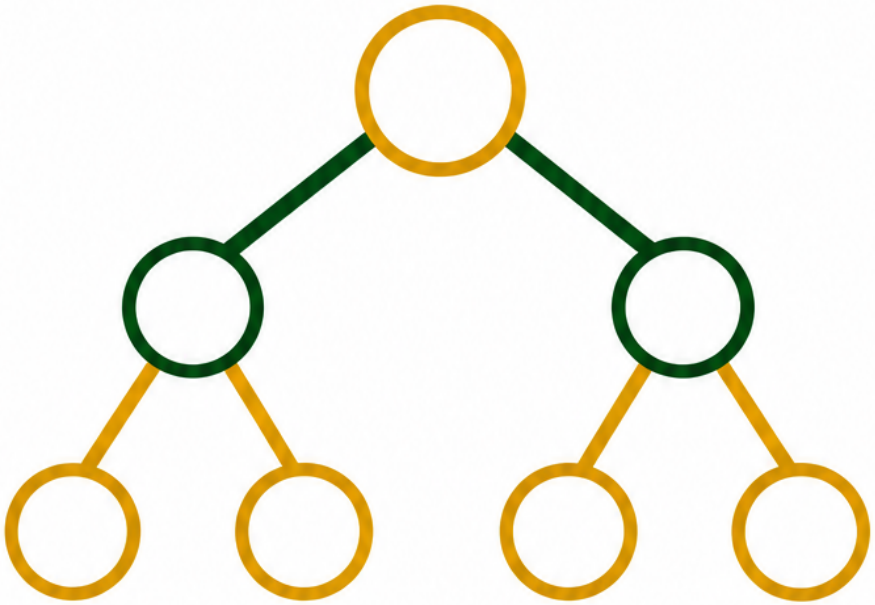
SCHOOL OF MATH

GRADE 6 MATH • CLASS 1

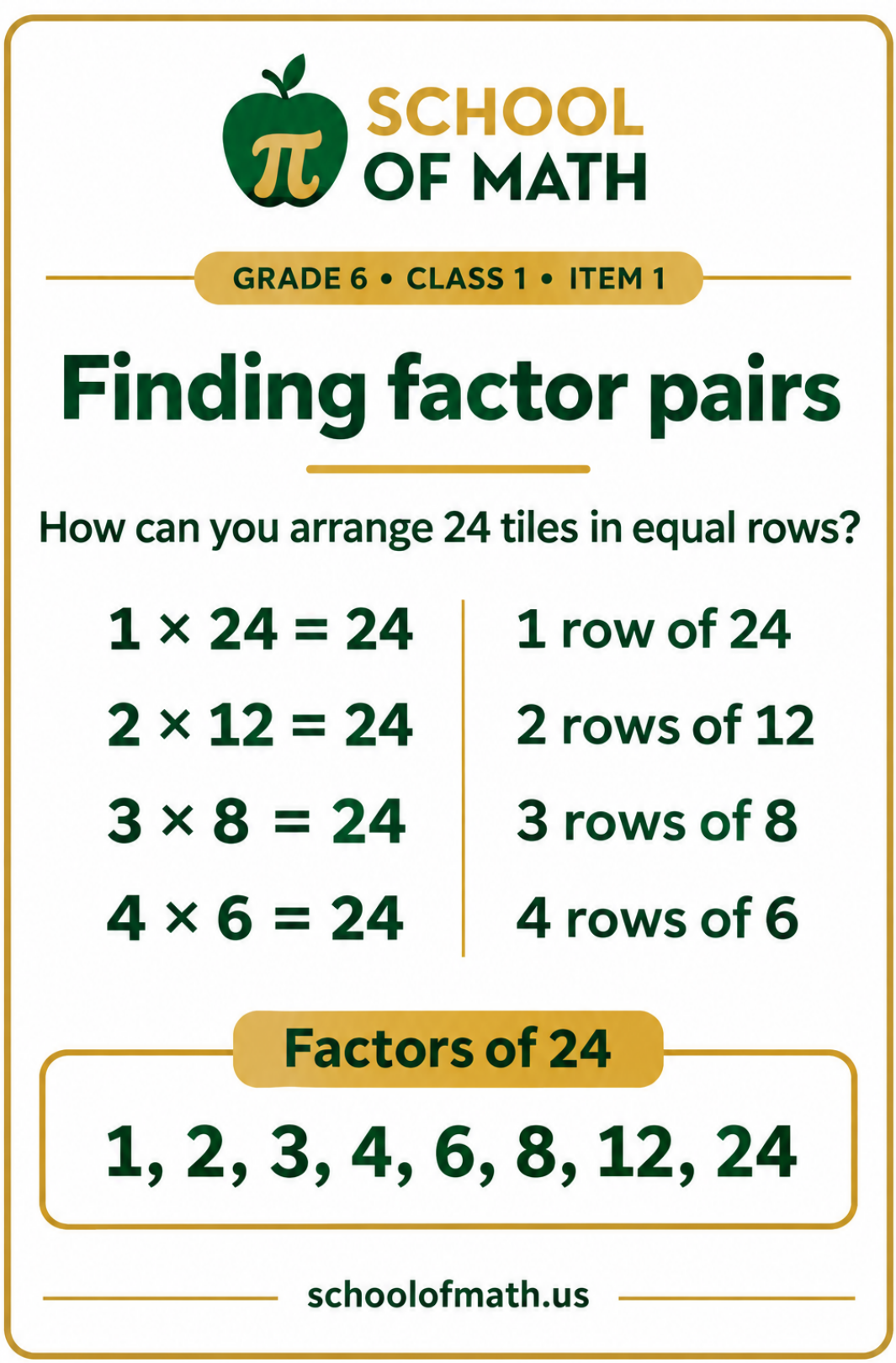
Factors, Multiples, and Prime Factorization

Greatest Common Factor and Least Common Multiple



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Image 1: Finding factor pairs



GRADE 6 · CLASS 1 · ADVANCED

Practice: Finding factor pairs

Questions 1–5 · Show your work in the space below each question.

Q1 List every factor pair of 180. How many positive factors does 180 have?

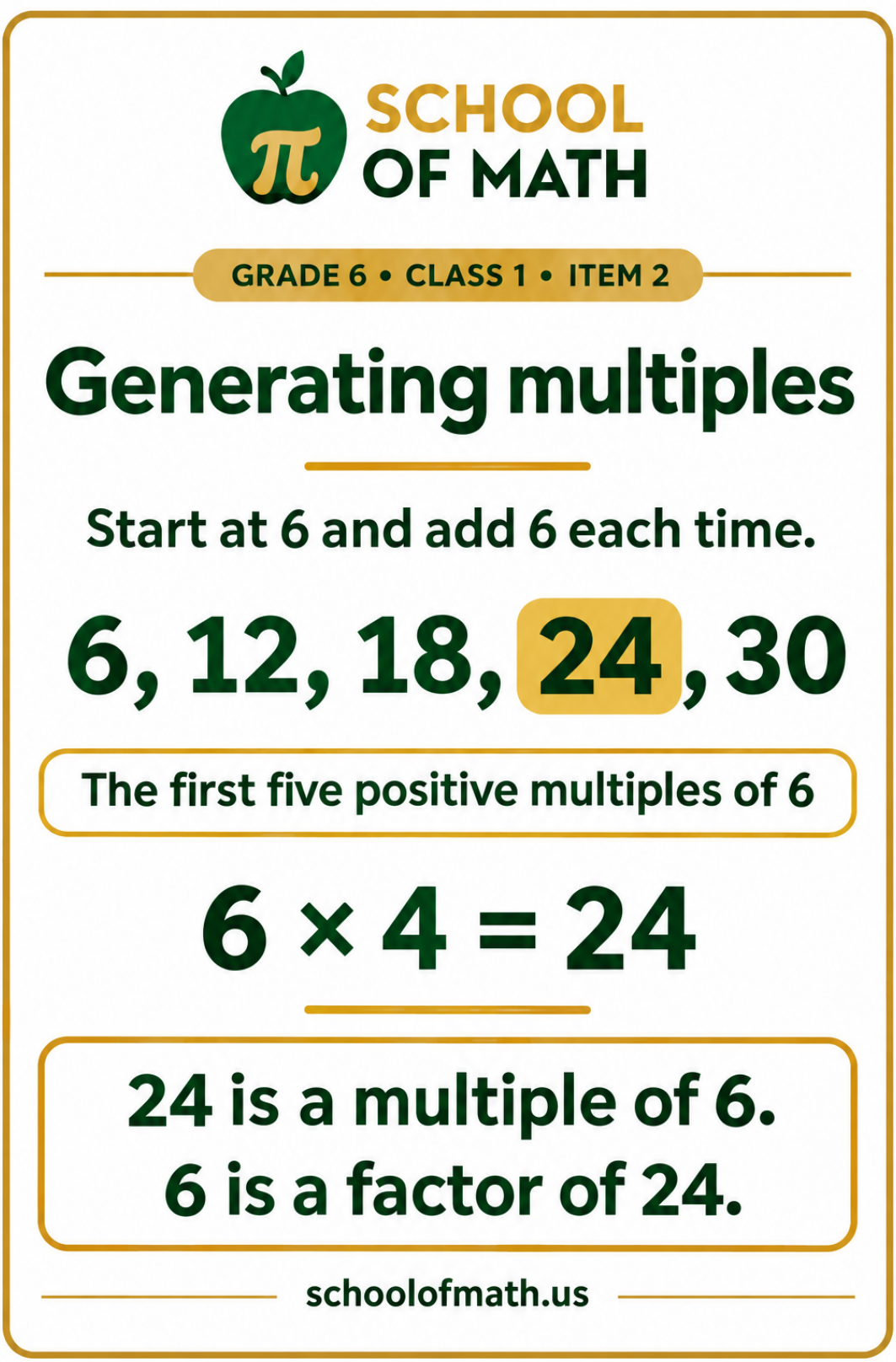
Q2 A floor design uses exactly 144 square tiles arranged as a solid rectangle. Count the different rectangles (a 2 × 72 and a 72 × 2 rectangle count as the same). Which rectangle has the smallest perimeter, and what is that perimeter in tile lengths?

Q3 Explain why 100 has an odd number of factors but 98 has an even number. List the factors of each.

Q4 What is the smallest whole number that has exactly 6 positive factors? Show how you know no smaller number works.

Q5 A school places 210 chairs in equal rows for an assembly. Every row must have at least 10 chairs, and there must be at least 10 rows. How many different arrangements are possible? (10 rows of 21 is different from 21 rows of 10.)

Image 2: Generating multiples



Practice: Generating multiples

Questions 6–10 · Show your work in the space below each question.

Q6 How many multiples of 7 are between 100 and 300?

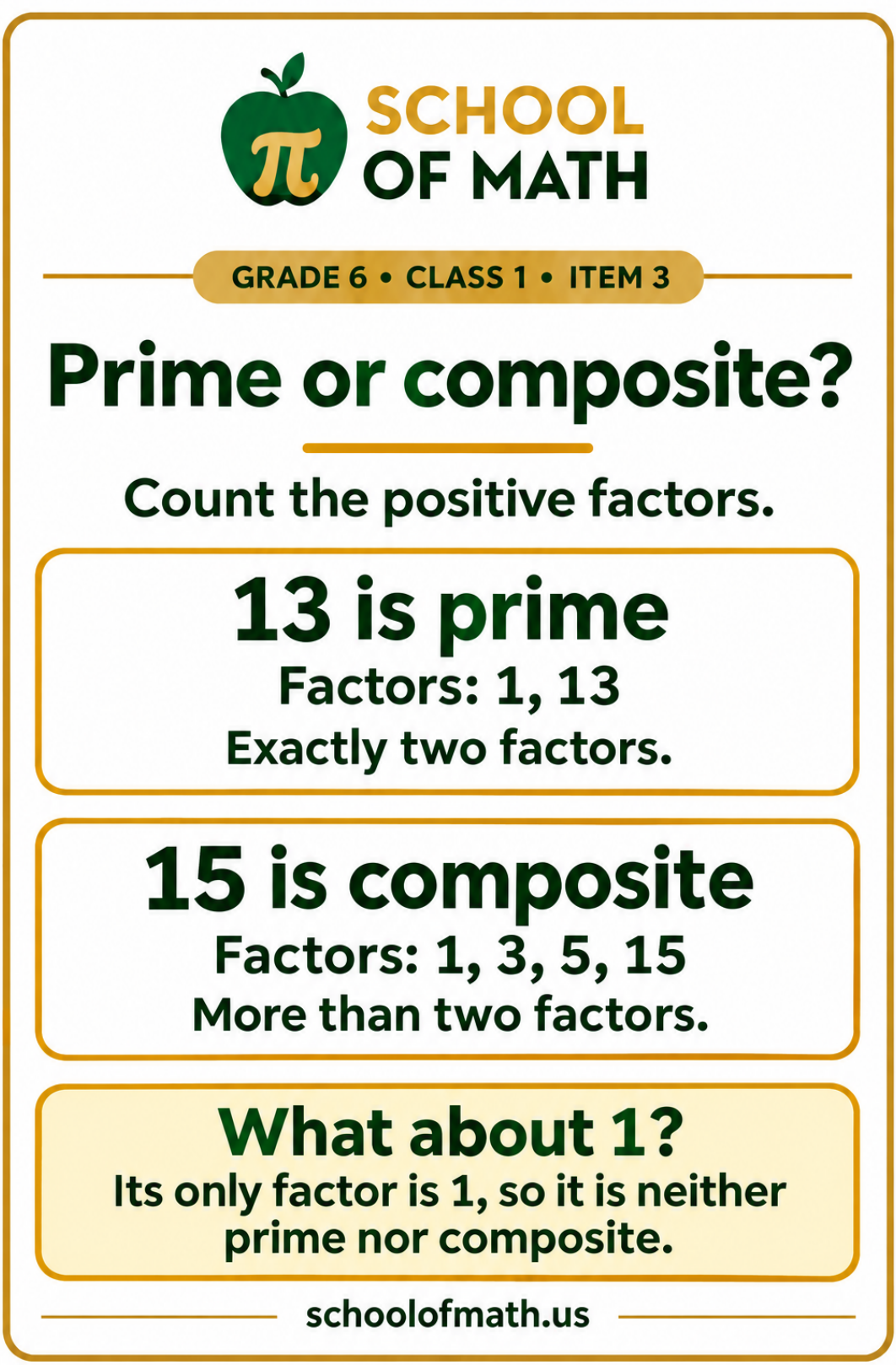
Q7 How many three-digit whole numbers are multiples of 12?

Q8 Show that 1,001 is a multiple of 7, of 11 and of 13. Then explain why 345,345 must also be a multiple of 7.

Q9 The sum of three consecutive multiples of 9 is 243. What are the three numbers?

Q10 Which of these is NOT always a multiple of 6?
A. Any multiple of 12
B. The sum of two multiples of 6
C. An even multiple of 3
D. A multiple of 2 plus a multiple of 3
E. A multiple of 2 times a multiple of 3

Image 3: Prime or composite?



Practice: Prime or composite?

Questions 11–15 · Show your work in the space below each question.

Q11 Is 221 prime or composite? Show the tests you used.

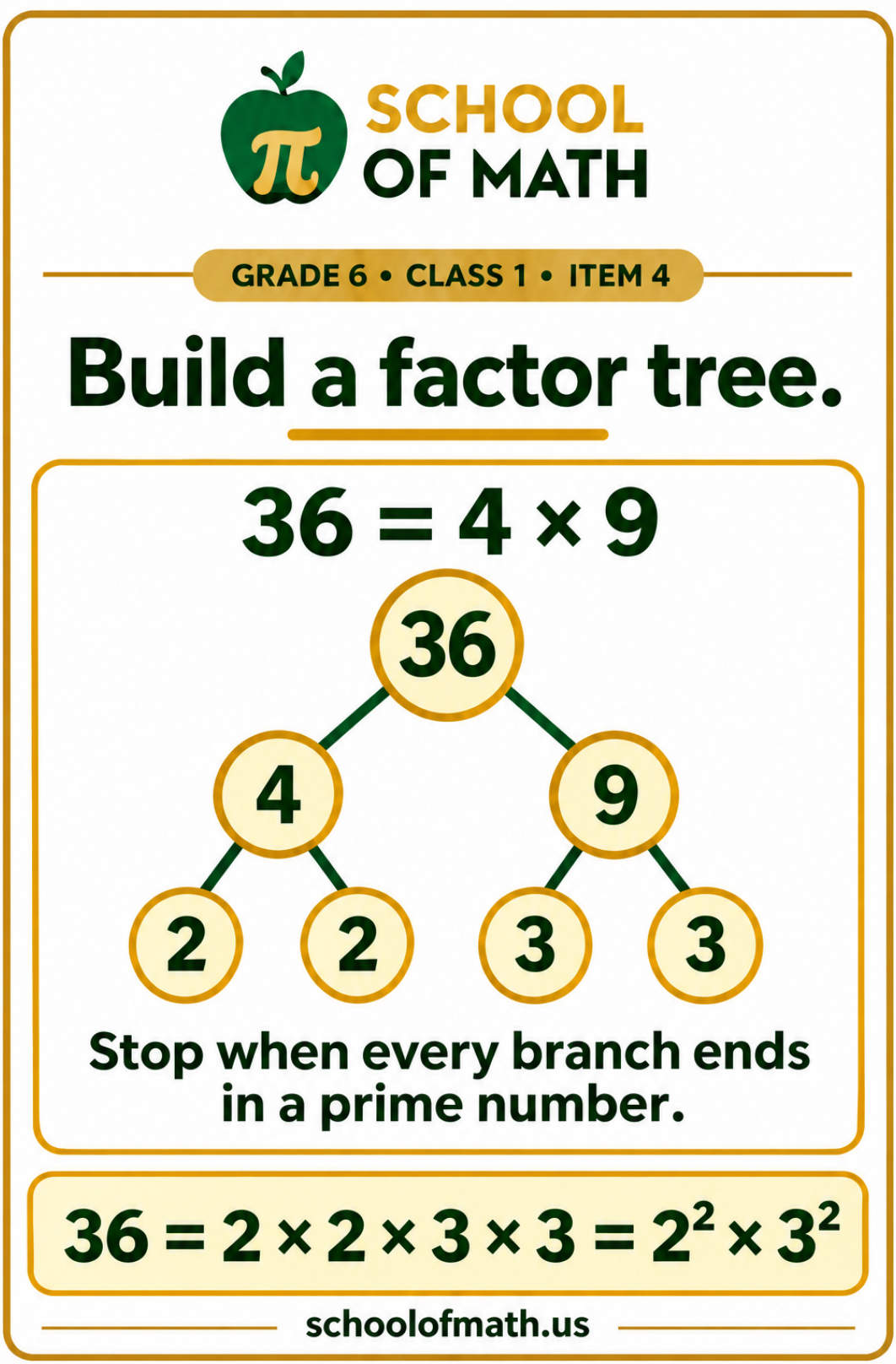
Q12 Is 199 prime or composite? Explain why you can stop testing after 13.

Q13 List every prime number between 80 and 110.

Q14 Two prime numbers add up to 85. What are they?

Q15 Find the sum of all the prime numbers between 40 and 60.

Image 4: Build a factor tree



Practice: Build a factor tree

Questions 16–20 · Show your work in the space below each question.

Q16 Write the prime factorization of 360 using exponents.

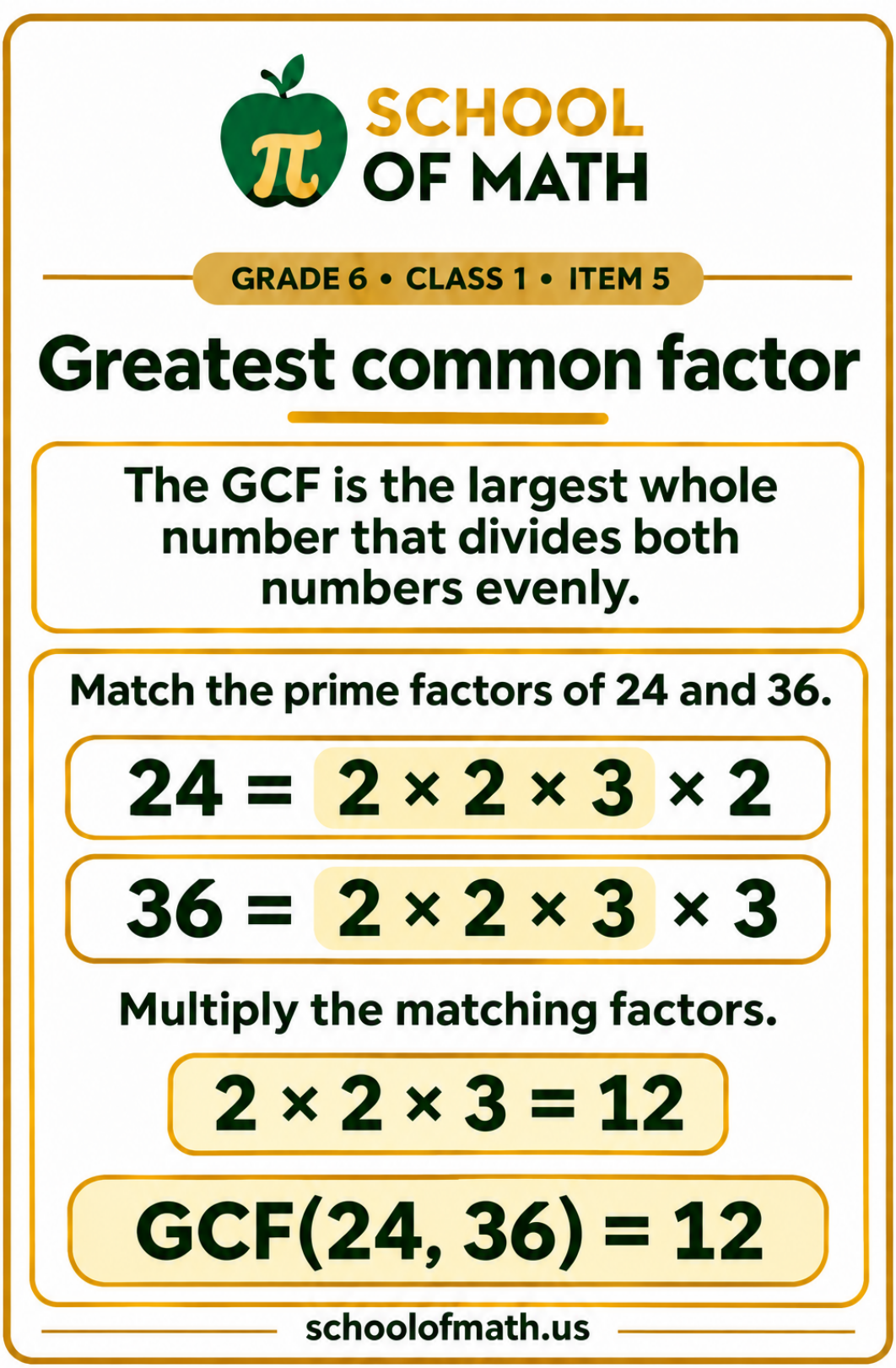
Q17 Write the prime factorization of 1,540 using exponents.

Q18 Build two different factor trees for 120: one that starts with 10 × 12 and one that starts with 8 × 15. Show that both end with the same prime factorization.

Q19 Use the prime factorization of 720 to find how many positive factors it has, without listing them.

Q20 What is the smallest whole number you can multiply 588 by so that the product is a perfect square? What is the perfect square?

Image 5: Greatest common factor



Practice: Greatest common factor

Questions 21–25 · Show your work in the space below each question.

Q21 Find GCF(84, 126) using prime factorization.

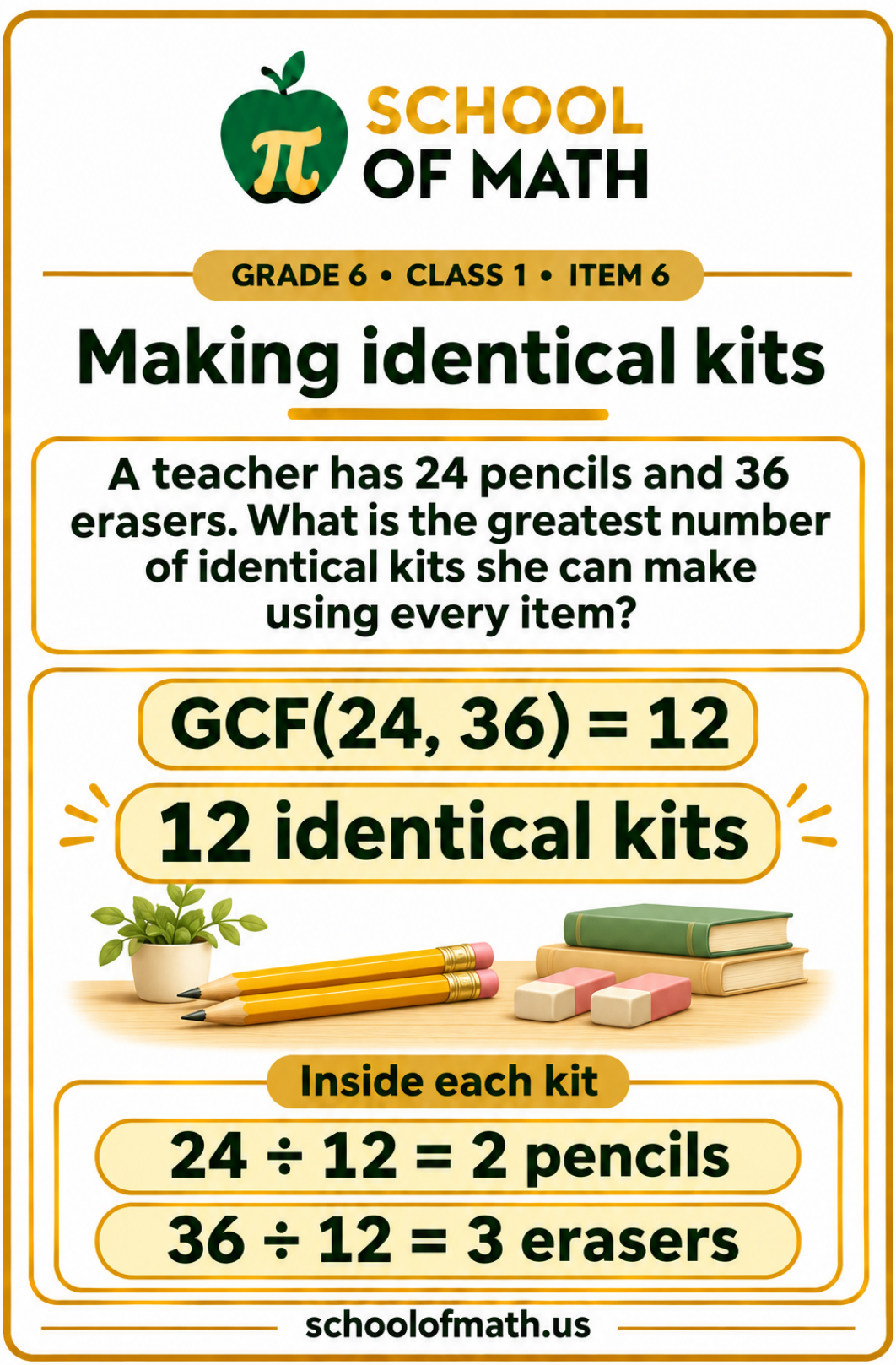
Q22 Find GCF(180, 252, 324).

Q23 Write 168/420 in lowest terms in one step by dividing by the GCF.

Q24 The GCF of 45 and a number n is 9. The number n is greater than 45 and less than 90. Find every possible value of n.

Q25 Which pair of numbers is relatively prime?
A. 21 and 35
B. 27 and 64
C. 26 and 39
D. 34 and 51

Image 6: Making identical kits



Practice: Making identical kits

Questions 26–30 · Show your work in the space below each question.

Q26 A club has 48 markers, 72 crayons and 120 stickers. What is the greatest number of identical kits it can make using every item, and what goes in each kit?

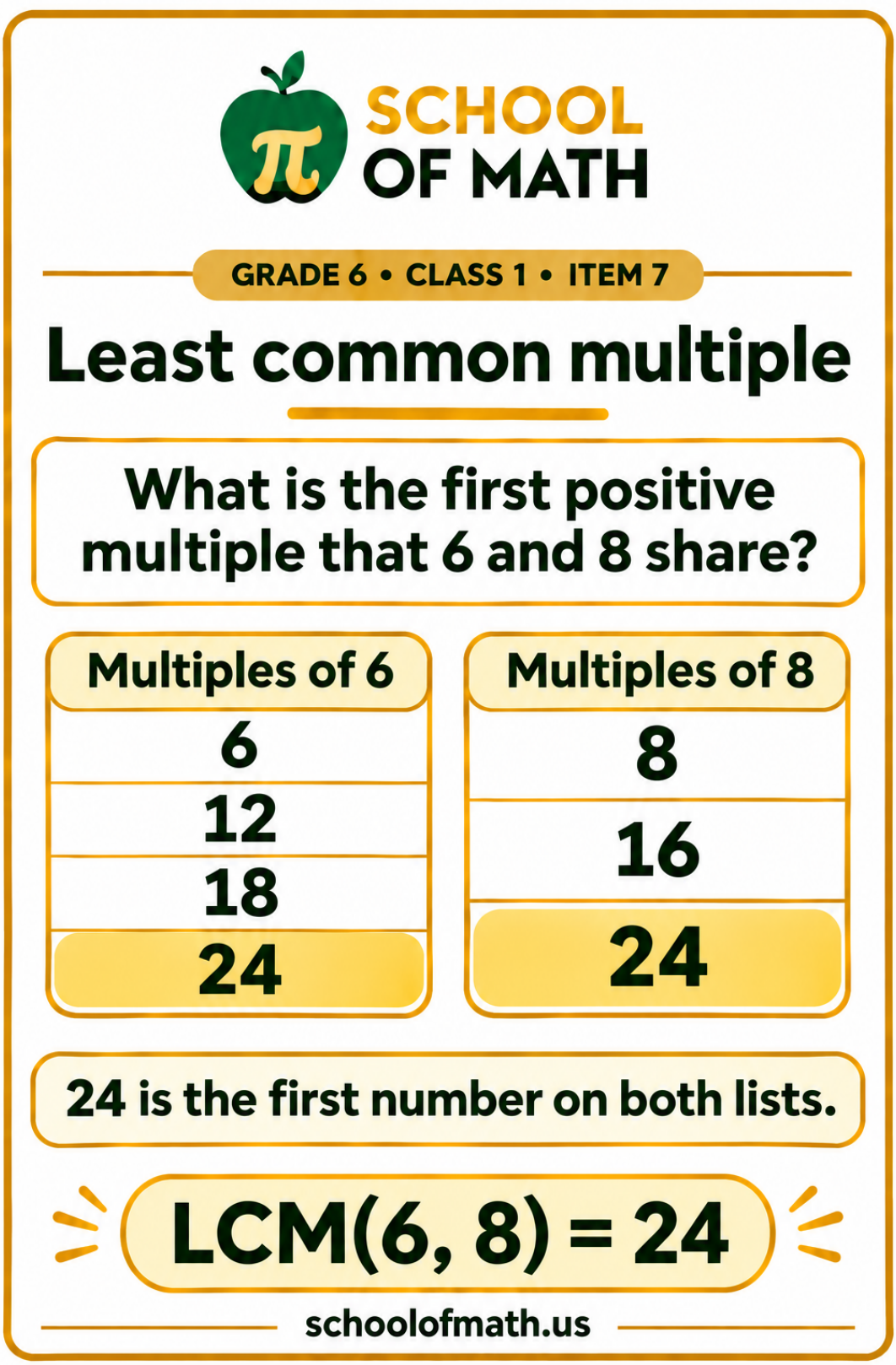
Q27 Two ribbons are 84 cm and 140 cm long. They must be cut into pieces that are all the same length, as long as possible, with nothing left over. How long is each piece, and how many pieces are there?

Q28 A rectangular floor measures 270 cm by 450 cm. It will be covered exactly by identical square tiles, as large as possible. What is the side length of each tile, and how many tiles are needed?

Q29 A coach has 56 boys and 70 girls. She wants teams that all have the same number of boys and the same number of girls, using every child. List every possible number of teams greater than 1.

Q30 A teacher made the greatest possible number of identical kits from all her pencils and erasers. She made 9 kits, each with 4 pencils and 7 erasers. How many pencils and erasers did she start with? Check that 9 really is the greatest number of kits.

Image 7: Least common multiple



Practice: Least common multiple

Questions 31–35 · Show your work in the space below each question.

Q31 Find LCM(18, 30) using prime factorization.

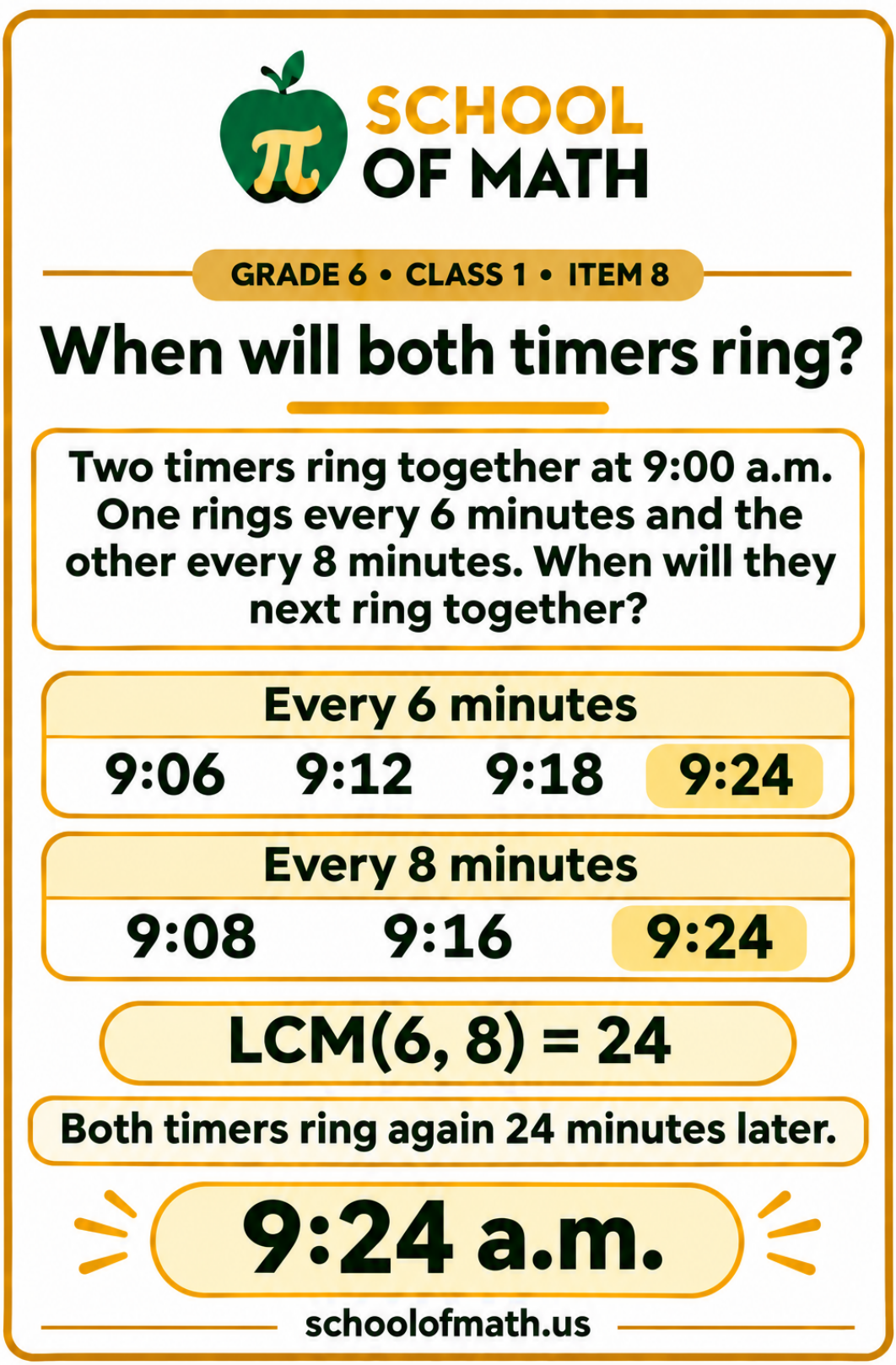
Q32 Find LCM(12, 20, 45).

Q33 Two numbers have GCF 6 and LCM 180. One of the numbers is 18. What is the other number?

Q34 Use the least common denominator to add 5/12 + 7/18.

Q35 What is the smallest whole number greater than 1 that leaves a remainder of 1 when it is divided by 2, by 3, by 4, by 5 and by 6?

Image 8: When will both timers ring?



Practice: When will both timers ring?

Questions 36–40 · Show your work in the space below each question.

Q36 Two lights flash together, then one flashes every 12 seconds and the other every 18 seconds. How many more times do they flash together during the next 3 minutes?

Q37 Bus A leaves the station every 15 minutes and Bus B every 25 minutes. Both leave together at 6:30 a.m. When do they next leave together?

Q38 Three bells ring every 4, 6 and 10 minutes, and all three ring together at noon. When do all three next ring together? How many times do all three ring together after noon, up to and including 6:00 p.m.?

Q39 A gear with 28 teeth turns a gear with 42 teeth. A marked tooth on each gear is touching now. How many full turns does each gear make before the two marked teeth touch again for the first time?

Q40 Runner A finishes a lap in 9 minutes and Runner B in 12 minutes. They start together at the starting line at 7:50 a.m. When are they next at the starting line together, and how many laps has each runner finished by then?

Homework review

Questions R1–R4 · One question for each image, in lesson order.

R1 List the factor pairs of 196. How many positive factors does it have, and why is the count odd?

R2 How many multiples of 8 are there from 200 to 400, including both 200 and 400?

R3 Is 323 prime or composite? Which primes do you need to test?

R4 Write the prime factorization of 2,016 using exponents. How many factors does 2,016 have?

Homework review

Questions R5–R8 · One question for each image, in lesson order.

R5 Find GCF(132, 198). Then use it to write 132/198 in lowest terms.

R6 A market packs 90 apples, 126 oranges and 162 bananas into identical baskets, using all the fruit. What is the greatest number of baskets, and what is in each one?

R7 Find LCM(14, 21, 35).

R8 One sprinkler turns on every 20 minutes and another every 45 minutes. Both turn on together at 5:15 a.m. When do they next turn on together?

Homework word problems

Problems W1–W4 · Decide whether each calls for the GCF, the LCM, or a factor count.

W1 Lucia has 64 red beads and 80 blue beads. She wants to make identical bracelets using every bead. What is the greatest number of bracelets she can make, and how many beads of each color go on each one?

W2 Veggie dogs come in packs of 10 and buns in packs of 8. What is the smallest number of each kind of pack you can buy to have exactly the same number of veggie dogs and buns?

W3 A rectangular garden is 84 feet by 60 feet. Fence posts go around the edge with one at each corner and equal spacing everywhere. The spacing must be as large as possible. What is the spacing, and how many posts are needed?

W4 Lia visits the library every 4 days and Omar every 10 days. They both visited on March 1. On what date will they next both visit on the same day?

Homework word problems

Problems W5–W8 · Decide whether each calls for the GCF, the LCM, or a factor count.

W5 A group of students has between 100 and 150 members. When they line up in rows of 3, 4 or 5, there are always exactly 2 students left over. How many students are there?

W6 Maya picks a mystery number n. The GCF of n and 40 is 8, and the LCM of n and 40 is 120. What is n?

W7 A box measures 12 cm by 18 cm by 30 cm. It will be filled exactly with identical cubes that are as large as possible. What is the edge length of each cube, and how many cubes fit?

W8 Rectangular tiles 15 cm by 20 cm are placed side by side, all facing the same way, to make the smallest possible square. What is the side of the square, and how many tiles are used?

Homework word problems

Problems W9–W12 · Decide whether each calls for the GCF, the LCM, or a factor count.

W9 A hallway has 50 closed lockers numbered 1 to 50. Student 1 opens every locker. Student 2 changes every 2nd locker (closing open ones and opening closed ones), student 3 changes every 3rd locker, and so on up to student 50. Which lockers are open at the end?

W10 Three lighthouses flash every 15, 20 and 24 seconds. They flash together at midnight. How often do all three flash together, and how many more times does that happen in the next hour?

W11 Find every whole number less than 100 that has exactly three positive factors. Explain why only these numbers work.

W12 The product of two whole numbers is 1,620 and their GCF is 9. What is their LCM? Find two different pairs of numbers that fit.