

Class: 9th
Subject: Maths
Topic: Real Numbers
No. of Questions: 20

Q1. Use Euclid's division lemma to find the HCF of 4052 and 12576

Solution: 4

[Explanation: HCF (4052, 12576)

12576 > 4052, so on applying Euclid's division lemma,

$$12576 = 4052 \times 3 + 420$$

$$420 \neq 0$$

$$4052 = 420 \times 9 + 272$$

$$272 \neq 0$$

$$420 = 272 \times 1 + 148$$

$$148 \neq 0$$

$$272 = 148 \times 1 + 124$$

$$124 \neq 0$$

$$148 = 124 \times 1 + 24$$

$$24 \neq 0$$

$$124 = 24 \times 5 + 4$$

$$4 \neq 0$$

$$24 = 4 \times 6 + 0$$

$$\text{Remainder} = 0, \text{HCF}(4052, 12576) = 4]$$

Q2. A sweet seller has 420 kaju barfis and 130 badaam barfis. She wants to stack them in such a way that each stack has the same number, and they take up the least area of the tray. What is the number of that can be placed in each stack for this purpose?

Solution: 10

[Explanation: For this purpose, we find HCF(420, 130)

Using Euclid's division lemma,

$$420 = 130 \times 3 + 30$$

$$130 = 30 \times 4 + 10$$

$$30 = 10 \times 3 + 0$$

$$\text{HCF}(420, 130) = 10]$$

Q.3 Find the HCF of 96 and 404 by prime factorization method. Hence find their LCM.

Solution: HCF=4, LCM= 9696

[Explanation: The prime factorization of 96= $2^5 \times 3$

Prime factorization of 404= $2^2 \times 101$

HCF= $2^2 = 4$

LCM= $2^5 \times 3 \times 101 = 9696$]

Q.4 Find the HCF and LCM of 6, 72, 120, using prime factorization method.

Solution: HCF= 6, LCM= 360

[Explanation: Prime factorization of 6= 2×3

Prime factorization of 72= $2^3 \times 3^2$

Prime factorization of 120= $2^3 \times 3 \times 5$

Here 2 and 3 are the smallest powers of the common factors 2 and 3, respectively.

HCF(6,72,120)= $2 \times 3 = 6$

$2^3, 3^2, 5$ are the greatest powers

LCM(6,72,120)= $2^3 \times 3^2 \times 5 = 360$]

Q.5 Show that $3\sqrt{2}$ is irrational.

Solution: In explanation

[Explanation: Let us assume, to contrary, that $3\sqrt{2}$ is irrational

Let a and b are co-primes ($b \neq 0$) such that $3\sqrt{2} = \frac{a}{b}$

$$\sqrt{2} = \frac{a}{3b}$$

Since 3, a and b are integers, $\frac{a}{3b}$ is rational and so is $\sqrt{2}$.

But this contradicts the fact that $\sqrt{2}$ is irrational.

So, we conclude $3\sqrt{2}$ is irrational.]

Q.6 There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in same direction. After how many minutes will they meet again after the starting point?

Solution: 36 minutes

[Explanation: Least time taken= LCM(12,18)

Factors of 12= $2^2 \times 3$

Factors of 18= 2×3^2

LCM(12,18)= $2^2 \times 3^2 = 36$

Time taken= 36 min]

Q.7 Given $HCF(306, 657)=9$, find the $LCM(306, 657)$

Solution: 22338

[Explanation: Product of numbers= HCF x LCM

$306 \times 657 = 9 \times LCM$

LCM= 22338]

Q.8 The LCM and HCF of two numbers is 180 and 6 respectively. If one of the numbers is 30, find the other.

Solution: 36

[Explanation: Let the number be a

$a \times 30 = 180 \times 6$

$a = (180 \times 6) / 30 = 36$]

Q.9 The floor of a room is 6m 75cm long and 5m wide. It is to be paved with square tiles. Find the largest size of tile needed?

Solution: 25 cm

[Explanation: 6m 75cm= 675cm

In order to find the largest size of tile needed, we find $HCF(675, 500)$

$675 = 500 \times 1 + 175$

$500 = 175 \times 2 + 150$

$175 = 150 \times 1 + 25$

$150 = 25 \times 6 + 0$

$HCF(675, 500) = 25$

Largest size of tile needed= 25 cm]

Q.10 Find the greatest number which will divide 625 and 1433 leaving remainder 5 and 3 respectively.

Solution: 10

[Explanation: We require a number which exactly divides (625-5) and (1433-3)

Numbers are 620 and 1430

$HCF(620,1430)=?$

$1430= 620 \times 2+190$

$620= 190 \times 3+50$

$190= 50 \times 3+40$

$50= 10 \times 5+0$

$HCF(620, 1430)= 10$

The required number is 10]

Q.11 Find the HCF of 38, 64 and 82 by prime factorization method

Solution: 2

[Explanation: Factors of 38= 2 x 19

Factors of 64= 2^6

Factors of 82= 2 x 41

$HCF(38, 64, 82)=2]$

Q.12 Find the LCM of 40, 48 and 45 by prime factorization method.

Solution: 720

[Explanation: Factors of 40= $2^3 \times 5$

Factors of 48= $2^4 \times 3$

Factors of 45= $3^2 \times 5$

$LCM(40,48,45)= 2^4 \times 3^2 \times 5= 720]$

Q.13 Four bells toll at intervals of 8,9,12 and 15 minutes respectively. If they toll together at 3 pm, when will they toll together next?

Solution: 9 pm

[Explanation: To find out the next interval, we need to find $LCM(8,9,12,15)$

Factors of 8= 2^3

Factors of 9= 3^2

Factors of 12= $2^2 \times 3$

Factors of 15= 3 x 5
LCM= $2^3 \times 3^2 \times 5 = 360$ min= 6 hours
Next interval= 3 + 6= 9 pm]

Q.14 In a morning walk, three boys step off together. Their steps measure 80 cm, 85 cm and 90 cm respectively. What minimum distance should each walk so that all can cover the distance in complete steps?

Solution: 122 m 40 cm

[Explanation: The minimum distance needed will be the LCM(80,85,90)

Factors of 80= $2^4 \times 5$

Factors of 85= 17×5

Factors of 90= $2 \times 3^2 \times 5$

LCM(80,85,90)= $2^4 \times 3^2 \times 5 \times 17 = 12240$

The required minimum distance= 12240 cm= 122 m 40 cm]

Q.15 Express 7429 as the product of primes

Solution: $17 \times 19 \times 23$

[Explanation: Prime factorization of 7429= $17 \times 19 \times 23$]

Q.16 Prove that $5 - \sqrt{3}$ is irrational.

Solution: Refer to explanation

[Explanation: Let us assume, to the contrary, $5 - \sqrt{3}$ is rational.

Let us also suppose a and b are co-prime ($b \neq 0$) such that $5 - \sqrt{3} = \frac{a}{b}$

$$5 - \frac{a}{b} = \sqrt{3}$$

$$\sqrt{3} = \frac{5b - a}{a}$$

Since a, b and 5 are integers, we get $5 - \frac{a}{b}$ as rational, and so $\sqrt{3}$ is rational

But this contradicts the fact that $\sqrt{3}$ is irrational

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

Q.17 Find the HCF of 1624, 522 and 1276 using Euclid's division lemma

Solution: 58

[Explanation: HCF(1624, 522, 1276)

HCF(1624, 522):

$$1624 = 522 \times 3 + 58$$

$$522 = 58 \times 9 + 0$$

Now HCF(1276, 58):

$$1276 = 58 \times 22 + 0$$

Here the remainder is 0

$$\text{HCF}(1624, 522, 1276) = 58]$$

Q.18 Without actually performing long division, state the type of rational number for $\frac{14588}{625}$

Solution: Terminating decimal

[Explanation: $\frac{14588}{625} = \frac{2 \times 2 \times 7 \times 521}{5 \times 5 \times 5 \times 5} = (2^6 \times 7 \times 521) / (5^4 \times 2^4)$
 $= 233408 / 10^4 = 23.3408$

Which is a terminating decimal]

Q.19 Write the decimal expansion for $\frac{13}{125}$, without actual division

Solution: 0.104

[Explanation: $\frac{13}{125} = 13/5^3 = (13 \times 2^3) / (5^3 \times 2^3) = 104/10^3 = 0.104]$

Q.20 Express 0.0875 as a rational number.

Solution: 7/80

[Explanation: $0.0875 = 875/10000 = 875/10^4 = (5^2 \times 7) / (10^2 \times 10 \times 10)$
 $= (5^3 \times 7) / (5^4 \times 2^4) = 7 / (5 \times 2^4) = 7/80]$