

Series : Mathematics - from zero to engineer (16).

Arithmetic - Review exercises II

In each of the following cases, the proportions of a mixture are given.
Find the ratio for each one.

a) $\frac{3}{4}$ of ingredient A, $\frac{1}{4}$ of ingredient B.

$$\begin{array}{l} 3 : 1 \\ A : B \end{array}$$

b) $\frac{2}{3}$ of ingredient P, $\frac{1}{15}$ of ingredient Q, and remainder of ingredient R

$$\frac{2}{3} = \frac{2}{3} \cdot \frac{5}{5} = \frac{10}{15} \quad \frac{15}{15} - \left(\frac{1}{15} + \frac{10}{15} \right) = \frac{15}{15} - \frac{11}{15} = \frac{4}{15}$$

$$\begin{array}{l} 10 : 1 : 4 \\ P : Q : R \end{array}$$

c) $\frac{1}{5}$ of ingredient R, $\frac{3}{5}$ of ingredient S, $\frac{1}{6}$ of ingredient T, and remainder of ingredient U.

$$\frac{1}{5} = \frac{1}{5} \cdot \frac{6}{6} = \frac{6}{30} \quad \frac{3}{5} = \frac{3}{5} \cdot \frac{6}{6} = \frac{18}{30} \quad \frac{1}{6} = \frac{1}{6} \cdot \frac{5}{5} = \frac{5}{30}$$

$$\frac{30}{30} - \left(\frac{6}{30} + \frac{18}{30} + \frac{5}{30} \right) = \frac{30}{30} - \frac{29}{30} = \frac{1}{30}$$

$$\begin{array}{l} 6 : 18 : 5 : 1 \\ R : S : T : U \end{array}$$

Express $\frac{3}{5}$ as a percentage.

$$\frac{3}{5} \cdot \frac{20}{20} = \frac{60}{100} = 60\%$$

Express 16% as a fraction in its simplest form.

$$16\% = \frac{16}{100} = \frac{16:4}{100:4} = \frac{4}{25}$$

$$17,5\% \text{ of } 12,50 = 17,5\% \cdot 12,50$$

$$100 : 12,5 = 8$$

$$\frac{17,5}{100} \cdot 12,50 = \frac{17,5}{8} = 2,1875$$

Evaluate each of the following expressions correct to four significant figures and three decimal places.

$$a) 13,6 \cdot 25,8 : 4,2 \approx 83,54 \approx 83,543$$

$$b) 13,6 : 4,2 \cdot 25,8 \approx 83,54 \approx 83,543$$

$$\begin{aligned} c) & 9,1(17,43 + 7,2(8,6 - 4,1^2 \cdot 3,1)) = 9,1(17,43 + 7,2(8,6 - 16,81 \cdot 3,1)) = \\ & = 9,1(17,43 + 7,2(8,6 - 52,111)) = 9,1(17,43 + 7,2 \cdot (-43,511)) = \\ & = 9,1(17,43 - 313,2792) = 9,1 \cdot (-295,8492) = -2692,22772 \approx -2692 \approx \\ & \approx -2692,228. \end{aligned}$$

$$\begin{aligned} d) & -8,4((6,3 \cdot 9,1 + 2,2^{1,3}) - (4,1^{-3,1} : 3,3^3 - 5,4)) = \\ & = -8,4((6,3 \cdot 9,1 + 2,787) - (0,0126 : 35,937 - 5,4)) = \\ & = -8,4((57,33 + 2,787) - (0,00035 - 5,4)) = \\ & = -8,4(60,117 + 5,39965) = -8,4 \cdot 65,51665 = -550,33986 \approx -550,3 \approx \\ & \approx -550,340. \end{aligned}$$

Convert each of the following common fractions to decimal form, correct to three decimal places.

$$a) \frac{3}{17} = 0,176 \quad b) -\frac{2}{15} = -0,133 \quad c) \frac{17}{3} = 5,667$$

$$d) -\frac{24}{11} = -2,182$$

Write each of the following numbers in its simplest form.

$$a) 6,7777... = 6,(7) \quad b) 0,01001001001... = 0,(010)$$

Convert each of the following decimal numbers to a common fraction in its simplest form.

$$a) 0,4 = \frac{4}{10} = \frac{2}{5}$$

$$b) 3,68 = \frac{368}{100} = \frac{92}{25}$$

$$c) 1,(4) = \frac{13}{9}$$

$$d) -6,1 = -\frac{61}{10}$$

$$1,(4) \cdot 10 = 14,(4)$$

$$1,(4) \cdot 10 - 1,(4) = 14,(4) - 1,(4)$$

$$1,(4) \cdot 9 = 13 \text{ / : } 9$$

$$1,(4) = \frac{13}{9}$$

Write each of the following numbers as a single number raised to a power.

a) $2^9 \cdot 2^2 = 2^{9+2} = 2^{11}$

b) $6^2 : 5^2 = \left(\frac{6}{5}\right)^2$

c) $((-4)^4)^{-4} = (-4)^{4 \cdot (-4)} = (-4)^{-16}$

d) $(3^{-5})^0 = 3^{-5 \cdot 0} = 3^0 = 1$