

HELPFUL FORMULAS

DESIRED BODY WEIGHT (DBW)

$$DBW = LBW \div (1 - DBF\%)$$

Step 1: $100\% - \text{Fat \%} = \text{Lean body \%}$

Step 2: $\text{Body weight} \times \text{Lean body \%} = \text{LBW}$

Step 3: $100\% - \text{Desired fat \%} = \text{Desired lean \%}$

Step 4: $\text{LBW} \div \text{Desired lean \%} = \text{DBW}$

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

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

WAIST-TO-HIP RATIO (WHR)

$$\text{Waist} \div \text{Hip} = \text{WHR}$$

Example: Individual with 36-inch waist and 35-inch hip circumference

$$36 \text{ in} \div 35 \text{ in} = 1.03$$

BMI METRIC FORMULA

Metric Formula: $\text{Weight (kg)} \div \text{Height}^2 \text{ (m)}$

Weight conversion:

$\text{weight in pounds} \div 2.2 = \text{weight in kg}$

Height conversion:

$(\text{height in inches} \times 2.54) \div 100 = \text{height in meters}$

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

$$(5' \times 12) + 8 = 68'' \quad 196 \div 2.2 = 89 \text{ kg}$$

$$(68'' \times 2.54) \div 100 = 1.73 \text{ m}$$

$$89 \text{ kg} \div (1.73 \text{ m} \times 1.73 \text{ m}) = 30 \text{ (rounded up)}$$

BMI STANDARD FORMULA

Standard Formula:

$$\frac{[(\text{Weight (lbs)} \times 703) \div \text{Height (inches)}]}{\text{Height (inches)}}$$

- Multiply weight (lbs) by 703
- Convert the height into inches: feet' x 12" + inches'
- Divide (weight x 703) twice by the height in inches

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

$$196 \text{ lbs} \times 703 = 137,788$$

$$137,788 \div 68 \text{ inches} = 2026.3 \text{ (rounded up)}$$

$$2026.3 \div 68 \text{ inches} = 29.7 = 30 \text{ (rounded up)}$$

PREDICTED 1 REPETITION MAX (1RM)

$$\text{Pounds lifted} \div \% \text{ 1RM} = \text{Predicted 1RM}$$

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

$$10\text{RM} \div 0.75 = 1\text{RM}$$

$$150 \text{ pounds} \div 0.75 = 200 \text{ pounds}$$

KARVONEN FORMULA - HEART RATE RESERVE (HRR)

Step 1: $220 - \text{Age} = \text{Predicted MHR}$

Step 2: $\text{Predicted MHR} - \text{Resting Heart Rate} = \text{HRR}$

Step 3: $(\text{HRR} \times \% \text{ intensity}) + \text{RHR} = \text{THR}$

Example: 34-year-old, resting heart rate = 62 bpm, 75% of HRR

- $220 - 34 = 186$ bpm
- $186 - 62 = 124$
- $(124 \times 0.75) + 62 = 155$ 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 AND PERCENTAGE OF CALORIES

Nutrition label values: 36g carbohydrate, 11g protein, 8g fat
Total Calories:

- Calories from carbs: $36\text{g} \times 4\text{cal/g} = 144$ calories
- Calories from protein: $11\text{g} \times 4\text{cal/g} = 44$ calories
- Calories from fat: $8\text{g} \times 9\text{cal/g} = 72$ calories

Total calories = $144 + 44 + 72 = 260$ calories

Percentage of Calories:

- Carb calories \div total calories = % of calories from carbohydrate
 $144 \div 260 = 55\%$ (0.55) of calories from carbohydrate
- Protein calories \div total calories = % of calories from protein
 $44 \div 260 = 17\%$ (0.169) of calories are from protein
- Fat calories \div total calories = % of calories from fat
 $72 \div 260 = 28\%$ (0.276) of calories are from fat

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

1 pound body fat = 3,500 kcal

Step 1: $(\text{Desired Weight Loss (pounds)} \times 3,500 \text{ kcal/pounds}) \div \# \text{ Weeks} = \text{Weekly Caloric Deficit (kcal/week)}$

Step 2: $\text{Weekly Caloric Deficit (kcal/week)} \div 7 \text{ days /week} = \text{Daily Caloric Deficit}$

Example: Individual wants to lose 15 pounds in 20 weeks; What daily caloric deficit is required to reach this goal?

- $(15 \text{ pounds} \times 3,500 \text{ kcal/pounds}) \div 20 \text{ weeks} = 2,625 \text{ kcal / week}$
- $2,625 \text{ kcal/week} \div 7 \text{ days/week} = 375 \text{ kcal/day}$

For more help on using these formulas, check out our Fitness Math course at ACEfitness.org/FitnessMath. If you purchased a Premium Plus program, the course has automatically been added to your MyACE Account.