

• Analysis •

1. Correct Answer: 24.098

⊕ The student needed to complete the following to solve this problem:

1. Write the equation vertically and align the decimal points.
2. Align the digits of each number vertically by place value.
3. Subtract the numbers and regroup (borrow) as necessary.

$$\begin{array}{r}
 25.\overset{0}{\cancel{0}}\overset{\cancel{9}}{\cancel{0}}\overset{10}{\cancel{0}} \\
 - 1.002 \\
 \hline
 24.098
 \end{array}$$

SKILL: Subtract multiple-digit decimal numbers.

2. Correct Answer: 512.64

- ⊕ The student needed to demonstrate proficiency multiplying decimal numbers. Mastery of multiplication facts and knowing how to correctly place the decimal point were necessary to solve this problem.
- ⊕ The student could have solved this problem in one of two ways:

⊕ **Solution A:**

$$\begin{array}{r}
 \overset{1}{2}\overset{1}{1}\overset{1}{2} \\
 142.4 \\
 \times 3.6 \\
 \hline
 8544 \\
 +42720 \\
 \hline
 512.64
 \end{array}$$

⊕ **Solution B:**

$$\begin{array}{r}
 142.4 \\
 \times 3.6 \\
 \hline
 8544 \\
 + 4272 \\
 \hline
 512.64
 \end{array}$$

SKILL: Multiply a decimal number by a decimal number.

3. Correct Answer: 8.5

⊕ The student needed to demonstrate mastery of long division and correctly place the decimal point in the quotient.

$$\begin{array}{r}
 8.5 \\
 2.3 \overline{)19.55} \rightarrow 23 \overline{)195.5} \\
 \underline{1840} \\
 115 \\
 \underline{115} \\
 0
 \end{array}$$

SKILL: Divide a decimal number by a decimal number.

4. Correct Answer: 0.83 or $0.8\bar{3}$... (The student should indicate in some way that the digit 3 repeats.)

- ⊕ The student needed to have a conceptual understanding of how to change a fraction to a decimal. He also needed to recognize that the quotient was a repeating decimal and indicate that mathematically in his answer.

$$\begin{array}{r} 0.833\dots \\ 6 \overline{) 5.000} \\ \underline{48} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

SKILL: Convert a fraction to a decimal.

5. Correct Answer: $\frac{13}{20}$

- ⊕ The student needed to have a conceptual understanding of the relationship between a percentage and a fraction. He also needed to recognize that the fractional answer could be simplified to lowest terms.

$$65\% = \frac{65}{100} \div \frac{5}{5} = \frac{13}{20}$$

SKILL: Convert a percentage to a fraction in lowest terms.

6. Correct Answer: $\frac{9}{10}$

- ⊕ The student needed to demonstrate that he had mastered adding multiple fractions with unlike denominators. He could have solved this problem in one of two ways.

⊕ **Solution A:**

1. Find a common denominator for all 3 fractions.
2. Find the sum of all 3 fractions.
3. Simplify the answer to lowest terms.

$$\begin{array}{r} \frac{1}{3} = \frac{10}{30} \\ \frac{2}{5} = \frac{12}{30} \\ \frac{1}{6} = \frac{5}{30} \\ \hline \frac{27}{30} \div \frac{3}{3} = \frac{9}{10} \end{array}$$

➔ **Solution B:**

1. Find a common denominator for 2 of the fractions.
2. Find the sum of those 2 fractions.
3. Find a common denominator of the sum of the first two fractions and the third fraction.
4. Find the sum of those 2 fractions.
5. Simplify the answer to lowest terms.

➔ **Example:**

$$\begin{array}{r} \frac{1}{3} = \frac{5}{15} \quad \frac{11}{15} = \frac{22}{30} \\ + \frac{2}{5} = \frac{6}{15} \quad + \frac{1}{6} = \frac{5}{30} \\ \hline \frac{11}{15} \quad \frac{27}{30} + \frac{3}{30} = \frac{9}{10} \end{array}$$

SKILL: Add multiple fractions with unlike denominators and simplify the answer to lowest terms.

7. Correct Answer: $16\frac{5}{24}$

- ➔ The student needed to demonstrate that he had mastered adding mixed numbers that require regrouping.

$$\begin{array}{r} 8\frac{5}{6} = \frac{20}{24} \\ + 7\frac{3}{8} = \frac{9}{24} \\ \hline 15\frac{29}{24} = 1\frac{5}{24} + 15 = 16\frac{5}{24} \end{array}$$

SKILL: Add mixed numbers with unlike denominators and simplify the answer to lowest terms.

8. Correct Answer: $1\frac{11}{12}$

- ➔ The student needed to show that he could subtract mixed numbers with unlike denominators that required regrouping.

➔ **Sample:**

$$\begin{array}{r} 2\frac{1}{6} = \frac{2}{12} + \frac{12}{12} = \frac{14}{12} \\ - 1\frac{1}{4} = \frac{3}{12} \\ \hline 1\frac{11}{12} \end{array}$$

SKILL: Subtract mixed numbers with unlike denominators and simplify the answer to lowest terms.

9. Correct Answer: $\frac{5}{8}$

➤ The student needed to show he had mastered the concept of multiplication of fractions. He could have solved the problem in one of two ways.

➤ **Solution A:**

1. First, divide ("cancel") the common factors.
2. Multiply the fractions.

$$\frac{\overset{1}{\cancel{3}}}{4} \times \frac{5}{\underset{2}{\cancel{8}}} = \frac{5}{8}$$

➤ **Solution B:**

1. Multiply the fractions

$$\frac{3}{4} \times \frac{5}{6} = \frac{15}{24} \div \frac{3}{3} = \frac{5}{8}$$

2. Simplify the answer to lowest terms.

SKILL: Multiply mixed numbers and simplify the answer to lowest terms.

10. Correct Answer: 2

➤ The student needed to show mastery of dividing mixed numbers. He could have solved the problem in one of three different ways.

➤ **Solution A:**

1. Change the mixed numbers to improper fractions.
2. Change the second fraction to its reciprocal.
3. Divide ("cancel") the common factors.
4. Multiply the fractions.

$$\begin{aligned} 2\frac{1}{4} \div 1\frac{1}{8} &= \\ \frac{9}{4} \div \frac{9}{8} &= \\ \frac{\overset{1}{\cancel{9}}}{\underset{1}{\cancel{4}}} \cdot \frac{\overset{8^2}{\cancel{8^2}}}{\underset{1}{\cancel{1}}} &= \frac{2}{1} = 2 \end{aligned}$$

➤ **Solution B:**

1. Change the mixed numbers to improper fractions.
2. Change the second fraction to its reciprocal.
3. Multiply the fractions.
4. Simplify the answer to lowest terms.

$$\begin{aligned} 2\frac{1}{4} \div 1\frac{1}{8} &= \\ \frac{9}{4} \div \frac{9}{8} &= \\ \frac{9}{4} \cdot \frac{8}{9} &= \frac{72}{36} \div \frac{36}{36} = 2 \end{aligned}$$

➔ **Solution C:**

1. Change the mixed numbers to improper fractions.
2. Find a common denominator for the fractions.
3. Divide the numerators. Then divide the denominators.
4. Simplify the answer to lowest terms.

$$2\frac{1}{4} \div 1\frac{1}{8} =$$

$$\frac{9}{4} \div \frac{9}{8} =$$

$$\frac{9}{4} \cdot \frac{2}{2} = \frac{18}{8}$$

$$\frac{18}{8} \div \frac{9}{8} = \frac{2}{1} = 2$$

SKILL: Divide mixed numbers and simplify the answer to lowest terms.

11. **A student who has mastered the prerequisite concepts should be able to complete the written assessment in about 30 minutes.**
12. **A student who has mastered the prerequisite concepts should feel confident in his or her ability to solve the problems and should not need to ask for assistance.**