

**KINETICS**

We Nurture The Future

IIT-JEE | Medical | Foundations

## Real Numbers

### Question 1.

In a seminar, the number of participants in English, German and Sanskrit are 45, 75 and 135. Find the number of rooms required to house them, if in each room, the same number of participants are to be accommodated and they should be of the same language.

- (a) 45
- (b) 17
- (c) 75
- (d) 135

Answer: (b) 17

Since, in each room, the same number of participants, of the same language, are to be accommodated, their number in each room

HCF of 45, 75 and 135.

$\text{HCF}(45, 75, 135) = 15$

Each room accommodates 15 participants

$\Rightarrow$  Total no. of rooms required for English  $= 45/15 = 3$

Total no. of rooms required for German  $= 75/15 = 5$

Total no. of rooms required for Sanskrit  $= 135/15 = 9$

Total no. of rooms  $= 3 + 5 + 9 = 17$

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### Question 2.

If  $p = \text{HCF}(100, 190)$  and  $q = \text{LCM}(100, 190)$ ; then  $p^2q^2$  is :

- (a)  $3.61 \times 10^5$
- (b)  $361 \times 10^3$
- (c)  $3.61 \times 10^6$
- (d)  $3.61 \times 10^8$

Answer:

$pq = (\text{HCF})(\text{LCM}) = \text{Product of given numbers.}$

$\Rightarrow pq = 190 \times 100 = 19000$

$\Rightarrow p^2q^2 = 361 \times 10^6 = 3.61 \times 10^8$

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Question 3.

A number  $\frac{p}{q}$ , when expressed in decimal form, terminates after 7 digits, then factors of  $q$  are of the form  $x^m \times y^n$ ; the value of  $x + y$  should be :

- (a) 7
- (b) 14
- (c) 9
- (d) 26

Answer: (a) 7

$\frac{p}{q}$  terminates after 8 digits

Decimal representation of  $\frac{p}{q}$  is terminating

=> Factors of  $q$  should be of the form  $x^m \times y^n$

$$x+y=2+5=7$$

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Question 4.

The condition to be satisfied by  $q$ , so that the rational number  $\frac{p}{q}$  has a non terminating decimal expansion is:

- (a) The prime factorisation of  $q$  is of the form  $2^m \times 5^n$
- (b) The prime factorisation of  $q$  is not of the form  $2^m \times 5^n$
- (c) The prime factorisation of  $q$  is of the form  $m^2 \times n^5$ .
- (d) The prime factorisation of  $q$  is not of the form  $m^2 \times 5^n$ .

Answer:

The prime factorisation is not of the form  $2^m \times 5^n$ , where  $m$  and  $n$  are non-negative integers

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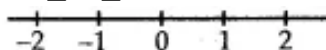
Question 5.

If  $-2 \leq x \leq 2$ , which of the following is not true for  $x$ :

- (a)  $x$  can take only 3 values if  $x$  is a natural number.
- (b) if  $x$  is an irrational number, then only one value of  $x$  is possible.
- (c) if  $x$  is a non-negative integer, then only 3 values of  $x$  are possible.
- (d) if  $x$  is a rational number, infinite values of  $x$  are possible.

Answer: (d) if  $x$  is a rational number, infinite values of  $x$  are possible.

$$-2 \leq x \leq 2$$



Question 6.

The largest positive integer which divides 434 and 539 leaving remainders 9 and 12 respectively is:

- (a) 9
- (b) 108
- (c) 17
- (d) 539

Answer: (c) 17

Required number is the HCF of  $(434 - 9)$  and  $(539 - 12)$

= HCF of 425 and 527.

= 17

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Question 7.

There is a circular path around a field. Reema takes 22 minutes to complete one round while her friend Saina takes 20 minutes to complete the same. If they both start at the same time and move in the same direction, after how many minutes will they meet again at the starting

- (a) 220
- (b) 3.4
- (c) 440
- (d) 4.4

Answer: (a) 220

LCM of 20 and 22 = 220 (question state: after how many minutes will they meet)

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Question 8.

If  $\text{HCF}(306, 657) = 9$ , then LCM of 306 and 657 is:

- (a) 1
- (b) 22338
- (c) 9
- (d) 12

Answer: (b) 22338

$\text{LCM}(306, 657) = \frac{306 \times 657}{9}$

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Question 9.

Euclid's Lemma states that, for given positive integers  $a$  and  $b$ , there exist unique integers  $q$  and  $r$ , such that  $a = bq + r$ , where :

- (a)  $0 < r < b$
- (b)  $0 \leq r < b$

- (c)  $0 < r \leq b$
- (d)  $0 \leq r \leq b$

Answer: (b)  $0 \leq r < b$

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Question 10.

A number which can be expressed in the form  $\frac{p}{q}$  where  $q \neq 0$  is a rational number is:

- (a) p and q are co-prime numbers
- (b) p and q are real numbers
- (c) p and q are numbers
- (d) p and q are integers

Answer: (d) p and q are integers

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Question 11.

In decimal expansion and representation, which of the following is not a rational numbers:

- (a) terminating decimal
- (b) terminates after 17 digits
- (c) non-terminating repeating
- (d) non-terminating non-repeating

Answer: (d) non-terminating non-repeating

In decimal representation, a rational number is either terminating or a non-terminating but repeating.

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Question 12.

If a positive integer 'a' is divided by 2, what can be the remainder ?

- (a) 0 or 1
- (b) 0,1 or 2
- (c) 1 or 2
- (d) Any positive number

Answer: (a) 0 or 1

5. When a is divided by 2, the remainder is either 0 or 1 using Euclid's Lemma

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Question 13.

For some positive integer q, every even integer is of the form:

- (a) q
- (b)  $q + 1$

- (c)  $2q$
- (d)  $2q + 1$

Answer: (c)  $2q$   
( $2q + r$ ,  $0 \leq r < 1$  but  $2q + 1$  is odd)

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Question 14.

If a non-zero rational number is multiplied to an irrational number, we always get:

- (a) an irrational number
- (b) a rational number
- (c) zero
- (d) one

Answer: (a) an irrational number  
The product of a rational (non-zero) and an irrational number is always an irrational number.

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Question 15.

HCF and LCM of two positive integers  $a$  and  $b$  satisfy a relationship, that:

- (a)  $(\text{HCF})(\text{LCM}) = \frac{a}{b}$
- (b)  $(\text{HCF})(\text{LCM}) = 1$
- (c)  $(\text{HCF})(\text{LCM}) = ab$
- (d) No defined relation

Answer: (c)  $(\text{HCF})(\text{LCM}) = ab$   
7.  $(\text{HCF})(\text{LCM}) = \text{product of nos. } a \text{ and } b$ .

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Question 16.

If we write 0.9 as a rational number, we get:

- (a)  $\frac{9}{10}$
- (b) 1
- (c)  $\frac{1}{2}$
- (d)  $\frac{1}{10}$

Answer: (b) 1  
8. Let  $x = 0.9$   
 $10x = 9.9$   
 $9x = 9$   
 $x = 1$

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Question 17.

Write an irrational number between 2 and 3.

- (a) 2.5
- (b) 2.001
- (c) 2.1333333456...
- (d) 2.13

Answer: (c) 2.1333333456...  
non terminating non repeating

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Question 18.

Which of the following are irrational whose sum and product are both rationals :

- (a)  $\sqrt{2} + 3, \sqrt{2} - 3$
- (b)  $\sqrt{2} + \sqrt{3}, \sqrt{2} - \sqrt{3}$
- (c)  $3 + \sqrt{2}, 3 - \sqrt{2}$
- (d)  $\sqrt{2} + 1, \sqrt{2} - 1$

Answer: (c)  $3 + \sqrt{2}, 3 - \sqrt{2}$   
 $3 + \sqrt{2} + 3 - \sqrt{2} = 6$  and  $(3 + \sqrt{2})(3 - \sqrt{2}) = 7$

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Question 19.

Find the value of x from the following such that  $x^2$  is irrational but  $x^4$  is rational:

- (a)  $\sqrt{2}$
- (b)  $3\sqrt{2}$
- (c)  $4\sqrt{2}$
- (d) 2

Answer: (c)  $4\sqrt{2}$   
 $\sqrt{2}$  is a irrational number.

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Question 20.

A rational number between 72 and 73 is:

- (a)  $\frac{\sqrt{2} + \sqrt{3}}{2}$
- (b)  $\frac{\sqrt{2} - \sqrt{3}}{2}$
- (c) 1.5
- (d) 1.8

Answer: (c) 1.5

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Question 21.

The rational number that corresponds to  $0.6 + 0.\bar{7} + 0.4\bar{7}$  is :

- (a)  $\frac{83}{90}$
- (b)  $\frac{7}{9}$
- (c)  $\frac{43}{90}$
- (d)  $\frac{167}{90}$

Answer: (d)  $\frac{167}{90}$

$$0.7 = 7/9$$

$$0.6 + 0.7 + 0.47$$

$$= 6/10 + 7/9 + 43/90$$

$$= \frac{167}{90}$$

---

Question 22.

The greatest number which divides 87 and 97, leaving 7 as remainder is :

- (a) 10
- (b) 1
- (c)  $87 \times 97$
- (d) 6300

Answer: (a) 10

Greatest number which divides 87 and 97, leaving 7 as remainder = HCF of 80 and 90

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Question 23.

The least number, which when divided by 10, 14 and 18, leaves remainder 4, is :

- a) 630
- (b) 634
- (c) 252
- (d) 496

Answer: (b) 634

Required number is the LCM of 10, 14 and 18 (is 630) + 4

$$= 630 + 4$$

$$= 634$$

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Question 24.

The greatest number which divides 17, 28 and 34 leaving remainders 2, 3 and 4 respectively is:

- (a) 5

- (b) 24
- (c) 1
- (d) 17

Answer: (a) 5

Here  $17 - 2 = 15$ ,  $28 - 3 = 25$ ,  $34 - 4 = 30$  Required number is the HCF of 15, 25 and 30 = 5

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Question 25.

72 litres of liquid A and 108 litres of liquid B are to be packed in containers of the same size. The minimum number of containers required are:

- a) 36
- (b) 18
- (c) 5
- (d) 10

Answer: (c) 5

For minimum number of containers required, each container should contain the maximum liquid. Volume of each container should be the HCF of 72 and 108, which is 36. Number of containers required for liquid

$$A = \frac{72}{36} = 2$$

Number of containers required for liquid

$$B = \frac{108}{36} = 3$$

$$\text{total} = 5$$


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Question 26.

The HCF of two consecutive rational numbers  $x$  and  $x + 1$  is :

- (a)  $x$
- (b)  $x + 1$
- (c) 1
- (d) 0

Answer: (c) 1

HCF of two consecutive numbers is always 1.

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Question 27.

The HCF of a number which is neither prime nor composite and any other number  $x$  is:

- (a)  $x$
- (b)  $x + 1$
- (c) 1
- (d) Any number



Answer: (c) 1

As, 1 is neither prime nor a composite number, thus, required number is the HCF of 1 and x, which is 1

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Question 28.

Find q and r, if  $12560 = 215q + r$ .

- (a)  $q = 58, r = 0$
- (b)  $q = 58, r = 10$
- (c)  $q = 58, r = 4$
- (d)  $q = 58, r = 90$

Answer: (d)  $q = 58, r = 90$

Using Euclid's Lemma, 12560 when divided by 215, gives quotient as 58 and remainder as 90.

$$\Rightarrow 12560 = 215(58) + 90$$

$$\Rightarrow q = 58 \text{ and } r = 90$$

---

Question 29.

Using Euclid's Lemma, if d is the HCF of 1155 and 506, find 'd'

- (a) 11
- (b) 143
- (c) 77
- (d) 66

Answer: (a) 11

$$1155 = 506 \times 2 + 143$$

$$506 = 143 \times 3 + 77$$

$$143 = 77 \times 1 + 66$$

$$77 = 66 \times 1 + 11$$

$$66 = 11 \times 6 + 0$$

Last divisor = 11  $\Rightarrow$

$$11 = \text{HCF}(66, 11) =$$

$$\text{HCF}(1155, 506)$$

$$\Rightarrow d = 11$$

---

Question 30.

An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups have to march in the same number of columns. Find the maximum number of columns in which they can march ?

- (a) 32
- (b) 60

- (c) 40  
(d) 8

Answer: (d) 8

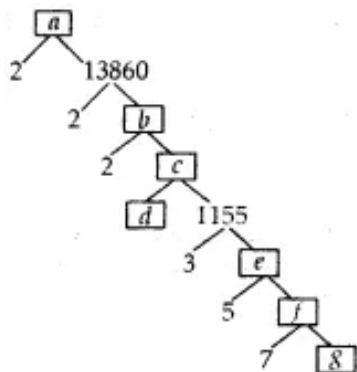
Required number is the HCF of 616 and 32  $616 = 32 \times 19 + 8$   $32 = 8 \times 4 + 0$

HCF (616,32) = 8

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Question 31.

The factor tree of a number has some unknowns, find the values of a, b, c, d, e, f and g.



Answer: a = 277720, b = 6930, c = 3465, d = 3, e = 385, f = 77, g = 11

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Question 32.

Which of the following is a rational number ?

- (a)  $(\sqrt[3]{2})^2$   
(b)  $(\sqrt[3]{2^3})^3$   
(c)  $(\sqrt[3]{2^3})^4$   
(d)  $(\sqrt[3]{2})^3$

Answer:  $(\sqrt[3]{2^3})^3$

$$(a) (\sqrt[4]{2})^2 = \left[ (2)^{\frac{1}{4}} \right]^2 = \sqrt{2} = \text{irrational}$$

$$(b) (\sqrt[4]{2^3})^3 = \left( 2^{\frac{3}{4}} \right)^3 = 2^{\frac{9}{4}} \text{ irrational}$$

$$(c) (\sqrt[4]{2^3})^4 = \left( 2^{\frac{3}{4}} \right)^4 = 2^3 = 8 \text{ rational}$$

$$(d) (\sqrt[4]{2})^3 = \left( 2^{\frac{1}{4}} \right)^3 = 2^{\frac{3}{4}} \text{ irrational}$$

Question 33.

$\frac{91}{625}$ , when written in decimal form 625 terminates; as factors of denominator are in the form  $m^2 \times n^5$ . This number will terminate after how many digits ?

- (a) 3
- (b) 2
- (c) 1
- (d) 4

Answer: (d) 4

$$= 91 \times 16/10^4$$

$$= 1456/10^4 = 0.1456$$

Question 34.

Select the incorrect answer,

$(2 + \sqrt{5})(2 - \sqrt{5})$  is:

- (a) a natural number
- (b) a rational number
- (c) a whole number
- (d) an irrational number

Answer: (d) an irrational number

which is a natural number, a whole number and also a rational number.

Question 35.

Which of the following rational numbers, in decimal form, terminates ?

- (a)  $\frac{64}{455}$

- (b)  $\frac{77}{210}$   
 (c)  $\frac{31}{200}$   
 (d)  $\frac{29}{343}$

Answer: (c)  $\frac{31}{200}$

(a)  $\frac{64}{455}$   
 $= \frac{64}{5 \times 7 \times 13}$   
 = non terminating

(b)  $\frac{77}{210}$   
 $= \frac{77}{7 \times 2 \times 3 \times 5}$   
 = non terminating

(c)  $\frac{31}{200}$   
 $= 31/2^3 \times 5^2$   
 = terminating

(d)  $\frac{29}{343}$   
 $= 29/7^3$   
 = non terminating

Question 36.

$\frac{91}{625}$ , when written in decimal form 625 terminates; as factors of denominator are in the form  $m^2 \times n^5$ . This number will terminate after how many digits ?

- (a) 3  
 (b) 2  
 (c) 1  
 (d) 4

Answer: (d) 4  
 $= 91 \times 16/10^4$   
 $= 1456/10^4 = 0.1456$

Question 37.

Select the incorrect answer,

$(2 + \sqrt{5})(2 - \sqrt{5})$  is:

- (a) a natural number  
 (b) a rational number  
 (c) a whole number  
 (d) an irrational number

Answer: (d) an irrational number  
which is a natural number, a whole number and also a rational number.

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Question 38.

The least positive integer divisible by 20 and 24 is

- (a) 360
- (b) 120
- (c) 480
- (d) 240

Answer: (b) 120

---

Question 39.

The HCF and LCM of two numbers is 9 and 459 respectively. If one of the numbers is 27, then the other number is

- (a) 459
- (b) 153
- (c) 135
- (d) 150

Answer: (b) 153

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Question 40.

The largest number which divides 615 and 963 leaving remainder 6 in each case is

- (a) 82
- (b) 95
- (c) 87
- (d) 93

Answer: (c) 87

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Question 41.

The product of three consecutive integers is divisible by

- (a) 5
- (b) 6
- (c) 7
- (d) none of these

Answer: (b) 6

---

Question 42.

The least number that is divisible by all the numbers from 1 to 8 (both inclusive) is

- (a) 840
- (b) 2520
- (c) 8
- (d) 420

Answer: (a) 840

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Question 43.

The smallest composite number is:

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Answer: (c) 3

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Question 44.

For some integer  $p$ , every odd integer is of the form

- (a)  $2p + 1$
- (b)  $2p$
- (c)  $p + 1$
- (d)  $p$

Answer: (a)  $2p + 1$

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Question 45.

The smallest composite number is:

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Answer: (c) 3

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Question 46.

A lemma is an axiom used for proving

- (a) other statement
- (b) no statement

- (c) contradictory statement
- (d) none of these

Answer: (a) other statement

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Question 47.

HCF of 8, 9, 25 is

- (a) 8
- (b) 9
- (c) 25
- (d) 1

Answer: (d) 1

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Question 48.

$\sqrt{7}$  is

- (a) An integer
- (b) An irrational number
- (c) A rational number
- (d) None of these

Answer: (b) An irrational number

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Question 49.

The product of a rational and irrational number is

- (a) rational
- (b) irrational
- (c) both of above
- (d) none of above

Answer: (b) irrational

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Question 50.

A number when divided by 61 gives 27 as quotient and 32 as remainder. find the number

- (a) 1967
- (b) 1796
- (c) 1679
- (d) 1569

Answer: (c) 1679

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Question 51.

For any two positive integers a and b, there exist (unique) whole numbers q and r such that

- (a)  $q = ar + b$ ,  $0 = r < b$ .
- (b)  $a = bq + r$ ,  $0 = r < b$ .
- (c)  $b = aq + r$ ,  $0 = r < b$ .
- (d) none of these

Answer: (b)  $a = bq + r$ ,  $0 = r < b$ .

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Question 52.

Two natural numbers whose difference is 66 and the least common multiple is 360, are:

- (a) 120 and 54
- (b) 90 and 24
- (c) 180 and 114
- (d) 130 and 64

Answer: (b) 90 and 24

---

Question 53.

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

- (a) Always irrational
- (b) Always rational
- (c) Rational or irrational
- (d) One

Answer: (a) Always irrational

---

Question 54.

Every positive even integer is of the form \_\_\_\_ for some integer 'q'.

- (a)  $2q$
- (b)  $2q - 1$
- (c)  $2q + 1$
- (d) none of these

Answer: (a)  $2q$

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Question 55.

$\frac{1}{\sqrt{3}}$  is –



- (a) A rational number
- (b) An irrational number
- (c) A whole number
- (d) None of these

Answer: (b) An irrational number

---

Question 56.

The largest number which divides 60 and 75, leaving remainders 8 and 10 respectively, is

- (a) 260
- (b) 75
- (c) 65
- (d) 13

Answer: (d) 13

---

Question 57.

p is

- (a) a rational number
- (b) an irrational number
- (c) both (a) & (b)
- (d) neither rational nor irrational

Answer: (b) an irrational number

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Question 58.

The largest number that will divide 398, 436 and 542 leaving remainders 7, 11 and 15 respectively is

- (a) 17
- (b) 11
- (c) 34
- (d) 45

Answer: (a) 17

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Question 59.

Which number is divisible by 11?

- (a) 1516
- (b) 1452

- (c) 1011
- (d) 1121

Answer: (b) 1452

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Question 60.

For positive integers  $a$  and  $3$ , there exist unique integers  $q$  and  $r$  such that  $a = 3q + r$ , where  $r$  must satisfy:

- (a)  $0 < r < 3$
- (b)  $1 < r < 3$
- (c)  $0 < r < 3$
- (d)  $0 < r < 3$

Answer: (a)  $0 < r < 3$

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Question 61.

The decimal expansion of the rational number  $\frac{47}{2^3 5^2}$  will terminate after:

- (a) one decimal place
- (b) two decimal places
- (c) three decimal places?
- (d) more than three decimal places

Answer: (c) three decimal places

---

Question 62.

The sum of a rational and an irrational number is

- (a) Rational
- (b) Irrational
- (c) Both (a) and (c)
- (d) Either (a) or (b)

Answer: (b) Irrational

---

Fill in the blanks:

1. Given any two positive integers  $a$  and  $b$ , there exist unique integers  $q$  and  $r$  satisfying  $a = bq + r$  and \_\_\_\_\_

Answer:  $0 < r < b$

---

2. A rational number  $\frac{p}{q}$  will have a terminating decimal representation, if prime factors of q are of the form \_\_\_\_\_

Answer: where m and n are positive integers.

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3. Rational number is a number which can be expressed in the form  $\frac{p}{q}$ , q and p, q are \_\_\_\_\_

Answer: integers

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4. If p is a prime number then  $\sqrt{p}$  is \_\_\_\_\_

Answer: irrational number

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5. Every \_\_\_\_\_ can be expressed as a product of prime numbers.

Answer: composite number

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Say true or false:

Question 1.

HCF of two consecutive natural numbers n and n +1 is n.

Answer: false

HCF of two consecutive natural numbers is 1

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Question 2.

Every composite number can be expressed as a product of primes.

Answer: true

---

Question 3.

HCF of three numbers a, b, c; when multiplied by their LCM gives the product abc

Answer: false

this property is true only for 2 numbers.

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Question 4.

The number  $6''$  can never have a value which ends with the digit 0.

Answer: true

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Question 5.

Non-terminating and Non-recurring decimals are called Irrational Numbers.

Answer: true

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Match the following:

Question 1.

1. $4.3\overline{72}$	a. $\frac{1093}{250}$
2. $4.3\overline{7}2$	b. $\frac{787}{180}$
3. $4.3\overline{7}2$	c. $\frac{1456}{333}$
4. $4.372$	d. $\frac{4329}{990}$

Answer:

1. $4.3\overline{72}$	b. $\frac{787}{180}$
2. $4.3\overline{7}2$	d. $\frac{4329}{990}$
3. $4.3\overline{7}2$	c. $\frac{1456}{333}$
4. $4.372$	a. $\frac{1093}{250}$

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Question 2.

a. it is the greatest positive integer which divides both the integers.	Rational number	4.37
b. it is the lowest of their common multiples.	HCF	Of two consecutive numbers is 1
c. terminating decimal expansion.	Irrational number	Of two consecutive numbers is their product.

d. non terminating non repeating decimal expansion.	LCM	2.101001000110000.....
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Answer:

a. it is the greatest positive integer which divides both the intergers.	HCF	Of two consecutive numbers is 1
b. it is the lowest of their common multiples.	LCM	Of two consecutive numbers is their product.
c. terminating decimal expansion.	Rational number	4.37
d. non terminating non repeating decimal expansion.	Irrational number	2.101001000110000.....

Classify the following as Rational and Irrational:

Question 1.

$$\sqrt{9}$$

Answer: Rational

Question 2.

$$2 + \sqrt{2}$$

Answer: Irrational

Question 3.

$$\frac{\pi}{2}$$

Answer: Irrational

Question 4.

$$0.666.....$$

Answer: Rational

Question 5.  
1.7324

Answer: Rational

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Question 6.  
 $\sqrt{4} + \sqrt{7}$

Answer: Irrational

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Question 7.  
0.7347896.....

Answer: Irrational

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Question 8.  
4.363636.....

Answer: Rational

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Question 9.  
 $-7 - \sqrt{3}$

Answer: Irrational

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Question 10.  
 $-3 + \sqrt{16}$

Answer: Rational

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