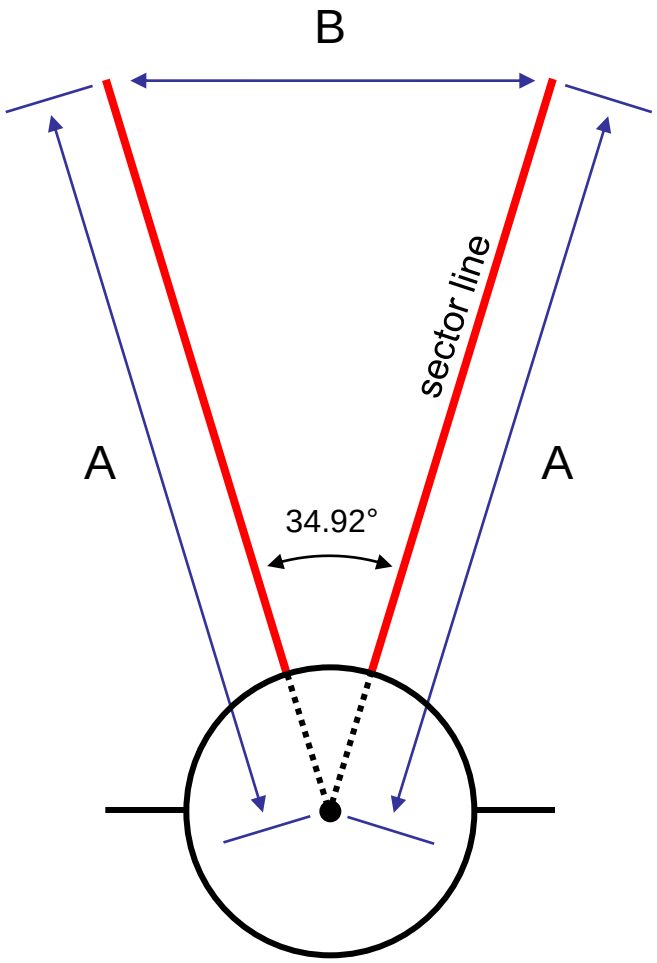
Laying Out Sector Angles for the Track & Field Throwing Events

Shot Put, Discus, Hammer & Weight Throw Sector Angle



The shot, discus, hammer & weight throw sector is **34.92°**. This angle was chosen due to its simple geometry.

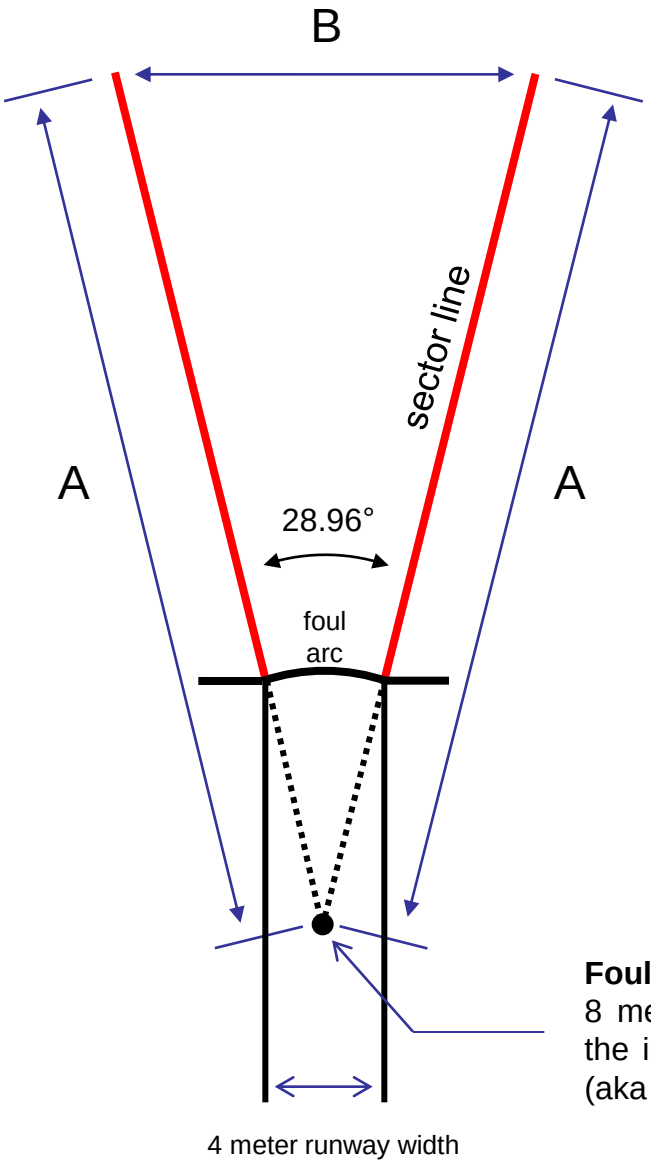
Create two sector hairlines (using a tape measure or string) of length "A" that start at the center of the circle. The other ends of the sector lines are separated by the distance "B" as given in the table at right. The distance "B" goes straight across; it is not curved.

In short, "B" is 60% of any length of "A".

Note: see Page 8 before painting the sector lines.

A	B
50 ft	30 ft
60 ft	36 ft
100 ft	60 ft
150 ft	90 ft
175 ft	105 ft
200 ft	120 ft
X	(0.6)*X

Javelin Throw Sector Angle



A	B
150 ft	75 ft
175 ft	87.5 ft
200 ft	100 ft
250 ft	125 ft
X	(0.5)*X

Foul Arc Center Point, 8 meters (26' 3") behind the inside of the foul arc (aka the "pull-thru point").

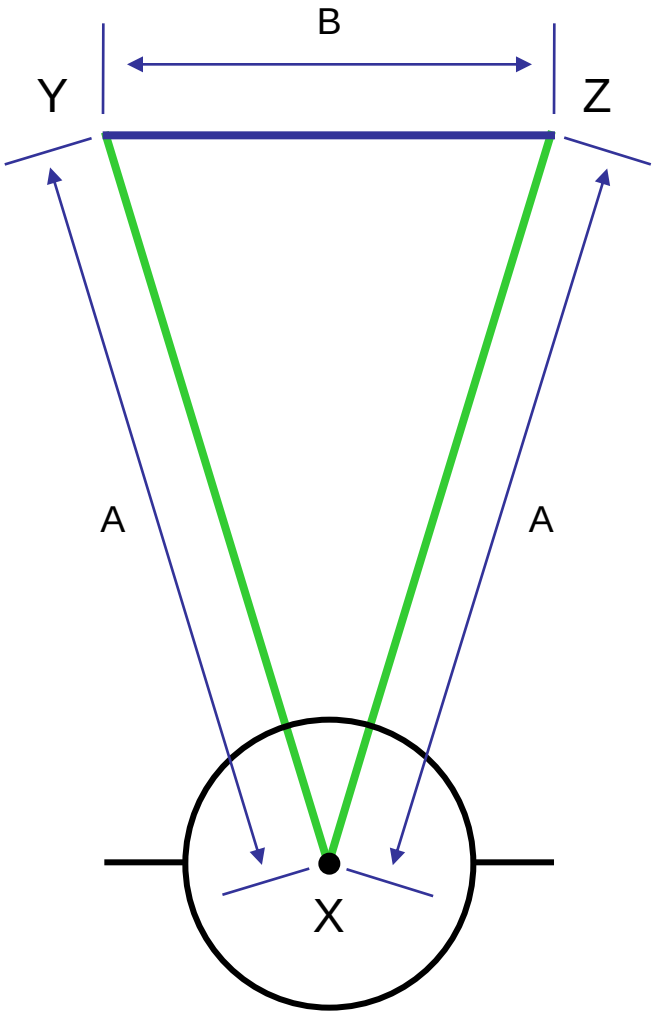
The javelin sector is **28.96°**. This angle resulted from constructing the sector lines from the Foul Arc Center Point thru the ends of the runway sidelines. However, the sector lines should **not** be actually drawn this way in the field because many javelin runways (mostly high school) are not the required 4 meters wide. Instead, use the following method:

Create two sector hairlines (using a tape measure or string) of length "A" that start at the Foul Arc Center Point. The other ends of the sector lines are separated by the distance "B" as given in the above table. The distance "B" goes straight across; it is not curved.

In short, "B" is 50% of any length of "A".

Note: see Page 8 before painting the sector lines.

Laying Out & Adjusting the Sector Lines



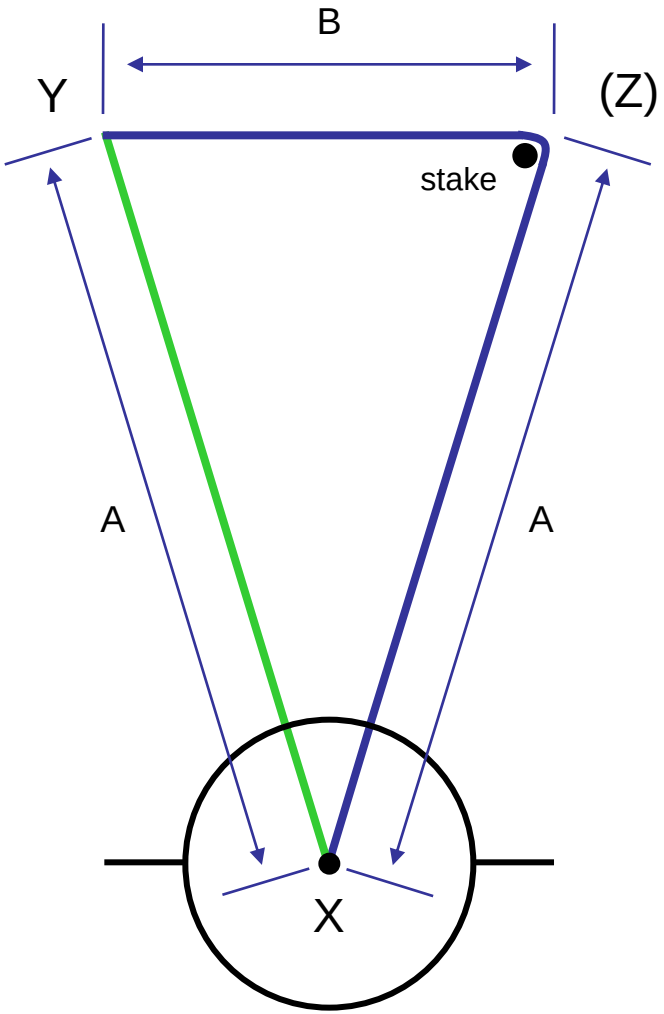
Ideally, three people will be available to lay out the sector lines, located in positions X, Y and Z.

Stretch out the measuring tapes or strings so that they are straight & taut, with the correct A and B lengths.

The person in position X will then direct Y and Z to the left or right, in unison, to center the sector on the throwing circle or runway:

- For shot put, the centering should be done on the stopboard.
- For discus, hammer and weight, the centering can be done relative to the circle dividing lines or the opening of the throwing cage, whichever is more symmetrical and easier to measure from.
- For javelin, the centering should be done on the points where the foul arc intersects the runway sidelines.

Laying Out & Adjusting the Sector Lines (con't)



An alternate layout method can be used when less than three people or measuring tapes are available.

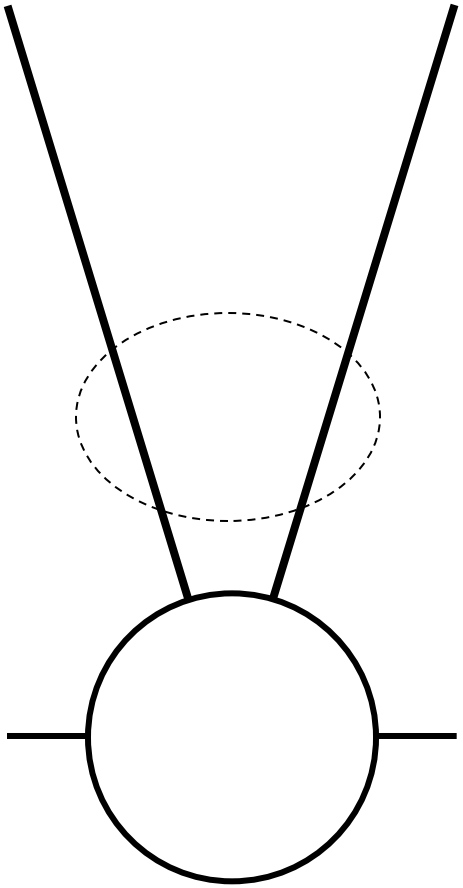
Stretch out one tape (green line at left), as before, from the center of the circle to Point Y.

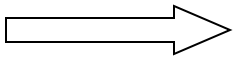
Place a stake or old screwdriver in the ground at Point Z (also distance A from the center of the circle).

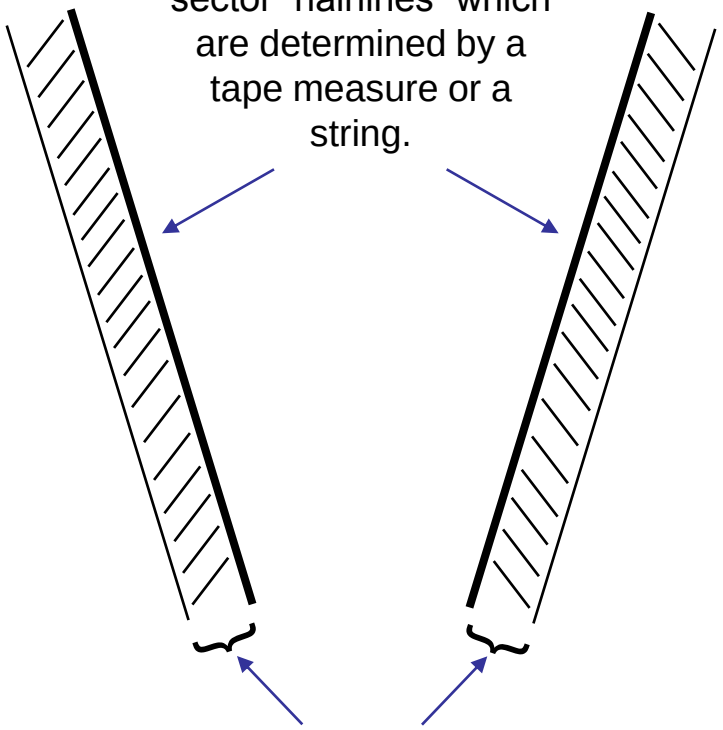
Run the second measuring tape (blue line) from the center of the circle, around the stake and to Point Y. The tape should read the distance of A+B at Point Y.

The final alignment will take a bit longer, as the stake may have to be reset once or twice by the person at position Y to get the correct lengths of A and B of the blue line.

Painting the Sector Lines







The heavy black lines shown here are the sector “hairlines” which are determined by a tape measure or a string.

The white stripes are always painted to the OUTSIDE of the hairlines. They are 5 cm (2 inches) wide. Because the white stripes are outside the hairlines, they mark the start of *foul* territory.

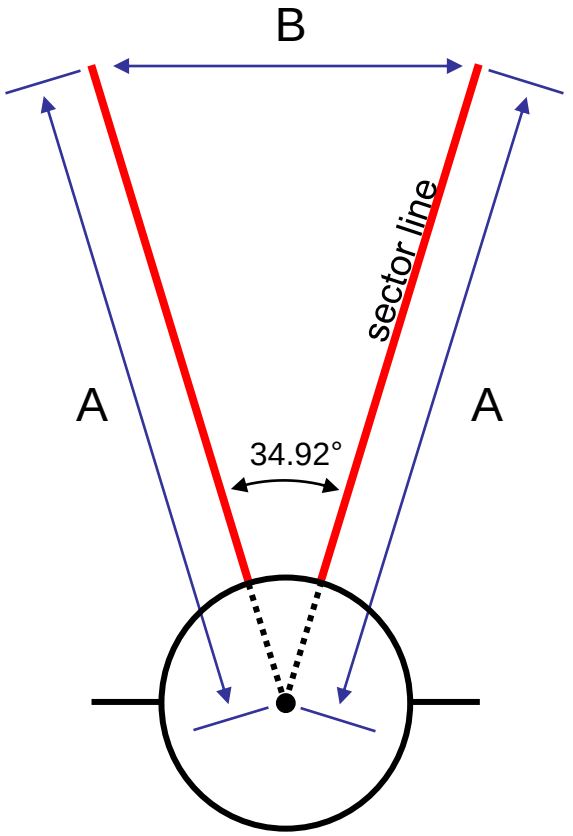
Note: The sector lines are not painted within the circle or the runway.

Sector Angle Tolerance

Of all the major T&F rule books, only USATF specifies a sector angle tolerance for the circle throws. Rule 187.22 states, "*Sectors shall be 34.92 degrees (±0.1 degree)*." There is no tolerance specified for the javelin sector angle, although the ±0.1° standard would be reasonable to use.

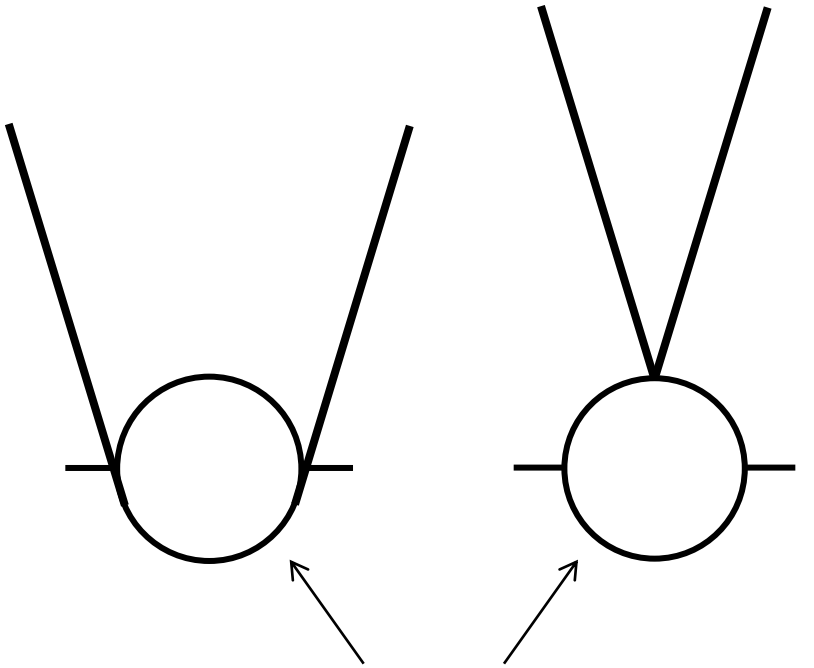
The following table converts ±0.1° to inches for various distances:

Sector length A (ft)	Cross-distance B (ft)	Tolerance of distance B (inch)
50	30	±1.0
100	60	±2.0
150	90	±3.0
200	120	±4.0
250	150	±5.0
300	180	±6.0

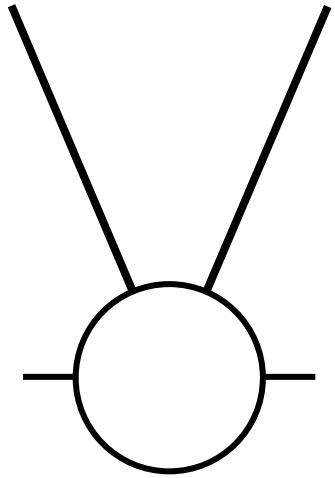


Sector Line Errors

(seen in the field)

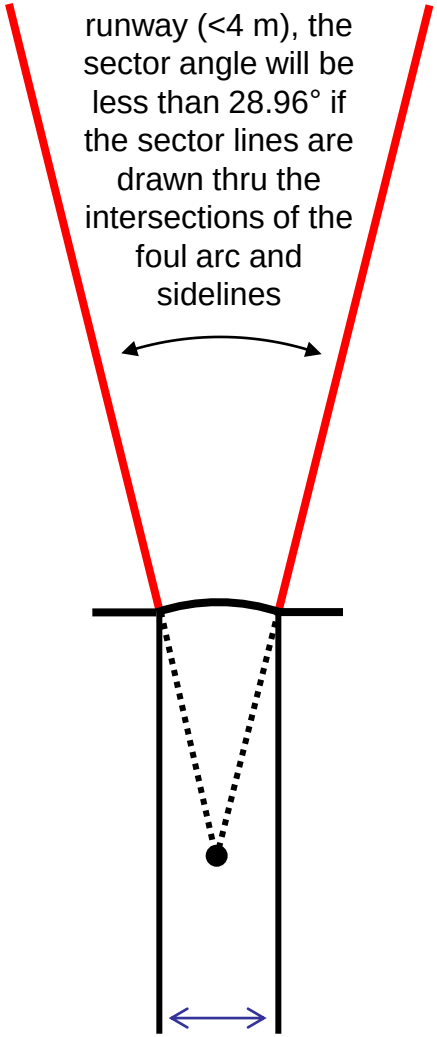


Incorrect sector line termination



Sector angle is greater than 34.92° (due to using an old rule book or incorrect layout) **or** less than 34.92° (due to incorrect layout)

With a narrow runway (<4 m), the sector angle will be less than 28.96° if the sector lines are drawn thru the intersections of the foul arc and sidelines



runway width is LESS than 4 m

Some History

The throwing events had no sector lines in the early 1900s. Instead, the shot, discus, weight and hammer were simply thrown from a circle.

By 1913, the new IAAF rule book mandated 90° sectors for hammer and discus, but no sectors for shot put or the weight throw. The javelin was thrown "from behind a scratch line, properly marked." The 1914 IAAF rule book further defined the javelin scratch line as a 12' x 3" board, but no sector or runway were specified.

Eventually, sectors were introduced for all the events thrown from a circle. Over time, the sector angle was reduced for safety purposes and to encourage more disciplined throwing.

The IAAF made the last sector angle change for the circle throws in 2003, reducing it to 34.92°. USATF matched that in 2003; NCAA followed suit in 2004, and NFHS in 2007, creating a sector angle that is identical everywhere.

The javelin runway and sector angle, 28.96°, were introduced in about 1951. They have remained unchanged since that time.

As an example of how the rules have changed, the following is a chronology of sector angles as specified by the NCAA rule books:

Year	Shot	Discus	Hammer	Weight
1922	none	90°	90°	---
1935	none	90°	90°	none (1)
1956	65.5° (2)	90°	90°	90°
1958 or 59	65.5° (2)	60°	60°	60°
1973-75	45°	45°	45°	45°
1979	40°	40°	40°	40°
2004	34.92°	34.92°	34.92°	34.92°

(1) The weight throw event was introduced in 1935, but no sector was specified.
(2) The sectors coincided with the outer edges of the stop board.

The NCAA adopted the IAAF definition of the runway and its 28.96° sector in either 1951 or 1952. It has not changed since then.