Sections 1.3, 1.4, 2.1 - 2.3, 3.2, and 6.3

1.3 Multiply Whole Numbers

Solution to a multiplication problem is \( \text{Product} \)

Multiplication is counting sets
Multiplicative Identity

\[ 6 \cdot 1 = 6 \]

Multiplication of Zero

\[ \text{answer is 0} \]

Multiply Larger Numbers

\[ 42 \times 3 \rightarrow \frac{40(3)}{2(3)} = \frac{120}{6} = 20 \]

\[ 74 \times 6 \rightarrow \frac{70(6)}{4(6)} = \frac{420}{24} = 17.5 \]

\[ 328 \times 2 \]

\[ 656 \]
Speed the process estimate

\[ 40 \times 30 \approx 1200 \text{ ft}^2 \]

zeros slide the numbers over

\[ 300 \times 4000 \]
\[ 1200000 \]
\[ 40000 \times 50 \]
\[ 2000000 \]

Two Digit work

\[
\begin{array}{l}
23 \times 41 \quad \text{estimate} \quad 800 \\
\quad \text{exact} \quad \frac{41}{123} \\
\quad \frac{23}{820} \\
\quad \frac{1200}{943} \\
\text{exact} = 1197
\end{array}
\]
You work an average of 3 hours per day for the standard work week. How many hours would you work in a year?

\[ 3 \times 5 = 15 \text{ hrs/week} \times 52 \]
\[ = 780 \text{ hrs} \]

At your job, you are paid $10.35 per hour. If you work 150 hours in a month what is your gross pay?

\[ 150 \times 10.35 = \$1552.50 \]
1.4 Division of Whole Numbers

The solution to a division problem is

\[ 91 \div 7 = \]

\[
\begin{array}{c|c}
91 & 13 \\
\hline
7 & 7 \\
\hline
21 & \\
\hline
0 & \\
\end{array}
\]


\[ 156 \div 6 = \]

\[
\begin{array}{c|c}
26 & 26 \\
\hline
6 & 12 \\
\hline
156 & 36 \\
\hline
36 & 0 \\
\hline
36 & 0 \\
\hline
0 & 0 \\
\end{array}
\]
Factors - a number that divides in with a zero remainder

Factors of 16?

1 2 4 8 16

Prime Numbers

numbers that cannot be divided down (then +1)

2, 3, 5, 7, 13, 17, 23, 47

Prime Factors

6

3 x 2
If I worked 32 hours and brought home (net pay) $522. How much did I make an hour?

\[
\frac{522}{32} = \$16.31
\]
If you have a jump drive that is 512MB and you are storing pictures on the drive that average 3MB, how many pictures will fit?

\[
\frac{512}{3} = 170.7
\]

\[\approx 170\]

---

2.1 Fractions

Parts of fractions

\[
\frac{\text{Numerator}}{\text{Denominator}}
\]

\[\text{Denominator can't equal 0 undefined}\]
Proper Fraction

\[
\frac{2}{3}, \frac{1}{2}, \frac{17}{20}, \frac{1}{4}
\]

< 1

Improper Fraction

\[
\frac{3}{2}, \frac{5}{3}, \frac{8}{7}, \frac{5}{4}
\]

> 1

Lowest terms

\[
\frac{12}{20} \div 2 \div 2 \div 2 = \frac{3}{5}
\]
Mixed Number

\[ \frac{2}{3} \]

\[ \frac{1}{2} \]

Conversion between types

\[ \frac{5}{3} \rightarrow 1 \frac{2}{3} \]

\[ \frac{15}{2} \rightarrow 7 \frac{1}{2} \]

\[ \frac{35}{3} \rightarrow 11 \frac{2}{3} \]

\[ \frac{95}{7} \leftarrow 3 \frac{4}{7} \]
What size rod would probably fit snuggly when 3/4 is too small and 7/8 is too large?

\[
\frac{3}{4} \quad \frac{7}{8} \quad \text{rod should be} \quad \frac{13}{16}
\]

\[
\frac{6}{8} \quad \frac{7}{8} \quad \frac{12}{16} \quad \frac{14}{16}
\]

2.2 Multiply Fractions

\[
\frac{2}{3} \cdot \frac{5}{7} = \frac{10}{21}
\]

\[
\frac{5}{8} \cdot \frac{4}{7} = \frac{20}{56} = \frac{10}{28} = \frac{5}{14}
\]
Mixed Numbers

\[2 \frac{2}{3} \cdot \frac{1}{5}\]

\[\frac{8}{3} \cdot \frac{1}{5} = \frac{8}{15}\]

In purchasing clothes, there is a 3/4 off sale. If the original price was $45, what will you save?

\[\frac{45}{1} \left(\frac{3}{4}\right) = 33.75\]
2.3 Division of Fractions

Reciprocal (Multiplicative Inverse)

\[
\frac{2}{3} \div \frac{5}{7} \rightarrow \frac{2}{3} \cdot \frac{7}{5} = \frac{14}{15}
\]

**Remember to invert and multiply**
Examples

If a stack of 5/8 in plywood is 10 5/8 in tall, how many pieces are there in the stack?

\[
10 \frac{5}{8} \div \frac{5}{8} = 17 \text{ pieces}
\]
The scale on a map is 1/4 in represents 100 miles. If there are 5 3/4 in between two cities how far are they apart?

\[
\frac{5\frac{3}{4}}{4} \div \frac{1}{4} \times 100 = 2300 \text{ miles}
\]

3.2 Mult and Div Decimals

\[
0.006 \times 0.0005 = 0.0000030
\]

\[
3.4 \times 0.3 = 1.02
\]

\[
4.5 \times .5 = 2.25
\]
You are paid $15.20 an hour and time and a half for everything over 40 hours a week. What is your gross earnings for a 43.7 hour week?

\[
15.20(40) + 3.7(15.20)(1.5) \\
608 + 84.36 \\
\$692.36
\]

Sheets of metal are piled for a mass cutting. Each sheet is 0.15 inches thick. How thick will 22 sheets be?

\[
.15(22) = 3.3 \text{ in}
\]
When purchasing a car you have two options, to buy the car outright for $5500, or to pay 24 payments of 249.55. How much extra do you pay if you take the payment plan?

\[ 24 \times 249.55 = 5989.20 \]

\[ \$5989.20 - \$5500 = \$489.20 \]

The "golfball" on the rims holds 7500 gallons of water when filled to capacity. If a gallon of water weighs 8.34 pounds, what is the load in the tower? Round to the nearest pound.

\[ 7500 \times 8.34 = 62,550 \text{ lbs} \]
A 1 inch metal plate weighs 235.45 pounds. There is 13.4 square feet so how much does it weigh per square foot? Round to the hundredth.

\[
\frac{235.45 \text{ lbs}}{13.4 \text{ ft}^2} = 17.57 \text{ lbs/ft}^2
\]
A steel pipe is 15.45 inches long at 55 degrees F. The temperature expansion of steel pipes are 0.0000065 in per degree. How long would the pipe be on a 110 degree day?

\[
\text{change 55}^\circ \\
55 \times 0.0000065 = 0.0003575 \text{ in} \\
15.45 + 0.0003575 = 15.4503575 \text{ in}
\]

If an ibuprofen tablet is 2.3 milligrams, how many milligrams of ibuprofen will you take if you take one every 6 hours for 3 days?

\[
12 \times 2.3 = 27.6 \text{ mg}
\]
Average - sum of data divided by the number of data points

What is the average height of a group of students that are 76 in, 65 in, 72 in, 69.5 in, and 61.5 inches tall?

\[
\frac{76 + 65 + 72 + 69.5 + 61.5}{5} = 68.8 \text{ in}
\]

6.3 Mult and Div Signed Numbers

**Signs**

- \(- \times - = +\)
- \(- \times + = -\)
- \(- \div - = +\)

\[
\frac{-20}{-4} = 5 \quad \text{as suggested by the left of the page.}
\]

\[
\frac{-210}{5} = -4
\]

2(-3)
A 1GB MP3 player in 2002 averaged $250 dollars. Today (2009) the average 1GB MP3 player sells for $15. Using the correct signs, what is the change in the MP3 player?

\[-235 \div 7\]

\[= -33.60\]