Helpful Formulas

Age-predicted Maximum Heart Rate (MHR)

220 – Age = MHR
MHR x % intensity = Target Heart Rate (THR)

Example: 34 year old at 75% intensity
220 – 34 = 186 x 0.75 = 139.5 bpm

Karvonen Formula—Heart Rate Reserve (HRR)

220 – Age = MHR
MHR – Resting Heart Rate = HRR
(HRR x % intensity) + RHR = THR

Example: 34 year old, resting heart rate = 62 bpm, at 75% intensity
220 – 34 = 186 – 62 = 124 x 0.75 = 93 + 62 = 155 bpm

Body Mass Index (BMI)

Weight (kg) ÷ Height^2 (m)
Weight conversion: weight in lb ÷ 2.2 = weight in kg
Height conversion: (height in inches x 2.54) ÷ 100 = height in meters

Example: Height = 5'8"
(5'x 12) + 8 = 68"
(68" x 2.54) ÷ 100 = 1.73 m

Weight = 196 lb
196 / 2.2 = 89 kg

89 kg ÷ (1.73 m x 1.73 m) = 29.7

Desired Body Weight (DBW)

DBW = LBW ÷ (1 – 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-lb individual with 30% body fat
How much will he or she weigh at 25% body fat?

- *100% – 30% = 70%*
- *200 lb x 0.70 = 140 lb LBW*
- *100% – 25% = 75%*
- *140 lb ÷ 0.75 = 187 DBW*

Caloric (kcal) Values per Gram (g)

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

This is not a complete list of all the formulas you may need for the ACE Personal Trainer Exam.

Math Tips

Multiplying by a percent

When multiplying by decimals, remember to move the decimal point two 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%).

```
  150
x .30
  000
+4500
 45.00
```

Dividing by a percent

When dividing by a percent, move the decimal point over two places to the right before you start long division.

For example: Your client currently weighs 151 lb and is 30% body fat. You know her lean body weight is 115 lb and her desired percent body fat is 20%. To find her new ideal body weight at 20% body fat, you must divide 115 lb by her new ideal lean body weight percent (80%).

```
     143.75
.80 ⟌ 11500.00
   – 80
     350
    –320
      300
     –240
       600
      –560
        400
       –400
          0
```

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 cal/g fat x 3 g fat = 27 cal fat

```
    .30
90 ⟌ 27.00
   –270
     00
```