EXERCISE 2.4 PAGE: 2.15

1. In which of the following expressions, prime factorization has been done?
(i) 24 = 2 × 3 × 4
(ii) 56 = 1 × 7 × 2 × 2 × 2
(iii) 70 = 2 × 5 × 7
(iv) 54 = 2 × 3 × 9
Solution:

(i) We know that
24 = 2 × 3 × 4 is not a prime factorization since 4 is not a prime number.

(ii) We know that
56 = 1 × 7 × 2 × 2 × 2 is not a prime factorization since 1 is not a prime number.

(iii) We know that
70 = 2 × 5 × 7 is a prime factorization since 2, 5 and 7 are prime numbers.

(iv) We know that
54 = 2 × 3 × 9 is not a prime factorization since 9 is not a prime number.

2. Determine prime factorization of each of the following numbers:
(i) 216
(ii) 420
(iii) 468
(iv) 945
(v) 7325
(vi) 13915
Solution:

(i) 216
We know that

2	216
2	108
2	54
3	27
3	9
3	3
	1

Hence, the prime factorization of 216 is 2 × 2 × 2 × 3 × 3 × 3.

(ii) 420
We know that

2	420
2	210
3	105
5	35
7	7
	1

Hence, the prime factorization of 420 is 2 × 2 × 3 × 5 × 7.

(iii) 468
We know that

2	468
2	234
3	117
3	39
13	13
	1

Hence, the prime factorization of 468 is 2 × 2 × 3 × 3 × 13.

(iv) 945
We know that

3	945
3	315
3	105
5	35
7	7
	1

Hence, the prime factorization of 945 is 3 × 3 × 3 × 5 × 7.

(v) 7325
We know that

5	7325
5	1465
293	293
	1

Hence, the prime factorization of 7325 is 5 × 5 × 293.

(vi) 13915
We know that

5	13915
11	2783
11	253
23	23
	1

Hence, the prime factorization of 13915 is 5 × 11 × 11 × 23.

3. Write the smallest 4-digit number and express it as a product of primes.
Solution:

1000 is the smallest 4-digit number.
We know that
1000 = 2 × 500
= 2 × 2 × 250
So we get
1000 = 2 × 2 × 2 × 125
It can be further expanded as
1000 = 2 × 2 × 2 × 5 × 25
We get
1000 = 2 × 2 × 2 × 5 × 5 × 5

Therefore, the smallest 4-digit number is 1000 and can be expressed as 2 × 2 × 2 × 5 × 5 × 5.

4. Write the largest 4-digit number and give its prime factorization.
Solution:

9999 is the largest 4-digit number
We know that

3	9999
3	3333
11	1111
101	101
	1

Therefore, 9999 is the largest 4-digit number and can be expressed as 3 × 3 × 11 × 101.

5. Find the prime factors of 1729. Arrange the factors in ascending order, and find the relation between two consecutive prime factors.
Solution:

We know that

7	1729
13	247
19	19
	1

Hence, 1729 can be expressed as 7 × 13 × 19
We know that the consecutive prime factors of 1729 are 7, 13 and 19
13 – 7 = 6
19 – 13 = 6

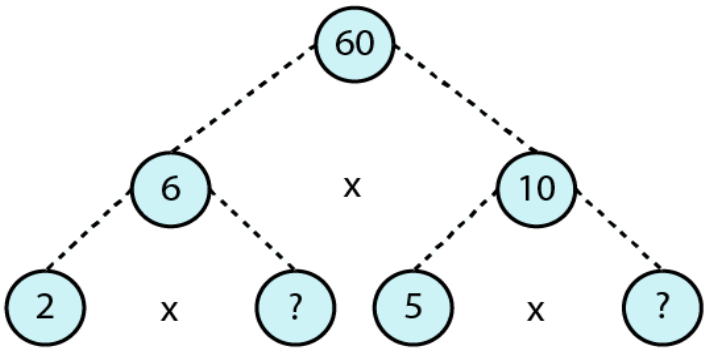
Therefore, in the two consecutive prime factors each factor is 6 more than the previous factor.

6. Which factors are not included in the prime factorization of a composite number?
Solution:

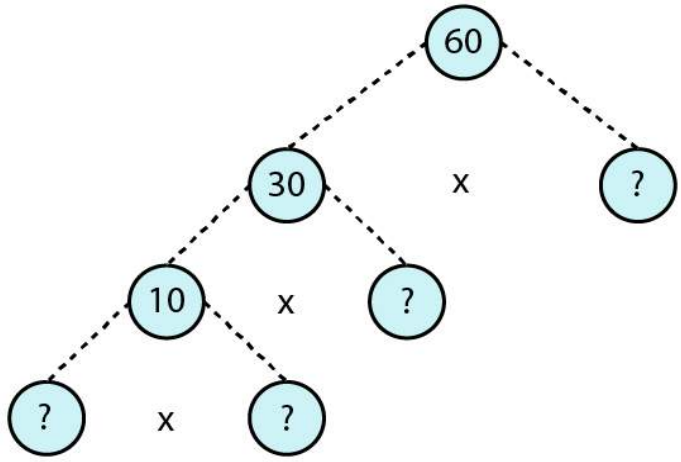
1 and the number itself are not included in the prime factorization of a composite number.

For example, 4 is a composite number having prime factorization 2 × 2.

7. Here are two difference factor trees for 60. Write the missing numbers:
(i)

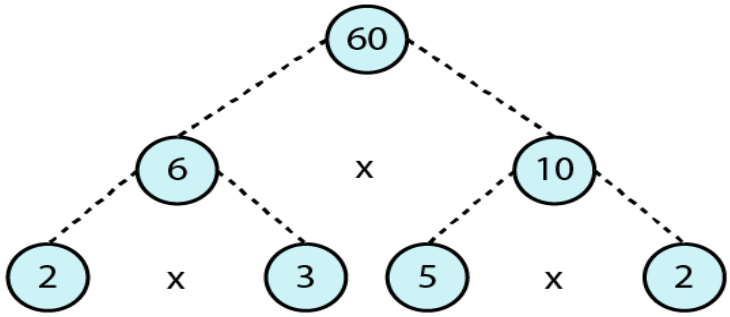


(ii)



Solution:

(i) We know that
6 = 2 × 3
10 = 5 × 2



(ii) We know that
60 = 30 × 2
30 = 10 × 3

$10 = 5 \times 2$