

Series: Mathematics - from zero to engineer (15).

Arithmetic - Review exercises I

Insert the appropriate sign, $<$ or $>$, between each of the following pairs of numbers.

a) $-12 > -15$ b) $9 > -17$ c) $-11 < 10$

Evaluate each of the following expressions.

a) $24 - 3 \cdot 4 + 28 : 14 =$

$$24 - 12 + 2 =$$

$$12 + 2 = 14$$

b) $(24 - 3) \cdot (4 + 28) : 14 =$

$$21 \cdot 32 : 14 =$$

$$672 : 14 = 48$$

$$\begin{array}{r} 21 \\ \cdot 32 \\ \hline 42 \\ + 63 \\ \hline 672 \end{array}$$

$$\begin{array}{r} 48 \\ 672 : 14 \\ \hline - 56 \\ \hline 112 \\ - 112 \\ \hline 0 \end{array}$$

Express each of the following numbers as a product of prime factors.

a)
$$\begin{array}{r|l} 156 & 2 \\ 78 & 2 \\ 39 & 3 \\ 13 & 13 \\ 1 & \end{array}$$

$$156 = 2 \cdot 2 \cdot 3 \cdot 13$$

b)
$$\begin{array}{r|l} 546 & 2 \\ 273 & 3 \\ 91 & 7 \\ 13 & 13 \\ 1 & \end{array}$$

$$546 = 2 \cdot 3 \cdot 7 \cdot 13$$

c)
$$\begin{array}{r|l} 1445 & 5 \\ 289 & 17 \\ 17 & 17 \\ 1 & \end{array}$$

$$1445 = 5 \cdot 17 \cdot 17$$

d)
$$\begin{array}{r|l} 1485 & 3 \\ 495 & 3 \\ 165 & 3 \\ 55 & 5 \\ 11 & 11 \\ 1 & \end{array}$$

$$1485 = 3 \cdot 3 \cdot 3 \cdot 5 \cdot 11$$

Round each of the following numbers to the nearest 10, 100, and 1,000.

a) $5045 \approx 5050, 5000, 5000$

b) $1100 \approx 1100, 1100, 1000$

c) $-1552 \approx -1550, -1600, -2000$

d) $-4995 \approx -5000, -5000, -5000$

Find the GCD and LCM of:

a) 1274 and 195

$$\begin{array}{r|l} 1274 & 2 \\ 637 & 7 \\ 91 & 7 \\ 13 & 13 \\ 1 & \end{array}$$

$$\begin{array}{r|l} 195 & 3 \\ 65 & 5 \\ 13 & 13 \\ 1 & \end{array}$$

$$1274 = 2 \cdot 7 \cdot 7 \cdot 13$$

$$195 = 3 \cdot 5 \cdot 13$$

$$\text{GCD} = 13, \text{ LCM} = 2 \cdot 7 \cdot 7 \cdot 13 \cdot 3 \cdot 5 = 19110$$

b) 64 and 18

$$\begin{array}{r|l} 64 & 2 \\ 32 & 2 \\ 16 & 2 \\ 8 & 2 \\ 4 & 2 \\ 2 & 2 \\ 1 & \end{array}$$

$$\begin{array}{r|l} 18 & 2 \\ 9 & 3 \\ 3 & 3 \\ 1 & \end{array}$$

$$64 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$18 = 2 \cdot 3 \cdot 3$$

$$\text{GCD} = 2, \text{ LCM} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 = 576$$

Reduce each of the following fractions to its simplest form.

$$a) \frac{8}{14} = \frac{8:2}{14:2} = \frac{4}{7}$$

$$b) \frac{162}{36} = \frac{162:18}{36:18} = \frac{9}{2}$$

$$c) -\frac{279}{27} = -\frac{279:9}{27:9} = -\frac{31}{3}$$

$$d) -\frac{81}{3} = -\frac{81:3}{3:3} = -\frac{27}{1} = -27$$

Evaluate each of the following expressions, giving your answer as a common fraction.

$$a) \frac{1}{3} + \frac{3}{5} = \frac{1}{3} \cdot \frac{5}{5} + \frac{3}{5} \cdot \frac{3}{3} = \frac{5}{15} + \frac{9}{15} = \frac{14}{15}$$

$$b) \frac{2}{7} - \frac{1}{9} = \frac{2}{7} \cdot \frac{9}{9} - \frac{1}{9} \cdot \frac{7}{7} = \frac{18}{63} - \frac{7}{63} = \frac{11}{63}$$

$$c) \frac{8}{3} \cdot \frac{6}{5} = \frac{48}{15} = \frac{48:3}{15:3} = \frac{16}{5}$$

$$d) \frac{4}{5} \text{ of } \frac{2}{15} = \frac{4}{5} \cdot \frac{2}{15} = \frac{8}{75}$$

$$e) \frac{9}{2} : \frac{3}{2} = \frac{9^3}{2^1} \cdot \frac{2^1}{3^1} = \frac{3}{1} = 3$$

$$f) \frac{6}{7} - \frac{4}{5} \cdot \frac{3}{2} : \frac{7}{5} + \frac{9}{4} = \frac{6}{7} - \frac{12}{10} \cdot \frac{5}{7} + \frac{9}{4} = \frac{6}{7} - \frac{12}{14} + \frac{9}{4} =$$

$$= \frac{6}{7} \cdot \frac{4}{4} - \frac{12}{14} \cdot \frac{2}{2} + \frac{9}{4} = \frac{24}{28} - \frac{24}{28} + \frac{9}{4} = \frac{9}{4}$$