Math:

1. An object is launched at a velocity of 40 m/s in a direction making an angle of 50° upward with the horizontal. Q1. What is the maximum height reached by the object? Q2. What is the object's total flight time (between launch and touching the ground)? Q3. What is the object's horizontal range (maximum x above ground)? plz use H= V_0
2. A soccer player kicks a ball at an angle of 370 from the horizontal with an initial speed of 20 m/s. Assume that the ball moves in a vertical plane a) Find the time at which the ball reaches the highest point of its trajectory. b) How high does the ball go? c) What is the horizontal range of the ball and how long is it in the air? d) What is the velocity of the ball as it strikes ground?
3. A projectile is thrown at a velocity 30 ms^{-1} making an angle 30 deg with the ground. Calculate the magnitude of the velocity of the football after one second.
4. Suppose a football player kick a ball with an angle 30 degree with horizontal with a velocity 25 ms^{-1}. The distance between the player and goalkeeper is 80m. The keeper run with a uniform velocity of 10 ms-1 to catch the ball. Can the keeper catch the ball? [g=9.8 ms-2]
5. A body is thrown at 20 ms-1 velocity making an angle 50 deg with horizontal direction. a) Calculate horizontal range b) Maximum height c) Time to ascend the maximum height d) Time of flight.
6. Suppose a football player kick a ball with an angle 30 degree with horizontal with a velocity 25 ms^{-1}. A keeper is on the line of the ball at 72 m from the ball striking would like to catch the ball. What is the velocity of the keeper?
7. A Cricket player strike a ball at an initial speed 40 m/s with an initial angle 25 deg. A fielder is on the line of the ball at 72 m from the ball striking would like to catch the ball. Find the velocity of the fielder. Ans. (15.38 m/s).
8. In a contest to drop a package on a target, one contest's plane is flying at a constant horizontal velocity of 155 Km/h at an elevation of 225 m toward a point directly above the target. At what angle of sight should the package be released to strike the target?

9. If a stone is thrown vertically upward with a velocity of 15 m/s, how high will it go before it starts coming back down?
10. A fielder throws a ball with an initial velocity of 30 m/s at an angle of 45 degrees to the horizontal. Calculate the horizontal and vertical components of the initial velocity.
11. A soccer player kicks a ball at an angle of 60 degrees to the horizontal with an initial speed of 25 m/s. Calculate the vertical velocity after 5 seconds.
12. An object falls freely from rest. Calculate its velocity after 3 seconds.
13. A ball is thrown vertically upward with an initial velocity of 15 m/s. Calculate the time it takes to reach its highest point.
14. A bicycle accelerates from 5 m/s to 17 m/s in 6 seconds. Determine the distance it travels during this time.
15. A rocket is launched vertically with an initial velocity of 50 m/s and its acceleration is 20 m/s^2. Considering gravity How long will it take to reach a height of 5000 meters?
16. A force of 20 N is applied to push an object horizontally across a table for a distance of 4 meters. Calculate the work done.
17. A car applies a braking force of 5000 N to come to a complete stop from a speed of 20 m/s at 4 second. Calculate the work done by the brakes.
18. A spring with a force constant of 100 N/m is compressed by 0.05 meters. Calculate the work done in compressing the spring.
19. A 50 kg box is pushed horizontally with a 1200 N force at an angle of 30 degrees with the horizontal. Given that the coefficient of sliding friction is 0.15, calculate the net force acting on the box and determine its acceleration.
20. If a 30 kg box is moving horizontally with a constant velocity on a rough surface with a coefficient of sliding friction of 0.3, what is the magnitude of the horizontal force being applied to the box?
21. A 60 kg crate is on an inclined plane with an angle of 25 degrees to the horizontal. If a 1000 N force is applied parallel to the incline and the coefficient of sliding friction is 0.25, calculate the frictional force acting on the crate and its acceleration down the incline.
22. A spring with a force constant of 500 N/m is compressed by 0.1 meters. Calculate the work done in compressing the spring.

23. A 1000 N force is applied to push a heavy crate horizontally across a rough surface for a distance of 10 meters. Given that the frictional force opposes the motion with 300 N of force, calculate the net work done on the crate.
24. A 60 kg hiker climbs a mountain that has a vertical height gain of 500 meters. Calculate the work done by the hiker against gravity during the ascent.
25. A spring is compressed by 0.025 meters when a force of 8.0 N is applied to it. Calculate the force constant (k) of the spring.
26. A 0.2 kg mass is attached to a spring with a force constant (k) of 400 N/m. If the mass is pulled 0.1 meters to the right and released from rest, find the mechanical energy of the oscillating mass-spring system.
27. A spring with a force constant (k) of 300 N/m is compressed by 0.04 meters. Calculate the potential energy stored in the compressed spring.
28. A 0.3 kg mass hangs from a spring with a force constant (k) of 500 N/m. If the mass is released from rest and allowed to fall, calculate the kinetic energy of the mass just before it reaches its equilibrium position.
29. A 0.5 kg mass is attached to a spring with a force constant (k) of 200 N/m. Find the period of oscillation of the mass-spring system when it is pulled 0.1 meters to the right and released from rest.