MIND CURVE · INFINITY THINK BEYOND

Real Numbers

Chapter 1 · Previous Year Questions with Answers · Class X Mathematics Basic (241)

01 TOPIC 1 HCF, LCM & Prime Factorisation

QUICK RECAP

- **Fundamental Theorem of Arithmetic:** every composite number is a product of primes in exactly one way (apart from order). Example: $196 = 2^2 \times 7^2$.
- **HCF** = smallest power of each *common* prime. **LCM** = greatest power of *every* prime that appears.
- For two numbers: HCF $\times$ LCM = product of the numbers. So if three of these are known, the fourth is easy.
- Recall from Class VI: 2 is the only even prime; the smallest odd prime is 3; consecutive natural numbers are co-prime.

Q1 MCQ · 1 mark — **2026 (II)** – 430/7/1, 430/7/2, 430/7/3

Prime factorisation of 1232 is :

(A) $2^3 \times 7 \times 14$ (B) 2, 4, 7
(C) $2^4 \times 7 \times 11$ (D) $2^4, 7, 11$

ANSWER (B) 99

Q2 MCQ · 1 mark — **2026 (II)** – 430/8/3

The number 196 is written as $196 = a^m \cdot b^n$, where a and b are prime numbers and m, n are natural numbers, then $m + n$ is equal to

(A) 3 (B) 4
(C) 5 (D) 9

ANSWER (B) 4

Q3 MCQ · 1 mark — **2024** – 430(B)/S

The exponent of 3 in the prime factorisation of 243 is :

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

ANSWER (D) 5

Q4 MCQ · 1 mark — **2023** – 430/C/B; **2026 (I)** – 430/4/2; **2026 (II)** – 430/8/1, 430/8/3

If a and b are two consecutive natural numbers, then HCF(a, b) is :

(A) a (B) b
(C) 1 (D) ab

> In 430/C/B the options were ordered a, b, ab, 1, so the answer there was (d).

ANSWER (C) 1

Q5 MCQ · 1 mark — **2024** – 430/S/1, 430/S/2, 430/S/3

If $a = 2^7 \cdot 3^{10}$ and $b = 2^3 \cdot 3^7$, then HCF(a, b) is :

(A) $2^7 \cdot 3^{10}$
(B) $2^{10} \cdot 3^{17}$
(C) $2^3 \cdot 3^7$
(D) $2^7 \cdot 3^7$

ANSWER **(C) $2^3 \cdot 3^7$**

Q6 MCQ · 1 mark — **2024** – 430/S/1, 430/S/2, 430/S/3

The LCM of the smallest odd prime number and greatest 2-digit number, is :

(A) 1
(B) 99
(C) 297
(D) 300

ANSWER **(B) 99**

Q7 MCQ · 1 mark — **2026 (II)** – 430(B)

If HCF (p, 8) = 4 and LCM (p, 8) = 24, then p is :

(A) 8
(B) 3
(C) 12
(D) 18

ANSWER **(C) 12**

Q8 MCQ · 1 mark — **2026 (II)** – 430/8/2

If L.C.M. of two numbers is 1890 and their H.C.F. is 30 and one of the numbers is 270, then the other number is

(A) 210
(B) 220
(C) 230
(D) 240

ANSWER **(A) 210**

Q9 MCQ · 1 mark — **2023** – 430/C/3

The HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54, the other number is :

(A) 36
(B) 45
(C) 9
(D) 81

ANSWER **(d) 81**

Q10 MCQ · 1 mark — **2025** – 430/1/1, 430/1/2, 430/1/3

If the HCF of two positive integers a and b is 1, then their LCM is :

(A) a + b
(B) a
(C) b
(D) ab

ANSWER * **(D) ab**

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Q11 MCQ · 1 mark — **2025** – 430/2/1, 430/2/2, 430/2/3

The value of (HCF − LCM) for the two numbers 3 and 5 is :

(A) 2
(B) 4
(C) 14
(D) −14

ANSWER *

HCF = 1, LCM = 15

(D) −14

Q12 MCQ · 1 mark — **2025** – 430/3/1, 430/3/2, 430/3/3

If $p = 2^3 \times 3^2 \times 5$ and $q = 2^2 \times 3^3$, then the LCM of p and q is :

(A) $2^3 \times 3^3$
(B) $2^2 \times 3^2$
(C) $2^2 \times 3^2 \times 5$
(D) $2^3 \times 3^3 \times 5$

ANSWER * **(D) $2^3 \times 3^3 \times 5$**

Q13 MCQ · 1 mark — **2025** – 430/4/1

If HCF (x, 20) = 2 and LCM (x, 20) = 60, then value of x is :

(A) 3
(B) 6
(C) 20
(D) 10

ANSWER *

$$x = \frac{2 \times 60}{20} = 6$$

(b) 6

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Q14 MCQ · 1 mark — **2025** – 430/4/3

The LCM of two numbers is 3600. Which of the following can not be their HCF ?

(A) 600
(B) 400
(C) 500
(D) 150

ANSWER *

HCF must divide LCM; 500 does not divide 3600.

(c) 500

Q15 MCQ · 1 mark — **2023** – 430/1/1

The prime factorisation of natural number 288 is

(A) $2^4 \times 3^3$
(B) $2^4 \times 3^2$
(C) $2^5 \times 3^2$
(D) $2^5 \times 3^1$

ANSWER * **(c) $2^5 \times 3^2$**

Q16 MCQ · 1 mark — **2023** – 430/1/2

The prime factorisation of 432 is :

(A) $2^3 \times 3^4$
(B) $2^4 \times 3^3$
(C) $2^3 \times 3^3$
(D) $2^4 \times 3^4$

ANSWER * (b) $2^4 \times 3^3$

Q17 MCQ · 1 mark — **2023** – 430/1/3

The prime factorisation of 1728 is

(A) $2^5 \times 3^3$
(B) $2^5 \times 3^4$
(C) $2^6 \times 3^3$
(D) $2^6 \times 3^2$

ANSWER * (c) $2^6 \times 3^3$

Q18 MCQ · 1 mark — **2023** – 430/6/1, 430/6/2

The prime factorisation of the number 2304 is

(A) $2^8 \times 3^2$
(B) $2^7 \times 3^3$
(C) $2^8 \times 3^1$
(D) $2^7 \times 3^2$

ANSWER * (a) $2^8 \times 3^2$

Q19 MCQ · 1 mark — **2023** – 430/6/3

The prime factorisation of the number 5488 is

(A) $2^3 \times 7^3$
(B) $2^4 \times 7^3$
(C) $2^4 \times 7^4$
(D) $2^3 \times 7^4$

ANSWER * (b) $2^4 \times 7^3$

Q20 MCQ · 1 mark — **2023** – 430/2/1, 430/2/3

If the HCF of 360 and 64 is 8, then their LCM is :

(A) 2480
(B) 2780
(C) 512
(D) 2880

ANSWER * (d) 2880

Q21 MCQ · 1 mark — **2023** – 430/2/2

If the HCF of 72 and 234 is 18, then the LCM (72, 234) is :

(A) 936
(B) 836
(C) 324
(D) 234

ANSWER * (a) 936

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Q22 MCQ · 1 mark — **2023** – 430/4/1, 430/4/2, 430/4/3

(HCF × LCM) for the numbers 70 and 40 is :

(A) 10 (B) 280
(C) 2800 (D) 70

ANSWER * **(c) 2800**

Q23 MCQ · 1 mark — **2023** – 430/5/1, 430/5/2

LCM of $(2^3 \times 3 \times 5)$ and $(2^4 \times 5 \times 7)$ is :

(A) 40 (B) 560
(C) 1680 (D) 1120

ANSWER * **(c) 1680**

Q24 MCQ · 1 mark — **2023** – 430/5/3

HCF of $(3^4 \times 2^2 \times 7^3)$ and $(3^2 \times 5 \times 7)$ is :

(A) 630 (B) 63
(C) 729 (D) 567

ANSWER * **(b) 63**

Q25 MCQ · 1 mark — **2023** – 430/6/1, 430/6/3

If HCF (72, 120) = 24, then LCM (72, 120) is

(A) 72 (B) 120
(C) 360 (D) 9640

ANSWER * **(c) 360**

Q26 MCQ · 1 mark — **2023** – 430/6/2; **2024** – 430/2/1, 430/2/2

The HCF of the smallest 2-digit number and the smallest composite number is

ANSWER *
HCF$(10, 4) = 2$. (2023 options: (a) 4 (b) 20 (c) 2 (d) 10 → (c); 2024 options: (A) 2 (B) 20 (C) 40 (D) 4 → (A))

2

Q27 MCQ · 1 mark — **2023** – 430(B)

If two positive integers x and y are written as $x = a^3b^2$ and $y = ab^3$, where a and b are prime numbers, then their HCF (x, y) is :

(A) ab (B) ab^2
(C) a^3b^3 (D) a^2b^2

ANSWER * **(b) ab^2**

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Q28 MCQ · 1 mark — **2023** – 430(B); **2026 (I)** – 430(B)

The product of the HCF and LCM of two numbers 50 and 20 is :

ANSWER *

HCF × LCM = 50 × 20 = 1000. (2023 options: (a) 10 (b) 100 (c) 1000 (d) 20 → (c); 2026 options: (A) 100 (B) 1000 (C) 50 (D) 20 → (B))

1000

Q29 MCQ · 1 mark — **2024** – 430/1/1, 430/1/3

HCF (132, 77) is:

(A) 11
(B) 77
(C) 22
(D) 44

ANSWER * **(a) 11**

Q30 MCQ · 1 mark — **2024** – 430/1/2

LCM (850, 500) is :

(A) 850×50
(B) 17×500
(C) $17 \times 5^2 \times 2^2$
(D) $17 \times 5^3 \times 2$

ANSWER *

$850 = 2 \times 5^2 \times 17, 500 = 2^2 \times 5^3$; LCM $= 2^2 \times 5^3 \times 17 = 8500$

(b) 17×500

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Q31 MCQ · 1 mark — **2024** – 430/5/1, 430/5/2, 430/5/3

HCF × LCM for the numbers 40 and 30 is :

(A) 12
(B) 120
(C) 1200
(D) 40

ANSWER * **(C) 1200**

Q32 MCQ · 1 mark — **2024** – 430/5/1, 430/5/3

Prime factorisation of 424 is :

(A) $2 \times 53 \times 4$
(B) $2 \times 53 \times 2$
(C) $2^3 \times 53$
(D) $2^4 \times 53$

ANSWER * **(C)** $2^3 \times 53$

Q33 MCQ · 1 mark — **2024** – 430/5/2

Prime factorisation of 882 is :

(A) $2^2 \times 3^2 \times 7$
(B) $2^3 \times 3 \times 7^2$
(C) $2 \times 3^2 \times 7^2$
(D) $2^2 \times 3^3 \times 7$

ANSWER * **(C) $2 \times 3^2 \times 7^2$**

Q34 MCQ · 1 mark — **2026 (I)** – 430/4/1, 430/4/3

If HCF (850, 325) is 25, then LCM (850, 325) is :

(A) 442 (B) 11050
(C) 8450 (D) 2210

ANSWER * **(B) 11050**

Q35 Very Short Answer · 2 marks — **2023** – 430/C/B

Find the HCF and the LCM of 36 and 60, using prime factorization method.

ANSWER

$36 = 2 \times 2 \times 3 \times 3$ ½
$60 = 2 \times 2 \times 3 \times 5$ ½
$\text{HCF} = 2 \times 2 \times 3 = 12$ ½
$\text{LCM} = 2 \times 2 \times 3 \times 3 \times 5 = 180$ ½

HCF = 12, LCM = 180

Q36 Very Short Answer · 2 marks · Internal choice (OR) part — **2023** – 430/C/1, 430/C/2

Find LCM and HCF of 96 and 160, using prime factorisation method.

ANSWER

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$ ½
$160 = 2 \times 2 \times 2 \times 2 \times 2 \times 5$ ½
$\text{HCF} = 32$ ½
$\text{LCM} = 480$ ½

HCF = 32, LCM = 480

Q37 Very Short Answer · 2 marks — **2024** – 430(B)/S

Find the greatest number which divides 65 and 117 completely.

ANSWER

$65 = 5 \times 13$ ½
$117 = 3^2 \times 13$ ½
$\therefore \text{HCF} = 13$ 1

HCF = 13

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Q38 Very Short Answer · 2 marks — **2023** – 430/1/1, 430/1/2, 430/1/3

Find the LCM and HCF of 92 and 510, using prime factorisation.

ANSWER *

$92 = 2^2 \times 23$, $510 = 2 \times 3 \times 5 \times 17$

HCF $= 2$, LCM $= 2^2 \times 3 \times 5 \times 17 \times 23 = 23460$

HCF = 2, LCM = 23460

Q39 Very Short Answer · 2 marks — **2023** – 430/2/1, 430/2/2, 430/2/3

(a) Find the HCF of the numbers 540 and 630, using prime factorization method.
OR
(b) Show that $(15)^n$ cannot end with the digit 0 for any natural number 'n'.

ANSWER *

(a) $540 = 2^2 \times 3^3 \times 5$, $630 = 2 \times 3^2 \times 5 \times 7$; HCF $= 2 \times 3^2 \times 5 = 90$

(b) $15^n = 3^n \times 5^n$ has no prime factor 2, so it cannot end with 0.

(a) HCF = 90

Q40 Very Short Answer · 2 marks — **2023** – 430/5/1

Find LCM of 576 and 512 by prime factorization.

ANSWER *

$576 = 2^6 \times 3^2$, $512 = 2^9$; LCM $= 2^9 \times 3^2 = 4608$

4608

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Q41 Very Short Answer · 2 marks — **2023** – 430/5/2

Find HCF of 660 and 704 by prime factorization.

ANSWER *

$660 = 2^2 \times 3 \times 5 \times 11$, $704 = 2^6 \times 11$; HCF $= 2^2 \times 11 = 44$

44

Q42 Very Short Answer · 2 marks — **2023** – 430/5/3

Find LCM of 480 and 256 using prime factorization.

ANSWER *

$480 = 2^5 \times 3 \times 5$, $256 = 2^8$; LCM $= 2^8 \times 3 \times 5 = 3840$

3840

Q43 Very Short Answer · 2 marks — **2024** – 430/2/1, 430/2/2, 430/2/3

Find the HCF of 84 and 144 by prime factorisation method.

ANSWER *

$84 = 2^2 \times 3 \times 7$, $144 = 2^4 \times 3^2$; HCF $= 12$

12

Q44 Very Short Answer · 2 marks — **2024** – 430/4/1, 430/4/3

Given that HCF (306, 1314) = 18, find LCM of (306, 1314).

ANSWER *

$$\text{LCM} = \frac{306 \times 1314}{18} = 22338$$

22338

Q45 Very Short Answer · 2 marks — **2024** – 430/4/2

Find the HCF of 45, 54, 270 using prime factorization method.

ANSWER *

$45 = 3^2 \times 5$, $54 = 2 \times 3^3$, $270 = 2 \times 3^3 \times 5$; HCF $= 3^2 = 9$

9

Q46 Very Short Answer · 2 marks — **2025** – 430/6/1

Using prime factorisation, find the HCF of 180, 140 and 210.

ANSWER *

$180 = 2^2 \times 3^2 \times 5$, $140 = 2^2 \times 5 \times 7$, $210 = 2 \times 3 \times 5 \times 7$; HCF $= 10$

10

Q47 Very Short Answer · 2 marks — **2025** – 430/6/2, 430/6/3

Using prime factorisation, find the HCF of 144, 180 and 192.

ANSWER *

$144 = 2^4 \times 3^2$, $180 = 2^2 \times 3^2 \times 5$, $192 = 2^6 \times 3$; HCF $= 2^2 \times 3 = 12$

12

Q48 Very Short Answer · 2 marks — **2026 (I)** – 430/5/1

Find the H.C.F. and L.C.M. of 1530 and 2040.

ANSWER *

$1530 = 2 \times 3^2 \times 5 \times 17$, $2040 = 2^3 \times 3 \times 5 \times 17$

HCF $= 2 \times 3 \times 5 \times 17 = 510$; LCM $= 2^3 \times 3^2 \times 5 \times 17 = 6120$

HCF = 510, LCM = 6120

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Q49 Very Short Answer · 2 marks — **2026 (I)** – 430/5/3

Find the H.C.F. and L.C.M. of 408 and 312.

ANSWER *

$408 = 2^3 \times 3 \times 17, 312 = 2^3 \times 3 \times 13$

$\text{HCF} = 24; \text{LCM} = 2^3 \times 3 \times 13 \times 17 = 5304$

HCF = 24, LCM = 5304

Q50 Very Short Answer · 2 marks — **2025** – 430(B)

Find the greatest number which divides 285 and 1249 leaving remainders 9 and 7 respectively.

ANSWER *

$285 - 9 = 276, 1249 - 7 = 1242; \text{HCF}(276, 1242) = 138$

138

Q51 Very Short Answer · 2 marks — **2024** – 430(B)

(a) Using prime factorization, find the HCF and LCM of 6, 72 and 120.

OR

(b) There is a circular path around a sports field. Three cyclists start from the same point and at the same time and go in the same direction. If they take 30 minutes, 40 minutes and 48 minutes respectively to complete one round of the field, after how many minutes will they meet again at the starting point ?

ANSWER *

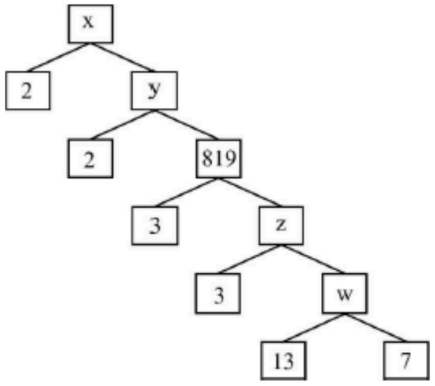
(a) $6 = 2 \times 3, 72 = 2^3 \times 3^2, 120 = 2^3 \times 3 \times 5; \text{HCF} = 6, \text{LCM} = 360$

(b) $\text{LCM}(30, 40, 48) = 240$ minutes

(a) HCF = 6, LCM = 360 OR (b) 240 minutes

Q52 Short Answer · 3 marks — Internal choice (OR) part — **2024** – 430/S/1, 430/S/2, 430/S/3

Find the values of x, y, z and w in the following factor tree. Also, write the prime factorisation of x.



ANSWER

$w = 13 \times 7 = 91$ ½

$z = 91 \times 3 = 273$ ½

$y = 2 \times 819 = 1638$ ½

$x = 1638 \times 2 = 3276$ ½

$3276 = 2 \times 2 \times 3 \times 3 \times 7 \times 13$ 1

$w = 91,\ z = 273,\ y = 1638,\ x = 3276 = 2 \times 2 \times 3 \times 3 \times 7 \times 13$

Q53 Short Answer · 3 marks **2024** – 430/3/1

Find LCM and HCF of two numbers 336 and 54, using prime-factorisation method.

ANSWER *

$336 = 2^4 \times 3 \times 7,\ 54 = 2 \times 3^3$

$\text{HCF} = 2 \times 3 = 6;\ \text{LCM} = 2^4 \times 3^3 \times 7 = 3024$

HCF = 6, LCM = 3024

Q54 Short Answer · 3 marks **2024** – 430/3/2

Find the HCF and LCM of 96 and 404, using prime-factorisation method.

ANSWER *

$96 = 2^5 \times 3,\ 404 = 2^2 \times 101$

$\text{HCF} = 4;\ \text{LCM} = 2^5 \times 3 \times 101 = 9696$

HCF = 4, LCM = 9696

Q55 Short Answer · 3 marks **2024** – 430/3/3

Find the HCF and LCM of 260 and 910 by prime-factorisation method.

ANSWER *

$260 = 2^2 \times 5 \times 13,\ 910 = 2 \times 5 \times 7 \times 13$

$\text{HCF} = 130;\ \text{LCM} = 1820$

HCF = 130, LCM = 1820

Q56 Short Answer · 3 marks **2025** – 430/2/1, 430/2/2, 430/2/3

(a) Prove that $\sqrt{5}$ is an irrational number.
OR
(b) State the "Fundamental Theorem of Arithmetic" and use it to find LCM of 36 and 54.

ANSWER *

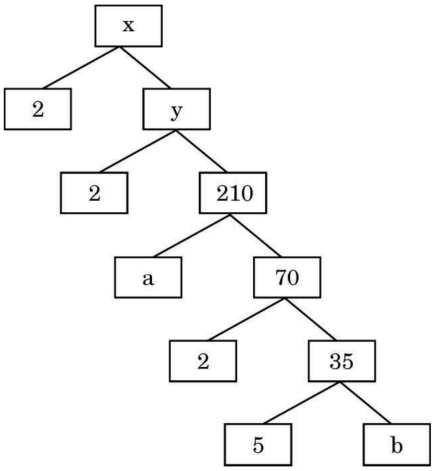
(b) Every composite number can be expressed as a product of primes, uniquely apart from order.

$36 = 2^2 \times 3^2,\ 54 = 2 \times 3^3;\ \text{LCM} = 2^2 \times 3^3 = 108$

(b) LCM = 108

Q57 Short Answer · 3 marks — **2025** – 430/1/1, 430/1/2, 430/1/3

(a) Prove that $\sqrt{3}$ is an irrational number.
OR
(b) The factor tree of a number x is shown below. Find the values of x, y, a and b. Hence, write the product of the prime factors of the number x so obtained.



ANSWER *

$b = 35 \div 5 = 7; a = 210 \div 70 = 3$

$y = 2 \times 210 = 420; x = 2 \times 420 = 840$

$840 = 2 \times 2 \times 2 \times 3 \times 5 \times 7$

$b = 7,\ a = 3,\ y = 420,\ x = 840 = 2^3 \times 3 \times 5 \times 7$

02 TOPIC 2 Prime & Composite Numbers

QUICK RECAP

- A **prime** has exactly two factors, 1 and itself. 1 is neither prime nor composite; 2 is the only even prime.
- To show $7 \times 11 \times 13 + 13$ is composite, take out the common factor: $13(77 + 1) = 13 \times 78$.

Q58 MCQ · 1 mark — **2025** – 430/3/1, 430/3/2, 430/3/3

A prime number has :

(A) exactly two prime factors
(B) exactly one prime factor
(C) at least one prime factor
(D) at least two prime factors

ANSWER * **(B) exactly one prime factor**

Q59 MCQ · 1 mark — **2024** – 430(B)

The total numbers of factors of a prime number is :

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

ANSWER * **(C) 2**

Q60 MCQ · 1 mark — **2025** – 430(B)

The sum of first five prime numbers is

(A) 18 (B) 26
(C) 28 (D) 39

ANSWER *
$2 + 3 + 5 + 7 + 11 = 28$

(C) 28

Q61 MCQ · 1 mark — **2026 (I)** – 430/4/1, 430/4/2, 430/4/3

$7 \times 29 \times 23 + 1$ is :

(A) a prime number. (B) divisible by 23.
(C) an odd number. (D) a composite number.

ANSWER *
$= 4670$, an even number greater than 2

(D) a composite number

Q62 MCQ · 1 mark — **2026 (I)** – 430/5/1, 430/5/2

$7 \times 11 \times 13 + 5$ is

(A) a prime number. (B) an odd number.
(C) a composite number. (D) a multiple of 5.

ANSWER *
$= 1006 = 2 \times 503$

(C) a composite number

Q63 MCQ · 1 mark — **2026 (I)** – 430/5/3

$17 \times 11 \times 13 + 11$ is

(A) a prime number. (B) multiple of 17.
(C) a composite number. (D) an odd number.

ANSWER *
$= 11(221 + 1) = 11 \times 222$

(C) a composite number

Q64 Assertion–Reason · 1 mark — **2025** – 430/1/1, 430/1/2, 430/1/3

Assertion (A): For any two natural numbers a and b, the HCF of a and b is a factor of the LCM of a and b.
Reason (R): HCF of any two natural numbers divides both the numbers.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER * **(A) Both A and R are true and R is the correct explanation of A.**

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Q65 Assertion–Reason · 1 mark — **2025** – 430/2/1, 430/2/2, 430/2/3

Assertion (A): The prime numbers which divide 36 also divide 6.
Reason (R): Any number which divides p^2 also divides p.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *

Primes 2 and 3 divide both 36 and 6. But 4 divides 2^2 and does not divide 2, so R is false as stated.

(C) Assertion (A) is true, but Reason (R) is false.

Q66 Short Answer · 3 marks — **2025** – 430/3/1, 430/3/2, 430/3/3

(a) Prove that $\sqrt{2}$ is an irrational number.
OR
(b) Find which among the following numbers a, b and c is/are composite numbers.
$a = 7 \times 11 \times 13 + 13$, $b = 6 \times 5 \times 4 + 4$, $c = 7 \times 13 + 6$

ANSWER *

$a = 13(77 + 1) = 13 \times 78$ composite; $b = 4(30 + 1) = 124$ composite; $c = 97$ prime

(b) a and b are composite; c = 97 is prime

03 TOPIC 3 HCF & LCM in Real-Life Situations

QUICK RECAP

- **LCM** answers "when will they happen together again?": people meeting, lights flashing, bells ringing.
- **Remainder twist:** "leaves remainder 5 in each case" → answer = LCM + 5. "When increased by 17 is divisible" → answer = LCM − 17.
- Count carefully: if they are together at time 0 and every 24 s, then in 120 s they are together at 24, 48, 72, 96, 120, that is $120 \div 24 = 5$ times.

Q67 Very Short Answer · 2 marks — **2026 (II)** – 430/7/1, 430/7/3

Gurpreet goes to a park to play every 6^{th} day, whereas Harpreet comes on every 10^{th} day. They played together on March 1, 2025. From March 1 to June 30, 2025, how many times have they played together ?

ANSWER

$520 = 2^3 \times 13 \times 5, \quad 468 = 2^2 \times 3^2 \times 13$ — 1

$\text{LCM}(520, 468) = 2^3 \times 3^2 \times 5 \times 13 = 4680$ — 1

Required number $= 4680 - 17 = 4663$ — 1

4663

Q68 Very Short Answer · 2 marks — **2026 (II)** – 430/7/2

In a string of light bulbs, green light flashes every 4^{th} second, red light flashes every 6^{th} second and white light flashes every 8^{th} second. When switched on, all of them flash together. In the next two minutes how

many times did they flash together ?

ANSWER

$\text{LCM}(6, 8, 4) = 24$ 1

It means lights flash together every 24^{th} second. Number of times lights flash together $= \frac{120}{24} = 5$ 1

5 times

Q69 Very Short Answer · 2 marks **2026 (II)** – 430(B)

Find the smallest number which when divided by 35, 56 or 84, leaves a remainder of 5 in each case.

ANSWER

$35 = 5 \times 7,\ 56 = 2^3 \times 7,\ 84 = 2^2 \times 3 \times 7$

$\text{LCM}(35, 56, 84) = 2^3 \times 3 \times 5 \times 7 = 840$ 1

Required number $= \text{LCM} + \text{Remainder} = 840 + 5 = 845$ 1

845

Q70 Short Answer · 3 marks Internal choice (OR) part **2026 (II)** – 430/8/1, 430/8/2, 430/8/3

Find the smallest number which when increased by 17 is exactly divisible by both 520 and 468.

ANSWER

$520 = 2^3 \times 5 \times 13, \quad 468 = 2^2 \times 3^2 \times 13$ 1

$\text{LCM}(520, 468) = 2^3 \times 3^2 \times 5 \times 13 = 4680$ 1

$(\text{Number} + 17) = 4680 \Rightarrow$ required number $= 4680 - 17 = 4663.$ 1

4663

Q71 Short Answer · 3 marks **2025** – 430/5/2

Find the smallest number which when increased by 20, is exactly divisible by 72, 90 and 150.

ANSWER *

$\text{LCM}(72, 90, 150) = 2^3 \times 3^2 \times 5^2 = 1800$

Required number $= 1800 - 20 = 1780$

1780

04 TOPIC 4 Can the Number End in 0? (Using Prime Factors)

QUICK RECAP

- To end in 0 a number must be divisible by 10, so its prime factorisation must contain **both 2 and 5**.
- $8^n = 2^{3n}$ and $12^n = 2^{2n} \times 3^n$ contain no 5, so they can never end in 0. The factorisation is unique, so there is no other way to get a 5.

Q72 MCQ · 1 mark **2025** – 430/2/1, 430/3/2

The number 2^n, where n is a natural number, cannot end with the digit :

(A) 4 (B) 6

(C) 2
(D) 0

ANSWER * (D) 0

Q73 MCQ · 1 mark **2025** – 430/2/2

The number 3^n, where n is a natural number, cannot end with the digit :

(A) 1
(B) 3
(C) 5
(D) 7

ANSWER * (C) 5

Q74 MCQ · 1 mark **2025** – 430/3/1, 430/3/3

3^n, where n is a natural number, cannot end with the digit :

(A) 3
(B) 5
(C) 7
(D) 9

ANSWER * (B) 5

Q75 MCQ · 1 mark **2025** – 430/2/3

If the number a^n, where n is a natural number, always ends with digit a, then the possible value of 'a' is :

(A) 2
(B) 4
(C) 6
(D) 8

ANSWER * (C) 6

Q76 MCQ · 1 mark **2023** – 430/6/1, 430/6/2, 430/6/3

If n is a natural number, then 8^n cannot end with digit

(A) 0
(B) 2
(C) 4
(D) 6

ANSWER * (a) 0

Q77 MCQ · 1 mark **2024** – 430/5/1, 430/5/2, 430/5/3

If x is a whole number, then 8^x ends with an even digit, except for which value of x ?

(A) 6
(B) 4
(C) 2
(D) 0

ANSWER *
$8^0 = 1$
(D) 0

Q78 Assertion–Reason · 1 mark **2026 (I)** – 430/4/1, 430/4/2, 430/4/3

Assertion (A): 4^n can not end with the digit zero.

Reason (R): Prime factorisation of 4^n is unique.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER * **(A) Both A and R are true and R is the correct explanation of A.**

Q79 Very Short Answer · 2 marks | Internal choice (OR) part | **2023** – 430/C/1, 430/C/2

Show that 8^n can never end with the digit 0 for any natural number n.

ANSWER

$8^n = (2 \times 2 \times 2)^n$ 1

For a number to end with zero it should have both 2 and 5 as its prime factors but 8^n has only 2 as its prime factor. So, it can not end with zero. 1

8^n can not end with zero.

Q80 Very Short Answer · 2 marks | Internal choice (OR) part | **2023** – 430/C/3

Show that 12^n can never end with a digit 0, where n is a natural number.

ANSWER

$12^n = (2 \times 2 \times 3)^n$ 1

For a number to end with zero it should have both 2 and 5 as its prime factors but 12^n has only prime numbers 2 and 3 as its factors so it can not end with zero. 1

12^n can not end with zero.

Q81 Very Short Answer · 2 marks | **2025** – 430/4/1, 430/4/2, 430/4/3

Show that 45^n can not end with the digit 0, n being a natural number. Write the prime number 'a' which on multiplying with 45^n makes the product end with the digit 0.

ANSWER *

$45^n = 3^{2n} \times 5^n$ has no prime factor 2, so it cannot end with 0.

Multiplying by $a = 2$ gives the factor 2×5, so the product ends with 0.

a = 2

Q82 Very Short Answer · 2 marks | **2025** – 430/5/1, 430/5/3

Check whether $15^n \times 2^n$, n being a natural number, ends with the digit zero.

ANSWER *

$15^n \times 2^n = 30^n = 2^n \times 3^n \times 5^n$ contains both 2 and 5, so it ends with 0.

Yes

Q83 Very Short Answer · 2 marks | **2025** – 430/5/2

Prove that, for a natural number n, 6^n can not end with the digit 0. Which prime number must be

multiplied with 6^n so that the resultant ends with the digit zero ?

ANSWER *

$6^n = 2^n \times 3^n$ has no prime factor 5, so it cannot end with 0.

Multiplying by 5 makes it end with 0.

5

Q84 Short Answer · 3 marks — **2024** – 430/4/2

Check whether the number 4^n can end with digit 0 for any natural number n. Give reasons for your answer.

ANSWER *

$4^n = 2^{2n}$; to end with 0 a number needs both 2 and 5 as prime factors.

By the uniqueness of prime factorisation, 4^n has no factor 5, so it cannot end with 0.

No

05 TOPIC 5 Rational & Irrational Numbers

QUICK RECAP

- rational $\pm$ irrational = irrational; non-zero rational $\times$ irrational = irrational.
- Two irrationals can give a rational: $\sqrt{2} + (-\sqrt{2}) = 0$, $\sqrt{8} \times \sqrt{2} = 4$. Always simplify before deciding.
- Useful identities: $(a-b)^2 = a^2 - 2ab + b^2$, $(a+b)(a-b) = a^2 - b^2$.

Q85 MCQ · 1 mark — **2023** – 430/C/1, 430/C/2

Which of the following is an irrational number ?

(A) $\left(2\sqrt{3} - \frac{1}{\sqrt{3}}\right)^2$

(B) $(\sqrt{2}-1)^2$

(C) $\sqrt{2} - (2+\sqrt{2})$

(D) $\frac{\sqrt{2}+5\sqrt{2}}{\sqrt{2}}$

ANSWER **(b) $(\sqrt{2}-1)^2$**

Q86 MCQ · 1 mark — **2026 (II)** – 430/8/1, 430/8/2, 430/8/3

Among the following pair of irrational numbers, whose product is a rational number ?

(A) $\sqrt{8}$, $\sqrt{32}$

(B) $\sqrt{3}$, $\sqrt{5}$

(C) $\sqrt{8}$, $\sqrt{20}$

(D) $\sqrt{2}$, $\sqrt{15}$

ANSWER **(A) $\sqrt{8}$, $\sqrt{32}$**

Q87 MCQ · 1 mark — **2025** – 430/1/1

The number $3 + \sqrt{2}$ is :

(A) a rational number

(B) an irrational number

(C) an integer

(D) a natural number

ANSWER * **(B) an irrational number**

Q88 MCQ · 1 mark **2025** – 430/1/2

$\frac{\sqrt{3}-3}{\sqrt{3}}$ is :

(A) a rational number
(B) an irrational number
(C) an integer
(D) a natural number

ANSWER *
$= 1 - \sqrt{3}$
(B) an irrational number

Q89 MCQ · 1 mark **2025** – 430/1/3

$(2+\sqrt{2})^2$ is :

(A) a rational number
(B) an irrational number
(C) an integer
(D) a natural number

ANSWER *
$= 6 + 4\sqrt{2}$
(B) an irrational number

Q90 MCQ · 1 mark **2025** – 430/5/1, 430/5/2

$(2-5\sqrt{3})^2$ is

(A) a negative integer
(B) an irrational number
(C) a rational number
(D) a positive integer

ANSWER *
$= 79 - 20\sqrt{3}$
(B) an irrational number

Q91 MCQ · 1 mark **2025** – 430/5/3

$\sqrt{2}(\sqrt{2}-1)$ is

(A) an integer
(B) a rational number
(C) an irrational number
(D) equal to 1

ANSWER *
$= 2 - \sqrt{2}$
(C) an irrational number

Q92 MCQ · 1 mark **2023** – 430/4/1, 430/4/2, 430/4/3

The number $(5 - 3\sqrt{5} + \sqrt{5})$ is :

(A) an integer
(B) a rational number

(C) an irrational number
(D) a whole number

ANSWER *
$= 5 - 2\sqrt{5}$
(c) an irrational number

Q93 MCQ · 1 mark — **2023** – 430(B)

The product of a non-zero rational number and an irrational number is :

(A) always irrational
(B) always rational
(C) rational or irrational
(D) always positive

ANSWER * **(a) always irrational**

Q94 Assertion–Reason · 1 mark — **2024** – 430/S/1, 430/S/2, 430/S/3

Assertion (A): $2 + \sqrt{2}$ is an irrational number.
Reason (R): The sum of a non-zero rational number and an irrational number is always an irrational number.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER **(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).**

Q95 Assertion–Reason · 1 mark — **2025** – 430/6/1, 430/6/2, 430/6/3

Assertion (A): $(a + \sqrt{b}) \cdot (a - \sqrt{b})$ is a rational number, where a and b are positive integers.
Reason (R): Product of two irrationals is always rational.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *
$(a + \sqrt{b})(a - \sqrt{b}) = a^2 - b$; but e.g. $\sqrt{2} \times \sqrt{3} = \sqrt{6}$ is irrational.
(C) Assertion (A) is true, but Reason (R) is false.

Q96 Assertion–Reason · 1 mark — **2024** – 430/3/1, 430/3/2

Assertion (A): $\sqrt{2}(5 - \sqrt{2})$ is an irrational number.
Reason (R): Product of two irrational numbers is always irrational.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *
$\sqrt{2}(5 - \sqrt{2}) = 5\sqrt{2} - 2$; but $\sqrt{2} \times \sqrt{2} = 2$ is rational.
(C) Assertion (A) is true, but Reason (R) is false.

Q97 Very Short Answer · 2 marks · Internal choice (OR) part — **2023** – 430/C/3

Give example of two irrational numbers whose (i) sum is a rational number. (ii) product is an irrational

number.

ANSWER

(i) Any relevant example. 1

(ii) Any relevant example. 1

Any relevant example

TOPIC 6

06 Proving Irrationality of $\sqrt{p}$

QUICK RECAP

- Assume $\sqrt{p} = \frac{a}{b}$ with a, b co-prime. Square: $pb^2 = a^2$, so p divides a. Write $a = pc$; then $b^2 = pc^2$, so p divides b.
- p divides both a and b, a contradiction to "co-prime". Hence $\sqrt{p}$ is irrational.
- Theorem used: if a prime p divides a^2, then p divides a.

Q98 Short Answer · 3 marks — **2023** – 430/C/1, 430/C/2, 430/C/3 (OR); **2024** – 430/S/1, 430/S/2, 430/S/3 (OR); **2025** – 430/2/1, 430/2/2, 430/2/3 (OR), 430/4/2; **2026 (I)** – 430/4/1, 430/4/2, 430/4/3; **2026 (II)** – 430(B), 430/8/1, 430/8/2, 430/8/3 (OR)

Prove that $\sqrt{5}$ is an irrational number.

ANSWER

Let us assume that $\sqrt{5}$ is a rational number. $\sqrt{5} = \frac{p}{q}$; p, q are coprime and $q \neq 0$

$\sqrt{5}q = p \Rightarrow 5q^2 = p^2$ ----(i). p^2 is divisible by 5. So, p is divisible by 5. 1

$p = 5c$ (for some integer c) $\Rightarrow p^2 = 25c^2$ ----(ii) ½

Putting p^2 in eqn.(i) $\Rightarrow 5q^2 = 25c^2 \Rightarrow q^2 = 5c^2$. So, q is divisible by 5. Thus, p and q have a common factor 5, which is a contradiction 1

$\therefore$ our assumption is incorrect. Therefore, $\sqrt{5}$ is an irrational number. ½

Therefore, $\sqrt{5}$ is an irrational number.

Q99 Short Answer · 3 marks — **2025** – 430/1/1, 430/1/2, 430/1/3 (OR), 430/4/1, 430/4/3; **2026 (II)** – 430/7/1, 430/7/2, 430/7/3

Prove that $\sqrt{3}$ is an irrational number.

ANSWER

Let $\sqrt{3}$ be a rational number. $\sqrt{3} = \frac{a}{b}$, where a & b are co-prime, $b \neq 0$ ½

$\Rightarrow a^2 = 3b^2 \Rightarrow 3$ divides a^2 thus 3 divides a --- (i) 1

Let $a = 3k$, for some integer $k \Rightarrow b^2 = 3k^2 \Rightarrow 3$ divides b^2 thus 3 divides b --- (ii) 1

Using (i) and (ii) a & b both are divisible by 3 which contradicts our assumption. $\therefore \sqrt{3}$ is an irrational number. ½

$\sqrt{3}$ is an irrational number.

Q100 Short Answer · 3 marks — **2025** – 430/3/1, 430/3/2, 430/3/3 (OR); **2026 (I)** – 430/5/1, 430/5/2, 430/5/3, 430(B)

Prove that $\sqrt{2}$ is an irrational number.

ANSWER *

Let $\sqrt{2} = \frac{p}{q}$, p, q co-prime, $q \neq 0$. Then $2q^2 = p^2$, so 2 divides p.

Let $p = 2c$: $q^2 = 2c^2$, so 2 divides q.

2 is a common factor of p and q, a contradiction. Hence $\sqrt{2}$ is irrational.

$\sqrt{2}$ is an irrational number.

07 TOPIC 7 — Proving Irrationality of $a + b\sqrt{p}$

QUICK RECAP

- Assume the number $= \frac{p}{q}$ (rational). Make $\sqrt{}$ the subject. Example: $2 + 3\sqrt{3} = \frac{p}{q} \Rightarrow \sqrt{3} = \frac{p-2q}{3q}$.
- The RHS is rational, but the LHS is irrational (given). Contradiction, so the number is irrational.

Q101 Very Short Answer · 2 marks — **2024** – 430/1/1, 430/1/2, 430/1/3

(A) Prove that $6 - 4\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.
OR
(B) Show that $11 \times 19 \times 23 + 3 \times 11$ is not a prime number.

ANSWER *

(A) Let $6 - 4\sqrt{5} = r \Rightarrow \sqrt{5} = \frac{6 - r}{4}$, rational — contradiction.

(B) $11 \times 19 \times 23 + 3 \times 11 = 11(437 + 3) = 11 \times 440$

(B) $= 11 \times 440$, not prime

Q102 Very Short Answer · 2 marks — **2024** – 430/3/1, 430/3/3

(a) Prove that $-7 - 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.
OR
(b) Explain why $(7 \times 11 \times 13 + 2 \times 11)$ is not a prime number.

ANSWER *

(a) Let $-7 - 2\sqrt{3} = r \Rightarrow \sqrt{3} = \frac{-7 - r}{2}$, rational — contradiction.

(b) $7 \times 11 \times 13 + 2 \times 11 = 11(91 + 2) = 11 \times 93$

(b) $= 11 \times 93$, not prime

Q103 Short Answer · 3 marks | Internal choice (OR) part | **2023** – 430/C/1, 430/C/2, 430/C/3

Prove that $2 + 3\sqrt{3}$ is an irrational number. It is given that $\sqrt{3}$ is an irrational number.

ANSWER

Let us assume that $2 + 3\sqrt{3}$ is a rational number. $2 + 3\sqrt{3} = \frac{p}{q}$; p, q are integers and $q \neq 0$ — 1

$\Rightarrow \sqrt{3} = \frac{p - 2q}{3q}$ — 1

RHS is rational but LHS is irrational. $\therefore$ Our assumption is wrong. Hence $2 + 3\sqrt{3}$ is an irrational number — 1

Hence $2 + 3\sqrt{3}$ is an irrational number.

Q104 Short Answer · 3 marks | **2023** – 430/C/B

Prove that $3 + 2\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is irrational.

ANSWER

Let us assume $3 + 2\sqrt{2}$ is rational number. $\Rightarrow 3 + 2\sqrt{2} = \frac{p}{q}$, where p and q are integers and $q \neq 0$ — 1

$\Rightarrow \sqrt{2} = \frac{p - 3q}{2q}$ — 1

Here, RHS is a rational number whereas LHS is an irrational number. $\therefore$ our assumption is wrong. — 1

Hence, $3 + 2\sqrt{2}$ is an irrational number

Hence, $3 + 2\sqrt{2}$ is an irrational number.

Q105 Short Answer · 3 marks | **2024** – 430(B)/S, 430(B)

Prove that $(3 + 2\sqrt{5})$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER

Let us assume that $x = 3 + 2\sqrt{5}$ is a rational number — ½

$\Rightarrow \sqrt{5} = \frac{x - 3}{2}$ — 1

Now RHS is rational but LHS is irrational — 1

$\therefore$ our assumption is wrong. Hence, $3 + 2\sqrt{5}$ is irrational. — ½

Hence, $3 + 2\sqrt{5}$ is irrational.

Q106 Short Answer · 3 marks | **2023** – 430/1/1, 430/1/3

Prove that $3 + 7\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

ANSWER *

Let us assume that $3 + 7\sqrt{2}$ is a rational number, say r.

$\Rightarrow \sqrt{2} = \frac{r - 3}{7}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{2}$ is irrational. Hence $3 + 7\sqrt{2}$ is irrational.

$3 + 7\sqrt{2}$ is irrational.

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Q107 Short Answer · 3 marks **2023** – 430/1/2

Prove that $5 - \sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $5 - \sqrt{3}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = 5 - r$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $5 - \sqrt{3}$ is irrational.

$5 - \sqrt{3}$ is irrational.

Q108 Short Answer · 3 marks **2023** – 430/2/1

Prove that $4 + 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $4 + 2\sqrt{3}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = \dfrac{r - 4}{2}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $4 + 2\sqrt{3}$ is irrational.

$4 + 2\sqrt{3}$ is irrational.

Q109 Short Answer · 3 marks **2023** – 430/2/2

Prove that $2 - 3\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER *

Let us assume that $2 - 3\sqrt{5}$ is a rational number, say r.

$\Rightarrow \sqrt{5} = \dfrac{2 - r}{3}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{5}$ is irrational. Hence $2 - 3\sqrt{5}$ is irrational.

$2 - 3\sqrt{5}$ is irrational.

Q110 Short Answer · 3 marks **2023** – 430/2/3

Prove that $10 + 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $10 + 2\sqrt{3}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = \dfrac{r - 10}{2}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $10 + 2\sqrt{3}$ is irrational.

$10 + 2\sqrt{3}$ is irrational.

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Q111 Short Answer · 3 marks **2023** – 430/5/1

Prove that $7 - 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $7 - 2\sqrt{3}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = \dfrac{7 - r}{2}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $7 - 2\sqrt{3}$ is irrational.

$7 - 2\sqrt{3}$ is irrational.

Q112 Short Answer · 3 marks **2023** – 430/5/2

Prove that $8 + 5\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER *

Let us assume that $8 + 5\sqrt{5}$ is a rational number, say r.

$\Rightarrow \sqrt{5} = \dfrac{r - 8}{5}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{5}$ is irrational. Hence $8 + 5\sqrt{5}$ is irrational.

$8 + 5\sqrt{5}$ is irrational.

Q113 Short Answer · 3 marks **2023** – 430/5/3

Prove that $11 + 3\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

ANSWER *

Let us assume that $11 + 3\sqrt{2}$ is a rational number, say r.

$\Rightarrow \sqrt{2} = \dfrac{r - 11}{3}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{2}$ is irrational. Hence $11 + 3\sqrt{2}$ is irrational.

$11 + 3\sqrt{2}$ is irrational.

Q114 Short Answer · 3 marks **2023** – 430/6/2, 430(B)

Prove that $5 + 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $5 + 2\sqrt{3}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = \dfrac{r - 5}{2}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $5 + 2\sqrt{3}$ is irrational.

$5 + 2\sqrt{3}$ is irrational.

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Q115 Short Answer · 3 marks **2023** – 430/6/3

Prove that $7 + 4\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER *

Let us assume that $7 + 4\sqrt{5}$ is a rational number, say r.

$\Rightarrow \sqrt{5} = \dfrac{r - 7}{4}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{5}$ is irrational. Hence $7 + 4\sqrt{5}$ is irrational.

$7 + 4\sqrt{5}$ is irrational.

Q116 Short Answer · 3 marks **2023** – 430/6/1; **2024** – 430/5/2

Prove that $3 - 2\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER *

Let us assume that $3 - 2\sqrt{5}$ is a rational number, say r.

$\Rightarrow \sqrt{5} = \dfrac{3 - r}{2}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{5}$ is irrational. Hence $3 - 2\sqrt{5}$ is irrational.

$3 - 2\sqrt{5}$ is irrational.

Q117 Short Answer · 3 marks **2024** – 430/2/1

Prove that $7 - 3\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER *

Let us assume that $7 - 3\sqrt{5}$ is a rational number, say r.

$\Rightarrow \sqrt{5} = \dfrac{7 - r}{3}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{5}$ is irrational. Hence $7 - 3\sqrt{5}$ is irrational.

$7 - 3\sqrt{5}$ is irrational.

Q118 Short Answer · 3 marks **2024** – 430/2/3

Prove that $5\sqrt{2} - 3$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

ANSWER *

Let us assume that $5\sqrt{2} - 3$ is a rational number, say r.

$\Rightarrow \sqrt{2} = \dfrac{r + 3}{5}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{2}$ is irrational. Hence $5\sqrt{2} - 3$ is irrational.

$5\sqrt{2} - 3$ is irrational.

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Q119 Short Answer · 3 marks — **2024** – 430/4/1, 430/4/3

Prove that $2 + 5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $2 + 5\sqrt{3}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = \dfrac{r-2}{5}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $2 + 5\sqrt{3}$ is irrational.

$2 + 5\sqrt{3}$ is irrational.

Q120 Short Answer · 3 marks — **2024** – 430/5/1, 430/5/3

Prove that $6 + 3\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

ANSWER *

Let us assume that $6 + 3\sqrt{2}$ is a rational number, say r.

$\Rightarrow \sqrt{2} = \dfrac{r-6}{3}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{2}$ is irrational. Hence $6 + 3\sqrt{2}$ is irrational.

$6 + 3\sqrt{2}$ is irrational.

Q121 Short Answer · 3 marks — **2025** – 430/6/3

Prove that $2 + 3\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

ANSWER *

Let us assume that $2 + 3\sqrt{5}$ is a rational number, say r.

$\Rightarrow \sqrt{5} = \dfrac{r-2}{3}$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{5}$ is irrational. Hence $2 + 3\sqrt{5}$ is irrational.

$2 + 3\sqrt{5}$ is irrational.

Q122 Short Answer · 3 marks — **2025** – 430(B)

Prove that $\dfrac{\sqrt{3}+5}{2}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

ANSWER *

Let us assume that $\dfrac{\sqrt{3}+5}{2}$ is a rational number, say r.

$\Rightarrow \sqrt{3} = 2r - 5$

RHS is rational but LHS is irrational, which contradicts the fact that $\sqrt{3}$ is irrational. Hence $\dfrac{\sqrt{3}+5}{2}$ is irrational.

$\dfrac{\sqrt{3}+5}{2}$ is irrational.

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Answers: CBSE Marking Schemes – www.cbse.gov.in/cbsenew/marking-scheme.html