JUNIOR CYCLE MATHS · FREE REVISION SHEET

Factors, multiples & primes

↗ Léim

Learning outcome (2018 specification): N.1d. Play the game: **leim.ie/prime-smash.html**

1. Factors and multiples

A **factor** divides in exactly: the factors of 12 are 1, 2, 3, 4, 6, 12. A **multiple** is in the times table: multiples of 6 are 6, 12, 18, 24 ...

Find factors in pairs: 36 = 1 × 36 = 2 × 18 = 3 × 12 = 4 × 9 = 6 × 6, so 36 has 9 factors.

2. Prime numbers

A **prime** has exactly two factors: 1 and itself. Primes up to 50: **2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47**.

1 is not prime (one factor only). **2** is the only even prime. Watch out for 51 = 3 × 17, 57 = 3 × 19, 91 = 7 × 13.

Quick tests: ÷3 if the digits add to a multiple of 3 · ÷5 if it ends in 0 or 5 · to test a number, try primes up to its square root.

3. Factor trees

Split into any two factors and keep going until every branch is prime.

360 = 10 × 36
10 = 2 × 5 · 36 = 4 × 9 = 2 × 2 × 3 × 3
360 = 2 × 2 × 2 × 3 × 3 × 5 = **$2^3 \times 3^2 \times 5$**

Finish the job: $2^2 \times 15$ isn't a product of primes (15 = 3 × 5). And $2^3 = 2 \times 2 \times 2 = 8$, not 6.

4. HCF and LCM

HCF	biggest number that goes into both · HCF(12, 18) = 6
LCM	smallest number both go into · LCM(12, 18) = 36

5. HCF and LCM with primes

84 = $2^2 \times 3 \times 7$ and 90 = $2 \times 3^2 \times 5$. **HCF:** shared primes, smaller power → 2 × 3 = **6**. **LCM:** every prime, bigger power → $2^2 \times 3^2 \times 5 \times 7$ = **1260**. Check: HCF × LCM = 84 × 90 = 7560 ✓

Which one? "Together again", "at the same time" → **LCM**. "Biggest equal groups", "largest size", "nothing left over" → **HCF**. **Exam tip:** show your factor tree (part marks), give the answer in the form asked (index form, a time of day), and multiply back to check.

PRACTICE · 34 QUESTIONS

Have a go

↗ Léim

A. Primes

1. Circle the primes: 2, 9, 17, 21, 29, 33, 41, 51 _____
2. Why is 1 not a prime number? _____
3. Is 87 prime? Explain. _____
4. List the primes between 50 and 70. _____
5. Which is the only even prime number? _____
6. Is 91 prime? Explain. _____

B. Factors and multiples

7. List all the factors of 24. _____
8. List all the factors of 45. _____
9. List all the factors of 64. _____
10. Write the first five multiples of 7. _____
11. Is 84 a multiple of 6? How do you know? _____
12. How many factors does 100 have? _____
13. Which multiple of 8 is between 50 and 60? _____
14. Write down a common factor of 18 and 30 (not 1). _____

C. Write as a product of primes in index form (show the tree)

15. 36 = _____
16. 48 = _____
17. 75 = _____
18. 84 = _____
19. 120 = _____
20. 200 = _____
21. 252 = _____
22. 300 = _____

D. HCF and LCM

23. The HCF of 18 and 24 = _____
24. The LCM of 18 and 24 = _____
25. The HCF of 20 and 32 = _____
26. The LCM of 20 and 32 = _____
27. The HCF of 45 and 60 = _____
28. The LCM of 6 and 8 = _____
29. The HCF of 56 and 70 = _____
30. The LCM of 15 and 25 = _____

Questions 31–34 are on the next page.

EXAM-STYLE · THEN CHECK

Exam corner + answers

↗ Léim

E. Exam-style questions (show your work)

31. The 46 bus stops outside the school every 15 minutes and the 47 every 20 minutes. Both stop there at 3:30 p.m. When will they next both stop there together?

32. Saoirse has 36 red beads and 54 blue beads. She makes identical bracelets using all the beads. What is the greatest number of bracelets, and how many of each colour are on each?

33. A floor is 240 cm by 180 cm. It is covered with square tiles, all the same size, with no cutting. What is the largest tile that can be used, and how many tiles are needed?

34. $a = 2^3 \times 3 \times 5$ and $b = 2^2 \times 3^2 \times 7$. Find the HCF and the LCM of a and b. Leave your answers in index form.

Answers

A	1. 2, 17, 29, 41 · 2. it has only one factor (a prime has exactly two) · 3. No: 8 + 7 = 15, so 87 divides by 3 (87 = 3 × 29) · 4. 53, 59, 61, 67 · 5. 2 · 6. No: 91 = 7 × 13
B	7. 1, 2, 3, 4, 6, 8, 12, 24 · 8. 1, 3, 5, 9, 15, 45 · 9. 1, 2, 4, 8, 16, 32, 64 · 10. 7, 14, 21, 28, 35 · 11. Yes: 6 × 14 = 84 · 12. 9 · 13. 56 · 14. 2, 3 or 6
C	15. $2^2 \times 3^2$ · 16. $2^4 \times 3$ · 17. 3×5^2 · 18. $2^2 \times 3 \times 7$ · 19. $2^3 \times 3 \times 5$ · 20. $2^3 \times 5^2$ · 21. $2^2 \times 3^2 \times 7$ · 22. $2^2 \times 3 \times 5^2$
D	23. 6 · 24. 72 · 25. 4 · 26. 160 · 27. 15 · 28. 24 · 29. 14 · 30. 75
E	31. LCM of 15 and 20 = 60 minutes, so 4:30 p.m. · 32. HCF = 18 bracelets, each with 2 red and 3 blue · 33. HCF = 60 cm; 4 × 3 = 12 tiles · 34. HCF = $2^2 \times 3$ (= 12) · LCM = $2^3 \times 3^2 \times 5 \times 7$ (= 2520)

Got one wrong? Check: is every factor in your answer prime? Did you mix up HCF (small, goes into both) and LCM (big, both go into it)? Then play **Prime Smash** at leim.ie/prime-smash.html: the "Go back over these" list at the end shows the rule for each mistake.

All questions written by Léim. Léim is independent and not connected with the State Examinations Commission or the NCCA.