

Fitness Career Opportunity

Sports Nutritionist

Sports nutritionists advise athletes and others on how to eat for optimal fitness and peak performance. They often work in universities, for sports teams, at health clubs, or in corporate or wellness centers.

Clients seek out sports nutritionists for a variety of reasons. The following are some of the more common reasons:

- to gain or lose weight
- to optimize athletic performance
- to increase energy and endurance
- to improve overall eating habits.

In seeking out a sports nutritionist, it is advisable to look for a registered dietician (R.D.) who belongs to the American Dietetic Association (ADA).

For a free state-by-state listing of registered dieticians, contact:

ADA National Center for Nutrition and Dietetic Hotline
(800-366-1655)
or
American Dietetic Association
216 W. Jackson Blvd.
Chicago, IL 60606-6995
(312) 899-0040 or (800) 877-1600
<http://www.eatright.org/nfs/>

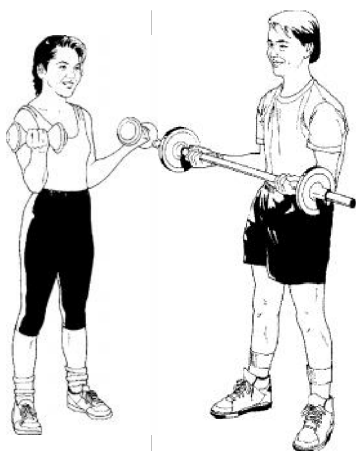
For information concerning sports nutrition, contact:

International Center for Sports Nutrition
Omaha, Nebraska
(402) 559-5505

Unit 2: Body Composition and Nutrition

Introduction

Many people place far too much emphasis on their body weight. Weight alone is not a good measure of health. A comparison of the amount of **fat** on your body to the amount of **lean body mass** is a much more accurate measure of your health. *Lean body mass* consists of your muscles, bones, and other tissues and organs. *Fat* appears on the body as flabby and untoned tissue. The proportion of fat in the body to lean body mass is known as **body composition**. Your body composition is expressed as the percentage of body weight that is fat compared to its percentage of lean body tissue.



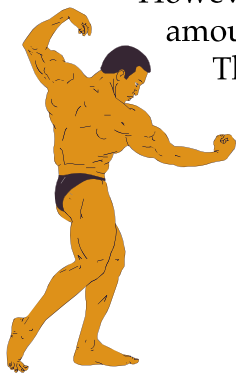
Your body composition is expressed as the body's percentage of fat and its percentage of lean body tissue.

The body composition of a fit male teenager should be between nine percent and 15 percent body fat. The body composition of a fit female teenager should be between 14 percent and 21 percent. Everyone should work towards these healthy ranges. Most Americans need to lower the amount of fat on their bodies and raise the amount of lean body mass, or muscle. Developing a body composition low in fat is one of the most important goals for achieving good health.

You cannot tell whether you carry too much body fat simply by weighing yourself. A weight scale combines both your lean body mass and your body fat into one measure.

Overweight, Overfat, Obese, Underfat, or Ideal?

A person who is **overweight** weighs approximately 10 percent more than is desirable for a particular height or age. An **overfat** person has *more* body fat than is recommended. An **underfat** person has *less* body fat than is recommended.



Body builders have a high percentage of muscle and low body fat.

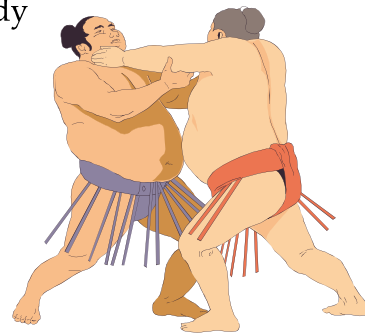
However, a person who weighs more than the suggested amount on a height-weight chart is not necessarily *overfat*.

These charts are figured for people who have an average percentage of body fat. But some people such as body builders and other muscular athletes will have a very low percentage of body fat. Most of their body is made of muscle. Muscle tissue is heavier and weighs more than an equal amount of fat tissue. Consequently, these very fit athletes will weigh more than the height-weight charts suggest.

On the other hand, a person who appears slim and lean may actually have too much body fat. He or she may have a low body weight because fat tissue weighs less than muscle tissue. This body composition is often seen in people who diet to avoid being overweight but do not exercise or achieve physical fitness. The amount of body fat we carry is not always obvious. We cannot tell by our looks or even by the pounds we register on a scale.

An **obese** person has an excessive amount of body fat. A Sumo wrestler would be considered *obese*.

It is important to know your body type and focus on healthy and reasonable goals for your body type. **Remember:** Working toward a certain body weight should not be our goal. Weighing the ideal amount for our height will not make our bodies healthy, fit, or low in body fat. A far more important goal is to eat a nutritious diet and get regular exercise. Together, these practices will lead to a healthy body composition.



A Sumo wrestler would be considered obese.

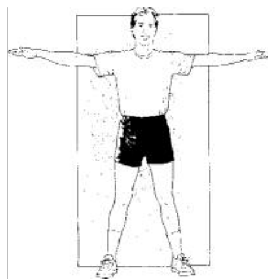
Ideal Body Weight: What Should I Weigh?

Your **ideal body weight** is how much you should weigh if your body fat percentage were in the proper range. There are simple formulas that are helpful in determining about what you should weigh. You will most likely look and feel the best—and be the healthiest—at your ideal body weight.

Acceptable Ranges for Percent Body Fat*		
Age	Male	Female
13	10-25%	17-32%
14	10-25%	17-32%
15	10-25%	17-32%
16	10-25%	17-32%
17	10-25%	17-32%
17+	10-25%	17-32%

* calculated from triceps and skinfold measurements

Body Types: Ectomorph, Endomorph, and Mesomorph



When it comes to body types, we are not all created equal! Everyone comes in a different size and shape. Our genetics, gender, and even lifestyle make each of us unique. However, some of us can be described as having one of three standard body types: **ectomorph**, **endomorph**, or **mesomorph**. Most of us are a combination of two body types. Your **somatotype** is your body type in terms of your body composition related to heredity.

Ectomorph: Slender and Lean

This body type is familiar in long-distance runners. An *ectomorph* is usually slender and lean with long bones and muscles. Ectomorphs usually have a low body weight and a low percentage of body fat.

Mesomorph: Trim and Athletic

The *mesomorph* has a well-proportioned build. A mesomorph has medium to large bones and solid muscular development. Their body fat is usually within the desirable ranges. Many athletes are considered to be mesomorphs.

Endomorph: Round and Soft

The *endomorph's* body is soft and round. The endomorph has thick, heavy legs, narrow shoulders, and a large chest. They carry a high percentage of body fat at and below the waist, creating a bottom-heavy look.

The Typical Body Type: A Combination of Two Body Types

Most of us can be classified as a combination of two of the basic body types. For example, an individual who is naturally muscular and well proportioned but has extra body fat would be a meso-endomorph. This body type is typical of heavy power lifters and Sumo wrestlers.

The only combination that cannot occur is the endo-ectomorph.

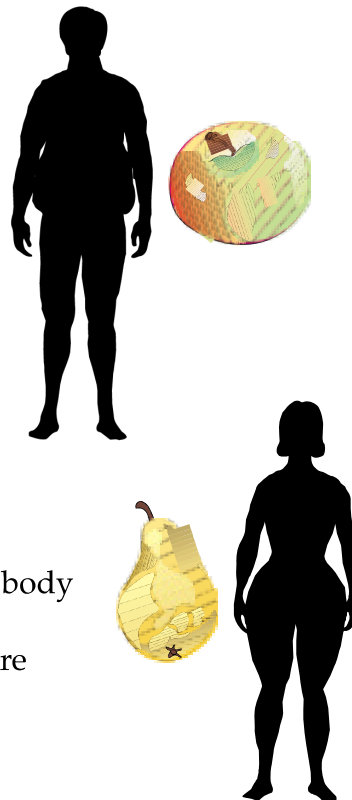
Heredity determines to a large extent what basic body type you will tend to be. However, exercise patterns and eating habits largely influence your body type as well.

Apple or a Pear?

When people gain excess weight, they often develop one of two body shapes. These shapes are referred to as the *apple* and the *pear*.

Apple. The apple-shaped person carries most of his extra weight in the chest and abdomen. Apples tend to be males and usually have pot bellies. Research has shown that the apple-shaped person is at greater risk for heart disease, diabetes, and certain cancers.

Pear. The pear-shaped person tends to store body fat below the waist. They carry extra fat in the thighs, hips, and buttocks. A pear shape is more common in females.



Waist-to-Hip Ratio

Check your own body shape using the waist-to-hip ratio below.

1. Measure your waist at its smallest point.

waist measurement: _____ inches

2. Measure your hips where they are the largest.

hip measurement: _____ inches

3. Divide the waist measurement by the hip measurement to determine your waist-to-hip ratio.

waist \div hip measurement = waist-to-hip ratio

Example: waist = 28 inches; hips = 40 inches

$28 \div 40 = 0.70$ waist-to-hip ratio

_____ \div _____ = _____ waist-to-hip ratio _____

According to the American Heart Association (AHA), a waist-to-hip ratio of greater than 0.80 for women and 0.95 for men may increase the risk for heart disease, high blood pressure, stroke, diabetes, respiratory problems, and certain cancers. In many cases, these problems can be improved with proper weight control.

Importance of Weight Control

One in every three Americans is either overfat or obese. It is a simple fact that carrying extra fat on your body increases your energy needs. Carrying extra fat also raises your risk for developing health-related problems.

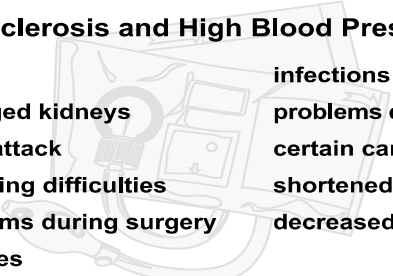
Maintaining a proper body composition helps a person feel and look good. It also helps a person to be at his mental and physical best.

The following are some health problems associated with carrying too much body fat.

- A diet high in fat can lead to arteriosclerosis (hardened arteries).
- Arteriosclerosis reduces the blood supply to vital organs.
- Arteriosclerosis raises blood pressure.
- Arteriosclerosis can cause a heart attack.

Regular exercise and a healthy diet are the keys to maintaining a healthy body composition.

Arteriosclerosis and High Blood Pressure can lead to...



stroke	infections
damaged kidneys	problems during pregnancy
heart attack	certain cancers
breathing difficulties	shortened life
problems during surgery	decreased quality of life
diabetes	

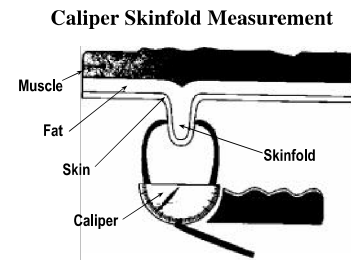
Methods of Measuring Body Composition

Body fat percentages can be estimated using different methods. The quickest and simplest methods use skinfold and body measurements. More complex methods include underwater weighing, electrical impedance, and ultrasound.

All methods used to determine body fat are approximations. However, taking body fat and body measurements is more accurate than weighing yourself on a scale.

Skinfold Measurements: Pinching Fat

Taking a *skinfold measurement* is a common, convenient method used to measure body fat. The skinfold technique pinches fat from various places on the body with instruments called **skinfold calipers**. The skinfold caliper measures the fat that lies directly under the skin. It is believed that half of the fat in our body lies right under the skin. The remaining half is deep within your body's organs. Skinfold measurements are usually taken at the back of the arm, at the waist or hip, chest, and thigh area. (See *Skinfold Measurements* activity on the following pages.)



Hydrostatic or Underwater Weighing: Measuring a Submerged Body

Hydrostatic or underwater weighing is considered to be the most accurate method of measuring body composition. Muscle is denser than fat. The difference between regular weight and underwater weight reflects the difference between fat and lean tissue. Thus, percentage of body fat can be calculated. This method requires special equipment and professional analysis. A large water tank or swimming pool and a weighing scale are required. The person is first weighed on dry land. Then the person is weighed under water.

Bioelectrical Impedance: Passing Electrical Currents through the Body

In the *bioelectrical impedance* method, the speed of an electric current is measured as it passes through the body. Muscle has a lot of water, while fat has very little water. The faster the flow, the lower the proportion of fat in the body.

Dual X-Ray Absorbiometry (DEXA)

In *dual X-ray absorbiometry* (DEXA), low-energy X-rays scan the whole body. Fat, muscle, and bone have different densities and can be seen on the X-ray film. The computer calculates the percentage of each.

Body Mass Index (BMI): Estimating Body Fat

Body mass index (BMI) is a commonly used method to estimate body fat. It compares your height and weight and predicts your body fat. (See *Body Mass Index* activity on pages 71-73.)

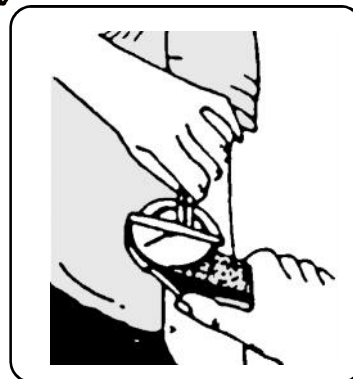
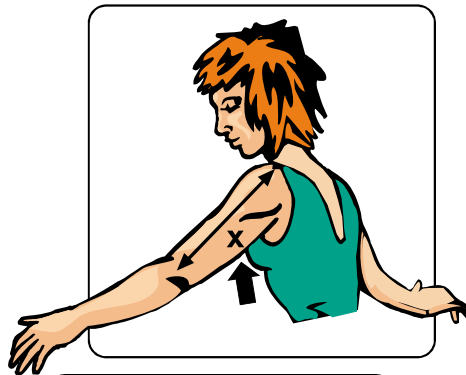
Skinfold Measurements

To determine your percent of body fat, first find a partner. Decide who will be measured first.

Measure two skinfolds on the body: the triceps, or the back of the arm, and the calf in the lower leg. Use the right side of the body for all measurements.

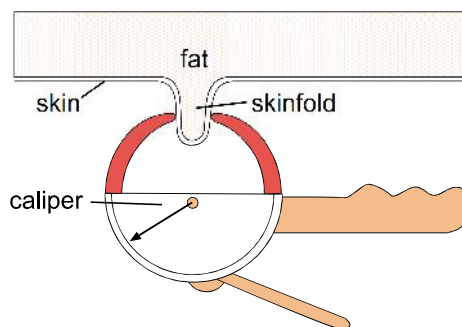
Procedure for Triceps Skinfold Measurement

1. Find the middle point between the shoulder and elbow on the back of the right arm. Mark it with an "X" using a marking pencil.
2. Lift the skin away from the muscle, grasping it right above the marked area. Pinch the skinfold with your finger and thumb. (It is not necessary to pinch hard.)
3. Using the skinfold caliper, measure the thickness of the skinfold. Repeat the measurement two more times, and record the average of the three to the nearest millimeter (mm).



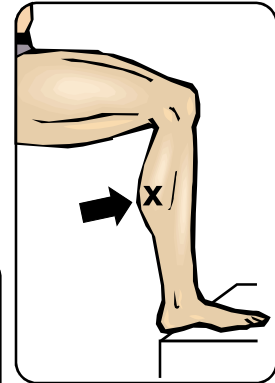
_____ + _____ + _____ = _____ ÷ 3 = _____ mm

My triceps skinfold measurement is _____ mm.



Procedure for Calf Skinfold Measurement

1. Place your right foot on a step or elevated surface to a bent-knee position of about 90 degrees. Mark an "X" on the inside of the lower leg at the largest part of the calf muscle.
2. Pinch the skinfold just above the marked point, lifting the skin away from the muscle. Measure the thickness of the skinfold with the calipers.
3. Take three total measurements, and record the average of the three to the nearest millimeter.



_____ + _____ + _____ = _____ ÷ 3 = _____ mm

My calf skinfold measurement is _____ mm.

Final Measurement Procedure

Add your triceps measurement and calf measurement together. Use the sum to determine an approximation of your body fat percentage. Refer to the *Body Composition Conversion Tables* on the following pages and the *Acceptable Ranges for Percent Body Fat* chart on page 61.

My final measurement is: triceps + calf = _____ mm.

My body fat percentage is estimated at _____ %.

Analyze your results.

My body fat percentage is (check one):

_____ lower than the desired range.

_____ in the proper range.

_____ higher than the desired range.

Note: A 3% to 5% body fat measurement error is associated with the skinfold method.

To maintain or improve my body composition I can do the following things:

1. _____
2. _____
3. _____
4. _____
5. _____

Body Composition Conversion Table for Females*

Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat
1.0	5.7	16.0	14.9	31.0	24.0	46.0	33.2	61.0	42.3
1.5	6.0	16.5	15.2	31.5	24.3	46.5	33.5	61.5	42.6
2.0	6.3	17.0	15.5	32.0	24.6	47.0	33.8	62.0	42.9
2.5	6.6	17.5	15.8	32.5	24.9	47.5	34.1	62.5	43.2
3.0	6.9	18.0	16.0	33.0	25.2	48.0	34.4	63.0	43.5
3.5	7.2	18.5	16.4	33.5	25.5	48.5	34.7	63.5	43.8
4.0	7.5	19.0	16.7	34.0	25.8	49.0	35.0	64.0	44.1
4.5	7.8	19.5	17.1	34.5	26.1	49.5	35.3	64.5	44.4
5.0	8.2	20.0	17.3	35.0	26.5	50.0	35.6	65.0	44.8
5.5	8.5	20.5	17.6	35.5	26.8	50.5	35.9	65.5	45.1
6.0	8.8	21.0	17.9	36.0	27.1	51.0	36.5	66.0	45.4
6.5	9.1	21.5	18.2	36.5	27.4	51.5	36.5	66.5	45.7
7.0	9.4	22.0	18.5	37.0	27.7	52.0	36.8	67.0	46.0
7.5	9.7	22.5	18.8	37.5	28.0	52.5	37.0	67.5	46.3
8.0	10.0	23.0	19.1	38.0	28.3	53.0	37.4	68.1	46.6
8.5	10.3	23.5	19.4	38.5	28.6	53.5	37.7	68.5	46.9
9.0	10.6	24.0	19.7	39.0	28.9	54.0	38.0	69.0	47.2
9.5	10.9	24.5	20.0	39.5	29.2	54.5	38.3	69.5	47.5
10.0	11.2	25.0	20.4	40.0	29.5	55.0	38.7	70.0	47.8
10.5	11.5	25.5	20.7	40.5	29.8	55.5	39.0	70.5	48.1
11.0	11.8	26.0	21.0	41.0	30.1	56.0	39.3	71.0	48.4
11.5	12.1	26.5	21.3	41.5	30.4	56.5	39.6	71.5	48.7
12.0	12.4	27.0	21.6	42.0	30.7	57.0	39.9	72.0	49.0
12.5	12.7	27.5	21.9	42.5	31.0	57.5	40.2	72.5	49.6
13.0	13.0	28.0	22.2	43.0	31.3	58.0	40.5	73.0	49.6
13.5	13.3	28.5	22.5	43.5	31.6	58.5	40.8	73.5	49.9
14.0	13.6	29.0	22.8	44.0	31.9	59.0	41.1	74.0	50.2
14.5	13.9	29.5	23.1	44.5	32.2	59.5	41.1	74.5	50.5
15.0	14.3	30.3	23.4	45.0	32.6	60.0	41.7	75.0	50.9
15.5	14.6	30.5	23.7	45.5	32.9	60.5	42.0	75.5	51.2

* Use this table to determine percent body fat for all girls ages 5 to 18.

Body Composition Conversion Table for Males*

Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat	Total (millimeters)	Percent Fat
1.0	1.7	16.0	12.8	31.0	23.8	46.0	34.8	61.0	45.8
1.5	2.0	16.5	13.1	31.5	24.2	46.5	35.2	61.5	46.2
2.0	2.5	17.0	13.5	32.0	24.5	47.0	35.5	62.0	46.6
2.5	2.8	17.5	13.9	32.5	24.9	47.5	35.9	62.5	46.9
3.0	3.2	18.0	14.2	33.0	25.3	48.0	36.3	63.0	47.3
3.5	3.6	18.5	14.2	33.5	25.6	48.0	36.3	63.0	47.3
4.0	3.9	19.0	15.0	34.0	26.0	49.0	37.0	64.0	48.0
4.5	4.3	19.5	15.3	34.5	26.4	49.5	37.4	64.5	48.4
5.0	4.7	20.0	15.7	35.0	26.7	50.0	37.8	65.0	48.8
5.5	5.0	20.5	16.1	35.5	27.1	50.5	38.1	65.5	49.1
6.0	5.4	21.0	16.4	36.0	27.5	51.0	38.5	66.0	49.5
6.5	5.8	21.5	16.8	36.5	27.8	51.5	38.9	66.5	49.9
7.0	6.1	22.0	17.2	37.0	28.2	52.0	39.2	67.0	50.2
7.5	6.5	22.5	17.5	37.5	28.6	52.5	39.6	67.5	50.6
8.0	6.9	23.0	17.9	38.0	28.9	53.0	40.0	68.0	51.0
8.5	7.2	23.5	18.3	38.5	29.3	53.5	40.6	68.5	51.3
9.0	7.6	24.0	18.6	39.0	29.7	54.0	40.7	69.0	51.7
9.5	8.0	24.5	19.0	39.5	30.0	54.5	41.1	69.5	52.1
10.0	8.4	25.0	19.4	40.0	30.4	55.0	41.4	70.0	52.5
10.5	8.7	25.5	19.7	40.5	30.8	55.5	41.8	70.5	52.8
11.0	9.1	26.0	20.1	41.0	31.1	56.0	42.2	71.0	53.2
11.5	9.5	26.5	20.5	41.5	31.5	56.5	42.5	71.5	53.6
12.0	9.8	27.0	20.8	42.0	31.9	57.0	42.9	72.0	53.9
12.5	10.2	27.5	21.2	42.5	32.2	57.5	43.3	72.5	54.3
13.0	10.6	28.0	21.6	43.0	32.6	58.0	43.6	73.0	54.7
13.5	10.9	28.5	21.9	43.5	33.0	58.5	44.0	73.5	55.0
14.0	11.3	29.0	22.3	44.0	33.3	59.0	44.3	74.0	55.4
14.5	11.7	29.5	22.7	44.5	33.7	59.5	44.7	74.5	55.8
15.0	12.0	30.0	23.1	45.0	34.0	60.0	45.1	75.0	56.1
15.5	12.4	30.5	23.4	45.5	34.4	60.5	45.5	75.5	56.5

*Use this table to determine percent body fat for all boys ages 5 to 18.

Body Mass Index

The *Body Mass Index* (BMI) is a quick and easy way to determine a healthy weight without referring to the standard charts.

On the *BMI* chart on the page 73, find your height in inches down the left side of the chart. Then go across the line of your height until you get to your weight in pounds. Now go up to the top of the chart to find your BMI.

The desirable ranges for females and males are listed below.

Acceptable Ranges of Body Mass Index (BMI)		
Age	Male	Female
	Percent of Fat	Percent of Fat
13	16.6 - 23	17.5 - 24.5
14	17.5 - 24.5	17.5 - 25
15	18.1 - 25	17.5 - 25
16	18.5 - 26.5	17.5 - 25
17	18.8 - 27	17.5 - 26
17+	19.0 - 27.8	18.0 - 27.3

The federal government has established the following BMI scale.

Percent of Fat	
lower than 18.5	underweight
18.5 - 24.9	normal
25 - 29.9	overweight
30 and higher	obese

If you possess a lot of muscle mass, your BMI may tend appropriately to be a bit higher. A high BMI is associated with a greater risk for cardiovascular disease and diabetes.

Results:

My body mass index is _____ .

To determine an approximation of your proper weight, place the ruler at your height and at the desirable body mass index (BMI) range. Your target weight will appear where the ruler crosses the left column.

My proper weight according to this formula should be approximately _____ pounds.

Do you believe this is an accurate measure of your proper body weight? _____

Why or why not? _____

BMI	Normal										Overweight										Obese										Extreme Obesity																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Figuring Ideal Body Weight According to Height

One common method used to determine appropriate body weight is based upon your height. This gives you a very basic approximation of how much you should weigh.

Formula

Females: 100 pounds (lbs.) for five feet and add an additional five pounds for each inch of height over five feet.

Example: A female who is five feet and five inches would estimate her ideal body weight as 125 pounds.

$$100 \text{ lbs.} + (5 \times 5 \text{ lbs.}) = 125 \text{ lbs.}$$

Males: 106 pounds for five feet and add an additional five pounds for each inch of height over five feet.

Example: A male who is five feet and nine inches would estimate his ideal body weight as 151 pounds.

$$106 \text{ lbs.} + (9 \times 5 \text{ lbs.}) = 151 \text{ lbs.}$$

Figure your ideal body weight using the formula above.

1. I currently weigh _____ pounds.
2. I am _____ feet and _____ inches tall.
3. According to this formula I should weigh _____ pounds.
4. Analyze your results. How does this formula compare to your

current body weight? _____

Does this formula seem to be appropriate for you? _____

Why or why not? _____

Figuring Ideal Body Weight According to Frame Size

This is another simple way to estimate your ideal body weight based upon your frame size. Follow these easy steps.

1. With a partner, measure the width of your elbow using the skinfold calipers. Elbow width is measured by bending the elbow 90 degrees, and then measuring the distance between the two knobby protrusions on each side of the elbow.
2. Refer to the *Frame Size Chart* on the following page to determine whether you have a small, medium, or large frame.
3. Once you have determined your frame size, refer to the *Height/Weight Chart* on page 77 for determining the suggested optimal weight range.

Record your scores.

1. According to the *Frame Size Chart*, I have a _____ frame.
2. According to the *Height/Weight Chart* for determining a suggested optimal weight range, I should weigh between _____ .
3. Analyze your results.

Do you feel this calculation is accurate for you?_____ Explain your answer. _____

What do you think your main body type is (ectomorph, endomorph, or mesomorph)? _____

Could you be a combination of two types? Explain. _____

Frame Size Chart			
Female			
Height	Small Frame	Medium Frame	Large Frame
5' 0" & below	less than 54 mm	54–67 mm	more than 67 mm
5' 1" to 5' 8"	less than 56 mm	56–70 mm	more than 70 mm
5' 9" & above	less than 58 mm	58–72 mm	more than 72 mm
Male			
Height	Small Frame	Medium Frame	Large Frame
5' 0" & below	less than 63 mm	63–76 mm	more than 76 mm
5' 5" to 6' 1"	less than 67 mm	67–81 mm	more than 81 mm
6' 2" & above	less than 70 mm	70–86 mm	more than 86 mm

Height/Weight Chart

Female

Height	Small Frame	Medium Frame	Large Frame
4' 9"	88– 90	92–103	100–115
4' 10"	90– 97	94–106	102–118
4' 11"	92–100	97–109	105–121
5' 0"	95–103	100–112	108–124
5' 1"	98–106	103–115	111–127
5' 2"	101–109	106–118	114–130
5' 3"	104–112	109–122	117–134
5' 4"	107–115	112–126	121–138
5' 5"	110–119	116–131	125–142
5' 6"	114–123	120–135	129–146
5' 7"	118–127	124–139	133–150
5' 8"	122–131	128–143	137–154
5' 9"	126–136	132–147	141–159
5' 10"	130–140	136–151	145–164
5' 11"	134–144	140–155	149–169
6' 0"	138–148	144–159	153–173

Male

Height	Small Frame	Medium Frame	Large Frame
5' 1"	107–115	113–124	121–136
5' 2"	110–118	116–128	124–139
5' 3"	113–121	119–131	127–143
5' 4"	116–124	122–134	130–147
5' 5"	119–128	125–138	133–151
5' 6"	123–132	129–142	137–156
5' 7"	127–136	133–147	142–161
5' 8"	131–140	137–151	146–165
5' 9"	135–145	141–155	150–169
5' 10"	139–149	145–160	154–174
5' 11"	143–153	149–165	159–179
6' 0"	147–157	153–170	163–184
6' 1"	151–162	157–175	168–189
6' 2"	155–166	162–180	173–194
6' 3"	159–170	167–185	177–199
6' 4"	163–174	172–190	184–203

Figuring Ideal Body Weight According to Body Fat Percentage

To determine ideal body weight in pounds (lbs.) using this formula, you must know your body fat percentage (%). Use the percentage of body fat found on the skinfold measurement test.

Follow these steps to determine a desirable body-weight range for you.

Example: A female weighing 105 lbs. with 20% body fat has a desired body weight range between 98 and 106 lbs.

1. Find the lean body percentage.

$$100\% - \text{Fat Percentage} = \text{Lean Body Percentage}$$

$$100\% - 20\% = 80\% \text{ (Lean Body Percentage)}$$

2. Find the lean body weight in pounds.

$$\text{Body Weight} \times \text{Lean Body Percentage} = \text{Lean Body Weight}$$

$$105 \times 80\% = 84 \text{ lbs. (Lean Body Weight)}$$

3. Use the table below to find the desired lean percentage.

$$100\% - \text{Desired Percent Fat} = \text{Desired Lean Percent}$$

Female:

$$\text{Upper limit: } 100 - 21 = 79\%$$

$$\text{Lower limit: } 100 - 14 = 86\%$$

Male:

$$\text{Upper limit: } 100 - 15 = 85\%$$

$$\text{Lower limit: } 100 - 9 = 91\%$$

4. Find the desired body weight range in pounds.

$$\text{Lean Body Weight} \div \text{Desired Lean Percentage} = \text{Desired Body Weight Range}$$

$$84 \div 79\% = 106 \text{ lbs. (Upper Limit)}$$

$$84 \div 86\% = 98 \text{ lbs. (Lower Limit)}$$

$$98 \text{ lbs.} - 106 \text{ lbs.} = \text{Desired Body Weight Range}$$

Use the formula above to figure your ideal body weight.

Improving Body Composition: Losing Body Fat

The best approach to losing body fat combines regular exercise with a sensible nutritional plan.

To lose a pound of fat, you must lose or burn about 3500 **calories** more than you take in. You could lose a pound of fat by eating 3500 fewer calories than you normally do. Or you could burn 3500 calories through exercise. The average teenager's daily diet is about 3500 calories. But simply going an entire day without food is a dangerous and inefficient way to lose fat. Similarly, the average person cannot safely burn 3500 calories after a day or even two days of exercise. The healthiest approach to losing body fat and *keeping it off* combines moderate exercise and a *slight* reduction of daily calories. This approach leads to a healthy and gradual loss of fat.

Dieting without Exercising

Dieting without exercising in order to reduce body weight can produce a loss of pounds on the scale. However, when exercise is not included in a weight-loss program, the body loses fat *and* valuable muscle tissue. Drastically reducing calories in the daily diet makes the body think it is starving. When the body is starved, it reacts by breaking down its own muscle tissues. In addition, the body will try to save energy by burning *fewer* calories!

Exercising without Dieting

For a weight-loss program to be successful, exercise is vital. Exercise preserves the lean muscle tissue. Preserving and increasing the amount of lean tissue helps you keep off the excess weight. Lean tissue consumes more calories than an equal amount of fat tissue. Lean tissue is, therefore, very valuable in losing and maintaining weight.

Exercise is the most important way to make long-term changes in your body composition. Your body will be leaner, stronger, and more toned. Try to strive for daily exercise, expending at least 300 calories per workout. (See activity *Calorie Usage in Activities* on the following page.)

To trim down, decrease your food intake and maintain a daily exercise program. If exercise is the only thing that is added or increased, weight loss will be a slow process. A change in nutritional habits needs to go hand-in-hand with workouts to achieve results.

Calorie Usage in Activities

Exercise is a great way to expend extra calories while controlling body fat and proper body weight. Try to expend around 300 calories at each workout. Here is a chart to help you in estimating the number of calories burned in various activities. Use the column that comes closest to your body weight to approximate calories expended.



Burning Calories			
Activity	Calories Burned Per Hour At Approximate Weight		
	75 lbs	100 lbs	150 lbs
Aerobic class	300	336	360
Bicycling, 6 mph	135	160	240
Bicycling, 12 mph	225	270	410
In-Line Skating	162	216	324
Jogging, 5.5 mph	365	440	660
Jogging, 7 mph	510	610	920
Jumping Rope	415	500	750
Running in place	360	430	650
Running, 10 mph	710	850	1280
Swimming, 25 yds/min	155	185	275
Swimming, 50 yds/min	270	325	500
Tennis (singles)	220	265	400
Walking slowly, 2 mph	125	160	240
Walking moderately, 3 mph	175	210	320
Walking briskly, 4.5 mph	245	295	440
Weight lifting	225	300	450

Figuring Calorie Usage in Activities

Example: Activity—**Brisk walking (150 lb. person)**

Number of calories per hour (**440**) x number of hours (**2**) = **880** calories

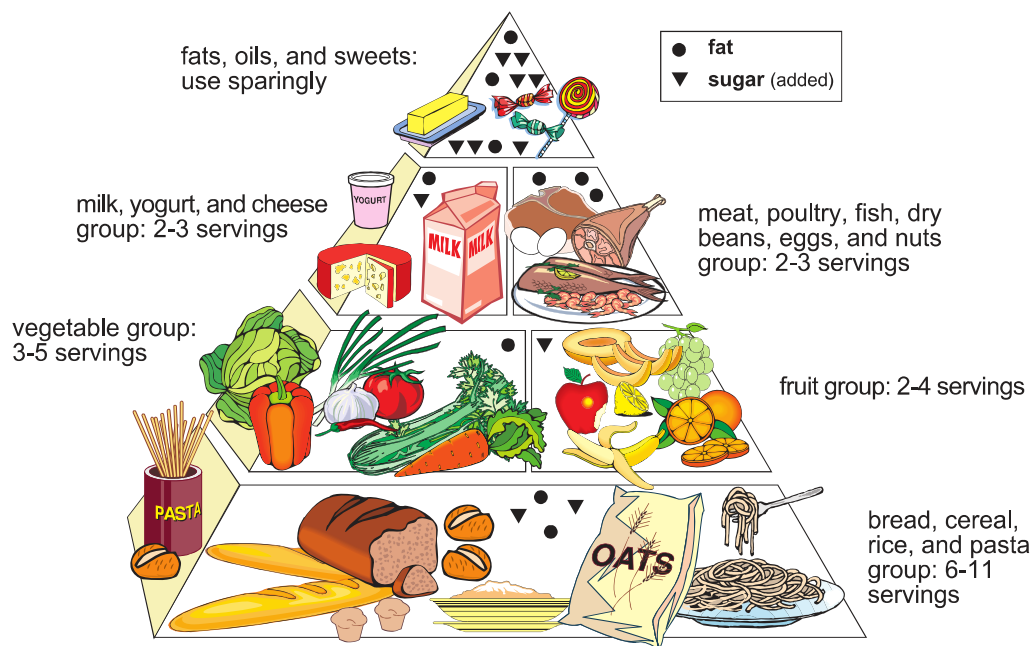
Activity: _____

Number of calories per hour _____ x number of hours _____ = _____ calories

The Eating Right Food Guide Pyramid

The United States Department of Agriculture (USDA) and the United States Department of Health and Human Services have developed guidelines for helping Americans choose better eating habits. The Food Guide Pyramid was developed as a general guide of what to eat each day. The Food Guide Pyramid calls for eating a variety of foods to get the **nutrients** you need and the right amount of calories to maintain a healthy weight.

These easy-to-follow guidelines suggest that most of our calories should come from **carbohydrates** (50-60 percent) such as bread, cereal, rice, and pasta. The rest of our calories should come from fruits and vegetables, dairy products, and lean meat, fish, poultry, beans, or nuts. We should eat *fats*, oils, and sweets sparingly. Keep in mind that within each food group there are still naturally occurring fats and oils that should be figured into your total intake.



The Food Guide Pyramid

The Food Guide Pyramid recommends the following daily guidelines.

- Six to 11 servings of whole grains—bread, cereal, rice, or pasta (a serving is equal to one slice of bread; $\frac{1}{2}$ of a bagel or English muffin; one ounce ready-to-eat cereal; $\frac{1}{2}$ cup of cooked cereal, rice, or pasta)
- Two to four servings of fruit (a serving is equal to one medium apple, orange, or banana; $\frac{1}{2}$ cup of canned fruit; $\frac{3}{4}$ cup of juice)
- Three to five servings of vegetables (a serving is equal to one cup of raw, leafy greens; $\frac{1}{2}$ cup of other vegetables, cooked or chopped raw; $\frac{3}{4}$ cup of vegetable juice)
- Two to three servings of milk, yogurt, and cheese (a serving is equal to one cup of milk or yogurt; $1\frac{1}{2}$ ounces of natural cheese; two ounces of processed cheese)
- Two to three servings of meat, beans, eggs, or nuts (a serving equals two to three ounces of cooked lean meat, poultry, or fish; $\frac{1}{2}$ cup cooked dried beans, one egg, or two tablespoons of peanut butter counts as one ounce of lean meat)



Tips ...

For Healthy Eating and Weight Control

Eat a variety of nutrient-rich foods.

Eat plenty of whole grains, fruits, and vegetables.

Eat moderate portions and be aware of what a serving size consists of.

Choose foods that are low in fat.

Use salt and sugar in moderation.

Make changes in your diet gradually.

Eat smaller, more frequent meals, and spread them evenly throughout the day.

Eat the majority of your food early in the day with your evening meal the smallest.

Eat slowly to give your stomach a chance to feel full.

Avoid second helpings.

Broil, bake, boil, steam, or barbecue rather than fry or saute.

Snack on healthy, low-fat foods such as popcorn, pretzels, low-fat crackers, and fruit.

Drink a glass or two of water before a meal to help diminish your appetite.

Learn to read food labels.

Eat from smaller plates to make food portions appear larger.

Keep a food diary to help you evaluate your diet.

Enlist encouragement from a close friend or family member.

Find an exercise partner you can count on.

Eat only in a specified place in the house.

Avoid fad diets that don't include the proper nutrients your body needs.

Avoid losing more than two pounds of weight per week.

Nutrition Facts and Fallacies

It is often hard to know what to believe about diet and exercise. A **fallacy** is a mistaken idea, often believed by many people. Here are several of the most commonly believed fallacies followed by the real facts.

- Fallacy:** I can just go on a popular or fad diet to lose weight.
- Fact:** Dieting alone may help you to lose weight temporarily, but the weight is usually gained back. Fad diets are diets that promise fast weight loss. Only a lifetime commitment to eating low-fat healthy foods and getting regular exercise guarantees success.
- Fallacy:** Certain foods, diet pills, or **diuretics** can help burn fat calories, promoting weight loss.
- Fact:** No foods burn fat. *Diuretics* are drugs that increase the amount of fluid lost through urine. Diet pills or diuretics may help you lose water weight. However, pounds lost from water weight are not body fat and will return quickly.
- Fallacy:** Sugar is a good source of quick energy.
- Fact:** Sugary foods may give you an immediate energy boost, but it is short-lived. The rapid rise in blood sugar is followed by feelings of hunger, irritability, and sleepiness.
- Fallacy:** During exercise you should drink water only when you feel thirsty.
- Fact:** Your body can become dehydrated before you feel thirsty. Serious health problems, up to and including death, can result if your fluid intake is inadequate. It is important to drink water before, during, and after exercise. Sports drinks (such as *Gatorade* and *Powerade*) are best used *after* exercise to replace important **electrolytes** lost during exercise.

Fallacy: Adding more **protein** to my diet will help me build muscle.

Fact: A normal diet supplies plenty of protein for muscle growth. Regular exercise training of specific muscle groups and a balanced diet increases muscle mass and strength. An excessive amount of protein is stressful to the kidneys. Like excess fat or carbohydrates in the diet, too much protein will be stored as fat.

Fallacy: *Fasting*, or skipping meals, will help me to lose weight.

Fact: Abstaining from food, or fasting, will not help you to lose fat weight. When you skip meals, your body is forced into a starvation mode. It will use up important calorie-burning muscle tissue to survive. Your body will slow down and begin to store fat even more efficiently than before.

Fallacy: Vitamins will give me more energy.

Fact: Vitamins do not supply energy. They only help the body to use energy. Energy is supplied by food in the form of calories. Vitamin supplements may be helpful for individuals with special needs. However, for an average, healthy person, a well-balanced diet supplies sufficient nutrients.

Fallacy: Muscle cramps indicate a lack of salt intake.

Fact: Muscle cramping is often caused by severe water loss from sweating or over-exercising. Salt tablets can worsen this condition. They draw more water out of the muscle and into the stomach.

Fallacy: Overfat people eat more than lean ones.

Fact: Not necessarily. Overfat people often eat *less* than lean individuals. Their bodies, however, have adjusted to a low-calorie intake. When they do overeat, they easily gain weight.

Fallacy: You only burn a high rate of calories while you exercise.

Fact: Exercise helps make your body a better fat-burning machine. Regular exercise helps you continue burning a high rate of calories even after you stop exercising.

Fallacy: Exercise increases your appetite.

Fact: Exercise actually blunts your appetite temporarily. More exercise means your body needs more nutrients. Exercise helps you to regulate calorie intake to appropriate levels.

Fallacy: Bread, rice, pasta, and other *carbohydrates* are fattening.

Fact: Whole grain carbohydrates such as bread, pasta, rice, and cereal have less than half the calories of fat. They are the best source of energy during physical activity. It is what is added to carbohydrates, such as butter and sour cream, that makes some foods fatty.

Eating Disorders: When Food Becomes an Enemy

Over a million Americans suffer from eating disorders. Poor eating habits and obsessive dieting can lead to serious health problems.

One type of eating disorder, known as *starvation sickness*, is called **anorexia nervosa**. It is characterized by a refusal to eat followed by severe weight loss. Individuals with this disorder believe they are overweight even though they appear very thin. Many may also develop an obsession to over exercise.

Another eating disorder is **bulimia**. The bulimic individual often eats large amounts of high-calorie foods. After overeating, the individual vomits or uses laxatives to get rid of the food before it is digested.

People with these disorders think they are overweight, even when they may actually be very thin. These eating disorders can cause chronic health problems and even death. People with these problems should seek the help of a professional.

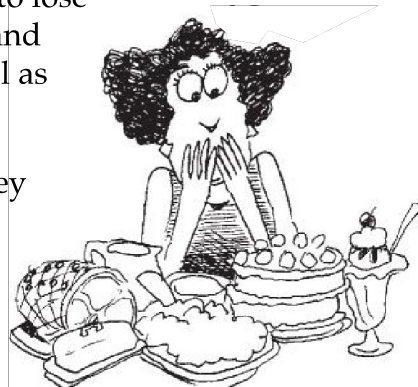
Summary

Many people place far too much emphasis on their body weight. Weight alone is not a sufficient measure of health. Knowing how much of your body is *lean body mass* and how much is *fat* is a much more important indicator of health. The proportion of *lean body mass* to fat in the body is known as *body composition*. Seeing the relationship between body weight, body shape, and disease has helped us understand the importance of body composition in achieving good health. Carrying an excessive amount of body fat, or being *overfat* or *obese*, puts us at high risk for many diseases.

To improve body composition, you should combine diet and regular exercise. It takes a reduction of 3500 *calories* to lose a pound of fat. To ensure that the fat is lost and not muscle, it is important to exercise as well as take in fewer calories.

A low-fat diet and regular exercise are the key ingredients in achieving good health and a lean, fit body.

Over a million Americans suffer from *anorexia nervosa* or *bulimia*. These eating disorders can cause health problems. Victims of these disorders need professional help.



Poor eating habits can lead to serious health problems.