**Problem 1**

A train covers 60 miles between 2 p.m. and 4 p.m. How fast was it going at 3 p.m.?

**Solution:**

The speed is travelled distance (60 miles) divided by travelled time (4pm – 2pm = 2hours):



#include<iostream>

using namespace std;

int main()

{

float distance\_travelled = 60; //in miles

float duration = 2; //in hours

cout << "How much miles distance is travelled? ";

cin >> distance\_travelled;

cout << endl << "How much time (in hours)? ";

cin >> duration;

float speed = distance\_travelled / duration; //mph

cout << "The speed of the train is " << speed << " miles per hours." << endl;

}

**Problem 2**

Is it possible that the car could have accelerated to 55mph within 268 meters if the car can only accelerate from 0 to 60 mph in 15 seconds?

**Solution:**

Let us find the maximum acceleration of the car:

The car can accelerate from 0 to  in 15 seconds. Then maximum acceleration is



If the car needs to accelerate to  within 268 meters then its acceleration should be



This acceleration is less than the maximum possible acceleration, so the car can reach the speed 55 mph within 268 meters.

STATIC CODE IS GIVEN. MAKE IT DYNAMIC!

#include<iostream>

using namespace std;

int main()

{

float max\_accelerate\_speed = 60; //in mph

float duration = 15; //in minutes

float max\_acceleration\_in\_meter\_per\_second = 60 \* 0.445/duration; //m/s

float acceleration\_need = 55; //mph

float acceleration\_need\_in\_meter\_per\_second = 55 \* 0.445; //m/s

float distance = 268; // meters

float acceleration = (acceleration\_need\_in\_meter\_per\_second\* acceleration\_need\_in\_meter\_per\_second / distance)/2;

cout << "If The acieved acceleration " << acceleration << " is less than " << max\_acceleration\_in\_meter\_per\_second << "Then YES." << endl;

}

Problem of the Week

**Problem 6**

A 8 kg block is at rest on a horizontal floor. If you push horizontally on the 8 kg block with a force of 20 N, it just starts to move.   
  
(a) What is the coefficient of static friction?   
  
(b) A 10.0 kg block is stacked on top of the 8 kg block. What is the magnitude F of the force, acting horizontally on the 8 kg block as before, that is required to make the two blocks start to move?

**Solution:**

The magnitude of horizontal force should be equal to the magnitude of the maximal static friction force, which is equal to the product of the coefficient of static friction and the normal force (gravitation force in the present problem).

(a)  The gravitation force is mg=8\*9.8 = 78.4 N. Then the coefficient of static friction is



(b) Now we know the coefficient of static friction and we know the normal force: 18\*9.8 = 176.4 N. Then we can find the magnitude of force F:



WRITE C++ Code.