

Error Pattern Activities and Handouts

Each exercise listed here could be done with the group, perhaps splitting them into smaller groups and having each subgroup do a different problem and then report back to the group with their analysis of the error being made. Each discussion should include a description of the error the student is making, a list of steps to employ to assist the student in learning how to do the problem correctly, and an explanation of how to avoid repeating the same error. The solutions for each of these error patterns are found in the *Error Pattern Exercise Solutions* materials. The entire list could be distributed as a handout.

Determine the error pattern the student made in each of the following problems:

$$46.325 + 234.56 + 13.567 + 2.7964 = 111.312$$

$$3.579 + 54.32 + 684.2 = 158.53$$

$$35.234 + 67.531 = 102.765$$

$$4.8 + 32 + 0.79 + 7.8 = 23.7$$

Could this error have been caused because the students are not accustomed to seeing addition problems written horizontally?

Determine the error pattern the student made in each of the following problems:

$$46.325 + 234.56 + 13.567 + 2.7964 = 0.000000111312$$

$$3.579 + 54.32 + 684.2 = 0.015853$$

$$35.234 + 67.531 = 0.102765$$

$$4.8 + 32 + 0.79 + 7.8 = 0.0237$$

Determine the error pattern the student made in each of the following problems:

$$\begin{array}{r} 4567 \\ + 7968 \\ \hline 14635 \end{array}$$

$$\begin{array}{r} 389 \\ + 964 \\ \hline 1453 \end{array}$$

$$\begin{array}{r} 2468 \\ + 3517 \\ \hline 7085 \end{array}$$

$$\begin{array}{r} 3421 \\ + 2476 \\ \hline 5897 \end{array}$$

Each of the following set of problems involving whole numbers is done incorrectly the same way. Determine the error pattern, solve the 4th and 5th problems using that pattern, describe it in your own words, indicate possible reasons for the error, and describe ways to help the student overcome the misconception (for more information on error patterns, see Ashlock, 2005).

a.

$$\begin{array}{r} 23 \\ + 4 \\ \hline 9 \end{array} \quad \begin{array}{r} 64 \\ + 5 \\ \hline 15 \end{array} \quad \begin{array}{r} 27 \\ + 4 \\ \hline 13 \end{array} \quad \begin{array}{r} 82 \\ + 9 \\ \hline \end{array} \quad \begin{array}{r} 34 \\ + 6 \\ \hline \end{array}$$

b.

$$\begin{array}{r} 38 \\ + 47 \\ \hline 715 \end{array} \quad \begin{array}{r} 52 \\ + 83 \\ \hline 135 \end{array} \quad \begin{array}{r} 27 \\ + 39 \\ \hline 516 \end{array} \quad \begin{array}{r} 64 \\ + 59 \\ \hline \end{array} \quad \begin{array}{r} 81 \\ + 28 \\ \hline \end{array}$$

c.

$$1 \qquad 4$$

Error Pattern Activities and Handouts

$\begin{array}{r} 342 \\ + 631 \\ \hline 973 \end{array}$	$\begin{array}{r} 74 \\ + 43 \\ \hline 18 \end{array}$	$\begin{array}{r} 385 \\ + 667 \\ \hline \end{array}$	$\begin{array}{r} 282 \\ + 723 \\ \hline \end{array}$	$\begin{array}{r} 279 \\ + 836 \\ \hline \end{array}$
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d.

$\begin{array}{r} 32 \\ - 16 \\ \hline 16 \end{array}$	$\begin{array}{r} 245 \\ - 137 \\ \hline 112 \end{array}$	$\begin{array}{r} 524 \\ - 298 \\ \hline 374 \end{array}$	$\begin{array}{r} 458 \\ - 372 \\ \hline \end{array}$	$\begin{array}{r} 241 \\ - 96 \\ \hline \end{array}$
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e.

$\begin{array}{r} 578 \\ + 179 \\ \hline 647 \end{array}$	$\begin{array}{r} 479 \\ + 578 \\ \hline 947 \end{array}$	$\begin{array}{r} 554 \\ + 256 \\ \hline 700 \end{array}$	$\begin{array}{r} 195 \\ + 589 \\ \hline \end{array}$	$\begin{array}{r} 355 \\ + 256 \\ \hline \end{array}$
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f.

$\begin{array}{r} 817 \\ \cancel{19} \cancel{7} \\ - 43 \\ \hline 1414 \end{array}$	$\begin{array}{r} 616 \\ \cancel{17} \cancel{6} \\ - 23 \\ \hline 1413 \end{array}$	$\begin{array}{r} 714 \\ \cancel{38} \cancel{4} \\ - 59 \\ \hline 325 \end{array}$	$\begin{array}{r} 273 \\ - 51 \\ \hline \end{array}$	$\begin{array}{r} 385 \\ - 39 \\ \hline \end{array}$
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g.

$\begin{array}{r} 8 \\ \cancel{19}1 \\ - 43 \\ \hline 443 \end{array}$	$\begin{array}{r} 2 \\ \cancel{3}25 \\ - 151 \\ \hline 174 \end{array}$	$\begin{array}{r} 51216 \\ \cancel{7} \cancel{2} \cancel{6} \\ - 349 \\ \hline 287 \end{array}$	$\begin{array}{r} 638 \\ - 349 \\ \hline \end{array}$	$\begin{array}{r} 638 \\ - 129 \\ \hline \end{array}$
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h.

$\begin{array}{r} 2 \\ 23 \\ + 39 \\ \hline 71 \end{array}$	$\begin{array}{r} 53 \\ + 26 \\ \hline 79 \end{array}$	$\begin{array}{r} 3 \\ 28 \\ + 45 \\ \hline 91 \end{array}$	$\begin{array}{r} 45 \\ + 35 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ + 36 \\ \hline \end{array}$
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i.

$\begin{array}{r} 313 \\ \times 4 \\ \hline 1252 \end{array}$	$\begin{array}{r} 210 \\ \times 15 \\ \hline 210 \end{array}$	$\begin{array}{r} 524 \\ \times 34 \\ \hline 1576 \end{array}$	$\begin{array}{r} 135 \\ \times 463 \\ \hline \end{array}$	$\begin{array}{r} 345 \\ \times 36 \\ \hline \end{array}$
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j.

$\begin{array}{r} 32 \\ \times 3 \\ \hline 6 \\ \underline{9} \\ 15 \end{array}$	$\begin{array}{r} 42 \\ \times 4 \\ \hline 8 \\ \underline{16} \\ 24 \end{array}$	$\begin{array}{r} 31 \\ \times 8 \\ \hline 8 \\ \underline{24} \\ 32 \end{array}$	$\begin{array}{r} 23 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 42 \\ \times 3 \\ \hline \end{array}$
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k.

$\begin{array}{r} 34 \\ \times 2 \\ \hline 68 \end{array}$	$\begin{array}{r} 27 \\ \times 4 \\ \hline 88 \end{array}$	$\begin{array}{r} 18 \\ \times 3 \\ \hline 34 \end{array}$	$\begin{array}{r} 24 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ \times 3 \\ \hline \end{array}$
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Error Pattern Activities and Handouts

l. $\begin{array}{r} 27 \\ \times 5 \\ \hline 255 \end{array}$ $\begin{array}{r} 43 \\ \times 6 \\ \hline 308 \end{array}$ $\begin{array}{r} 62 \\ \times 7 \\ \hline 494 \end{array}$ $\begin{array}{r} 38 \\ \times 6 \\ \hline \end{array}$ $\begin{array}{r} 28 \\ \times 5 \\ \hline \end{array}$

m. $2 \overline{)176}$ $4 \overline{)824}$ $3 \overline{)713}$ $3 \overline{)639}$ $4 \overline{)518}$

n. $\begin{array}{r} 33 \\ 3 \overline{)99} \\ \underline{90} \\ 9 \\ \underline{9} \\ 0 \end{array}$ $\begin{array}{r} 25 \\ 7 \overline{)364} \\ \underline{35} \\ 14 \\ \underline{14} \\ 0 \end{array}$ $\begin{array}{r} 78 \\ 8 \overline{)696} \\ \underline{64} \\ 56 \\ \underline{56} \\ 0 \end{array}$ $4 \overline{)192}$ $6 \overline{)528}$

o. $\frac{4}{5} + \frac{1}{2} = \frac{5}{7}$ $\frac{1}{4} + \frac{1}{4} = \frac{2}{8}$ $\frac{1}{6} + \frac{3}{4} = \frac{4}{10}$ $\frac{3}{4} + \frac{1}{3} =$ $\frac{5}{8} + \frac{1}{9} =$

p. $\begin{array}{r} \frac{1}{2} = \frac{2}{4} \\ + \frac{1}{4} = \frac{2}{4} \\ \hline \frac{4}{4} = 1 \end{array}$ $\begin{array}{r} \frac{1}{3} = \frac{3}{9} \\ + \frac{2}{3} = \frac{6}{9} \\ \hline \frac{9}{9} = 1 \end{array}$ $\begin{array}{r} \frac{3}{5} = \frac{6}{10} \\ + \frac{1}{10} = \frac{2}{10} \\ \hline \frac{8}{10} = \frac{2}{5} \end{array}$ $\frac{1}{7} =$ $\frac{1}{5} =$
 $\begin{array}{r} + \frac{3}{14} = \\ \hline \end{array}$ $\begin{array}{r} + \frac{5}{6} = \\ \hline \end{array}$

q. $\begin{array}{r} 3\frac{1}{2} = \frac{3}{2} \\ + 2\frac{1}{3} = \frac{2}{3} \\ \hline \frac{5}{6} \end{array}$ $\begin{array}{r} 2\frac{2}{5} = \frac{4}{5} \\ + 8\frac{2}{10} = \frac{2}{10} \\ \hline \frac{6}{10} \end{array}$ $\begin{array}{r} 8\frac{1}{4} = \frac{5}{4} \\ + 7\frac{3}{5} = \frac{12}{5} \\ \hline \frac{17}{20} \end{array}$ $\begin{array}{r} 5\frac{1}{6} \\ + 3\frac{3}{12} \\ \hline \end{array}$ $\begin{array}{r} 3\frac{1}{5} \\ + 2\frac{3}{6} \\ \hline \end{array}$

r. $\frac{1}{8} \times 1 = \frac{1}{8}$ $\frac{2}{3} \times 3 = \frac{6}{9}$ $\frac{4}{5} \times 2 = \frac{8}{10}$ $\frac{3}{9} \times 4 =$ $\frac{1}{9} \times 5 =$

s. $\frac{2}{3} \times \frac{3}{5} = 90$ $\frac{1}{5} \times \frac{3}{4} = 60$ $\frac{2}{3} \times \frac{2}{5} = 60$ $\frac{3}{6} \times \frac{1}{7} =$ $\frac{5}{6} \times \frac{3}{7} =$

t. 0.3 0.4 0.4 0.5 0.9

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$$\begin{array}{r} \underline{+0.9} \\ 0.12 \end{array} \quad \begin{array}{r} \underline{+0.7} \\ 0.11 \end{array} \quad \begin{array}{r} \underline{+0.8} \\ 0.32 \end{array} \quad \begin{array}{r} \underline{+0.6} \\ \end{array} \quad \begin{array}{r} \underline{+0.9} \\ \end{array}$$

u.

$$\begin{array}{r} 3.69 \\ - 2.8 \\ \hline 1.1 \end{array} \quad \begin{array}{r} 5.32 \\ - 4.3 \\ \hline 1.9 \end{array} \quad \begin{array}{r} 7.18 \\ - 3.5 \\ \hline 4.3 \end{array} \quad \begin{array}{r} 8.97 \\ - 5.8 \\ \hline \end{array} \quad \begin{array}{r} 6.34 \\ - 4.3 \\ \hline \end{array}$$

v.

$$\begin{array}{r} 4 \ 12 \\ \cancel{5.32} \\ - 0.08 \\ \hline 4.34 \end{array} \quad \begin{array}{r} 6 \ 12 \\ \cancel{7.22} \\ - 0.06 \\ \hline 6.26 \end{array} \quad \begin{array}{r} 4 \ 14 \\ \cancel{5.34} \\ - 0.09 \\ \hline 4.35 \end{array} \quad \begin{array}{r} 7.67 \\ - 0.08 \\ \hline \end{array} \quad \begin{array}{r} 9.85 \\ - 0.08 \\ \hline \end{array}$$

w.

$$\begin{array}{r} 2.7 \\ \times 0.6 \\ \hline 16.2 \end{array} \quad \begin{array}{r} 8.36 \\ \times 6 \\ \hline 50.16 \end{array} \quad \begin{array}{r} 0.765 \\ \times 2.6 \\ \hline 4590 \\ \underline{1530} \\ 19.890 \end{array} \quad \begin{array}{r} 4.64 \\ \times 0.5 \\ \hline \end{array} \quad \begin{array}{r} 5.65 \\ \times 7 \\ \hline \end{array}$$

x.

$$\begin{array}{r} 0.543 \\ 6 \overline{) 3.27} \\ \underline{30} \\ 27 \\ \underline{24} \\ 3 \end{array} \quad \begin{array}{r} 9.062 \\ 4 \overline{) 36.26} \\ \underline{36} \\ 26 \\ \underline{24} \\ 2 \end{array} \quad \begin{array}{r} 27.871 \\ 3 \overline{) 83.62} \\ \underline{6} \\ 23 \\ \underline{21} \\ 26 \\ \underline{24} \\ 22 \\ \underline{21} \\ 1 \end{array} \quad \begin{array}{r} 4 \overline{) 78.65} \\ \hline \end{array} \quad \begin{array}{r} 5 \overline{) 78.68} \\ \hline \end{array}$$

Reference

Ashlock, R. (2005). *Error Patterns in Computation*. Upper Saddle River, NJ: Prentice Hall.

Brumbaugh, D. K., Ortiz, E., Gresham, G. (2006). *Teaching Middle School Mathematics*. Mahwah, NJ: Lawrence Erlbaum Associates.

Brumbaugh, D., Rock, D. (2001). *Scratch Your Brain C1*. Pacific Grove, CA: Critical Thinking Books and Software.