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Math-Curriculum Based Measurement (M-CBM)

Training Session Overview of Math Computation CBM (M-CBM) and Math Facts Probes for use with AIMSweb

Part of a training series developed to accompany the ***AIMSweb Improvement System*.**

Purpose is to provide the background information and data collection procedures necessary to administer and score Reading Comprehension- Curriculum Based Measurement (MAZE).

Designed to accompany:

- *Administration and Scoring of M-CBM Workbook*
- Standard Math-CBM probes
- AIMSweb Web-based Software

Training Session Goals

Brief review of M-CBM

- Its Purpose.
- Its Origins.

Learn how to administer and score through applied practice.

Why Assess Math Computation via CBM:

- **Computational skills are critical for math success.**
- **Using the algorithms for computation assist in building math skills needed to master higher-level math proficiency.**
- **Broad-range achievement tests in math cover many skills, but few of each type.**

Why assess Math via M-CBM Cont'd:

- **Many broad-range math achievement tests have only one form.**
  - Difficult to monitor progress repeatedly over time
  - Hard to determine where student's skill-levels start/stop
- **M-CBM provides many, narrow-band tests (many items across a grade-level or problem type)**
- **Simple to administer, score, chart progress.**

M-CBM Methodology:

- **Research has shown that having students write answers to computational problems for 2-4 minutes is a reliable, valid means of assessing student progress in math computation.**
- **Appropriate for average-performing students in Grades 1-6**
- **Appropriate for students enrolled above Grade 6, but are performing below this level.**

M-CBM Methodology:

- Based on expected math computation skills for Grades 1-6:
- Benchmarking: M-CBM (10 probes available per grade level)
- Strategic Monitoring: M-CBM (40 probes available per grade level)

- Progress Monitoring: M-CBM (40 probes available per grade level)

or:

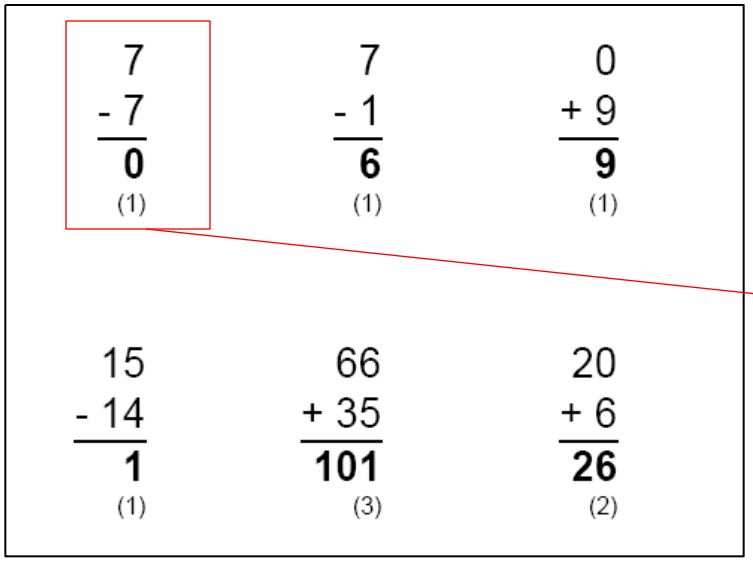
- Progress Monitoring: Math Facts: (40 probes available per grade level)

- Each probe contains 2 pages of computations, (front/back)
- Students complete probes under standardized conditions (See specific directions)

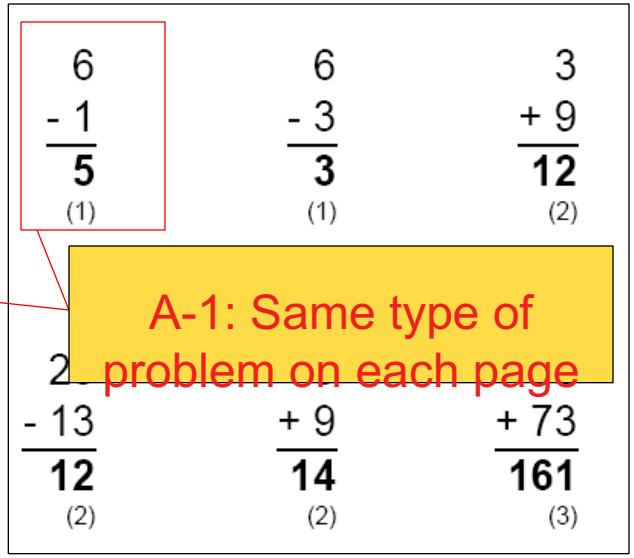
- Administer individually, small group, or class-wide:
  (Grade 1-3 = 2 minutes)
- (Grade 4-6 = 4 minutes)

M-CBM Grade-Level Probes

- All M-CBM Grade-level type probes level are based on Prototype Probe
- Prototype Probes: All types of problems contained within the scope of a grade-level skill spectrum are consistent in order/sequence across all probes for each specified grade level.



Grade 2: Probe 1



Grade 2: Probe 2

M-CBM Sample 2nd Grade Probe (Student Copy)

AIMSweb® M-CBM Computation Benchmark #3 - Grade 2

Student Name: _____ Grade: _____ Teacher Name: _____

7 - 1	9 - 1	4 + 9	5 - 5	6 + 0	1 + 5
20 - 12	34 + 74	4 + 13	61 + 67	9 4 + 4	6 + 9
9 - 1	47 - 45	6 + 3	97 + 81	65 + 57	79 + 25

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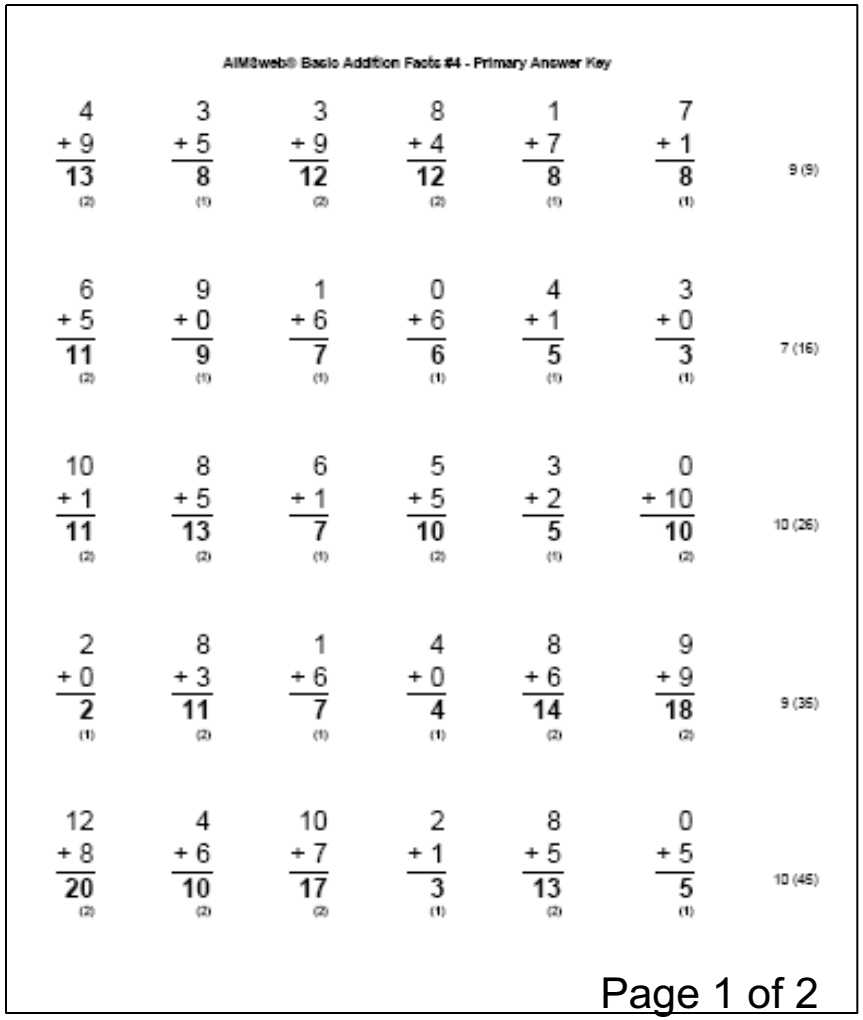
M-CBM Sample 2nd Grade Probe (Teacher's Answer Key)

AIMSweb® M-CBM Computation Benchmark #3 - Grade 2 Answer Key

7 - 1 **6** (1)	9 - 1 **8** (1)	4 + 9 **13** (2)	5 - 5 **0** (1)	6 + 0 **6** (1)	1 + 5 **6** (1)	7 (7)
20 - 12 **8** (1)	34 + 74 **108** (3)	4 + 13 **17** (2)	61 + 67 **128** (3)	9 4 + 4 **17** (2)	6 + 9 **15** (2)	13 (20)
9 - 1 **8** (1)	47 - 45 **2** (1)	6 + 3 **9** (1)	97 + 81 **178** (3)	65 + 57 **122** (3)	79 + 25 **104** (3)	12 (32)

M-CBM Math Facts: Addition



AIM8web® Basic Addition Facts #4 - Primary Answer Key

4 + 9 = 13 (2)	3 + 5 = 8 (1)	3 + 9 = 12 (2)	8 + 4 = 12 (2)	1 + 7 = 8 (1)	7 + 1 = 8 (1)	9 (9)
6 + 5 = 11 (2)	9 + 0 = 9 (1)	1 + 6 = 7 (1)	0 + 6 = 6 (1)	4 + 1 = 5 (1)	3 + 0 = 3 (1)	7 (16)
10 + 1 = 11 (2)	8 + 5 = 13 (2)	6 + 1 = 7 (1)	5 + 5 = 10 (2)	3 + 2 = 5 (1)	0 + 10 = 10 (2)	10 (26)
2 + 0 = 2 (1)	8 + 3 = 11 (2)	1 + 6 = 7 (1)	4 + 0 = 4 (1)	8 + 6 = 14 (2)	9 + 9 = 18 (2)	9 (35)
12 + 8 = 20 (2)	4 + 6 = 10 (2)	10 + 7 = 17 (2)	2 + 1 = 3 (1)	8 + 5 = 13 (2)	0 + 5 = 5 (1)	10 (45)

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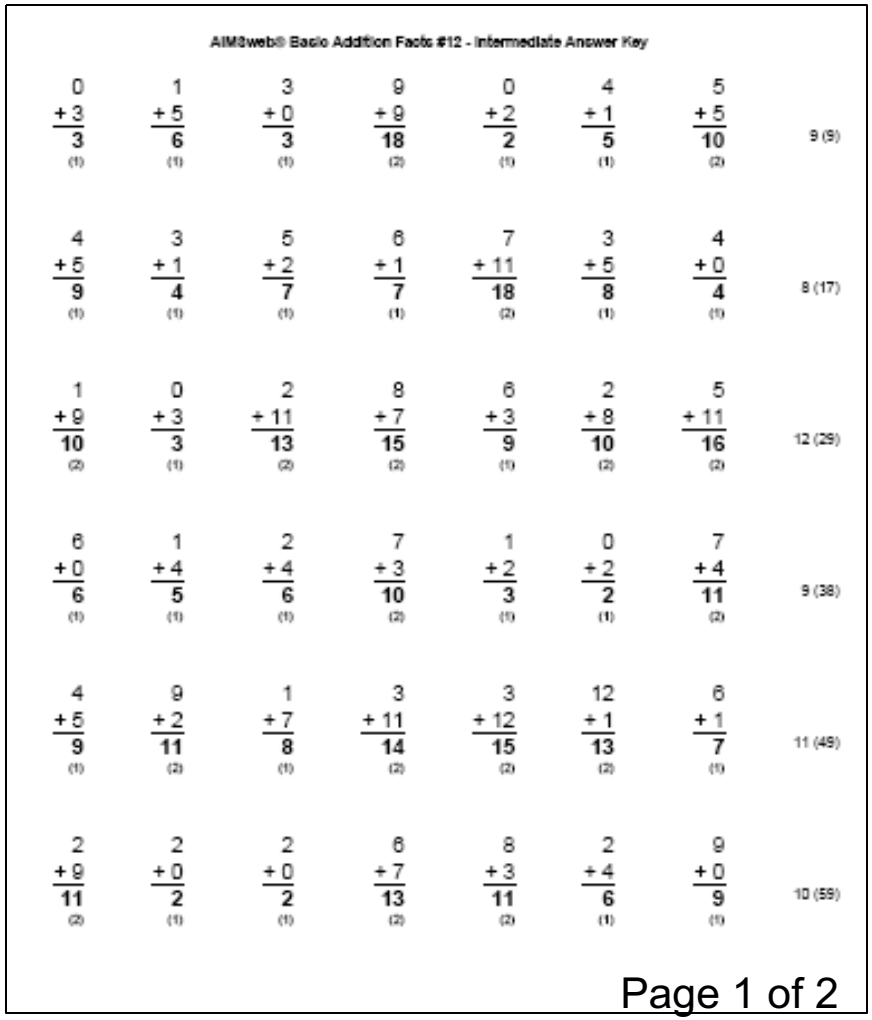

AIM8web® Basic Addition Facts #12 - Intermediate Answer Key

0 + 3 = 3 (1)	1 + 5 = 6 (1)	3 + 0 = 3 (1)	9 + 9 = 18 (2)	0 + 2 = 2 (1)	4 + 1 = 5 (1)	5 + 5 = 10 (2)	9 (9)
4 + 5 = 9 (1)	3 + 1 = 4 (1)	5 + 2 = 7 (1)	6 + 1 = 7 (1)	7 + 11 = 18 (2)	3 + 5 = 8 (1)	4 + 0 = 4 (1)	8 (17)
1 + 9 = 10 (2)	0 + 3 = 3 (1)	2 + 11 = 13 (2)	8 + 7 = 15 (2)	6 + 3 = 9 (1)	2 + 8 = 10 (2)	5 + 11 = 16 (2)	12 (29)
6 + 0 = 6 (1)	1 + 4 = 5 (1)	2 + 4 = 6 (1)	7 + 3 = 10 (2)	1 + 2 = 3 (1)	0 + 2 = 2 (1)	7 + 4 = 11 (2)	9 (38)
4 + 5 = 9 (1)	9 + 2 = 11 (2)	1 + 7 = 8 (1)	3 + 11 = 14 (2)	3 + 12 = 15 (2)	12 + 1 = 13 (2)	6 + 1 = 7 (1)	11 (49)
2 + 9 = 11 (2)	2 + 0 = 2 (1)	2 + 0 = 2 (1)	6 + 7 = 13 (2)	8 + 3 = 11 (2)	2 + 4 = 6 (1)	9 + 0 = 9 (1)	10 (59)

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Grades 1-3 (fewer problems)

Grades 4-6 (more problems)

M-CBM Math Facts: Probe options

- Addition (+) facts
- Subtraction (-) facts
- Addition/Subtraction (+ / -) mixed facts

- Multiplication facts (x)
- Division facts (÷)
- Multiplication/Division mixed facts (x / ÷)

- Addition/Subtraction/Multiplication/Division mixed facts (+, -, x, ÷)

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AIMSweb Math Fact Probes

Used primarily for instructional planning and short-term progress monitoring

AIMSweb Math Fact Probes

(p.8 in M-CBM Workbook)

Content of Facts Probe	Timing	Test Arrangements	What is Scored
Addition Fact Families 0-12 (0+0 to 12+12)	2 minutes	Individual, small or large group	Correct digits in answer
Subtraction Fact Families 0-12 (0-0 to 24-12)	2 minutes	Individual, small or large group	Correct digits in answer
Addition and Subtraction Fact Families 0-12	2 minutes	Individual, small or large group	Correct digits in answer
Multiplication Fact Families 0-12 (0+0 to 12+12)	2 minutes	Individual, small or large group	Correct digits in answer
Division Fact Families 0-12 (0/0 to 144/12)	2 minutes	Individual, small or large group	Correct digits in answer
Multiplication and Division Fact Families 0-12	2 minutes	Individual, small or large group	Correct digits in answer
Addition, Subtraction, Multiplication and Division Fact Families 0-12	2 minutes	Individual, small or large group	Correct digits in answer

M-CBM Administration Setup

Things you will need:

- **Appropriate M-CBM or Math Facts Probes**
- **Students need pencils.**
- **Stopwatch or timers**

Setting up the testing room:

- **Large group: Monitor carefully to ensure students are not skipping and X-ing out items**
- **Small group/individual: Monitor similarly.**
- **If students are off task, cue with statements such as:**

- ***"Try to do EACH problem."***

or

"You can do this kind of problem so don't skip."

M-CBM Directions for Administration

Different M-CBM's require different instructions (4 versions):

Standard Math-Curriculum Based Measurement Probe instructions:

- Grades 1-3: Page 13 of workbook
- Grades 4-6: Page 14 of workbook

Single-Skill Math Fact Probes—Standard Directions:

- Grades 1-6 probes: Page 15 of workbook

Multiple Skill Math Fact Probes—Standard Directions:

- Grades 1-6 probes: Page 16 of workbook

M-CBM After Testing—Scoring

What is Correct?

- **Grades 1-6: Score Digits Correct (DC).**
  Each digit correct in any answer = 1 point.

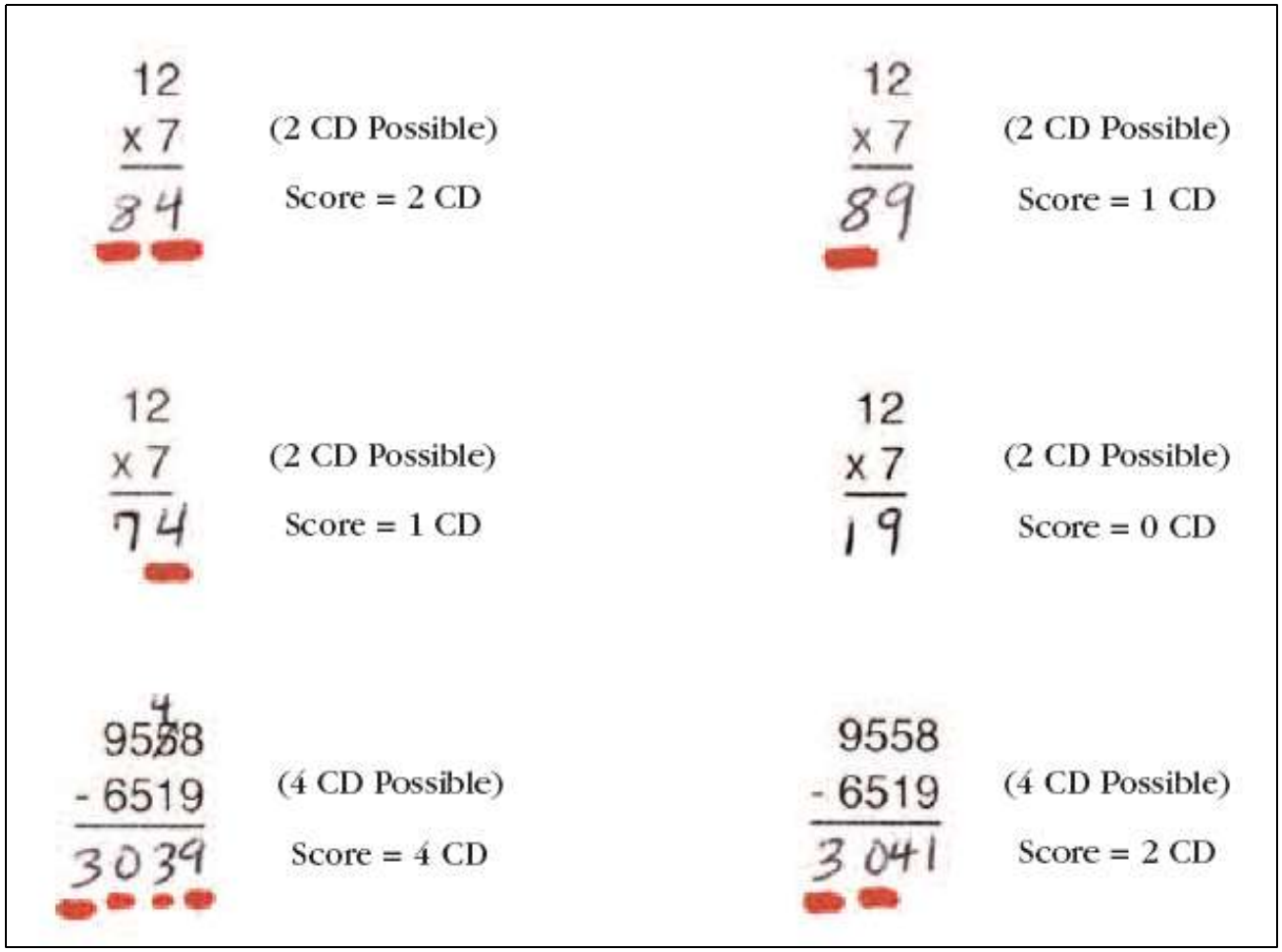
If problem is "X"-ed out, ignore X and score anyway.

- **Use Answer Key for quick scoring.**

- **See Page 18 of workbook for examples.**

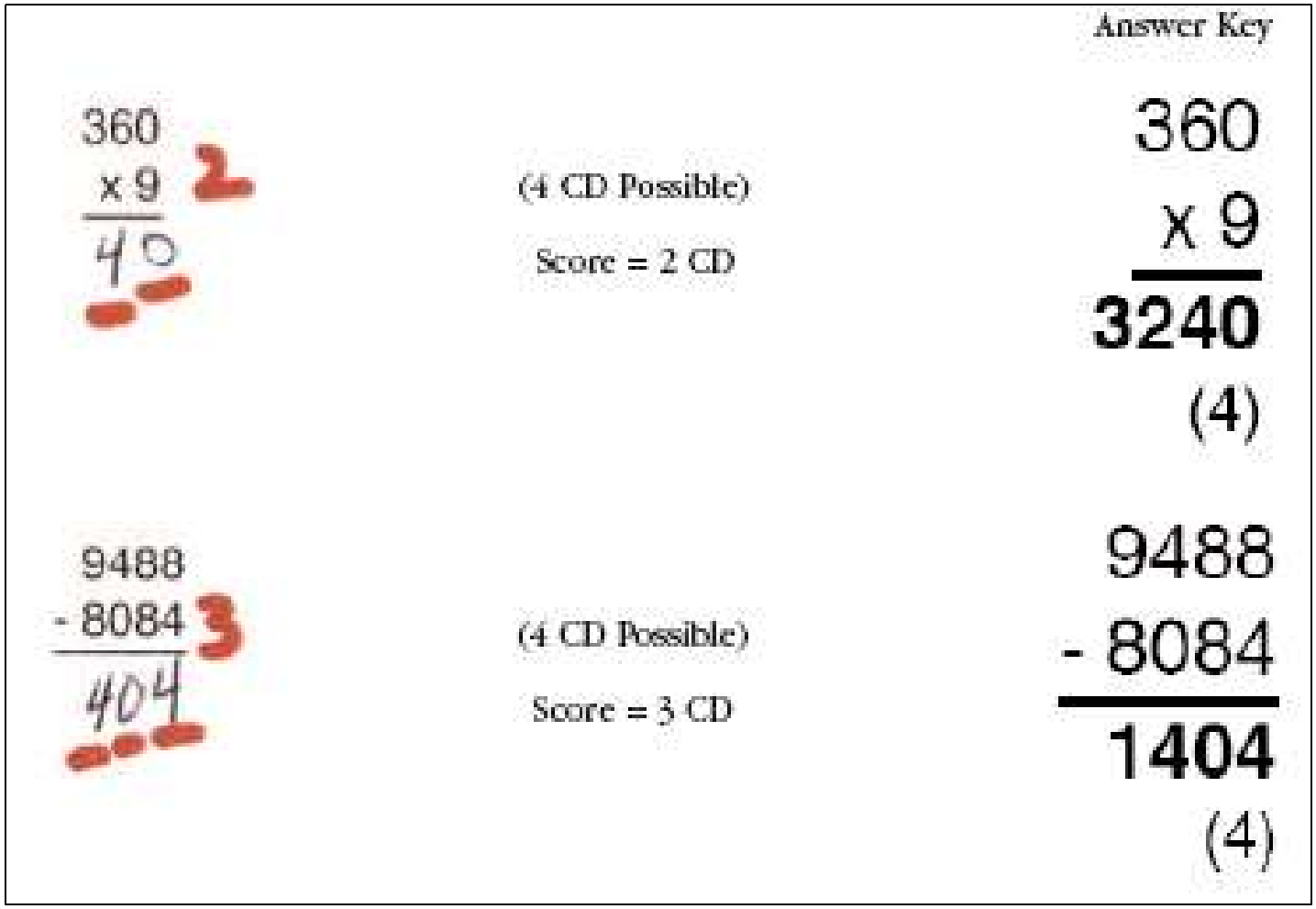
M-CBM: How to score Correct Digits (CD)

Correct Digits - Each correct digit that a student writes is marked with an underline and counted.



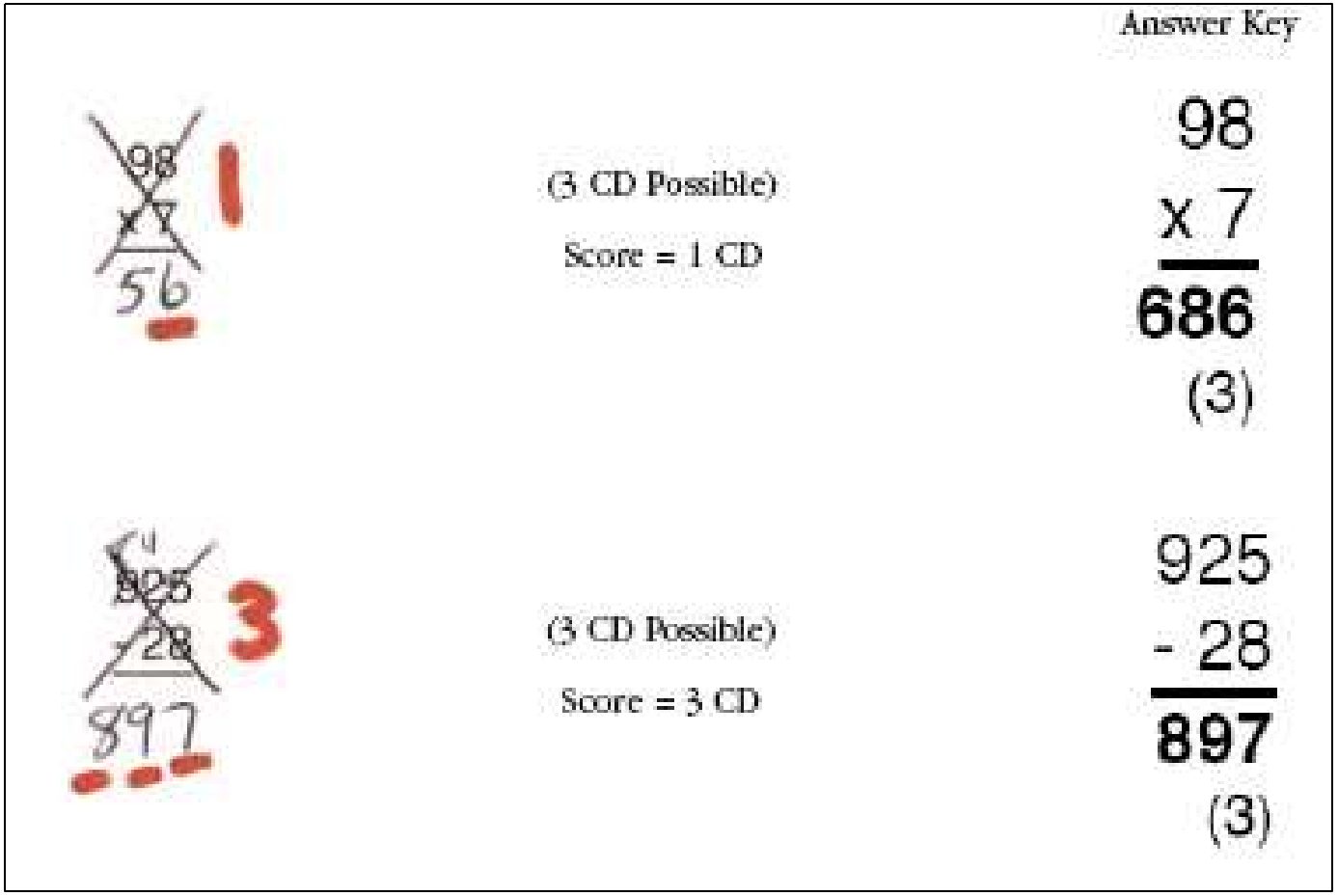
M-CBM: How to score Incomplete Problems

Incomplete Problems - Sometimes students don't finish a problem. Score for the number of correct digits that are written.



M-CBM: How to score "X"-ed out problems

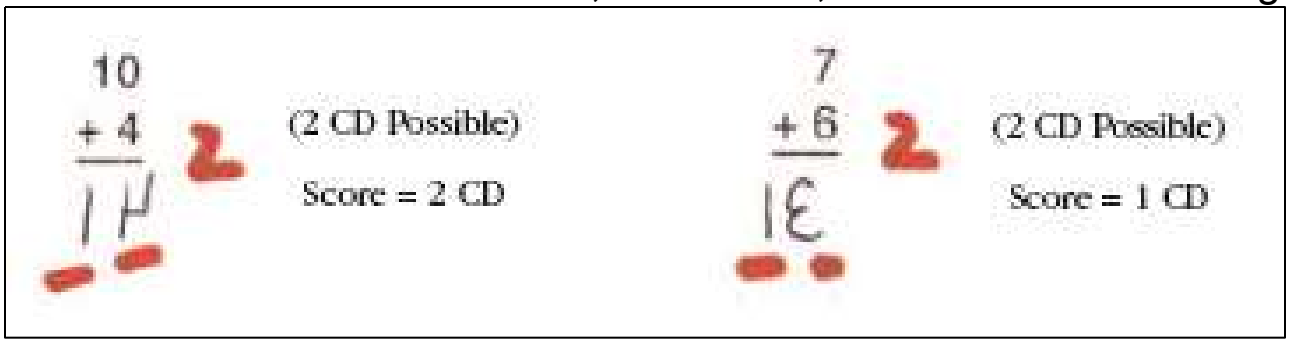
X-ed Out Problems - Sometimes students start a problem and then cross it out. Sometimes students go back and write answers for problems they have crossed out. Ignore the X and score what you see.



M-CBM: How to score reversals

Legibility and Reversed or Rotated Numbers - Sometimes trying to figure out what number the student wrote can be challenging, especially with younger students or older students with mathematics achievement problems. To make scoring efficient and reliable, we recommend attention to three rules:

1. If it is difficult to determine what the number is at all, count it wrong.
2. If the reversed number is obvious, but correct, count it as a correct digit.



3. If the numbers 6 or 9 are potentially rotated and the digit is currently incorrect, count it as an incorrect digit.

How to score M-CBM: Critical Processes (CP) Scoring

Scoring Rules for Answer and Critical Processes:

When students' Grade 5 or Grade 6 M-CBM probes are scored for the number of CDs in the **answer only and critical processes**, the examiner uses the answer key that details which digits are to be counted. Each problem has an "assigned CD value" based on what AIMSweb believes is the most conventional method of solving the computational problem. Compare how the same multi-step multiplication problem would be scored using the different methods.

Use error patterns diagnostically

Answer Only:

630
x 48
30240
(5)

Answer Only

5 CD Possible

Answer & Critical Processes:

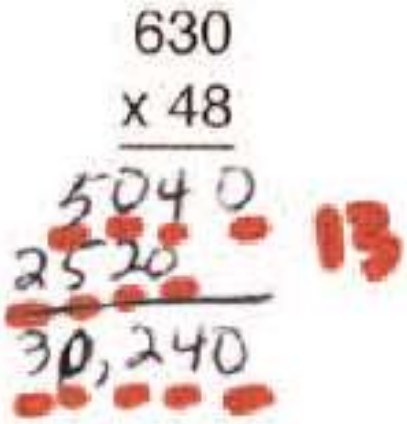
630
x 48
5040
2520
30240
(13)

Answer and Critical Processes

13 CD Possible

How to score M-CBM: Critical Processes (CP) Scoring *(Correct vs. Incorrect)*

Should the student solve the problem correctly, their score would be 13 CD.



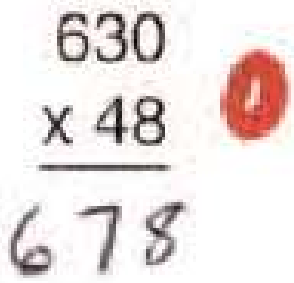
(13 CD Possible)

Score = 13 CD

Answer Key

630
x 48
5040
2520
30240
(13)

Should the student solve the problem and not write any of the CD, the score would be 0 CD.



(13 CD Possible)

Score = 0 CD

(p. 21 in M-CBM Workbook)

Although you don't need to count every digit written in a correct answer, it is important to write the number of CDs awarded to the problem next to the answer.

How to score M-CBM: Critical Processes (CP) Scoring *(Work not shown)*

If the answer is correct as shown below-left, their score is the number of CDs possible shown in the answer key.

630
x 48
30240 13

(13 CD Possible)

Score = 13 CD

Answer Key

630
x 48
5040
2520
30240
(13)

If they do *not* show their work and the answer is incorrect, the examiner can only "score what they see" as shown below.

630
x 48 3
30348

(13 CD Possible)

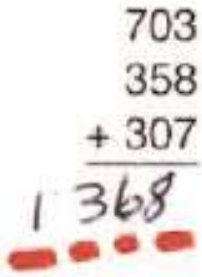
Score = 3 CD

(p. 21 in M-CBM Workbook)

How to score M-CBM: Answer & Critical Processes (CP) Scoring *(Alignment)*

When students' answers are not aligned correctly according to place value:

If the answer is correct, ignore the alignment problem and count the digits as correct as shown below.



(4 CD Possible)

Score = 4 CD

Answer Key

703
358
+ 307
1368
(4)

If the answer is incorrect, count the digits as they appear in approximate place value as shown below, even if a place value error may seem obvious.

(13 CD Possible)

Score = 4 CD

Answer Key

630
x 48
5040
2520
30240
(13)

(p. 22 in M-CBM Workbook)

The End