

Factors and Multiples: practice solutions, Grade 6 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Factors of 28



Pairs: 1×28 , 2×14 , 4×7 . We stop because the next candidate, **5**, does not divide **28**, and **6** does not either.

The factors of **28** are **1, 2, 4, 7, 14, 28**.

2 Multiples of 9



$9 \times 1 = 9$, $9 \times 2 = 18$, $9 \times 3 = 27$, $9 \times 4 = 36$, $9 \times 5 = 45$, $9 \times 6 = 54$.

The first six multiples of **9** are **9, 18, 27, 36, 45, 54**.

3 Prime or composite?



- **17**: only the factors **1** and **17**, so it is **prime**.
- **$21 = 3 \times 7$** : **composite**.
- **29**: not divisible by **2**, **3** or **5** (and **$7 \times 7 = 49 > 29$**), so it is **prime**.
- **$39 = 3 \times 13$** : **composite**.
- **1** has only one factor: **neither**.
- **$51 = 3 \times 17$** : **composite**.

4 Divisible by 2, 5 or 10



- **340** ends in **0**: divisible by **2**, **5** and **10**.
- **785** ends in **5**: divisible by **5** only.
- **1,206** ends in **6**: divisible by **2** only.
- **4,115** ends in **5**: divisible by **5** only.

5 True or false?



- False. **$45 \div 7$** is not a whole number (**$7 \times 6 = 42$** and **$7 \times 7 = 49$**).
- True. **6** is even, so **$6 \times n$** has **2** as a factor and is even.
- False. **1** has only one factor, but a prime has exactly two.
- False. **2** is prime and even.

6 Multiples in a range



$7 \times 5 = 35$ is too small and $7 \times 6 = 42$ works. Continue: $7 \times 7 = 49$, $7 \times 8 = 56$, $7 \times 9 = 63$. Next is $7 \times 10 = 70$, which is not less than 70.

The multiples are 42, 49, 56, 63.

7 GCF by listing



Factors of 12: 1, 2, 3, 4, 6, 12. Factors of 30: 1, 2, 3, 5, 6, 10, 15, 30.

Common factors: 1, 2, 3, 6. The greatest is 6, so $\text{GCF}(12, 30) = 6$.

8 Digit sums



- 2,718: $2 + 7 + 1 + 8 = 18$, divisible by 3 and by 9.
- 5,436: $5 + 4 + 3 + 6 = 18$, divisible by 3 and by 9.
- 7,305: $7 + 3 + 0 + 5 = 15$, divisible by 3 but not by 9.
- 6,481: $6 + 4 + 8 + 1 = 19$, divisible by neither.

9 Factor tree of 84



$84 = 4 \times 21$, $4 = 2 \times 2$ and $21 = 3 \times 7$. All the end numbers are prime.

$84 = 2 \times 2 \times 3 \times 7 = 2^2 \times 3 \times 7$. Check: $4 \times 3 \times 7 = 84$.

10 GCF with prime factors



$56 = 2^3 \times 7$ and $42 = 2 \times 3 \times 7$.

Common primes with the smaller exponent: 2^1 and 7^1 . So $\text{GCF}(56, 42) = 2 \times 7 = 14$.

11 LCM of 6 and 15



Multiples of 15: 15, 30, 45, ... Multiples of 6: 6, 12, 18, 24, 30, ...

The first number on both lists is 30, so $\text{LCM}(6, 15) = 30$.

12 Factoring out the GCF



a. $\text{GCF}(45, 60) = 15$, so $45 + 60 = 15(3 + 4) = 15 \times 7 = 105$.

b. $\text{GCF}(24, 40) = 8$, so $24 + 40 = 8(3 + 5) = 8 \times 8 = 64$.

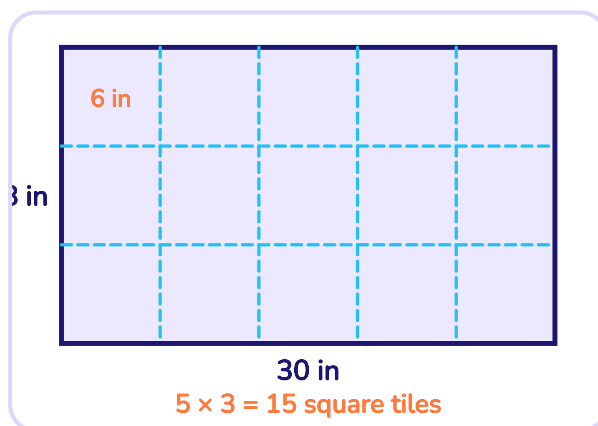
13 Tiling a floor



The side must divide both 30 and 18, and we want the largest: $\text{GCF}(30, 18) = 6$ (since $30 = 2 \times 3 \times 5$ and $18 = 2 \times 3^2$).

Tiles per row: $30 \div 6 = 5$. Rows: $18 \div 6 = 3$. Total: $5 \times 3 = 15$.

The largest tile has a side of 6 inches (about 15 cm) and 15 tiles are needed.



14 Two lighthouses



We want the smallest common multiple of 9 and 12. $9 = 3^2$ and $12 = 2^2 \times 3$, so $\text{LCM} = 2^2 \times 3^2 = 36$.

They flash together again 36 seconds later. Check: $36 = 9 \times 4 = 12 \times 3$.

15 A mystery number



A multiple of both 4 and 7 is a multiple of $\text{LCM}(4, 7) = 28$. The multiples of 28 are 28, 56, 84, ...

Only 56 is between 40 and 80. Check: $56 = 4 \times 14 = 7 \times 8$.

16 Find the mistake



96 is a common multiple of 8 and 12, but it is not the **least** one. The multiples of 12 are 12, 24, 36, ... and $24 = 8 \times 3$ is already a multiple of 8.

With primes: $8 = 2^3$ and $12 = 2^2 \times 3$, so $\text{LCM} = 2^3 \times 3 = 24$. The product $a \times b$ equals the LCM only when the numbers share no common factor other than 1.

17 School kits



$72 = 2^3 \times 3^2$ and $54 = 2 \times 3^3$, so $\text{GCF}(72, 54) = 2 \times 3^2 = 18$.

She can make 18 kits, each with $72 \div 18 = 4$ pencils and $54 \div 18 = 3$ erasers.

18 Find the other number



Since $\text{GCF} \times \text{LCM} = a \times b$, we get $4 \times 60 = 12 \times b$, so $b = 240 \div 12 = 20$.

Check: $12 = 2^2 \times 3$ and $20 = 2^2 \times 5$. $\text{GCF} = 2^2 = 4$ and $\text{LCM} = 2^2 \times 3 \times 5 = 60$. The other number is 20.

19 Three school bells



$4 = 2^2$, $6 = 2 \times 3$ and $10 = 2 \times 5$. Take every prime with its largest exponent:
 $\text{LCM} = 2^2 \times 3 \times 5 = 60$.

They ring together again after 60 minutes, at 1:00 p.m.

20 The missing digit



The digit sum is $5 + \square + 4 = 9 + \square$, which must be a multiple of 9. With a single digit, $\square = 0$ (sum 9) or $\square = 9$ (sum 18). The numbers are **504** and **594**.

Divisibility by 4: **04** is divisible by 4, but **94** $= 4 \times 23 + 2$ is not. So only **504** works ($504 = 4 \times 126$).

21 Sums of multiples



Write the numbers as $6a$ and $6b$ with a and b whole numbers. By the distributive property, $6a + 6b = 6(a + b)$, a multiple of 6.

Example: $42 = 6 \times 7$ and $78 = 6 \times 13$, so $42 + 78 = 6(7 + 13) = 6 \times 20 = 120$. As $42 = 2 \times 3 \times 7$ and $78 = 2 \times 3 \times 13$, $\text{GCF}(42, 78) = 6$.

22 Hot dogs and buns



The number of items must be a multiple of 8 and of 6: $\text{LCM}(8, 6) = 24$.

Hot dog packs: $24 \div 8 = 3$. Bun packs: $24 \div 6 = 4$. You buy 3 packs of hot dogs and 4 packs of buns, for **24** of each.



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