Bats are no longer made of just aluminum, but can also be made of composite, which is known for being a material that the ball jumps off of. There are also strict regulations on what bats can be used depending on the age level of the player.

Measuring Yourself for a Bat

Although there are many different ways to measure for the best baseball bat length, the best way is to choose what you feel comfortable swinging. A general rule to follow is never go up more than an inch at a time. This makes it easier to adjust to your new bat without drastically changing your swing.

This measurement will tell you where you should be looking on the chart below:

Weight/Height	3'5"- 3'8"	3'9" - 4'	4'1"- 4'4"	4'5"- 4'- 8"	4'9"- 5'	5'1"- 5'- 4"	5'5"- 5'- 8"	5'9"- 6'	6'1"- Over'
Under 60 lbs	27"	28"	29"	29"					
61 - 70 lbs	27"	28"	29"	30"	30"				
71 - 80 lbs	28"	28"	29"	30"	30"	31"			
81 - 90 lbs	28"	29"	29"	30"	30"	31"			
91 - 100 lbs	29"	29"	30"	30"	31"	31"	31"		
101 - 110 lbs	29"	29"	30"	30"	31"	31"	32"		
111 - 120 lbs	29"	29"	30"	30"	31"	31"	32"		
121 - 130 lbs		30"	30"	30"	31"	32"	32"	33"	
131 - 140 lbs		30"	30"	30"	31"	32"	32"	33"	33"
141 - 150 lbs		30"	30"	31"	31"	32"	33"	33"	33"
151 - 160 lbs		30"	31"	31"	31"	32"	33"	33"	34"
161 - 170 lbs			31"	31"	32"	32"	33"	33"	34"
171 - 180 lbs				31"	32"	32"	33"	34"	34"
Over 180 lbs						33"	33"	34"	34"

How to Measure Your Child for a Youth Bat
If you're shopping for a bat for your kid, the process of measuring will be a little different. If your young player is between 3' and 3'4", start with a 26-inch bat and increase the bat size 1 inch for every 4-to-5 inches that they grow. The following steps are the ideal process for determining the correct youth bat size for children:

Choosing the Correct Length Youth Bat: Measure His/Her Height
Be sure you measure with his/her baseball cleats on. Stand a bat next to your child and compare him/her to the bat. The bat should reach, but not exceed, your child's hip. If it reaches past his/her hip area, it's going to be too long to swing.

Choosing the Correct Weight Youth Bat: Weigh Him/Her
Weight is a contributing factor to which bat he/she should swing because the little league bat size chart uses a combination of weight and height to determine the best bat choice. In general:

- Children under 60 pounds should swing a bat between 26 and 29 inches long
- Children weighing more than 70 pounds should swing a bat ranging from 28 to 32 inches long

What is Bat Drop?
Bat weight is measured by the minus or drop weight. Drop weight is the difference between the length and weight of the bat, so a bat that is 30 inches long and has a drop weight of -10 will weigh 20 ounces. The bigger the drop weight is, the lighter the bat will weigh.
Remember that only high school baseball bats and college baseball bats are regulated and must have a drop of no more than -3.
If you are a strong player, you may assume you want a heavier bat. This is not necessarily the case. **You'll want to swing a bat that still allows you to generate the ideal amount of bat speed through the zone**. Finding this balance could be difficult at first, but once you do, you'll be hitting the ball farther and harder than you could have imagined.
After finding a baseline for the length of the bat, it's important to incorporate the length of the bat into deciding on the weight. For youth baseball and softball, the taller the child, the longer the bat should be. They may not be strong enough to use a heavier bat, so they would have a bat with a larger weight drop.
It's important to choose the right balance between length and weight because it makes a difference in the physics of the swing. For instance, consider the following:

- If you have a long, light bat, you can swing it very fast, but it will not have much inertia behind it.
- If you swing a short, heavy bat, you will not have the fastest bat speed, but will have plenty of inertia.

Deciding on the length and weight of the bat you swing is a personal choice - you should try combining what is comfortable with what style of player you want to be. If you envision yourself being a contact player like Ichiro Suzuki, you won't worry as much about losing inertia with your swing, but if you want to be a power hitter like Giancarlo Stanton and swing for the fences, you'll want the inertia you would get from the shorter, heavier bat. You can refer to the chart below to give you a ballpark idea of what bat drop you should be using. Keep in mind that the chart below can be used to find bat drop for both baseball and softball bats and it can be used by both adult and youth players:
TRAVEL BALL 2 5/8" Baseball Bats

Age	Under 7	8-9	10-11	12-13	14 and Over
Length	24"-26"	26"-29"	28"-30"	29"-32"	31"-34"
Drop	(-12)-(-10)	(-12)-(-10)	(-10)-(-8)	(-9)-(-5)	(-3)

High School and College Bats Sizing by Age
The chart below breaks down baseball bat sizing by age for high school and college players. High school and college bats use the same sizing regulations.
High School /College 2 5/8" Baseball Bats

Age	14-15	16-18	18 and Over
Length	31"-33"	32"-34"	32"-34"
Drop	(-3)	(-3)	(-3)

Bat Size Rules and Regulations

Recent rule changes in most leagues have been adopted in an attempt to make the game safer and more competitive. For this reason, new safety standards have been issued to new bats and they are expected to be used by every player.

USA Baseball Bats

Beginning January 1, 2018, several youth baseball organizations have adopted a new USA Baseball Bat Standard. The objective of this rule change is to make the game more uniform and ensure the long-term integrity of the game. This new bat standard is now in place in organizations such as Little League, Babe Ruth, PONY, American Amateur Baseball Congress, Cal Ripken, and Dixie Youth. T-Ball bats are also affected under this new rule change. The new USA baseball bats can range in barrel size from 2 1/4" to 2 5/8". The weight drops can vary from -13.5 all the way to -5.

Big Barrel Bats for Pony Leagues

USSSA did not adopt the new USA Baseball Bat rule change. The rules for USSSA bats have not changed and they will continue to use **High school and college bats must all be BBCOR (Batted Ball Coefficient of Restitution) Certified. BCCOR baseball bats** use an updated measurement standard that replaced the old BESR (Bat Exit Speed Ratio) Certification. Look for the stamp on the right indicating certification.

This standard is designed to measure the trampoline effect of the bat and ball on impact, rather than just the exit speed of the ball. This makes BBCOR bats perform more like wood bats. High school and college bats should have a league-required -3 weight drop and can range in size from 31" to 34".

Types and Materials of Bats

Now that you know what length, weight, and league type you need for your new bat, it's time to pick your material. Typically, there are 3 options at the amateur level:

- Composite Bats
- Hybrid Bats
- Alloy Bats

Composite Bats vs. Alloy Bats vs. Hybrid Bats
When it comes to choosing the material of your bat, it's pretty easy to choose between wood and non-wood. With the exception of those states that mandate its use, wood is typically reserved for the professionals, practice bats and tournaments. But once you settle on a non-wood bat, choosing a bat material may feel overwhelming. You can use the chart below as a quick cheat sheet to remember the differences:

Deciding which type of bat is best for you can be a challenging task. Here are some tips on each type of bat to help you make the best decision for your budget and playing style.

Composite Bats
Composite bats are made out of a layered material similar to carbon fiber, which makes it easy to control the weight distribution of the bat. Manufacturers can make bats balanced (weight is evenly distributed) or end-loaded (the bat has more weight at the end of the barrel, giving it a heavier swing weight), depending on the style.

Pros of Composite Bats

- Reduced vibration to the hands, minimizing sting from a miss-hit ball.
- Tend to have a larger sweet spot and more ”pop”.

Cons of Composite Bats

- Often more expensive than alloy bats, since the manufacturing process is more complex.
- Using a composite in temperatures below 60 degrees will decrease performance and can cause cracking.
- Requires a break-in time. Remember that the pop won't come until a composite bat is broken in. To break it in, follow these tips:
    - Hit between 150-200 hits with a regular baseball or softball, not a rubber batting cage ball.
    - Slightly rotate the bat each time you hit the ball, so you evenly break it in - this ensures your bat lasts a long time.

The above is the only recommended way to break in your composite bat. Methods such as hitting your bat against a tree or rolling it are not recommended and will damage the bat and void the manufacturer warranty. You can find more information by reading our step-by-step directions on how to break in a composite bat.

Alloy bats

Alloy bats, also called metal and aluminum bats, have been around longer than composite.

Pros of Alloy Bats

- Tend to be less expensive than composite bats.
- Do not require a break-in time, meaning they're at their prime right out the wrapper.
- Often last longer and even when they get damaged, they typically dent, rather than crack. This means they can still be used once damaged, where as once it is cracked, a composite bat can't be. As long as the bat is not damaged to the extent where a barrel ring can no longer fit around the barrel, the bat will still be considered legal.

Cons of Alloy Bats

- Tend to have a smaller sweet spot and less "pop."

A good rule of thumb is the more expensive the alloy, the longer the sweet spot is and the better balanced the bat will be.

If you like both alloy and composite, it's possible to get a hybrid, or comp/alloy bat. Hybrid bats have a composite handle and an alloy barrel. The benefits of getting a hybrid bat are that you can get the composite handle, which reduces vibration, and the alloy barrel for the performance and cost savings.

Hybrid Bats

Hybrid bats combine a composite handle with alloy barrel materials into one baseball ball bat. This design combines the benefits a player gets from the light feel of a composite handle with the durability that an alloy barrel has.

Pros of Hybrid Bats

Hybrid bats tend to have a lower price point than composite bats

- Lighter feel when swinging due to composite handle
- Like aluminum bats, hybrid bats are ready to use right away and require no breaking in
- Hybrid bats tend to be more durable than composite bats

Cons of Hybrid Bats

- Not legal in all leagues
- Handle is still susceptible to same cracking and temperature risks as composite bats

One-piece Bats vs. Two-piece Bats

- One Piece Bats: Typically stiffer and more balanced. The one piece design does not allow for more vibration control, so they will often have a lot of vibration on miss-hit balls.
- Two Piece Bats: Tend to have more flex and less vibration.

Generally speaking, contact hitters benefit from one piece bats for the better balance, and power hitters benefit more from the two piece bats for the added flex. The choice between the two is based on your personal preference and hitting style.

The Bat's Weight
This criterion is a lot like how much you can bench in the weight room. If you're a bigger, stronger player, then a heavier bat for maximum power makes sense. However, a smaller player benefits from a lighter bat, because that allows more bat speed. To determine the weight that's right for you, swing a variety of bats or borrow a teammate's bat. Don't worry about having the same bat weight as others. It's more about which weight gives you
most control.

Bat Weight and Batted Ball Velocity
To see the effects of bat weight and bat speed, here is a summary of an experiment that I found summarized in a 1980 high-school textbook, *Physics of Sports* developed by Florida State University.[6] For this experiment, the ball mass, pitch speed, and bat swing speed were all kept constant. Only the bat mass was changed. The data shows that a heavier bat produces a faster batted ball speed. This makes intuitive sense since a heavier bat brings more momentum into the collision. Doubling the mass of the bat results in an increase of almost 12mph. So, using a heavier bat should result in faster hit balls, which means the hit ball will travel farther. **If a player can maintain the same bat swing speed with a heavier bat, the heavier bat will produce higher batted ball velocity and an increase in distance.**
But, any player who has experimented swinging bats with widely different weights knows that it is easier to swing a light bat than a heavier bat. Put another way, it takes more effort to swing a heavy bat with the same speed as it does a lighter bat, and most players cannot swing a heavy bat as quickly as they can a bat which is half the weight. So, we need to see how the batted ball speed depends on bat swing speed.

Bat Swing Speed and Batted Ball Velocity
A similar experiment (from the same 1980 high-school textbook *Physics of Sports* developed by Florida State University[6]) changed the bat swing speed while the ball mass, pitch speed, and bat mass (30oz) were all kept constant. **The data shows that a faster bat swing produces a faster batted ball speed. Doubling the swing speed of the bat results in an increase of almost 22mph. So, it would seem that swinging the same bat faster is more beneficial than swinging a heavier bat at a the same speed**. Ideally, the best result would be to swing a heavier bat faster. But, as I already stated, it is harder to swing a heavier bat with the same speed, let alone swing a heavier bat faster.

So, it looks like we have two different effects (increasing bat weight and increasing bat swing speed) which both result in faster batted ball speeds. However, it does not seem possible to get both effects at the same time. In fact, increasing bat weight might decrease bat swing speed. So, we need to see how these two parameters are related before we can answer the question "what is the final batted ball speed?"

Bat Weight, Swing Speed, and Batted Ball Velocity
Anyone who has swung a bat knows that it is easier to swing a lighter bat than it is to swing a heavier bat. More importantly, it is possible to swing a lighter bat faster than a heavier bat. Exactly how the bat swing speed is related to bat weight for a given player is a little harder to determine. Terry Bahill[2,7,8] and his colleague have extensively studied the relationship between bat swing speeds and bat weights for a wide variety of players. Bahill developed the Bat Chooser™ machine to measure bat swing speed, and uses the results to determine the Ideal Bat Weight™ for an individual player. This device has been successfully used by numerous players who have greatly increased their batting averages after correctly choosing an appropriate weight bat, as well as by several college teams who have gone on to win championships after finding their correct bat weights. His data shows definitively that players cannot swing heavy bats as quickly as they can lighter bats, and the details vary somewhat from player to player and vary more considerably depending on the technical playing ability of the individual. For example, using results from his published work[7,8] measurements of the bat speed a function of bat weight for a Major League power hitter as may be fit by the straight line equation

$$v_{2b} = -0.42\, m_2 + 75 \qquad (\textit{power hitter})$$

where speed is in mph and weight is in ounces. In contrast, measurements for a 10 year old Little League player were better fit by a hyperbola

$$(m_2 + 28)(v_{2b} + 12.8) = 2728. \qquad (\textit{little leaguer})$$

Let's assume that the mass of the baseball is a constant m_1=5.125oz, the coefficient of restitution is e=0.55, and that the initial velocity of the baseball is representative of a typical pitch speed, (v_{1b}=-90mph for the Major League player and v_{1b}=-40mph for the Little League player). Then we can substitute either of the equations for bat speed into the equation for batted ball speed and make some plots like those shown by Bahill in his papers[2,7] and book[8]. The blue dots with error bars represent measurements of bat swing speed for various bat weights. The blue curve in each plot shows how the bat swing speed decreases with increasing bat weight according to the equations above. The red curve in each plot shows how the resulting batted ball velocity depends on both the bat weight and the bat swing speed. Notice that the curves are very different for the Major League power hitter and the Little League. The professional has much more control over his bat swing speed, and can produce much greater final ball speed.

Both plots show that the batted ball velocity initially increases as the bat weight increases until the bat swing speed drops below a certain level after which the batted velocity begins to decrease again. This results in an "optimum" bat weight for each player, indicated by the black arrows in the plots. This optimum bat weight is the bat weight which will result in the fasted batted ball velocity for each player. The optimum bat weight for the professional power hitter is about 41oz, and about 16oz for the Little Leaguer.

Perhaps a pertinent question is why a major league power hitter would choose to use a lighter bat (say 32oz) when an optimal 41oz bat would produce a higher batted ball velocity? Two possibilities come to mind. First, the fact that you can swing a lighter bat faster means that you can wait just a little bit longer before committing to a swing. For a professional, the ability to wait even 1/10th of a second longer to watch a pitched ball can result in a considerable improvement in the chance of making contact. Secondly, most hitters can control a lighter bat more effectively than they can a heavier bat. Bat control affects the location of the bat as it crosses the plate, and more control over bat location is definitely a good thing when the pitched ball crosses the plate considerable variation in height or distance from the batter. Notice further, from the plot for the major league power hitter, that for bat weights in the range of 35oz to 45oz there is very minor change in the batted ball velocity. Using a 33oz bat instead of a 41oz bat will only very slightly reduce the batted ball velocity, but it will have a significant affect on the bat swing speed and the resulting swing time. Based on such a trade-off between ball speed and bat control, Bahill has defined the Ideal Bat Weight™ as the weight at which the batted ball speed drops 1% below the speed of the optimum batted ball speed bat weight. As shown in the plot, the Ideal Bat Weight for the power hitter is about 32-33oz. This is right in the weight range used by most professional players.

The results for the Little League player are quite different. The optimum bat weight, for maximum batted ball speed, is about 16oz, and the Ideal Bat Weight is about 12-13oz. As was shown in the table at the top of this page, most available 30-inch wood and aluminum Little League bats weigh between 20 and 26oz, which is well above both the optimum and ideal weights for this player. From the plot we can see that if this player used a 23oz bat he would have a much lower bat swing speed and a significantly lower batted ball velocity. Most young players are forced to use bats which are heavier than the ideal bat weight because light enough bats are not available.

Rules of Thumb for Recommended Bat Weights

The plots above were obtained by using the Bat Chooser™ machine to determine the Ideal Bat Weight™ for a specific player. The data proves the point that bat weight affects both swing speed and batted ball velocity. But, how does an amateur player, without access to this machine, estimate his/her optimum (or ideal) bat weight in order to get the best batted ball speed and still maintain control over the bat? Using the results of a large database of measurements* from the Bat Chooser instrument, Bahill and his colleagues have come up with up set of basic rules of thumb which can help any player estimate the recommended bat weight he or she should be using in order to obtain the highest performance possible. If you want more detailed rules, or information about how Bahill and his colleagues arrived at these rules of thumb I would strongly recommend reading his book. (Note: For calculating bat weight from the formulas in the table, use height in inches, weight in pounds and age in years.)

PLAYER	RECOMMENDED BAT WEIGHT (oz)
Major League Baseball	Height/3 + 7
Amateur Baseball	Height/3 + 6
Junior League baseball (13 to 17 yrs. old)	Height/3 + 1
Little League Baseball (11-12 yrs. old)	Weight/18 + 16
Little League Baseball (9 – 10 yrs. old)	Height/3 + 4
Little League Baseball (7 – 9 yrs. old)	Age *2 + 4

WHAT IS "DROP"?

Simply, the DROP is the difference between length and weight.

- The higher the drop, the lighter the bat.
- The smaller the drop, the heavier the bat.

In each of those categories there will be a number e.g. -10oz, -11oz, -12oz etc.

Those numbers are the DROP which represent the weight difference between the length of the bat and the actual weight of the bat.

For example, If looking for a 30inch, 20oz Youth Baseball bat, we know that the difference between the length and the weight is 10oz. Therefore the bat will commonly be known as a Drop 10oz. 30-20 = 10oz. This will help determine the players comfort zone by length and weight.