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# CONSUMER DECISION MAKING

2025-2026 Guide

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EXTENSION





# CONSUMER DECISION MAKING

## Study Guide Additional Resources

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## ACTIVEWEAR

Sales of activewear are at an all-time high. According to market research by the NDP Group, activewear sales generated \$35 billion in 2014, making up nearly 17% of the American clothing market. Activewear is clothing worn for sport or physical exercise. It uses the latest in performance fabrics and technology to ensure that apparel can meet the intense demands of sporting disciplines like running, cycling, swimming, and gym work. Activewear includes tops, shorts, tights, socks, jackets, sports bras, and more. The right activewear can enhance your training and performance. Fabric and fit are probably the most important factors when choosing activewear.

### Fabric

Fabrics are designed for different purposes. Some pull sweat away from your skin, and others absorb it. When it comes to workout clothes, some choices are better than others, depending on your workout.

### Wicking

Wicking fabrics are breathable synthetic fabrics that provide moisture control for an athlete's skin during a mid to high-intensity workout. In essence, the fabric "wicks" the sweat away from your skin, which helps it evaporate quickly and keep your body cool. Wicking fabrics tend to be soft, lightweight, and stretchy, making them an excellent choice for activewear. This broad category of fabrics is used to make garments like T-shirts, sports bras, running and cycling jerseys, socks, and polo-style shirts for any physical where the goal is to keep your skin as cool and dry as possible. Moisture-wicking fabrics are used to make apparel for outdoor activities such as hiking, fishing, mountain biking, snow skiing, and mountain climbing. There are a number of products marketed for their wicking. Many of these products are used as a blend with each other or with cotton. Additionally, these products may be branded under a variety of names, such as Dri-Fit, Coolmax, Vapor, and Climalite.

- **Polyester** is the workhorse of workout fabrics and is the one you see on labels most often. It's basically plastic cloth. It's durable, wrinkle-resistant, lightweight, breathable, and non-absorbent.
- **Spandex**—Also known as elastane and by the brand name Lycra, spandex puts stretch in workout wear. The synthetic fabric can expand to nearly 600 percent of its size, offer an unrestricted range of motion, and then snap back in place. Spandex is an anagram for expands.
- **Emerging Performance Fabrics**—The next big thing in activewear is products that provide even more benefits. These benefits include improved wicking, temperature control, UV protection, and anti-odor properties. Bamboo is an example of a new, emerging performance fabric. These products may also be more expensive.

### Cotton

Cotton can also be a good choice when choosing activewear. It is a breathable, soft, comfortable, and natural fiber that works well for lighter workouts. Cotton also tends to be less expensive than synthetic activewear. However, cotton is very absorbent and slow to dry. When wet, cotton holds the moisture next to your body.

**Fit**

Choose activewear that fits your body and your workout. For example, avoid wide-leg or loose pants/leggings if you are running or biking. Likewise, for activities such as yoga or Pilates, choose stretchy, fitting fabrics. Also, avoid fabrics that can chafe or irritate your skin during repetitive movement. Pay closer attention to fit more than size because some workout clothes tend to run smaller and more form-fitting than regular clothes.

**Cost**

There are many factors to consider when shopping for activewear. You may be surprised at how much activewear costs. Paying the top dollar does not necessarily mean you will get the best activewear. Be sure that whatever price you choose to pay for activewear is the right activewear for you and that it meets the needs you desire.



# ATHLETIC SHOES

With the many types of athletic shoes that are available, it can be hard to choose the right shoes for you. There are differences in design and variations in material and weight. The American Academy of Orthopedic Surgeons says that these differences have been developed to protect the areas of the feet that encounter the most stress in a particular athletic activity. Let's review some of the different types of sports shoes available.

## Athletic shoes

- Are grouped into the following categories: running, training, and walking; they include shoes for hiking, jogging, and exercise walking. These shoes should have a comfortable soft upper, good shock absorption, smooth tread, and a rocker sole design that encourages the foot's natural roll during the walking motion. Features of a good jogging shoe should include cushioning, flexibility, control, stability in the heel counter area, lightness, and good traction. Whereas, cross-training shoes combine several characteristics of other types of shoes so that you can participate in more than one sport and wear the same shoe. A good cross trainer should have flexibility in the forefoot that you need for running and stability on the inside and outside of the shoe for the control needed for aerobics and tennis. Walking shoes should flex easily at the ball of the foot, which helps the feet to push forward.

## Court sport shoes

- Include shoes for tennis, basketball, and volleyball. Most court sports require the body to move forward, backward, and side-to-side. As a result, most athletic shoes used for court sports are subjected to heavy abuse. The key to finding a good court shoe is the sole. Ask a coach or shoe salesperson to help you select the best type of sole for your sport.

## Field sport shoes

- Include shoes for soccer, football, and baseball. These shoes are cleated, studded, or spiked. The spike and stud formations vary from sport to sport, but they generally are replaceable or detachable cleats, spikes, or studs affixed into nylon soles.

## Track and field sports shoes

- Are very specific to the sport. The needs of the individual are most important when picking the shoe. For example, foot types, gait patterns, and training styles should always be considered. It is always best to ask a coach about the type of shoe that should be selected for the event in which you are participating. Proper-fitting sports shoes can enhance performance and prevent injuries. Follow these specially designed fitting facts when purchasing a new pair of athletic shoes:

- Try on athletic shoes after a workout or run at the end of the day. Your feet will be at their largest.
- Wear the same type of sock that you will wear for that sport.
- When the shoe is on your foot, you should be able to freely wiggle all of your toes. The distance from the tip of the toe to the end of the shoe should be a thumb's width.
- The shoes should be comfortable as soon as you try them on. There is no break-in period. If they're not comfortable in the store, they won't be comfortable when you're exercising.
- Walk or run a few steps in the shoes. They should be comfortable, and the heel of the shoe should not slip off the foot as you walk or run.
- Always re-lace the shoes you are trying on. You should lace through each top eyelet as you crisscross the lacing pattern to ensure a more snug fit and decrease slippage. Don't tie the laces too tight, as this may cause injury to the nerves or tendons on the top of the foot and ankle.
- The shoe should have a firm grip on your heel, and your heel should not slip as you walk or run.



Now that you know what type of shoe to buy and tips for picking out a properly fitting shoe, you need to consider:

- Its construction—how well it was made. Understanding the basics of shoe construction can help you choose intelligently from among the thousands of available styles.
- Stitching should be secure, even, and straight. There should be no rough spots, wrinkles, bulky seams, or gummy adhesives.
- The rubber around the base of the shoe should be one continuous strip, tightly attaching the sole to the upper.
- The toe box should be square for adequate toe room.
- The shoe should have side and tongue padding for extra comfort. Cushioning on the cuff around the ankle and at the Achilles tendon helps to reduce friction and irritation.
- The inner sole should be soft and resilient, with adequate arch cushions.
- The reflector should be as big as possible, especially if you will be outside at dusk or dawn.
- The insole should be removable for cleaning and replaced when it loses springiness.

In addition to being overwhelmed by all the choices in athletic shoes, you may be surprised at how much they cost.

Slick and television commercials tout technological features, the latest gimmicks, and shoes named after sports celebrities. Paying more than \$100 does not necessarily get you a better shoe. Good quality shoes may be pricey but don't overlook the less expensive shoes because they can outperform their costlier brandmates. Be sure that whatever price you decide to pay for the shoes, it's because the shoe has the features that meet your needs—not because it is a certain brand or has a sports celebrity's name on it.

## REFERENCES

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## CELL PHONES

Pew Research Center tracks that 97% of Americans own a cell phone of some kind, and 9 out of 10 own a version of a smartphone. People of all ages have either a smartphone or a cellphone. Over the past few years, Americans' dependency on cell phones has leveled out. PRC has broken down the dependency based on age. Americans 18-29 years of age have the higher dependency, followed by the 65+ crowd in 2023. It is important that we learn to select the cell phone that is right for each of us based on use and needs.

The most common manufacturers of phones are Apple and Samsung. Phones range and vary in price based on where you purchase and discounts that service providers may offer. You know when it is time to get a new phone when your phone is performing at a slower rate than normal, when the security updates are unable to download, when you are switching cell phone providers, or when you need to upgrade your camera.

### Smartphones

Smartphones can search the web, download and run apps, send emails, and use social media. Most people pick an operating system such as Android or Apple iOS and stick to it for the most part.

#### Android

Android OS is used by the largest variety of phones. Google, OnePlus, Samsung, and other manufacturers run on the Android system. You can customize your OS easily with all the controls and tools offered. Being Google-based, this system utilizes Google Maps, Google search engines, and the cloud for photos and storage.

The biggest drawback is the time it takes for the system to update. Once the updates are out, they typically will take up memory and storage space.

#### Apple

The Apple system is the same no matter what carrier you choose and closely resembles the system that iPads run on. It integrates easily with other Apple products like MacBooks, Apple Watch, AirPods, and others. Siri is a virtual assistant that can interpret and execute multiple requests. They have updated it to include Apple Pay and other new augmented reality features.

#### Phone Features

Biometrics uses physical characteristics, fingerprints, facial recognition, and voices to be able to recognize people.

Cell phone cameras have developed over the years. Many phones have multicamera setups, including wide, ultrawide, and telephoto options. Portrait and Night modes are also common features. You can also download apps to improve shots after they have been captured.

Wireless charging docks help declutter spaces. Some phones and chargers are faster than others. You should check labels before purchasing docks to ensure they are compatible with your phone.



## DENTAL PRODUCTS

With so many dental care products on the market, deciding which to use can be a real challenge. Exploring general product categories for oral health will provide insight across the range of dental care products. According to the Centers for Disease Control (CDC), “oral health affects our ability to eat, speak, smile, and show emotions. Oral health also affects self-esteem, school performance, and attendance at work or school. Oral diseases—which range from cavities and gum disease to oral cancer—cause pain and disability for millions of Americans.”<sup>1</sup>

Home oral care recommendations from the American Dental Association (ADA) are based on data from clinic studies and systemic reviews. Oral care can help lessen the need for extensive dental intervention in the future.<sup>2</sup> The ADA recommends that you brush daily with fluoride toothpaste. They also recommend that you clean between your teeth regularly. Of course, eating a healthy diet and seeing your dentist regularly is a key to dental care. To explore dental care products more effectively, the following categories of products will be reviewed:

- Toothbrushes
- Toothpaste
- Dental Floss

## TOOTHBRUSHES

The ADA recommends brushing your teeth at least twice a day. However, how do you select the appropriate toothbrush? There are so many different brands and styles of toothbrushes. To complicate things even more, there are even manual and powered toothbrushes. The toothbrush is one of many tools to clean teeth, gums, and even your tongue. When choosing a toothbrush, consider the following:

- Head Size—A smaller head size makes the toothbrush easier to maneuver into tight areas that are trickier to access. A compact head is smaller and more maneuverable than a full-size head. Brush heads can also be straight or angled. Angled brush heads help reach the insides of your teeth, which are more susceptible to tartar buildup. Dentists suggest that a round-headed toothbrush provides a more versatile design.
- Bristle Design – Equally important, heads with varying-sized bristles are more popular among manufacturers, which help to get into deeper gaps between teeth and hard-to-reach areas. The shape of the bristle patterns can also vary. Diagonal patterns are good for cleaning the sides of the teeth and along the gum line. A cup-shaped design will be better for cleaning around teeth. A block design has all bristles the same size and type, while polishing bristles are made of rubber-like material arranged in circles to help clean surface stains without damaging the enamel. Other variations include wavy, crisscross, and tapered. These designs are more about comfort and preference.





- **Bristle Firmness** – Many consumers feel that the firmer the bristles, the better, but that is not accurate. While no oral hygiene can be harmful, so can the wrong oral hygiene. Firm bristles can damage teeth and gums. Soft bristles will do an effective job as the firmer variety without irritating your gums, which may contribute to a receding gum line. Toothbrushes are marketed as Extra Soft, Soft, Medium, and Hard. Generally, go soft unless there is some valid reason to go with a firmer or softer bristle. Packaging may also express bristle firmness in millimeters. A “soft” bristle brush may show 0.15 mm, while a “hard” bristle brush may show 0.23 mm, reflecting the thickness of the bristles.
- **Handle Design**—While less important than head size and bristles, a comfortable and secure handle should be your priority. There are lots of varieties, so picking one that fits well is important. Handles can be straight, contra-angle, non-slip grip, and flexible. The handle should allow you to comfortably reach every tooth surface, including the very back of your mouth.



Each of the design features referenced above is important for any toothbrush, regardless of the type in question. The traditional “manual” toothbrush is the foundation for more contemporary versions, including the increasingly popular powered/electric toothbrush. Here are some key features about both types of brushes and considerations when purchasing one or the other.

- **Manual**—These are the most inexpensive types of toothbrushes and are as effective in keeping teeth healthy as any other. While the toothbrush heads are of the utmost importance, manual toothbrush handle designs are extensive. However, the same selection principles referenced above apply. Furthermore, there is greater variability in head design among manual toothbrushes than its electronic counterparts. Manual brushing is estimated to result in about 300 brush strokes per minute.
- **Electric** – An electric toothbrush performs rotations or oscillations of its bristles, making it a bit easier to remove tartar in hard-to-reach places where manual motion may prove to be more difficult. These brushes have removable heads and tend to be considerably more expensive to replace than the manual ones. Most are either battery-operated or rechargeable. Some have timers to signal the user when to shift to other areas or stop altogether. Compared to manual brushes, these might be better at reducing the incidence of gingivitis and plaque, given that they increase the amount of brush strokes per minute. The ADA recommends electric toothbrushes for people with arthritis or other issues that prevent manual brushing from being effective. These brushes can also be divided into three sub-types:



- Standard power is a generic term to differentiate any powered toothbrush from the other two types of speed or movement. A standard electric toothbrush produces about 2,500 to 7,000 brush strokes per minute.
- Sonic power – this type moves the head fast enough to produce a hum in the audible frequency. Some models can produce up to 30,000 brush strokes per minute compared to a standard electric toothbrush. The benefit of this model is that it has a large sweeping motion to remove food particles and bacteria from the teeth and gum lines.
- Ultrasonic power—This brush is faster than a sonic-powered brush, reaching up to 2.4 million strokes per minute. The benefit of such a high speed is that it breaks up the bacteria chains found in the mouth, whereas cleaning occurs simply by placing the brush on the tooth without any manual motion. Some models have adjustable frequencies to allow for more sweeping motion.



## TOOTHPASTE

The ADA recommends that people use only toothpaste that contains fluoride. Toothpaste containing fluoride has been shown to prevent cavities. Also, any toothpaste packaging should be reviewed to make certain that the ADA's Seal of Acceptance is present. This means that the product has met ADA criteria for safety and effectiveness. Products that do not have the seal do not mean they are not safe or effective; they have not been studied or endorsed by the ADA. Toothpaste is also developed and marketed with specific problems in mind. For example, if tartar buildup is a problem, there are formulations that are designed to help with that. Toothpaste can contain ingredients that prevent enamel erosion or cosmetically affect the mouth, such as whitening or improving bad breath. They can come in the form of gels, pastes, or even powders.

- **Types** - They can come in the form of gels, pastes, or even powders.
  - **Gel**—made from silica, tooth gel is less abrasive and creates less foam and splatter. Compared to a paste, tooth gel has a less minty aftertaste.
  - **Paste** has a foamier texture when brushing, thicker, stronger flavors, and tends to be more abrasive than gels.
  - **Powders** contain dry ingredients like salt, baking soda, activated charcoal powder, and flavorings. They require adding water and are good for removing stains and plaque. However, they do not fight cavities as effectively and may be too abrasive. There is no ADA seal.

**Ingredients** – They contain both active and inactive ingredients. However, to be endorsed by the ADA, toothpaste must be fluorinated. Those are primarily for fighting cavities. Desensitizing agents are used for people who experience sensitivity due to toughness, temperature, and air current. Some formulations are designed to remove surface stains, often called “whitening toothpastes.” Formulations are also available to fight gum disease by destroying bacteria responsible for plaque and tartar buildup. Finally, some formulations are fluoride-free. Those products will not have the ADA seal. Due to small children’s propensity to swallow small amounts of toothpaste, the ADA recommends that children 6 and under use very small amounts of toothpaste to avoid fluorosis.



The ADA Seal of Acceptance is an important part of selecting any type of toothpaste. However, there may be some circumstances where the seal is not present. Always consult your dentist before using any products that do not have the ADA seal.

## DENTAL FLOSS

Flossing is a very important part of every oral hygiene regimen. Flossing once a day before bedtime decreases the likelihood of cavities and gum disease caused by food particles not removed from brushing alone. The benefits of flossing include removing bad breath-causing bacteria and plaque from below the gumline. It can reduce the likelihood of soreness, puffiness, and redness of the gums, and it helps prevent gingivitis. The most common types of dental floss are waxed and un-waxed thread, both made from nylon. There is no distinct advantage of either when it comes to improving your oral hygiene regimen except as noted below.





- Waxed—This type of floss contains a thin layer of wax on its surface, making it a little thicker but easier to glide between the teeth. Waxed floss is more likely to be flavored than unwaxed floss and is generally stronger. People with tightly spaced teeth may find it difficult to use waxed floss.
- Un-waxed floss is generally thinner than waxed and a bit more comfortable to move in and out of your teeth. It usually does not come in flavors, which, for some people, may be an advantage. Compared to the waxed variety, it is more likely to break during flossing but easier to get between tight-fitting teeth.

## RESOURCES

Basics of Oral Health. (2022, October 17). Centers for Disease Control and Prevention.

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## FITNESS EQUIPMENT

Your personal health can be positively impacted by including physical activity in your regular routine. It can improve your physical health and other facets of living a healthy life. “Regular physical activity can improve your brain health, help manage weight, reduce the risk of disease, strengthen bones and muscles, and improve your ability to do everyday activities,” according to the Centers for Disease Control (CDC).

According to the National Institute of Health, four basic types of exercise can improve health and physical activity. Each of them has different benefits, and the use of multiple types can magnify the benefits regardless of age. Types include:

- **Endurance** — This activity increases breathing and heart rate. It is often referred to as “aerobic” or “cardiovascular (cardio).” Walking, cycling, swimming, climbing, dancing, and running are all endurance-building activities. A range of fitness equipment products can be used for endurance.
- **Strength** — Muscle strength can help you become a better athlete, increase work productivity, and make strenuous daily activities easier. It can also help you with your balance. Equipment and products to help build strong muscles may include “strength training” and “resistance training” equipment. The CDC recommends two days of strength training per week.
- **Balance—Balance** is an important part of physical fitness and focuses on maintaining proper posture over the body’s base of support. Improved balance can prevent falls among the elderly, increase an athlete’s ability to generate power in a vertical jump, and increase the force or resistance placed upon the body to increase strength. A range of products on the market can help improve balance for all ages and purposes.
- **Flexibility** — Exercises that stretch muscles can greatly impact your body’s ability to stay flexible. Muscle flexibility allows for greater freedom of movement for other exercises as well as for everyday activities. It may also help you avoid discomfort when combined with small spaces for extended periods of time like a meeting, classroom, plane flight, or even a car/bus ride3. Equipment/products used to improve flexibility can be quite simple and inexpensive compared to other types of fitness equipment. However, the impact on your physical fitness can be quite dramatic over time.

A wide range of products is available in this product category, and there is an even wider range of uses for them. In addition, one should consider their physical fitness goals. Fitness equipment can provide benefits, although different, depending on the user’s age and current physical ability. However, most of the equipment referenced in this guide can be used across ages and abilities, depending on the type of equipment and the person’s ability to use the equipment towards their fitness goals effectively. This product category includes the following types of fitness equipment but may include others not listed or referenced here.

- Dumbbell Set
- Treadmill
- Stationary Bicycle
- Barbell Set
- Rowing Machine
- Elliptical Trainer
- Balance Trainer



## DUMBBELL SETS (XEndurance Strength Balance Flexibility)

Dumbbells are small bars that fit in your hand and have equal weights on either side. They weigh as little as 2 pounds and go up to over 100 pounds. Depending on their range of uses and anticipated benefits, dumbbells can range from simple small sets to very large extensive sets. Some are more appropriate for single-person use in your home, while others may be more appropriate for multiple people to use at the same time as studio sets in a gym setting.

- **Materials** – Dumbbells can be made from various materials, including rubber, neoprene, urethane, steel, and cast iron. In addition, some may include a combination of both, such as rubber-coated cast iron products. Each has advantages and disadvantages based on the type of use, space, and storage. The types of materials used can also be reflected in the cost. For example, the rubber-coated hexagonal weights may be more expensive than the non-coated equivalent due to the extra materials used. In addition, rubber may be less likely to scuff or scar a delicate floor.



- **Types** – Dumbbells come in three general types: fixed, adjustable, or plate loadable. Fixed dumbbells have a single grip, which is permanently fixed between the billets and cannot be altered. Adjustable dumbbells consist of a series of weight plates mounted in a base with a mechanical handle or dial that can be adjusted for a specific plate, which adjusts the amount of weight. The plate loadable is also a varied type of dumbbell that includes a handle that can be loaded with varied weight plates and secured with a barbell collar. Depending on their intended purpose and use, one type may be more advantageous than another. For example, smaller sets of 2, 3 & 5-pound weights may not be expandable within the set, unlike the larger studio sets that may range from 5 to 50 pounds each.



- **Shapes**—Dumbbells can be round/circular, hexagonal, square, or globe. Depending on how and where they will be used, the shape can impact which is preferential. For example, hexagon-shaped dumbbells are less likely to roll away if set down on the floor, on a flat surface, or when stored. Circular dumbbells distribute their weight more uniformly than other shapes, and their ability to roll can be both an advantage and disadvantage.



- **Handles**—The handle is a very important feature of any dumbbell. Variations in grip thickness, shape, texture, and finish can make a big difference when selecting the best one for you. Some have revolving grips, which allow the grip to spin separately from the dumbbell to avoid torque in the wrists when changing hand positions.

**TREADMILLS** ( ✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)

The treadmill is a stationary exercise machine that features a walking or running belt designed primarily for cardio exercise. However, they can be used for all types of exercise depending on the type and features of the individual model. Treadmills can offer a variety of speed and incline settings that are ideal for varied cardio fitness levels. Some models even offer Bluetooth connectivity for audio/visual and programming. Some have LCD touchscreens for interactive controls, including streaming training programs. Treadmills can provide some unique advantages for their users to include:

- Offering cushioned running/walking surfaces for shock absorption reduces high impact for runners, which can lead to back, knee, and ankle problems over time.
- Low-impact cardio helps build a stronger heart and bones, reduce blood pressure, and even help with weight loss.
- Building leg muscles and improving core strength.
- Improves mental health through endorphins released through aerobic exercise.

Treadmills can be grouped into 4 different types. Each may share similar features and benefits as well as have some features unique to each type. Since treadmills can be a very versatile piece of fitness equipment, evaluating the scope of its use is important when selecting the best one for your own use.

- **Manual** – These products are generally lighter and the least expensive treadmill types. They generally offer fewer features than the others as an electric motor does not power them. The primary features include handrails and the treadmill belt. They are powered exclusively by the person walking or running. As a result, when you stop walking/running, the treadmill stops as well. This is a much safer option at home if there are small children around. They are usually foldable, making them much easier to store. They are generally smaller and lighter than their motored counterparts.



- **Motorized** – These products require a main power source for the electric motor and other powered features like LCD displays, speakers, and streaming capabilities. Motorized treadmills are generally heavier than manual ones but may be equipped with rollers to make moving them easier. The motorized belt and deck may have adjustable speeds and inclines for extended capabilities. Commercial versions may include vitals sensors to monitor heart rate. Their more rugged construction may be more appropriate for extended or heavy use and will likely be more expensive than the home-type models. However, they also work well at home despite the cost.



- **Hybrid**—These products are generally more expensive and durable than other models. Their hybrid designs can include “tread climbers” that combine traditional designs with elliptical machines.





- **Medical**—These are very specialized machines but also have their place depending on their intended use. Sometimes referred to as “zero gravity” or “anti-gravity” treadmills, they allow the user to walk or run at a lower percentage of their own body weight. This is especially valuable for preventative rehabilitation or therapy. They function primarily like a standard treadmill except as noted above.

Treadmill safety is very important, especially for any version that will be at home and may be accessible to small children. Great care should be taken when selecting a treadmill. Ensure that it has important safety features, such as emergency stop systems like a panic button, a tether with a shut-off clip, or both.



### **STATIONARY BICYCLES ( ✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)**

Stationary bicycles or “exercise bikes,” like treadmills, are a type of stationary fitness equipment that provides some of the same fitness benefits as cycling with some important benefits over being out on an open road. Aside from the cardiovascular benefits of this type of activity, stationary bicycles also help with weight loss, burn fat, strengthen leg and lower body muscles, and provide a low-impact workout. This equipment allows for interval training and is much safer than road cycling for obvious reasons.

The most common and basic design of a stationary bicycle includes a metal frame, single wheel, seat, and some type of handlebar. From this point, the variations begin and have a great impact on its use and versatility. Other features can include vitals monitoring sensors, LCD screens, audio input ports, Bluetooth, and streaming program capabilities.

There are five general types of stationary bicycles: indoor cycling bikes, recumbent bikes, upright bikes, air bikes, and folding bikes. Each has its own unique characteristics and fitness benefits. Depending on your fitness goals, you should select the type and model that best fits your needs.

- **Indoor Bike** – This is likely the most common type of stationary bicycle. It includes the basic design with the handlebars positioned forward of the cycle (above the front wheel) to allow the rider to lean forward, like being out on the open road. What makes this type unique is the exposed flywheel that uses friction or magnetic resistance to create different levels of intensity. The control is either a manual control (knob) or electronic control (digital). These models are great for high-intensity workouts and have a smaller footprint than some of the other types. You can even stand up on the pedals and ride in that position. One fault is that they generally provide no upper-body workout.



- **Recumbent Bike** – This type is unique in that it places the rider lower to the ground and repositions the pedals in front of the rider as opposed to directly below. As a result, this type is considered the lowest-impact type of bike. Unlike the Indoor Bike’s narrow seat, this one provides a wider seat and a backrest, putting the rider into an almost reclined position. People who might experience pain on a bike might be more comfortable with this type of bike. It may also be beneficial to someone recovering from injury, someone with balance problems, older people, or even someone with a disability. This bike gives up intensity for comfort and stability. There is no upper body or hand movement with these models, making it less versatile.





- **Upright Bike** – This model is like the Indoor Bike but with one major difference. The handles are closer to the rider to keep the rider from leaning forward at any point during the ride. For some, this position might be a bit uncomfortable for long rides. This also creates a more compact footprint than other types. In addition, the seat tends to be smaller than on the recumbent bike. This model provides a more robust and intense workout than the recumbent bike, but there are fewer choices for this type of bike on the market.



- **Air Bike** – While the Indoor Bike uses a flywheel, an air bike uses a fan to generate resistance while pedaling. The faster you pedal, the faster the fan turns and the more resistance you create. These models tend to be noisier than others, so if noise is an issue, this may not be the best choice. The pedals are located directly below the rider, like the Indoor Bike, and the seat size varies depending on the model chosen. One of the unique features of most Air Bikes is the moveable handles that add to an upper body workout. It works like an elliptical where your upper body movement can assist you with your lower body workout.



- **Folding Bike** – These models are designed with space as a priority. These are not your sturdiest designs but are functional and great for small spaces. They are designed to be folded up and stored away easily. These models have the handlebars in front of you and the pedals below. Your ability to get an intense workout from these models is very unlikely, but they do provide a decent cardio workout. Many do have low maximum weight capacities and generally do not come with any “extras.” This makes them very affordable.



#### **BARBELL SETS** (✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)

- A barbell set is a piece of fitness equipment generally purchased as a set, although individual pieces can be purchased and is primarily used for weight training to build strength. While it can be used to address other fitness benefits relative to alternatives, this option is generally more expensive. A set includes a barbell and a long bar (4' to 8') designed to accept weight plates on either end to increase or decrease the total weight. Collars are used to prevent the plates from moving outward unevenly. It is one of the simplest pieces of fitness equipment in most gyms. However, it is much more complicated to learn how to use it correctly and effectively. In exchange, a barbell set for weight training requires using multiple muscle groups at once. This can make complete workouts more efficient. Sometimes, you can work your entire body with a single move, which is great for budding athletes. The two basic components of barbell sets include the weight and the barbells (with collars).



- **Weights** – The plates of any barbell set are the most important consideration. Most sets are available with cast-iron or bumper plate styles. Your choice will influence how you set up your gym, how many can be stacked onto a barbell, and other factors. Cast-iron plates are the most traditional options for a set. They can be thinner than coated plated, allowing more stacking on any given barbell. However, cast iron can rust if exposed to moisture or damp basements/garages. They are also a bit noisier as they clank together during your workouts. Bumper plates are generally made from a rubber base and, as a result, can be thicker than cast-iron plates, reducing the number that can be stacked on a barbell. These also tend to be a bit pricier than the cast-iron plates. As far as sets, they can range from as little as 65 pounds and as high as 600 pounds. Unless you expect to be lifting that much, a mid-range set at 300-350 pounds is a good place to start.



- **Barbells** – Most sets include a Standard or an Olympic barbell that is about 7' to 8' in length and weighs approximately 45 pounds. They have a “sleeve” on either end that holds the plates of weight secured by a collar. Each different type of barbell has different qualities and a special design that serves its specific purpose. In addition to varying shape and size, they may also feature different amounts of knurling (grippy lining on the metal), amount of whip (the way the weight changes as the bar moves), and sleeves.

- Standard Bar: 35-55 lbs, versatile lifts, static sleeves
- Olympic Bar: 33-44 lbs, versatile lifts, spinning sleeves
- Trap (Hex) Bar: 30-70 lbs, great for deadlifts, not very versatile
- Swiss Bar: 35 lbs, good for those with limited shoulder mobility, holds less weight
- Safety Squat Bar: 50 lbs, good for beginners, not very common
- Curl Bar: 25-35 lbs, good for arm lifts, varied hand positions, limited to arm lifts
- Cambered Bar: 85 lbs, good for lower body lifts, hard to find
- Log Bar: 135 lbs, specialized lifting, good for very heavy weight, hard to find
- Deadlift Bar: 45 lbs, flexes for deadlifts, deeper knurling, relatively expensive
- Powerlift Bar: 45 lbs, stronger steel, great for heavy weights, not for beginners



- **Collars** – There is a range of different collars that fit on barbell sleeves to secure the weight plates. They include spring collars, spinlock (threaded) collars, lockjaw collars, and muscle clamp collars to name a few. When it comes to securing the weight plates, make sure your collar is designed for the sleeves on your bar to prevent the weight plates from moving.



As anyone could imagine, barbell sets take up much more space than other forms of fitness equipment. In addition, their size and total weight make storing them after each use impractical. Depending on the size of the set, it might include racks for the bar(s) and weight plates. That is a big consideration when choosing to add this to your home gym. Plenty of space is a must.



## ROWING MACHINES (✓ Endurance ✓ Strength ✓ Balance ✓ Flexibility)

- You do not have to be a rower to use and benefit from a rowing machine. Rowing machines provide a total-body workout. It is beneficial for all fitness levels. Its low-impact design is great for building up the heart and lungs as well as power and endurance. Using a total body approach, it is an efficient fitness product and a great alternative to the treadmill or elliptical. The rhythmic motion can also be meditative. These products have different features important in selecting the best one to suit your gym and fitness needs. Rowing machines can feature LCD displays, streaming workout capabilities, vitals monitoring, different resistance systems, and a variety of ergonomic designs. Some machines have a large footprint and can be much more challenging to store away after each use than others. Keep those things in mind when making your selections. They can also be on the pricier side of fitness equipment.

Some general types of rowing machines on the market may influence your decision to purchase one. The primary difference between these types is the system used to create the resistance that makes the workout different.

- **Hydraulic Rowers**—These rowers use a piston attached to the frame and the seat/bars. While these tend to be the smaller, more affordable rowers, they provide less of a full-body workout due to the rigid rowing action of the piston. The resistance to these models does not change.
- **Air Rowers** – The resistance system on these models uses a flywheel that sucks air in the faster/harder you row, which creates the resistance needed for a great workout. Some models include a “damper” to adjust the amount of air to increase/decrease the tension of each stroke. These are the most popular models because they have virtually unlimited resistance for any amount of strength. They have a smooth, natural feel but can be quite loud, and the harder/faster you pull, the greater the resistance.
- **Magnetic Rowers**—Like the Air Rowers, these models use a flywheel for resistance. However, instead of air, they use a magnetic brake. The resistance is constant, so if you want to change the level of resistance, you must stop, adjust, and resume rowing, which may not be ideal if you plan on a session with varied levels of resistance without interruption. These models tend to be a little smaller and are quieter than others.
- **Water Rowers** – These rowers give the most realistic feel to rowing as they use water to create resistance. The faster you row, the more resistance you get. However, you must add more water to the tank to increase the overall resistance. These are more expensive than other models and are generally larger. In addition, the water must be changed periodically.



Size, storage, noise, and usability are all important considerations when purchasing a rowing machine. Knowing the different types of resistance and the advantages and limitations of each choice is crucial to making the best purchase for your needs.

**ELLIPTICAL TRAINERS** (✓Endurance ✗Strength ✓Balance ✓Flexibility)

Elliptical fitness machines are stationary units that provide a great, low-impact workout without the same movements as running on a treadmill, pedaling, an exercise bike, walking, and climbing stairs. Also referred to as “cross-trainers,” these machines are primarily used to improve cardiovascular capacity and to strengthen muscles with a low risk of injury. Machines put the user in an upright standing position on pedals, which can then hold on to a static bar for support or can hold moving bars for greater versatility in your workout. Elliptical trainers can be great total-body workout machines. These, too, come with a variety of resistance systems and features to add to your workout through LCD screens, digital displays, programs, streaming programming capabilities, and other features. Like a stationary bike, ellipticals are smaller and easier to store than other larger forms of fitness equipment. When selecting the best model for your use, consider value, size, ergonomics, exercise intensity, connectivity, and programs. Like all other forms of fitness equipment, you should also consider any safety features. Consumer Reports differentiates between those with and without heart monitoring programs and groups ellipticals into three different types based on its configuration.

- **Front-Drive Ellipticals**—The location of the flywheel is in the front of the machine and can provide greater vertical range of motion, like a stair climber. These usually have pedals supported on wheels that glide on a track. Depending on the quality of the rollers, this can create noise. The pedals in this configuration are closer to the ground and easier to mount.
- **Center-Drive Ellipticals**—These machines tend to be a little more compact, taking up less floor space. The pedals are mounted on a driveshaft that more closely mimics walking or jogging with a circular motion.
- **Rear-Drive Ellipticals**—This machine has a smaller rear-mounted drive wheel and can have a track-and-roller setup for the pedals. These models often allow the user to tilt forward to provide an incline to their workout. As a result, they are a bit longer in their design and footprint. The ride on this machine can be very smooth and quiet.



The added features of ellipticals may be just as valuable to the user as the type of configuration. The level of resistance, monitoring heart rates, and adjusting workouts are very important in deciding which model to purchase. Due to the limited resistance of these machines, they are not ideal for building strength. However, they are excellent machines for other fitness benefits.



## BALANCE TRAINERS

This group of products is extremely broad in terms of design. Improving your balance is fundamental for living a healthy and active life. While balance for younger people may be less of a struggle, this can be crucial for older adults who may lose their natural balance and stability. Anyone can improve their balance with a little bit of helpful equipment. The goal of balance equipment is to create instability in the body, forcing your muscles and body to adapt. However, doing this safely is of the utmost importance. Remember, you are intentionally creating instability, so proceed with caution. Doing so helps strengthen key muscles to regain balance and improve overall stability. Below are a few examples of balance trainers that provide a range of benefits for balance and stability.

- **Balance Ball**—This is a soft, inflated elastic ball that can be extremely versatile in its application. Some designs include a full sphere/ball, while others may be a half-ball mounted on a flat, rigid platform. A key consideration when purchasing a balance ball should include the size and thickness of the material. You should also consider the weight limitations and the types of exercises that you will be doing. This one is not for beginners.
- **Balance Pads** – These are great for rehabilitation and for those recovering from injuries. They are easy to use and less unstable than a balance ball. They are generally pads made of foam with a uniform thickness.
- **Balance Board** – Although they may come in different shapes and sizes, their movement is either multidirectional or bidirectional. Larger designs allow for a wider stance, making it easier to balance. They are designed to rock, roll, or wobble. Although primarily designed for standing on them, they can be used for other exercises where an unstable platform may help build stability and strength. Some designs include a platform that rolls/floats on a separate roller.
- **Exercise Step**—With a wide range of designs, the exercise step is a simple but highly effective piece of fitness equipment. Stepping up and down and holding leg positions can dramatically improve balance. This product is valuable for those with very basic skills all the way to those requiring more advanced balance skills. It can vary in shape, length, width, and height.



Materials and construction are important variables in design and function. Wood, rubber, plastic, foam, and metal construction can affect weight capacity, durability, cost, and versatility. Remember that the possibility of injury is crucial based on the intended use and the intended user. The use of some devices on carpets versus hard, flat surfaces can change the risk factor. Also, appropriate footwear when using them can dramatically affect the safety of the product. Always use proper footwear to avoid slipping. Products that can be used for balance are not limited to those referenced here, so understanding the nature of the product and its intended purpose and user is more important than the product itself.

Before you begin a fitness program using any type of fitness equipment, it is important that you visit your doctor to be sure that your choices will not cause any unintended injury. This is true for the young, old, novice, or experienced fitness enthusiast. Fitness equipment can have great benefits in creating a fitness regimen that improves your overall endurance, strength, balance, and flexibility.



## RESOURCES

Benefits of Physical Activity. (2022, September 23). Centers for Disease Control and Prevention. <https://www.cdc.gov/physicalactivity/basics/pa-health/index.htm#print>

Four Types of Exercise Can Improve Your Health and Physical Ability. (2022, October 14). National Institute of Health. <https://www.nia.nih.gov/health/four-types-exercise-can-improve-your-health-and-physical-ability>

Flexibility Exercise (Stretching). (2022, September 23). American Heart Association. <https://www.heart.org/en/healthy-living/fitness/fitness-basics/flexibility-exercise-stretching>

Elliptical Buying Guide. (2022, October 14). Consumer Reports. <https://www.consumerreports.org/health/ellipticals/buying-guide/>



# GROCERY MEAT

## Info Found on the Label

Every package of meat specifies the type, the wholesale cut, and the cut name. You'll also find the weight, price per pound, total price, sell-by date, and safe handling instructions. All meat should be purchased before the sell-by date. Some packages may also include nutrition information, preparation information, and the country of origin.

You may have noticed two stamps on packages of meat. Since the early 1900s, the USDA has mandated that all meat be inspected. The inspection stamp means that the animal is fit for human consumption. Every package of meat and poultry will have an inspection stamp on it. Grading tells us the quality or palatability of the meat. This stamp is voluntary and paid for by the food companies, but most meat packages will have it.

## Use Your Senses

When purchasing meat and poultry, it's important to use your senses of touch, smell, and sight. Always make sure the meat is firm to the touch and check that the packaging doesn't have any tears, holes, or excessive amounts of liquid. It should also be cold to the touch and have no odor. Here are more specific details for meat and poultry.

## Ways to Cook

**Grilling:** Grilling is a fast and easy way to cook meat. High heat is applied directly to the surface of the meat, searing the outside and creating a browned, flavorful crust.

**Broil:** Broiling is similar to grilling: it cooks with high heat on one side, and then the other. In broiling, however, heat comes from above, and the meat sits on a perforated rack in a pan. Broiling is a simple and convenient way to prepare many cuts of meat.

**Stir-Fry and Sauté:** The French word for jump is sauté, and that's what happens to your favorite ingredients when using stir-fry or sauté cooking techniques. Sautéing is a way to cook food quickly in a small amount of oil or other fat in a pan over direct heat. Stir-frying meat is similar, except the ingredients must be constantly moving.

**Roast:** With the invention of the modern oven, however, roasting has never been easier. Here's how it works: Heat radiates from oven walls to cook the surface, hot air in the oven transfers or connects heat into the meat, and meat's heated exterior conducts heat to the inside.

**Braise:** Braising is a low and slow cooking method that begins with dry heat and ends with moist heat. Sear beef at high temperatures in a heavy-bottomed Dutch oven to attain a caramelized crust (dry heat), and then cover and finish cooking in a liquid at lower temperatures (moist heat).

**Smoke:** Smoking is a method of cooking meat and other foods over a fire. Wood chips are added to the fire to give the food a smoky flavor. Smoking adds flavor to the meat and provides a small food preservation effect.

**Sous Vide:** A method of cooking food, especially meat or fish, by vacuum-sealing and immersing it in warm water.



# GROCERY MEAT

## BEEF

### Marbling Descriptions

- The degree of marbling illustrates the minimum amount of marbling necessary to qualify for the following U.S. quality grades.
- Though not officially graded except as U.S. Prime or U.S. Choice, the degree-of-marbling photographs identify the points within each grade level.

Further explanations for the meaning of the quality grading photographs or the criteria may be obtained from the US. Department of Agriculture, Agricultural Marketing Service, Livestock & Seed Program, either the Standardization Branch, or the Meat Grading and Certification Branch, or from a member of the North American Meat Processors Association.

Since marbling is such an important factor in grading beef quality, the following pictures illustrate the lower limits of six marbling degrees: Moderately Abundant, Slightly Abundant, Moderate, Modest, Small, and Slight.

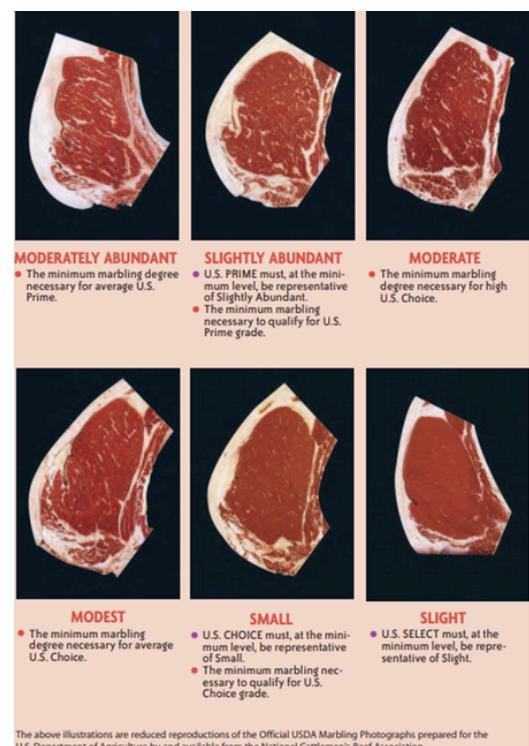
It should be noted that the Official United States Standards for Grades of Carcass Beef refer to ten degrees of marbling. These color photographs have been developed to assist government, industry, and academia in the proper application of official grade standards.

### Quality Grades

Quality grades serve to identify the eating characteristics of the product and guide the tenderness and palatability of the meat. There are eight beef quality grades, in order from the highest to lowest quality: U.S. Prime, U.S. Choice, U.S. Select, U.S. Standard, U.S. Commercial, U.S. Utility, U.S. Cutter, and U.S. Canner.

Each grade level is identified by its own grade stamp. The grade designation assigned to a carcass is determined by evaluating its sex characteristics, maturity, the quality of the lean muscle, and the degree of marbling present.

The goal of using these criteria is to provide purchasers with a system that measures and predicts quality using methods that maximize consistency and reliability. Upon request, the grading service may establish specific grade specification programs for purchasers or suppliers using the above criteria. A number of these purchase specification programs are currently in existence.





# GROCERY MEATS

## COMMON BEEF CUTS

### CHUCK ROAST

**Common Names:**

- Chuck Eye Roast, Chuck Pot Roast, Chuck Roll Roast

**Description:**

- This is the classic pot roast, becoming moist and tender when braised and full of rich beef flavor.

**Cooking Methods:** Braise or Slow Cooker

### BONELESS COUNTRY-STYLE RIBS

**Common Names:**

- Bistro Braising Strips, Boneless Country-Style Ribs, Country Style Chuck Ribs, Country-style Short Ribs

**Description:**

- Juicy and flavorful, it becomes extremely tender when cooked slowly at a low temperature.

**Cooking Methods:** Braise

### BACK RIBS

**Common Names:**

- Beef Back Ribs, Ribs

**Description:**

- Back ribs are flavorful and great when cooked on the grill.

**Cooking Methods:** Braise, Grill, Smoke

### BONELESS RIBEYE ROAST

**Common Names:**

- Boneless Prime Rib, Boneless Ribeye Roll, Boneless Ribeye, Lip On, Rib Roast, Ribeye Roast

**Description:**

A rib roast without the bones. Rich, beefy flavor; juicy and tender with generous marbling throughout.

**Cooking Methods:** Roast

### BONELESS STRIP STEAK

**Common Names:**

- Kansas City Steak, Manhattan Steak, New York Strip, Top Loin Steak

**Description:**

- This premium lean steak is a steakhouse classic known for its marbling, tenderness, and flavor.

**Cooking Methods:** Grill, Sous Vide, Stir Fry and Sauté

### FILET MIGNON

**Common Names:**

- Filet, Fillet, Tenderloin Filet, Tenderloin Steak, Tournedos (Tenderloin Tips)

**Description:**

- The most tender beef cut, it is lean yet succulent and elegant. It has a melt-in-your-mouth texture, subtle flavor, and a compact shape.

**Cooking Methods:** Grill, Sous Vide, Stir Fry and Sauté



## GROCERY MEAT

### COMMON BEEF CUTS

#### FLANK

##### **Common Names**

- Flank

##### **Description**

- Lean and flavorful, it should be thinly sliced against the grain when carving. It is an ideal choice to marinate.

##### **Cooking Methods:**

- Grill

#### FLAT IRON

##### **Common Names**

- Shoulder Top Blade Steak, Top Blade Filet, Top Blade Steak

##### **Description**

- Second in tenderness to the tenderloin steak, the flat iron is well-marbled, richly flavored, and juicy. It is best when cooked to no more than medium doneness.

##### **Cooking Methods:**

- Grill, Stir Fry, and Sauté

#### BACK RIBS

##### **Common Names:**

- Beef Back Ribs, Ribs

##### **Description:**

- Back ribs are flavorful and great when cooked on the grill.

##### **Cooking Methods:** Braise, Grill, Smoke

#### GROUND BEEF

##### **Common Names:**

- Grind, Ground Chuck, Ground Round, Ground Sirloin

##### **Description:**

- It is versatile, flavorful, and economical. Shape it into burger patties, meatballs, meatloaf, or brown and crumble it for a variety of dishes.

##### **Cooking Methods:**

- Bake, Broil, Grill, Stir Fry and Sauté

#### INSIDE SKIRT

##### **Common Names:**

- Skirt Steak

##### **Description**

- It boasts a deep, rich, beefy flavor. It is best when marinated before grilling; when slicing, cut against the grain.

##### **Cooking Methods:**

- Grill



## GROCERY MEAT

### COMMON BEEF CUTS

#### PRIME RIB

**Common Names:**

- Ribeye Roast

**Description:**

- Rich flavor, juicy tenderness, and majestic appearance. The grand champion of beef roasts. It's one of the most tender beef cuts. Fine-grained with generous marbling throughout.

**Cooking Methods:**

- Roast

#### RIBEYE

**Common Names:**

- Boneless Ribeye
- Delmonico Steak
- Filet of Ribeye

**Description:**

- This boneless steak is rich, tender, juicy and full-flavored, with generous marbling throughout.

**Cooking Methods:**

- Grill, Sous Vide, Stir Fry and Sauté

#### STEW BEEF

**Common Names:**

- Beef for Stew, Beef Stew Meat, Stew Beef

**Description:**

- Well-trimmed beef, cut into 3/4 to 1 1/2-inch pieces, covered with liquid and simmered slowly in a covered pot. Commonly cut from the sirloin, but it can come from any tender cut.

**Cooking Methods:**

- Braise

#### T-BONE

**Common Names:**

- T-Bone Steak

**Description:**

This well-marbled cut consists of two lean, tender steaks—the strip and tenderloin—connected by a telltale T-shaped bone. In a T-bone, the tenderloin is between 1/2 and 1 1/4 inches in diameter.

**Cooking Methods:**

- Grill, Stir Fry, and Sauté

#### TENDERLOIN ROAST

**Common Names:**

- Chateaubriand

**Description:**

The most tender beef roast is lean, succulent, and elegant, with mild flavor.

**Cooking Methods:**

- Grill, Roast



## GROCERY MEATS

### COMMON BEEF CUTS

#### TENDERLOIN STEAK

**Common Names:**

- Filet, Filet Mignon, Fillet, Tenderloin Filet, Tournedos (Tenderloin Tips)

**Description:**

The most tender beef cut, it is lean yet succulent and elegant. It has a melt-in-your-mouth texture, subtle flavor, and a compact shape.

**Cooking Methods:**

- Grill, Stir Fry, and Sauté

#### TOP ROUND ROAST

**Common Names:**

- Top Round Pot Roast

**Description:**

- Economical, moderately tender, and full-flavored. Slice thin against the grain.

**Cooking Methods:**

- Braise, Instant Pot, Roast, Slow Cooker

#### TOP SIRLOIN STEAK

**Common Names:**

- Top Sirloin Steak

**Description:**

Family-sized steak that offers lean, well-flavored, and moderately tender beef at an affordable everyday price. Convenient and a great value with no bones and little fat. Versatile, juicy, and delicious.

**Cooking Methods:**

- Broil, Grill, Stir Fry and Sauté

#### TRI-TIP

**Common Names:**

- Bottom Sirloin Roast, Tri-Tip Roast, Triangle Roast

**Description:**

- Juicy, tender, and versatile, this roast offers rich beef flavor. Easily recognized by its triangular shape, this West Coast favorite is gaining broader popularity.

**Cooking Methods:**

- Grill, Roast, Smoke, Sous Vide

#### WHOLE BRISKET

**Common Names:**

- Beef Brisket, Brisket, Deckle-off Brisket, Packer Brisket

**Description:**

- A flavorful cut that becomes tender when cooked slowly at low temperatures, it is the traditional cut used for corned beef and is popular in smoked barbecue.

**Cooking Methods:**

- Braise, Smoke



## GROCERY MEAT

### LAMB

#### Grade

Carcasses within the ovine species are classified as lamb, yearling mutton, or mutton, depending upon their evidence of maturity, as indicated by the development of muscular and skeletal systems. The youngest carcasses are called Lamb, and this is the product primarily used in food service establishments.

As with the other species, quality grades identify the product's eating characteristics. They are a guide to identifying the tenderness and palatability of the meat. There are four quality grades for lamb and yearling mutton. The grades, in order from the highest to lowest quality, are as follows: U.S. Prime, U.S. Choice, U.S. Good, and U.S. Utility. In determining the quality grade, consideration is given to the animal's maturity based on its lean and skeletal development and the degree of fat streaking on the flank.

#### Common Lamb Cuts

##### Bone-In Leg

Because of its impressive presentation, the bone-in leg is perfect for any holiday celebration or special occasion. The bone adds flavor and richness to the meat.

##### BRT Leg

The BRT, or boneless leg, is one of the most versatile cuts of lamb. It can be roasted whole, trimmed into kabob meat, individual chops, or smaller roasts, or butterflyed and grilled. The leg is the leanest lamb cut. A whole boneless leg of American Lamb typically weighs 7-8 pounds, so there will be plenty of leftovers.

##### Ground Lamb

Mellow and mildly flavored, ground lamb contains lean meat and trimmings from the leg, loin, rib, shoulder, flank, neck, breast, or shanks. Readily available and the perfect substitute for ground beef in many recipes, ground lamb offers a long list of possibilities for quick and easy weeknight dinners: meatballs, burgers and sliders, shepherd's pie, kabobs, and meatloaf. Add aromatic seasonings to impart delicious flavor and variety to any meal made with ground lamb.

##### Kabob & Stew

Trimmed and cubed lamb from the leg or shoulder is readily available at grocery stores for quick and easy stew or kabobs. You can also trim and hand-cut stew meat from leg, shoulder, or shank roast.

##### Loin Chop

One of the most readily available cuts in the case at the grocery store and butcher shop, loin chops are lean, tender, and delicious! With their perfect 3-to 4-ounce serving size and attractive "T"-shaped bone that runs through the meat, loin chops (sometimes called T-bone chops) are simple to prepare. Season with a dry rub or marinate for 4 to 6 hours, then grill, broil, or panfry the chops for a delicious meal.



# GROCERY MEAT

## LAMB

### Rack

An impressive presentation that is surprisingly easy to prepare at home, the rack offers versatility for entertaining. The rack of lamb is an icon of fine dining menus across the country. Serving a rack of lamb makes it easy to have an effortless, restaurant-quality meal at home. There are 8 chops per rack, and an American Rack weighs about 2 pounds.

**Frenched Rack:** a few inches of meat is removed from the end of the bones

**Crown Roast:** two frenched racks tied together to resemble a crown.

### Ribs

One of the most cost-conscious cuts of lamb, the lamb spare ribs or Denver ribs are perfect for braising and grilling and are a great substitute for baby back pork ribs in your favorite BBQ recipe.

### Shank

Lamb shanks come in fore and hind shanks. When slow-cooked, they practically melt off the bone and are a popular menu item across the country. Lean on fat but big on flavor; the meaty shank is perfect for braising in a slow, simmering broth.

### Shoulder Chop

Traditional lamb chops come from the animal's rib, loin, sirloin, and shoulder. Shoulder chops (also called blade and arm chops) require a shorter amount of cooking time than other cuts, making them an economical and flavorful choice for quick and easy meals.

### Shoulder Roast

The Lamb's shoulder comes from the upper front shoulder of the lamb. The shoulder of any animal bears a lot of weight and will be a tough cut that needs to be cooked low and slow in order to break down the connective tissue and make it tender. It differs from the "leg of lamb," which comes from the rear leg and is leaner and more tender. The shoulder has a higher fat content, is richer in flavor, and is less expensive than the lamb leg. Because of the higher fat content, it is also more forgiving and stays juicier.



# GROCERY MEAT

## PORK

### Grade

Pork carcasses are graded by (a) class, as determined by the apparent sex condition of the animal at the time of slaughter, and (b) grade, which reflects the quality and the expected yield of lean cuts in the carcass. The five classes of pork carcasses are barrow, gilt, sow, stag, and boar. The five grades are U.S. No. 1, U.S. No. 2, U.S. No. 3, U.S. No. 4, and U.S. Utility. These grades, however, do not apply to stag and boar carcasses. It is usually unnecessary to specify a grade other than for the carcass as the requirements of the Item Description and/or specified fat limitation generally apply.

### Common Pork Cuts

#### Ground Pork

Ground pork is affordable, fresh, and extremely versatile. It soaks up any flavor you add to it. It's available with an average lean-fat ratio of 70 percent lean and 30 percent fat, making it a great substitute for other ground meats featured in your favorite recipes.

Common cooking methods for ground pork include grilling and sautéing. Nothing beats that first bite of a juicy burger or the mouthwatering flavors of pork stir fry. Learn how to grill, bake, or sauté your ground pork perfectly!

#### Ham

Ham refers to the meat from the hind leg, which is typically cured and smoked. Boneless and bone-in hams are available.

Boneless hams are available in a variety of sizes, and they're considered easier to cut and serve. Bone-in hams are popular and come in a variety of sizes and cuts. A whole ham is perfect for feeding a group. When you cut a whole ham in half, you end up with two cuts- a shank end, which is easier to carve, and a leaner butt end. Center slices are cut from the cross-section of either a butt or shank.

#### Pork Belly

Pork Belly is the boneless cut that remains after removing the loin and spareribs. Pork belly comes from a hog's belly' or underside after removing the loin and spareribs. Fresh pork belly is succulent, richly flavorful, and often served in small portions. Pork belly is at its best and is most tender when prepared using a slow cooking method, such as braising. Pork belly is a popular menu item among restaurant chefs who appreciate its versatility, flavor, and texture.

If you aren't going to use pork belly to make homemade bacon, there are multiple ways to cook it. Common methods include roasting, smoking, and searing, and pork belly can be used as the main feature or enhancement to any menu.



# GROCERY MEAT

## PORK

### Pork Chops

Pork chops are the most popular cut of pork. They come from the loin, the meat that runs from the pig's hip to its shoulder.

While pork chops are known by various names, such as loin, rib, sirloin, top loin, and blade chops, it's important to remember that they all cook the same way.

The length of cooking primarily depends on the thickness of the chop. Some prefer thin-cut chops, but others prefer the juiciness of a thick-cut chop on the bone. Thickness can vary from  $\frac{1}{2}$  to 2 inches.

### Pork Loin

The pork loin roast comes from the area of the pig between the shoulder and the beginning of the leg. It is sold either bone-in or deboned — loin roasts with a bone tend to be juicier and more flavorful, but you'll need to carve around the bone to serve. Boneless pork loin roast can be rolled and tied for cooking.

Pork loin roast is sometimes confused with tenderloin, but they are not the same. A pork loin roast is typically sold in pieces weighing 2-4 pounds, while the tenderloin is a smaller, long cut that usually weighs about a pound.

Pork loin roasts are delicious when brined or rubbed with a spice mixture and barbecued over indirect heat. They should not be braised or stewed, as they tend to fall apart and become a bit tough when cooked using moist heat.

### Pork Rib Roast

The pork rib roast (or rack of pork) is the pork equivalent of a standing beef rib roast or a rack of lamb. It is a simpler version of a pork crown roast, which is a pork rib roast tied into a circle.

This cut makes an elegant centerpiece for a special occasion dinner. The pork rib roast is not always available in the supermarket meat case, but you can order it ahead of time by asking your meat department manager or butcher.

### Pork Shoulder

Pork shoulder goes by several names at the grocery store, including picnic roast, Boston butt, blade roast, and pork butt. Common cooking methods for pork shoulder include braising, smoking, roasting, grilling, and slow cooking.

### Pork Steak

Pork steaks are cut from the pork shoulder and contain the blade bone. This cut is commonly referred to as pork blade steaks.

Pork steaks are a quick-cooking, popular cut perfect for backyard BBQs or a simple Tuesday night dinner! Common cooking methods for pork belly steaks are braising, sauteeing, and grilling.



# GROCERY MEAT

## PORK

### Ribs

Back Ribs / Loin Back / Baby Back	Back ribs come from the blade and center section of the pork loin, which is known for the “finger meat” between the bones. Back ribs also are referred to as “baby” back ribs because they are smaller than spareribs.
Spareribs	Spareribs come from the belly of the hog and are known for their full flavor. These are larger and meatier than the other types of ribs.
St. Louis Style	St. Louis style ribs are a squared cut of spare ribs. These are straight and flat and work best for any recipes that require browning in a frying pan.
Rib Tips	Rib tips are the lower portion of spare ribs that remain after cutting St. Louis style ribs.
Country-style Ribs	Country style ribs are cut from where the loin and shoulder meet. They’re a combination of higher fat and lean meat and are sold as slabs or individual servings – perfect for those who want to use a knife and fork instead of eating ribs off the bone.

### Pork Tenderloin

Pork tenderloin can be prepared in several ways and is flavorful, lean, and easy to cook. Whether you are looking for a quick weeknight dinner or something extra special, pork tenderloin is a nutritious and tasty choice.

Pork tenderloin can be impressive with simple seasonings, roasted, grilled, sautéed, or used as an ingredient in a variety of recipes. It is a mild, lean, and tender cut from the full pork loin and typically weighs around  $\frac{3}{4}$  to  $1\frac{1}{2}$  pounds.

### Sausage

Sausage is seasoned ground pork and comes from a variety of cuts, including the shoulder, butt, and loin.

Sausage is delicious in a variety of recipes! Add sausage to your menu and spice up any weeknight meal. It comes pre-seasoned and ready to cook.

Sausage comes in a wide range of ethnic varieties, so you can ignite your taste buds and experience new, authentic flavors at home!

- **Andouille** (French/Cajun)
- **Bratwurst** (German)
- **Chorizo** (Mexican and Spanish)

Popular cooking methods for Pork Sausage include grilling, roasting, sautéing, and stewing. When cooking sausage, cook to an internal temperature of 160° F to ensure doneness.



# GROCERY MEAT

## CHICKEN

### Grading

Food safety inspection is mandatory, but quality grading is voluntary. Chickens are graded according to the USDA Agricultural Marketing Service's quality regulations and standards. Grade A chickens have plump, meaty bodies and clean skin. They are also free of bruises, broken bones, feathers, cuts, and discoloration.

### Fresh or Frozen

The term fresh on a poultry label refers to any raw poultry product that has never been held below 26°F. Raw poultry held at 0°F or below must be labeled frozen or previously frozen. No specific labeling is required on raw poultry stored at temperatures between 0 and 25°F.

### Dating of Product

USDA requires a "pack date" or code date for poultry products and thermally processed, commercially sterile products, (commonly referred to as canned products where containers can be flexible, such as pouches, or semi-rigid, as in lunch bowls) to help identify product lots and facilitate trace-back activities in the event of an outbreak of foodborne illness. For other poultry products under the jurisdiction of FSIS, dates may be voluntarily applied, provided they are labeled in a manner that is truthful and not misleading, and in compliance with FSIS regulations.

A calendar date must express both the month and day of the month. In the case of shelf-stable and frozen products, the year must also be displayed. Additionally, immediately adjacent to the date must be a phrase explaining the meaning of that date, such as "Best if Used By."

The use-by date is for quality assurance; peak quality begins to lessen after the date, but the product may still be used. It's always best to buy a product before the date expires. If a use-by date expires while the chicken is frozen, the food can still be used because foods kept frozen continuously are safe indefinitely. The quality of the poultry may diminish the longer it is frozen.

### Hormones and Antibiotics

No hormones are used in raising chickens, and the U.S. Food and Drug Administration has not approved the use of steroid hormone implants for growth purposes in poultry.

Antibiotics may be used to prevent disease and increase feed efficiency. Before the bird can be slaughtered, a "withdrawal" period is required from the time antibiotics are administered. FSIS randomly samples poultry at slaughter and tests for residues to ensure levels are not above the tolerance level at slaughter. Data from this monitoring program have shown a very low percentage of residue violations.



# GROCERY MEAT

## CHICKEN

### Chicken Cuts

#### **Wings**

Wings aren't the meatiest cut, but they can still pack plenty of crunch and flavor. They may be served whole or divided into drumettes, which connect directly to the torso, and flats, which are the smaller pieces closer to the wing tips. They are usually cooked briefly at high temperatures and are a classic choice for game day and tailgating.

#### **Drumstick**

Another favorite for finger-food fans. It's one of the few cuts of meat that comes with its own convenient handle and just enough meat for a few big bites. Drumsticks are the legs with the feet removed. The dark meat in this cut is friendly to heavy seasoning, marinades, grills, and barbecues. It's also one of the most popular cuts of chicken when fried!

#### **Thigh**

A lot of poultry fans enjoy dark meat, which is one of the reasons thighs are so popular. Cajuns, in particular, revere the thigh, as it's the star ingredient in a chicken and sausage gumbo. Thigh meat is darker and contains more oil than breast meat, making it a juicier cut that's much more forgiving when slightly overcooked. When marinated, the versatility of the thigh is virtually unrivaled, making it ideal for browning and use in gravies, jambalaya, or shish kabobs. The cut comes from the underside of the animal between the legs and wings.

#### **Breast**

Breast meat comes from the front of the bird and consists of lean muscle. It's where almost all of the bird's "white meat" is found, which makes it a popular and common food item on tables throughout the country.

#### **Bone-in Breasts**

Bone-in is generally the roughest cut for breasts and can include substantial amounts of skin, cartilage, and connective tissue. Cooking the breasts this way allows the bone and other tissue to help keep the meat moist and flavorful, which is often a real challenge with white meat.

#### **Split Breasts**

A split breast is similar to bone-in, except it's been split down the middle. It may be sold as a single half or a whole breast that's simply been divided. Like whole bone-in breasts, there is some variety in this kind of cut, and it offers all the same advantages as a classic bone-in breast: the fat and skin attached to the meat make it easier to keep juicy and flavorful.

#### **Boneless/Skinless Breasts**

Most people think of breast meat when they think of it. It is a sight in almost every supermarket and a common ingredient in all kinds of food, from fried chicken to casseroles. It is a good choice when looking for pre-seasoned options, or if you have some extra time, you can marinate a boneless breast ahead of time.



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## HEADPHONES/EARBUDS

Whether watching videos or listening to music or podcasts, headphones and earbuds have become ever-important accessories. Phones, for example, come with a set when you purchase them. They add so much value as an accessory that phone companies just include them in the box. The need for headphones (collectively all styles and models) is important whether at home, school, work, play, or on the go. There are so many different applications for which consumers want and need sound delivered. Selecting the best pair of headphones is a very personal decision, but plenty of styles, models, and features require the consumer to do their homework before purchasing a set. Some can be very small and slip into a coin purse or shirt pocket, while others can blow you away with amazing sound. Some come with wires and some without. Some consumers may even purchase multiple types/sets to suit different needs. Explore some styles and features and evaluate how they address specific needs and wants among retail consumers.



Figure 1: Headphones & Earbuds (Source: The Wire Realm)

### Over-Ear

These styles are the largest within the spectrum of headphone models. This is in part because, as an over-the-ear. The design of the cups covers the entire ear, and the pads typically press up against the head. Another benefit of completely covering the ear is blocking outside sound and preventing delivered sound from leaking. All of these have some important implications for the user and even others.

These headphones come in two styles that affect sound in a couple of ways:

- Closed-back headphones have a solid cover over the back of each earcup, which helps keep sound and block ambient noise. While that can be a great feature, blocking outside noises can prevent the listener from hearing things like “take out the trash” or “dinner is ready.”
- Open-back headphones have openings on the back of the earcup, intended to give the listener a clearer and more natural sound. However, that design allows sound to bleed out, which might disturb the person sitting in the airplane or library next to you. A benefit is that it allows the listener to hear ambient sounds that may be important to hear.

By design, the over-ear models are the largest, covering the entire ear. The quality of sound is likely better in these models than others, but they may come at some expense, literally and figuratively. They tend to be more costly. They also can cause the ears to get warm/hot if used for extended periods of time.

These headphones come with adjustable headbands that connect the two earcups. They can come in a wide range of designs, including slim/sleek bands, wider padded bands, and everything in between. Depending on how they are worn, they can mess up your hairstyle. Again, those become personal choices.



### On-Ear

This style of headphone generally is smaller and lighter than its over-ear sibling. These models press directly over the outer ear instead of the head. Many consumers find them more comfortable than the over-ear models. Similarly, these headphones come in closed-back and open-back styles to create the same effects. However, since they only go directly over the ear and do not press against the head, they are much more likely to bleed sound out and let ambient noise in than the over-ear headphones. This is primarily because they do not create a seal against the head when they sit on the ear. Depending on the size/shape of the user's ears, these headphones can vary greatly in this regard.



Figure 2: Over-ear (L) & On-ear (R) Models (Source: Crutchfield Corporation)

The headbands on these models are similar to those of the over-ear; however, many styles are foldable, making them convenient for storage and protecting them from damage when not in use.

### In-Ear & Earbuds

The smallest models come in two styles: in-ear and earbud headphones. While very similar in appearance, some subtle differences exist that even experts argue about how different they are. Albeit small, it is still important to know the difference.

In-ear style headphones rest in the “bowl” of the ear, just outside the ear canal. However, most styles include silicone canal tips. These enter the ear canal and create a seal with the ear canal to prevent sound from bleeding out and ambient noise from getting in. When comparing this style with its on-ear and over-ear siblings, the relative difference in effectively sealing in sound and blocking out noise can be very different. For ultimate comfort, some manufacturers even offer custom-molded earpieces that fit perfectly in the bowl of your ear if you are willing to pay the extra price. That's one way to create a sound seal and a way to keep others from borrowing your headphones.

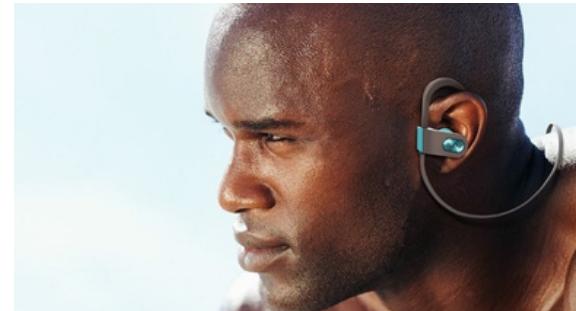
Earbuds also rest in the “bowl” of the ear, just outside the ear canal. However, this style does not include the canal tips like the in-ear styles. Manufacturers will include soft foam slip-on covers to add comfort, but they do not provide a seal with the ear canal as the in-ear styles do. As one might expect, while some sounds might bleed out, ambient noise or sounds can easily be heard when using earbuds. As was mentioned earlier, there are some advantages to hearing outside sounds. The most common way people acquire a set of earbuds is the white ones that come with the purchase of an iPhone®. Don't believe that there is no retail market for earbuds. They tend to be the most economical option, and many quality products provide suitable listening pleasure.



Figure 3: Earbuds vs. In-Ear (Source: HiFi Headphones)

Some listeners may find these types of headphones uncomfortable if used for long periods of time. Consider the comfort level and time they will be used before making your purchase.

Many of these models also come with a wide range of designs to hold the earbud in place. For many, simply putting them in the ear, as shown in Figure 3 is enough for them to stay in place. However, depending on the level of activity, “ear hooks” may be needed to keep them in place. A wide range of products is available for the active listener who wants to listen while they work out, play sports, or do anything that may need to provide some support and keep them in place.



#### Sound Quality Figure 4: Ear-Hook Design

Like speakers, headphones and earbuds can emphasize different parts of the audio spectrum and are very much a subjective quality measure. While some “accuracy” measures can be evaluated with sophisticated instruments, consumers generally must rely more on enjoyability, which is completely subjective. Many people like strong, deep bass sound when it comes to headphones and earbuds, specifically music, but hi-fi enthusiasts lean more towards accurate, natural sound. Which one are you?

Consumers should try them before they buy them. This requires driving to a retail outlet, listening to them, and comparing them first-hand. Taking any music or audio with you for which you typically would use the headset is also a good idea. However, purchasing online without the ability to listen to them poses a bit of a dilemma. The best recourse in this situation is to evaluate the seller’s return policy so that you can return them if you are not happy with them.

Over-ear and On-ear models, given their size, allow manufacturers to focus on the quality of sound rather than portability. You can still find relatively good quality sound ranging from \$20 to \$800.

Many models have onboard controllers that allow the listener to raise the volume, lower the volume, mute, pause, or advance music or sound on the headphones. These can add versatility to the device.

#### Size & Portability

The decision between In-Ear, On-Ear, and Over-Ear models must be evaluated against their intended purpose, holding other features constant. When portability is the most important feature, the In-Ear/Earbud models will be smarter. However, if the quality of sound takes priority, the larger Over-Ear or On-Ear models will likely be a better choice. It is important to consider that some high-quality in-ear/earbud models will provide better sound quality than the over-ear or on-ear models. Look at your choices carefully before you make any rash decisions that will leave you feeling like you didn’t get what you paid for.

Over-ear models typically do not come foldable, making them bulky and difficult to stow compared to the earbuds.



However, many on-ear models come in foldable styles with a semi-hard case or bag. Will the consumer store them in a cabinet, drawer, backpack, purse, or pocket?

Some in-ear/earbud models exist, including a rigid or soft collar that lays around the neck with wired earbud/in-ear headphones. These styles can be foldable and easier to store than their larger, over-the-head siblings.



Figure 5: Rigid and Soft Collar-Style In-Ear Headphones

### **Wired**

The array of headphones and models that keep you tethered to a device will likely provide you with the best listening experience. While you get that at the expense of being unable to move further than the cord will allow, you virtually eliminate the interruption of disconnecting from your listening experience. Consider the length of the cord provided with the device and the interface with the sound source. You can find them with a 1/8" connector for some phones and computers; some come with a 1/4" jack for sound systems and other professional uses. You can also find some USB connectors for use with computers and other computer-based USB ports. Depending on the application, you will need to select the appropriate wired connection. While there are adapters between 1/8" and 1/4" connectors, it will be more difficult to find an adapter to convert those to/from a USB connection as the source or the headphones.

Don't assume that every corded headphone keeps you tethered to your home or office. You must remember that the cord can simply be between the phone in your backpack and your ears. Do not let the wired headphones keep you static. You can always get great sound on the move. The only thing keeping you tethered is the source of the sound, so your headphones can be as portable as your source.

### **Wireless**

Wireless headphones provide the most freedom of movement with proximity to the sound source. The most common form of connection is with Bluetooth® technology. The standard range of Bluetooth is about 30 feet in an open space. Wires and cords can get in the way of active movement. The wireless options provide considerable freedom in that respect. However, if your activities separate you from your sound source beyond its range, you will experience interruption or disconnection from the sound. Even people or objects between your source and device can reduce the effective range of the connection.

An inherent part of any wireless headphone is the use of batteries to power the device. The best measure of battery performance is actual playtime. Unlike a wired device, wireless headphones must be powered to make the wireless connection. Larger over-ear or on-ear devices may be less efficient with battery usage, while smaller in-ear models may boast up to 20 hours of playtime. Whichever model you choose, be aware of playtime, the amount of time it will take to recharge, and the interface with the charging device (USB, Firewire, AC adapter, etc.). In terms of size, larger models may have larger battery capacity compared to smaller ones. The key is to compare active playtime. Reference to "true wireless" models continues to expand. Like the in-ear collar style models, there remains a wire connecting the two earpieces. True wireless headphones are especially portable but often have shorter playtime.



One final note about wireless headphones is that there are wireless and wired models. Keep a vigilant eye on device specs, which provide great versatility for the consumer.

### **Noise-cancelling**

Noise-cancelling (NC) technology is available in many models and provides some very important benefits. There is passive and active NC technology. Passive NC technology is based on the construction of headphones, which include materials that help block ambient sound. Active NC technology is embedded circuitry that works off battery power to erase low-frequency sound waves, including much outside ambient noise. Working in a noisy environment, like a train station lobby, can make it difficult to concentrate on your work. NC headphones are designed to cancel out that noise. NC-featured devices will likely come at a premium but may be worth the expense, depending on the application and user.

Active NC headphones require power, and as described in the Wireless section, the key is to determine and compare active playtimes. Remember that if you are using the headphones for short periods, playtime may be less of a factor in deciding between models and styles. In some cases, the NC technology can be switched off to conserve battery playtime.

The biggest challenge regarding NC headphones is distinguishing good NC technology from not-so-good NC technology, especially by reading the product packaging or specs. The best determination is to do a hands-on evaluation. Try them out.

### **Microphones**

The integration of microphones in headphones can dramatically affect the versatility of any headset. For example, answering a call on your phone using your headphones might be a valuable benefit. Many professionals working at home may use headphones with mics to conference with colleagues across the internet. Gamers are especially attracted to earphones with mics. It changes how they interact with other online gamers and allows them to listen and speak clearly. There is a wide range of options regarding headphones with microphones. Some microphones may include their own NC technology to increase the quality of sound going through the mic. In terms of design, some microphones are rigid and affixed to the earcups in the over-ear or on-ear models. The in-ear models generally house the integrated mic in one of the earpieces or on the cord connecting to the device. The collar-style headphones may be integrated into the collar or the wires connecting the earpieces.



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# Laptops and Chromebooks

Laptops are common in households and in the workplace. These devices help discover news, talk with friends, respond to emails, pay bills, order clothes, and even watch shows. Laptops have developed significantly over the years and have many new and flashy features. Extended battery life, processing systems, dual-tablet options, and how lightweight they can be are all features that may need to be included in the decision-making process.

## Size

While the ideal model may have the biggest screen, which often comes as a larger device that weighs more and takes up more space, 15-16-inch screens should suit most people. Thirteen, 14, and 17-inch screens are the most common, and some manufacturers have an 11-inch display option.

Small screens, ranging from 10 to 13 inches, work great for the on-the-go person. They are light and compact enough to fit in everyday bags. Some 10-inch screens have a level-3 processor that can be slow-running. Battery life varies, but most offer 20 hours on a single charge.

Medium screens, ranging from 14 to 16 inches, offer a mix of performance, portability, and price. These models have generous battery life and higher-end specifications, making them more appealing to gamers. These features can also be handy when editing high-resolution videos.

Large screens, ranging from 17 to 18 inches, are referred to as desktop replacements. Their heavy weight and size make them more likely to sit on a desk and travel less. These are handy when operating in spreadsheets, needing to run multiple windows at once, or watching your favorite movies.



Chromebooks

These laptops run on the Chrome operating system developed by Google. They are often inexpensive, starting at less than \$200 and ranging into a higher-end option similar to a regular laptop. These computers rely heavily on cloud-based apps like Gmail and Google Docs to store files online. These devices work better when streaming content rather than downloading it. You will also need reliable internet to get the most out of a Chromebook.

## Convertibles and Detachable

Some models offer a 2-in-1 function running as a laptop and tablet. Convertibles have a keyboard that can be folded behind a touchscreen display, while detachable models allow you to remove the keyboard entirely. The touchscreen display makes it easier to scroll through photos and other storage. Apple doesn't make a 2-in-1 laptop, but you can pair the iPad with a Bluetooth keyboard.



## Processors

Processors with multiple cores can process more data at the same time, therefore offering more speed.

Clock speed, measured in gigahertz (GHz), along with the number of cores and other factors, determines a processor's speed and ability to process information. Generally speaking, the higher the clock speed, the faster the processor.

Battery life is also a top factor when choosing a laptop. Lower power consumption means a longer battery life.

If a laptop is primarily used for basic things like emails, web browsing, and office documents, any processor on the market will work within a small budget.

For Windows laptops, watching high-resolution videos, or playing games, you will want a mid- or higher processor like Intel's Core5 or AMD Ryzen.

Mac laptops no longer use intel processors as they have developed an Apple-based M series, M1, M2, and M3. All are fast and have long battery life.

## Operating systems

Mac and PC systems have various models. They both support popular software like Adobe, Photoshop, Chrome, and Zoom. Apple has the benefit of connecting to an iPhone, as Android can connect with a PC. This allows you to text from your keyboard.

## Memory

The more memory a laptop has, the faster it can be. Memory is measured in gigabytes (GB). Mid-range laptops have around 16GB of memory, and less expensive models have 8GB. If you work with multiple tabs in a browser, the 16GB may be better for you.

## Drives

Solid-state drives (SSDs) are significantly faster and often smaller than traditional hard drives, as they don't have moving parts. SSDs are measured in GB and terabytes; most common laptops have 256GB and 512GB storage, and the higher-end ones have 1 terabyte or more.

Hard Drives store files on a spinning disk and use more power than an SSD. They are also commonly slower overall. Hard drives are measured in GB and Terabytes, and their speed is measured in revolutions per minute (rpm). Slow hard drives will take longer to start up and complete tasks. Hard drives are the least common in laptops but can be found in budget models.

Optical Drives are practically nonexistent. However, you can purchase an external option if you need one to load an old DVD or install an app.



## Battery

Laptops run on a rechargeable lithium-ion battery to function without being plugged into a wall outlet. They will go into sleep mode to extend battery life. You can lengthen battery life by dimming the display, turning off WiFi connectivity, and using only essential apps. Batteries should last several years in a laptop without needing replacement.

## Touchscreen

Many companies now include touchscreens on laptops, except Apple. These models have custom touch-enabled multimedia apps that let you use your fingers to zoom, turn, and scroll. This option commonly increases the laptop's value and cost.

## Ports

The newest port to arrive on computers is the USB-C. These are reversible, so you can't plug them incorrectly. They are also convertible to the earlier version of USB with an adapter.

USB ports connect add-on devices like digital cameras, external hard drives, and flash drives.

Ethernet ports or a wireless network card let you link multiple computers to share files, a printer, or a broadband internet connection.

Thunderbolt is a high-speed data transfer port used to connect external devices. The newest version, Thunderbolt 4, uses a USB-C connection and enables connectivity to 4K displays.

HDMI output jack lets you run a video cable from a computer to a TV screen, allowing you to stream or watch movies on the TV from your laptop.



# OUTDOOR BACKPACKS

The following is a general guide for pack sizes (measured in liters) that typically work well for backpackers during warm-weather hikes of varying lengths. Colder-weather trips usually require a larger pack, while ultralight backpackers may go smaller than the recommendations. (For more information, see our Expert Advice article on Ultralight Backpacking.)

## Length of trip Pack capacity (liters)

Weekend (1–3 nights) 35–50

Multiday (3–5 nights) 50–80

Extended (5+ nights) 70+



## Weekend (1–3 nights; 35–50 liters)

Efficient packers using newer, less-bulky gear can keep things light on 1- to 3-night trips by using a pack in this range. Be aware that packing light requires self-discipline and careful planning. If you can pull it off, though, the light-on-your-feet rewards are fantastic.

## Multiday (3–5 nights; 50–80 liters)

- These are the most popular backpacking packs sold at REI, and they're an excellent choice for warm-weather trips lasting three or more days.
- 50–80 liter packs are also used for backcountry skiing, day trips, overnights, and sometimes two-night trips.



## Extended trip (5+ nights; 70 liters or larger)

Extended trips of 5 days or more usually call for packs of 70 liters or larger. These are also usually the preferred choice for:

- Winter treks lasting more than 1 night. Larger packs can more comfortably accommodate extra clothing, a warmer sleeping bag, and a 4-season tent (which typically includes extra poles).
- Adults taking young children backpacking. Mom and Dad wind up carrying a lot of kids' gear to make the experience enjoyable for their young ones.



## Climbing Packs

REI also carries packs designed primarily as climbing packs. Most have modest capacities that are appropriate only for day trips or overnights. Common features include:

- The ability to strip down the pack to its minimal weight (removing the lid, frame sheet, and possibly the hip belt) during a summit push.
- A narrower, sleeker, sometimes higher profile than a usual pack bag, permitting unencumbered arm movement.
- Several lash-on points for external tool attachment.
- A daisy chain—a length of webbing stitched to the outside of a pack—provides multiple gear loops for attaching a helmet or tools.
- A reinforced crampon patch (to prevent crampon points from gouging holes in the pack bag).
- Gear loops on the hip belt or low on the pack body are useful as clip-on points for gear or as attachment points for skis.
- Shop REI's selection of backpacks.





Once you've chosen the type of backpack you want, the next step is to work with an REI sales specialist to expertly fit you to your pack.

### **The right fit offers:**

- A size appropriate for your torso length (not your overall height).
- A comfortably snug grip on your hips.

If you're unable to work with a fit specialist in a store, you can enlist a friend and follow the directions provided in the REI Expert Advice article on [Finding Your Torso and Hip Size](#).

### **Torso Length**

Some packs are available in multiple sizes, from extra small to large, which fit a range of torso lengths. These ranges vary by manufacturer and by gender. Check the product specs tab for size details of a specific pack. Other packs may feature an adjustable suspension, which can be modified to fit your torso, especially if you're in between sizes. The drawback: An adjustable harness adds a little weight to a pack.

### **Waist Size**

Some packs are available in multiple sizes, from extra small to large, which fit a range of torso lengths. These ranges vary by manufacturer and by gender. Check the product specs tab for size details of a specified pack.

Other packs may feature an adjustable suspension, which can be modified to fit your torso, especially if you're in between sizes. The drawback: An adjustable harness adds a little weight to a pack.

### **Women-Specific Backpacks**

These are engineered specifically to conform to the female frame. Torso dimensions are generally shorter and narrower than men's packs. And hip belts and shoulder straps are contoured with the female form in mind.

### **Youth-Specific Backpacks**

These typically offer smaller capacities and include an adjustable suspension to accommodate a child's growth. With their smaller frame sizes, women's backpacks often work well for young backpackers of either gender. So do small versions of some men's packs.

### **Additional Backpack Fit Adjustments**

#### **Load lifter straps**

They are stitched into the top of the shoulder straps and connect to the top of the pack frame. Ideally, they will form a 45° angle between your shoulder straps and the pack. Kept snug (but not too tight), they prevent the upper portion of a pack from pulling away from your body, which would cause the pack to sag on your lumbar region.



#### **Sternum strap**

This mid-chest strap allows you to connect your shoulder straps, which can boost your stability. It can be useful when traveling on uneven cross-country terrain, where an awkward move could cause your pack to shift abruptly and throw you off balance.

For tips on pack loading, see the REI Expert Advice article on [How to Load a Backpack](#).



## Backpack Frame Type

### Internal-frame backpacks

Most packs sold at REI today are body-hugging internal frame packs designed to stabilize a hiker on uneven, off-trail terrain. They may incorporate various load-support technologies that all transfer the load to the hips.

### External-frame backpacks

An external-frame pack may be an appropriate choice if you carry a heavy, irregular load. Toting an inflatable kayak to the lake or heading out to the backcountry with surveying tools? An external frame pack will serve you best. External frame packs also offer good ventilation and lots of gear organization options.

### Frameless backpacks

Ultralight devotees who like to hike fast and light might choose a frameless pack or a climbing pack where the frame is removable for weight savings.

## Backpack Features

### Main compartment access:

- Top-loading openings are pretty standard. Items not needed until the end of the day go deep inside.
- Some packs also offer a zippered front panel that folds open, exposing the full interior of the pack, or a side zipper, which also makes it easier to reach items deeper in your pack.

### Sleeping bag compartment

- This is a zippered stash spot near the bottom of a pack. It's a useful feature if you don't want to use a stuff sack for your sleeping bag. Alternately, this space can easily hold other gear you'd like to reach.
- Top lid: Many packs offer a zippered top lid where most backpackers store quick-access items: sunscreen, insect repellent, a camera, snacks, and a map. Some lids detach from the main pack and convert into a hip-belt pack for day trips.

### Pockets

#### Typical offerings:

- Elasticized side pockets lie flat when empty, but stretch out to hold a water bottle, tent poles, or other loose objects.
- Hipbelt pockets: These accommodate small items you want to reach quickly—a smartphone, snacks, packets of energy gel, etc.
- Shovel pockets: These are flaps stitched onto the front of a pack bag with a buckle closure at the top. Originally intended to hold a snow shovel, they now pop up on many 3-season packs, serving as stash spots for a map, jacket, or other loose, lightweight items.
- Front pocket(s): Sometimes added to the exterior of a shovel pocket, these can hold smaller, less bulky items.

### Ventilation

This can be a drawback of internal-frame designs. Much of the pack rides on your back, cutting airflow and accelerating sweaty-back syndrome. Designers have addressed this in a variety of ways—ventilation “chimneys” built into back panels, for example.

A few packs have engineered a suspended mesh back panel, sometimes called “tension-mesh suspension.” This is a trampoline-like design where the frame-supported pack bag rides along a few inches away from your back, which instead rests against the highly breathable mesh.

### Padding

You may encounter sore spots on your hips and lower back if you're using a lightweight pack with a fairly minimalistic hip belt and lumbar pad. If this is the case, consider using a cushier hip belt.



### Attachment points

If you frequently travel with an ice axe or trekking poles, look for tool loops that allow you to attach them to the exterior of the pack. Rare is the pack that does not offer at least a pair of tool loops.

### Backpack Accessories

#### Raincover

Pack fabric interiors are usually treated with a waterproof coating. Yet packs have seams and zippers where water can seep through, and the fabric's exterior absorbs some water weight during a downpour.

The solution is a rain cover, which could be a plastic garbage bag (cheap but clumsy) or a more customized pack cover. This is a good item if you expect rain on your trip. An alternative: bundling gear internally in waterproof "dry" stuff sacks. Lightweight dry sacks can be a better option in windy conditions; strong gusts have the potential to abruptly peel a cover right off a pack.

#### Hydration reservoir

Nearly all packs offer an internal sleeve into which you can slip a hydration reservoir (almost always sold separately), plus You can slip the sip tube with 1 or 2 "hose portals."

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# OUTDOOR EQUIPMENT

## Tents, Sleeping Bags, and Camp Stoves

In 2011, an estimated 42 million Americans went camping. Those campers spent a staggering \$534.9 million days camping! There are many different types of camping experiences, each varying in time, terrain, season, and purpose. Properly preparing for a camping trip is probably one of the most important aspects of making the experience enjoyable. With this many people and time spent in the outdoors, it is important for each person to equip themselves with the best and most appropriate equipment available.

This study guide presents three essential camping equipment items: tents, sleeping bags, and camp stoves. With advances in technology over the last century, each item has improved in construction and purpose and is no longer a "one size fits all" product. To ensure a fun camping experience, consumers should become familiar with the many differences in the equipment before making purchases.

### Tents

A tent is a portable shelter made of fabric and supported by poles, with lines securing the structure to the ground. Today's tents come in/for a variety of shapes, seasons, sizes, weights, features, and purposes.

- **Seasons**

- Three-season tents are designed for spring, summer, and fall. They have a variety of ventilation options and are typically made of thinner, less durable material than four-season tents. Three-season tents are best used in mild to hot climates.
- Four-season tents are built to provide better protection from snowfall and wind. Venting is minimal, and the material is tougher than three-season tents. The season type is a bit misleading in that these tents are really designed for one season: winter. This type of tent may not be suitable for hot climates due to its limited ventilation.

- **Size and Weight**

- One of the biggest factors in selecting a tent is its size. Size is usually quantified by how many people can sleep on the floor. A "person" rating typically depicts this. As an example, a tent may be described as capable of sleeping 4 people. Keep in mind that this rating does not take into consideration any gear that may also need to be stored in the tent. An alternative means of determining the best tent is to estimate the amount of floor space needed by the camper(s) and match that to the floor space (noted by dimensions or square footage on the packaging) of the tent being purchased.
- With size also comes weight. Factors that affect weight are the size of the tent itself, the type and amount of material used, and the tent's features. Weight is an extremely important factor to consider when camping in more remote locations (e.g., backpacking or wilderness camping) and hauling the gear on foot to the campsite. Weight is less of a factor if the camper is "car camping" (parked close to the campsite) or using a horse or ATV to haul the gear.

- **Features**—Today's tents offer a variety of features that help make your living space more enjoyable and comfortable.

- Rain fly: A removable, water-resistant outer wall made of cloth that helps protect the tent from rain. Rain comes in two categories: full-length and partial. Full-length extends almost completely to the floor and provides the most protection. Partial covers the mesh panels at the top of the tent and offers more ventilation than the full-length.
- Vestibule: A floorless "porch" usually created by an extension of the rain fly. Its purpose is to provide a semi-protected transition area between the tent and the outdoors. It is often used as an area to remove wet or muddy shoes.



- Door: A cloth door panel that is often secured by a zipper. Some tents have multiple doors to allow easier movement in and out of the tent.
- Poles: A rod made of aluminum, fiberglass, or carbon fiber that helps shape and structure a tent. Fiberglass poles are found on inexpensive, light-duty tents (cheaper, heavier, and less durable than the other two). Aluminum poles are strong, light, and inexpensive. Carbon fiber poles are found on high-end tents. These are light and strong but are the most expensive to replace.
- Panels/Walls: The inner cloth canopy comprises a solid and/or screened (mesh) material. A solid, waterproof wall can provide protection from rain, but provides less ventilation inside the tent. A screened wall allows for better airflow in and out of the tent but does not prevent rain from entering the tent. A hybrid design that uses a mixture of solid and screened material helps reduce condensation inside the tent. Tent fabric usually has better airflow in and out of the tent but does not prevent rain from entering the tent. A hybrid design that uses a mixture of solid and screened material helps reduce condensation inside the tent. A hybrid design that uses a mixture of solid and screened material helps reduce condensation inside the tent. Tent fabrics usually have a waterproof rating associated with their polyurethane-coated fabric. Higher values are associated with better waterproofing capabilities. For example, a rainfly with a rating of 2,500mm is more waterproof than 1,000mm. Keep in mind that the higher the rating (more coating), the heavier the tent will be.
- Windows: Typically made of screened (mesh) material, it allows air to flow in and out of the tent while minimizing the entry of insects or other critters.
- Floor: A fabric component of the tent that is made of more durable material than the walls. The floor must hold up against the weight of its occupants and contact with the ground.
- Footprint: A durable material (also called ground cloth) placed under the tent to provide extra protection from abrasion and moisture. A footprint will also help extend the life of the tent.

- **Sleeping Bags**

- Camping is all about enjoying the great outdoors, but comfort is probably the number one priority while you're fast asleep in your tent. Having the right sleeping bag can make all the difference in getting a restful sleep. Below are three of the most important factors to consider when purchasing a sleeping bag.
- *Temperature Rating:* The temperature rating indicates the lowest ambient temperature and the average user would still remain comfortable inside the sleeping bag. For example, rating +35 degrees Fahrenheit that the average person would remain comfortable inside the sleeping bag at +35 degrees Fahrenheit or higher. In selecting the ideal bag, select one that is rated for the coldest temperature expected.
- *Insulation Type:* Most sleeping bags are insulated with either a synthetic polyester fill or goose down.
  - Advantages: Synthetic Insulation
    - Dry Fairly fast
    - Easy to clean
    - Less Expensive
    - Non-allergenic
  - Advantages: Down Insulation
    - Lightweight
    - Performs well in cold, dry weather
    - Highly compressible
    - Durable
- *Shape and Size:* The most common shapes (in order of largest capacity to smallest) are rectangle, semi-rectangular, and mummy. Of the three, mummy shapes are smaller and typically lighter weight, ideal for backpacking. To compare sizes when purchasing, check the shoulder and hip girth specifications. Lengths come in "regular" or "long." Long is recommended for individuals 6'6" or taller.



## CAMP STOVES

- **Size and weight:** camp stoves come in various arrangements, fuel types, and accessories. Stoves can range in weight from a few ounces to several pounds. Select a furnace that minimizes weight and volume when backpacking. Be sure to factor in the weight of the stove's fuel. If car-camping, size, and weight are less of a factor.
- **Burners:** Stoves are designed with single or multiple burners. Single burners are best for simple meal preparations such as boiling water or a single can/pot of food. Multiple burners are ideal when preparing large meals that require more than one burner to be running at a time. Single burners weigh less and are the burner of choice for most backpacks.
- **Fuel Type - Cartridge vs. Liquid Fuel**
  - **Cartridge stoves** use compressed gasses such as propane, butane, or iso-butane in their container.
  - These are typically lighter in weight, require less maintenance, and burn cleaner. Butane does not perform at temperatures below freezing (32 degrees Fahrenheit). Stoves are sold with a burner that attaches to the top of the cartridge, which serves as the stove's base. The canister cannot be refilled.
  - **Liquid Gas stoves** have a refillable fuel tank typically filled with white gas or kerosene. These stoves work better in cold and windy conditions than cartridge stoves; however, they are more challenging and require more maintenance. Liquid fuels are heavier than the compressed gas fuels.



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## PROFESSIONAL DRESS

Dressing for success ensures that you put your best foot forward and make a positive first impression. After all, before you speak your name, your future employer, college professor, or colleague SEES you. You don't have to spend a lot of money to land a quality, professional-looking outfit. Three common levels of professional dress are business professional, business casual, and casual.

What you wear includes not only clothes but also shoes, accessories, and jewelry. Men should have shoes that match their belt and socks. Women should wear jewelry that isn't distracting by making noise or dangling. Personal grooming is also a factor: hair should be trimmed and attractive, nails and hands should be clean, etc.

When purchasing clothes to wear in professional settings, you don't have to break the bank. Purchasing classic styles over the current trends will last longer. Classic styles in suits, dresses, and coats will ensure longevity in these items. Find ways to incorporate items that can be worn with multiple other shirts, pants, or jackets. This will allow for a mix-and-match wardrobe. Trendy items can be purchased to keep the classics in style. Trendy accessories to bring your wardrobe through each season can be an inexpensive way to utilize bright colors.

Professional dress can be found in various venues, not just department stores. These include clearance racks, outlet stores, thrift or resale shops, garage sales, and borrowing from friends.

### Casual

You cannot go wrong with khakis and a nice shirt or blouse in a casual situation. Casual isn't sloppy; you should have wrinkle-free attire, clothes that don't reveal much skin or undergarments, and no offensive words or pictures on the shirt. You must find the happy place between casual and too casual. Acceptable attire includes clean jeans without holes, dresses or skirts, comfortable shoes, polo-type shirts, button-down shirts, simple blouses, and sweaters. Clothes to avoid include, but aren't limited to, shorts, athletic wear, miniskirts, sweatshirts, graphic t-shirts, hats, flip-flops, and athletic shoes.



### Business Professional

This is the most formal level of professional dress. This style is best used when attending career or business fairs, some interviews, and semi-formal to formal events. Sticking to darker or traditional colors like black, grey, and navy is recommended. Examples of professional dress are jackets and blazers with matching skirts or pants, a button-up collared shirt and tie combination, or a tailored, conservative shirt or blouse, dress, and jacket.



### Care of Clothing

**Ironing** is simple to use to remove wrinkles from clothing. Many irons have different settings to match the type of fabric your clothing is made of. Utilizing the proper setting will help maintain the integrity of the item and lengthen its life. Be sure to check the label of the clothing item to properly care for it.

**Dry Cleaning** is often recommended for most professional dress items. This process utilizes solvents and additives to clean and dissolve grease and oils that water can't.



# TABLETS

A tablet computer, more commonly referred to as a “tablet,” is a mobile computer system with distinguishing characteristics that make it unique from laptop computers, desktop models, and even smartphones. A tablet includes a full operating system with a touchscreen interface. The device includes rechargeable batteries, comes in a thin, flat platform, and can have screen sizes that range from approximately 7 to 10 inches (measured diagonally). These devices are designed to be smaller than laptops and have similar functions. However, they are also intended to be larger than smartphones to add productivity while remaining highly mobile, light, and agile.

## Types of Tablets

- **Slate** - This type of tablet is typically in the smaller range of tablets. Their screen sizes can be as small as 5 to 6 inches, below tablets' standard 7 to 10-inch range. However, some slate tablets can be as large as 10 inches. The primary feature, or lack thereof, is that slate tablets do not come with a keyboard. Although you can typically add a keyboard as an accessory, the slate tablets are small and sleek and are designed primarily for touchscreen interface (including on-screen keyboards) for accessing entertainment apps, watching videos, or playing games that use the touchscreen interface. The touchscreen can be used using the finger(s) or even a stylus (likely not included at the time of purchase).



Figure 1: [Slate] Apple iPad 1st Generation (Released January 10, 2010)

- **Mini tablet**—This tablet generally weighs less than slate tablets and typically has a smaller screen size. It is designed to be more portable than its larger version, but specifications can be different. Functionally, it is like a larger tablet and typically includes a touchscreen interface. Due to its smaller size, this tablet type may be a bit more affordable than its larger version. Screen sizes are typically around 7 inches.



Figure 2: Apple iPad (mini) 6 (Released September 2021)



- **Phablet** – This type of tablet gets its name from “smartphone” and “tablet” as a crossover between the smaller smartphone and the functional attributes of tablets. This type is also known as a hybrid. With screens in the 5-inch range, the typical phablet is around 5.5 inches. These tablets are designed for screen-intensive interaction, with many having or including a stylus typically stored within the frame of the device for notetaking or sketching. These devices are typically used for mobile web browsing and multimedia viewing and, like smartphones, include a touchscreen interface. As the size of smartphones increases to even larger models than the phablet, what differentiates a phablet from a large smartphone is the 16:9 aspect ratio unique to the phablet. Some smartphones may be “longer” than the phablet and do not hold to the 16:9 aspect ratio.



Figure 3: [Phablet] Samsung Galaxy S23 (Released February 2023)

**Laplet** (2-in-1) – This type of tablet is uniquely identified as being equipped with a keyboard as part of its original design. This tablet typically includes on-screen keyboards that can also be used to interface with the device. These models run full-featured desktop operating systems like Windows® and Apple iOS®, allowing them to run software (or apps) like those found on laptops/desktops. In addition, many models can be found to have I/O ports like USB or DisplayPort (VGA, DVI, etc.). However, the laplet’s most prominent feature is the keyboard. Within this type of tablet, the laplet can be categorized as either a 2-in-1 Convertible or a 2-in-1 Detachable.

**Convertibles** – This form of laplet has a keyboard that folds or flips back and is hidden or concealed by the screen frame when not in use

**Detachables** – This laplet has a keyboard that can be detached from the actual laplet and stored separately. While other forms of tablets can include a keyboard as an accessory, the detachable laplet includes an integrated keyboard as part of its original design.



Figure 4: [Laplet] Convertible & Detachable Models



- **Others** – As tablets evolved to meet unique consumer demands, other forms of tablets were developed. While less common now, other forms of tablets still target gamers. Gaming tablets may include peripheral devices that interface with a much more functional gamepad or thumbstick to provide a better gaming experience. Other designs included the booklet or clamshell designs that included an integrated gamepad or thumbstick. These are designed specifically for gaming experiences and are less functional when it comes to web browsing, multimedia viewing, apps, or other diverse uses.



Figure 5: [Gaming] Nintendo Switch (Released March 2017)



## Specifications and Features of Tablets

When evaluating tablets, a wide range of general features may be included in each standard design or variations in brand models, providing consumers with a wealth of options to meet their needs. Here are some featured categories that consumers can find in tablet specifications and marketing pieces packaged with the tablet.

- **Screen Size & Shape** - The standard tablet screen size is about 7 inches. However, variations, including the phablet and mini tablets, might be as small as 5.5 inches. The measure of a screen, like a television, is determined by the diagonal length of the visible screen and does not include the actual size of the device or its frame or chassis. When held in landscape mode, most modern tablets have the short, wide shape of a wide-screen television (16:9 aspect ratio). It is important to note that not every model has the standard size screen. Screen sizes that are square in design may provide a smaller viewing screen when watching HD video that is formatted for the 16:9 aspect ratio.
- **Wireless Connectivity** - Most models offer WiFi connectivity as a standard feature. This allows the device to connect wirelessly to a local area network (router). The connectivity allows downloading, livestreaming, and updating the operating system or applications. Although connecting to WiFi is most common, that does not work for all when connectivity is required but there is no available WiFi. Many models include cellular network connections. These models tend to be more costly and may add charges to your cellular network bill. However, it remains a valuable feature for those with insufficient WiFi. Keep in mind that some cellular plans allow the user to share smartphone internet service with their tablet.
- **Display** - The tablet display specifications are characterized in different ways.
  - One important factor in evaluating tablet displays is resolution. Higher resolutions make images and text appear sharper. Resolutions at the 800x600 level will present lower quality viewing than HD resolutions or 3180x2160 UHD screens. However, UHD resolutions on a 7-inch screen may not be visibly better than lower resolution screens.
  - Some displays have an anti-glare coating that makes it easier to view in bright light. Shiny, uncoated screens can require higher screen brightness settings to view clearly, which uses more battery power than lower screen brightness settings. Be aware that some anti-glare coating may require special cleaning products, which the shiny glass uncoated screens require.
  - Viewing angles is another important display feature. Wider viewing angles allow the device to be held in different positions for viewing. This may also affect multiple viewers' ability to see the screen clearly from different angles. Depending on the circumstances, this may be a benefit or not. Users may not want the person in the seat next to them to be able to see their screen.
  - Tablets can include ambient light sensors that adjust brightness and contrast automatically. This improves viewing ability and can also prolong battery life.
- **Operating System** - All tablets come with an operating system like those installed on laptops. They are scaled-down versions that conserve battery life due to the smaller processors required to run apps. Google's Android, Apple iOS, Chrome OS, and Windows operating systems dominate the tablet market and are, in large part, the features that affect the tablet's capabilities the most. The ability to update the operating system is critical to allowing the tablet to use the newest apps while improving the security of the device. There are other operating systems depending on the tablet. A direct correlation exists between the operating system and available apps that a device can use.
- **Hardware** - All computing devices have a processor. The processors (measured in gigahertz) affect the speed at which processing occurs over the device. The larger the gigahertz (GHz), the faster and better performance. Performance and processing speed can also be affected by the amount of memory on the device, both hard drive and random-access-memory (RAM). As with the processor, the larger the better. Hard drive space can be as little as 16GB and increase from there to as high as 64GB or 128 GB. Of course, I/O ports can extend hard drive space. As it relates to RAM, tablets can range from 512MB to at or above 2GB.



- **Ports (I/O)** - Input and Output (I/O) ports can be important features in a tablet depending on its use by expanding its capabilities. The most common ports found include USB, Thunderbolt, and DisplayPorts. There are other ports available. A port can be used to expand a device's memory or connect an accessory, as with gaming tablets. Some tablets include a slot for microSD cards, which also expand memory. There is a multitude of adapters and accessories that can be used with tablets to expand their capabilities using an existing port.
- **Printing**—A tablet's ability to print via WiFi adds a valuable function. Those using Apple iOS and Android operating systems include this capacity.
- **App Market**—One key feature of most apps is that they are proprietary to the operating system. Depending on which OS is being used, the availability of apps is limited to those offered within that platform. Many developers create apps that are available on the largest platforms, Apple iOS and Android. Some apps come pre-installed on the tablet's operating system; all others must be downloaded. Hard drive space and operating systems can affect the availability and use of apps on any tablet.
- **Camera**—Now standard in most portable devices, tablets can feature forward—and rear-facing cameras. The key to cameras is the quality of images. Two-camera devices may include cameras with different image capture quality. Also, the ability to record video/audio is a key function of many tablets. The higher the pixel value, the better the picture and video quality. Some models support and record 720 HD or Full HD video quality.
- **Battery Life**—Battery life can be a considerable factor depending on the frequency and time a tablet is in active use. By design, tablets are smaller, lighter, and more efficient than laptops. Tablets can have a battery life of 7 to 10 hours. That time can vary even within the device's expected range. It all depends on active use, screen brightness, use of WiFi, and processing demand, among a few variables.
- **Multiple Users**—The ability for a single device to be used by multiple users varies considerably. Some Android models allow the user to log in with their own credentials. This is especially valuable for parents who want to limit and monitor apps used by children. Apple iOS models do allow different users to log in to their Apple account differently, but not in the same way as Android.
- **Accessories**—As with most consumer products, there are generally more accessories available than devices. These include Bluetooth I/O devices, covers, skins, stands, screen covers, and more. Some of them add to the functionality of your tablet, while others prolong its life. Some just make the device more functional. Regardless of the accessory, consider how it adds or detracts from the value of your tablet.



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## TELEVISIONS

The electronics market is one of the most dynamic markets for consumer buyers. Televisions have changed dramatically over the last decade based on constantly shifting and improving technologies. This is affected not only by television display technology but also by the trends and changes in how people access television programming.

The latest marketing features of television manufacturers boast Ultra High Definition (UHD) or 4K TVs, and some are even expanding to 8K TVs with promises of even greater picture detail than their predecessors. Many sets even include high dynamic range (HDR), which promises sharper and brighter images with more vivid colors. However, as many other features manufacturers highlight in their marketing, not all HDR (and other features) are created or delivered equally. Buyers need to do their homework and remember that those that deliver better quality will likely be more costly than their discounted competitors. Either way, there is much to consider when buying a new television. This guide will focus on the most important features of televisions in today's (2022) television market. The most important of features to consider include the following:

- Resolution
- Screen/Display Type
- Screen Size
- Luminosity (DR)
- Connectivity
- Sound
- Refresh Rate

While one might argue that some features may be more important than others, without doubt, the most obvious features of a television focus on the screen and the picture it displays. This is also the most dynamic feature of most televisions on the market today.

### Resolution

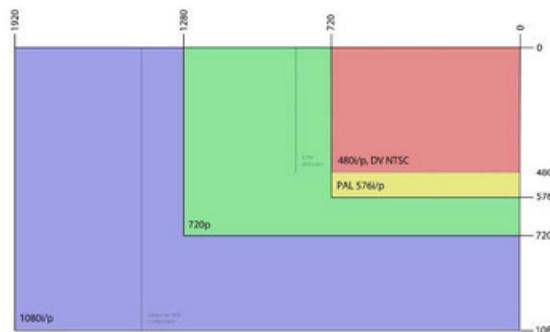
The resolution of a television is the quantity of horizontal and vertical pixels used in the display to show the image. One can think of pixels as "dots" or elements on the screen that make up the image. The more pixels on a screen, the higher the "resolution" and overall quality of the picture. The number of vertical pixels identifies resolutions.

Resolution	Description	Width (in pixels)	Height (in pixels)
480i or 480p	Standard Definition (SD)	640	480
720p	High Definition (HD)	1280	720
1080i or 1080p	High Definition (HD)	1920	1080
2160p	Ultra High Definition (UHD) or 4K	3840	2160

**Tip:** A 32-inch TV with 1080p resolution has the same number of pixels as a 55-inch 1080p TV. This means that the picture on the 32-inch TV will be of better quality than the one on the 55-inch TV if the resolution on both is the same (1080p).

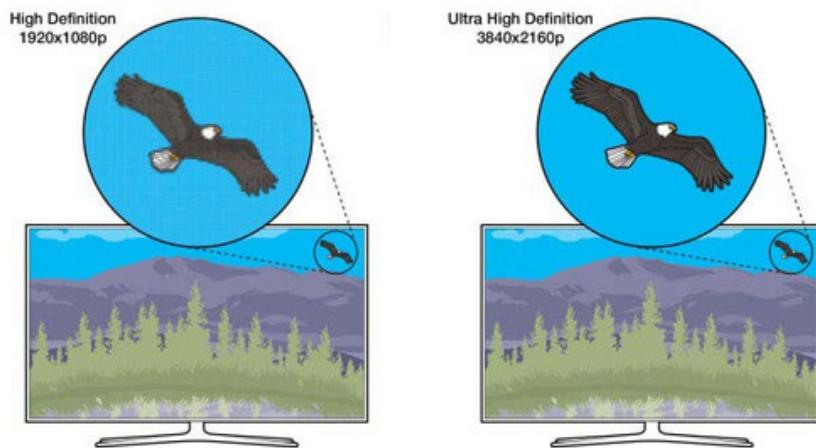


Ultra-High Definition (UHD) models, called 4K, have a larger screen resolution than HD models. The UHD televisions have 3840x2160 pixels (8 million pixels) which amounts to approximately four times the amount of an HD model. The UHD image quality is much more apparent in larger televisions (greater than 55 inches) or when you are sitting closer to the TV than with a 1080p.



More recently, the 8K televisions have entered the market with screen resolutions of 7680x4320, exceeding 33 million pixels. This is the highest resolution defined in the current UHD standard. They are technically UHD televisions, but there aren't many of them on the market. The ones on the market are considerably more expensive than the 4K models. It may be a bit too early for the average consumer to consider purchasing an 8K model, especially considering that a limited amount of viewing content is designed for 8K. However, many streaming services offer plenty of 4K content.

Thanks to higher resolution screens, a 4K TV can display greater detail than a 1080p set but only if the content is also UHD.



Keep in mind that resolution should not be used as a single feature of image quality without considering the size of the television and the viewing distance from it. Each of these criteria plays an important role, along with resolution, in determining picture quality.

### Screen/Display Type

The type of display or screen is also a very important aspect of any television. There is a wide range of display types including:

- LCD (liquid crystal display)
- LED (light-emitting diode)
- Plasma
- OLED
- QLED
- 4K UHD



The **LCD** and **LED** screens are flat panels that have continually improved quality. Both use very similar technology except for the source/type of light. LCDs use fluorescent lights for backlighting, while LEDs use LED technology. These screens are essentially the lowest picture quality displays compared to the others referenced here but have contributed greatly to the evolution of flat screens. These are going to be the most economical models compared to other types of displays. One of the greatest disadvantages of LCD and LED displays is that the viewing angle may affect the quality of the image at extreme angles (greater than 45°).

The **Plasma** screen is usually found in larger displays (40 to 60 inches or larger). The display is a different technology with better picture quality than LCD or LED models. However, they are generally less energy-efficient and produce more heat than LCD or LED models. Various other differences exist, but these are the most relevant and significant differences between Plasma and LCD/LED models. Due to their high light emissions, plasma screens have an excellent range of viewing angles compared to other types.

**OLEDs** (organic LEDs) are slightly different from LEDs but have dominated the television market for years. Unlike LEDs, the OLED can control individual diodes instead of the backlighting inherent to LEDs. This improves the quality through darker blacks, higher contrast, and more vibrant colors. OLEDs also have better ranges of viewing angles than LED/LCD models.

**QLEDs** (quantum LED) are just another form of LCD, but they use quantum dots to produce colors. They use a blue light source plus a thin film embedded with tiny quantum dots or nanocrystals, resulting in very saturated primary colors. They provide high-quality images with vibrant colors but have a more limited viewing angle than OLEDs.

One of the newest display types is the **QD-LED** from Samsung® and Sony®. This hybrid between OLED and QLED uses quantum features and OLED feathers to add high contrast, deep blacks, and unlimited viewing angles.

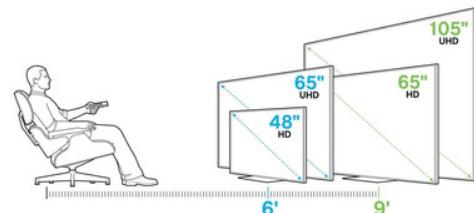
## Screen Size

Screen size is another valuable consideration when purchasing a television. Aside from the obvious benefit of a larger screen, the assumption is that bigger is better. Until recently, the 50-inch screen was at the top end of model sizes. However, by 2020, the 65-inch models left the newer 55-inch televisions in the lurch.

ConsumerReports indicates that televisions between 60- and 69-inch models make up 16% of the market sales in the United States with 70-inch models making up 11%. That means that 1 in 4 televisions are 60 inches or larger.



If you buy a 1080p set, the closest you can sit to your television while maintaining a proper field of view is 1.6 times the diagonal measurement of your television. If you have a 60-inch television, you will want to sit at least 96 inches (8 feet) away. If you know your viewing distance (e.g., distance from the sofa to the television), you can calculate the “minimum” size of television you need by dividing the distance to the television by the same factor, 1.6. For obvious reasons, bigger is not always better when you have a limited space to place your television and where people will be positioned when viewing it.



But don't feel obliged to perform these calculations. These days, just about all larger sets are 4K UHD models. Because these TVs have more densely packed pixels, you can go larger, and your seating distance can be as close as the screen diagonal itself. So, for example, with a 65-inch UHD TV, you could sit as close as 5½ feet from the set. The goal is to create a comfortable, immersive viewing experience. You don't want to be so close you can't see the entire screen or too far away that you miss out on the high definition.

## Luminosity

This refers to the amount and quality of light emitted to produce the picture. The more common term used is Dynamic Range. One of television's most exciting TV developments is the HIGH Dynamic Range (HDR). This boosts the TV's brightness, contrast, and color. For the viewer, it makes the picture on the screen look more like real life. Of course, those without HDR are referred to as STANDARD Dynamic Range (SDR), resulting in a comparatively lower quality image.



However, the quality difference between SDR and HDR is not immediately apparent when you simply turn on the television. The show that is playing must be “mastered” to take advantage of the HDR feature. A more appropriate way to express this until all programs are mastered is to call a model “HDR capable.” Nonetheless, HDR is an improvement, and having an HDR unit will certainly improve the viewing quality of SDR. Also, remember that not all HDR models produce equally rich, lifelike images. Looking for HDR ratings or scores in reviews may be more valuable when choosing between HDR models.

## Connectivity

The television's ability to “connect” to broadcast programs is important. Without your television's ability to receive wired or wireless connections to programs, having a television would simply be pointless. Nonetheless, there are slight variations in how televisions can receive programming, and by no means are their standard connections included in every model. In addition, televisions may also include input and output connections that make them more versatile and useful in other applications like home theatre systems or networking.



## Wired Connectivity

Connecting the television to a source of programming can be as simple as using a digital antenna and a coaxial connection. This allows you to connect via air waves to any local signals broadcast in your area. Wired connections are also common among cable or satellite services, providing everything from local broadcasting to movies, sports, news, and other programs. Some of the different input ports can include the following:

- Antenna
- HDMI
- RCA Video/Audio
- Component
- Composite
- S Video
- VGA Optical Audio
- USB
- LAN

Each provides different functions for connecting programming (audio & video) to your television.

Others provide the ability to connect your television to other devices like external sound systems. Some wired connections have limitations. For example, it is not recommended that HDMI cables be used over 50 feet in length before the quality of the signal is decreased. This application may include sending a signal to a TV in the back patio. With LAN connections, you can purchase other third-party hardware and send the same audio/video signal long distances to single or multiple televisions, as you might see in an office lobby, sports restaurant, or other application.

## Wireless Connectivity

Many televisions in today's market have the capacity to connect wirelessly to local area networks. Like the wired (LAN) input, this connection can connect to other devices for streaming, mirroring, or remote connections. Network connectivity is extremely valuable when there is a need to connect to streaming services.

## Smart TV

Most televisions on today's market, especially those in the mid-to-large-sized range, have licensed software installed, making them "smart." These televisions can access online content, such as Amazon Prime, Hulu, and Netflix streaming video services. Some models may have limitations to the most popular services, while others provide a wide range of apps that can add value to the user. Some manufacturers even have their own proprietary apps that extend the options for the consumer. If a basic model does not have the apps or "smart" capabilities, having the correct wired or wireless connections can allow for<sup>2</sup>third-party streaming devices like Roku, Amazon Fire TV, Apple TV, and Google Chromecast.

Also called internet TVs or connected TVs, can be a bridge to a world of online content that can be accessed directly from the TV itself. Most smart TVs these days let you access multiple streaming video services, such as Amazon Prime, Hulu, Netflix, Sling TV, and YouTube TV, plus one or more internet music services, such as Pandora and Spotify. Many smart TVs also let you check social media sites such as Facebook and Twitter, and several support casual games as well.

The latest feature of many smart TVs is their ability to communicate with other voice-enabled digital assistants, such as Amazon Alexa, Apple Siri, and Google Assistant. These capabilities can extend the consumer's ability to turn on/off their television set and select programming through their digital assistant rather than a handheld remote control.



## Sound

As televisions have increased in size, they have also decreased in thickness due to the screen technologies that make them slimmer. In addition, the interest in sleek, slim, and contemporary models has affected the sound quality of many televisions. Smaller frames allow less space to include adequate sound, especially in smaller models. While most televisions provide sound adequate for small or closer viewing distances, larger screens in larger rooms may require an additional sound-emitting device to match the size and quality of the screen. A television's ability to connect to a soundbar or surround-sound system via HDMI or single audio cable. Output ports on television can be critically important to the consumer's ability to connect an adequate sound system to their television that matches the display's quality and the room's size.

## Refresh Rate

A television's refresh rate refers to how many images the screen can display per second. What value does this play in viewing? Videos with lots of fast action can make a big difference in the quality of the picture. Sporting events and gaming are examples of when a higher refresh rate may be visible and beneficial to the consumer. A standard 60Hz refresh rate is suitable for most applications, while the avid gamer may prefer the 120Hz models for improved picture quality in high-motion gaming. The same would be true for anyone who likes clarity in high-motion viewing, like racing and action films. Buyers beware: higher refresh rates marketed on packaging may be inflated by manufacturers. Be sure to look for "native refresh rate" values on the device specifications to make sure you are truly getting what they claim.

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## WIRELESS PORTABLE SPEAKERS

Anytime people get together, especially to celebrate an important occasion, music is invariably part of the celebration. Weddings, funerals, graduations, sporting events, prayer, romance, rocking a baby to sleep, or even studying can all have music that plays a part in the activity. It is an important part of human life and culture. The portability of speakers and their wireless connection add convenience. Wireless and Bluetooth speakers bring top-quality sound whether you are at home, at work, or on the go. The challenge can be in finding the right model for the occasion.

Wireless and Bluetooth speakers can cost as little as \$2 up to \$800 and are a convenient alternative to larger portable P/A systems. Their sizes can also vary considerably, as can other features available across all variations and models.

There are two main groups of wireless speakers available on the market today. While there are other technologies out there, the market share is split between Bluetooth® and WiFi. These two technological communication standards are the foundation of most wireless speakers and will be the focus of the information provided below.

**Bluetooth®** is a short-range wireless communication technology that allows devices such as mobile phones, computers, and peripherals to transmit data or voice (sound) wirelessly over a short distance. The typical range for Bluetooth technology is about 30 feet.



Bluetooth



**WiFi™** is a wireless communication technology that uses radio waves to provide wireless high-speed internet and network connections that references IEEE 802.11x which is a standard for defining communication over a wireless local area network, or WLAN. The typical range for WiFi routers (2.4GHz) can reach up to 150 feet indoors and 300 feet outdoors.

Bluetooth and WiFi, like many other wireless devices in your home or office, use the same band of radio wave frequency clustered around 2.4GHz. If you see a sticker on your baby monitor, cordless phone, or wireless microphone on your karaoke machine it has nothing to do with speed. It simply refers to the radio band frequency being used to communicate or transmit data or sound. Although the effective range of Bluetooth and WiFi vary dramatically, both can be affected by interference from other wireless devices as well as structures like walls, furniture, and even people.



Figure 1: L-R, Bluetooth, WiFi, and Bluetooth/WiFi Capable Models (Source: Consumer Reports, 2019)

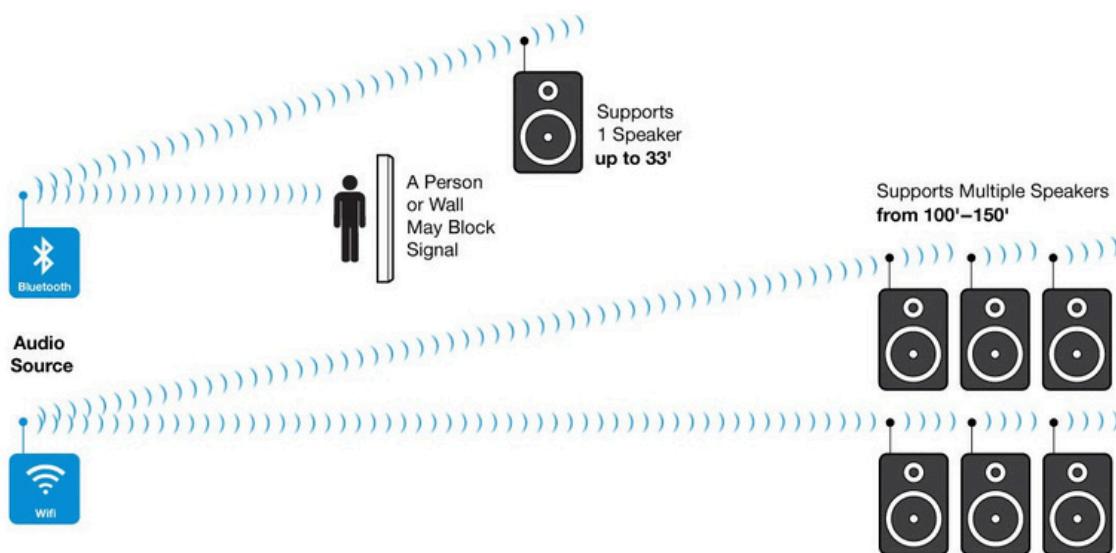


Figure 2: Bluetooth & WiFi Range (Source: Consumer Reports, 2019)

These general descriptions can explore some important features that might be found in this wide range of models developed for an even wider range of applications.

### Design

One of a portable speaker's most important design features is its size. Keep in mind that the smallest models (minis) and the largest models (sometimes called "tailgater" or "block rocker") can both be considered portable wireless speakers.



Figure 3: [Mini] 0.7 oz & 1.5" x 1.5" x 1.0"



Figure 4: [Tailgater] 29 lbs & 12" x 15" x 20"

Without question, between these two examples, there would be a considerable weight difference. Depending on its use and application, weight can be a significant factor in determining the best model for the consumer. The smallest models could weigh only a few ounces, while the larger models could weigh up to or over 20 pounds.

In addition to weight, unit construction and design vary. The lightweight models are made of plastic or other lightweight composites, while the large models may be made of more substantial materials. Choices of material provide function, durability, and style, but don't let the looks fool you. Two different models of similar size and weight can fit neatly in a backpack. However, one is going to the beach, and the other is going to a study session. Construction of some models may include waterproof designs like those developed to go in the shower, while others may need to be more rugged than waterproof.



Durability should extend not only to the model shell but include internal components as well. That includes interactive buttons, ports, and speakers. Some designs include rubberized or silicone edges as shock-absorbing features in case they fall onto a hard surface. Finally, style can play a major role in deciding what type of speaker to purchase. Wireless speakers can provide a wide range of aesthetic designs, from sleek, modern, sophisticated looks to the more rugged outdoor design. The key to design, construction, size, style and durability falls on the intended use.

### Portability

As referenced earlier, portability is a relative term and can include the Mini, Tailgate models, and everything in between. So, what are some important factors to consider in relation to these wireless speakers that make them portable? Of course, you can't put a 29-pound speaker in your backpack or beach bag. You cannot experience any great level of success taking a WiFi speaker on a camping trip. Like design, the key is to determine how the speaker will be used and where it will be used. Moving a speaker around the kitchen can be portable, as can carrying it in a canoe down the river. Many "portable" speakers that connect via Bluetooth or WiFi must be plugged into a power source. Some have rechargeable batteries, while others require a battery pack accessory to power the speaker with a wired power source. Any of these configurations may be considered portable if they are moved easily from place to place for different needs and uses. Unless you are using disposable batteries, most devices must be plugged into a power source at some point. Don't discount a speaker that must be plugged in as it is not portable. Other facets covered in this resource include design, size, weight, battery life, charging, and even setup. Many of these also have relevance in a speaker's portability. You will need to evaluate some of those facets and their impact on portability, given its intended use and purpose.

### Sound

Sound quality can be a major factor in deciding which model is good for you. Like other features, where you plan to use it must be at the forefront of your decision. Large outdoor areas may require higher wattage or "bigger" sound than a small dorm room. However, loudness is not the only measure of quality. All wireless speakers require the transmission of data or sound to the speaker, and the data compression dramatically impacts sound quality. WiFi speakers are generally better than Bluetooth speakers due to how the data is compressed and transmitted. WiFi can transmit higher-quality sound to the speaker than Bluetooth. Some of the simpler wireless models only have a single speaker and can only play in Mono as opposed to Stereo sound delivery. Higher-end models may include a 2.1-channel system that includes 2 channels of sound (left and right speaker) plus a separate subwoofer. The quality of sound between a Mono and 2.1 channel system is clearly distinguishable to any listener. A wireless speaker's sound can also be affected by the arrangement of speakers. A single speaker can only send sound in a single general direction. Other speakers can send sound in multiple directions. Only a speaker with multiple speakers arranged appropriately can be set in the middle of the room and send sound in all directions. These omnidirectional models will likely be more expensive than the single-speaker unidirectional speakers. Keep in mind that some shell designs give the impression of multiple speakers or surround sound, so read the manufacturer's information closely. The model in Figure 5 can be placed in the middle of a room and broadcast sound in all directions. The smaller model in Figure 6 plays sound in only 1 direction. If laid flat, the speaker will push sound upward. Speaker arrangement can add effective reach if that is the intent.



Figure 5: Omnidirectional Wireless Model



Figure 6: Unidirectional Wireless Model



Figure 7: Speakers arranged in a circular design

Wattage (W) is a feature that many speakers use within their marketing strategy. However, wattage is a power unit of measure. The true measure of speaker power is a combination of speaker rating (wattage), power of the amplifier, and efficiency between the two. Two models boasting 40W of sound may not necessarily be equally loud. Since you can't know the specs of the internal amplifier nor the speaker's efficiency, that would be like buying two jelly-filled donuts without knowing what filling was used. They just will not be the same. Also, know that reference to wattage may not be specific to the speaker. You may see a 40W speaker, a 40W amp, or 40W of sound as a marketed feature.



## Voice Control

These speakers are sometimes referred to as “smart” speakers. They are voice command devices with an integrated virtual assistant that offers interactive actions and hands-free activation with the help of a wake phrase like “Alexa,...” or “Hey Google!...” or “Hey Cortana!”

Some of these devices may be accessed via Bluetooth, WiFi, or both and may extend the speaker's functionality beyond playing sound (music) by accessing/controlling automated functions with integrated controllers.



Figure 8: Smart Speaker with Voice Control

## Power Supply & Batteries

The portability of any device can undoubtedly be extended by its ability to function under DC power. Wireless speakers may have integrated rechargeable batteries with a charging port or require an AC power supply to function. Some AC-powered devices can be powered by a battery pack purchased separately as an accessory. AC-powered devices that can easily be unplugged, moved, and plugged into another outlet can undoubtedly be considered portable due to the scope of their size and the availability of a power source.

For those that operate in some capacity with DC power (internal or external), their portability, excluding size and function, is much greater than being tethered to a power supply with a power cord. Not all batteries are the same. There are differences in how much power they will store, how fast the device consumes the power, how long it takes to recharge, and what power source can be used to recharge, to name a few. In addition, battery life can increase or decrease the life of your device, especially if it is internal and cannot be removed/replaced.

Most DC models on the market have internal rechargeable batteries. Lithium-ion and Lithium polymer batteries provide excellent power density and are lightweight, small, and safer than other designs in recent years. There are three factors

related to understanding batteries: 1) Capacity – refers to the battery that will charge to 100% when new and only 70% over time; 2) Longevity – refers to the number of times a battery can be charged (charging cycles) before it will no longer charge; and 3) Performance – refers to the runtime of a battery on a full charge. However, most devices disclose two details: the battery type and either #-hours of runtime or “milliamp Hours” noted as **mAh**. The playtime/runtime is likely the closest comparable detail. Using mAh can be similar to the example above with speaker wattage.

Example: Consider two devices, one boasting 1,400 mAh and the other 4,400 mAh. The assumption that the 4,400 mAh battery will outplay the 1,400 mAh battery, but this may be false if the 1,400 mAh device is considerably more efficient with its power than the other. They may have equal playtime. Generally, Bluetooth devices will use less power than a WiFi device. They need to know what quantity of mAh each has to ensure their expected playtime is the closest comparable measure.



## Setup

I think it's essential to establish a connection between the broadcasting device (data source) and the wireless speaker. Bluetooth can be easily connected, whereas WiFi models require an app or more detailed connection requirements. However, device use may interrupt Bluetooth connections (phone/alarm/notifications). On the other hand, WiFi devices get their audio directly from the internet stream, avoiding interruption by the device.

## Connection Range

Bluetooth can range from 30-33 feet, but it can easily be affected (shortened/interrupted) by any large objects that may get between the connecting device and the speaker. This could include a wall, a large structure, or even a person. WiFi ranges can extend from 100-150 feet. Obstructions are generally limited to walls and large structures. In Outside settings, WiFi can range up to 300 feet.

## Pairing multiple devices

Some Bluetooth and WiFi models can pair multiple devices simultaneously. However, the pairing process, range, and other factors vary significantly between and among both types.

Pairing two devices via Bluetooth may be challenging in public areas with many devices. You need to know which one is yours (as it appears on your list of broadcasting devices), and it may be coded without the name, making it easier to recognize. Pairing Bluetooth can also pose an issue if moving objects (e.g., people at a party) block or interrupt the signals. WiFi devices may be relatively easy to connect but can be much more reliable with a WiFi signal. Also, pairing WiFi devices usually takes place using an app on a mobile device, tablet, or computer.

Multiroom pairing is much more common among WiFi devices simply due to the WiFi signal's strength, range, and reliability. Pairing speakers in multiple rooms at home or at work may have many applications that add to the versatility of some wireless speakers.



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