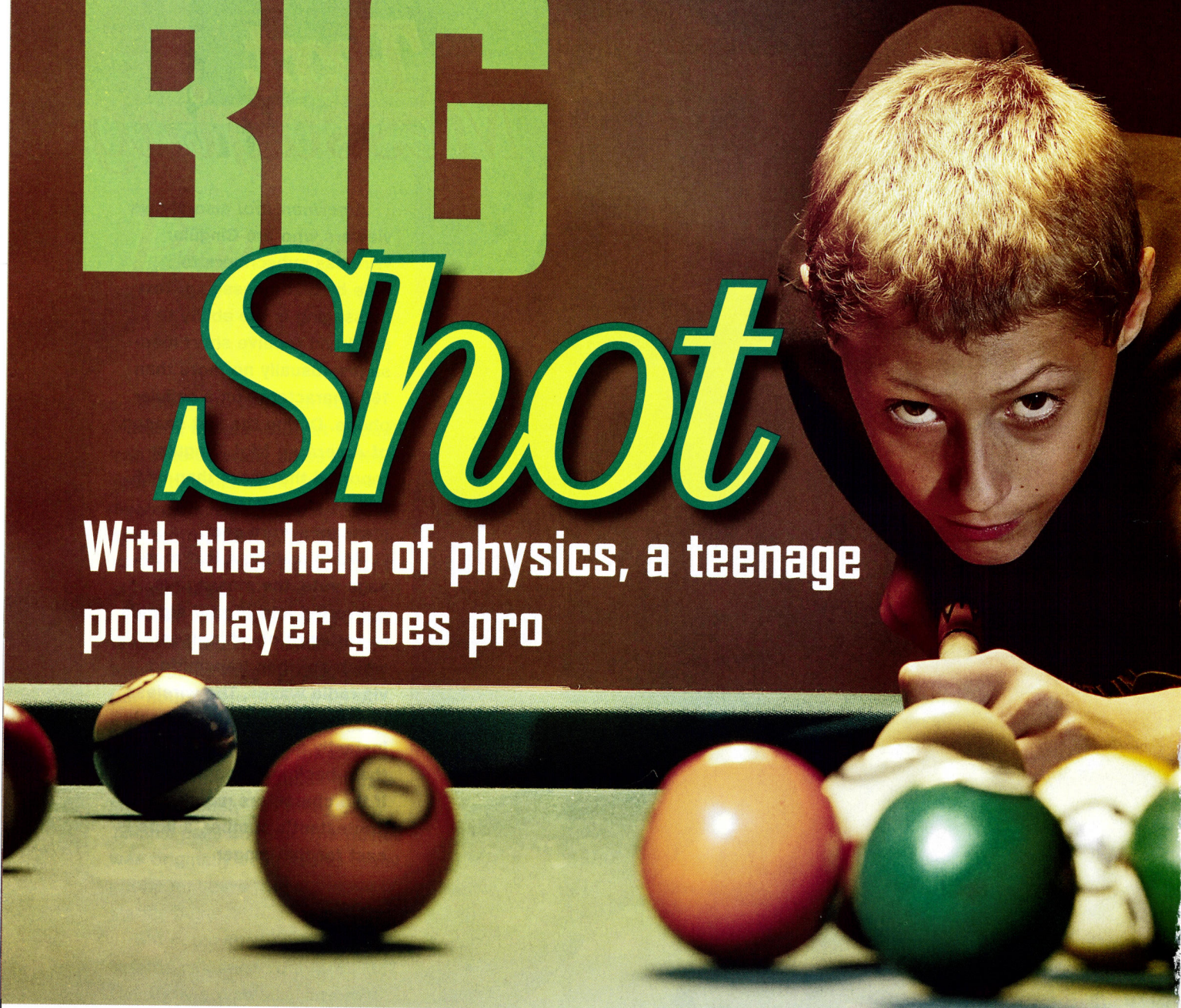


# BIG Shot

With the help of physics, a teenage pool player goes pro



**A**ustin Murphy, 13, sizes up the balls that are scattered around the pool table. A crowd of adults has gathered around, but Austin puts them out of his mind. Concentrating only on the game, he sinks the shot.

Regulars to the local pool hall in Folsom, California, know that Austin is a force to be reckoned with. He started playing pool when he was just 5 years old. Now he is the youngest professional competitor on the International Pool Tour. His secret? “You need to know about geometry and physics,” says Austin.

## BILLIARD BASICS

Knowing principles of physics alone won't make you a great pool player, says David “Dr. Dave” Alciatore, a professor of engineering at Colorado State University. But it can certainly give you the upper hand against even your fiercest opponents.

Common sense—and basic physics

**POOL TIME:**  
Austin practices  
billiards for nearly  
an hour each day.

## webextra

See Professor Alciatore's video explanations of various pool shots at: [www.engr.colostate.edu/~dga/pool/normal\\_videos/index.html](http://www.engr.colostate.edu/~dga/pool/normal_videos/index.html)

the cue ball isn't lost; it's just shared between the two balls—shooting the colored ball across the table.

### ON THE MOVE

When the balls knock against each other, the cue ball also transfers *momentum* to the colored ball. Since an object's momentum is equal to its mass multiplied by its velocity, the quicker a billiard ball is moving, the greater its momentum.

If Austin smacks the colored ball straight on with the cue ball, the cue ball will transfer all of its momentum to the other ball. This will cause the cue ball to stop completely. But this pool whiz also knows that if he were to hit the cue ball so that it

collides on an angle with the colored ball, both balls would deflect in a V-shape, or 90° angle (see *Nuts & Bolts*, right).

### TRICK SHOT

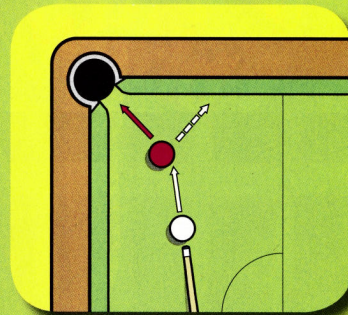
Austin has other tricks up his sleeve: For instance, he uses a technique called "Draw" to put backspin on the cue ball. How? He hits the bottom of the cue ball to make it spin backward, even as it moves forward. After the cue ball hits a colored ball, the backspin will cause the cue ball to slowly roll back toward Austin. Similarly, in a move called "Follow," Austin hits the top of the cue ball to give it topspin. This causes it to continue to roll forward after striking a colored ball. "[This] helps to set up the cue ball for the next shot," explains Austin.

What's the best advice Austin has for up-and-coming pool players? "Visualize the shot in your head and take a few deep breaths," says Austin. "If you aren't confident, you won't make the shot." ❁

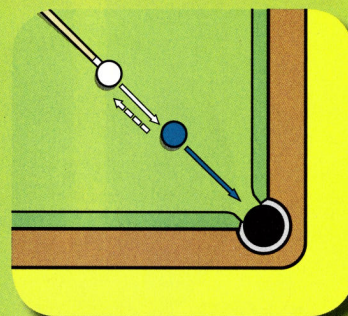
—Andrew Klein

## nuts & bolts

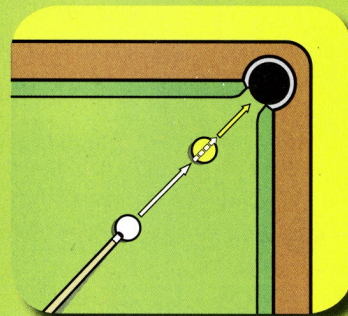
- 1 90-DEGREE RULE:** When the cue ball hits another ball at an angle, both balls deflect at a 90° angle.



- 2 DRAW:** When the pool stick hits the bottom of the cue ball, the ball moves forward and gains backspin. The result: After the cue ball hits the colored ball, the cue ball will roll backward.



- 3 FOLLOW:** When the pool stick hits the top of the cue ball, the ball moves forward and gains topspin. The result: After the cue ball hits the colored ball, the cue ball will roll forward.



laws—tells Austin that when he hits the cue ball with his pool stick, the ball will roll forward. If his aim is on target, the ball will hit a colored ball. The *law of conservation of energy* ensures that when the two balls collide, the cue ball will transfer some of its *kinetic energy* (energy of motion) to the colored one. The energy from