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Multiples and Factors

IGCSE Mathematics

The Panda Math Tutor

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1 Introduction to Multiples and Factors

Note

Multiples and factors are fundamental concepts in number theory that form the foundation for understanding divisibility, prime numbers, and many other important mathematical ideas. These concepts appear frequently in IGCSE examinations and are essential for success in higher mathematics.

In this chapter, we will explore:

- Understanding factors and multiples
- Prime and composite numbers
- Prime factorization
- Highest Common Factor (HCF)
- Lowest Common Multiple (LCM)
- Applications to real-world problems

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2 Factors

Definition

A **factor** of a number is a whole number that divides into it exactly (with no remainder).

If a divides b exactly, we write $a \mid b$ and say "a is a factor of b" or "b is divisible by a".

Example: The factors of 12 are: 1, 2, 3, 4, 6, and 12.

Method

Finding All Factors of a Number

Steps to find all factors:

Step 1: Start with 1 (which is always a factor)

Step 2: Test each number in order: 2, 3, 4, 5, ...

Step 3: For each number that divides exactly, record BOTH:

- The divisor (small factor)
- The quotient (large factor)

Step 4: Stop when the divisors start repeating or when divisor > quotient

Step 5: List all factors in ascending order

Example

Find all factors of 36.

Solution:
We test each number systematically:

$$\begin{aligned}
36 \div 1 &= 36 \quad \checkmark \quad \text{Factors: } 1, 36 \\
36 \div 2 &= 18 \quad \checkmark \quad \text{Factors: } 2, 18 \\
36 \div 3 &= 12 \quad \checkmark \quad \text{Factors: } 3, 12 \\
36 \div 4 &= 9 \quad \checkmark \quad \text{Factors: } 4, 9 \\
36 \div 5 &= 7.2 \quad \times \quad \text{Not a factor} \\
36 \div 6 &= 6 \quad \checkmark \quad \text{Factor: } 6
\end{aligned}$$

We stop here because the next number (7) would give a quotient less than 7.
All factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36

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Note

Quick Check: Count your factors! If you have an odd number of factors, the number is a perfect square. For example, 36 has 9 factors because $36 = 6^2$.

Warning

Common Mistake: Students often forget that 1 and the number itself are ALWAYS factors!
Incorrect: Factors of 20 are 2, 4, 5, 10
Correct: Factors of 20 are 1, 2, 4, 5, 10, 20

Preview ends here

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