

Error Pattern Exercises

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

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

$$3.579 + 54.32 + 684.2 = 158.53$$

$$35.234 + 67.531 = 102.765$$

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

Describe the error the student is making. List the steps you would employ to assist the student in learning how to do the problem correctly and avoid repeating the same error. 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:

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

$$3.579 + 54.32 + 684.2 = 0.015853$$

$$35.234 + 67.531 = 0.102765$$

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

Describe the error the student is making. List the steps you would employ to assist the student in learning how to do the problem correctly and avoid repeating the same error.

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.

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

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

$\begin{array}{r} 342 \\ + 631 \\ \hline 973 \end{array}$	$\begin{array}{r} 1 \\ 74 \\ + 43 \\ \hline 18 \end{array}$	$\begin{array}{r} 4 \\ 385 \\ + 667 \\ \hline \end{array}$	$\begin{array}{r} 282 \\ + 723 \\ \hline \end{array}$	$\begin{array}{r} 279 \\ + 836 \\ \hline \end{array}$
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d.

32
- 16
<u>16</u>

245
- 137
<u>112</u>

524
- 298
<u>374</u>

458
- 372
<u>86</u>

241
- 96
<u>145</u>

e.

578
+ 179
<u>647</u>

479
+ 578
<u>947</u>

554
+ 256
<u>700</u>

195
+ 589
<u>784</u>

355
+ 256
<u>611</u>

f.

8 17
19 7
- 4 3
<u>1414</u>

6 16
17 6
- 2 3
<u>1413</u>

7 14
38 4
- 5 9
<u>325</u>

273
- 51
<u>222</u>

385
- 39
<u>346</u>

g.

8
19 1
- 43
<u>443</u>

2
3 25
- 151
<u>174</u>

5 12 16
7 2 6
- 3 4 9
<u>2 8 7</u>

638
- 349
<u>289</u>

638
- 129
<u>509</u>

h.

2
23
+ 39
<u>71</u>

53
+ 26
<u>79</u>

3
28
+ 45
<u>91</u>

45
+ 35
<u>80</u>

48
+ 36
<u>84</u>

i.

313
x 4
<u>1252</u>

210
x 15
<u>210</u>

524
x 34
<u>1576</u>

135
x 463
<u>1576</u>

345
x 36
<u>1242</u>

j.

32
<u>x 3</u>
6
<u>9</u>
15

42
<u>x 4</u>
8
<u>16</u>
24

31
<u>x 8</u>
8
<u>24</u>
32

23
<u>x 3</u>
6
<u>9</u>
32

42
<u>x 3</u>
6
<u>9</u>
32

k.

34
<u>x 2</u>
68

27
<u>x 4</u>
88

18
<u>x 3</u>
34

24
<u>x 4</u>
34

35
<u>x 3</u>
34

l.

27
<u>x 5</u>
255

43
<u>x 6</u>
308

62
<u>x 7</u>
494

38
<u>x 6</u>
34

28
<u>x 5</u>
34

$$m. \quad 2 \overline{)233} \quad 4 \overline{)211} \quad 3 \overline{)231} \quad 3 \overline{)639} \quad 4 \overline{)518}$$

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

Each of the following set of problems involving fractions 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).

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

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

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

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

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

Each of the following set of problems involving decimals 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.
$$\begin{array}{r} 0.3 \\ +0.9 \\ \hline 0.12 \end{array}$$

$$\begin{array}{r} 0.4 \\ +0.7 \\ \hline 0.11 \end{array}$$

$$\begin{array}{r} 0.4 \\ +0.8 \\ \hline 0.32 \end{array}$$

$$\begin{array}{r} 0.5 \\ +0.6 \\ \hline \end{array}$$

$$\begin{array}{r} 0.9 \\ +0.9 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 3.69 \\ -2.8 \\ \hline 1.1 \end{array}$$

$$\begin{array}{r} 5.32 \\ -4.3 \\ \hline 1.9 \end{array}$$

$$\begin{array}{r} 7.18 \\ -3.5 \\ \hline 4.3 \end{array}$$

$$\begin{array}{r} 8.97 \\ -5.8 \\ \hline \end{array}$$

$$\begin{array}{r} 6.34 \\ -4.3 \\ \hline \end{array}$$

c.
$$\begin{array}{r} 4 \ 12 \\ \cancel{5.3\cancel{2}} \\ -0.08 \\ \hline 4.34 \end{array}$$

$$\begin{array}{r} 6 \ 12 \\ \cancel{7.2\cancel{2}} \\ -0.06 \\ \hline 6.26 \end{array}$$

$$\begin{array}{r} 4 \ 14 \\ \cancel{5.3\cancel{4}} \\ -0.09 \\ \hline 4.35 \end{array}$$

$$\begin{array}{r} 7.67 \\ -0.08 \\ \hline \end{array}$$

$$\begin{array}{r} 9.85 \\ -0.08 \\ \hline \end{array}$$

d.
$$\begin{array}{r} 2.7 \\ \times 0.6 \\ \hline 16.2 \end{array}$$

$$\begin{array}{r} 8.36 \\ \times 6 \\ \hline 50.16 \end{array}$$

$$\begin{array}{r} 0.765 \\ \times 2.6 \\ \hline 4590 \\ \underline{1530} \\ 19.890 \end{array}$$

$$\begin{array}{r} 4.64 \\ \times 0.5 \\ \hline \end{array}$$

$$\begin{array}{r} 5.65 \\ \times 7 \\ \hline \end{array}$$

e.
$$\begin{array}{r} 0.543 \\ 6 \overline{) 3.27} \\ \underline{30} \\ 27 \\ \underline{24} \\ 3 \end{array}$$

$$\begin{array}{r} 9.062 \\ 4 \overline{) 36.26} \\ \underline{36} \\ 26 \\ \underline{24} \\ 2 \end{array}$$

$$\begin{array}{r} 27.871 \\ 3 \overline{) 83.62} \\ \underline{6} \\ 23 \\ \underline{21} \\ 26 \\ \underline{24} \\ 22 \\ \underline{21} \\ 1 \end{array}$$

$$4 \overline{) 78.65}$$

$$5 \overline{) 78.68}$$

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.