

GRADE 8 MATHS

Factors, Multiples & Divisibility

Complete Printable Worksheet Pack

6 Worksheets • Factors • Multiples • Prime Numbers • Divisibility Rules • HCF • LCM • Number Theory

Worksheet 1: Factors & Factor Pairs

Name: _____ Date: _____

1. List all positive factors of 48.
2. Write all factor pairs of 72.
3. How many positive factors does 36 have?
4. Find the greatest factor of 96 that is less than 20.
5. A number has factor pairs (1, 84), (2, 42), (3, 28), (4, 21), (6, 14), (7, 12). What is the number?
6. Is 91 a prime number or a composite number? Explain.
7. Find all factors of 120 that are also multiples of 5.
8. Which number has more factors: 48 or 54? Show your factor lists.
9. Find a number between 40 and 60 with exactly 8 positive factors.
10. Explain why every positive integer has at least one factor pair.

Answer Key — Worksheet 1

1. 1, 2, 3, 4, 6, 8, 12, 16, 24, 48.
2. (1,72), (2,36), (3,24), (4,18), (6,12), (8,9).
3. 9 factors.
4. 16.
5. 84.
6. Composite; $91=7\times 13$.
7. 5, 10, 15, 20, 30, 40, 60, 120.
8. 48 has 10 factors; 54 has 8, so 48 has more.
9. 48 has exactly 10 factors, 54 has 8, so 54 is a valid answer.
10. 1 and the number itself always divide a positive integer exactly.

Worksheet 2: Multiples, Common Multiples & LCM

Name: _____ Date: _____

1. Write the first eight positive multiples of 9.
2. Find the first five common multiples of 6 and 8.
3. Find the LCM of 12 and 18.
4. Find the LCM of 15, 20 and 30.
5. Two bells ring every 12 minutes and every 18 minutes. If they ring together at 9:00, when will they next ring together?
6. Find the smallest number greater than 100 that is a multiple of both 14 and 18.
7. Is 360 a multiple of 15, 18 and 24? Check each.
8. Find the LCM of 24 and 36 using prime factorisation.
9. Two lights flash every 20 seconds and 28 seconds. How many seconds until they flash together again?
10. Explain why the LCM of two positive integers is always a multiple of each number.

Answer Key — Worksheet 2

1. 9, 18, 27, 36, 45, 54, 63, 72.
2. 24, 48, 72, 96, 120.
3. 36.
4. 60.
5. 9:36.
6. 126.
7. $360/15=24$ yes; $360/18=20$ yes; $360/24=15$ yes.
8. $24=2^3 \times 3$ and $36=2^2 \times 3^2$, so $\text{LCM}=2^3 \times 3^2=72$.
9. $\text{LCM}(20,28)=140$ seconds.
10. By definition, the LCM is the least positive number that is a multiple of all the given numbers.

Worksheet 3: Prime, Composite & Prime Factorisation

Name: _____ Date: _____

1. List the prime numbers between 20 and 40.
2. Write 84 as a product of prime factors.
3. Write 360 as a product of prime factors.
4. Is 97 prime? Explain.
5. Find the prime factorisation of 126.
6. Which has the greater number of prime factors, counting repeats: 72 or 90?
7. Find the prime factorisation of 2,520.
8. A number has prime factorisation $2^3 \times 3^2 \times 5$. Find the number.
9. Explain why 1 is neither prime nor composite.
10. Find a number less than 100 that has exactly three distinct prime factors and give its factorisation.

Answer Key — Worksheet 3

1. 23, 29, 31, 37.
2. $2^2 \times 3 \times 7$.
3. $2^3 \times 3^2 \times 5$.
4. Yes; it has no prime divisors up to square root of 97, which is less than 10.
5. $2 \times 3^2 \times 7$.
6. $72 = 2^3 \times 3^2$ has 5 prime factors counting repeats; $90 = 2 \times 3^2 \times 5$ has 4, so 72 has more.
7. $2^3 \times 3^2 \times 5 \times 7$.
8. 360.
9. A prime has exactly two positive factors; 1 has only one, so it is neither prime nor composite.
10. Example: $30 = 2 \times 3 \times 5$.

Worksheet 4: Divisibility Rules

Name: _____ Date: _____

1. State whether 4,536 is divisible by 2, 3, 4, 5, 6 and 9.
2. Find the smallest digit that can replace ■ so that 72■4 is divisible by 3.
3. Find all digits ■ that make 45■0 divisible by 9.
4. Is 7,128 divisible by 4? Explain.
5. Find the missing digit in 83■5 so the number is divisible by 3.
6. Can a number ending in 0 ever fail to be divisible by 5? Explain.
7. Find the smallest digit ■ so that 6■24 is divisible by both 3 and 4.
8. Determine whether 9,999 is divisible by 9 and by 3.
9. A six-digit number has digit sum 27. What can you conclude about divisibility by 3 and 9?
10. Explain why a number divisible by 6 must be divisible by both 2 and 3.

Answer Key — Worksheet 4

1. Divisible by 2, 3, 4 and 6; not by 5; divisible by 9 because digit sum is 18.
2. $72\square4$ has digit sum $13+\square$; smallest digit making a multiple of 3 is 2, so 7224.
3. $45\square0$ has digit sum $9+\square$; digits 0 or 9 work.
4. Yes; last two digits 28 are divisible by 4.
5. $83\square5$ has digit sum $16+\square$; $\square=2,5,8$. Any of these works.
6. No. Any whole number ending in 0 is divisible by 5.
7. 6024 works; $\square=0$ is the smallest.
8. 9,999 has digit sum 36, so it is divisible by both 9 and 3.
9. It is divisible by 3 and also by 9.
10. $6=2\times3$, so divisibility by 6 requires divisibility by both 2 and 3.

Worksheet 5: HCF, LCM & Number Theory

Name: _____ Date: _____

1. Find the HCF of 48 and 72.
2. Find the HCF of 84 and 126 using prime factorisation.
3. Find the LCM of 18 and 30.
4. Two ropes are 84 cm and 126 cm long. What is the greatest equal length into which both can be cut with no waste?
5. Find the HCF and LCM of 24 and 36.
6. If the HCF of two numbers is 8 and their LCM is 240, give one possible pair of numbers.
7. Three lights flash every 12, 18 and 30 seconds. After how many seconds will they flash together?
8. Find the smallest positive integer that is divisible by 8, 12 and 15.
9. Two numbers have product 720 and HCF 6. If one number is 30, find the other and check the LCM.
10. Explain the relationship between the HCF and LCM of two positive integers a and b .

Answer Key — Worksheet 5

1. 24.
2. 42.
3. 90.
4. 42 cm.
5. $\text{HCF}=12$; $\text{LCM}=72$.
6. One possible pair is 24 and 80: $\text{HCF}=8$ and $\text{LCM}=240$.
7. $\text{LCM}(12,18,30)=180$ seconds.
8. 120.
9. Other number $=720/30=24$; $\text{HCF}(30,24)=6$ and $\text{LCM}=120$.
10. For positive integers a and b , $\text{HCF}(a,b) \times \text{LCM}(a,b) = a \times b$.

Worksheet 6: Factors, Multiples & Divisibility Challenge

Name: _____ Date: _____

1. Find the smallest number greater than 200 that is divisible by 6, 8 and 15.
2. A number has exactly four positive factors, two of which are 1 and 13. Give a possible number.
3. Find the smallest positive number that has exactly 12 positive factors.
4. Find the smallest positive integer that leaves remainder 1 when divided by 6, 8 and 10.
5. A number is divisible by 4 and 9 but not by 5. Give three possible four-digit examples.
6. Find the smallest number greater than 500 that is a multiple of 12 and leaves remainder 2 when divided by 7.
7. Two numbers have HCF 12 and LCM 180. If one number is 36, find the other.
8. Find all digits x such that $52x8$ is divisible by 3 and 4.
9. A number between 100 and 200 has exactly 6 factors and is divisible by 3. Give one possible number and justify it.
10. Explain why a prime number greater than 3 must be of the form $6n-1$ or $6n+1$.

Answer Key — Worksheet 6

1. $\text{LCM}(6,8,15)=120$; multiples are 120,240, so the smallest greater than 200 is 240.
2. $13^3=2197$ has factors 1,13,169,2197.
3. 60 has exactly 12 positive factors.
4. 121: 121 leaves remainder 1 on division by 6, 8 and 10.
5. Examples: 1008, 1026 and 1044.
6. Multiples of 12 greater than 500: 504,516,...; 506 is $2 \bmod 7$, so 516? $516 \bmod 7=5$. Continue: $552 \bmod 7=6$; $564 \bmod 7=4$; $576 \bmod 7=2$, so 576.
7. $36 \times \text{other} = 12 \times 180 = 2160$, so $\text{other} = 60$.
8. Divisible by 4 automatically because last two digits 08; digit sum $15+x$ must be divisible by 3, so $x=0,3,6,9$.
9. $111=3 \times 37$ has exactly 4 factors, so not valid. $117=3^2 \times 13$ has 6 factors, so 117 works.
10. Every integer is congruent to $0,1,2,3,4,5 \bmod 6$. A prime greater than 3 cannot be divisible by 2 or 3, leaving only residues 1 and 5, i.e. $6n+1$ or $6n-1$.