PYQ Dec. 21

(11) If $\log_{10} 3 = x$ and $\log_{10} 4 = y$, then the value of $\log_{10} 120$ can be expressed as

a. $x-y+1$ b. $x+y+1$
c. $x+y-1$ d. $2x+y-1$

PYQ Dec. 21

(12) ☆ Find the value of $\log(x^6)$, if $\log(x) + 2\log(x^2) + 3\log(x^3) = 14$

a. 3 b. 4
c. 5 d. 6

PYQ June 22

(13) $\log\left(\frac{p^2}{qr}\right) + \log\left(\frac{q^2}{pr}\right) + \log\left(\frac{r^2}{pq}\right)$ is:

a. pqr b. 0
c. 1 d. None of these

PYQ June 22

(14) $\log \sqrt{3} = 6^{-1}$ base a, then 'a' will be:

a. 27 b. 36
c. 15 d. 1

PYQ June 22

(15) $\log_{\sqrt{2}} 64$ is equal to:

a. 12 b. 6
c. 1 d. 8

PYQ Dec 22

(16) ☆ If $\log_{10} 2 = y$ and $\log_{10} 3 = x$, then the value of $\log_{10} 15$ is:

a. $x-y+1$ b. $x+y+1$
c. $x-y-1$ d. $y-x+1$

PYQ Dec 22

(17) $\log_3^4 . \log_4^5 . \log_5^6 . \log_6^7 . \log_7^8 . \log_8^9$ equal to:

a. 3 b. 2
c. 1 d. 0

PYQ Jun 23

(18) The value of $\left[\log_{10}(5\log_{10} 100)\right]^2$ is:

a. 3 a. 2
c. 1 c. 0

PYQ Jun 23

(19) Given that $\log_{10} x = m+n-1$ and $\log_{10} y = m-n$, the value of $\log_{10}(100x/y^2)$ is expressed in terms of m and n as

a. $1-m+3n$ b. $m-1+3n$
c. $m+3n+1$ d. m^2-n^2

PYQ Jun 24

(20) If $\log_a b = 3$ and $\log_b c = 2$, then $\log_a c$ is:

a. 5 b. 6
c. 9 d. 1

PYQ Sep 24

(21) $\log_2 \log_2 \log_4 256 + 2\log_{\sqrt{2}} 2$ is equal to:

a. 3 b. 2
c. 5 d. 7

Answer Key

1	a	2	d	3	c
4	b	5	c	6	b
7	c	8	d	9	c
10	c	11	b	12	d
13	b	14	a	15	a
16	a	17	b	18	c
19	a	20	b	21	c

LOGARITHM

Mock Test Paper Questions

MTP May 18

(1) The value of $\log_{0.1} 0.001$

a. 3 b. 2
c. 4 d. 1/3

MTP May 18

(2) if $\log_4 x = \frac{-3}{2}$ then x is

a. 1/8 b. 1/4
c. 1/2 d. 1/3

MTP Nov 18

(3) If $\log_7 \log_5(\sqrt{x+5}+\sqrt{x})=0$ the value of x is ☆

a. 0 b. 1
c. 1/4 d. 4

MTP May 19

(4) If $a=\log_{24}12, b=\log_{36}24, \log_{48}36$ then prove that $1+abc=$

a. 2bc b. 2ca
c. 2ba d. 3bc

MTP May 19 Series II

(5) The value of $\log_{64}512$ is

a. 9 b. 9/2
c. 9/4 d. 3/2

MTP May 19 Series II

(6) The value of $\left(\log_b a.\log_c b.\log_a c\right)^3 =$

a. 1 b. 3
c. $(\log_b c)^3$ d. $(\log_c b)^3$

MTP Nov 19

(7) If $\log_9 x+\log_3 x=\frac{3}{2}$ then x is.

a. 0 b. 3
c. 9/4 d. 1

MTP May 20

(8) Given that $\log_{10}2=x$ and $\log_{10}3=y$, the value of $\log_{10}60$ is expressed as

a. $x-y+1$ b. $x+y+1$
c. $x-y-1$ d. none of these

MTP Nov 20

(9) $\log_e x+\log(1+x)=0$ is equivalent to ☆

a. $x^2+x+e=0$
b. $x^2+x-e=0$
c. $x^2+x+1=0$
d. $x^2+x-1=0$

MTP March 21

(10) If $x^2+y^2=7xy$, then $\log\frac{1}{3}(x+y)=$ then x is

a. $(\log x+\log y)$
b. ½ $(\log x+\log y)$
c. 1/3$(\log x+\log y)$
d. $3(\log x/\log y)$

MTP Apr 21

(11) The Value $\frac{\log_3 8}{\log_9 16.\log_4 10}$ is

a. $3\log_{10}2$ b. $7\log_{10}3$
c. $3\log_e z$ d. None

MTP Nov. 21

(12) If $\log_{10}5+\log_{10}(5x+1)=\log_{10}(x+5)+1$, then x is equal to

a. 1 b. 3
c. 5 d. 10

MTP Oct 21

(13) Find the value of $\log\frac{x^n}{y^n}+\log\frac{y^n}{z^n}+\log\frac{z^n}{x^n}$

a. -1 b. 0
c. 1 d. 2

MTP March 22

(14) Find the value of

$$\left[\log_{10}\sqrt{25}-\log_{10}(2^3)+\log_{10}(4)^2\right]$$

a. x b. 10
c. 1 d. None

MTP June 22

(15) If $x=\log_{24}12, y=\log_{36}24, z=\log_{48}36$, then $xyz+1=$

a. 2xy b. 2xz
c. 2yz d. 2

MTP Dec 22 – Series I

(16) $\log_a\sqrt{3}=\frac{1}{6}$, find the value of a

a. 9 b. 81
c. 27 d. 3

MTP Dec 22 – Series I

(17) $\log\frac{p^2}{qr}+\log\frac{q^2}{pr}+\log\frac{r^2}{pq}=$

a. pqr b. 1/pqr
c. 1 d. 0

MTP Dec 22 Series II

(18) $\log_{0.01}10000=?$

a. 2 b. -2
c. 4 d. -4

MTP Jun 23 Series I

(19) If $\log_3 4.\log_4 5.\log_5 6.\log_6 7.\log_7 8.\log_8 9=x$, then find the value of x

a. 4 b. 2
c. 3 d. 1

MTP Jun 23 Series I

(20) If $\frac{1}{2}\log_{10}4=y$ and if $\frac{1}{2}\log_{10}9=x$, then the value of $\log_{10}15$

a. $x-y+1$ b. $x+y-1$
c. $x+y+1$ d. $y-x+1$

MTP Jun 23 Series II

(21) $7\log\left(\frac{16}{15}\right)+5\log\left(\frac{25}{24}\right)+3\log\left(\frac{81}{80}\right)$ is equal

a. 0 b. 1
c. log 2 d. log 3

MTP Jun 23 Series II

(22) $\log_4(x^2+x)-\log_4(x+1)=2$ find x

a. 16 b. 0
c. -1 d. None of these

MTP Jun 23 Series II

(23) Given log 2 = 0.3010 and log3 = 0.4771 then the value of log 24

a. 1.3081 b. 1.1038
c. 1.3801 d. 1.830

MTP Dec 23 Series II

(24) Given that $\log_{10}2=x$ and $\log_{10}3=y$ the value of $\log_{10}120$ is expressed as

a. $2x-y+1$ b. $2x+y+1$
c. $2x-y-1$ d. None of these

MTP Dec 23 Series I

(25) The simplified value of

$2\log_{10}5+\log_{10}8-\frac{1}{2}\log_{10}4$ is

a. 1/2 b. 4
c. 2 d. None of these

MTP Dec 23 Series I

(26) ☆ If $\log(\frac{a+b}{4})=\frac{1}{2}(\log a+\log b)$ then $\frac{a}{b}+\frac{b}{a}$

a. 12 b. 14
c. 16 d. 8

MTP Dec 23 Series II

(27) On solving the equation $\log t+\log(t-3)=1$ we get the value of t as

a. 5 b. 2
c. 3 d. 0

MTP Dec 23 Series II

(28) If $\log 2=0.3010$ and $\log 3=0.4771$, then the value of log 24 is:

a. 1.0791 b. 1.7323
c. 1.3801 d. 1.8301

MTP June 24 Series I

(29) If $\log_4(x^2+x)-\log_4(x+1)=2$ then the value of x is

a. 2 b. 3
c. 16 d. 8

MTP June 24 Series II

(30) If $\frac{a-b}{2}=\frac{1}{2}(\log a+\log b)$, the value of a^2+b^2 is

a. 6ab b. 8ab
c. $6a^26^2$ d. None of these

MTP June 24 Series III

(31) If $\log_4 x=-3/2$ Then x is

A a. 1/8 b. ¼
c. ½ d. 1/3

MTP Sep 24 Series I

(32) Given that $\log_{10}2=x$ and $\log_{10}3=y$, the

B value of $\log_{10}120$ is expressed as

a. $2x-y+1$ b. $2x+y+1$
c. $2x-y-1$ d. None of these

MTP Sep 24 Series II

(33) $\log\frac{a^2}{bc}-\log\frac{ca}{b^2}+\log\frac{c^2}{ab}=$

A a. 0 b. 1
c. log a d. None of these

MTP Sep 24 Series II

(34) $\frac{1}{\log_{xy}(xyz)}+\log_{xyz}yz+\frac{1}{\log_{xz}(xyz)}=?$

B ☆ a. 1 b. 2
c. 3 d. None of these

MTP Sep 24 Series II

(35) If n = m! where (' m' is a positive integer > 2)

A then the value of:

☆ $\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\frac{1}{\log_4 n}+\ldots.+\frac{1}{\log_m n}$

a. 1 b. 0
c. -1 d. 2

Answer Key

1	a	2	a	3	d
4	a	5	d	6	a
7	b	8	b	9	d
10	b	11	a	12	b
13	b	14	c	15	c
16	c	17	d	18	b
19	b	20	a	21	c
22	a	23	a	24	b
25	b	26	b	27	a
28	c	29	c	30	a
31	a	32	b	33	a
34	b	35	a		