Passing From the Heart

When watching a Thunder game, do you ever find yourself marveling at players’ ability to horizontally and gracefully pass the ball to each other, sometimes even halfway across the court? Have you ever thought about the choreography that goes into some of the most impressive Thunder plays?

Pro tip: This activity can be done at home or in a classroom. It can be done by an individual student, a small student group or a family.

Here’s what you’ll need:
- A basketball (or other similar sized ball)
- A hula hoop
- Two friends
- Access to a gym, playground, or similar wide open space
- A pencil or pen and paper
- Tape measure

Watching Thunder players weave in and out of the opposing team while making their way across the court can be hypnotic. Because of all the practice and work they can put in, they often move while being able to exactly anticipate where their teammates will be. While they certainly make it look effortless, if you’ve ever played a team sport you likely know that it’s a lot harder than it looks!

You’re going to explore the physics behind multiple points of movement that help Thunder players achieve their incredible passes. Though Thunder players pass the basketball in many different configurations (including overhanded, which will be featured in the next Devon Thunder Explorers activity, “Lob It or Leave It”) you’re going to focus today on passing from the chest.

Begin by grabbing your friends, your basketball (or similarly sized ball) and heading to your open area of choice. Practice throwing the ball from the center of your chest. Stand with your feet about hip width apart to give you a sturdy, supportive base. Then, bend you elbows and stick your arms out at your side like wings that are spread. Grasping the ball with both hands at your center, try throwing it straight out away from you.

Practice passing this way until it feels comfortable, and then try passing it to your friend with you both standing still.

Once you and your friend are reasonably comfortable with the method of horizontal passing, you’re going to experiment with it. Start with passing the ball from your center while your friend is moving. Imagine they’re moving down the court to the goal and you need to get the ball to them for the winning shot.

Now try it so that you’re moving and your friend is standing still. Try to pass it to them from your center. Which one of these was easier (you stationary while your friend moved or you moving while your friend was stationary)?

What benefit do you think both combinations of passes would serve in a basketball game? Do you think you could successfully pass the ball while you and your friend are both moving? Give it a try!
Now it’s time to compare horizontal throwing to a couple other styles. Grab some paper and a pencil and decide with your friend who’s going to throw the ball and who’s going to record. Let the recorder watch the thrower toss the ball in three different ways—overhand, from the chest, and underhand.

Try watching this from the side so that you can see the different trajectories each throw follows. Can you sketch out and label the different trajectories? What hypothesis might you make about why throwing a certain way would be better for specific shots or passes?

Now conduct some tests to gather some data about this method of passing. Use the tape measure to determine distance. Stand 6FT apart facing your friend and pass the ball back and forth five times. How much force did you need to use to accurately get it to them without knocking them over backwards or not getting it there at all?

Using the quantifiers “a little force,” “a medium amount of force,” and “a lot of force” document both of your responses to these five shots. Repeat this standing 12FT apart, and then repeat it one more time standing 18FT apart. Record your responses to each of these challenges.

Now try passing the ball to each other again in the various movement combinations you tried earlier (you moving/friend stationary, friend moving/you’re stationary, both you and friend are moving) at 6FT, 12FT, and 18FT. (Obviously as one or both of you are moving these distances might change, but try to be as close to those distances as possible.)

Pass five times in each movement variation to be consistent with your first experiment. Take special notice of the amount of force you have to apply to the pass given this added variable of movement to achieve the accuracy that you want.

How much force did you have to use when you and your friend were both stationary versus the amount you needed to use when one or both of you were moving?

It’s time to up the difficulty of this new passing choreography you’re learning. Grab a third friend and a hula hoop. To explain your next challenges, let’s refer to your first friend as Rumble and your second friend as Otto.

You and Rumble are going to pass the ball back and forth to each other just like you did in Warm Up.

However, this time, have Otto stand between you two holding a hula hoop off to one side. You have to get the ball through the hula hoop and into Rumble’s hands.

Start with you and Rumble both being stationary while passing the ball through the hula hoop.

What do you notice about passing now that you’ve added in another variable (Otto and the hula hoop)?

Is it more or less challenging to pass the ball to Rumble through the hula hoop than it was when one or both of you were jogging while passing in Warm Up?

Speaking of jogging while passing, that’s your next challenge! Just like in Warm Up, you’re going to jog while trying to pass to a stationary Rumble (through a stationary Otto hula hoop).

You’re also going to try to stay stationary and catch a pass from a jogging Rumble (through a stationary Otto’s hula hoop).
For the most challenging iteration, start at one end of the gym (or wherever you’re trying this) and have Rumble start at the other end on the opposite side. Jog towards each other and try to complete a pass through the hula hoop.

**Pro tip: As with all the challenges in Warm Up, be sure to switch spots and let Otto try passing while you or Rumble hold the hula hoop.**

Just like in Warm Up, try some more formal tests now that you’re basically a pro player. Test the same fashion to see what sort of force you need to apply to your passes to accurately get the ball into Rumble’s hands. Pass the ball five times apiece in each of these configurations:

- You, Rumble, and Otto are all stationary
- You are moving towards Rumble and Otto, who are both stationary
- Rumble is moving towards you and Otto, who are both stationary

Record the results for these various passes.

Were you able to successfully pass the ball to your friend through the moving hula hoop? Which version of the challenge was the most fun? Which was the most difficult?

How can you translate what you learned through these physical challenges into analyses of Thunder players’ moves? Think back to Warm Up when you observed different trajectories from different throws.

After experimenting with more complex moves with horizontal passing, was your original hypothesis correct? In what situations might passing from the chest be more beneficial than lobbing overhand or underhand? Which situations would passing from the chest not be as advantageous?

How about the experiments with force and movement? What amount of force did you have to exert on the ball to successfully get it in your friend’s hands with the added challenge of getting it through the hula hoop? Did your results line up with what you were expecting based on the data you gathered in Warm Up? How would your results change if you varied how far apart you were standing from your friends?

Forget the hula hoops and see how well you can pass the ball when your friend is actually playing defense against you. Have them try to block your shot to your friend on the other side. Can you still successfully make the pass?

For an even more physical challenge, try to identify which muscles you use when you make a horizontal pass. Are they the same muscles you use when you toss overhand? Focus especially on where you feel it in your legs and your arms. Can you think of any other exercises that use muscles the same as a horizontal pass?
In this Devon Thunder Explorers activity, students considered two main different points: the physicality, coordination, and forethought required to make challenging passes (with a very specific passing style) amid the tension of the game, as well as some basic physics principles behind these gravity-defying passes. In addition to free practice trying to get the hang of some of these challenging moves, they also conducted tests and collected data regarding how much force they need to accurately sink the ball into their friend’s hands. They introduced variables of movement as well as a third person in a defense blocking position to increase the difficulty.

They also briefly considered the trajectories of the ball based on how it was thrown (overhand, underhand, or horizontally). They hypothesized and experimented with the fact that horizontal chest passes work best when players need to quickly pass the ball across court. The trajectory of that pass allows precision and power. A chest pass would likely not work efficiently for making a shot, though, which is why the lobbed arc of an overhand shot works in that case.

Finally, in Overtime they were encouraged to consider which muscles are engaged when they do a chest pass as opposed to an overhand throw. Chest passes engage the entire body (not unlike doing a push-up) and allow for more power (even if a student doesn’t naturally have much upper body strength).

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