MATHS

BOOKS - NAGEEN PRAKASHAN

ENGLISH

REAL NUMBERS

Solved Examples

1. Use Euclid's division algorithm to find the HCF of (i) 135 and 225 (ii) 196 and 38220 (iii)

867 and 255

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2. Use Euclid's algorithm to find the H.C.F. of 4052 and 12576.

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3. Find the HCF of 55 and 210 . express it as a linear combinaton of 55 and 210, i.e. HCF of 55 and 210= 210a +55b, for some a andb

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4. Find HCF 65 and 117and express it in the form of 65m+117n.

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5. The decimal expansion of the rational number 43/2^(4)5^(3) will terminate after how many places of decimals?

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6. Find the largest number , which divides 246 and 1030 leaving remainder 6 in each case.

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7. Find the largest number that will divide 546,437 , and 400 leaving remainders 19 ,12 ,and 9 respecting.

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8. Show that every positive even integer is of the form $2q$, and that every positive odd integer is of the form $2q + 1$, where q is some integer.

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9. Use Euclid's division lemma to show that the square of any positive integer is either of the form $3m$or $3m + 1$for some integer m.[Hint: Let x be any positive integer then it is of the

form $3q$, $3q+1$or $3q+2$Now square each of these and sho

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10. Use Euclids division Lemma to show that the cube of any positive integer is either of the form $9m$, $9m+1$ or, $9m+8$ for some integer m .

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11. Show that one and only one out of n,(n+2) and (n +4) is divisble by 3, where n is any positive interger.

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12. Show that the square of an odd positive integer is of the form $8q + 1$, for some integer q.

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

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14. There are $156, 208$ and 260 students in group A, B and C respectively . Buses are to be hired to take them for a field trip. Find the

minimum number of buses to be hired, if the same number of students should be accommodated in each bus and separate bus for separate group is needed.

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15. A sweet seller has 420 kaju barfis and 130 badam 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 maximum number of barfis that can be placed in each sta

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16. An electronic device makes a beep after every 60 sec. Another device makes a beep after every 62 sec. They beeped together at 10 a.m. The next time, when they would beep together at the earliest is

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17. Express each of the following as a product of prime factors:

(i) 140 (i)156 (iii) 3825

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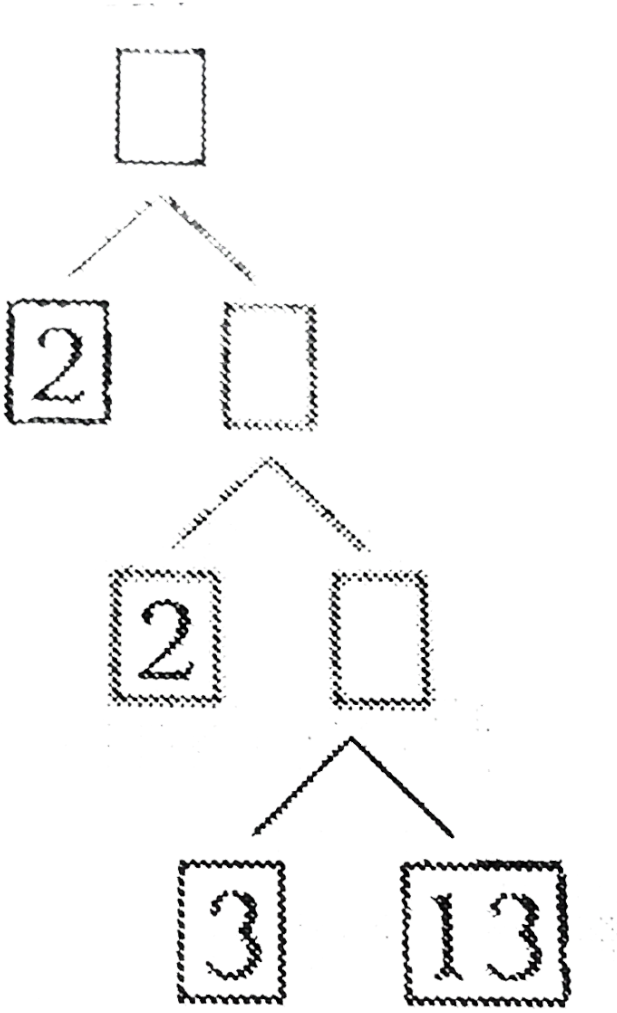
18. Find the missing numbers in the following prime factorisation



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19. Show that $5 \times 11 \times 17 + 17$ is a composite number.

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20. Find the HCF and LCM of the following pairs using prime factorisation method:

(i) 140 and 154 (ii) 504 and 735

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21. Find the HCF and LCM of the following by prime factorisation method :

(i) 12,18,24 (ii) 15,25,45

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22. Find the LCM and HCF of the 26 and 91 and verify that

HCF $\times$ LCM = product of the given two numbers.

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23. The HCF of two numbers is 23 and their LCM is 1449. If one number is 207, find the other number.

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24. The HCF of $2472, 1284$ and a third number N is 12. If their LCM is $2^3 \times 3^2 \times 5 \times 103 \times 107$. Find the number N.

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25. Given that $HCF(306, 657) = 9$. Find $LCM(306, 657)$

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26. Show that 12^{th} cannot end with the digit 0 or 5 for any natural number n.

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27. In a morning walk, three persons step off together and their steps measure $40cm$, $42cm$ and 45cm, respectively. What is the minimum distance each should walk so that each can cover thesame distance in complete steps?

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28. What is the smallest number that, when divided by 35,56 and 91 leaves remainder of 7.

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29. Find the greatest number of 5 digits exactly divisible by $35, 56$ and 91.

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30. Three bells ring at intervals of $4, 7$ and 14 minutes. All three range at 6 am. When will they ring together again ?

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31. Amar visits the recreation club after every 5days, Akbar visit after every 24 days, while Anthony goes there after every 9 days. If all three of them met at the club last on a Sunday, then tall me O' student, on which day of the week will all three meet again ?

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32. Five bells begins to toll together and toll respectively at intervals 6,7,8,9 and 12 seconds.

How many times will they toll together in one hour, excluding the one at the start?

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Solved Example

1. Without actual performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminationg repeating decimal

expansion :

(i) $\frac{12}{125}$ (ii) $\frac{7}{1600}$ (iii) $\frac{11}{3125}$

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2. Show that :

(i) $\frac{3}{250}$ (ii) $\frac{11}{50}$

are terminating decimals. Express each of them in decimal form without actual division (long division).

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3. Show that each of the following are non-terminating repeating decimal :

(i) $\frac{5}{12}$ (ii) $\frac{7}{75}$

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4. The decimal expansion of the rational number $\frac{43}{2^4 \times 5^3}$ will terminate after how many places of decimals?

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5. Express each of the following in the simplest form :

(i) $0.\bar{6}$ (ii) $3.\bar{3}$

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6. Express each of the following in the simplest form :

(i) $0.\overline{36}$ (ii) $1.\overline{046}$

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7. A rational number in its decimal expansion is 327.7081. What can you say about the prime factors of q, when this number is expressed in the from $\frac{p}{q}$? Give reason.

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

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9. Prove that $\sqrt{11}$ is irrational.

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10. Prove that for any prime positive integer p, $\sqrt{p}$ is an irrational number.

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11. Show that $(2+\sqrt{3})$ is an irrational number.

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12. Prove that $5\sqrt{7}$ is irrational.

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13. Show that the following numbers are irrational. $\frac{1}{\sqrt{2}}$ (ii) $7\sqrt{5}$

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14. A rational number in its decimal expansion is 327.7081. What can you say about the prime factors of q, when this number is expressed in the from $\frac{p}{q}$? Give reason

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15. Show that 12^{th} cannot end with the digit 0 or 5 for any natural number n.

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Problems From Ncert Exemplar

1. Write whether every positive integer can be of the form $4q + 2$ where q is an integer, Justify your answer

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2. The number 525 and 3000 are both divisible only 3,5,15,25,75. What is HCF (525, 3000)? Justify your answer.

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3. Can two number have 18 as their HCF and 380 as their LCM? Give reason

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4. Show that the square of any positive integer cannot be of the form 6m+2 or 6m+5 for some integer q.

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5. Show that any positive odd integer is of the form $6q+1$ or $6q+3$ or $6q+5$, where q is some integer.

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6. Show that the cube of a positive integer of the form $6q+r, q$ is an integer and r=0,1,2,3,4,5 is also of the form 6m+r

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7. If n is an odd positive integer, show that $\left(n^2-1\right)$ is divisible by 8.

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8. Using Euclid's division algorithm, find the largest number that divides 1251, 9377 and 15628 leaving remainders 1, 2 and 3, respectively.

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9. Prove that $\sqrt{p}+\sqrt{q}$ is an irrational, where p and q are primes.

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10. For any positive integer n, prove that n^3-n divisible by 6.

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11. Use Euclid division algorithm to find the HCF of 441, 567 and 693.

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Exercise 1 A

1. Use Euclid's division algorithm , to find the H.C.F. of the following : (i) 70 and 40 (ii) 18 and 45

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2. If the HCF of 408 and 1032 is expressible in the form $1032\,m - 408 \times 5$, find m.

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3. Express the H.C.F. of 18 and 24 in the form of 18x + 24y.

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4. Express the H.C.F. of 30 and 36 in the form of $30x + 36y$.

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5. Find the largest number that divides 1989 and 967 and leaves a remainder of 5 and 7 respectively.

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6. Find the largest number that divides 189 and 249 leaving remainder 9 in each case .

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7. Find the largest number that divides 280 and 1248 leaving remainders 4 and 6 respectively.

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8. Find the greartest number that divides 699 and 572 leaving remainders 6 and5 respectively .

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9. Show that any positive odd integer is of the form $4q+1$ or $4q+3$, where q is some integer.

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10. Show that any positive integer is of the form $3q$ or, $3q + 1$ or, $3q + 2$ for some integer q .

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11. Show that every even positive integer is of the form 6q or 6q + 2 or 6q + 4 for some integer q .

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12. Prove that every positive integer different from 1 can be expressed as a product of a non-negative power of 2 and an odd number.

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13. Show that the square of any positive integer is either of the form 4q or 4q+1 for some integer q.

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14. Show that the square of any positive integer cannot be of the form 5q+2 or 5q+3 for some integer q.

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15. Prove that one and only out of n,(n+2) and (n+4) is divisible by 3, where n is any positive integer.

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16. There are 576 boys and 448 girls in a school that are to be divided into equal sections of either boys or girls alone . Find the total number of sections thus formed.

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17. The length, breadth and height of a room are 8m and 25cm, 6m and 75cm and 4m 50cm, respectively. Determine the longest rod which can measure the three dimensions of the room exactly.

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18. A sweet seller has 420 kaju barfis and 130 badam 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 maximum number of barfis that can be placed in each sta

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20. In a group there are 21 childrens, 35 ladies and 49 gents. They all want to stay in same hotel. Find the minimum number of rooms required for their stay so that in each room equal number of members stay with the condition that children, female and male stay in separate rooms.

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21. Three sets of English, Hindi and Mathematics books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of Mathematics books is 336. Assuming that the books are of the same thickness, determine the number of stacks of English, Hindi and Mathematics books.

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22. Find the HCF of 81 and 237 and express it as a linear combination of 81 and 237.

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23. Find the polynomials $u(x)$ and $v(x)$ such that

$$\left(x^4-1\right)\cdot u(x)+\left(x^7-1\right)\cdot v(x)=(x-1)$$

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24. Six bells commence tolling together and toll at interval of 2, 4 , 6, 8 , 10 , 12 minutes respectively . In 30 hours , how many times do they toll together ?

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25. Find the greatest number of 4 digits which is exactly divisible by 15 , 24 and 36.

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26. A number when divided by 143 leaves 31 as remainder. What will be the remainder, when the same number is divided by 13 ?

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27. p and q are two positive integers such that the least prime factor of p is 3 and the least prime factor of q is 5 . Find the least prime factor of (p + q).

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28. Express each of the following as a product of prime factors:

$(i)96(ii)84(iii)150(iv)240(v)3072(vi)324$

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Exercise 1 B

1. Explain why $7 \times 11 \times 13 + 13$and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite

numbers.

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2. Show that $5 \times 7 \times 11 + 11$ is a composite number .

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3. Find the HCF and LCM of the following by prime factorisation method :

(i) 12 and 15 (ii) 20 and 25 (iii) 28 and 42

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4. Using prime factorisation method, find the HCF and LCM of the following pairs. Hence, verify $HCF \times LCM$= product of two numbers. (i) 96 and 120 (ii) 16 and 20

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5. The HCF and LCM of two numbers are 145 and 2175 respectively. If the first number is 435,

find the second number.

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6. The HCF and LCM of two numbers are 18 and 720 respectively. Find the product of two numbers.

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7. Is it possible to have two numbers whose HCF is 20 and LCM is 630? Give reason.

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8. Given that LCM (252,594)=8316. Find HCF (252,594).

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9. The LCM of two number is 192 and their product is 3072. Find the HCF of two numbers.

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10. Check whether 6^n can end with the digit 0 for any natural number n .

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11. Prove that there is no natural number for which 4^n ends with the digit zero.

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12. Three pieces of timber of lengths 63m, 42m and 35m, have to be divided into planks of the same length. What is the greatest possible length of each plank?

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13. Two tanks contain 735 litres and 504 litres of water resepectively. Find the maximum capacity of a container which can measure the water of either tank an exact number of times.

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14. A circular field has a circumference of 360km. Three cyclists start together and can cycle 48, 60 and 72 km, a day, round the field. When will they meet again?

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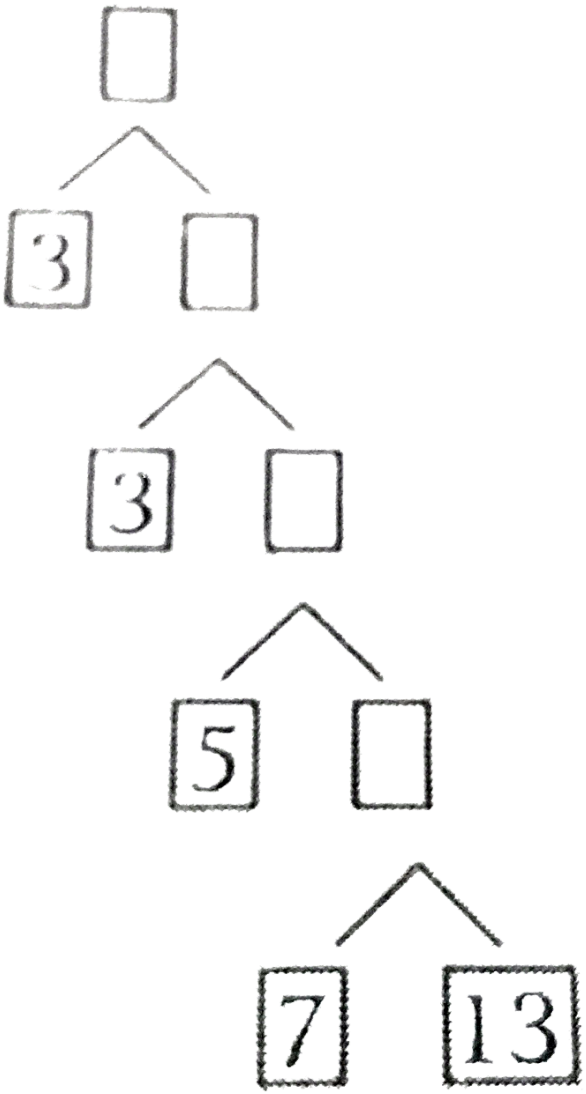
15. Write the missing numbers in the following factor tree :



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16. Find the greastest number of 5 digits exactly divisible by 24 , 15 and 36 .

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Exercise 1 C

1. By actual division, show that each of the following rational numbers is a terminating decimal. Express each in the decimal form :

(i) $\frac{17}{2^2 \times 5^3}$ (ii) $\frac{24}{625}$

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2. With out actually performing the long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminating repeating decimal expansion :

(i) $\frac{17}{8}$ (ii) $\frac{64}{455}$ (iii) $\frac{29}{343}$ (iv) $\frac{129}{2^2 5^7 7^2}$ (v) $\frac{6}{15}$ (vi) $\frac{27}{210}$

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3. The decimal expansion of the rational number $\frac{27}{2^2 \cdot 5^3}$, will terminate after how many places of decimals ?

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4. Express each of the following as a fraction in simplest form : (i) $0.\bar{5}$ (ii) $1.\bar{4}$ (iii) $0.\overline{15}$

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5. What can you say about the prime factors of their denominators ? (i) 12.123456789 (ii) $12.\overline{123456789}$

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6. Prove that $\sqrt{3}$ is irrational.

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8. Verify by the method of contradiction that $\sqrt{7}$ is irrational.

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9. If the HCF of 408 and 1032 is expressible in the form 1032 × 2 + 408 × p, then find the value of p.

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10. State whether the given statements are true or false :

(i) The sum of two rationals is always rational.

(ii) The sum of two irrationals is always irrational.

(iii) The product of two rationals is always rational.

(iv) The product of two irrationals is always irrational.

(v) The sum of a rational and an irrational is always rational.

(vi) The product of a rational and an irrational is always irrational.

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11. Give an example of :

(i) Two rationals whose sum is rational.

(ii) Two irrationals whose sum is rational.

(iii) Two irrationals whose product is rational.

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12. Find the HCF (865, 255) using Euclid's division lemma

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Revision Exercise Very Short Answer Questions

1. State Euclid Division lemma

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2. State division algorithm to calculate HCF.

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3. Express 120 as the product of prime factors.

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4. Express 75 as the product of prime factors.

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5. Find : H.C.F. (3, 5)

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6. Find : L.C.M. (3, 5)

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7. If a and b are relatively prime numbers, then what is their HCF?

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8. Write the H.C.F. of the smallest composite number and the smallest prime number.

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9. What is the decimal expansion of $\frac{13}{2 \times 5^2}$?

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10. If a and b are relatively prime numbers, then what is their LCM?

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11. Give an example of two irrationals whose sum is rational.

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12. Give an example of two irrational numbers whose sum is rational

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Revision Exercise Short Answer Questions

1. Express $0.\bar{7}$ in the simplest form.

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2. Express $1.\overline{2}$ in the simplest form.

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4. Find the largest number which divides 320 and 458 leaving remainders 5 and 8 respectively.

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5. The smallest number which when divided by 28 and 32 leaves remainders 8 and 12 respectively

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6. Find the greatest number of 3 digits which is exactly divisible by 12 and 15.

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Short Answer Questions

1. Show that $1 + \sqrt{2}$ is irrational.

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2. Show that $\frac{1}{\sqrt{5}}$ is irrational.

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Revision Exercise Long Answer Questions

1. Prove that if x and y are odd positive integers, then $x^2 + y^2$ is even but not divisible by 4.

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3. Prove that if a positive integer is of the form $6q + 5$, then it is of the form $3q + 2$ for some integer q , but not conversely.

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4. Prove that the square of any positive integer is of the form $5q, 5q + 1, 5q + 4$ for some integer q.

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5. Show that the square of an odd positive integer is of the form $8q + 1$, for some integer q.

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