GRADE 7
Factors, Multiples & Divisibility

Complete Number Theory Practice Pack

6 Worksheets • Factors • Multiples • Primes • Divisibility • HCF & LCM

Worksheet 1 — Factors & Factor Pairs

Instructions: Show your working. Use factorisation and divisibility rules where appropriate. Check challenge answers carefully.

1. List all positive factors of 96.

2. Write all factor pairs of 144.

3. How many positive factors does 72 have?

4. Find the greatest common factor (GCF) of 84 and 126.

5. Find the GCF of 96, 144 and 168.

6. A rectangle has area 180 cm² and whole-number side lengths. List all possible factor pairs for its dimensions.

7. A number has exactly 8 positive factors. Is 24 one possible example? Explain.

8. Find the smallest number greater than 50 that has exactly 10 positive factors.

Answer Key — Factors & Factor Pairs

1. 1,2,3,4,6,8,12,16,24,32,48,96.

2. (1,144),(2,72),(3,48),(4,36),(6,24),(8,18),(9,16),(12,12).

3. 12.

4. 42.

5. 24.

6. (1,180),(2,90),(3,60),(4,45),(5,36),(6,30),(9,20),(10,18),(12,15).

7. Yes; $24=2^3\times3$, so it has (3+1)(1+1)=8 factors.

8. 80; 80 = 2^4 x 5, so it has (4+1)(1+1) = 10 factors.

Worksheet 2 — Multiples & LCM

Instructions: Show your working. Use factorisation and divisibility rules where appropriate. Check challenge answers carefully.

1. Write the first six positive multiples of 14.

2. Find the least common multiple (LCM) of 18 and 30.

3. Find the LCM of 24 and 36.

4. Find the LCM of 12, 18 and 30.

5. Two lights flash every 12 seconds and 18 seconds. If they flash together at 2:00:00, when will they next flash together?

6. Find the smallest positive number that is a multiple of 8, 12 and 15.

7. Two buses leave a station every 20 minutes and 28 minutes. They leave together at 8:00 a.m. When will they next leave together?

8. Find the smallest three-digit number divisible by both 18 and 24.

Answer Key — Multiples & LCM

1. 14,28,42,56,70,84.

2. 90.

3. 72.

4. 180.

5. 2:00:36.

6. 120.

7. 10:20 a.m. (LCM of 20 and 28 = 140 minutes.)

8. 144.

Worksheet 3 — Prime & Composite Numbers

Instructions: Show your working. Use factorisation and divisibility rules where appropriate. Check challenge answers carefully.

1. List all prime numbers between 20 and 50.

2. Is 91 prime or composite? Give a factor pair to justify your answer.

3. Is 97 prime or composite? Explain briefly.

4. Find the prime factorisation of 420.

5. Find the prime factorisation of 756.

6. A number has prime factorisation $2^3 \times 5^2$. What is the number?

7. Which is greater: the number of factors of 72 or the number of factors of 100? Find both counts.

8. Find the smallest composite number that is not divisible by 2, 3 or 5.

Answer Key — Prime & Composite Numbers

1. 23,29,31,37,41,43,47.

2. Composite; $91 = 7 \times 13$.

3. Prime; it has no divisor among primes $\leq \sqrt{97}$.

4. $2^2 \times 3 \times 5 \times 7$.

5. $2^2 \times 3^3 \times 7$.

6. 200.

7. 72 has 12 factors; 100 has 9 factors.

8. 49.

Worksheet 4 — Divisibility Rules

Instructions: Show your working. Use factorisation and divisibility rules where appropriate. Check challenge answers carefully.

1. Is 7,236 divisible by 3? By 9? Show the digit-sum test.

2. Is 12,450 divisible by 2, 5 and 10?

3. Is 8,316 divisible by 4? Use the last-two-digits rule.

4. Is 54,432 divisible by 6? Explain using divisibility by 2 and 3.

5. Find the missing digit ■ so that 4,72■ is divisible by 9. Give all possible digits.

6. Find the smallest digit that can replace ■ so that 63■2 is divisible by 3 and 4.

7. Which of these are divisible by 8: 1,024; 2,136; 3,450; 4,512?

8. A number is divisible by 2, 3, 5 and 9. What is the smallest possible positive number?

Answer Key — Divisibility Rules

1. Digit sum 18: yes for both 3 and 9.

2. Yes to all three.

3. Yes; 16 is divisible by 4.

4. Yes; it is even and digit sum is 18.

5. The missing digit is 5.

6. 1; 6312 has digit sum 12 (divisible by 3) and ends in 12 (divisible by 4).

7. 1,024; 2,136; 4,512.

8. 90.

Worksheet 5 — HCF, LCM & Prime Factorisation

Instructions: Show your working. Use factorisation and divisibility rules where appropriate. Check challenge answers carefully.

1. Use prime factorisation to find the GCF of 180 and 252.

2. Use prime factorisation to find the LCM of 45 and 84.

3. Find the GCF and LCM of 72 and 120.

4. Two numbers have prime factorizations $2^3 \times 3^2$ and $2^2 \times 3 \times 5$. Find their GCF and LCM.

5. A school has 168 pencils and 252 erasers. It wants identical packs with no items left over. What is the greatest number of packs? How many pencils and erasers per pack?

6. Three alarms sound every 15, 20 and 24 minutes. If they sound together at 7:00 a.m., when next?

7. The product of two positive integers is 360 and their GCF is 6. Give one possible pair.

8. Two numbers have GCF 12 and LCM 180. If one number is 36, find the other.

Answer Key — HCF, LCM & Prime Factorisation

1. 36.

2. 1260.

3. GCF=24; LCM=360.

4. GCF=$2^2 \times 3 = 12$; LCM=$2^3 \times 3^2 \times 5 = 360$.

5. 84 packs; 2 pencils and 3 erasers per pack.

6. 9:00 a.m. (LCM = 120 minutes.)

7. 18 and 20; GCF 2, so not valid. One valid pair is 12 and 30: product 360, GCF 6.

8. 60, because 36×60 = 12×180.

Worksheet 6 — Divisibility & Number Theory Challenge

Instructions: Show your working. Use factorisation and divisibility rules where appropriate. Check challenge answers carefully.

1. Find the smallest positive integer greater than 100 that is divisible by 7, 9 and 11.

2. A number has prime factorisation $2^2 \times 3 \times 7^2$. Find the number of positive factors it has.

3. Find the smallest number that has exactly 12 positive factors.

4. Find the smallest number greater than 200 that leaves remainder 1 when divided by 6, 8 and 10.

5. Two numbers have GCF 15 and LCM 300. One number is 60. Find the other.

6. A number is divisible by 4 and 9 but not by 5. Give the smallest three-digit example.

7. Find all digits x for which 72x6 is divisible by 9 and 4.

8. A number has exactly 9 positive factors. Give two different examples and explain their prime-factor forms.

Answer Key — Divisibility & Number Theory Challenge

1. 693.

2. (2+1)(1+1)(2+1)=18 factors.

3. 60 (prime form $2^2 \times 3 \times 5$ gives $3 \times 2 \times 2 = 12$ factors).

4. 241.

5. 75, since $60 \times 75 = 15 \times 300$.

6. 108.

7. x = 3; 7236 has digit sum 18 and ends in 36, which is divisible by 4.

8. Examples: $36 = 2^2 \times 3^2$ and $100 = 2^2 \times 5^2$; each has (2+1)(2+1)=9 factors.