



Progress Monitoring: Scoring Mathematics Computation Probes

Est. Time: 30 Minutes

Objective

To learn how to use two different methods to score mathematics progress monitoring computation probes.

Overview

Progress monitoring is a type of formative assessment in which student learning is evaluated on a regular basis to provide useful feedback about performance to both students and teachers. Though there are a number of methods for monitoring a student's progress, the most widely used is **general outcome measurement**, sometimes referred to as **curriculum-based measurement (CBM)**. Progress monitoring consists of the frequent administration (e.g., once per month, every two weeks) of brief probes or tests, which includes sample items from every skill taught across the academic year. In mathematics, teachers should administer two types of probes:

- Computation probes — Measures students' procedural knowledge (e.g., the ability to add fractions)
- Concepts and applications probes — Assesses conceptual understanding of mathematics or students' ability to apply mathematics knowledge (e.g., to make change from a purchase)

Scoring

Following their administration, the probes are scored. Concepts and applications probes are scored according to the number of correct responses given. Computation probes can be scored either according to the number of digits correct or by the number of correctly answered problems. To ensure that the probes are easily comparable between classes and throughout the school, teachers should make certain to score them in the same way. Below is an example of a computation probe scored using both methods. For illustrative purposes, we chose an elementary probe; however, these scoring methods can be used for middle and high school mathematics probes, as well. (Note: An example of a scored concepts and application probe has not been included because its scoring method—the number of correct responses—is the same as that in the computation probe below.)



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Number of Correctly Answered Problems

Number of Digits Correct

Name: Rashid Date: 10/27/XXXX

X $\begin{array}{r} 64 \\ + 57 \\ \hline 111 \end{array}$	X $\begin{array}{r} 82 \\ + 99 \\ \hline 171 \end{array}$	X $\begin{array}{r} 99 \\ - 71 \\ \hline 28 \end{array}$	4. $\begin{array}{r} 24 \\ \times 7 \\ \hline 1428 \end{array}$
X $\begin{array}{r} 49 \\ + 33 \\ \hline 712 \end{array}$	6. $\begin{array}{r} 15r2 \\ 5 \overline{)77} \\ \underline{5} \\ 27 \\ \underline{25} \\ 2 \end{array}$	7. $\begin{array}{r} 66 \\ + 23 \\ \hline 89 \end{array}$	8. $\begin{array}{r} 12 \\ \times 4 \\ \hline 48 \end{array}$
9. $\begin{array}{r} 59 \\ - 36 \\ \hline 23 \end{array}$	X 10. $\begin{array}{r} 15 \\ \times 7 \\ \hline 735 \end{array}$	11. $\begin{array}{r} 12r5 \\ 7 \overline{)89} \\ \underline{7} \\ 19 \\ \underline{14} \\ 5 \end{array}$	12. $\begin{array}{r} 65 \\ - 33 \\ \hline 32 \end{array}$
13. $\begin{array}{r} 24 \\ 4 \overline{)96} \\ \underline{8} \\ 16 \\ \underline{16} \\ 0 \end{array}$	14. $\begin{array}{r} 34 \\ - 13 \\ \hline 21 \end{array}$	15. $\begin{array}{r} 71 \\ \times 3 \\ \hline 213 \end{array}$	16. $\begin{array}{r} 4r5 \\ 7 \overline{)33} \\ \underline{28} \\ 5 \end{array}$

Name: Rashid Date: 10/27/XXXX

1. $\begin{array}{r} 64 \\ + 57 \\ \hline 121 \end{array}$	2. $\begin{array}{r} 82 \\ + 99 \\ \hline 171 \end{array}$	3. $\begin{array}{r} 99 \\ - 71 \\ \hline 28 \end{array}$	4. $\begin{array}{r} 24 \\ \times 7 \\ \hline 1428 \end{array}$
5. $\begin{array}{r} 49 \\ + 33 \\ \hline 712 \end{array}$	6. $\begin{array}{r} 15r2 \\ 5 \overline{)77} \\ \underline{5} \\ 27 \\ \underline{25} \\ 2 \end{array}$	7. $\begin{array}{r} 66 \\ + 23 \\ \hline 89 \end{array}$	8. $\begin{array}{r} 12 \\ \times 4 \\ \hline 48 \end{array}$
9. $\begin{array}{r} 59 \\ - 36 \\ \hline 23 \end{array}$	10. $\begin{array}{r} 15 \\ \times 7 \\ \hline 785 \end{array}$	11. $\begin{array}{r} 12r5 \\ 7 \overline{)89} \\ \underline{7} \\ 19 \\ \underline{14} \\ 5 \end{array}$	12. $\begin{array}{r} 65 \\ - 33 \\ \hline 32 \end{array}$
13. $\begin{array}{r} 24 \\ 4 \overline{)96} \\ \underline{8} \\ 16 \\ \underline{16} \\ 0 \end{array}$	14. $\begin{array}{r} 34 \\ - 13 \\ \hline 21 \end{array}$	15. $\begin{array}{r} 71 \\ \times 3 \\ \hline 213 \end{array}$	16. $\begin{array}{r} 4r5 \\ 7 \overline{)33} \\ \underline{28} \\ 5 \end{array}$

As you can see, the different methods of scoring yield very different results. If we score this probe using the number of correctly answered problems, the score is 11 (problems correct). Conversely, were we to use the number of digits correct, the score would be 32.

FYI

- Typically, addition, subtraction, and multiplication problems should be scored from RIGHT to LEFT. By scoring from right to left, the teacher will be sure to note incorrect digits in the place-value columns. However, division problems should be scored LEFT to RIGHT.
- If the student does not use a traditional algorithm to arrive at a solution, but instead uses a partial algorithm (e.g., partial sums, partial products) then addition, subtraction, multiplication, and division problems should be scored from LEFT to RIGHT.



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Activity

(Note: An alternate form of the elementary mathematics probe above has been used to simplify the scoring process for illustrative purposes.)

1. Score the probe below according to the *number of correctly answered problems*.

Name: <u>Rashid</u>		Date: <u>11/12/XXXX</u>	
1.	$\begin{array}{r} 21 \\ \times 8 \\ \hline 168 \end{array}$	2.	$\begin{array}{r} 83 \\ - 62 \\ \hline 21 \end{array}$
3.	$\begin{array}{r} 21 \\ 4 \overline{)84} \\ \underline{8} \\ 4 \\ 4 \\ \hline 0 \end{array}$	4.	$\begin{array}{r} 23 \\ + 48 \\ \hline 611 \end{array}$
5.	$\begin{array}{r} 47 \\ + 61 \\ \hline 108 \end{array}$	6.	$\begin{array}{r} 37 \\ \times 5 \\ \hline 1535 \end{array}$
7.	$\begin{array}{r} 79 \\ - 43 \\ \hline 36 \end{array}$	8.	$\begin{array}{r} 12 \\ 5 \overline{)60} \\ \underline{5} \\ 10 \\ 10 \\ \hline 0 \end{array}$
9.	$\begin{array}{r} 57 \\ - 25 \\ \hline 32 \end{array}$	10.	$\begin{array}{r} 64 \\ \times 4 \\ \hline 2416 \end{array}$
11.	$\begin{array}{r} 14r4 \\ 6 \overline{)88} \\ \underline{6} \\ 28 \\ 24 \\ \hline 4 \end{array}$	12.	$\begin{array}{r} 88 \\ + 33 \\ \hline 1111 \end{array}$
13.	$\begin{array}{r} 13r5 \\ 7 \overline{)96} \\ \underline{7} \\ 26 \\ 21 \\ \hline 5 \end{array}$	14.	$\begin{array}{r} 89 \\ - 24 \\ \hline 65 \end{array}$
15.	$\begin{array}{r} 34 \\ + 37 \\ \hline 611 \end{array}$	16.	$\begin{array}{r} 41 \\ \times 9 \\ \hline 369 \end{array}$



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Activity

2. Score the probe below according to the *number of digits correct*.

Name: Rashid Date: 11/12/XXXX

1. $\begin{array}{r} 21 \\ \times 8 \\ \hline 168 \end{array}$	2. $\begin{array}{r} 83 \\ - 62 \\ \hline 21 \end{array}$	3. $\begin{array}{r} 21 \\ 4 \overline{)84} \\ \underline{8} \\ 4 \\ 4 \\ \hline 0 \end{array}$	4. $\begin{array}{r} 23 \\ + 48 \\ \hline 611 \end{array}$
5. $\begin{array}{r} 47 \\ + 61 \\ \hline 108 \end{array}$	6. $\begin{array}{r} 37 \\ \times 5 \\ \hline 1535 \end{array}$	7. $\begin{array}{r} 79 \\ - 43 \\ \hline 36 \end{array}$	8. $\begin{array}{r} 12 \\ 5 \overline{)60} \\ \underline{5} \\ 10 \\ 10 \\ \hline 0 \end{array}$
9. $\begin{array}{r} 57 \\ - 25 \\ \hline 32 \end{array}$	10. $\begin{array}{r} 64 \\ \times 4 \\ \hline 2416 \end{array}$	11. $\begin{array}{r} 14r4 \\ 6 \overline{)88} \\ \underline{6} \\ 28 \\ 24 \\ \hline 4 \end{array}$	12. $\begin{array}{r} 88 \\ + 33 \\ \hline 1111 \end{array}$
13. $\begin{array}{r} 13r5 \\ 7 \overline{)96} \\ \underline{7} \\ 26 \\ 21 \\ \hline 5 \end{array}$	14. $\begin{array}{r} 89 \\ - 24 \\ \hline 65 \end{array}$	15. $\begin{array}{r} 34 \\ + 37 \\ \hline 611 \end{array}$	16. $\begin{array}{r} 41 \\ \times 9 \\ \hline 369 \end{array}$



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Questions/Discussion Topics

1. Compare the results of the probes that you scored using the two different methods. Now, discuss some of the potential advantages and disadvantages of each scoring method.
2. Compare Rashid's first probe with his second probe that you just scored. Do you notice any pattern in the types of errors he is making?