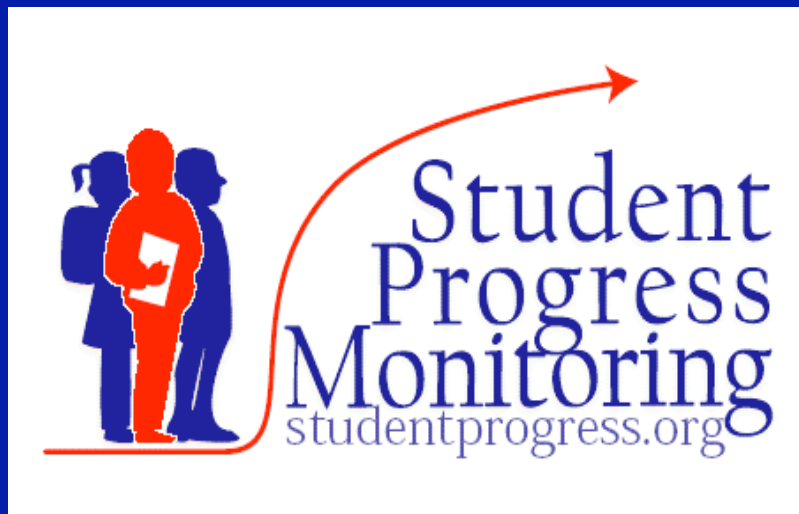


Student Progress Monitoring in Mathematics

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Session Objectives

- Discuss curriculum-based measurement as one research-validated form of progress monitoring.
- Contrast curriculum-based measurement with mastery measurement.
- Describe several forms of mathematics measures within curriculum-based measurement.
- Detail procedures for test administration, scoring, goal setting, and instructional decision making.

Progress Monitoring

- Progress Monitoring is conducted frequently and is designed to:
 - Estimate rates of student improvement.
 - Identify students who are not demonstrating adequate progress.
 - Compare the efficacy of different forms of instruction and design more effective, individualized instructional programs for problem learners.

Curriculum-Based Measurement

- CBM is a specific type of progress monitoring with 30 years of research support.
- CBM procedures are reliable and valid.
- Teachers who use CBM for instructional decision making can build more effective programs and increase student achievement.

How Do Teachers Often Make Data-Based Instructional Decisions in Mathematics?

- **Mastery measurement**
is a typical method for evaluating student performance on skill(s) being instructed.

Mastery Measurement Example

This example does not illustrate curriculum-based measurement procedures.

Fourth-Grade Mathematics Computation Curriculum

1. Multidigit addition with regrouping
2. Multidigit subtraction with regrouping
3. Multiplication facts, factors to 9
4. Multiply 2-digit numbers by a 1-digit number
5. Multiply 2-digit numbers by a 2-digit number
6. Division facts, divisors to 9
7. Divide 2-digit numbers by a 1-digit number
8. Divide 3-digit numbers by a 1-digit number
9. Add/subtract simple fractions, like denominators
10. Add/subtract whole number and mixed number

Multidigit Addition Mastery Test

Name: _____ Date _____

Adding

$$\begin{array}{r} 36521 \\ + 63758 \\ \hline \end{array}$$

$$\begin{array}{r} 53429 \\ + 63421 \\ \hline \end{array}$$

$$\begin{array}{r} 84525 \\ + 75632 \\ \hline \end{array}$$

$$\begin{array}{r} 67842 \\ + 53937 \\ \hline \end{array}$$

$$\begin{array}{r} 57321 \\ + 46391 \\ \hline \end{array}$$

$$\begin{array}{r} 56382 \\ + 94742 \\ \hline \end{array}$$

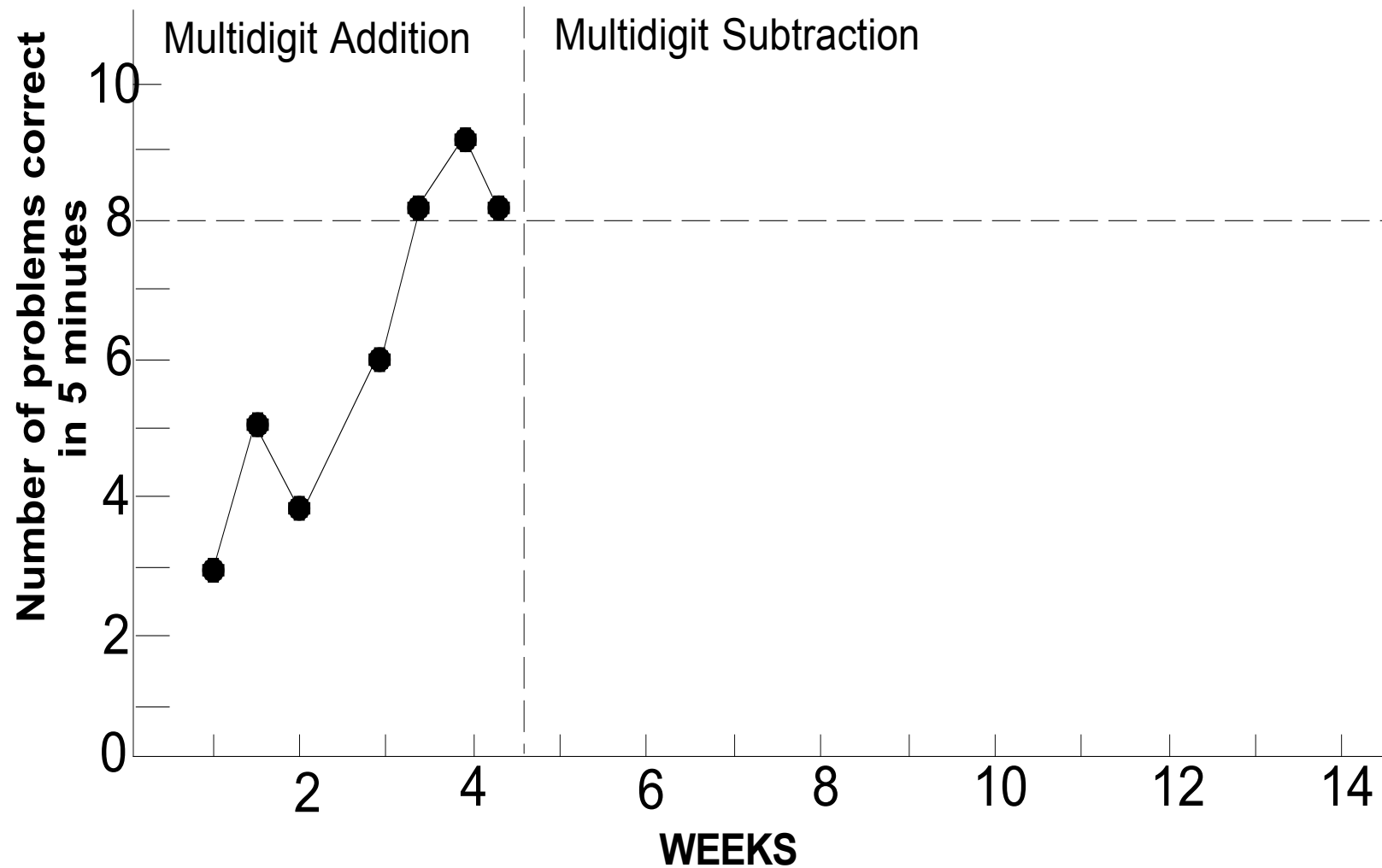
$$\begin{array}{r} 36422 \\ + 57529 \\ \hline \end{array}$$

$$\begin{array}{r} 34824 \\ + 69426 \\ \hline \end{array}$$

$$\begin{array}{r} 32415 \\ + 85439 \\ \hline \end{array}$$

$$\begin{array}{r} 45321 \\ + 86274 \\ \hline \end{array}$$

Mastery of Multidigit Addition



Fourth-Grade Mathematics Computation Curriculum

1. Multidigit addition with regrouping
2. Multidigit subtraction with regrouping
3. Multiplication facts, factors to 9
4. Multiply 2-digit numbers by a 1-digit number
5. Multiply 2-digit numbers by a 2-digit number
6. Division facts, divisors to 9
7. Divide 2-digit numbers by a 1-digit number
8. Divide 3-digit numbers by a 1-digit number
9. Add/subtract simple fractions, like denominators
10. Add/subtract whole number and mixed number

Multidigit Subtraction Mastery Test

Name: _____ Date _____

Subtracting

$$\begin{array}{r} 6521 \\ - 375 \\ \hline \end{array}$$

$$\begin{array}{r} 5429 \\ - 634 \\ \hline \end{array}$$

$$\begin{array}{r} 8455 \\ - 756 \\ \hline \end{array}$$

$$\begin{array}{r} 6782 \\ - 937 \\ \hline \end{array}$$

$$\begin{array}{r} 7321 \\ - 391 \\ \hline \end{array}$$

$$\begin{array}{r} 5682 \\ - 942 \\ \hline \end{array}$$

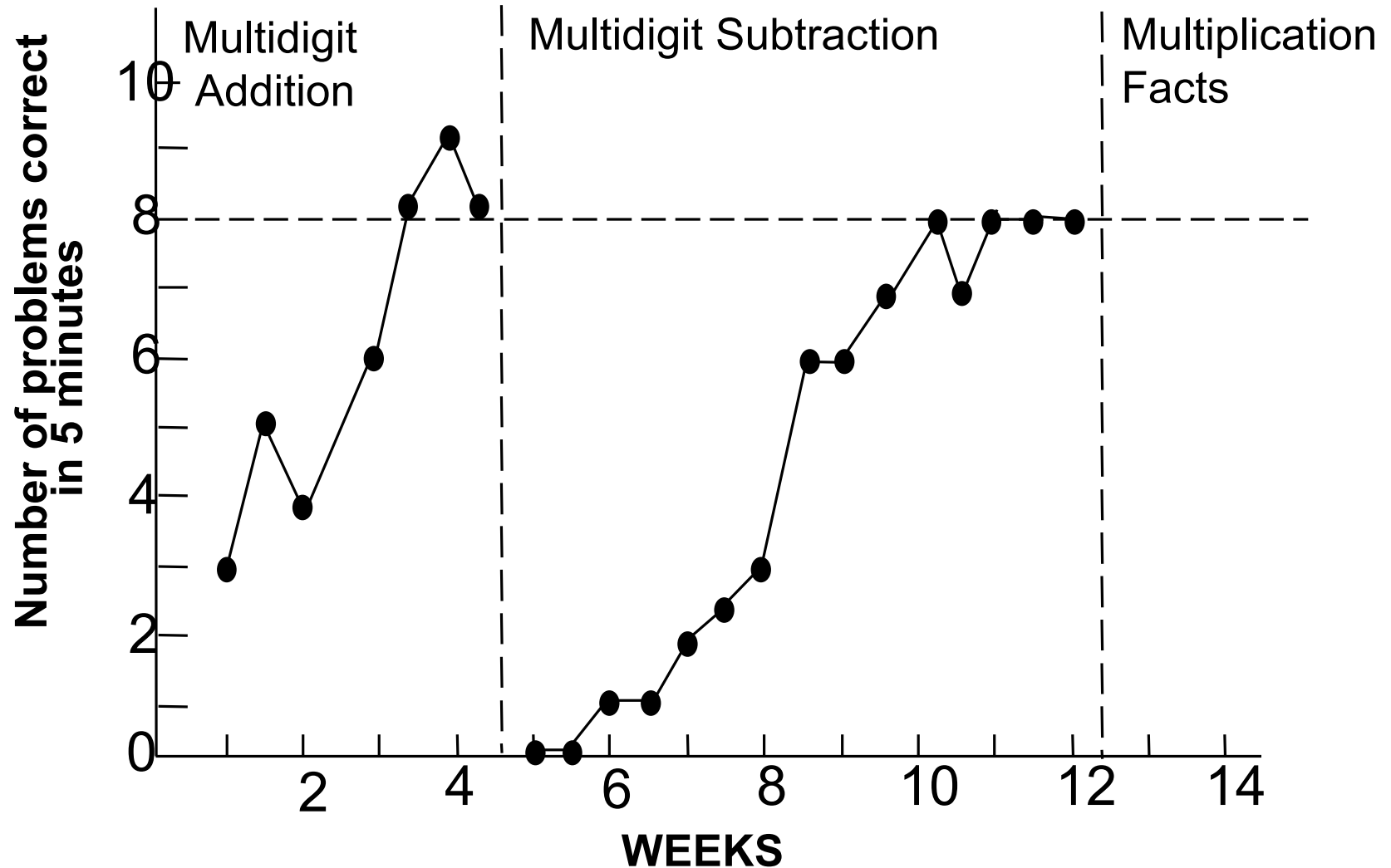
$$\begin{array}{r} 6422 \\ - 529 \\ \hline \end{array}$$

$$\begin{array}{r} 3484 \\ - 426 \\ \hline \end{array}$$

$$\begin{array}{r} 2415 \\ - 854 \\ \hline \end{array}$$

$$\begin{array}{r} 4321 \\ - 874 \\ \hline \end{array}$$

Mastery of Multidigit Addition and Subtraction



Some Difficulties with Mastery Measurement

- Hierarchy of skills is logical, not empirical.
- Assessments do not reflect maintenance or generalization.
- Number of objectives mastered do not necessarily relate well to performance on criterion measures, such as high-stakes tests.
- Measurement methods are designed by teachers and have unknown reliability and validity.

In Contrast, Curriculum-Based Measurement

- Focuses on general outcome measures, rather than assessing only the skill(s) currently taught.
- Involves standardized procedures for test development, administration, scoring, and decision making.
- Provides a reliable and valid way for monitoring student progress across the year.

- Sample CBM measure in mathematics computation
- All critical skills in the year-long curriculum are tested on each alternate form

Sheet #1 Computation 6

Password: ARM

Name: _____ Date: _____

A $\frac{3}{5} - \frac{1}{3} =$	B $\begin{array}{r} 2.66 \\ \times 5.4 \\ \hline \end{array}$	C $5\frac{3}{5} - 3\frac{4}{5} =$	D $\begin{array}{r} 15961 \\ + 92307 \\ \hline \end{array}$	E $\begin{array}{r} 23281 \\ - 16754 \\ \hline \end{array}$
F $\begin{array}{r} 2.591 \\ + 7.6588 \\ \hline \end{array}$	G $\begin{array}{r} 65983 \\ + 56937 \\ \hline \end{array}$	H $.13 \overline{)884}$	I $122 \overline{)8614}$	J $3 \times \frac{1}{2} =$
K $\begin{array}{r} 5952 \\ \times 246 \\ \hline \end{array}$	L $7\frac{4}{7} + 1\frac{2}{3} =$	M $45 \overline{)65}$	N $3\frac{1}{3} + 8\frac{2}{3} =$	O $\begin{array}{r} 3.4423 \\ - 1.33 \\ \hline \end{array}$
P $\frac{2}{5} \times \frac{2}{5} =$	Q $81 \overline{)9301}$	R $\begin{array}{r} 1.292 \\ \times 1.7 \\ \hline \end{array}$	S $1.3 \overline{)598}$	T $\frac{7}{9} + \frac{2}{3} =$
U $\begin{array}{r} 3596 \\ \times 168 \\ \hline \end{array}$	V $7 + \frac{1}{5} =$	W $\frac{3}{4} \div \frac{7}{9} =$	X $9\frac{3}{10} - 3\frac{3}{5} =$	Y $\begin{array}{r} 55867 \\ - 32719 \\ \hline \end{array}$

Steps for Conducting Curriculum-Based Measurement

- Step 1: How to Place Students in a Curriculum-Based Measurement Math Task for Progress Monitoring
- Step 2: How to Identify the Level of Material for Progress Monitoring
- Step 3: How to Administer and Score Curriculum-Based Measurement Math Probes
- Step 4: How to Graph Scores
- Step 5: How to Set Ambitious Goals
- Step 6: How to Apply Decision Rules to Graphed Scores to Know When to Revise Programs and to Increase Goals

Step 1: How to Place Students in a Curriculum-Based Measurement Math Task for Progress Monitoring

- Grades 1–6:
 - Computation
- Grades 2–6:
 - Concepts and Applications
- Kindergarten and First Grade:
 - Number Identification
 - Quantity Discrimination
 - Missing Number

Step 2: How to Identify the Level of Material for Progress Monitoring

- Generally, students use the CBM materials prepared for their grade level.
- However, some students may need to use probes from a different grade level if they perform well below grade-level expectations.

Finding Appropriate Level of Material for Progress Monitoring

- To find the appropriate CBM level:
 - Determine the grade-level probe at which you expect the student to perform in math competently by year's end.
- OR
- On two separate days, administer a CBM test (either Computation or Concepts and Applications) at the grade level lower than the student's grade-appropriate level. Use the correct time limit for the test at the lower grade level, and score the tests according to the directions.
 - If the student's average score is between 10 and 15 digits or blanks, then use this lower grade-level test.
 - If the student's average score is less than 10 digits or blanks, move down one more grade level or stay at the original lower grade and repeat this procedure.
 - If the average score is greater than 15 digits or blanks, reconsider grade-appropriate material.

Step 3: How to Administer and Score Curriculum-Based Measurement Math Probes

- Students answer mathematics problems.
- Teacher grades mathematics probe.
- The number of digits correct, problems correct, or blanks correct is calculated and plotted on the student graph.

Computation

- For students in grades 1–6.
- Student is presented with 25 computation problems representing the year-long, grade-level mathematics curriculum.
- Student works for set amount of time (time limit varies for each grade).
- Teacher grades test after student finishes.

Computation: Sample Measure

from *Monitoring Basic
Skills Progress: Basic
Math Computation*

by L. S. Fuchs, Hamlett,
and Fuchs

<http://www.proedinc.com>

Sheet #6

Computation 3

Password: BOO

Name: _____ Date: _____

A $\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$	B $\begin{array}{r} 57 \\ \times 3 \\ \hline \end{array}$	C $\begin{array}{r} 73 \\ - 25 \\ \hline \end{array}$	D $\begin{array}{r} 800 \\ - 147 \\ \hline \end{array}$	E $\begin{array}{r} 32 \\ \times 7 \\ \hline \end{array}$
F $\begin{array}{r} 1 \overline{)8} \\ \hline \end{array}$	G $\begin{array}{r} 3 \\ \times 0 \\ \hline \end{array}$	H $\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$	I $\begin{array}{r} 7 \overline{)28} \\ \hline \end{array}$	J $\begin{array}{r} 54 \\ + 84 \\ \hline \end{array}$
K $\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$	L $\begin{array}{r} 0 \\ \times 0 \\ \hline \end{array}$	M $\begin{array}{r} 5 \overline{)35} \\ \hline \end{array}$	N $\begin{array}{r} 48 \\ - 19 \\ \hline \end{array}$	O $\begin{array}{r} 312 \\ + 23 \\ \hline \end{array}$
P $\begin{array}{r} 8 \\ \times 0 \\ \hline \end{array}$	Q $\begin{array}{r} 1 \overline{)5} \\ \hline \end{array}$	R $\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$	S $\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$	T $\begin{array}{r} 4 \overline{)4} \\ \hline \end{array}$
U $\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$	V $\begin{array}{r} 2 \overline{)14} \\ \hline \end{array}$	W $\begin{array}{r} 774 \\ - 90 \\ \hline \end{array}$	X $\begin{array}{r} 705 \\ - 374 \\ \hline \end{array}$	Y $\begin{array}{r} 103 \\ + 901 \\ \hline \end{array}$

Computation: Time Limits

- Length of test varies by grade.

Grade	Time limit
First	2 min.
Second	2 min.
Third	3 min.
Fourth	3 min.
Fifth	5 min.
Sixth	6 min.

Computation: Scoring

- Students receive 1 point for each problem answered correctly.
- Computation tests can also be scored by awarding 1 point for each **digit** answered correctly.
- The number of digits correct within the time limit is the student's score.

Computation: Scoring Digits in Answers

Correct Digits: Evaluate Each Numeral in Every Answer

$$\begin{array}{r} 4507 \\ -2146 \\ \hline \underline{2361} \\ \checkmark \checkmark \checkmark \checkmark \end{array}$$

4 correct
digits

$$\begin{array}{r} 4507 \\ -2146 \\ \hline \underline{2461} \\ \checkmark \quad \checkmark \checkmark \end{array}$$

3 correct
digits


$$\begin{array}{r} 4507 \\ -2146 \\ \hline \underline{2441} \\ \checkmark \quad \checkmark \end{array}$$

2 correct
digits


Computation:

Scoring Different Operations


Examples:

$$\begin{array}{r} 1 \\ 18 \\ + 16 \\ \hline 34 \end{array}$$


2 correct
digits

$$\begin{array}{r} 41 \\ 158 \\ - 29 \\ \hline 129 \end{array}$$


3 correct
digits

$$\begin{array}{r} 22 \\ \times 43 \\ \hline 66 \\ 880 \\ \hline 946 \end{array}$$


3 correct
digits

$$\begin{array}{r} \overline{23} \\ 8 \overline{)184} \\ \underline{16} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

2 correct
digits

Computation: Scoring

Division Problems with Remainders

- When giving directions, tell students to write answers to division problems using R for remainders when appropriate.
- Although the first part of the quotient is scored from left to right (just like the student moves when working the problem), score the remainder from right to left (because student would likely subtract to calculate remainder).

Computation: Scoring

Scoring Examples: Division with Remainders

Correct Answer

4 0 3 R 5 2
→ ←

2 3 R 1 5
→ ←

Student's Answer

4 3 R 5
→ ← (1 correct digit)
✓

4 3 R 5
→ ← (2 correct digits)
✓ ✓

Computation: Scoring

Scoring Decimals and Fractions

- Decimals: Start at the decimal point and work outward in both directions.

$$\overleftarrow{2} . \overrightarrow{15} \quad (3 \text{ correct digits})$$

- Fractions: Score right to left for each portion of the answer. Evaluate digits correct in the whole number part, numerator, and denominator. Then add digits together.
 - When giving directions, be sure to tell students to reduce fractions to lowest terms.

$$\overleftarrow{12} \quad \overleftarrow{3} / \overleftarrow{16} \quad (5 \text{ correct digits})$$

Computation: Scoring

Scoring Examples: Decimals

Correct Answer

4 0 3 . 5 2
← →

4 0 3 . 5 2

Student's Answer

4 3 . 5 (2 correct digits)
← →
✓ ✓

4 0 . 4 2 (1 correct digit)
← →
✓ ✓ ✓ ✓

Computation: Scoring

Scoring Examples: Fractions

<u>Correct Answer</u>	<u>Student's Answer</u>
6 7 / 1 2 ← ← ←	6 8 / 1 1 ✓ ✓ (2 correct digits)
5 1 / 2	5 6 / 1 2 ✓ ✓ (2 correct digits)

Computation

Samantha's Computation Test

- Fifteen problems attempted.
- Two problems skipped.
- Two problems incorrect.
- Samantha's score is 13 problems.
- However, Samantha's correct digit score is 49.

Sheet #15

Computation 5

Password: HAT

Name: Samantha Date: November 16

A $\frac{3}{5} - \frac{2}{7} = \frac{11}{35}$ $\frac{21}{35} - \frac{10}{35} =$	X $\begin{array}{r} 5.697 \\ - 3.300 \\ \hline 2.397 \end{array}$	X $\begin{array}{r} 27568 \\ + 46047 \\ \hline 73605 \end{array}$	D $\frac{3}{7} + \frac{4}{7} = \frac{7}{7} = 1$	E $\begin{array}{r} 300 \\ \times 62 \\ \hline 600 \\ 18000 \\ \hline 18600 \end{array}$
X $8\frac{3}{11} - 2\frac{4}{11} =$	G $\begin{array}{r} 2 \\ \times 872 \\ \hline 1584 \\ 15840 \\ \hline 17424 \end{array}$	X $38\overline{)76}$	I $\begin{array}{r} 599\overline{)3} \\ - 24915 \\ \hline 35026 \end{array}$	J Rename as improper: $8\frac{1}{2} = \frac{17}{2}$
K Reduce: $\frac{4}{6} = \frac{2}{3}$	L Rename as mixed: $\frac{16}{3} = 5\frac{1}{3}$	M $\begin{array}{r} 8.492 \\ + .160 \\ \hline 8.652 \end{array}$	N $5\frac{3}{5} + 2\frac{3}{5} =$ $7\frac{6}{5} = 8\frac{1}{5}$	O $\begin{array}{r} 66000 \\ 7594 \\ 248 \\ + 930 \\ \hline 74772 \end{array}$
P $\begin{array}{r} 90 R6 \\ 8\overline{)726} \\ \underline{72} \\ 06 \\ \underline{0} \\ 60 \end{array}$	Q Reduce: $\frac{3}{12} = \frac{1}{4}$	R $\frac{8}{9} - \frac{1}{3} =$	S $7\overline{)847}$	T $\begin{array}{r} 68650 \\ - 7397 \\ \hline \end{array}$
U Rename as improper: $6\frac{2}{3} =$	V $28\overline{)68}$	W $\frac{2}{3} + \frac{2}{9} =$	X Rename as mixed: $\frac{37}{8} =$	Y $\frac{2}{5} + \frac{2}{7} =$

Concepts and Applications

- For students in grades 2–6.
- Student is presented with 18–25 Concepts and Applications problems representing the year-long grade-level math curriculum.
- Student works for set amount of time (time limit varies by grade).
- Teacher grades test after student finishes.

Concepts and Applications

Student Copy of a Concepts and Applications test

- This sample is from a second grade test.
- The actual Concepts and Applications test is 3 pages long.

Monitoring Basic Skills Progress: Basic Math Concepts and Applications

Name _____ Date _____ Test 3 Page 1

Column A Applications 2 Column B

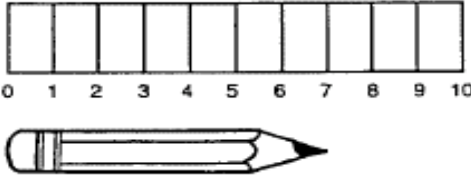
(1) Write the number in each blank.

_____ two
_____ eleven
_____ thirteen

(2) Write + or - in the blank.

9 _____ 2 = 11

(3) How long is the pencil?



_____ units

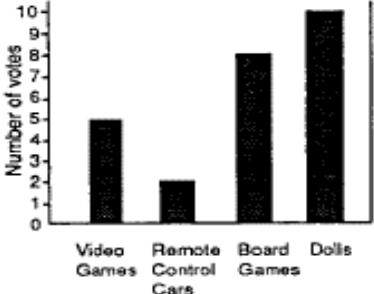
(4) Counting by 3's, fill in the blanks.

84, 87, 90, _____, _____

(5) Write the number in the blank.

1 + 7 = _____ + 1

(6) Favorite Toys



Toy Category	Number of Votes
Video Games	5
Remote Control Cars	2
Board Games	8
Dolls	10

Write the number in each blank.

How many votes did video games get? _____

How many fewer votes did remote control cars get than board games? _____

How many more votes did dolls get than board games? _____

Concepts and Applications

- Length of test varies by grade.

Grade	Time limit
Second	8 min.
Third	6 min.
Fourth	6 min.
Fifth	7 min.
Sixth	7 min.

Concepts and Applications

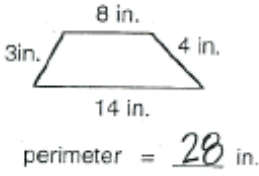
- Students receive 1 point for each blank answered correctly.
- The number of correct answers within the time limit is the student's score.

Concepts and Applications

Quinten's Fourth Grade Concepts and Applications Test

- Twenty-four blanks answered correctly.
- Quinten's score is 24.

~~X~~



perimeter = 28 in.

(2) Write a number in the blank.

180 minutes = 3 hours

(3) Rewrite as a decimal.

$\frac{7}{10}$.70

$\frac{8}{100}$.08

(4) Look at this number.

6,784.91

Which digit is in the tenths place? 9

(5) Southgate Mall is 15 miles from town. There are 36 stores upstairs and 27 stores downstairs. How many stores are there in the mall altogether?

63

$$\begin{array}{r} 36 \\ + 27 \\ \hline 63 \end{array}$$

(6) Write >, <, or = in the blank.

$\frac{9}{10} = \frac{9}{10}$

(7) Which is the best unit for weighing a box of cereal?

(A) milligrams
(B) grams
(C) kilograms

B

(8) Daniel has \$7.16. If he buys a \$3.49 toy, how much will he have left?

\$3.67

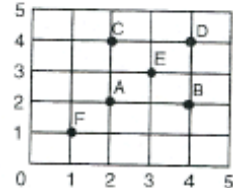
$$\begin{array}{r} 7.16 \\ - 3.49 \\ \hline 3.67 \end{array}$$

~~X~~

Complete the sequence.

23, 26, 29, 30, 31


(10)

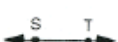



Write the letter of the point that goes with each number pair.

C (2, 4)
B (4, 2)

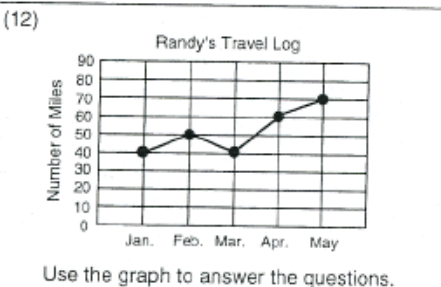
(11) Write the letter in each blank.

C  (A) line

A  (B) point

D  (C) ray

(D) line segment



- How many miles did Randy travel altogether? _____
- How many fewer miles did Randy travel in January than in April? _____
- How many miles did Randy travel in March? _____

(13) Write a number in each blank.

Of these numbers,

33,763 8,745 33,824

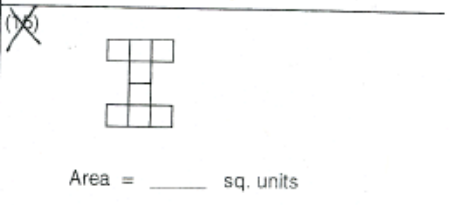
33,824 is the largest.

8,745 is the smallest.

(14) Write the number in the blank.

four hundred thousand, twenty-eight

400,028



(16) Write the letter in the blank.

Pat programmed his VCR to record in 4 hours. It is 5:00 in the evening now. At what time will the VCR begin recording?

D

(A) 1:00 a.m.
(B) 1:00 p.m.
(C) 9:00 a.m.
(D) 9:00 p.m.

(17) Write the number in each blank.

3 tens, 2 tenths = 30.2

1 ten, 7 ones, 46 hundredths = 17.46

(18) Write the number in each blank.

$$\begin{array}{r} 7 \text{ R}5 \\ 6 \overline{)47} \end{array}$$

The dividend is _____.

The remainder is _____.

The quotient is _____.

(19) Write the fraction when:

6 is the numerator and 5 is the denominator. $\frac{6}{5}$

9 is the denominator and 3 is the numerator. $\frac{3}{9}$

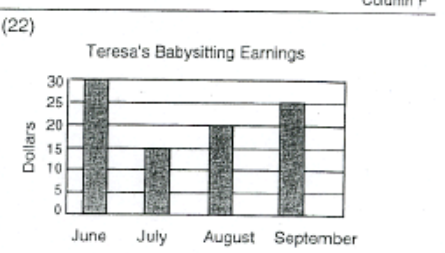
(20) Look at this number.

578.16

Which digit is in the hundredths place? 6

(21) Solve the problem by estimating the sum or difference to the nearest ten.

In his stamp collection Jamar has 21 German stamps and 68 Dutch stamps. About how many fewer German stamps does he have than Dutch stamps?



Use the bar graph to answer the questions.

Teresa babysat for 5 hours in July. How much does she charge for each hour? \$ _____00

How much money did Teresa earn altogether in the four months? \$ _____00

How much money did Teresa earn in August? \$ _____00


(23) Look at this number.

7,954

Which digit is in the thousands place? _____

Which digit is in the hundreds place? _____

(24) Write the time.



_____ : _____

Sample Early Numeracy Measures

- Number Identification
- Quantity Discrimination
- Missing Number

See <http://www.progressmonitoring.org> for more information

Number Identification

- For kindergarten or first grade students.
- Student is presented with 84 items and is asked to orally identify the written number between 0 and 100.
- After completing some sample items, the student works for 1 minute.
- Teacher writes the student's responses on the Number Identification score sheet.

Number Identification

Student Copy of
a Number
Identification test

- Actual student copy is 3 pages long.

Number Identification, page 1—Student copy

12

17

5

5

34

13

3

10

37

45

20

13

45

64

31

12

23

10

17

47

17

49

58

1

14

23

6

23

Number Identification

Number Identification Score Sheet

Number Identification—Administrator copy

Student: _____ Date: _____ Number correct: _____

Directions: Write the number that the student says in the blank.

- | | | | |
|----------------|----------------|----------------|----------------|
| 1. _____ (12) | 22. _____ (49) | 43. _____ (1) | 64. _____ (1) |
| 2. _____ (17) | 23. _____ (58) | 44. _____ (18) | 65. _____ (11) |
| 3. _____ (5) | 24. _____ (1) | 45. _____ (42) | 66. _____ (10) |
| 4. _____ (5) | 25. _____ (14) | 46. _____ (11) | 67. _____ (54) |
| 5. _____ (34) | 26. _____ (23) | 47. _____ (25) | 68. _____ (60) |
| 6. _____ (13) | 27. _____ (6) | 48. _____ (7) | 69. _____ (5) |
| 7. _____ (3) | 28. _____ (23) | 49. _____ (90) | 70. _____ (13) |
| 8. _____ (10) | 29. _____ (15) | 50. _____ (2) | 71. _____ (57) |
| 9. _____ (37) | 30. _____ (8) | 51. _____ (20) | 72. _____ (31) |
| 10. _____ (45) | 31. _____ (15) | 52. _____ (3) | 73. _____ (5) |
| 11. _____ (20) | 32. _____ (44) | 53. _____ (26) | 74. _____ (20) |
| 12. _____ (13) | 33. _____ (32) | 54. _____ (14) | 75. _____ (28) |
| 13. _____ (45) | 34. _____ (18) | 55. _____ (8) | 76. _____ (20) |
| 14. _____ (64) | 35. _____ (12) | 56. _____ (0) | 77. _____ (6) |
| 15. _____ (31) | 36. _____ (3) | 57. _____ (12) | 78. _____ (13) |
| 16. _____ (12) | 37. _____ (0) | 58. _____ (12) | 79. _____ (16) |
| 17. _____ (23) | 38. _____ (5) | 59. _____ (8) | 80. _____ (18) |
| 18. _____ (10) | 39. _____ (15) | 60. _____ (8) | 81. _____ (10) |
| 19. _____ (17) | 40. _____ (12) | 61. _____ (27) | 82. _____ (1) |
| 20. _____ (47) | 41. _____ (48) | 62. _____ (20) | 83. _____ (0) |
| 21. _____ (17) | 42. _____ (6) | 63. _____ (19) | 84. _____ (17) |

Number Identification

- If the student does not respond after 3 seconds, point to the next item and say “Try this one.”
- Do not correct errors.
- Teacher writes the student’s responses on the Number Identification score sheet. Skipped items are marked with a hyphen (-).
- At 1 minute, draw a line under the last item completed.
- Teacher scores the task, putting a slash through incorrect items on score sheet.
- Teacher counts the number of correct answers in 1 minute.

Number Identification

Jamal's Number Identification Score Sheet

- Skipped items are marked with a (-).
- Fifty-seven items attempted.
- Three incorrect.
- Jamal's score is 54.

Number Identification—Administrator copy

Student: Jamal Date: Oct. 3 Number correct: 54

Directions: Write the number that the student says in the blank.

1. <u>42</u> (42)	22. <u>9</u> (9)	43. <u>17</u> (17)	64. _____ (20)
2. <u>94</u> (94)	23. <u>92</u> (92)	44. <u>19</u> (19)	65. _____ (16)
3. <u>5</u> (5)	24. <u>4</u> (4)	45. <u>38</u> (38)	66. _____ (13)
4. <u>7</u> (7)	25. <u>81</u> (18)	46. <u>12</u> (12)	67. _____ (5)
5. <u>49</u> (49)	26. <u>37</u> (37)	47. <u>4</u> (4)	68. _____ (0)
6. <u>15</u> (15)	27. <u>12</u> (12)	48. <u>16</u> (16)	69. _____ (19)
7. <u>31</u> (31)	28. <u>50</u> (50)	49. <u>10</u> (10)	70. _____ (11)
8. <u>44</u> (44)	29. <u>45</u> (45)	50. <u>14</u> (14)	71. _____ (36)
9. <u>0</u> (0)	30. <u>76</u> (76)	51. <u>46</u> (46)	72. _____ (5)
10. <u>4</u> (40)	31. <u>42</u> (42)	52. <u>20</u> (20)	73. _____ (62)
11. <u>2</u> (2)	32. <u>33</u> (33)	53. <u>11</u> (11)	74. _____ (5)
12. <u>22</u> (22)	33. <u>3</u> (3)	54. <u>74</u> (74)	75. _____ (1)
13. <u>32</u> (32)	34. <u>4</u> (4)	55. <u>3</u> (3)	76. _____ (3)
14. <u>10</u> (10)	35. <u>37</u> (37)	56. <u>22</u> (22)	77. _____ (74)
15. <u>9</u> (9)	36. <u>67</u> (67)	57. <u>7</u> (7)	78. _____ (13)
16. <u>1</u> (1)	37. <u>17</u> (17)	58. _____ (18)	79. _____ (8)
17. <u>20</u> (20)	38. <u>13</u> (13)	59. _____ (10)	80. _____ (3)
18. <u>82</u> (82)	39. <u>7</u> (7)	60. _____ (20)	81. _____ (4)
19. <u>17</u> (17)	40. <u>62</u> (26)	61. _____ (35)	82. _____ (2)
20. <u>12</u> (12)	41. <u>46</u> (46)	62. _____ (12)	83. _____ (8)
21. <u>48</u> (48)	42. <u>1</u> (1)	63. _____ (79)	84. _____ (12)

Quantity Discrimination

- For kindergarten or first grade students.
- Student is presented with 63 items and asked to orally identify the larger number from a set of two numbers.
- After completing some sample items, the student works for 1 minute.
- Teacher writes the student's responses on the Quantity Discrimination score sheet.

Quantity Discrimination

Student Copy of a
Quantity

Discrimination test

- Actual student copy is 3 pages long.

Quantity discrimination, page 1—student copy

3	7	8	5	13	16
16	2	13	12	9	0
4	11	8	1	1	11
5	0	2	10	10	9
7	1	8	7	16	2
0	7	1	0	9	1
6	0	9	19	5	1

Quantity Discrimination

Quantity Discrimination Score Sheet

Quantity Discrimination—Administrator copy

Student: _____ Date: _____ Number correct: _____

Directions: Write the number that the student says in the blank.

- | | | |
|----------------|----------------|----------------|
| 1. _____ (7) | 22. _____ (4) | 43. _____ (7) |
| 2. _____ (8) | 23. _____ (5) | 44. _____ (17) |
| 3. _____ (16) | 24. _____ (9) | 45. _____ (18) |
| 4. _____ (16) | 25. _____ (8) | 46. _____ (2) |
| 5. _____ (13) | 26. _____ (4) | 47. _____ (19) |
| 6. _____ (9) | 27. _____ (4) | 48. _____ (8) |
| 7. _____ (11) | 28. _____ (10) | 49. _____ (12) |
| 8. _____ (8) | 29. _____ (10) | 50. _____ (8) |
| 9. _____ (11) | 30. _____ (10) | 51. _____ (7) |
| 10. _____ (5) | 31. _____ (8) | 52. _____ (9) |
| 11. _____ (10) | 32. _____ (9) | 53. _____ (3) |
| 12. _____ (10) | 33. _____ (17) | 54. _____ (5) |
| 13. _____ (7) | 34. _____ (5) | 55. _____ (7) |
| 14. _____ (8) | 35. _____ (7) | 56. _____ (4) |
| 15. _____ (16) | 36. _____ (7) | 57. _____ (10) |
| 16. _____ (7) | 37. _____ (9) | 58. _____ (13) |
| 17. _____ (1) | 38. _____ (8) | 59. _____ (6) |
| 18. _____ (9) | 39. _____ (19) | 60. _____ (20) |
| 19. _____ (6) | 40. _____ (11) | 61. _____ (12) |
| 20. _____ (19) | 41. _____ (16) | 62. _____ (19) |
| 21. _____ (5) | 42. _____ (10) | 63. _____ (14) |

Quantity Discrimination

- If the student does not respond after 3 seconds, point to the next item and say “Try this one.”
- Do not correct errors.
- Teacher writes student’s responses on the Quantity Discrimination score sheet. Skipped items are marked with a hyphen (-).
- At 1 minute, draw a line under the last item completed.
- Teacher scores the task, putting a slash through incorrect items on the score sheet.
- Teacher counts the number of correct answers in 1 minute.

Quantity Discrimination

Lin's Quantity Discrimination Score Sheet

- Thirty-eight items attempted.
- Five incorrect.
- Lin's score is 33.

Quantity Discrimination—Administrator copy

Student: Lin Date: Jan. 17 Number correct: 33

Directions: Write the number that the student says in the blank.

- | | | |
|------------------------------|-----------------------------|----------------|
| 1. <u>7</u> (7) | 22. <u>4</u> (4) | 43. _____ (7) |
| 2. <u>8</u> (8) | 22. <u>4</u> (5) | 44. _____ (17) |
| 3. <u>16</u> (16) | 24. <u>6</u> (9) | 45. _____ (18) |
| 4. <u>16</u> (16) | 25. <u>8</u> (8) | 46. _____ (2) |
| 5. <u>12</u> (13) | 26. <u>4</u> (4) | 47. _____ (19) |
| 6. <u>9</u> (9) | 27. <u>4</u> (4) | 48. _____ (8) |
| 7. <u>11</u> (11) | 28. <u>10</u> (10) | 49. _____ (12) |
| 8. <u>8</u> (8) | 29. <u>10</u> (10) | 50. _____ (8) |
| 9. <u>11</u> (11) | 30. <u>10</u> (10) | 51. _____ (7) |
| 10. <u>5</u> (5) | 31. <u>8</u> (8) | 52. _____ (9) |
| 11. <u>10</u> (10) | 32. <u>7</u> (9) | 53. _____ (3) |
| 12. <u>10</u> (10) | 33. <u>17</u> (17) | 54. _____ (5) |
| 13. <u>7</u> (7) | 34. <u>5</u> (5) | 55. _____ (7) |
| 14. <u>8</u> (8) | 35. <u>7</u> (7) | 56. _____ (4) |
| 15. <u>16</u> (16) | 36. <u>7</u> (7) | 57. _____ (10) |
| 16. <u>7</u> (7) | 37. <u>9</u> (9) | 58. _____ (13) |
| 17. <u>0</u> (1) | 38. <u>8</u> (8) | 59. _____ (6) |
| 18. <u>9</u> (9) | 39. _____ (19) | 60. _____ (20) |
| 19. <u>6</u> (6) | 40. _____ (11) | 61. _____ (12) |
| 20. <u>19</u> (19) | 41. _____ (16) | 62. _____ (19) |
| 21. <u>5</u> (5) | 42. _____ (10) | 63. _____ (14) |

Missing Number

- For kindergarten or first grade students.
- Student is presented with 63 items and asked to orally identify the missing number in a sequence of four numbers.
- After completing some sample items, the student works for 1 minute.
- Teacher writes the student's responses on the Missing Number score sheet.

Missing Number

Student Copy of a Missing Number Test

- Actual student copy is 3 pages long.

Missing Number, page 1—Student copy

3 4 ___ 6	___ 4 5 6	___ 8 9 10
5 6 ___ 8	60 70 80 ___	14 16 18 ___
2 3 4 ___	70 80 90 ___	6 7 ___ 9
40 50 60 ___	0 1 2 ___	4 ___ 6 7
0 1 ___ 3	30 35 40 ___	1 2 ___ 4
___ 1 2 3	2 ___ 4 5	1 ___ 3 4
3 4 ___ 6	2 3 4 ___	___ 2 3 4

Missing Number

Missing Number Score Sheet

Missing Number—Administrator copy

Student: _____ Date: _____ Number correct: _____

Directions: Write the number that the student says in the blank.

- | | | |
|----------------|----------------|----------------|
| 1. _____ (5) | 22. _____ (4) | 43. _____ (9) |
| 2. _____ (3) | 23. _____ (12) | 44. _____ (90) |
| 3. _____ (7) | 24. _____ (0) | 45. _____ (5) |
| 4. _____ (7) | 25. _____ (80) | 46. _____ (6) |
| 5. _____ (90) | 26. _____ (3) | 47. _____ (10) |
| 6. _____ (20) | 27. _____ (14) | 48. _____ (3) |
| 7. _____ (5) | 28. _____ (2) | 49. _____ (5) |
| 8. _____ (100) | 29. _____ (14) | 50. _____ (2) |
| 9. _____ (8) | 30. _____ (7) | 51. _____ (8) |
| 10. _____ (70) | 31. _____ (1) | 52. _____ (18) |
| 11. _____ (3) | 32. _____ (60) | 53. _____ (8) |
| 12. _____ (5) | 33. _____ (14) | 54. _____ (20) |
| 13. _____ (2) | 34. _____ (4) | 55. _____ (6) |
| 14. _____ (45) | 35. _____ (40) | 56. _____ (8) |
| 15. _____ (3) | 36. _____ (3) | 57. _____ (4) |
| 16. _____ (0) | 37. _____ (2) | 58. _____ (0) |
| 17. _____ (3) | 38. _____ (9) | 59. _____ (40) |
| 18. _____ (2) | 39. _____ (5) | 60. _____ (80) |
| 19. _____ (5) | 40. _____ (10) | 61. _____ (4) |
| 20. _____ (5) | 41. _____ (6) | 62. _____ (7) |
| 21. _____ (1) | 42. _____ (6) | 63. _____ (0) |

Missing Number

- If the student does not respond after 3 seconds, point to the next item and say “Try this one.”
- Do not correct errors.
- Teacher writes the student’s responses on the Missing Number score sheet. Skipped items are marked with a hyphen (-).
- At 1 minute, draw a line under the last item completed.
- Teacher scores the task, putting a slash through incorrect items on the score sheet.
- Teacher counts the number of correct answers in 1 minute.

Missing Number

Thomas' Missing Number Score Sheet

- Twenty-six items attempted.
- Eight incorrect.
- Thomas's score is 18.

Missing Number—Administrator copy

Student: Thomas Date: May 15 Number correct: 18

Directions: Write the number that the student says in the blank.

1. 5 (5)

2. 3 (3)

3. 7 (7)

~~4.~~ 8 (7)

~~5.~~ 81 (90)

~~6.~~ 19 (20)

7. 5 (5)

~~8.~~ 91 (100)

9. 8 (8)

~~10.~~ 71 (70)

11. 3 (3)

12. 5 (5)

13. 2 (2)

~~14.~~ 41 (45)

15. 3 (3)

16. 0 (0)

17. 3 (3)

18. 2 (2)

19. 5 (5)

20. 5 (5)

21. 1 (1)

22. 4 (4)

~~23.~~ 11 (12)

24. 0 (0)

~~25.~~ 71 (80)

26. 3 (3)

27. _____ (14)

28. _____ (2)

29. _____ (14)

30. _____ (7)

31. _____ (1)

32. _____ (60)

33. _____ (14)

34. _____ (4)

35. _____ (40)

36. _____ (3)

37. _____ (2)

38. _____ (9)

39. _____ (5)

40. _____ (10)

41. _____ (6)

42. _____ (6)

43. _____ (9)

44. _____ (90)

45. _____ (5)

46. _____ (6)

47. _____ (10)

48. _____ (3)

49. _____ (5)

50. _____ (2)

51. _____ (8)

52. _____ (18)

53. _____ (8)

54. _____ (20)

55. _____ (6)

56. _____ (8)

57. _____ (4)

58. _____ (0)

59. _____ (40)

60. _____ (80)

61. _____ (4)

62. _____ (7)

63. _____ (0)

Additional Samples of Mathematics Measures

AIMSweb[®]: <http://www.aimsweb.com>

Grade-Level Computation

Basic Facts: Single Operation

Basic Facts: Mixed Operations

Yearly Progress Pro[™]:

<http://www.mhdigitallearning.com>

Mixed Computation and Problem Solving

AIMSweb[®]

Computation: Grade-Level Skills

AIMSweb[®] M-CBM Computation Progress Monitor #1 - Grade 3 Answer Key

$\begin{array}{r} 0 \\ + 2 \\ \hline 2 \end{array}$ (1)	$\begin{array}{r} 3 \\ + 2 \\ \hline 5 \end{array}$ (1)	$\begin{array}{r} 9 \\ + 9 \\ \hline 18 \end{array}$ (2)	$\begin{array}{r} 8 \\ + 4 \\ \hline 12 \end{array}$ (2)	$\begin{array}{r} 2 \\ - 2 \\ \hline 0 \end{array}$ (1)	$\begin{array}{r} 6 \\ - 4 \\ \hline 2 \end{array}$ (1)	8 (8)
$\begin{array}{r} 0 \\ + 6 \\ \hline 6 \end{array}$ (1)	$\begin{array}{r} 645 \\ 187 \\ + 399 \\ \hline 1231 \end{array}$ (4)	$\begin{array}{r} 12 \\ - 6 \\ \hline 6 \end{array}$ (1)	$\begin{array}{r} 91 \\ + 41 \\ \hline 132 \end{array}$ (3)	$\begin{array}{r} 452 \\ + 501 \\ \hline 953 \end{array}$ (3)	$\begin{array}{r} 37 \\ + 42 \\ \hline 79 \end{array}$ (2)	14 (22)
$\begin{array}{r} 559 \\ 35 \\ + 322 \\ \hline 916 \end{array}$ (3)	$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$ (1)	$\begin{array}{r} 18 \\ + 929 \\ \hline 947 \end{array}$ (3)	$\begin{array}{r} 808 \\ + 57 \\ \hline 865 \end{array}$ (3)	$\begin{array}{r} 44 \\ - 24 \\ \hline 20 \end{array}$ (2)	$\begin{array}{r} 41 \\ - 15 \\ \hline 26 \end{array}$ (2)	14 (38)
$\begin{array}{r} 4 \\ 9 \\ + 4 \\ \hline 17 \end{array}$ (2)	$\begin{array}{r} 5 \\ 9 \\ + 0 \\ \hline 14 \end{array}$ (2)	$\begin{array}{r} 16 \\ - 2 \\ \hline 14 \end{array}$ (2)	$\begin{array}{r} 765 \\ + 91 \\ \hline 856 \end{array}$ (3)	$\begin{array}{r} 849 \\ + 930 \\ \hline 1779 \end{array}$ (4)	$\begin{array}{r} 370 \\ 620 \\ + 327 \\ \hline 1317 \end{array}$ (4)	17 (53)
$\begin{array}{r} 19 \\ + 31 \\ \hline 50 \end{array}$ (2)	$\begin{array}{r} 10 \\ - 0 \\ \hline 10 \end{array}$ (2)	$\begin{array}{r} 5 \\ 2 \\ + 5 \\ \hline 12 \end{array}$ (2)	$\begin{array}{r} 107 \\ - 64 \\ \hline 43 \end{array}$ (2)	$\begin{array}{r} 8 \\ + 1 \\ \hline 9 \end{array}$ (1)	$\begin{array}{r} 83 \\ - 80 \\ \hline 3 \end{array}$ (1)	10 (83)
$\begin{array}{r} 194 \\ + 7 \\ \hline 201 \end{array}$ (3)	$\begin{array}{r} 953 \\ - 479 \\ \hline 474 \end{array}$ (3)	$\begin{array}{r} 50 \\ - 18 \\ \hline 32 \end{array}$ (2)	$\begin{array}{r} 14 \\ - 5 \\ \hline 9 \end{array}$ (1)	$\begin{array}{r} 309 \\ - 84 \\ \hline 225 \end{array}$ (3)	$\begin{array}{r} 305 \\ - 84 \\ \hline 221 \end{array}$ (3)	15 (78)

AIMSweb® Basic Facts: Mixed Operations and Single Operation

AIMSweb® Basic Addition and Subtraction Facts #1 - Intermediate Answer Key

$\frac{4}{-0}$ (1)	$\frac{7}{+7}$ (2)	$\frac{4}{+7}$ (2)	$\frac{4}{-4}$ (1)	$\frac{9}{+0}$ (1)	$\frac{2}{-0}$ (1)	$\frac{5}{-5}$ (1)	9 (9)
$\frac{11}{-8}$ (1)	$\frac{12}{-6}$ (1)	$\frac{7}{-3}$ (1)	$\frac{1}{+7}$ (1)	$\frac{8}{-6}$ (1)	$\frac{9}{-9}$ (1)	$\frac{1}{+5}$ (1)	7 (18)
$\frac{12}{-8}$ (1)	$\frac{10}{-5}$ (1)	$\frac{7}{-3}$ (1)	$\frac{8}{-6}$ (1)	$\frac{12}{+4}$ (2)	$\frac{9}{+0}$ (1)	$\frac{8}{-1}$ (1)	8 (24)
$\frac{3}{+2}$ (1)	$\frac{8}{+8}$ (2)	$\frac{9}{-7}$ (1)	$\frac{12}{-2}$ (2)	$\frac{3}{+6}$ (1)	$\frac{1}{-1}$ (1)	$\frac{10}{-2}$ (1)	9 (33)
$\frac{2}{+7}$ (1)	$\frac{1}{+8}$ (1)	$\frac{9}{-2}$ (1)	$\frac{5}{-0}$ (1)	$\frac{0}{+3}$ (1)	$\frac{9}{+1}$ (2)	$\frac{5}{+3}$ (1)	8 (41)
$\frac{9}{-9}$ (1)	$\frac{8}{-7}$ (1)	$\frac{4}{+9}$ (2)	$\frac{10}{-6}$ (1)	$\frac{3}{+7}$ (2)	$\frac{6}{+0}$ (1)	$\frac{9}{-5}$ (1)	9 (50)

AIMSweb® Basic Addition Facts #1 - Intermediate Answer Key

$\frac{0}{+4}$ (1)	$\frac{7}{+7}$ (2)	$\frac{4}{+7}$ (2)	$\frac{4}{+4}$ (1)	$\frac{9}{+0}$ (1)	$\frac{0}{+2}$ (1)	$\frac{5}{+5}$ (2)	10 (10)
$\frac{8}{+11}$ (2)	$\frac{12}{+6}$ (2)	$\frac{7}{+3}$ (2)	$\frac{1}{+5}$ (1)	$\frac{8}{+6}$ (2)	$\frac{9}{+9}$ (2)	$\frac{1}{+5}$ (1)	12 (22)
$\frac{12}{+8}$ (2)	$\frac{10}{+5}$ (2)	$\frac{3}{+7}$ (2)	$\frac{6}{+8}$ (2)	$\frac{9}{+3}$ (2)	$\frac{9}{+0}$ (1)	$\frac{8}{+1}$ (1)	12 (34)
$\frac{4}{+3}$ (1)	$\frac{8}{+8}$ (2)	$\frac{9}{+7}$ (2)	$\frac{12}{+2}$ (2)	$\frac{3}{+6}$ (1)	$\frac{1}{+1}$ (1)	$\frac{10}{+2}$ (2)	11 (45)
$\frac{2}{+7}$ (1)	$\frac{1}{+8}$ (1)	$\frac{9}{+2}$ (2)	$\frac{0}{+5}$ (1)	$\frac{0}{+3}$ (1)	$\frac{9}{+1}$ (2)	$\frac{6}{+4}$ (2)	10 (55)
$\frac{9}{+9}$ (2)	$\frac{7}{+8}$ (2)	$\frac{4}{+9}$ (2)	$\frac{6}{+10}$ (2)	$\frac{4}{+10}$ (2)	$\frac{6}{+0}$ (1)	$\frac{9}{+5}$ (2)	13 (88)



ERASE



PLAY



Solve the problem below:

$$5 \overline{)428}$$

- A 85 R 3
- B 85
- C 3
- D 3 R 85



ERASE



PLAY



Allen decided to give away 25 of his old books.
He gave each of his 5 little brothers the same number of books.
How many books did he give each little brother?

books

Step 4: How to Graph Scores

- Graphing student scores is vital.
- Graphs provide teachers with a straightforward way to:
 - Review a student's progress.
 - Monitor the appropriateness of student goals.
 - Judge the adequacy of student progress.
 - Compare and contrast successful and unsuccessful instructional aspects of a student's program.

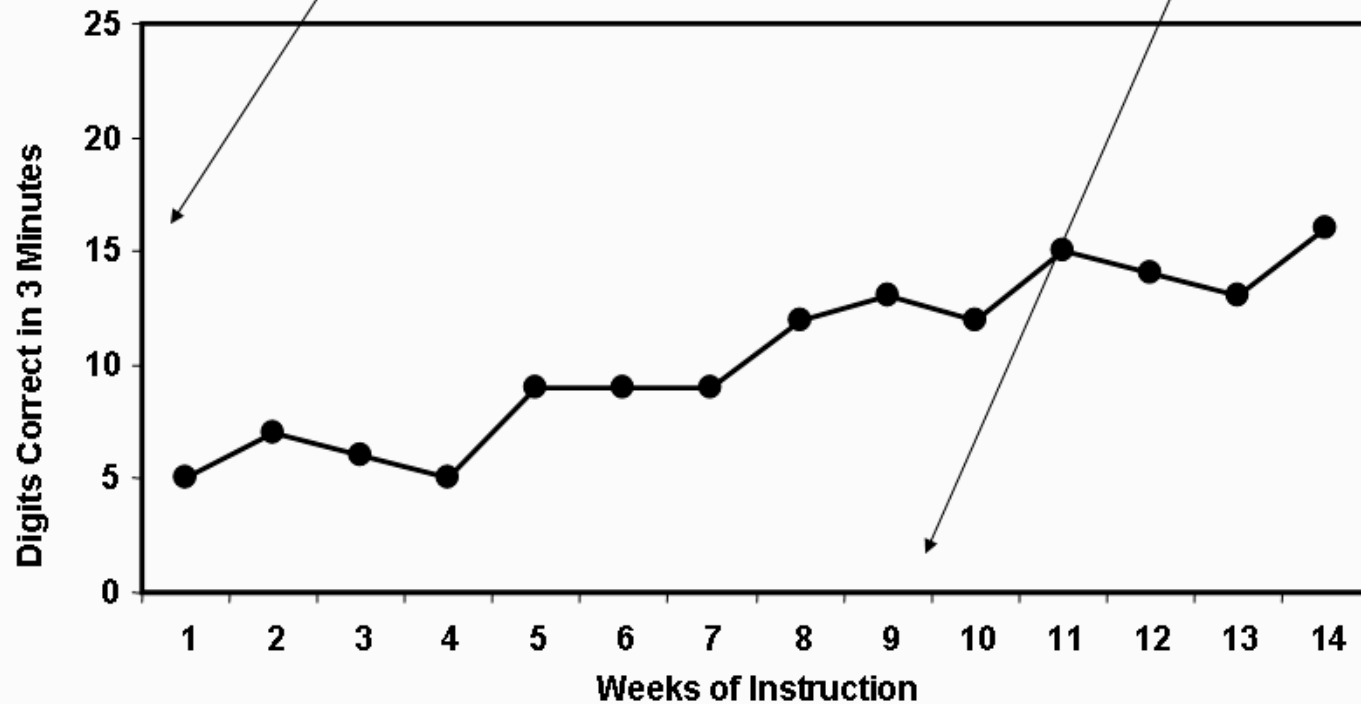
Graphing Scores

- Teachers can use computer graphing programs.
- Teachers can create their own graphs.
 - Create template for student graph.
 - Use same template for every student in the classroom.
 - Vertical axis shows the range of student scores.
 - Horizontal axis shows the number of weeks.

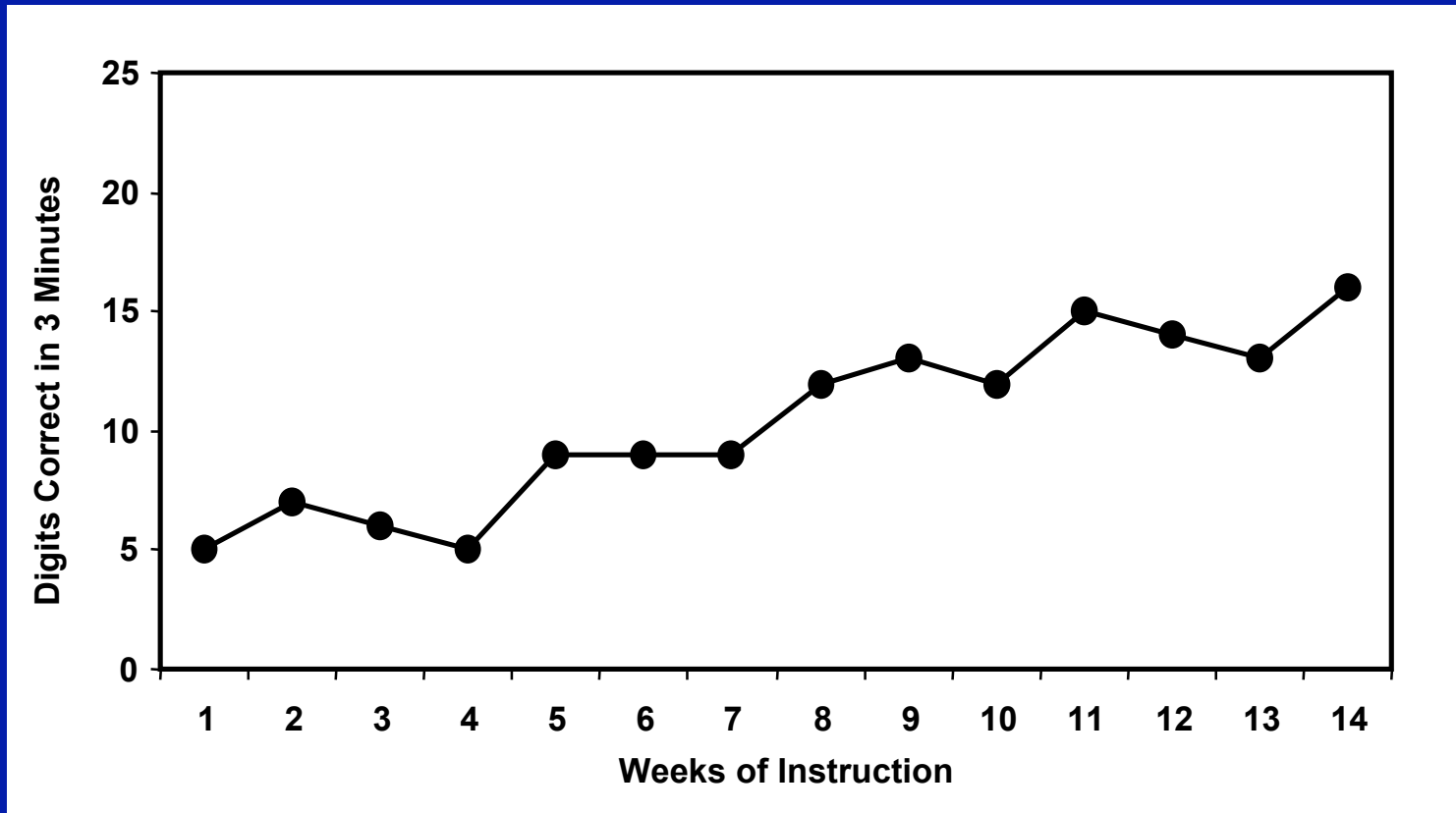
Progress Monitoring Graph

The vertical axis is labeled with the range of student scores.

The horizontal axis is labeled with the number of instructional weeks.



Progress Monitoring Graph



Student scores are plotted on graph and a line is drawn between scores.

Step 5: How to Set Ambitious Goals

- Once a few scores have been graphed, the teacher decides on an end-of-year performance goal for each student.
- Three options for making performance goals:
 - End-of-Year Benchmarking
 - National Norms
 - Intra-Individual Framework

Goal Setting: End-of-Year Benchmarks

End-of-Year Benchmarking

- For typically developing students, a table of benchmarks can be used to find the CBM end-of-year performance goal.

End-of-Year Benchmarks

Grade	Probe	Maximum score	Benchmark
Kindergarten	Data not yet available		
First	Computation	30	20 digits
First	Data not yet available		
Second	Computation	45	20 digits
Second	Concepts and Applications	32	20 blanks
Third	Computation	45	30 digits
Third	Concepts and Applications	47	30 blanks
Fourth	Computation	70	40 digits
Fourth	Concepts and Applications	42	30 blanks
Fifth	Computation	80	30 digits
Fifth	Concepts and Applications	32	15 blanks
Sixth	Computation	105	35 digits
Sixth	Concepts and Applications	35	15 blanks

Goal Setting: National Norms

National Norms

- For typically developing students, a table of median rates of weekly increase can be used to find the end-of-year performance goal.

Grade	Computation: Digits	Concepts and Applications: Blanks
First	0.35	n/a
Second	0.30	0.40
Third	0.30	0.60
Fourth	0.70	0.70
Fifth	0.70	0.70
Sixth	0.40	0.70

Weekly Growth Example

National Norms

- Median performance: 14
- Fourth Grade
Computation Norm: 0.70
- Multiply by weeks left:
 $16 \times 0.70 = 11.2$
- Add to median:
 $11.2 + 14 = 25.2$
- The end-of-year
performance goal is 25

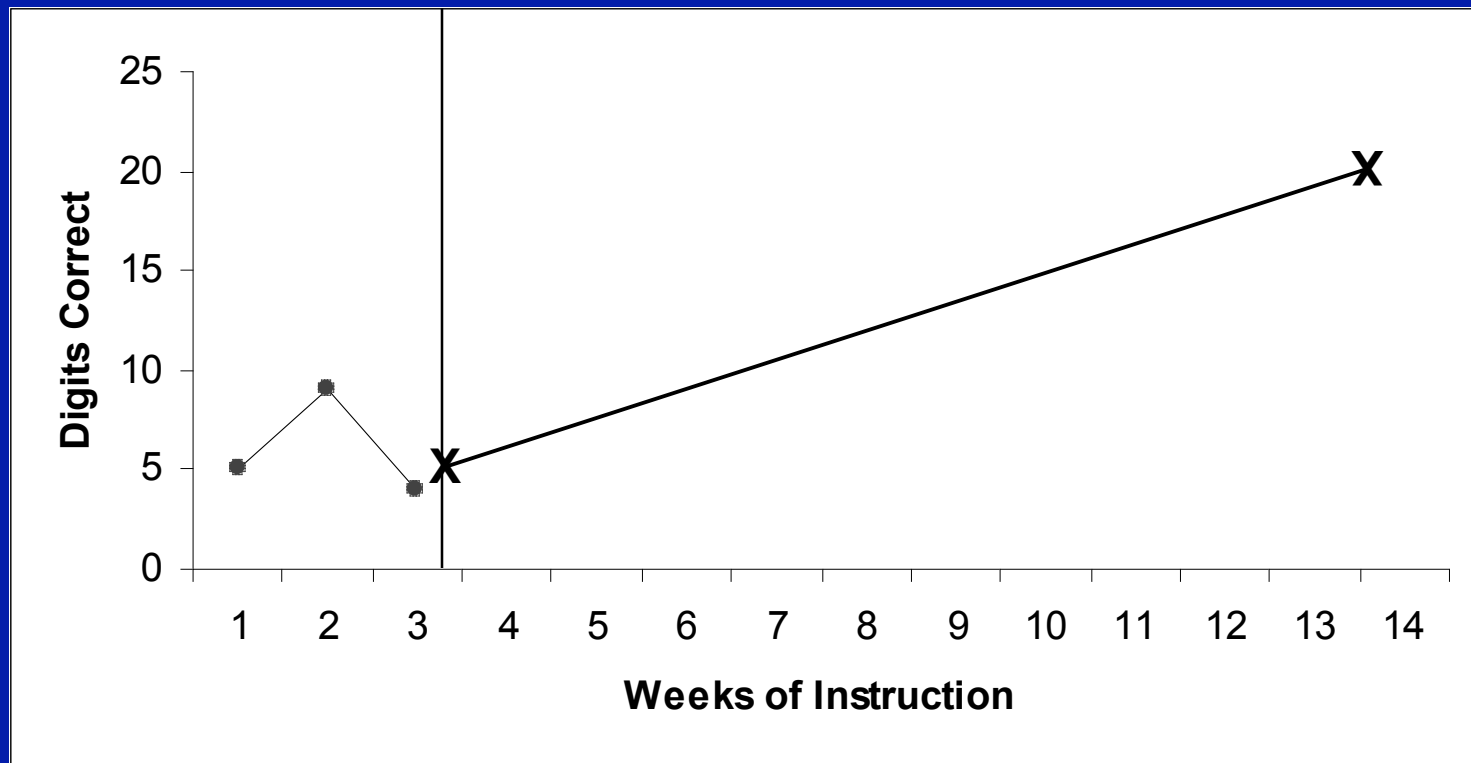
Grade	Computation: Digits	Concepts and Applications: Blanks
First	0.35	n/a
Second	0.30	0.40
Third	0.30	0.60
Fourth	0.70	0.70
Fifth	0.70	0.70
Sixth	0.40	0.70

Drawing the Goal Line

- Once the end-of-year performance goal has been created, the goal is marked on the student graph with an X.
- A goal line is drawn between the median of the student's baseline scores and the X.

Goal Plotted on a Graph

Drawing a Goal Line



Goal line: The desired path of measured behavior to reach the performance goal over time.

Sample IEP Goal

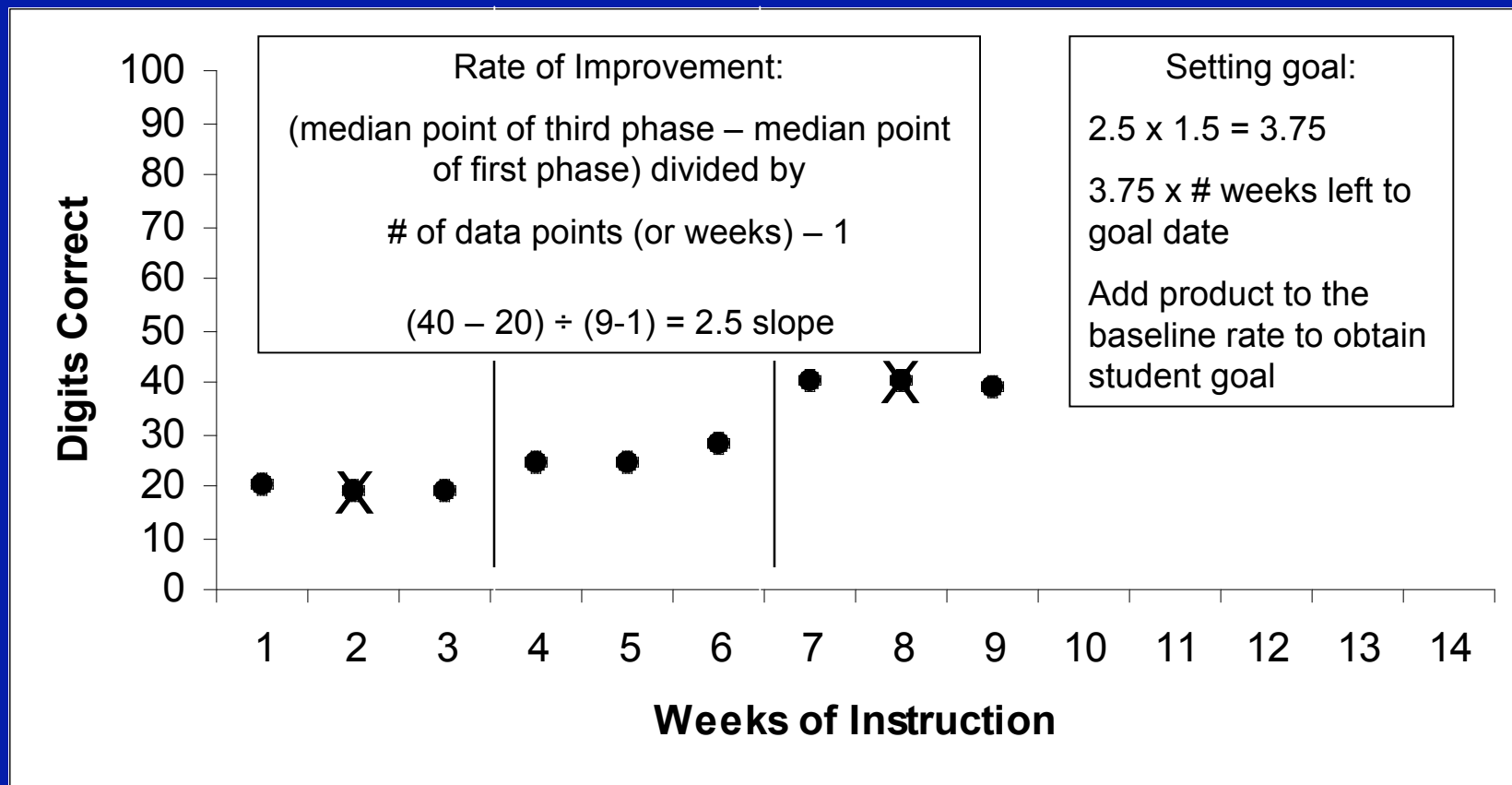
- Consider median baseline performance
- Calculate number of instructional weeks until end of year (or IEP date)
- Figure normative growth for weekly slope and/or consider end-of-year benchmarks
- **Given 25 computational problems at the sixth-grade level, Pamela will write 75 digits correct in 6 minutes by __ (insert date) __.**
(i.e., end of year, or 36 instructional weeks from baseline to goal date)

Goal Setting: Intra-Individual Framework

Intra-Individual Framework

- Weekly rate of improvement (slope) is calculated using at least eight data points.
- Rate of improvement is multiplied by 1.5.
- Product is multiplied by the number of weeks until the end of the school year.
- Amount of increase is added to the student's baseline rate to produce end-of-year performance goal.

Quick Way to Calculate Weekly Rate of Improvement



Step 6: How to Apply Decision Rules to Graphed Scores to Know When to Revise Programs and to Increase Goals

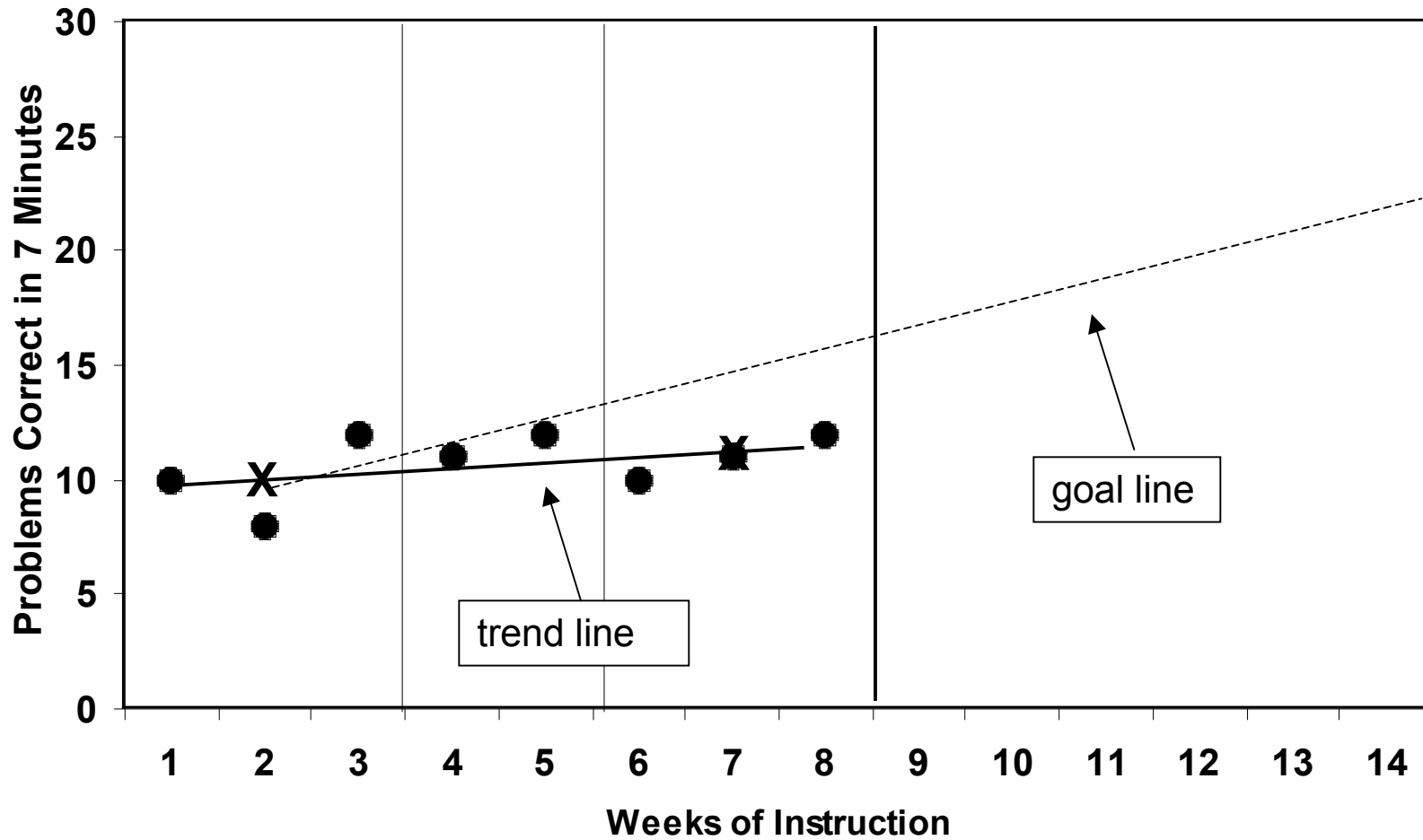
- After drawing the goal line, teachers evaluate student progress periodically.
- After seven to eight CBM scores, teachers draw a trend line to represent actual student progress.
- Teachers compare the student's trend line to the goal line.
- The trend line can be drawn using the Tukey method.

Trend line: A line drawn in the data path to indicate the direction (trend) of the observed behavior.

Standard Decision Rules: Trend Line

- After trend lines have been drawn, teachers use graphs to evaluate student progress and formulate instructional decisions.
 - If the trend line is steeper than the goal line, the end-of-year performance goal needs to be increased.
 - If the trend line is flatter than the goal line, the student's instructional program needs to be revised.
 - If the trend line and goal line are fairly equal, no changes need to be made.

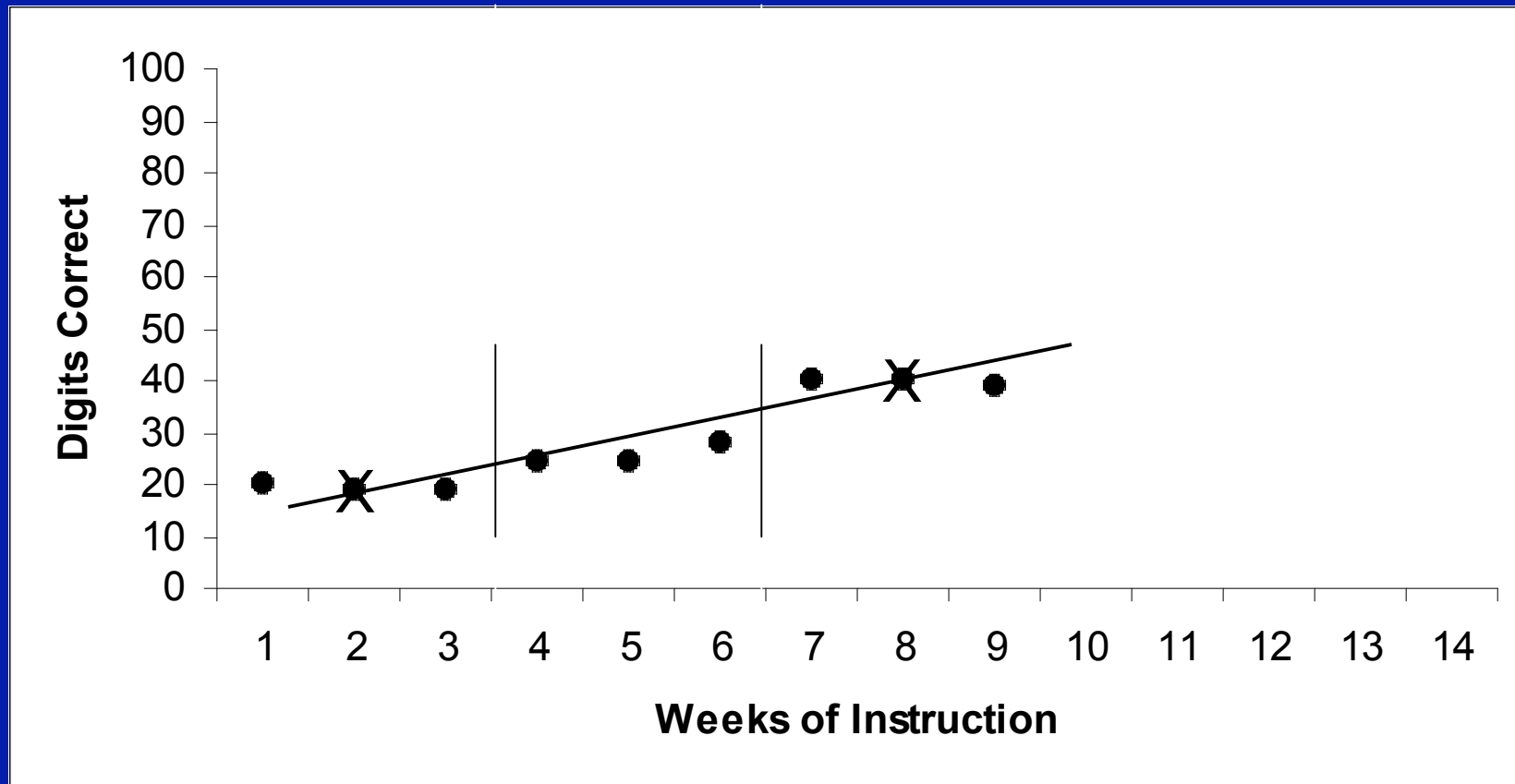
What Is the Data-Based Decision?



Drawing a Trend Line

- Tukey Method
 - Graphed scores are divided into three fairly equal groups.
 - Vertical lines are drawn to separate the groups.
- In the first and third groups:
 - Find the intersection between the median score and the median point in time.
 - Mark with an X.
 - Draw a line between the first group X and third group X.
 - This line is the trend line.

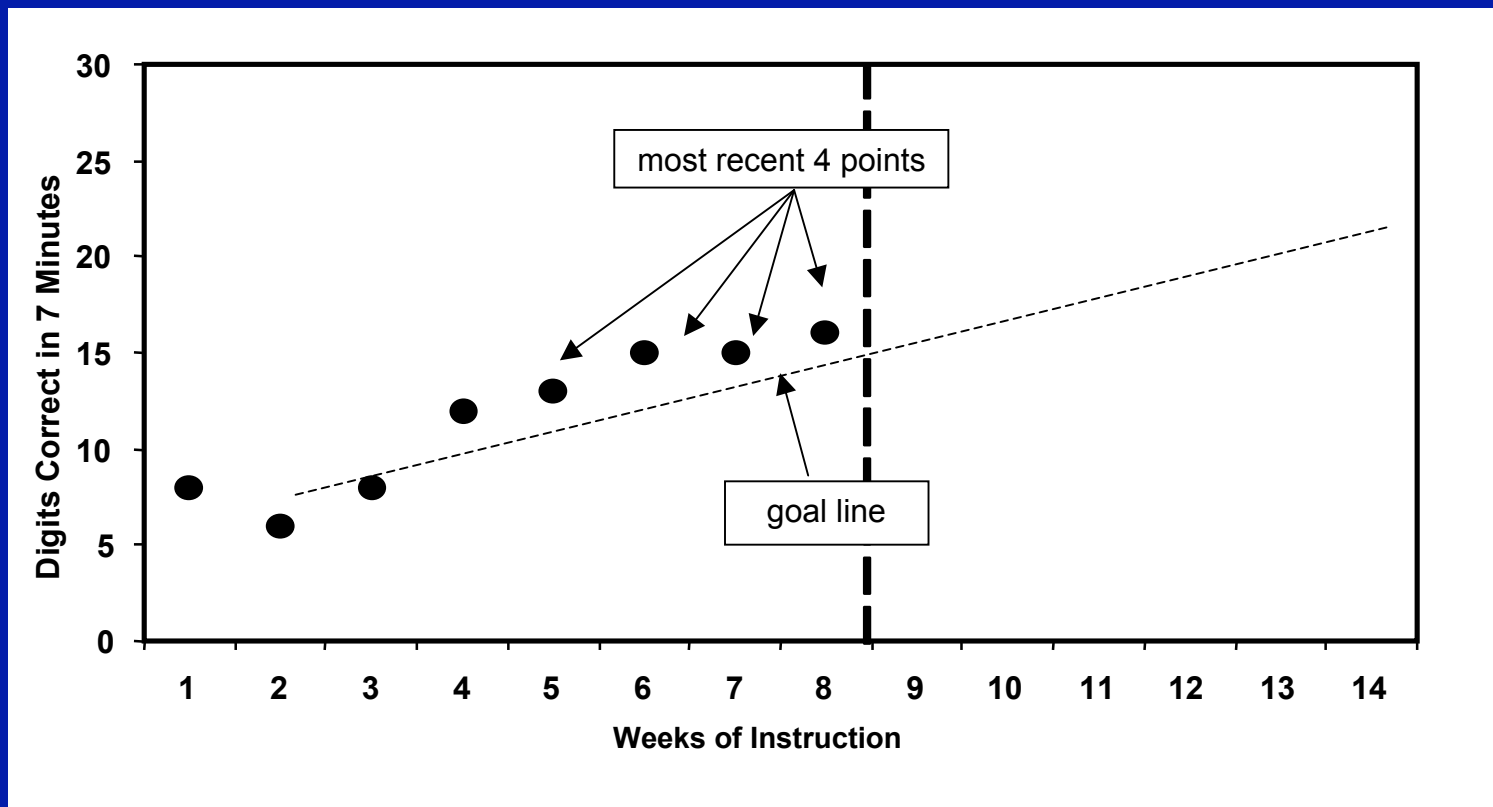
Drawing a Trend Line Using the Tukey Method



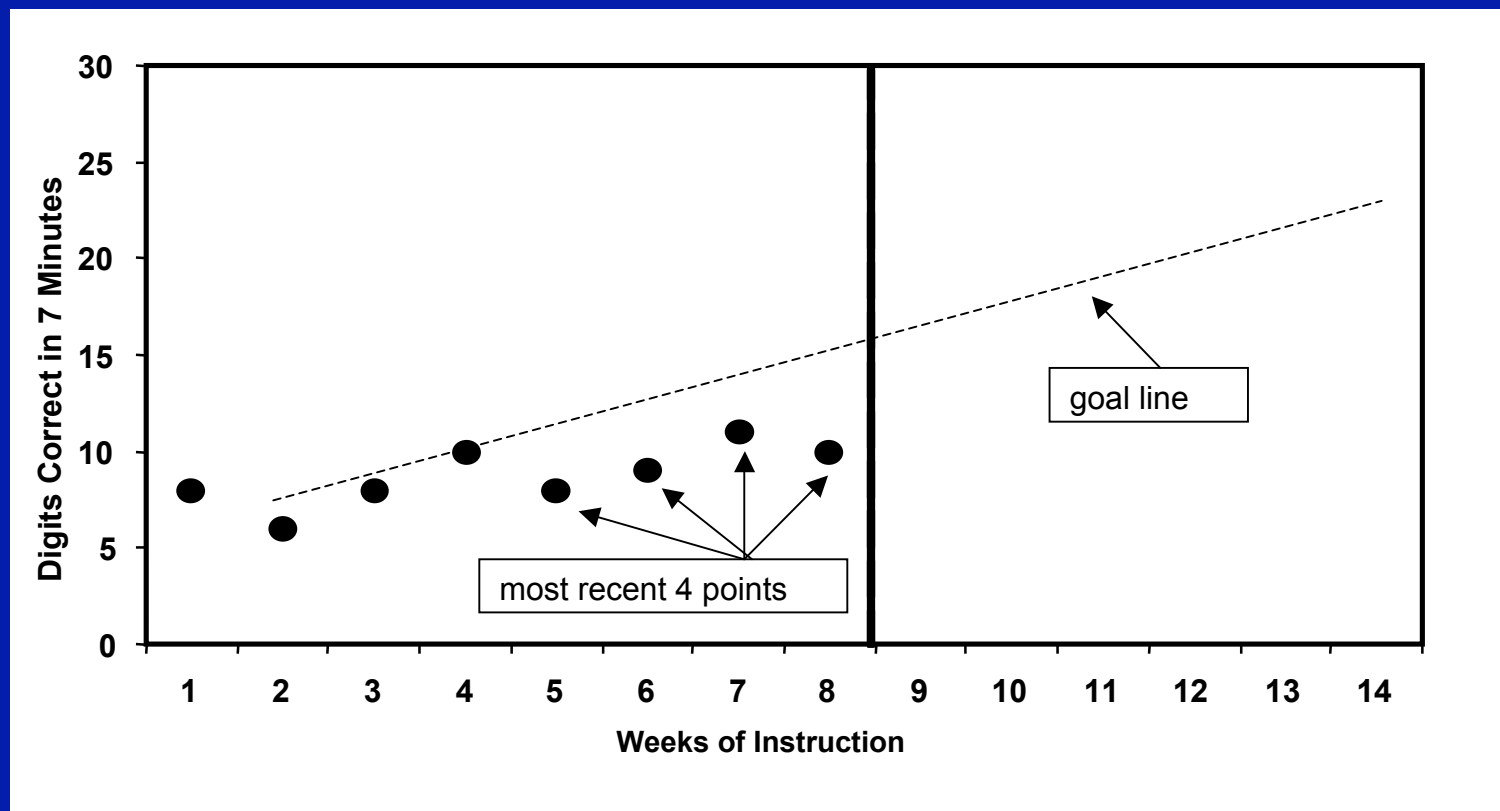
Standard Decision Rules: Using the 4-Point Rule

- If at least 3 weeks of instruction have occurred and at least six data points have been collected, examine the four most recent consecutive points:
 - If all four most recent scores fall above the goal line, the end-of-year performance goal needs to be increased.
 - If all four most recent scores fall below the goal line, the student's instructional program needs to be revised.
 - If these four most recent scores fall both above and below the goal line, continue collecting data (until the 4-point rule can be used or a trend line can be drawn).

What Is the Data-Based Decision?



What Is the Data-Based Decision?



Computer- or Web-Based Progress Monitoring Systems

- A variety of CBM computer- or Web-based management programs are available.
- Each program provides its own versions of probes.
- Systems create graphs and aid teachers with performance goals and instructional decisions:
 - individual raw scores
 - graphs of the low-, middle-, and high-performing students
 - class averages
 - list of students who may need additional intervention
 - skill mastery information
- Various types of programs are available for varying fees.

In Summary, Curriculum-Based Measurement:

- Provides an easy and quick method for gathering student progress information.
- Allows teachers to analyze student progress and adjust student goals and instructional programs.
- Allows for comparison of individual student data with peers in the classroom, with school/district data, or with national norms.

NCSPM Tools Chart

- Interested in learning about Progress Monitoring tools that will work for you?
- Visit www.studentprogress.org and click on the Tools tab.
- All of the tools on the chart have been reviewed by the Technical Review Committee and have been evaluated against rigorous criteria.
- Click on each tool's name for vendor-provided information about features and pricing.