



Name: _____ Date: _____

Math in Basketball: Try other basketball challenges
Student Handout

In this challenge, you get to choose a new set of player stats, then use the 3 key variables to figure out the maximum height the ball reaches during a free throw shot.

(This activity can also be completed online. Go to www.getthemath.org, click on "The Challenges," then scroll down and click on "Math in Basketball: Try other challenges.")

FAST BREAK FACTS: KNOW THE STATS

1. **Identify what you already know.** Look at the **Fast Break Facts** on the last page of this handout for information about the 3 key variables and select a player's stats from the choices below:

- The Acceleration of Gravity: _____
- Initial Vertical Velocity (Select one): ___ 20 ft/sec ___ 22 ft/sec ___ 24 ft/sec
- Release Height (Select one): ___ 5 ft ___ 6 ft ___ 8 ft

Combine these 3 key variables used to calculate the ball's height, h , at a given time, t , by setting up an equation to get started.

$h(t) =$ _____

AT WHAT TIME(S) DOES THE BALL REACH 10 FEET?

2. **Plan it out.** What strategy will you use? Select one or more representations, such as your equation or a graph (found on the last page), to **calculate the value(s) of t when the ball reaches a height of 10 feet.**

3. **Solve your problem.** Show all your steps. You may use the graph on the last page of this handout or show your work in the space below.

Your solution: (Round your answer to the nearest hundredth.)

- The time(s) the ball will reach 10 feet are: _____

AT WHAT TIME DOES THE BALL REACH THE MAXIMUM HEIGHT?

4. **Plan it out.** What strategy will you use? Select one or more representations, such as your equation or a graph (found on the last page), to **calculate the value(s) of t when the ball reaches its maximum height.**

5. **Solve your problem.** Show all your steps. You may use the graph on the last page of this handout or show your work in the space below.

Your solution: (Round your answer to the nearest hundredth.)

The time the ball will reach the maximum height is: _____

WHAT IS THE MAXIMUM HEIGHT OF THE BASKETBALL?

6. **Plan it out.** What strategy will you use? Select one or more representations, such as your equation or a graph (found on the last page), to **calculate the maximum height the ball will reach on its way to the basket.**
7. **Solve your problem.** Show all your steps. You may use the graph on the last page of this handout or show your work in the space below.

Your solution: (Round your answer to the nearest whole hundredth.)

The maximum height of the basketball will be at: _____

8. **Try another player's stats.** See how the maximum height and times change when you modify the initial vertical velocity and release height. Use another copy of the handout to select a different Initial Vertical Velocity and Release Height and assist another player!

FAST BREAK FACTS

THE 3 KEY VARIABLES

- **The Acceleration of Gravity** – which causes a ball to speed up, or accelerate, when falling at a rate of -32ft/sec^2 . Use only downward pull or half of -32ft/sec^2 , which is $-16t^2$.
- **Initial Upward Velocity (v_0)** - the angle and speed when it leaves the player's hand. Multiply by time to get the vertical distance traveled.
- **Release Height (h_0)** - the starting position of the ball.

PLAYER'S STATS (Select one of each)

Initial Upward Velocity: ___ 20 ft/sec ___ 22 ft/sec ___ 24 ft/sec

Release Height: ___ 5 ft ___ 6 ft ___ 8 ft

STANDARD COURT MEASUREMENTS

Height of the basketball hoop off the floor:	10 ft
Distance from the free throw line to backboard	15 ft
Diameter of hoop/rim	18 in

GRAPH YOUR DATA

