Name: Jing Ma

Tuesday Lab

#include "library.h"

//Part 1: Calculation

/\*

const double g = 32.174; // g is gravity ft/s

void calculation( double const v, double const t){

// v = velocity

// t = time

double tt = 2\*v/g;

int const h = v\*t - g\*(t\*t)/2;

if(t<= tt){

print(h);

}

}

void main(){

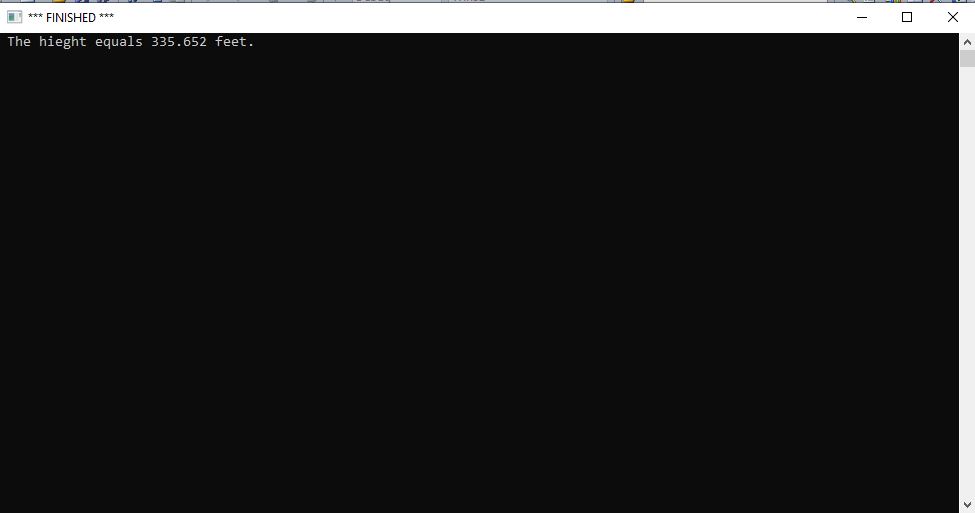
print(" The hieght equals ");

calculation(200,2);

print(" feet.");

}

\*/



//Part 2 Tablulation

/\*

const double g = 32.174;

// g is gravity ft/s

void tabulation(double const v,double const t){

const double tt = 2\*v/g;

const int h = v\*t - g\*(t\*t)/2;

if(t<= tt){

print("after ");

print(t);

print(" seconds, height is ");

print(h);

print(" feet");

new\_line();

tabulation(v, t+0.5);

}

}

void tabulationLoop(int v, int t){

tabulation(v, 0);

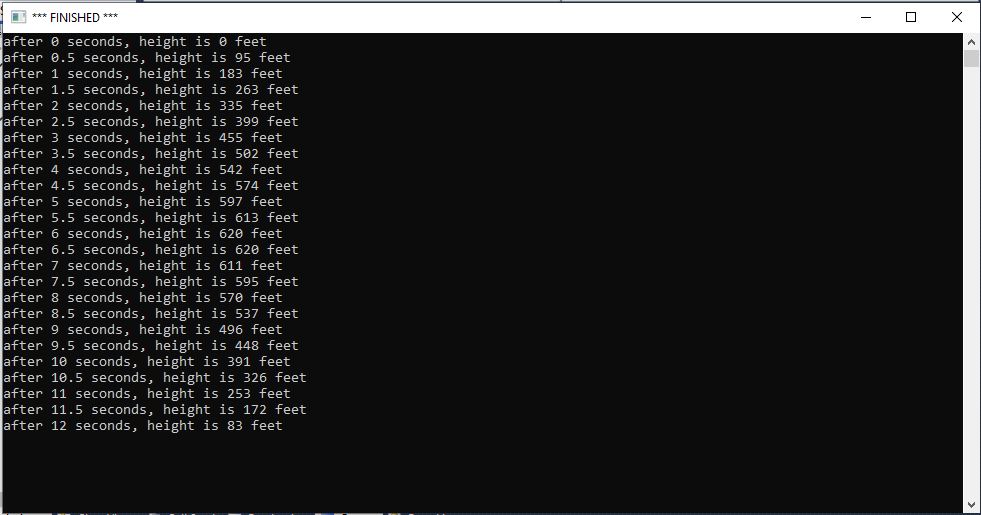
}

void main(){

tabulationLoop(200, 12);

}

\*/



//Part 3: Interaction

/\*

const double g = 32.174;

// g is gravity ft/s

void tabulation(double v, double t){

double tt = 2\*v/g;

int h = ((v\*t) - (0.5\*g\*(t\*t)));

if(t<= tt){

print("after ");

print(t);

print(" seconds, height is ");

print(h);

print(" feet");

new\_line();

tabulation(v, t+0.5);

}

}

void tabulationLoop(int v){

tabulation(v, 0);

}

void interaction(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

print("The height above the ground for each time are ");

new\_line();

tabulationLoop(initialVelocity);

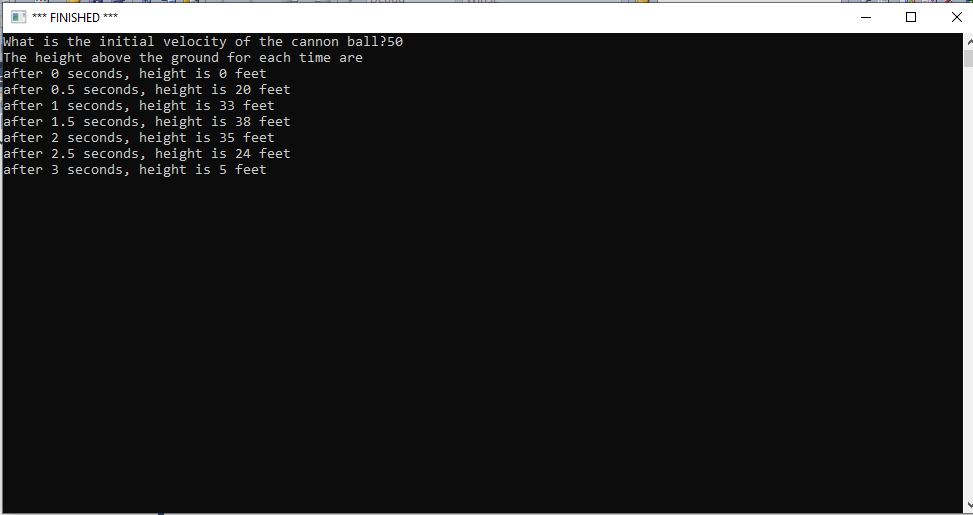
}

void main(){

interaction();

}

\*/



//Part 4: Visual Representation

/\*

const double g = 32.174;

const double pi = acos(-1.0);

void line(int n, int s, int angle){

if(n>0){

draw\_distance(s);

turn\_right\_by\_degrees(angle);

line(n-1,s,angle);

}

}

void circle(double x, double y, double radius, double R, double G, double B){

const double pi = acos(-1.0);

double Circumference= 2\*radius\*pi;

double side = Circumference/360;

//move\_to(x,y);

move\_to(x,y-radius);

line(360,side,1);

//line(360, (2\*pi\*radius)/360, 1);

}

void dot(double const x, double const y, double const R, double const G, double const B){

start\_shape();

circle(x,y,1,R,G,B);

set\_pen\_width(10);

set\_pen\_color(R,G,B);

fill\_shape();

}

void tab\_up(double const v, double const t, double const R, double const G, double const B){

double const g = 32.174;

double tt = 2\*v/g;

int h = v\*t - g\*(t\*t)/2;

if(t<= tt/2){

dot(100,600-h,R,G,B);

tab\_up(v,t+1,R-0.1,G,B+0.1);

}

}

void tab\_down(double v, double t, double R, double G, double B){

double const g = 32.174;

double tt = 2\*v/g;

int h = v\*t - g\*(t\*t)/2;

if(tt/2 < t <= tt){

dot(100,600-h,R,G,B);

tab\_down(v,t+1,R+0.1,G,B-0.1);

}

}

void visual\_rep(int initialVelocity){

make\_window(200,600);

tab\_up(initialVelocity,0,1.0,0.0,0.0);

tab\_down(initialVelocity,initialVelocity/32.174,0.0,0.0,1.0);

}

void interaction(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

new\_line();

visual\_rep(initialVelocity);

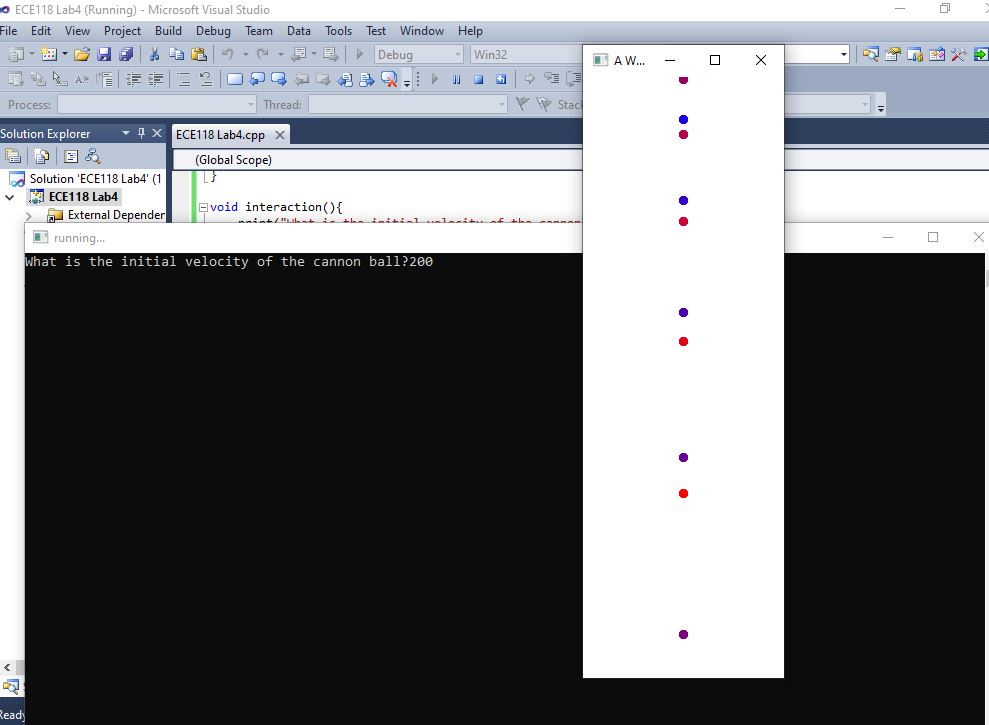
}

void main(){

interaction();

}

\*/



//Part 5: First Flight

/\*

const double g = 32.174;

void line(int const n, int const s, int const angle) {

if(n>0) {

draw\_distance(s);

turn\_right\_by\_degrees(angle);

line(n-1,s,angle);

}

}

void circle(double const x, double const y, double const radius, double const R, double const G, double const B){

double const C = 2\*radius\*3.14;

double const s = C/360;

move\_to(x,y-radius);

line(360,s,1);

}

void dot(double const x, double const y, double const R, double const G, double const B){

start\_shape();

circle(x,y,1,R,G,B);

set\_pen\_width(10);

set\_pen\_color(R,G,B);

fill\_shape();

}

void up\_down(double velocity\_y, double velocity\_x, double y,double t, double R, double G, double B){

double const tt = 2\*velocity\_y/g;

int const h = velocity\_y\*t-g\*t\*t/2;

int const I = velocity\_x\*t;

if(t<=tt){

dot(I,y-h,R,0,B);

up\_down(velocity\_y,velocity\_x,y,t+1,R-0.06,G,B+0.06);

}

}

void arc(double v, double degree, double x, double y, double R,double G, double B){

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = v\*cos(d);

double const vy = v\*sin(d);

make\_window(x,y);

up\_down(vy,vx,y,0,R,G,B);

}

void interaction(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

new\_line();

arc(initialVelocity,60,1000,500,1.0,0.0,0.0);

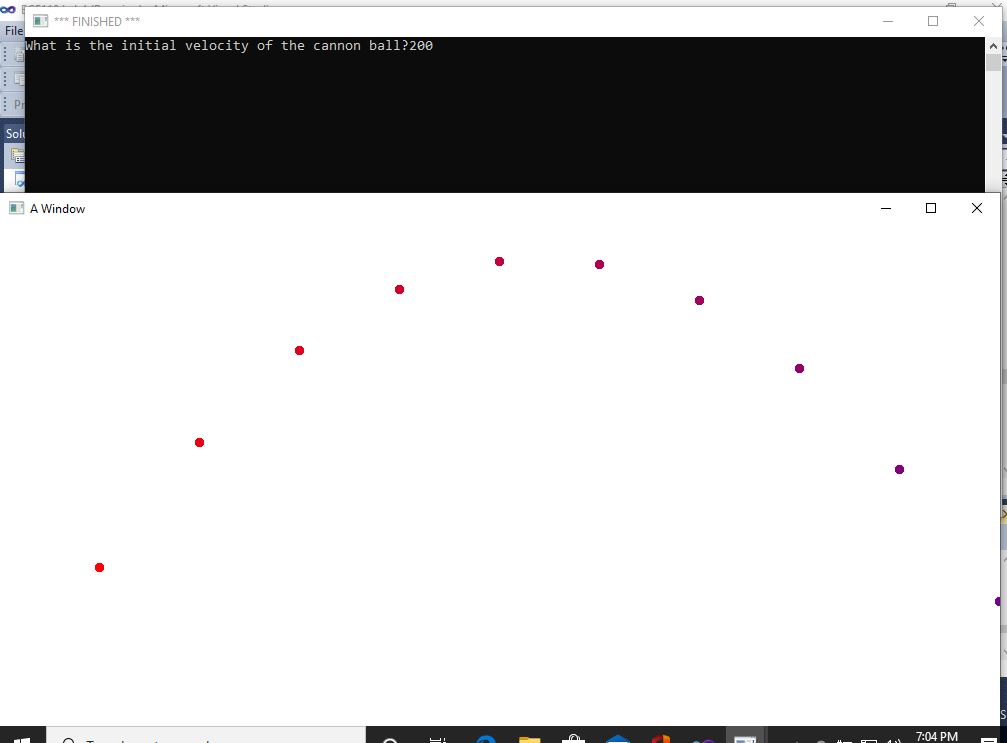
}

void main(){

interaction();

}

\*/



// Part 6: Nice Arc

/\*

void line(int const n, int const s, int const angle) {

if(n>0) {

draw\_distance(s);

turn\_right\_by\_degrees(angle);

line(n-1,s,angle);

}

}

void circle(double const x, double const y, double const radius, double const R, double const G, double const B){

double const pi = acos(-1.0);

double const C = 2\*radius\*pi;

double const s = C/360;

move\_to(x,y-radius);

line(360,s,1);

}

void dot(double const x, double const y, double const R, double const G, double const B){

start\_shape();

circle(x,y,1,R,G,B);

set\_pen\_width(30);

set\_pen\_color(R,G,B);

fill\_shape();

}

void curve(double const vy, double const vx, double const y,double const t, double const R, double const B){

double const g = 32.174;

double const tt = 2\*vy/g;

double const h = vy\*t-g\*t\*t/2;

double const I = vx\*t;

if(t<=tt){

move\_to(I,y-h);

dot(I,y-h,R,0,B);

curve(vy,vx,y,t+0.08,R-0.01,B+0.015);

}

}

void niceArc(double const v, double const degree, double const x, double const y, double const a, double const c){

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = v\*cos(d);

double const vy = v\*sin(d);

make\_window(x,y);

curve(vy,vx,y,0,a,c);

}

void interaction(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

new\_line();

niceArc(initialVelocity,55,1000,600,1.0,0.0);

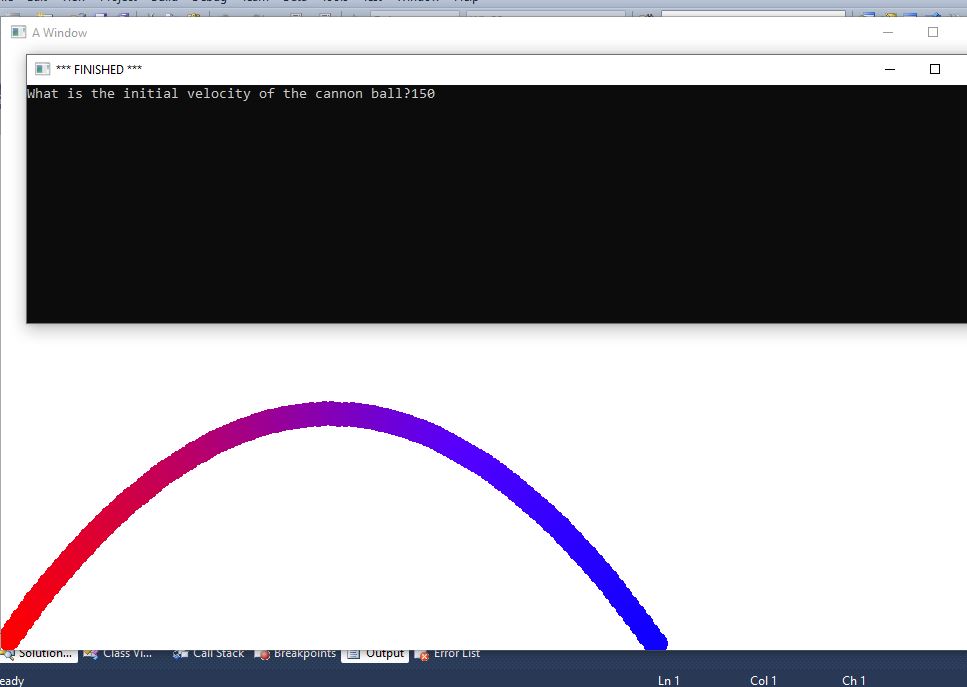
}

void main() {

interaction();

}

\*/



//Part 7: Take the Battle to the Enemy

/\*

void line(int const n, int const s, int const angle) {

if(n>0) {

draw\_distance(s);

turn\_right\_by\_degrees(angle);

line(n-1,s,angle);

}

}

void circle(double const x, double const y, double const radius, double const R, double const G, double const B){

double const pi = acos(-1.0);

double const C = 2\*radius\*pi;

double const s = C/360;

move\_to(x,y-radius);

line(360,s,1);

}

void dot(double const x, double const y, double const R, double const G, double const B){

start\_shape();

circle(x,y,1,R,G,B);

set\_pen\_width(30);

set\_pen\_color(R,G,B);

fill\_shape();

}

void up\_down(double velocity\_y, double velocity\_x, double y,double t, double R, double G, double B){

double const g = 32.174;

double const T = 2\*velocity\_y/g;

int const h = velocity\_y\*t-g\*t\*t/2;

int const I = velocity\_x\*t;

if(t<=T){

dot(I,y-h,R,0,B);

up\_down(velocity\_y,velocity\_x,y,t+1,R-0.06,G,B+0.06);

}

}

void curve(double const vy, double const vx, double const y,double const t, double const R, double const B){

double const g = 32.174;

double const tt = 2\*vy/g;

double const h = vy\*t-g\*t\*t/2;

double const I = vx\*t;

if(t<=tt){

move\_to(I,y-h);

dot(I,y-h,R,0,B);

curve(vy,vx,y,t+0.08,R-0.01,B+0.015);

}

}

void arc(double v, double degree, double x, double y, double R,double G, double B){

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = v\*cos(d);

double const vy = v\*sin(d);

make\_window(x,y);

up\_down(vy,vx,y,0,R,G,B);

}

void niceArc(double const v, double const degree, double const x, double const y, double const a, double const c){

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = v\*cos(d);

double const vy = v\*sin(d);

make\_window(x,y);

curve(vy,vx,y,0,a,c);

}

void battle(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

new\_line();

print("What is the initial degree?");

double degree = read\_double();

new\_line();

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = initialVelocity\*cos(d);

double const vy = initialVelocity\*sin(d);

double const g = 32.174;

double const tt = 2\*vy/g;

niceArc(initialVelocity,degree,1000,600,1.0,0.0);

new\_line();

print("Final horizontal distance is ");

print(vx\*tt);

print(" feet");

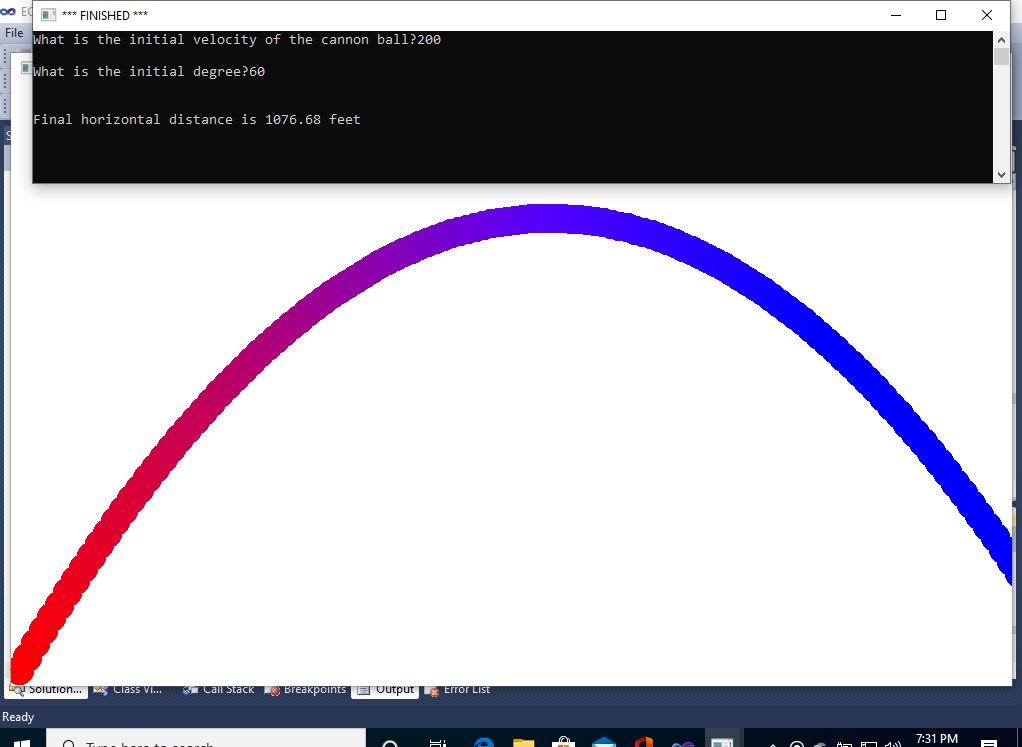
}

void main() {

battle();

}

\*/



// Part 8: The Game (not completed)

void line(int const n, int const s, int const angle) {

if(n>0) {

draw\_distance(s);

turn\_right\_by\_degrees(angle);

line(n-1,s,angle);

}

}

void circle(double const x, double const y, double const radius, double const R, double const G, double const B){

double const pi = acos(-1.0);

double const C = 2\*radius\*pi;

double const s = C/360;

move\_to(x,y-radius);

line(360,s,1);

}

void dot(double const x, double const y, double const R, double const G, double const B){

start\_shape();

circle(x,y,1,R,G,B);

set\_pen\_width(30);

set\_pen\_color(R,G,B);

fill\_shape();

}

void up\_down(double velocity\_y, double velocity\_x, double y,double t, double R, double G, double B){

double const g = 32.174;

double const T = 2\*velocity\_y/g;

int const h = velocity\_y\*t-g\*t\*t/2;

int const I = velocity\_x\*t;

if(t<=T){

dot(I,y-h,R,0,B);

up\_down(velocity\_y,velocity\_x,y,t+1,R-0.06,G,B+0.06);

}

}

void curve(double const vy, double const vx, double const y,double const t, double const R, double const B){

double const g = 32.174;

double const tt = 2\*vy/g;

double const h = vy\*t-g\*t\*t/2;

double const I = vx\*t;

if(t<=tt){

move\_to(I,y-h);

dot(I,y-h,R,0,B);

curve(vy,vx,y,t+0.08,R-0.01,B+0.015);

}

}

void arc(double v, double degree, double x, double y, double R,double G, double B){

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = v\*cos(d);

double const vy = v\*sin(d);

make\_window(x,y);

up\_down(vy,vx,y,0,R,G,B);

}

void niceArc(double const v, double const degree, double const x, double const y, double const a, double const c){

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = v\*cos(d);

double const vy = v\*sin(d);

make\_window(x,y);

curve(vy,vx,y,0,a,c);

}

void battle(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

new\_line();

print("What is the initial degree?");

double degree = read\_double();

new\_line();

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = initialVelocity\*cos(d);

double const vy = initialVelocity\*sin(d);

double const g = 32.174;

double const tt = 2\*vy/g;

niceArc(initialVelocity,degree,1000,600,1.0,0.0);

new\_line();

print("Final horizontal distance is ");

print(vx\*tt);

print(" feet");

}

void draw\_cannon(double const x, double const y, double const radius){

double const pi = acos(-1.0);

set\_pen\_color(color::black);

set\_pen\_width(10);

start\_shape();

move\_to(x,y); note\_position();

turn\_right\_by\_radians(1.571);

turn\_left\_by\_radians(0.1);

draw\_distance(4\*radius); note\_position();

turn\_left\_by\_radians(1.483);

draw\_distance(2\*radius); note\_position();

turn\_left\_by\_radians(1.483);

draw\_distance(6\*radius); note\_position();

turn\_left\_by\_radians(1.657);

draw\_distance(2\*radius+6\*2\*radius\*cos(1.483)); note\_position();

turn\_left\_by\_radians(1.657);

draw\_distance(2\*radius); note\_position();

turn\_left\_by\_radians(pi);

draw\_distance(radius); note\_position();

turn\_right\_by\_radians(pi);

}

void shooting(double const x, double const y, double const angle){

double const pi = acos(-1.0);

turn\_left\_by\_radians(angle\*pi/180.00);

draw\_cannon(x,y-10,10);

turn\_right\_by\_radians((angle+5)\*pi/180.00);

turn\_left\_by\_radians(pi/2);

circle(x,y-10,10,0.0,0.0,0.0);

set\_pen\_color(color::white);

fill\_shape();

turn\_left\_by\_radians(1.5708);

circle(x,y-10,10,0.0,0.0,0.0);

turn\_left\_by\_radians(pi/2);

}

void battle(){

print("What is the initial velocity of the cannon ball?");

double initialVelocity = read\_double();

new\_line();

print("What is the initial degree?");

double degree = read\_double();

new\_line();

double const pi = acos(-1.0);

double const d = degree\*pi/180.00;

double const vx = initialVelocity\*cos(d);

double const vy = initialVelocity\*sin(d);

double const g = 32.174;

double const tt = 2\*vy/g;

make\_window(800,400);

shooting(40,400,35);

niceArc(initialVelocity,degree,800,400,1.0,0.0);

new\_line();

print("Final horizontal distance is ");

print(vx\*tt);

print(" feet");

}

void main(){

battle();

}

//Part 9: Make it Interesting