Mental Math · Divisibility — Practice

CKSTEM Math Problem Solving · Grades 5–7

1 THE DIVISOR ONLY SEES THE TAIL

Is 4,830 divisible by 10?

WORK IT OUT HERE

2 THE DIVISOR ONLY SEES THE TAIL

Is 2,386 divisible by 2?

WORK IT OUT HERE

3 THE DIVISOR ONLY SEES THE TAIL

Is 5,121 divisible by 3?

WORK IT OUT HERE

4 THE DIVISOR ONLY SEES THE TAIL

Is 7,219 divisible by 5?

WORK IT OUT HERE

5 THE DIVISOR ONLY SEES THE TAIL

Is 9,316 divisible by 4?

WORK IT OUT HERE

6 THE DIVISOR ONLY SEES THE TAIL

Is 12,344 divisible by 8?

WORK IT OUT HERE

7 THE DIVISOR ONLY SEES THE TAIL

Is 64,728 divisible by 9?

WORK IT OUT HERE

8 THE DIVISOR ONLY SEES THE TAIL

Is 4,170 divisible by 6?

WORK IT OUT HERE

9 THE DIVISOR ONLY SEES THE TAIL

Does 8,640 pass EVERY test for 2, 3, 4, 5, 6, 8, 9, and 10 at once?

WORK IT OUT HERE

10 THE DIVISOR ONLY SEES THE TAIL

Is 3,924 divisible by BOTH 4 and 9?

WORK IT OUT HERE

11 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 6,250 divisible by 5?

WORK IT OUT HERE

12 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 3,471 divisible by 2?

WORK IT OUT HERE

13 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 5,128 divisible by 4?

WORK IT OUT HERE

14 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 8,802 divisible by 10?

WORK IT OUT HERE

15 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 7,254 divisible by 9?

WORK IT OUT HERE

16 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 5,313 divisible by 9?

WORK IT OUT HERE

17 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 9,162 divisible by 6?

WORK IT OUT HERE

18 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Is 836 divisible by 4?

WORK IT OUT HERE

19 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Does 5,940 pass EVERY test for 2, 3, 4, 5, 6, 8, 9, and 10 at once?

WORK IT OUT HERE

20 RUN THE RULES — EACH DIVISOR READS ITS OWN TAIL

Does 4,932 pass the test for 3, 4, 8, AND 9 all at once?

WORK IT OUT HERE

21 TURN THE RULE INTO AN EQUATION

What digit A makes 26A divisible by 9?

WORK IT OUT HERE

22 TURN THE RULE INTO AN EQUATION

What digit A makes 5A3 divisible by 9?

WORK IT OUT HERE

23 TURN THE RULE INTO AN EQUATION

What is the SMALLEST digit A so that 23A is divisible by 3?

WORK IT OUT HERE

24 TURN THE RULE INTO AN EQUATION

What is the smallest digit A so that 5A1 is divisible by 3?

WORK IT OUT HERE

25 TURN THE RULE INTO AN EQUATION

What digit A makes 81A6 divisible by 9?

WORK IT OUT HERE

26 TURN THE RULE INTO AN EQUATION

What digit A makes 2A36 divisible by 9?

WORK IT OUT HERE

27 TURN THE RULE INTO AN EQUATION

What digit A makes 7A5 divisible by 9?

WORK IT OUT HERE

28 TURN THE RULE INTO AN EQUATION

What digit A makes 13A4 divisible by 9?

WORK IT OUT HERE

29 TURN THE RULE INTO AN EQUATION

What digit A makes 8A4 divisible by 36?

WORK IT OUT HERE

30 TURN THE RULE INTO AN EQUATION

What digit A makes 8A8 divisible by 36?

WORK IT OUT HERE

31 THE ALTERNATING SWING (÷11)

Is 6,259 divisible by 11?

WORK IT OUT HERE

32 THE ALTERNATING SWING (÷11)

Is 7,405 divisible by 11?

WORK IT OUT HERE

33 THE ALTERNATING SWING (÷11)

What is 1,234 mod 11?

WORK IT OUT HERE

34 THE ALTERNATING SWING (÷11)

What is 5,019 mod 11?

WORK IT OUT HERE

35 THE ALTERNATING SWING (÷11)

Is 90,816 divisible by 11?

WORK IT OUT HERE

36 THE ALTERNATING SWING (÷11)

What is the remainder when 81,924 is divided by 11?

WORK IT OUT HERE

37 THE ALTERNATING SWING (÷11)

What is 47,316 mod 11?

WORK IT OUT HERE

38 THE ALTERNATING SWING (÷11)

Find the digit A so that 7A283 is divisible by 11.

WORK IT OUT HERE

39 THE ALTERNATING SWING (÷11)

Find the digit A so that 2A4,857 is divisible by 11.

WORK IT OUT HERE

40 THE ALTERNATING SWING (÷11)

What is 7,654,321 mod 11?

WORK IT OUT HERE

41 ONE THOUSAND IS ONE SHORT

Is 5,002 divisible by 7?

WORK IT OUT HERE

42 ONE THOUSAND IS ONE SHORT

Is 3,016 divisible by 13?

WORK IT OUT HERE

43 ONE THOUSAND IS ONE SHORT

Is 7,021 divisible by 7?

WORK IT OUT HERE

44 ONE THOUSAND IS ONE SHORT

Is 5,280 divisible by 13?

WORK IT OUT HERE

45 ONE THOUSAND IS ONE SHORT

What is 1,234,567 mod 7?

WORK IT OUT HERE

46 ONE THOUSAND IS ONE SHORT

Is 246,810 divisible by 7?

WORK IT OUT HERE

47 ONE THOUSAND IS ONE SHORT

What is the remainder when 246,810 is divided by 13?

WORK IT OUT HERE

48 ONE THOUSAND IS ONE SHORT

Find the digit A so that 62A is divisible by 7.

WORK IT OUT HERE

49 ONE THOUSAND IS ONE SHORT

Is 8,008 divisible by BOTH 7 and 13?

WORK IT OUT HERE

50 ONE THOUSAND IS ONE SHORT

What is 9,876,543 mod 7?

WORK IT OUT HERE

51 COPRIME PIECES

Is 76 divisible by 12?

WORK IT OUT HERE

52 COPRIME PIECES

Is 7,245 divisible by 45?

WORK IT OUT HERE

53 COPRIME PIECES

Is 5,544 divisible by 56?

WORK IT OUT HERE

54 COPRIME PIECES

Is 7,128 divisible by 72?

WORK IT OUT HERE

55 COPRIME PIECES

Is 504 divisible by 36?

WORK IT OUT HERE

56 COPRIME PIECES

Is 924 divisible by 12?

WORK IT OUT HERE

57 COPRIME PIECES

Is 4,632 divisible by 24?

WORK IT OUT HERE

58 COPRIME PIECES

What is the remainder when 837,465 is divided by 99?

WORK IT OUT HERE

59 COPRIME PIECES

Is 7,140 divisible by 84?

WORK IT OUT HERE

60 COPRIME PIECES

Is 6,996 divisible by 132?

WORK IT OUT HERE

61 EVERYTHING, COMBINED

Is 9,768 divisible by 88?

WORK IT OUT HERE

62 EVERYTHING, COMBINED

Is 638,638 divisible by 7?

WORK IT OUT HERE

63 EVERYTHING, COMBINED

Is 638,638 divisible by 13?

WORK IT OUT HERE

64 EVERYTHING, COMBINED

What is 638,640 mod 7?

WORK IT OUT HERE

65 EVERYTHING, COMBINED

Is 471,471 divisible by 11?

WORK IT OUT HERE

66 EVERYTHING, COMBINED

What is 471,473 mod 13?

WORK IT OUT HERE

67 EVERYTHING, COMBINED

Is 851,136 divisible by 88?

WORK IT OUT HERE

68 EVERYTHING, COMBINED

Is 85,248 divisible by 72?

WORK IT OUT HERE

69 EVERYTHING, COMBINED

Is 2,509,848 divisible by 792?

WORK IT OUT HERE

70 EVERYTHING, COMBINED

Is 123,123 divisible by 7, 11, AND 13 all at once?

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. Yes — *The Divisor Only Sees the Tail*
The 10-rule reads only the last digit: check whether 4,830 ends in a 0.

2. Yes — *The Divisor Only Sees the Tail*
The 2-rule reads only the last digit: check whether the final digit of 2,386 is even.

3. Yes — *The Divisor Only Sees the Tail*
The 3-rule reads the digit sum: add 5 + 1 + 2 + 1 and see if that total is a multiple of 3.

4. No — *The Divisor Only Sees the Tail*
The 5-rule reads only the last digit: check whether 7,219 ends in a 0 or a 5.

5. Yes — *The Divisor Only Sees the Tail*
The 4-rule reads only the last two digits: test whether 16 is divisible by 4.

6. Yes — *The Divisor Only Sees the Tail*
The 8-rule reads only the last three digits: test whether 344 is divisible by 8.

7. Yes — *The Divisor Only Sees the Tail*
The 9-rule reads the digit sum: add 6 + 4 + 7 + 2 + 8 and see if that total is a multiple of 9.

8. Yes — *The Divisor Only Sees the Tail*
For 6, pass both pieces: confirm 4,170 is even (last digit) AND its digit sum is a multiple of 3.

9. Yes — *The Divisor Only Sees the Tail*
Run each tail in turn: last digit for 2, 5, 10, last two for 4, last three for 8, the digit sum for 3 and 9, and 2-and-3 for 6 — all must clear.

10. Yes — *The Divisor Only Sees the Tail*
Read two different tails: test the last two digits 24 for 4, and the digit sum 3 + 9 + 2 + 4 for 9 — both must pass.

11. Yes — *Run the Rules — Each Divisor Reads Its Own Tail*
The 5-rule reads only the last digit: check whether 6,250 ends in a 0 or a 5.

12. No — *Run the Rules — Each Divisor Reads Its Own Tail*
The 2-rule reads only the last digit: check whether the final digit of 3,471 is even.

13. Yes — *Run the Rules — Each Divisor Reads Its Own Tail*
The 4-rule reads only the last two digits: test whether 28 is divisible by 4.

14. No — *Run the Rules — Each Divisor Reads Its Own Tail*
The 10-rule reads only the last digit: check whether 8,802 ends in a 0.

15. Yes — *Run the Rules — Each Divisor Reads Its Own Tail*
The 9-rule reads the digit sum: add 7 + 2 + 5 + 4 and see if that total is a multiple of 9 (passing 3 alone is not enough).

16. No — *Run the Rules — Each Divisor Reads Its Own Tail*
The 9-rule reads the digit sum: add 5 + 3 + 1 + 3 — a sum that is a multiple of 3 but not of 9 fails the 9-test.

17. Yes — *Run the Rules — Each Divisor Reads Its Own Tail*
For 6, pass both pieces: confirm 9,162 is even (last digit) AND its digit sum 9 + 1 + 6 + 2 is a multiple of 3.

18. Yes — *Run the Rules — Each Divisor Reads Its Own Tail*
The 4-rule reads only the last two digits and ignores the hundreds digit: test whether 36 is divisible by 4.

19. No — *Run the Rules — Each Divisor Reads Its Own Tail*
Run each tail in turn — last digit for 2, 5, 10, last two for 4, last three for 8, the digit sum for 3 and 9, and 2-and-3 for 6 — and a single failure on any one means the whole thing fails.

20. No — *Run the Rules — Each Divisor Reads Its Own Tail*
Run each tail on 4,932 in turn: digit sum 4 + 9 + 3 + 2 for 3 and 9, last two digits 32 for 4, last three digits 932 for 8 — all four must clear.

21. 1 — *Turn the Rule into an Equation*
Add the known digits 2 + 6, then choose A so the digit sum reaches the next multiple of 9.

22. 1 — *Turn the Rule into an Equation*
Add the known digits 5 + 3, then choose A so the digit sum reaches the next multiple of 9.

23. 1 — *Turn the Rule into an Equation*
Add the known digits 2 + 3, then pick the smallest A that lifts the digit sum to a multiple of 3.

24. 0 — *Turn the Rule into an Equation*
Add the known digits 5 + 1, then pick the smallest A that lifts the digit sum to a multiple of 3.

25. 3 — *Turn the Rule into an Equation*
Add the known digits 8 + 1 + 6, then choose A so the digit sum reaches the next multiple of 9.

26. 7 — *Turn the Rule into an Equation*
Add the known digits 2 + 3 + 6, then choose A so the digit sum reaches the next multiple of 9.

27. 6 — *Turn the Rule into an Equation*
Add the known digits 7 + 5, then choose A so the digit sum reaches the next multiple of 9.

28. 1 — *Turn the Rule into an Equation*
Add the known digits 1 + 3 + 4, then choose A so the digit sum reaches the next multiple of 9.

29. 6 — *Turn the Rule into an Equation*
Split 36 into coprime 4 x 9: the digit sum 8 + A + 4 must be a multiple of 9 AND the last two digits A4 must be divisible by 4 — only one digit clears both.

30. 2 — *Turn the Rule into an Equation*
Split 36 into coprime 4 x 9: the digit sum 8 + A + 8 must be a multiple of 9 AND the last two digits A8 must be divisible by 4 — only one digit clears both.

31. Yes — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them — a result of 0 or a multiple of 11 means yes.

32. No — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them — a result of 0 or a multiple of 11 means yes.

33. 2 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them; whatever that alternating sum leaves mod 11 is the remainder.

34. 3 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them; whatever that alternating sum leaves mod 11 is the remainder.

35. Yes — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them — a result of 0 or a multiple of 11 means yes.

36. 7 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them; reduce that alternating sum mod 11 to get the remainder.

37. 5 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, -, + from the right and add them; whatever that alternating sum leaves mod 11 is the remainder.

38. 4 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right to get the alternating sum 3 - 8 + 2 - A + 7, then choose A so it lands on 0 or a multiple of 11.

39. 7 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right to get the alternating sum 7 - 5 + 8 - 4 + A - 2, then choose A so it lands on 0 or a multiple of 11.

40. 4 — *The Alternating Swing (÷11)*
Tag the digits +, -, +, - from the right and add them; whatever that alternating sum leaves mod 11 is the remainder.

41. No — *One Thousand Is One Short*
Split into 3-digit blocks from the right (5 | 002), swing them 002 - 5 = -3, and test that small block-sum mod 7 (a 4-digit number is just two blocks).

42. Yes — *One Thousand Is One Short*
Split into 3-digit blocks from the right (3 | 016), swing them 016 - 3, and test that small block-sum mod 13 (a 4-digit number is just two blocks).

43. Yes — *One Thousand Is One Short*
Split into 3-digit blocks from the right (7 | 021), swing them 021 - 7, and test that small block-sum mod 7 (a 4-digit number is just two blocks).

44. No — *One Thousand Is One Short*
Split into 3-digit blocks from the right (5 | 280), swing them 280 - 5, and test that block-sum mod 13 (a 4-digit number is just two blocks).

45. 5 — *One Thousand Is One Short*
Split into 3-digit blocks from the right (1 | 234 | 567), swing them 567 - 234 + 1, and reduce that block-sum mod 7.

46. No — *One Thousand Is One Short*
Split into 3-digit blocks from the right (246 | 810), swing them 810 - 246, and test that block-sum mod 7.

47. 5 — *One Thousand Is One Short*
Use the same block-sum (810 - 246) and reduce it mod 13 — one grouping answers both 7 and 13.

48. 3 — *One Thousand Is One Short*
A 3-digit number is a single block, so find A that pushes 62A up to the next multiple of 7.

49. Yes — *One Thousand Is One Short*
Because 1001 = 7 x 11 x 13, swing the 3-digit blocks (8 | 008) once and read the single block-sum against both 7 and 13.

50. 5 — *One Thousand Is One Short*
Split into 3-digit blocks from the right (9 | 876 | 543), swing them 543 - 876 + 9, and reduce that block-sum mod 7.

51. No — *Coprime Pieces*
Use the honest coprime split 12 = 4 x 3 (not 2 x 6, which shares a factor): test the last two digits against 4 AND the digit sum against 3 — both must pass.

52. Yes — *Coprime Pieces*
45 = 9 x 5 (coprime), so it must pass BOTH the digit-sum test for 9 and the last-digit test for 5.

53. Yes — *Coprime Pieces*
56 = 8 x 7 (coprime), so it must pass BOTH the last-three test for 8 and the 7-test.

54. Yes — *Coprime Pieces*
72 = 8 x 9 (coprime), so it must pass BOTH the last-three test for 8 and the digit-sum test for 9.

55. Yes — *Coprime Pieces*
36 = 4 x 9 (coprime), so it must pass BOTH the last-two test for 4 and the digit-sum test for 9.

56. Yes — *Coprime Pieces*
Use the honest coprime split 12 = 4 x 3, so it must pass BOTH the last-two test for 4 and the digit-sum test for 3.

57. Yes — *Coprime Pieces*
24 = 8 x 3 (coprime), so it must pass BOTH the last-three test for 8 and the digit-sum test for 3.

58. 24 — *Coprime Pieces*
99 = 9 x 11 (coprime); find the remainder mod 9 (digit sum) and mod 11 (alternating swing), then combine them.

59. Yes — *Coprime Pieces*
84 = 4 x 3 x 7, all pairwise coprime, so it must pass the last-two test for 4, the digit-sum test for 3, AND the 7-test.

60. Yes — *Coprime Pieces*
132 = 4 x 3 x 11, all pairwise coprime, so it must pass the last-two test for 4, the digit-sum test for 3, AND the 11-swing.

61. Yes — *Everything, Combined*
88 = 8 x 11 (coprime), so it must pass BOTH the last-three test for 8 and the alternating-swing test for 11.

62. Yes — *Everything, Combined*
Notice that 638,638 has the form abcabc, recall the identity abcabc = abc x 1001, then check whether 7 appears in the factorization of 1001.

63. Yes — *Everything, Combined*
Notice that 638,638 has the form abcabc, recall the identity abcabc = abc x 1001, then check whether 13 appears in the factorization of 1001.

64. 2 — *Everything, Combined*
Split into 3-digit blocks from the right (638 | 640), swing them 640 - 638, and reduce that block-difference mod 7.

65. Yes — *Everything, Combined*
Notice that 471,471 has the form abcabc, recall the identity abcabc = abc x 1001, then check whether 11 appears in the factorization of 1001.

66. 2 — *Everything, Combined*
Split into 3-digit blocks from the right (471 | 473), swing them 473 - 471, and reduce that block-difference mod 13.

67. Yes — *Everything, Combined*
88 = 8 x 11 (coprime), so it must pass BOTH the last-three test for 8 (136) and the alternating-swing test for 11.

68. Yes — *Everything, Combined*
72 = 8 x 9 (coprime), so it must pass BOTH the last-three test for 8 and the digit-sum test for 9.

69. Yes — *Everything, Combined*
792 = 8 x 9 x 11, all pairwise coprime, so it must pass THREE tests at once: the last-three for 8, the digit sum for 9, AND the alternating-swing for 11 — start by reading the last three digits.

70. Yes — *Everything, Combined*
Notice that 123,123 has the form abcabc, recall the identity abcabc = abc x 1001, then check whether 7, 11, and 13 all appear in the factorization of 1001.