Helpful Formulas

CALCULATING FAT WEIGHT (FW), LEAN BODY WEIGHT (LBW) AND BODY FAT % (BF %)

- \( BW \times BF\% = FW \)
- \( BW - FW = LBW \)
- \( \left( \frac{FW}{BW} \right) \times 100 = BF\% \)

Example: 150-pound individual with 20% body fat

- \( 150 \text{ pounds} \times 0.20 = 30 \text{ pounds} \)
- \( 150 \text{ pounds} - 30 \text{ pounds} = 120 \text{ pounds} \)
- \( \left( 30 \text{ pounds} \div 150 \text{ pounds} \right) \times 100 = 20\% \)

DESIRED BODY WEIGHT (DBW)

\[ \text{DBW} = \frac{\text{LBW}}{1 - \text{DBF} \%} \]

Step 1: 100% – Fat % = Lean body %
Step 2: Body weight x Lean body % = LBW
Step 3: 100% – Desired fat % = Desired lean %
Step 4: LBW ÷ Desired lean % = DBW

Example: 200-pound individual with 30% body fat. How much will he or she weigh at 25% body fat?

- \( 100\% - 30\% = 70\% \)
- \( 200 \text{ pounds} \times 0.70 = 140 \text{ pounds} \text{ LBW} \)
- \( 100\% - 25\% = 75\% \)
- \( 140 \text{ pounds} \div 0.75 = 187 \text{ DBW} \)

WAIST-TO-HIP-RATIO (WHR)

\[ \frac{\text{Waist}}{\text{Hip}} = \text{WHR} \]

Example: Individual with 36-inch waist and 35-inch hip circumference
\[ 36 \text{ in} \div 35 \text{ in} = 1.03 \]
BODY MASS INDEX (BMI)

Weight (kg) ÷ Height2 (m)
Weight conversion:
Weight in pounds ÷ 2.2 = weight in kg
Height conversion:
(Height in inches x 2.54) ÷ 100 = height in meters

Example: BMI for a 5' 8", 196-pound individual

(5' x 12) + 8 = 68" 196 / 2.2 = 89 kg
(68" x 2.54) ÷ 100 = 1.73 m
89 kg ÷ (1.73 m x 1.73 m) = 29.7

PREDICTED 1 REPETITION MAX (1RM)

Pounds lifted ÷ % 1RM = Predicted 1RM

Example: Individual can perform maximum of 10 repetitions (10RM) with 150 pounds. What is his predicted 1RM?

10RM ÷ 0.75 = 1RM
150 pounds ÷ 0.75 = 200 pounds

Tanaka & Seals Formula for Age-predicted MHR

Step 1: 208 – (0.7 X Age) = Predicted MHR

Example: 34-year-old, resting heart rate = 62 bpm

• 208 – (0.7 X 34) = 184 bpm

Karvonen Formula- HRR

Step 1: 208 – (0.7 X Age) = Predicted MHR
Step 2: Predicted MHR – Resting Heart Rate = HRR
Step 3: (HRR x % intensity) + RHR = THR

Example: 34-year-old, resting heart rate = 62 bpm

• 208 – (0.7 X 34) = 184 bpm
• 184 – 62 = 124
• (124 x 0.75) + 62 = 155 bpm

CALORIC (KCAL) VALUES PER GRAM (G)

Fat = 9 kcal/g  Alcohol = 7 kcal/g
Carbohydrates = 4 kcal/g       Protein = 4 kcal/g

TOTAL CALORIES FROM FAT (FAT CAL) AND PERCENT OF CALORIES FROM FAT (%FAT)

Step 1: Fat (g) per serving x 9 kcal/g x # Servings Per Container = TF
Step 2: [(Fat (g) per serving x 9 kcal/g) ÷ Calories per serving] x 100 = %FAT

Example: Calculate total calories from fat and percent of calories from fat from this food label:
Servings Per Container: 3
Amount Per Serving
Calories: 144
Total Fat: 4 g
• 4 g x 9 kcal/g x 3 = 108 kcal
• [(4 g x 9 kcal/g) ÷ 144 kcal] x 100 = 25

DAILY CALORIC DEFICIT NEEDED TO ACHIEVE DESIRED WEIGHT LOSS IN SET TIMEFRAME

1 pound body fat = 3,500 kcal
Step 1: (Desired Weight Loss (pounds) x 3,500 kcal/pounds) ÷ # Weeks = Weekly Caloric Deficit (kcal/week)
Step 2: Weekly Caloric Deficit (kcal/week) ÷ 7 days /week = Daily Caloric Deficit

Example: Individual wants to lose 15 pounds in 20 weeks. What daily caloric deficit is required to reach this goal?
• (15 pounds x 3,500 kcal/pounds) ÷ 20 weeks = 2,625 kcal / week
• 2,625 kcal/week ÷ 7 days/week = 375 kcal/day

Math Tips

Multiplying by a percent
When multiplying by decimals, remember to move the decimal point 2 places to the left in your final answer.
For example: To find your client’s body fat weight, multiply her total body weight (150 lb) by her body fat percent (30%).
Dividing by a percent
When dividing by a percent, move the decimal point over 2 places to the right before you start long division.

For example: Your client currently weighs 150 lb and is 30% body fat. You know her lean body weight is 105 lb and her desired percent body fat is 20%. To find her new ideal body weight at 20% body fat, you must divide 105 lb by her new ideal lean body weight percent, which equals 80% or 0.80 in decimal form.

First, you set up the division equation as…

\[
\begin{array}{c}
0.80 \\
\hline
105.00 \\
\end{array}
\]

Then you will have to move the decimal points two places to the right and divide as follows…

\[
\begin{array}{c}
131.25 \\
80 |10500.00 \\
-80 \\
250 \\
-240 \\
100 \\
-80 \\
200 \\
-160 \\
400 \\
-400 \\
0
\end{array}
\]

Finding the percent of a whole
When dividing a bigger number into a smaller number, you must add a decimal point and at least 2 zeros at the end of the smaller number. Be sure to extend the decimal point to your answer – writing your answer to the right of the decimal point since it will ultimately be a percent of the whole.

For example: You notice on a food label that the item has 90 calories per serving and 3 grams of fat per serving. What percent of calories from this serving of food comes from fat?

First, you must convert grams of fat into calories so you can work with the same units in your equation:

\[
9 \text{ cal/g fat} \times 3 \text{ g fat} = 27 \text{ cal}
\]

\[
\begin{array}{c}
.30 \\
90 \\
\hline
270 \\
0
\end{array}
\]