

Sequences & Series (CIMC L0–L5 + Gauss Foundation) — Practice

CKSTEM Math Problem Solving · Grades 4–7

1 GAUSS PAIRING

Find $1 + 2 + 3 + \dots + 50$.

WORK IT OUT HERE

2 GAUSS PAIRING

Find the sum of every whole number from 1 to 200.

WORK IT OUT HERE

3 GAUSS PAIRING

Find $1 + 2 + 3 + \dots + 500$.

WORK IT OUT HERE

4 FIND THE STEP

A list begins 7, 11, 15, 19, What is the next number in the list?

WORK IT OUT HERE

5 FIND THE STEP

A garden adds the same number of new flowers every week. After week 1 there are 8 flowers, after week 2 there are 15, after week 3 there are 22, and after week 4 there are 29. How many flowers are there after week 8?

WORK IT OUT HERE

6 FIND THE STEP

A water tank loses the same amount every hour. At hour 1 it holds 100 litres, at hour 2 it holds 93 litres, at hour 3 it holds 86 litres. How many litres remain at hour 12?

WORK IT OUT HERE

7 COUNT THE STEPS, NOT THE CALENDAR

A baker decorates cakes on the even-numbered days. On Day 2 she decorates 30 cakes, on Day 4 she decorates 33, on Day 6 she decorates 36. How many cakes will she decorate on Day 14?

WORK IT OUT HERE

8 COUNT THE STEPS, NOT THE CALENDAR

A library counts donated books every third day. On Day 1 the count is 12, on Day 4 it is 17, on Day 7 it is 22. What will the count be on Day 22?

WORK IT OUT HERE

9 COUNT THE STEPS, NOT THE CALENDAR

A train station tracks waiting passengers every fifth day. On Day 1 there are 6, on Day 6 there are 10, on Day 11 there are 14. How many waiting passengers will there be on Day 36?

WORK IT OUT HERE

10 GAUSS PAIRING (APPLIED)

Find the sum $5 + 6 + 7 + 8 + \dots + 20$.

WORK IT OUT HERE

11 GAUSS PAIRING (APPLIED)

A bakery lines up 20 trays. The first tray holds 4 muffins, the second 6, the third 8, and each tray after holds two more than the one before. How many muffins are there altogether?

WORK IT OUT HERE

12 GAUSS PAIRING (APPLIED)

A farmers' market sets up 25 stalls along a path. The first stall displays 11 jars of jam, and each next stall displays 4 more jars than the one before. How many jars of jam are displayed across all 25 stalls?

WORK IT OUT HERE

13 FACTOR OUT, THEN PAIR

Find $6 + 12 + 18 + 24 + \dots + 60$.

WORK IT OUT HERE

14 FACTOR OUT, THEN PAIR

A garden adds 8 new tomatoes the first day, 16 the next, 24 the next, and so on, growing by 8 every day. After 25 days, how many tomatoes have been added in all?

WORK IT OUT HERE

15 FACTOR OUT, THEN PAIR

A choir learns 9 new lyrics on Day 1, 18 on Day 2, 27 on Day 3, and so on — adding 9 more each day. After 50 days, how many lyrics have they learned in all?

WORK IT OUT HERE

16 WRITE-IT-TWICE, THEN COMBINE

Find $2 + 4 + 8 + 16 + 32$.

WORK IT OUT HERE

17 WRITE-IT-TWICE, THEN COMBINE

A rumour starts with 3 people on Round 1. In each new round, three times as many people hear it as in the previous round. The rumour stops spreading before any round would add more than 500 people. How many people have heard the rumour in all?

WORK IT OUT HERE

18 WRITE-IT-TWICE, THEN COMBINE

A chain message starts with 4 people on Round 1. Each new round, the number of new people doubles. The chain stops before any round would add more than 1000 new people. How many people in total are in the chain?

WORK IT OUT HERE

19 INCLUSION-EXCLUSION

Find the sum of every positive integer less than 100 that is a multiple of 3 or a multiple of 5.

WORK IT OUT HERE

20 INCLUSION-EXCLUSION

Find the sum of every positive integer less than 150 that is a multiple of 7 or a multiple of 9.

WORK IT OUT HERE

21 INCLUSION-EXCLUSION

Find the sum of every positive integer less than 300 that is a multiple of 6 or a multiple of 10.

WORK IT OUT HERE

Answer Key

Each answer comes with a hint that names the move. The tag says which video to rewatch if you are stuck.

1. 1275 — *Gauss Pairing*

Pair the smallest with the largest — every outer pair lands on the same total — then multiply by how many pairs.

2. 20100 — *Gauss Pairing*

Use Gauss Pairing: the count of terms times (first plus last), then halve.

3. 125250 — *Gauss Pairing*

Same recipe — count of terms times (first plus last) over two; do the multiplication in friendly pieces.

4. 23 — *Find the Step*

Subtract two neighbours to read the step, then add that step on once.

5. 57 flowers — *Find the Step*

Read the step from any two neighbours, then jump from week 1 by step-many copies.

6. 23 litres — *Find the Step*

The step is negative — read it from two neighbours, then add eleven copies to the hour-1 value.

7. 48 cakes — *Count the Steps, Not the Calendar*

Convert the calendar jump from Day 2 to Day 14 into a count of three-extra-cake steps, then add.

8. 47 books — *Count the Steps, Not the Calendar*

Map the calendar jump to step index — how many three-day jumps from Day 1 to Day 22? — then add that many copies of the per-step rise.

9. 34 passengers — *Count the Steps, Not the Calendar*

Divide the calendar gap from Day 1 to Day 36 by five to get the number of steps — then add that many copies of the rise per step.

10. 200 — *Gauss Pairing (applied)*

Count the terms, then use count times (first plus last) over two.

11. 460 muffins — *Gauss Pairing (applied)*

Find the last tray's count first (twenty trays, step two, starting at four), then apply Gauss Pairing.

12. 1475 jars — *Gauss Pairing (applied)*

Find the last stall's count by jumping the constant step from the first value across every gap between stalls, then apply Gauss Pairing — count of terms times (first plus last), halved.

13. 330 — *Factor Out, Then Pair*

Every term is six times something — factor that six out, pair the small list inside, then scale back.

14. 2600 tomatoes — *Factor Out, Then Pair*

Factor out the common multiplier so the inside list becomes 1, 2, 3, ... up to some k — Gauss-pair THAT list, then scale back by the factor you pulled out.

15. 11475 lyrics — *Factor Out, Then Pair*

Pull out the common multiplier; the inside becomes 1, 2, 3, ... which Gauss-pairs cleanly. Multiply the inside sum by the factor at the end.

16. 62 — *Write-It-Twice, Then Combine*

It's a doubling sum — use first times (r-to-the-n minus one) over (r minus one), with r equal to two.

17. 363 people — *Write-It-Twice, Then Combine*

List the rounds until the next would exceed five hundred, then apply first times (r-to-the-n minus one) over (r minus one).

18. 1020 people — *Write-It-Twice, Then Combine*

Find the last round whose value still stays under the limit, count how many rounds that is, then use first times $(r\text{-to-the-}n\text{ minus one})$ over $(r\text{ minus one})$.

19. 2318 — *Inclusion-Exclusion*

Sum the multiples of three, sum the multiples of five, then subtract the sum of multiples of fifteen so the overlap isn't counted twice.

20. 2652 — *Inclusion-Exclusion*

Apply Inclusion-Exclusion with the overlap set being multiples of sixty-three; each piece is itself a Gauss-pair sum.

21. 10350 — *Inclusion-Exclusion*

Sum the multiples of six and the multiples of ten, then subtract the sum of multiples of thirty so the overlap isn't double-counted.