Fitness and Nutrition : Cardiorespiratory Fitness

Lesson 4 Overview

Cardiorespiratory fitness, also called aerobic fitness, cardio fitness, and cardiorespiratory endurance, is an essential component of physical fitness. When you've reached an appropriate level of cardiorespiratory fitness, your heart and lungs work together to transport oxygen- and nutrient-rich blood to all of the muscles and systems in the body, as needed. Your muscles are able to efficiently use the delivered oxygen to produce energy needed to sustain exercise without too much fatigue.

Cardiorespiratory fitness is the ability to maintain high-endurance aerobic exercises, such as cycling, swimming, and running, for a prolonged period of time (for example, a period of 20 minutes or more), without the early onset of performance-inhibiting fatigue.

Cardiorespiratory fitness offers numerous physical and psychological benefits. In this lesson, you'll learn the general principles of cardiorespiratory exercise.

4.1 Develop a cardiorespiratory routine

Cardiorespiratory Fitness Routines

READING ASSIGNMENT

Many people make cardiorespiratory exercise the center of their fitness routines. People want to look toned and healthy on the outside and have efficiently working hearts and lungs on the inside.

To get ready, you'll want to review some of the exercise terminology presented in prior lessons. VO_2max is an excellent measure of cardiorespiratory fitness. VO_2max is the highest level of oxygen consumption that can be sustained during exercise. VO_2max is a laboratory measurement of the workings of the cardiorespiratory system and muscles.

VO_2max works like this: The more you increase the intensity of your workout, the more

oxygen you need to bring into your body and the more carbon dioxide you need to remove from your body. The harder you work, the faster your breathing rate, which brings in more oxygen and removes more carbon dioxide.

In this lesson, you'll become familiar with the workings of the cardiorespiratory system, identify appropriate blood pressure ranges, and learn the basic principles of exercise, including intensity, mode, duration, and frequency. You'll also learn how to find resting and target heart rates.

[Couple Walking for Exercise]

Studies have shown that low-intensity exercise can lower blood pressure for a duration of almost 24 hours after the exercise is completed.

Cardiorespiratory exercise can help to prevent or lessen the damage from obesity, hypertension, heart disease, joint disorders, and stress. Many studies have linked cardiorespiratory exercise to the lowering of blood pressure both immediately following exercise and for almost 24 hours after the exercise is completed. In the past, it was shown that exercise significantly lowered blood pressure for an hour or two after exercise, but it wasn't known how long the effect lasted. After studying elderly patients with high blood

pressure taking part in a low-intensity, 45-minute aerobic exercise session (riding stationary bicycles and walking), researchers found that the blood-pressure-lowering effect lasts approximately 24 hours.

It has been known for years that emotional stress increases the risk for heart disease; stress can have as much of a negative impact as a lack of exercise or a poor diet. The way a person handles emotional stress can affect cardiac health.

How do we know this? People with long-term clinical depression tend to have more heart disease and hypertension. The levels of homocysteine, a heart-damaging chemical found in the blood, are generally higher in depressed and chronically angry people. Homocysteine can damage the protective layers of artery walls, causing arterial damage and, ultimately, heart disease. People who exercise on a regular basis tend to have less clinical depression and lower homocysteine levels.

Here's the moral of this story: The more you exercise, the less depression you'll experience and the healthier your heart will be. So, let the (cardio) games begin!

[Woman Working Out]

The more you enjoy your workouts, the more likely you are to repeat them on a regular basis.

The best cardiorespiratory workout is the one that you'll perform on a regular basis. Why is this the case? The type of exercise you choose, the frequency with which you do the exercise, the level of intensity you achieve during exercise, and the amount of time you'll spend doing the exercise will affect your results. The more you like the workout, the more you'll do it. That's what getting and staying in shape is all about. Whether you select an

exercise video, go for long, quick-stepping walks, or swim laps in the pool, make sure your heart rate gets and stays in the target range for at least 20 minutes. That 20-minute time period is the least amount of time a person can exercise and derive cardiorespiratory benefit. The following box has more information on exercise that can develop and maintain cardiorespiratory endurance.

Exercises That Develop Cardiorespiratory Endurance

Walking	Jogging	Running	Swimming
Basketball	Climbing stairs	Hiking	Dancing (fast)
Kickboxing	Step aerobics	Racquetball	Jumping rope
Water aerobics	Water jogging	Cross-country skiing	Cycling
Housework (vacuuming, sweeping)	Rowing	Outdoor chores (chopping wood, scraping paint)	

Note: To achieve any cardiovascular benefit, all aerobic exercise must be maintained in the target heart range for at least 20 minutes.

[Exercises That Develop Cardiorespiratory Endurance]

One of the least expensive cardiorespiratory exercises to engage in is walking. Walking for 20 minutes three or four times a week is a very effective way to improve the cardiorespiratory system. As your system improves, your heart and lungs will work more efficiently. You'll supply more oxygen to working muscles while burning fat. Fat stores will decrease, and more muscle mass will magically appear!

TARGET HEART RATE RANGE

[Woman Walking Fast]

Walking for 20 minutes three or four times a week is an effective way to improve cardiorespiratory health.

So how do you know that what you're doing for exercise is actually working or is enough to produce the health effects that you desire? On one hand, you want to exercise at an intensity that makes your heart rate increase. On the other hand, working your heart too much can be dangerous and will make exercise difficult to do for an extended period of time. When exercising, you should aim to keep your heart beating a certain amount of times per minute; this is known as *target heart rate*.

Before finding your target heart rate, you need to calculate your maximum heart rate (MHR). Maximum heart rate is the fastest your heart should ever beat in one minute. To find your MHR, simply subtract your age from 220. For example, for a person who's 30 years old: 220 – 30 = 190 MHR

When exercising, you should aim to keep your heart rate between 60 and 80 percent of your MHR. This is called the target heart rate range.

To find this range, multiply your MHR by .6 and .8.

TARGET HEART RANGE

If your **MHR = 190**, then multiply this number by both .6 and .8. The results of these two

calculations will give your target heart rate range.

190 × .6 = 114 and 190 × .8 = 152

Therefore, your target heart rate range is **114–152**. You'll know if the exercise that you're doing is working if your heart rate falls between 114 and 152 beats per minute. If your heart rate is lower than 114, then you must work harder for the exercise to work; if it's higher than 152, then it might be difficult for you to maintain that intensity.

If you maintain a target heart rate range while walking, you're exercising aerobically. Walking at a steady pace, with a little bit of huffing and puffing, indicates that you're in your target range. Another rule of thumb is that conversation should be a bit difficult, but not labored. You should feel some exertion, but your muscles shouldn't burn, and you shouldn't be gasping for breath. If this is happening, slow your pace and work up to a faster pace. Listen to your body (unless it tells you to stay in bed and eat chocolate all day).

Use these two quick steps to calculate a target heart rate range:

1. Find MHR by subtracting the person's age from 220.
2. Multiply MHR by .6 and by .8.

Cardio for Couch Potatoes

When former couch potatoes first begin walking, they should walk slowly for the first several weeks, with each session being no more than 20 minutes. This will allow the walker to ease into a healthy regimen, without experiencing discouraging aches and pains. Active people who have been exercising regularly (at least two times a week) can start walking at a maximum of 30 to 40 minutes per session. For very active people who have been exercising three or more times a week, brisk walking sessions can last up to 40 to 60 minutes. The following "Exercise" activity provides more information on a great program for couch potatoes.

AMERICA ON THE MOVE

America on the Move, or AOM, is the brainchild of Dr. James O. Hill, director of the Colorado

Health Sciences Center. AOM is a nationwide initiative, begun in 2000, that urges people to make small changes in their diets and physical activity levels.

AOM is recommended for the “seriously out-of-shape baby boomer” and other couch potatoes. AOM seeks to stem heart disease and other conditions caused by physical inactivity and poor diet.

Participants are encouraged to add 2,000 steps to their day (about one mile) to burn an extra 100 calories daily. In addition, they’re asked to attempt to eliminate 100 calories from their diet each day. This addition/subtraction routine can help adults avoid the 3- to 5-pound annual weight gain that plagues most Americans.

To date, over 250,000 people have taken the AOM challenge, including people from senior groups, community centers, and work groups.

Many participants point out that AOM isn’t stressful and is easy to do, because it requires only baby steps and 5 to 10 minutes each day.

Walking allows for few excuses. Don’t have 20 minutes? If 20 minutes isn’t possible, even 10 minutes of exercise can help to improve cardiorespiratory endurance. Knees hurt? Jog in the pool. Even walkers who don’t have any joint distress might want to jog in the water to add a little spice to their walking workout.

When you feel ready, spend most of your walking time walking briskly. When you’ve been walking regularly, three times a week, for several months, you’ll experience a wonderful training effect. Your resting heart rate will be slower, your stroke volume will be greater, and your heart will efficiently move blood through your body with less effort than prior to your walking regimen. You’ll probably notice that your resting heart rate is lower after just a few weeks of beginning cardiorespiratory exercise. This means that you need to recalculate your target heart rate periodically to keep up with your fitness level.

An important part of exercise is successfully monitoring your progress. Fitness professionals and healthcare professionals take a team approach to exercise monitoring. The following Exercise activity has more information about monitoring your exercise and teaching others how to monitor their progress.

MONITORING

- During the first weeks of exercise, establish resting and target heart rates. Take a pulse about 5 minutes into an exercise regimen. If the rate is too low, increase the exercise intensity. If the rate is too high, slow down the exercise and work up gradually.
- After several weeks of regular exercise, obtain the resting heart rate. It will probably be lower than before. This means the target heart rate will need to be recalculated.
- During regular exercise, a pulse should be taken 5 minutes into exercise and then at 15-minute intervals. Adjust exercise as appropriate.

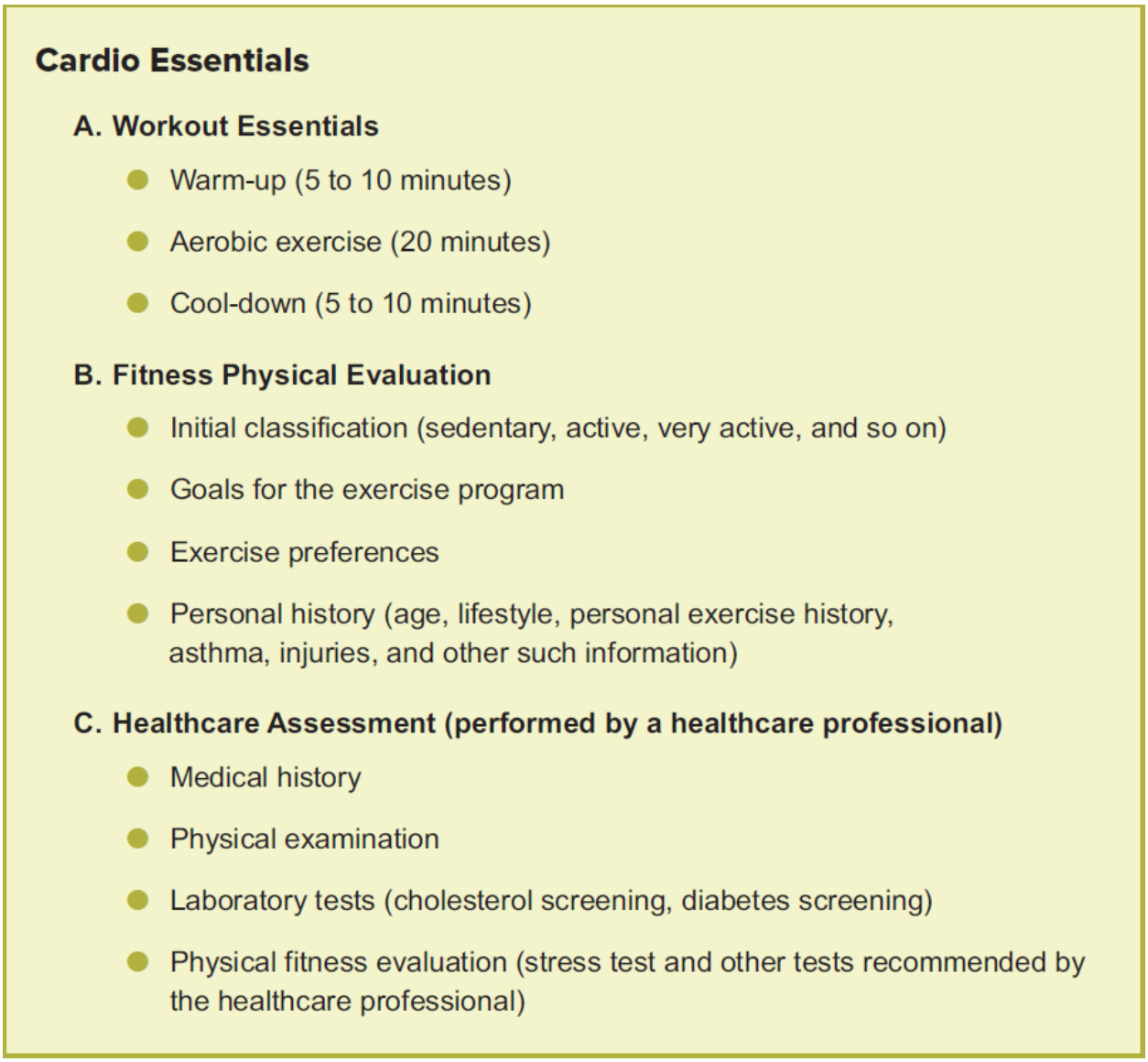
Don’t overdo it! If your back, hips, knees, ankles, or feet hurt, or if your normal resting heart rate is faster than usual, take at least one day off. Or, employ different modes of exercise that emphasize different muscles. If problems persist, consult with a healthcare professional.

The Heart of Cardiorespiratory Fitness

The heart must be overloaded to get into shape, just like any other muscle in the body. However, you want to make certain that you’re taxing the heart a little, but not too much. Too little overload and you get no cardiorespiratory advantage. Too much overload and you might harm your cardiorespiratory system.

Before beginning a vigorous aerobic exercise routine intended to overload the heart, all adults, whether they’re healthy or not, should have a thorough physical examination. A diagnostic exercise stress test is an excellent component of the examination. People should share their exercise plans with their healthcare professionals.

The following box contains some general guidelines for cardiorespiratory exercise.



[Cardio Essentials]

Key Points

READING ASSIGNMENT

Key Points

Cardiorespiratory exercise can help to prevent or lessen the damage from obesity, hypertension, heart disease, joint disorders, and stress.

Walking briskly is an inexpensive, effective way to improve the cardiorespiratory system and increase endurance.

Exercise: Cardiorespiratory Fitness

Based on what you've read, answer the following questions.

1. What diseases and disorders can be prevented or lessened through regular cardiorespiratory exercise?
2. Explain the relationship between depression and heart disease.
3. What's the relationship between VO_2max and cardiorespiratory exercise?
4. A man who is 40 years old wants to begin exercising daily. Calculate his target heart rate range.
5. Why should couch potatoes begin exercising at a slower, less intense rate than active individuals?
6. Before starting a cardiorespiratory exercise program, which medical tests might you consider receiving from your doctor?

Exercise Answer Key:
Exercise: Cardiorespiratory Fitness

1. Obesity, hypertension, heart disease, joint disorders, and stress
2. People with long-term clinical depression tend to have more heart disease and hypertension
because of the increase in homocysteine levels in the blood. Homocysteine
can damage the protective layers of artery walls, causing arterial damage
and, ultimately, heart disease.
3. The greater the intensity of your workout, the more oxygen you need to bring into your body and the more carbon dioxide you need to remove from your body. The harder you work, the faster your breathing rate, which brings in more oxygen and removes more carbon dioxide.
4.
220 – 40 = 180 (maximum heart rate)
180 × .6 = 108
180 × .8 = 144

Target heart rate range = 108–144

5. To decrease the risk of minor aches and pains and major muscle injuries
6. Blood pressure monitoring, blood work, and treadmill stress test

4.2 Identify ways to personalize a cardiorespiratory routine

Up Close and Personal

READING ASSIGNMENT

Everyone's fitness program should be personalized; some fitness professionals call personalized fitness programs exercise prescriptions. Every fitness program, or exercise prescription, should include a warm-up, a primary conditioning period (often referred to simply as the workout), and a cool-down.

The Overture: Warm-Up

Every workout should start with a warm-up. The purpose of a warm-up is to increase your heart rate and blood flow, allowing the muscles to receive the amount of blood required to successfully complete the workout. Here are some examples of warm-up exercises:

- Begin slowly with a low-intensity version of the chosen exercise. For example, start out with a walk before a jog.
- Complete a series of different exercises that help to warm the muscles for better flexibility and to slowly raise the heart rate. For example, do 15 minutes of a combination of low-intensity calisthenics, walking at a slow pace, stretching, and slow jogging.

The Performance: Workout Intensity, Frequency, and Duration

Aerobic workouts are meant to improve cardiorespiratory fitness, strength, and endurance. This means that you must include modes of exercise that "stress" the body with the proper frequency, intensity, and duration.

The mode of exercise refers to the type of exercise chosen. The mode could be walking, running, jogging, swimming, cycling, or any other exercise that uses large muscles in a

repetitive manner. When selecting modes of exercise, ask yourself these questions:

- Can the exercise be enjoyed over the long term?
- Are the appropriate facilities available?
- Are there any injuries that must be worked around?
- Is there a budget that must be adhered to?

Fitness can be achieved only through frequency; that is, the fitness program must be repeated multiple times each week. The current thinking is that a frequency of 3 to 5 times per week is minimal, with 10 times a week maximal. That's why it's important to pick exercises that can be enjoyed over time. It's generally recommended when starting a cardiorespiratory training regimen to plan for 3 to 5 sessions per week. More isn't always better; the body likes balance. If you push it to the limit and exercise more than 5 days a week, you'll probably see only minimal improvements, and you'll place yourself at risk for muscle injuries and illness due to reduced immune function. Additionally, you might experience difficulty exercising at the previous intensity rate because you'll be too tired. On the other hand, as few as 3 nonconsecutive (alternating days) 20- to 30-minute exercise sessions per week might give cardio benefit, depending on the routine and the person's level of overall fitness.

Intensity is another, often overlooked, important component of cardiorespiratory fitness. It isn't just the fact that you walk for 20 minutes a day; it's the overload factor— how much did you reasonably tax your system (without blowing a sprocket)? If you don't push the body, at least a little bit, you won't increase the oxygen you can extract and deliver to your exercising muscles.

[Man Doing Sit-Ups on Beach]

Intensity is an important component of a regular fitness

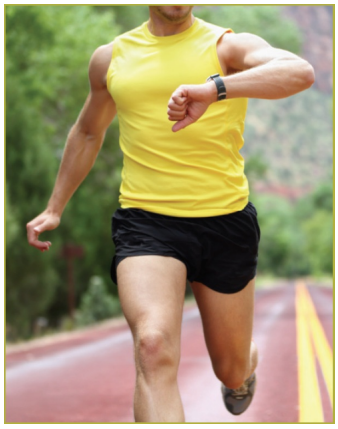
regimen.

Some fitness professionals like to speak about training intensities, rating people at 50 to 85 percent of training intensity. The *training intensity (TI)* is supposed to show how fit a person is by comparing the resting heart rate with the maximum heart rate.

To calculate training intensity, you'll need to know your resting heart rate (RHR) and heart rate reserve (HRR) numbers The HRR is calculated by subtracting the RHR (resting heart rate) from the MHR (maximal heart rate), or HRR = MHR – RHR.

To obtain these numbers, take your pulse when you're exercising at your hardest. That's your MHR. Take your pulse about 20 to 30 minutes after you're through exercising and have been sitting quietly. That's your RHR. To figure out how intensely you're training, guess whether you're working at 50, 70, or 85 percent of your ability, and then use this formula to find out how close you were:

TI (training intensity) = HRR × 50, 70, or 85 percent + RHR



[Jogging Man Testing His Heart Rate]

Maximum heart rate is the pulse you have when you're exercising at peak effort.

Never allow your heart rate to go beyond an 85 percent TI. A rule of thumb is to train at around 50 percent TI during the first month of exercise after a long period of inactivity. Cardiorespiratory benefit can be gained by exercising at 50 percent TI. After a fitness level

has been reached, the person exercising can work toward 70 percent TI or higher. Competitive athletes' performing intervals will exceed 85 percent of their TI during hard bouts of training.

Remember that the target heart rate (THR) is another measure of cardiorespiratory fitness. THRs, based on age and level of fitness, can be calculated or looked up on charts. A THR indicates if the exercise intensity is sufficient to improve health-related fitness. In plain English, if your heart rate goes up a certain amount during a certain period of exercise, you're either becoming fit or you're already fit. THR is easy to measure; it simply requires taking your pulse and comparing it to a THR chart.

We've discussed exercise duration in previous lessons. Not only do you need to push yourself, but you've got to get your heart rate up and keep it there for a while for cardio benefit. It isn't enough to get your heart and lungs working for just a minute. Several schools of thought exist as to the amount of exercise time, or duration, required for cardiorespiratory health. Most fitness professionals seem to agree that cardio health can be improved if the workout portion of exercise lasts at least 20 to 60 minutes.

Duration will vary depending on a person's fitness level and the intensity of exercise. The less intense the exercise, the longer it will need to be maintained to get any benefit from it. If you're exercising at 85 percent TI, then as little as 20 minutes might be sufficient for improvement; at 50 percent TI, at least 30 minutes is needed. Some fitness professionals say you must exercise for at least 20 minutes at a time for cardio benefit. Some research has found that more frequent sessions of less time might also provide a cardiorespiratory benefit, such as three 10-minute workouts per day, separated by four hours, at 70 percent TI. Everyone seems to agree that any workout should be preceded by at least a five-minute warm-up and followed by a five-minute cool-down.

You've Earned It: The Cool-Down

Cool-down is an essential and pleasant portion of a cardiorespiratory workout. Cool-down should include 5 to 15 minutes of light exercise or stretching after the workout. Cool-down helps to get blood back to the heart where it's needed, rather than collecting in the legs and arms. Cool-down also helps to decrease muscle soreness and even out the heartbeat.

[Woman on Elliptical Machine]

The cool-down period should consist of 5 to 15 minutes of light exercise or stretching after a workout.

Many people are tempted to skip the cool-down. Don't do it! Your body will thank you. If you don't cool down, blood can pool in the exercised body parts and diminish return of blood to the heart. The result is swollen feet and dizziness in the head. In addition, abruptly stopping an intense cardio workout with no cool-down can even bring on cardiac abnormalities, such as irregular heartbeats or arrhythmias.

Key Points and Links

READING ASSIGNMENT

Key Points

- Every fitness program should include a warm-up, a primary conditioning period (the workout), and a cool-down.

Links

- Livestrong (www.livestrong.com/article/25929-workout-plan-creators/)
- Gaiam Life (life.gaiam.com/article/creating-your-own-cardio-fitness-plan)

Exercise: Exercise

Based on what you've read, answer the following questions.

1. What four considerations should you make before selecting a mode of cardiorespiratory exercise?
2. What are the minimum and maximum frequencies for exercise regimens?
3. What are the benefits of the cool-down period following exercise?

Exercise Answer Key:
Exercise: Exercise

1. The long-term enjoyment of the exercise, the availability of facilities, the need to accommodate injuries, and budgetary restrictions
2. A frequency of 3 to 5 times per week is minimal, and 10 times is maximal.
3. Cool-down helps get blood back to the heart, rather than collecting in the arms and legs. It also helps to decrease muscle soreness and even out the heartbeat.

4.3 Design a training program with a mix of cardio and anaerobic training

Cardio Training: Different Strokes

READING ASSIGNMENT

Over the years, many fitness professionals have developed different types of cardio training programs. The following sections contain just a few of the more popular techniques.

Interval Training

Interval training is a common way to increase cardiorespiratory fitness very quickly. Cardiorespiratory activities are performed at an intensity and duration of 90 to 100 percent TI for 60 to 90 seconds. After a period of active rest (walking slowly or jogging in place), the person repeats high-effort activities for another 60- to 90-second period. This process is repeated to complete three cycles of this pattern of activity. The workout should be increased by one cycle every two weeks to once a month.

Medium-Range Training

Medium-range training involves time periods of 10 to 30 minutes of high-intensity exercise. The effort should be 90 to 100 percent. You shouldn't be able to hold a conversation while the workout is being performed. Medium-range training is a type of "racing" workout.

Long, Steady Distance (LSD) Training

Long, steady distance (LSD) training is an activity that can be sustained indefinitely, such as long walks or easy cycling. A conversation should be possible while engaged in this type of training. An LSD workout teaches the body to burn fat and creates endurance. This workout should exceed 30 minutes.

Combination Cardio and Anaerobic Training

Changing and rotating exercises and techniques helps to avoid training burnout. A good way to train for cardio fitness and overall strength is to follow a weight-training program with cardio activities. On days that you aren't training with weights, you do some LSD training. Some circuit training can be done at least once a week, but for safety reasons, not on a day following a leg workout with weights. The combination of two or more of these techniques with a change (if possible) in the chosen activity can break up the monotony and help to avoid training burnout as cardio fitness and strength increase.

Training Program Examples

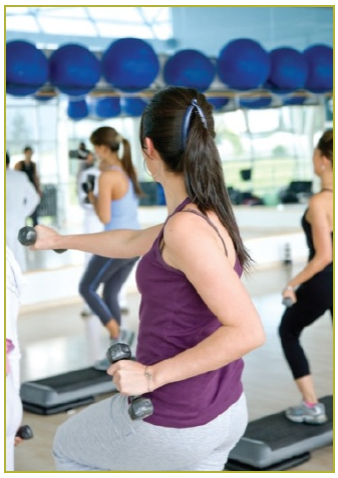
The following are some examples of the various training programs.

Example 1: Interval and Combination Cardio

Warm up with a 5-minute jog or cycle and 2 minutes of stationary rowing.

- 1/2-mile run
- 1 minute of slow jog to recover
- 20 push-ups (bring your chest to the floor and keep your back straight)
- 20 sit-ups
- 10 bicep curls
- 2 minutes of hard run or hard cycle
- 1-minute walk

- 3 minutes of stretching



[Woman at Aerobics Class]

A good way to train for cardio fitness and overall strength is to follow a weight-training program with cardio activities.

Example 2: Interval and Combination Cardio

Perform the following workout for 40 minutes. A fast, 2-minute cycle must be done every 4 minutes. Between cycles, perform the various exercises below in any combination until 4 minutes have passed; then get back on the bike for another 2 minutes.

- 3 minutes of rowing
- 20 sit-ups
- 10 fast push-ups
- 10 shoulder raises
- 10 shoulder presses
- 10 light squats
- 10 triceps dips
- 10 bicep curls
- 10 lateral pull-downs

- 10 bench presses
- 10 light hamstring curls

If you don't have access to equipment, improvise. Use push-ups, triceps dips, squat jumps, and jumping jacks, and run outside.

Example 3: Outdoor Cardio/Sprint for Interval and Medium Range

If you do this workout right, you'll always be really tired by the end, no matter what your fitness level. Start with a 5-minute warm-up jog; long strides, high-knees marching; then stretch thoroughly.

This program includes five sets, each containing five intervals. Before each interval, perform the listed exercise. The interval is to sprint 1/4 mile and then turn around and sprint back 1/4 mile. Recover by walking 1/4 mile. This means you'll start each interval at opposite ends of the 1/4-mile distance. Rest for 2 minutes between each set. Remember, sprints are done up on the toes. Try to think about bringing your calves, quads, hips, arms, and abs all into the sprinting effort.

- **Set 1:** Do five push-ups (chest to ground) and sprint 1/4 mile. Walk to the opposite end. Do five total intervals, and then rest for 2 minutes.
- **Set 2:** Same as Set 1, but perform five squat jumps (in-place frog jump) between intervals.
- **Set 3:** Same as Set 1, but do three clap-hands push-ups in between intervals.
- **Set 4:** Same as Set 1, but do two push-ups, two squat jumps, and two clap-hands push-ups between intervals.
- **Set 5:** Same as Set 4, but one of each exercise between intervals.

When you complete all of the sets, do a 5-minute cool-down jog and thorough stretch.

Example 4: Cardio Endurance Drill 1 (Medium Range)

Do an 8-minute slow jog and then stretch for 4 minutes. Run at a 60 to 75 percent pace for 5 minutes and then walk for 1 minute. Repeat until you've done 8 5-minute runs. Slow jog for 5 minutes and then stretch.

Example 5: Cardio Endurance Drill 2 (Medium Range)

Do a 5-minute warm-up jog and then stretch. Run for 12 minutes straight. Measure your distance (track or treadmill). Try to do this once a week. Aim to complete 1¾ miles in 12 minutes. If you can already do this, aim for 2 miles in 12 minutes.

Example 6: Cardio Endurance Drill 3 (Medium Range or LSD, Depending on Intensity)

Exercise a total of 45 minutes using a combination of exercises. For example, do a 5- minute run, 10-minute cycle, 5-minute stair stepper, and 5-minute row.

Example 7: Cardio Endurance Drill 4 (Medium Range)

Do a 5-minute warm-up jog and stretch. If you're near a track, do sprint pyramids. Begin with a 400-meter sprint, a 400-meter walk, a 200-meter sprint, a 200-meter walk, a 100- meter sprint, and a 100-meter walk. Gradually increase the number of sprints at each distance to give yourself more of a challenge.

Example 8: Sprint Training (Interval)

Find a steep slope. Warm up for 5 minutes and stretch. Perform eight 1/4-mile sprints up the hill; walk back during recovery. Don't rest between these eight sprints other than the walk-back recovery.

Example 9: 30-Minute Treadmill

Settings for equipment or speed for walking or jogging are just suggestions; modify them according to your needs and abilities and, when possible, add some cardio overload if appropriate.

This drill involves alternating speed-walking intervals with recovery (walking or slowly jogging) intervals. Be sure to increase your intensity or speed to ensure a cardio workout. Exercise levels are 1–3 (easy, relaxed), 4–6 (conversation difficult, but not labored), 7–8 (huffing and puffing). Don't go beyond your ability. Use a treadmill with settings or walk/jog on a track or an outdoor mild incline.

Time	Intensity (treadmill)	Speed (walking)	Level
5 minutes	3.0 mph	warm-up	2–3
5 minutes	4.5 mph	slow jog	4
1 minute	5.5 mph	run	6
2 minutes	4.0 mph	slow jog	4
1 minute	5.5 mph	run	6
2 minutes	4.0 mph	slow jog	4
1 minute	6.0 mph	fast run	7
2 minutes	4.0 mph	slow jog	4
1 minute	as fast as you can	as fast as you can	7–8
2 minutes	4.0 mph	slow jog	4
5 minutes	3.0 mph	cool-down	2–3

[Treadmill Times and Intensities]

Example 10: 45-Minute Treadmill

Settings for equipment or speed for walking or jogging are just suggestions; modify them according to your needs and abilities and, when possible, add some cardio overload if appropriate.

This drill also involves high-intensity intervals and recovery (walking or slow jogging) intervals. Be sure to increase your intensity or speed to ensure a cardio workout. Exercise levels are 1–3 (easy, relaxed), 4–6 (conversation difficult, but not labored), 7–8 (huffing and puffing). Don’t go beyond your ability. Use a treadmill with settings or walk/jog on a track or an outdoor mild incline.

Time	Intensity (treadmill)	Speed (walking)	Level
10 minutes	3.0 mph	warm-up	2
1 minute	5.0 mph	jog	5
1 minute	6.0 mph	faster jog	5–7
1 minute	5.0 mph	jog	5
5 minutes	4.5 mph	slow jog	4
1 minute	5.0 mph	faster jog	5–7
1 minute	as fast as you can	as fast as you can	7–8
1 minute	5.5 mph	fast jog	5-6
5 minutes	5.0 mph	jog	4–5
3 minutes	5.5 mph	fast jog	5–6
10 minutes	5.0 mph	jog	4–5

[Treadmill Times and Intensities]

Example 11: Spin and Stride

Do this program on a treadmill, a stationary bike, and an elliptical climber or walk, cycle, and climb stairs. Alternate 15 minutes on each activity. Try to keep the intensity level fairly high, depending on your fitness level.

Treadmill/Walk

- 1-minute warm-up
- 3-minute jog
- 1-minute fast jog
- 2-minute faster jog
- 1-minute fast jog
- 1-minute jog
- 2-minute cool-down

Cycle

Note: If you're bicycling outdoors, treat 70–80 rpm as very fast and 100–110 rpm as fast as you can go.

- 3 minutes 70–80 rpm
- 1 minute 100–110 rpm
- 1 minute 70–80 rpm
- 1 minute 100–110 rpm
- 1 minute 70–80 rpm
- 1 minute 100–110 rpm
- 1 minute 70–80 rpm
- 4-minute cool-down

Elliptical Trainer

Note: If you're climbing stairs, treat 4/5 as walking quickly upstairs, 5/5 as a jog, and 6/6 as fast as you can go.

- 3 minutes, level 4/5
- 2 minutes, level 6/6
- 3 minutes, level 5/5
- 2 minutes, level 6/6
- 5-minute cool-down

Example 12: Cardio on Wheels

This routine combines two complementary cardio exercises: cycling and skating. This combination keeps the muscles stimulated, burns calories, sculpts legs and glutes, and strengthens the core.

Day 1: Cycling

Begin with 30 minutes of easy or moderate cycling (conversation requires just a little bit of effort). As you progress in weeks 2 through 4, add bursts of 1-minute, high-intensity cycling (conversation requires a lot of effort). Gradually work your way up to 45 to 60 minutes of cycling with 2 to 4 bursts.

Day 2: Inline Skating and Cycling

Begin with 5 minutes of easy skating (remember all your safety gear). For the next 5 minutes, skate with long strides at a moderate speed (conversation is moderately difficult). For the next 5 minutes, sprint at a challenging pace (conversation is very difficult). Return to a moderate speed for 5 minutes and then slow to an easy pace for 5 minutes. Total skating time is 25 minutes.

Next, jump on your bike and repeat the same sequence: easy–moderate–challenging–moderate–easy for 25 minutes of cycling.

Day 3: Inline Skating and Cycling

Begin with 5 minutes of easy skating. Then, alternate 5 minutes of striding at a moderate pace with 5 minutes of easy skating. Do this easy-moderate routine 3 times or until you've been skating for 45 minutes.

After skating, jump on your bike and repeat Day 2 (easy–moderate–challenging–easy) for 25 minutes.

Day 4: Repeat Day 2, but do your cycling before your skating.

Personal Fitness Programs and Phases

[Women Doing Step Aerobics]

Some people benefit from fast, intense workouts, while others benefit from slow, steady workouts.

Everyone starts out at different fitness levels and has different physical abilities. Some

people can handle fast, intense workouts, and others benefit more from slow, steady workouts. Some people are interested in or are able to do only one type of exercise, whereas others prefer a “buffet” of exercises. We’ve introduced this material in previous lessons. We’ll now apply it to cardiorespiratory fitness workouts.

Starter Phase

If you approach a fitness program too fast, you’ll become bored and sore on the first day, and that will be that—game over. The starter phase allows the body to get used to the idea of exercise, avoid soreness and injury, and to experiment until you find the program that works best.

The starter phase can last from three to eight weeks, depending on the person. The starter phase of the fitness program should include a warm-up, short workout, and cool-down, with attention to fatigue and pain.

Remember the training effect? The training effect makes it seem as if running for a mile or doing 20 laps in the pool will be a “piece of cake.” Your body is able to hold it together for the first several training sessions before it begins the long cycle of adaptation. You must be very careful to avoid injury or overdoing it while you’re still experiencing the training effect. It will feel as if you can do much more than your body is really able to safely handle. Typically, depending on the individual, the first one or two exercise sessions feel good, with little soreness or perceived stress. Then, like a ton of bricks, on the third or fourth session, everything hurts or only half the workout can be completed. Avoid the consequences of ignoring the training effect by designing a conservative fitness program and allowing enough time in the starter phase.

Slow Progression Phase

In the slow progression phase, from 12 to 18 weeks, you slowly work up to where you want to be. Remember that fitness is a lifetime commitment, not a seasonal fancy.

Maintenance Phase

When you’ve reached the maintenance phase, you should be achieving your frequency, intensity, and duration of exercise goals with each workout. This is where you’ll stay, with minor changes, over the years.

Specific Versus Cross-Training

Sports shoe and clothing companies have caught on to the fact that some athletes like one activity, whereas others prefer cross-training. They offer different shoes and different outfits for specific exercises or one type of shoe or outfit that works with many types of exercise.

The question is, which makes you more fit: doing one specific exercise or doing several different types of exercise—that is, cross-training? This is an eternal fitness question. Much research has been done to support the effectiveness of both approaches.

Any sport or exercise you do places two types of demands on your body. Every exercise has a specific pattern of muscle and joint coordination and places high demands on very specific groups of muscles. To become very good at a sport, or to become very fit, you need to develop endurance. The jury is still out on whether the best way to do this is to play lots of tennis, period, or to supplement tennis with running and swimming.

When deciding between specific training and cross-training, first figure out your fitness goal. Do you want to become a world-class swimmer, or do you want to be fit overall? Most exercise professionals would agree that cross-training helps to maintain a good aerobic base and good muscular balance, as well as helping to avoid injury.

Athletes who want to concentrate only on their sport feel a need to dedicate all their available time only to that sport. However, cross-training reduces overuse injuries, lessens flexibility and strength imbalances, increases plasma volume, and improves body composition when included in an off-season program for athletes.

An argument for cross-training could be that one of the keys to fitness is to be fit overall. For example, weight training doesn't help a runner increase his time, but it does help strengthen muscles in the abdomen and lower back, which helps to prevent injury, keeping the runner on the track. You could add in cycling to give the weight-bearing hips, knees, and ankles a rest while maintaining endurance and burning calories to reduce body fat.

Of course, cross-training is sometimes needed because of external factors. It's hard to row when the lake is frozen, and it's hard to long-distance run when it's 110 degrees in the shade!

Slow Versus Intense

Two types of training that play off each other are long, slow distance training and interval training. Lots of people like long, slow training because the intensity of the exercise doesn't increase; only the time does. Long, slow training requires at least 40 to 60 minutes each session. In contrast, interval training has become popular because it's done with speed and might not become boring. In interval training, you do repeats of intense exercise for one to five minutes, then rest; most people wait until they're fit before using interval training.

Cardio Faux Pas

To avoid exercise routine mistakes and obtain maximum benefits from your exercise program, it's important to avoid the following mistakes:

1. Exercising Too Hard, Too Often

If you don't rest enough between hard cardio workouts, you'll stop making progress, and you might even lose some of the fitness you've gained. You're also a likely candidate for exercise burnout.

How to Fix It: To keep your muscles happy and your motivation elevated, alternate shorter, tougher cardio workouts (20 minutes is good) with longer, easier 40- to 60-minute workouts. Don't push yourself to the absolute limit more than twice a week. Remember, the more intensely you train, the more time your body needs to recover. A good plan would be to do a couple of really hard workouts and then take one day off each week.

2. Cardio Coasting

If you stick with the same cardio workout, such as the same aerobic exercise class workout day in and day out, you can actually sabotage your results. You'll also become bored, which means you might stop exercising! To reliably boost your fitness (cardio) level, you need to get outside that "I know this routine inside and out" zone to the point where you're a bit winded and you can feel your heart pounding (within reason). Remember, cardio is most effective when you challenge yourself.

How to Fix It: Instead of coasting or doing moderate-intensity workouts all the time, add in some high-intensity intervals twice a week. For example, warm up on the treadmill and then increase the speed or the incline for 1 minute. Recover for 1 or 2 minutes with easy or moderate exercise. Alternate for 15 minutes. Challenge yourself with a different exercise

video or class, cycling instead of swimming, or making some other change.

Cardio Myths

You might have heard some myths regarding cardiorespiratory exercise. Consider the following true and false statements regarding cardiorespiratory exercise.

- *True or False?* A healthy diet or regular exercise can slow the progress of heart disease, such as atherosclerosis.

True. Many studies have shown that diets low in saturated fat paired with regular aerobic, cardiorespiratory exercise can slow the development of atherosclerotic plaques (hardened fatty deposits in the arteries). Diet and exercise have also been shown to prevent the progression of heart disease.

Bottom line: Research shows that regular aerobic exercise and a low-fat diet help to slow or prevent some types of heart disease.

- *True or False?* There's a great risk of sudden cardiac death while exercising.

False. About 10 to 15 sudden cardiac deaths during exercise are reported annually in the United States. Considering the millions of people who exercise or play sports on a regular basis, the likelihood of a healthy person dying from sudden cardiac death is extremely small. A thorough medical exam can identify some of the risk factors for sudden cardiac death.

Bottom line: Resolve to get in and stay in shape. Have a thorough physical examination and share your medical history with your healthcare professional. Work with a fitness professional to design an exercise regimen that meets your needs and fitness level.

- *True or False?* People get a "physical high" or "runner's high" when they do aerobic exercise.

True. During sustained, vigorous aerobic exercise, the pituitary gland releases hormones called endorphins. Endorphins are natural chemicals that can give a feeling of happiness or well-being.

Bottom line: Exercise will make you feel good!

- *True or False?* If you exercise and smoke, the exercise will decrease the damage from smoking.

False. Smoking diminishes the body's ability to transport oxygen through the blood, because the carbon dioxide from smoke combines more easily with oxygen than hemoglobin. Chronic smoking decreases the body's immune response. So, if you smoke and exercise, you'll probably be wheezing and sneezing. Exercise can't compete against the harsh chemical agents found in cigarettes. If you stop smoking and exercise, the increased fitness level may help to increase the function of compromised pulmonary and cardiac tissue.

Bottom line: Stop smoking.

- *True or False?* You must wait two hours after eating to exercise.

Mixed. This myth depends on how much you ate and how vigorously you're going to exercise. You can take a slow stroll as soon as you put down your fork. If you ate a large meal and want to go all out on the treadmill, two hours is a good waiting time. High-fat and high-protein meals might require a longer time to wait before exercise due to increased digestive complexity.

- *True or False?* The best time to exercise is early in the morning.

False. Aerobic exercise can be done any time of the day, except for right after a heavy meal. Of course, midday may be the hottest or most humid time of the day, so plan outdoor exercise around the weather. People watching their weight seem to like to work out at lunchtime, highly stressed people seem to prefer to exercise in the evening, and people who exercise in the morning seem to stick more regularly to their regimen.

- *True or False?* Athletes must drink sports beverages.

False. When you exercise, you burn energy; when you burn energy, you get hot; when you get hot, you sweat, and that's when you lose fluid and minerals. The aim is to replace the fluid volume and the minerals dissolved in the sweat. A good rule of thumb is to consume 8 to 10 ounces of water for every 15 minutes of vigorous exercise. Fruits, such as oranges and bananas, have minerals, and water has fluid! Sports beverages could be helpful, but read the label; highly concentrated beverages will slow down the body's ability to absorb water and defeat the purpose of drinking them.

- *True or False?* If it's hot or cold outside, one shouldn't exercise outdoors.

False. Exercising in very hot and humid weather isn't a great idea. It's hard for the body to accommodate the heat. However, depending on your health, a very short session might be OK. Exercising in the cold should be OK if you select clothing that will conserve heat (the layered look) and if it isn't too windy. Exercise actually increases the production of body heat.

Motivation: Making It Happen

Every year millions of people decide to start a cardiorespiratory fitness program, especially around the New Year. Three months later, you can look at the classified ads or online and find great deals on used exercise equipment. Many garage sales seem to have an almost-new stationary bicycle or treadmill.

[Day Planner]

Scheduling is an important aspect of maintaining fitness.

There are lots of excuses for dropping out of a cardio program, but very few good reasons. If people start too fast, select the wrong program for their fitness level, or get no instant gratification, they tend to become discouraged. The most common excuse is usually time—that is, no time to do all of the things that need to be done. It can be difficult for adults to find time to exercise, but it isn't impossible. You know what to tell people: "If you aren't healthy, you'll have lots of time when you're recovering from an illness caused by stress, poor diet, and lack of exercise" or "Who deserves the gift of good health more than you and your family?" The following are more helpful pointers:

- There are 168 hours in a seven-day week; you need only three 30-minute workouts to get your heart and lungs in shape and improve cardiorespiratory fitness. Counting warm-up, cool-downs, and clean-up, that's about three hours per week.

- Exercise must be fun. Design an exercise program around as many activities that you enjoy as possible.
- You can use exercise time to socialize with friends or have quiet time, whichever you prefer.
- Keep a record. You'll be proud to look over your weekly accomplishments.
- Indulge yourself. Buy a fancy sweatshirt or cool workout shoes, or request a gift certificate for an after-exercise massage.

Key Points and Links

READING ASSIGNMENT

Key Points

- No one specific exercise program suits every individual. Everyone starts out at different fitness levels and has different physical abilities.
- The most common excuse for discontinuing a cardio program is lack of time. That's why scheduling is an important part of maintaining fitness.

Links

- 43 Minute Low Impact Workout for Endurance - Descending Ladder Total Body Burnout Challenge (www.youtube.com/watch?v=YCCYBNlzUcg)
- Fat Burning Cardio Workout - 37 Minute Fitness Blender Cardio Workout at Home (www.youtube.com/watch?v=fcN37TxBE_s)
- Personal Training Session (www.youtube.com/watch?v=GX7H94rjpM8)

Exercise: Cardio Training

Based on what you've read, answer the following questions.

1. What's the difference between medium-range training and LSD training?
2. What are the benefits of the starter phase of a fitness program?

Exercise Answer Key:

Exercise: Cardio Training

1. Medium-range training involves periods of 10 to 30 minutes of high-intensity exercise at 90 to 100 percent TI. This training is a type of “racing” workout. LSD training is an activity that’s performed at a low intensity and can be sustained indefinitely. It teaches the body to burn fat and creates endurance. LSD training should exceed 30 minutes.
2. The starter phase allows the body to get used to the idea of exercise and to avoid soreness
and injury, and it allows individuals time to experiment until they find the program that works best for them.

Lesson 4 Review

Self-Check

1. Which one of the following s the fastest your heart should ever beat in one minute?

a. Maximum Heart Rate
b. Target Heart Rate
c. Minimum Heart Rate
d. Rapid Heart Rate

2. Which one of the following is supposed to show how fit a person is by comparing the resting heart rate with the maximum heart rate?

a. Resting Heart Rate
b. Maximal Heart Rate
c. Training Routine
d. Training Intensity

3. Which one of the following is an essential and pleasant portion of a cardiorespiratory workout?

a. Warm-up
b. Cardio
c. Cool-down
d. Strength

4. Which one of the following will vary depending on a person’s fitness level and the intensity of exercise?

a. Intensity
b. Length
c. Duration
d. Cool-down

5. Which one of the following involves time periods of 10 to 30 minutes of high-intensity exercise?

a. Interval training
b. Long, steady distance (LSD) training
c. Cardio Training
d. Medium-range training

6. Which one of the following is a common way to increase cardiorespiratory fitness very quickly?

a. Long, steady distance (LSD) training
b. Interval training
c. Medium-range training
d. Cardio Training

7. Which one of the following is an activity that can be sustained indefinitely, such as long walks or easy cycling?

a. Medium-range training
b. Long, steady distance (LSD) training
c. Interval training
d. Cardio Training

8. Which one of the following phases of exercise allows the body to get used to the idea of exercise, avoid soreness and injury, and to experiment until you find the program that works best?

a. Starter phase
b. Slow progression phase
c. Maintenance phase
d. Interval phase

9. Which one of the following phases of exercise slowly works up to where you want to be?

a. Interval phase
b. Maintenance phase
c. Slow progression phase
d. Starter phase

10. Which one of the following phases of exercise is when you should be achieving your frequency, intensity, and duration of exercise goals with each workout?

a. Maintenance phase
b. Starter phase
c. Interval phase
d. Slow progression phase

Self-Check Answer Key

1. Maximum Heart Rate
   Explanation: _Maximum heart rate_ is the fastest your heart should ever beat in one minute.
   Reference: Section 4.1

2. Training Intensity
   Explanation: The _training intensity (TI)_ is supposed to show how fit a person is by comparing the resting heart rate with the maximum heart rate.
   Reference: Section 4.1

3. Cool-down
   Explanation: _Cool-down_ is an essential and pleasant portion of a cardiorespiratory workout.
   Reference: Section 4.2

4. Duration
   Explanation: Duration will vary depending on a person’s fitness level and the intensity of exercise.
   Reference: Section 4.2

5. Medium-range training
   Explanation: _Medium-range training_ involves time periods of 10 to 30 minutes of high-intensity exercise.
   Reference: Section 4.3

6. Interval training
   Explanation: _Interval training_ is a common way to increase cardiorespiratory fitness very quickly.
   Reference: Section 4.3

7. Long, steady distance (LSD) training
   Explanation: Long, steady distance (LSD) training is an activity that can be sustained indefinitely, such as long walks or easy cycling.
   Reference: Section 4.3

8. Starter phase
   Explanation: The _starter phase_ allows the body to get used to the idea of exercise, avoid soreness and injury, and to experiment until you find the program that works best.
   Reference: Section 4.3

9. Slow progression phase
   Explanation: In the _slow progression phase_, from 12 to 18 weeks, you slowly work up to where you want to be. Remember that fitness is a lifetime commitment, not a seasonal fancy.
   Reference: Section 4.3

10. Maintenance phase
    Explanation: When you've reached the _maintenance phase_, you should be achieving your frequency, intensity, and duration of exercise goals with each workout. This is where you'll stay, with minor changes, over the years
    Reference: Section 4.3

Flash Cards

1. Term: Target Heart Rate (THR)
Definition: What you should aim to keep your heart beating a certain amount of times per minute

2. Term: Maximum Heart Rate (MHR)

Definition: The fastest your heart should ever beat in one minute

3. Term: Training Intensity (TI)
Definition: Shows how fit a person is by comparing the resting heart rate with the maximum heart rate

4. Term: Resting Heart Rate (RHR)
Definition: What your heart beating when resting or not exercising

5. Term: Interval Training
Definition: A common way to increase cardiorespiratory fitness very quickly

6. Term: Cardiorespiratory Activities
Definition: Performed at an intensity and duration of 90 to 100 percent TI for 60 to 90 seconds

7. Term: Medium-Range Training
Definition: Involves time periods of 10 to 30 minutes of high-intensity exercise; the effort should be 90 to 100 percent

8. Term: Long, Steady Distance (LSD) Training
Definition: An activity that can be sustained indefinitely, such as long walks or easy cycling

Exercise

1. Review Exercise: Personal Fitness

Based on what you've read, answer the following questions.

1. How would you determine whether the target heart rate was achieved while walking? What should you do if you felt uncomfortable and out of breath?
2. What are the three components of an effective cardiorespiratory exercise program?
3. What's the best time of day to exercise?

Exercise Answer Key:

Review Exercise: Personal Fitness

1. If you maintain a target heart range while walking, you're exercising aerobically. Walking at a steady pace, with a little bit of huffing and puffing, indicates that you're in your target range. Conversation should be a bit difficult, but not labored. You should feel some exertion, but your muscles shouldn't burn and you shouldn't be gasping for breath. If this is happening, slow your pace and work up to a faster pace.
2. Mode of exercise, frequency, and intensity
3. There's no one specific time of day that's best for exercise. Aerobic exercise can be performed at any time of the day, except right after a heavy meal. It's up to each individual to determine his or her ideal time to exercise.