

**UNIT 2** *Factors***Overhead Slides**

---

**Overhead Slides**

- 2.1 Factors and Primes
- 2.2 Divisibility Test
- 2.3 Sieve of Eratosthenes
- 2.4 Factor Trees
- 2.5 Expressing Numbers as Products of Prime Factors
- 2.6 Index Notation
- 2.7 Highest Common Factor (HCF)
- 2.8 Use of Factor Trees to Find the HCF
- 2.9 Lowest Common Multiple (LCM)
- 2.10 Use of Factor Trees to Find the LCM
- 2.11 Square Roots

## OS 2.1

*Factors and Primes*

A *prime* number has exactly *two* factors, 1 and itself.

5 is a prime number because it has only *two* factors, 1 and 5.

8 has factors 1, 2, 4 and 8, so it is *not* prime.

1 is not a prime factor because it has only one factor, namely 1 itself.

On the following table:

list the factors of the numbers

1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, and then

indicate whether each number is a *prime*.

<i>Number</i>	<i>Factors</i>	<i>Prime ?</i>
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

**OS 2.2***Divisibility Test*

---

***Divisibility Test***

If a number is divisible by **2**,  
it will end with 0, 2, 4, 6 or 8.

If a number is divisible by **3**,  
the *sum* of its digits will be a multiple of 3.

If a number is divisible by **4**,  
the last two digits will be a multiple of 4.

If a number is divisible by **5**,  
it will end in 0 or 5.

If a number is divisible by **9**,  
the *sum* of its digits will be a multiple of 9.

If a number is divisible by **10**, it will end in 0.

*Can you find tests for divisibility by other numbers?*

**OS 2.3***Sieve of Eratosthenes*

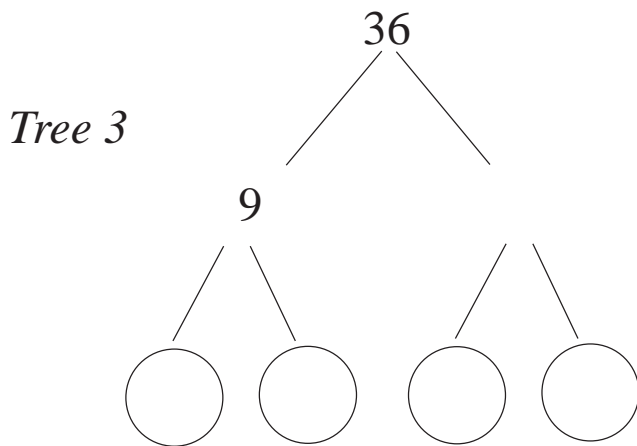
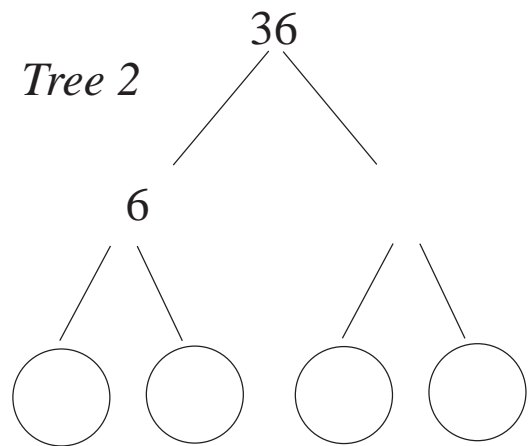
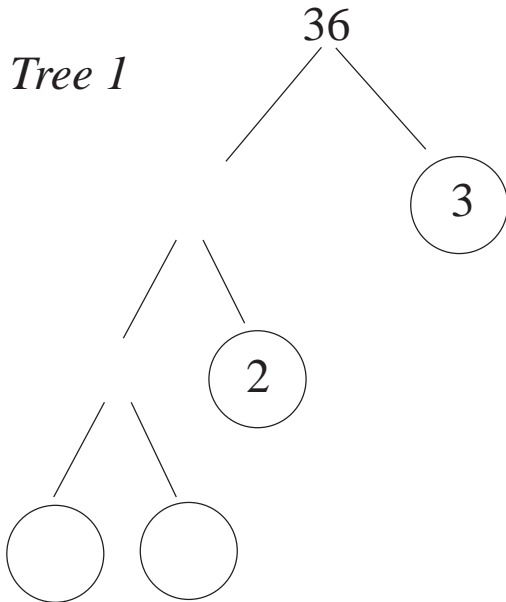
---

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

# OS 2.4

## Factor Trees

Here are three factor trees for 36. Write in the missing numbers.



$$36 = \square \times \square \times \square \times \square$$

$$= 2^{\square} \times 3^{\square}$$

## OS 2.5 *Expressing Numbers as Products of Prime Factors*

---

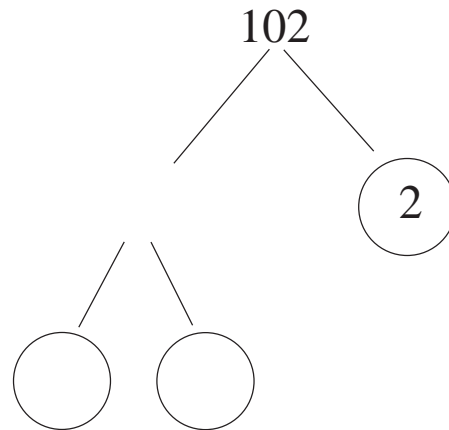
Express each of the following numbers as the product of its prime factors:

(a) 102

(b) 60

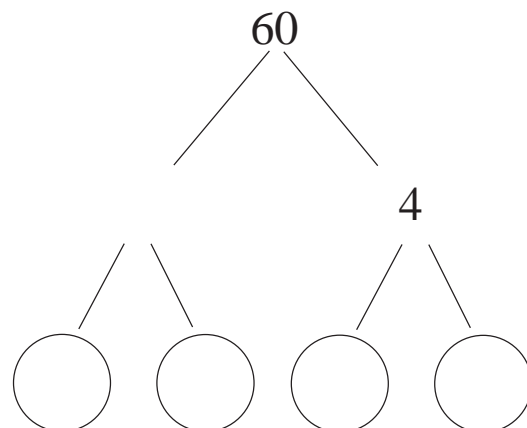
Create factor trees as shown below, and then write the prime numbers in ascending order.

(a)



102 = .....

(b)



60 = .....

**OS 2.6***Index Notation*

---

Fill in the missing numbers:

$$1. \quad 2 \times 2 \times 2 \times 2 \times 2 = 2^{\square}$$

$$2. \quad 7 \times 7 \times 7 \times 7 \times 7 = 7^{\square}$$

$$3. \quad 10 \times 10 \times 10 = 10^{\square}$$

$$4. \quad 32 = 2 \times \square$$
$$= 2^{\square}$$

$$5. \quad 10\,000 = 10 \times \square$$
$$= 10^{\square}$$

$$6. \quad 125 = 5 \times \square$$
$$= 5^{\square}$$

# OS 2.7

## *Highest Common Factor (HCF)*

---

Determine the HCF of:

(A) 20 and 30

The factors of 20 are .....

The factors of 30 are .....

Circle the largest (highest) number that is a factor of both 20 and 30.

The HCF of 20 and 30 is .....

(B) 12 and 14

The factors of 12 are .....

The factors of 14 are .....

Circle the largest (highest) number that is a factor of both 12 and 14.

The HCF of 12 and 14 is .....

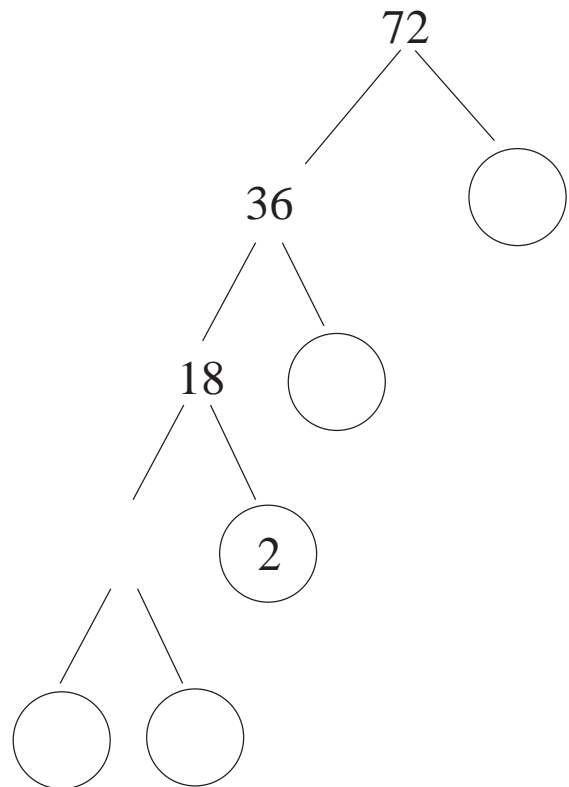
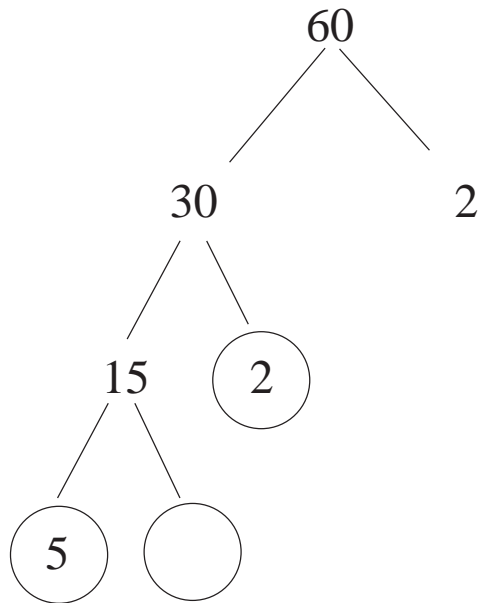
---

# OS 2.8

## Use of Factor Trees to Find the HCF

Determine the HCF of 60 and 72.

Using factor trees:



$$60 = \dots\dots\dots$$

$$= \dots\dots\dots$$

$$72 = \dots\dots\dots$$

$$= \dots\dots\dots$$

The HCF is calculated using the prime factors that are common to both numbers.

$$\text{The HCF of 60 and 70} = \dots\dots\dots$$

$$= \dots\dots\dots$$

# OS 2.9

## *Lowest Common Multiple (LCM)*

---

Determine the LCM of:

(A) 5 and 7

The multiples of 5 are .....

The multiples of 7 are .....

Circle the smallest (lowest) number that is in both lists.

The LCM of 5 and 7 is ..... .

(B) 6 and 10

The multiples of 6 are .....

The multiples of 10 are .....

Circle the smallest (lowest) number that is in both lists.

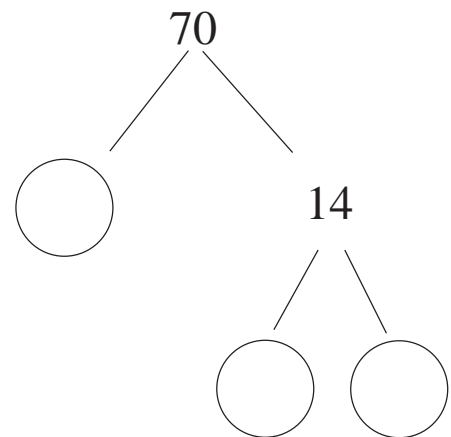
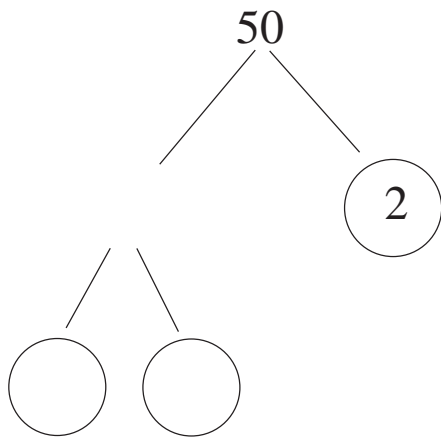
The LCM of 6 and 10 is ..... .

**OS 2.10**

*Use of Factor Trees to Find the LCM*

Determine the LCM of 50 and 70.

Using factor trees to find the prime factorisations:



50 = .....

70 = .....

So LCM of 50 and 70 = ..... × ..... × ..... × ..... ×

= .....

## OS 2.11

Square Roots

---

The square root of a number is a number which, when squared (multiplied by itself), gives you the first number.

For example,

$$\text{if } a = b^2, \text{ then } b = \sqrt{a}$$

(A) Find, without using a calculator:

(i)  $\sqrt{49}$

(ii)  $\sqrt{121}$

(iii)  $\sqrt{196}$

(iv)  $\sqrt{225}$

(v)  $\sqrt{400}$

(vi)  $\sqrt{10\,000}$

(vii)  $\sqrt{160\,000}$

(B) Explain why:

(i)  $8 < \sqrt{80} < 9$

(ii)  $12 < \sqrt{160} < 13$

---