Co-Prime Numbers and Twin Primes

Unit: Number Play - Student Practice Worksheet

Overview: Anaya said 8 and 9 had nothing in common. Kabir said that was impossible — every pair of numbers shares at least one factor. Both of them were right, in a way neither had expected. It took Ms. Rao one shared factor to show they were arguing about two completely different meanings of "nothing in common."

Practice Questions (30 Total)

Section A - Easy

Q1. The peach chips are the only matching factors of 8 and 9. What does that make the pair?

8

1 2 4 8

9

1 3 9

- [ ] **A.** Co-prime — they share only 1
- [ ] **B.** Twin primes
- [ ] **C.** Not co-prime, because both are composite
- [ ] **D.** The same number

Q2. Must both numbers in a co-prime pair be prime themselves?

- [ ] **A.** Yes, always
- [ ] **B.** No
- [ ] **C.** Only the smaller one
- [ ] **D.** Only the larger one

Q3. Are 6 and 9 co-prime?

- [ ] **A.** Yes, they share only 1
- [ ] **B.** No, they also share 3
- [ ] **C.** Yes, since both are composite
- [ ] **D.** Cannot be determined

Q4. The circled marks sit two steps apart. Which pair of twin primes is shown?

- [ ] **A.** 4 and 6
- [ ] **B.** 4 and 8
- [ ] **C.** 6 and 8
- [ ] **D.** 5 and 7

Q5. What are twin primes?

- [ ] **A.** Two primes that are equal
- [ ] **B.** Any two prime numbers
- [ ] **C.** Two primes that differ by exactly 2
- [ ] **D.** Two composite numbers 2 apart

Q6. Are 6 and 25 co-prime?

- [ ] **A.** Yes
- [ ] **B.** No, they share 5
- [ ] **C.** Only if prime
- [ ] **D.** Cannot be told

Q7. The peach box lists every shared factor of 6 and 9. Why is the pair not co-prime?

6: 1, 2, 3, 6

9: 1, 3, 9

shared: 1 and 3

- [ ] **A.** Because 6 is even
- [ ] **B.** Because they share nothing
- [ ] **C.** Because they share 3 as well as 1
- [ ] **D.** Because 9 is a square

Q8. Does 'co-prime' describe a single number or a pair?

- [ ] **A.** A single number
- [ ] **B.** A group of three or more
- [ ] **C.** It has no fixed meaning
- [ ] **D.** A pair

Q9. Which pair of primes are NOT twin primes, despite both being prime?

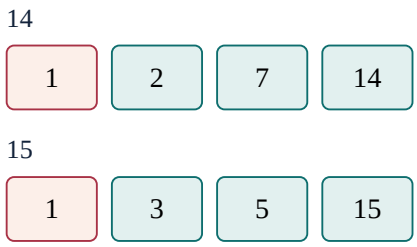
- [ ] **A.** 3 and 5
- [ ] **B.** 11 and 13
- [ ] **C.** 17 and 19
- [ ] **D.** 2 and 7

Q10. Kabir says every pair shares a factor, so no pair can ever be co-prime. What is wrong with this reasoning?

- [ ] **A.** Nothing, he is correct
- [ ] **B.** Co-prime means sharing ONLY 1, not sharing nothing at all
- [ ] **C.** Co-prime numbers share no factors including 1
- [ ] **D.** Every pair shares at least two factors

Section B - Medium

Q11. Using the two factor rows, which pair is co-prime?



- [ ] **A.** 14 and 15
- [ ] **B.** 12 and 18
- [ ] **C.** 10 and 15
- [ ] **D.** 8 and 12

Q12. Are two consecutive whole numbers, like 15 and 16, always co-prime?

- [ ] **A.** No, never
- [ ] **B.** Only if both are prime
- [ ] **C.** Yes, always

- [ ] **D.** Only if both are odd

Q13. List the next twin prime pair after (11,13).

- [ ] **A.** (15,17)
- [ ] **B.** (17,19)
- [ ] **C.** (13,15)
- [ ] **D.** (19,21)

Q14. 13 and 17 are both circled primes. Why are they not twin primes?

- [ ] **A.** 13 is not prime
- [ ] **B.** 17 is even
- [ ] **C.** They are equal
- [ ] **D.** They differ by 4, not 2

Q15. Is every pair of twin primes automatically co-prime?

- [ ] **A.** Yes, always
- [ ] **B.** No, never
- [ ] **C.** Only for small primes
- [ ] **D.** Only if their sum is even

Q16. Is the pair (9, 16) co-prime?

- [ ] **A.** No, they share 2
- [ ] **B.** Yes
- [ ] **C.** No, they share 4
- [ ] **D.** No, since both are composite

Q17. The peach box lists shared factors of 18 and 24. Is this pair co-prime?

18: 1, 2, 3, 6, 9, 18

24: 1, 2, 3, 4, 6, 8, 12, 24

shared: 1, 2, 3, 6

- [ ] **A.** Yes, because they share 1
- [ ] **B.** Yes, both are even
- [ ] **C.** No — they share 2, 3, and 6 as well as 1
- [ ] **D.** Cannot tell

Q18. Anaya claims all pairs of distinct prime numbers are co-prime, whether or not they are twins. Is this true?

- [ ] **A.** False — only twin primes are co-prime
- [ ] **B.** False — no primes are co-prime
- [ ] **C.** True, but only for primes under 10
- [ ] **D.** True

Q19. A pair of numbers shares the factors 1 and 5. Are they co-prime?

- [ ] **A.** No, since sharing 5 disqualifies them
- [ ] **B.** Yes
- [ ] **C.** Yes, since 5 is prime
- [ ] **D.** Cannot be determined

Q20. How many twin prime pairs exist between 1 and 20?

- [ ] **A.** 2
- [ ] **B.** 3
- [ ] **C.** 4
- [ ] **D.** 5

Section C - Challenge

Q21. Both cards show an even number written as 2 times something. Can this pair be co-prime?

$8 = 2 \times 4$

$10 = 2 \times 5$

Both even, so both carry factor 2

- [ ] **A.** No — two even numbers always share the factor 2
- [ ] **B.** Yes — some even pairs are co-prime
- [ ] **C.** Only if both are also prime
- [ ] **D.** Yes, because 8 and 10 share only 1

Q22. Kabir claims that if two numbers are BOTH even, they can never be co-prime. Is this always true?

- [ ] **A.** False — some even pairs are co-prime
- [ ] **B.** True — two even numbers always share the factor 2
- [ ] **C.** True only if both are also prime
- [ ] **D.** False — no two numbers can share factor 2

Q23. Are 15 and 28 co-prime? Check their factor lists to decide.

- [ ] **A.** No, they share the factor 7
- [ ] **B.** Yes — 15 has 1,3,5,15 and 28 has 1,2,4,7,14,28, sharing only 1
- [ ] **C.** No, they share the factor 5
- [ ] **D.** Cannot be determined without a calculator

Q24. 11 and 13 are twin primes. What kind of number sits in the peach box between them?

11 12 13

- [ ] **A.** Always prime as well
- [ ] **B.** Always odd
- [ ] **C.** It can be anything, with no pattern
- [ ] **D.** Always even, so composite

Q25. Between 1 and 50, is there a run of twin prime pairs that get less frequent as numbers grow larger?

- [ ] **A.** No, twin primes appear at exactly the same rate forever
- [ ] **B.** No, twin primes stop entirely after 50
- [ ] **C.** Yes — twin primes appear to thin out, though mathematicians still study exactly how
- [ ] **D.** Twin primes become more frequent as numbers grow

Q26. Three numbers 8, 9, and 25 are pairwise checked for co-primality. Which statement is true?

- [ ] **A.** All three pairs (8,9), (9,25), (8,25) are co-prime
- [ ] **B.** Only (8,9) is co-prime
- [ ] **C.** None of the three pairs are co-prime
- [ ] **D.** Only (9,25) is co-prime

Q27. Co-prime holds for (4,25) and (25,6). What does the peach box show about (4,6)?

4 and 25 share only 1

25 and 6 share only 1

4 and 6 also share 2

- [ ] **A.** It is also co-prime
- [ ] **B.** No such counterexample can exist
- [ ] **C.** They share factor 2, so co-prime is not transitive
- [ ] **D.** Only true when all three are prime

Q28. A number n is co-prime with every number smaller than it. What can you conclude about n?

- [ ] **A.** n must be even
- [ ] **B.** n must be composite
- [ ] **C.** n must be prime (or 1)
- [ ] **D.** Nothing can be concluded

Q29. Which pair is BOTH twin primes AND co-prime?

- [ ] **A.** (21,23) — 21 is not prime
- [ ] **B.** (25,27) — neither is prime
- [ ] **C.** (15,17) — 15 is not prime
- [ ] **D.** (29,31) — both prime, differ by 2, and share no factor but 1

Q30. Is (1, n) co-prime for any whole number n?

- [ ] **A.** No, never
- [ ] **B.** Yes, always — 1 has only itself
- [ ] **C.** Only if n is prime
- [ ] **D.** Only if n is even

Answer Key

Q1: (A) (a) Co-prime — they share only 1. The peach chip 1 is the only overlap; 8 and 9 can both be composite and still be co-prime.

Q2: (B) (b) No. 8 and 9 are co-prime even though both are composite — co-prime is about the pair's shared factors, not primality.

Q3: (B) (b) No, they also share 3. Factors of 6 are 1,2,3,6 and of 9 are 1,3,9.

Q4: (D) (d) 5 and 7. Both circled numbers are prime and the gap is exactly 2. 4, 6, and 8 are composite.

Q5: (C) (c) Two primes that differ by exactly 2. Like 5 and 7, or 11 and 13.

Q6: (A) (a) Yes. Factors of 6 are 1,2,3,6 and of 25 are 1,5,25 — only 1 is shared.

Q7: (C) (c) Because they share 3 as well as 1. Co-prime allows only the shared 1.

Q8: (D) (d) A pair. Co-prime is always a relationship between two numbers.

Q9: (D) (d) 2 and 7. Both are prime, but they differ by 5, not 2.

Q10: (B) (b) Co-prime means sharing ONLY 1, not sharing nothing at all.

Q11: (A) (a) 14 and 15. The only peach overlap is 1. The other pairs all share a factor greater than 1.

Q12: (C) (c) Yes, always. Any larger common factor would have to divide their difference, which is 1.

Q13: (B) (b) (17,19). Both 17 and 19 are prime and differ by 2 — 15 is not prime.

Q14: (D) (d) They differ by 4, not 2. Twin primes must sit exactly two apart.

Q15: (A) (a) Yes, always. Two different primes can never share a factor besides 1.

Q16: (B) (b) Yes. Factors of 9 are 1,3,9 and of 16 are 1,2,4,8,16 — only 1 is shared.

Q17: (C) (c) No — they share 2, 3, and 6 as well as 1, so they are the opposite of co-prime.

Q18: (D) (d) True. Any two different primes can only share the factor 1.

Q19: (A) (a) No, since sharing 5 disqualifies them. Co-prime requires the only shared factor to be 1.

Q20: (C) (c) 4. The pairs are (3,5), (5,7), (11,13), and (17,19). An earlier key that said 3 missed (17,19).

Q21: (A) (a) No — two even numbers always share the factor 2, so they can never be co-prime.

Q22: (B) (b) True — two even numbers always share the factor 2.

Q23: (B) (b) Yes. Despite both being composite, no factor beyond 1 appears in both lists.

Q24: (D) (d) Always even, so composite. For odd twin primes the middle number is even and greater than 2.

Q25: (C) (c) Yes — listing (3,5) through (41,43) up to 50 already shows growing gaps.

Q26: (A) (a) All three pairs are co-prime. 8={1,2,4,8}, 9={1,3,9}, 25={1,5,25} share nothing beyond 1.

Q27: (C) (c) They share factor 2, so co-prime is not automatically true for (a,c) just because it held for (a,b) and (b,c).

Q28: (C) (c) n must be prime (or 1). Any extra factor smaller than n would share that factor with n.

Q29: (D) (d) (29,31) — both prime, differ by 2, and share only 1.

Q30: (B) (b) Yes, always — 1's only factor is 1 itself, so the shared factor with any n can only be 1.

You've got this! Keep learning and shining! - Ruchi Math Coaching