



Physics of Sports Project

Goal: Explain the physics behind a particular aspect of your favorite sport in a presentation.

Overview: In this project, you will tie together all of the physics principles you've learned about in order to describe what's going on in one simple action. You will analyze this motion using graphing, kinematics formulas, forces (Newton's Laws), momentum, work, energy and power. Of course, we haven't learned all of these topics yet, but as we do them, you should be thinking about how they apply to your situation. You will also give a written explanation of what's going on and why things happen the way they do. For example, why do football players lower their body before attempting to tackle another player?

Instructions: Choose a very brief situation from sports (or elsewhere, subject to teacher approval) to which you can apply the principles of physics you have learned. The situation should involve an impact, change in momentum, and/or transformation of energy.

Ideas: • a bat, club, racket, or hand hitting a ball • a football tackle • a racecar turning (or crashing) • drag racing • shooting an arrow • pitching a baseball • the high jump or pole vault • a gymnastics maneuver • a wrestling or martial arts maneuver • flying a plane • rowing a boat • pedaling a bicycle

Necessary components of the project:

Graphs (Position vs. time and Velocity vs. time)

Kinematics analysis (formulas, solutions, explanation)

Free Body Diagram, showing forces involved and arrow lengths represent magnitude and include discussion of friction)

Newton's Laws (diagrams, explanations, 2nd Law formula)

Work and Energy analysis (formulas, solutions, explanation)

Power analysis (formula, solution, explanation)

Conclusions (how physics knowledge can improve sport)

Presentation of Choice: poster, slides presentation, video, other ideas?

Physics of a Sport Rubric:

Category	Score
Graph – position vs. time	3 2 1
Graph – velocity vs. time	3 2 1
Kinematics	5 4 3 2 1
Free body diagram	5 4 3 2 1
1 st Law	3 2 1
2 nd Law	5 4 3 2 1
3 rd Law	3 2 1
Momentum	5 4 3 2 1
Work and Energy	5 4 3 2 1
Power analysis	5 4 3 2 1
Use of graphics	3 2 1
Organization of information	3 2 1
Overall presentation	3 2 1
Conclusions	5 4 3 2 1