Gaps & Intervals — Practice

CKSTEM Math Problem Solving · Grades 4–7

1 IF N OBJECTS SIT IN A LINE WITH ONE AT EACH END, THEN THERE ARE N – 1 SPACES BETWEEN THEM — ALWAYS ONE LESS.

Seven fence posts stand in a straight line along a yard, with a post at each end. How many spaces sit between neighbouring posts?

WORK IT OUT HERE

2 IF N OBJECTS SIT IN A LINE WITH ONE AT EACH END, THEN THERE ARE N – 1 SPACES BETWEEN THEM — ALWAYS ONE LESS.

A long ribbon has 12 knots tied along it, with a knot at each end. How many sections of ribbon sit between neighbouring knots?

WORK IT OUT HERE

3 IF N OBJECTS SIT IN A LINE WITH ONE AT EACH END, THEN THERE ARE N – 1 SPACES BETWEEN THEM — ALWAYS ONE LESS.

A garland is strung from one wall to the other with 25 small lights along it, one light touching each wall. How many gaps separate neighbouring lights?

WORK IT OUT HERE

4 IF N OBJECTS ARE EQUALLY SPACED FROM END TO END, THEN GAP = TOTAL ÷ (N − 1) — DIVIDE BY SPACES, NOT BY OBJECTS.

A caretaker sets up 5 lamp posts along a 24 m garden walkway, with a lamp at each end and the same distance between neighbours. How far apart are neighbouring lamps?

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5 IF N OBJECTS ARE EQUALLY SPACED FROM END TO END, THEN GAP = TOTAL ÷ (N − 1) — DIVIDE BY SPACES, NOT BY OBJECTS.

A coach plants 11 flags equally spaced along an 80 m sideline, with a flag at each end. What is the distance between neighbouring flags?

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6 IF N OBJECTS ARE EQUALLY SPACED FROM END TO END, THEN GAP = TOTAL ÷ (N − 1) — DIVIDE BY SPACES, NOT BY OBJECTS.

A swim official places 13 buoys equally spaced across a 144 m lake, with a buoy at each shore. What is the distance between neighbouring buoys?

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7 IF EQUALLY-SPACED OBJECTS ARE NUMBERED 1..N, THEN THE DISTANCE FROM OBJECT I TO OBJECT J IS |J − I| × GAP — COUNT THE GAPS YOU CROSS, NOT THE STOPS.

Eight chairs sit in a straight line 3 m apart, with a chair at each end. How far is it from chair 2 to chair 5?

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8 IF EQUALLY-SPACED OBJECTS ARE NUMBERED 1..N, THEN THE DISTANCE FROM OBJECT I TO OBJECT J IS |J − I| × GAP — COUNT THE GAPS YOU CROSS, NOT THE STOPS.

Twelve hydro poles stand equally spaced in a straight line, with neighbouring poles 25 m apart. How far is it from the 4th pole to the 11th pole?

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9 IF EQUALLY-SPACED OBJECTS ARE NUMBERED 1..N, THEN THE DISTANCE FROM OBJECT I TO OBJECT J IS |J − I| × GAP — COUNT THE GAPS YOU CROSS, NOT THE STOPS.

Twenty-one banners hang equally spaced along a 160 m parade route, with a banner at each end. How far is it from banner 4 to banner 17?

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10 IF DEPARTURES (OR STRIKES / EVENTS) ARE AT EQUAL TIME INTERVALS WITH BOTH ENDPOINTS KNOWN, THEN (LAST − FIRST) ÷ (N − 1) = INTERVAL. TIMES ARE POINTS ON A LINE.

A school rings 6 bells at equal time intervals during the morning. The first bell rings at 7:00 a.m. and the last rings at 7:30 a.m. How many minutes pass between neighbouring bells?

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11 IF DEPARTURES (OR STRIKES / EVENTS) ARE AT EQUAL TIME INTERVALS WITH BOTH ENDPOINTS KNOWN, THEN (LAST − FIRST) ÷ (N − 1) = INTERVAL. TIMES ARE POINTS ON A LINE.

Trains leave a station at equal time intervals. The first train leaves at 6:00 a.m. and the last leaves at 9:00 a.m., with 13 trains in total. How many minutes pass between neighbouring trains?

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12 IF DEPARTURES (OR STRIKES / EVENTS) ARE AT EQUAL TIME INTERVALS WITH BOTH ENDPOINTS KNOWN, THEN (LAST − FIRST) ÷ (N − 1) = INTERVAL. TIMES ARE POINTS ON A LINE.

A fountain runs equally spaced shows from 11:10 a.m. to 4:10 p.m. on the same day, with 11 shows in total. How many minutes apart are neighbouring shows?

WORK IT OUT HERE

13 IF A REGULAR PATTERN WOULD PLACE N_0 OBJECTS BUT SOME POSITIONS ARE BLOCKED (END CLEARANCES, EXCLUDED ZONES), THEN COUNT = N_0 − (BLOCKED); SUBTRACT, NEVER RECOUNT.

A 40 m railing has a post every 4 m, with a post position at each end. For accessibility, all posts within 4 m of either end are removed. How many posts remain?

WORK IT OUT HERE

14 IF A REGULAR PATTERN WOULD PLACE N_0 OBJECTS BUT SOME POSITIONS ARE BLOCKED (END CLEARANCES, EXCLUDED ZONES), THEN COUNT = N_0 − (BLOCKED); SUBTRACT, NEVER RECOUNT.

A 90 m walkway is lined with bollards every 6 m, with a bollard position at each end. No bollards may sit between 30 m and 48 m (driveway), endpoints included. How many bollards are placed?

WORK IT OUT HERE

15 IF A REGULAR PATTERN WOULD PLACE N_0 OBJECTS BUT SOME POSITIONS ARE BLOCKED (END CLEARANCES, EXCLUDED ZONES), THEN COUNT = N_0 − (BLOCKED); SUBTRACT, NEVER RECOUNT.

A 200 m hiking trail has a distance marker every 10 m, with a marker position at each end. Two restrictions apply: no markers at any position within 20 m of either end, endpoints included; and no markers from 90 m to 120 m, endpoints included. How many markers are placed?

WORK IT OUT HERE

16 IF TWO PLANS (DIFFERENT SPACING, DIFFERENT COUNT) BOTH FIT THE SAME FIXED CORRIDOR, THEN $(N_1 - 1) \times G_1 = (N_2 - 1) \times G_2$ — EQUATE SPACES × GAP.

Two plans line the SAME hallway, each with an object at each end. Plan A places 5 chairs spaced 6 m apart. Plan B places 4 chairs equally spaced along the same hallway. What is the spacing in Plan B?

WORK IT OUT HERE

17 IF TWO PLANS (DIFFERENT SPACING, DIFFERENT COUNT) BOTH FIT THE SAME FIXED CORRIDOR, THEN $(N_1 - 1) \times G_1 = (N_2 - 1) \times G_2$ — EQUATE SPACES × GAP.

Two planting plans cover the SAME path, each with a tree at each end. Plan A uses 11 trees spaced x m apart. Plan B uses 6 trees spaced (x + 5) m apart. Find x.

WORK IT OUT HERE

18 IF TWO PLANS (DIFFERENT SPACING, DIFFERENT COUNT) BOTH FIT THE SAME FIXED CORRIDOR, THEN $(N_1 - 1) \times G_1 = (N_2 - 1) \times G_2$ — EQUATE SPACES × GAP.

Two seating plans line the SAME corridor, each with a chair at each end. Plan A uses 13 chairs spaced x m apart. Plan B uses 9 chairs spaced (x + 2) m apart. Find x and the corridor length.

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. 6 spaces — *If N objects sit in a line with one at each end, then there are N − 1 spaces between them — always one less.*

Use Posts and Spaces — line them up with one at each end, then count one fewer than the number of posts.

2. 11 sections — *If N objects sit in a line with one at each end, then there are N − 1 spaces between them — always one less.*

Treat the knots as posts in a line — the sections are the spaces between them.

3. 24 gaps — *If N objects sit in a line with one at each end, then there are N − 1 spaces between them — always one less.*

Lights at both walls means lights at both ends — apply Posts and Spaces to count the gaps.

4. 6 m — *If N objects are equally spaced from end to end, then gap = total ÷ (N − 1) — divide by spaces, not by objects.*

Use Count the Spaces — first figure out how many gaps the lamps make between them, then use that count with the total length.

5. 8 m — *If N objects are equally spaced from end to end, then gap = total ÷ (N − 1) — divide by spaces, not by objects.*

First count how many gaps the 11 flags create, then divide the 80 m total by that number of gaps.

6. 12 m — *If N objects are equally spaced from end to end, then gap = total ÷ (N − 1) — divide by spaces, not by objects.*

Use Count the Spaces — find the number of gaps the buoys make first, then divide the lake width by that.

7. 9 m — *If equally-spaced objects are numbered 1..N, then the distance from object i to object j is |j − i| × gap — count the gaps you cross, not the stops.*

Count the gaps between chair 2 and chair 5, then multiply by the spacing — do not count the chairs themselves.

8. 175 m — *If equally-spaced objects are numbered 1..N, then the distance from object i to object j is |j − i| × gap — count the gaps you cross, not the stops.*

The number of 25 m gaps between the 4th and 11th pole is the difference of their position numbers — multiply that count by the spacing.

9. 104 m — *If equally-spaced objects are numbered 1..N, then the distance from object i to object j is |j − i| × gap — count the gaps you cross, not the stops.*

Use Position to Position — but the spacing is not given directly, so figure out the size of one gap from the total route first.

10. 6 minutes — *If departures (or strikes / events) are at equal time intervals with both endpoints known, then (last − first) ÷ (N − 1) = interval. Times are points on a line.*

Treat the bell times as posts on a timeline — find the number of gaps between the 6 bells, then divide the 30-minute span by that count.

11. 15 minutes — *If departures (or strikes / events) are at equal time intervals with both endpoints known, then (last − first) ÷ (N − 1) = interval. Times are points on a line.*

Convert the span from 6:00 to 9:00 into minutes, then divide by the number of gaps the 13 trains create on the timeline.

12. 30 minutes — *If departures (or strikes / events) are at equal time intervals with both endpoints known, then (last − first) ÷ (N − 1) = interval. Times are points on a line.*
First convert the time span from 11:10 a.m. to 4:10 p.m. into minutes, then divide by the count of gaps that the 11 shows make on the timeline.

13. 7 posts — *If a regular pattern would place N_0 objects but some positions are blocked (end clearances, excluded zones), then count = N_0 − (blocked); subtract, never recount.*
Use Pattern Minus Forbidden — count every position from 0 m to 40 m as if no rule applied, then subtract the ones inside the end-clearance zones.

14. 12 bollards — *If a regular pattern would place N_0 objects but some positions are blocked (end clearances, excluded zones), then count = N_0 − (blocked); subtract, never recount.*
Count the full unrestricted pattern of bollard positions first, then subtract the positions that fall inside the driveway zone.

15. 11 markers — *If a regular pattern would place N_0 objects but some positions are blocked (end clearances, excluded zones), then count = N_0 − (blocked); subtract, never recount.*
Use Pattern Minus Forbidden — list every marker position from 0 m to 200 m as if no rule applied, then subtract the positions blocked by the end clearances and the positions blocked by the mid-trail zone.

16. 8 m — *If two plans (different spacing, different count) both fit the same fixed corridor, then $(N_1 - 1) \times g_1 = (N_2 - 1) \times g_2$ — equate spaces × gap.*
Write Plan A's hallway length as spaces times gap, then set Plan B's spaces times its unknown gap equal to that same length.

17. 5 m (with path length 50 m) — *If two plans (different spacing, different count) both fit the same fixed corridor, then $(N_1 - 1) \times g_1 = (N_2 - 1) \times g_2$ — equate spaces × gap.*
Write the path length two ways — Plan A as 10 gaps of x, Plan B as 5 gaps of (x + 5) — set them equal and solve for x.

18. 4 m (with corridor length 48 m) — *If two plans (different spacing, different count) both fit the same fixed corridor, then $(N_1 - 1) \times g_1 = (N_2 - 1) \times g_2$ — equate spaces × gap.*
Write the corridor length two ways using each plan's spaces times its gap, set the two expressions equal, and solve for x.