

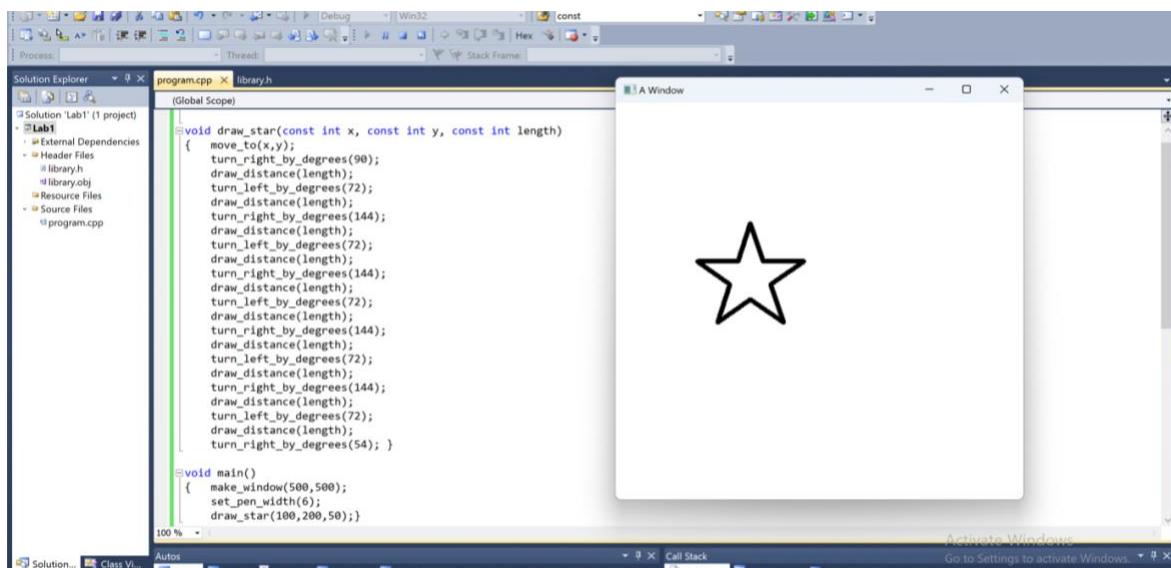
## Lab 2

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20238 – ECE118-R/RC

### 1. A Five-Pointed Star.

```
#include "library.h"

void main()
{
    make_window(500,500);
    set_pen_width(6);
    turn_right_by_degrees(90);
    draw_distance(50);
    turn_left_by_degrees(72);
    draw_distance(50);
    turn_right_by_degrees(144);
    draw_distance(50);
    turn_left_by_degrees(72);
    draw_distance(50);
    turn_right_by_degrees(144);
    draw_distance(50);
    turn_left_by_degrees(72);
    draw_distance(50);
    turn_right_by_degrees(144);
    draw_distance(50);
    turn_left_by_degrees(72);
    draw_distance(50);
    turn_right_by_degrees(144);
    draw_distance(50);
    turn_left_by_degrees(72);
    draw_distance(50);
    turn_right_by_degrees(54); }
```



## 2. A Function.

```
#include "library.h"
void draw_star(const int x, const int y, const int length)
{
    set_pen_color(color::black);
    set_pen_width(4);
    move_to(x,y);
    turn_right_by_degrees(90);
    draw_distance(length);
    turn_left_by_degrees(72);
    draw_distance(length);
    turn_right_by_degrees(144);
    draw_distance(length);
    turn_left_by_degrees(72);
    draw_distance(length);
    turn_right_by_degrees(54); }
```

```
void main()
{
    make_window(500,500);
    draw_star(100,200,50);
    draw_star(132.5,210,25);
    draw_star(300,300,50);
    draw_star(300,100,25);
    draw_star(250,300,15);}
```



```
#include "library.h"
void draw_star(const int x, const int y, const int length)
{
    set_pen_color(color::black);
    set_pen_width(4);
    move_to(x,y);
    turn_right_by_degrees(90);
    draw_distance(length);
    turn_left_by_degrees(72);
    draw_distance(length);
    turn_right_by_degrees(144);
    draw_distance(length);
    turn_left_by_degrees(72);
    draw_distance(length);
    turn_right_by_degrees(54); }

void main()
{
    make_window(500,500);
    draw_star(100,200,50);
    draw_star(132.5,210,25);
    draw_star(300,300,50);
    draw_star(300,100,25);
    draw_star(250,300,15);}
```



### 3. Colouring It In.

```
#include "library.h"

void draw_star(const int x, const int y, const int length)
{
    set_pen_color(color::blue);
    set_pen_width(4);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(54);
    note_position();
    fill_shape(); }

void main()
{
    make_window(500,500);
    draw_star(100,200,50);
    draw_star(132.5,210,25);
    draw_star(300,300,50);
    draw_star(300,100,25);
    draw_star(250,300,15);}
```

The screenshot shows a Microsoft Visual Studio-like IDE interface. On the left, the Solution Explorer displays a project named 'Lab1' with files 'library.h', 'library.obj', and 'program.cpp'. The 'Program.cpp' file is open in the main editor area, showing the following code:

```
#include "library.h"

void draw_star(const int x, const int y, const int length)
{
    set_pen_color(color::blue);
    set_pen_width(4);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(54);
    note_position();
    fill_shape(); }

void main()
{
    make_window(500,500);
    draw_star(100,200,50);
    draw_star(132.5,210,25);
    draw_star(300,300,50);
    draw_star(300,100,25);
    draw_star(250,300,15); }
```

The output window on the right shows three blue five-pointed stars drawn on a white background. The stars are positioned at approximately (100, 200), (132.5, 210), and (300, 300) relative to the top-left corner of the window.

#### 4. The Lone-Star Program.

```
#include "library.h"

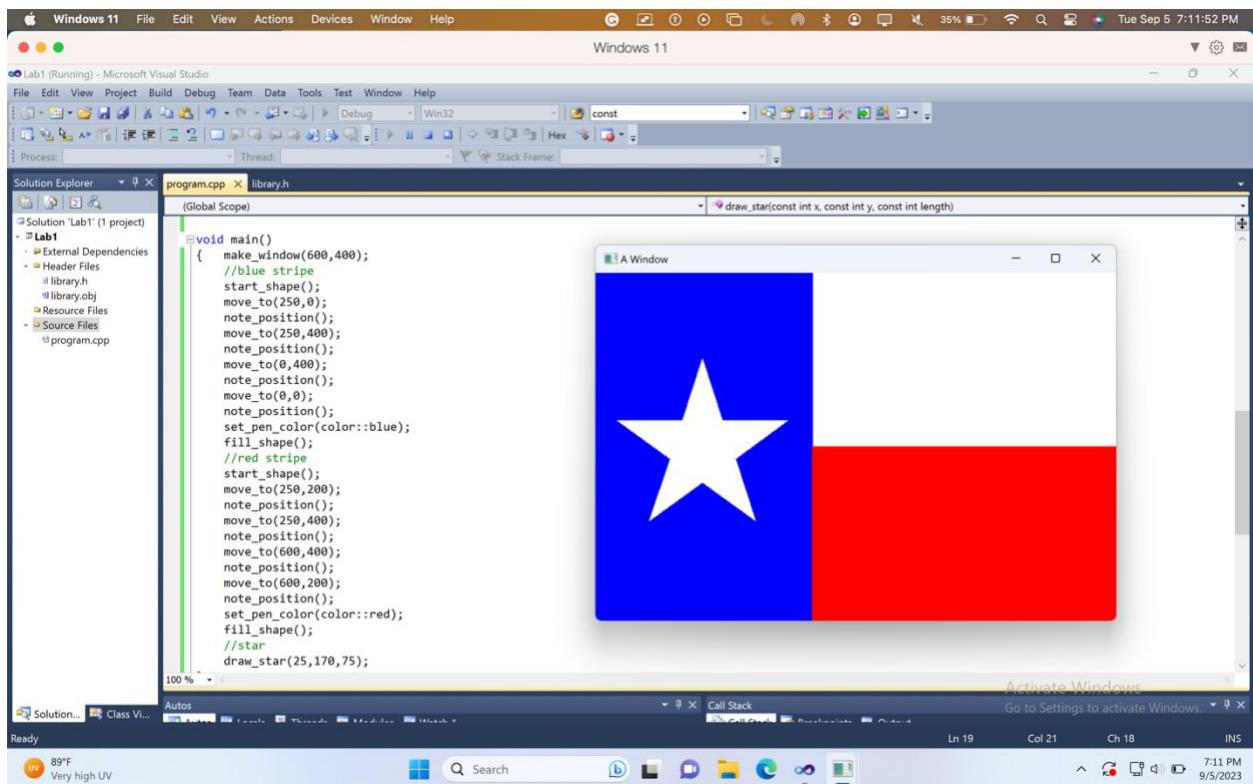
void draw_star(const int x, const int y, const int length)
{
    set_pen_color(color::white);
    set_pen_width(1);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(54);
    note_position();
    fill_shape(); }

void main()
{
    make_window(600,400);
    //blue stripe
    start_shape();
    move_to(250,0);
    note_position();
    move_to(250,400);
    note_position();
    move_to(0,400);
    note_position();
    move_to(0,0);
    note_position();
```

```

set_pen_color(color::blue);
fill_shape();
//red stripe
start_shape();
move_to(250,200);
note_position();
move_to(250,400);
note_position();
move_to(600,400);
note_position();
move_to(600,200);
note_position();
set_pen_color(color::red);
fill_shape();
//star
draw_star(25,170,75); }

```



## 5. Rows of Stars.

```
#include "library.h"
void draw_star(const int x, const int y, const int length)
{
    set_pen_width(1);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(54);
    note_position();
    set_pen_color(color::white);
    fill_shape(); }

void make_blue_rectangle(const int x, const int y, const int x2, const int y2)
{
    set_pen_color(color::blue);
    fill_rectangle(x*0, y*0, x2, y2); }

void row_of_six_stars(const int x, const int y, const int length)
{
    draw_star(x*0.02, y*0.045, length*3/247);
    draw_star(x*0.085, y*0.045, length*3/247);
    draw_star(x*0.15, y*0.045, length*3/247);
    draw_star(x*0.215, y*0.045, length*3/247);
    draw_star(x*0.28, y*0.045, length*3/247);
    draw_star(x*0.345, y*0.045, length*3/247); }

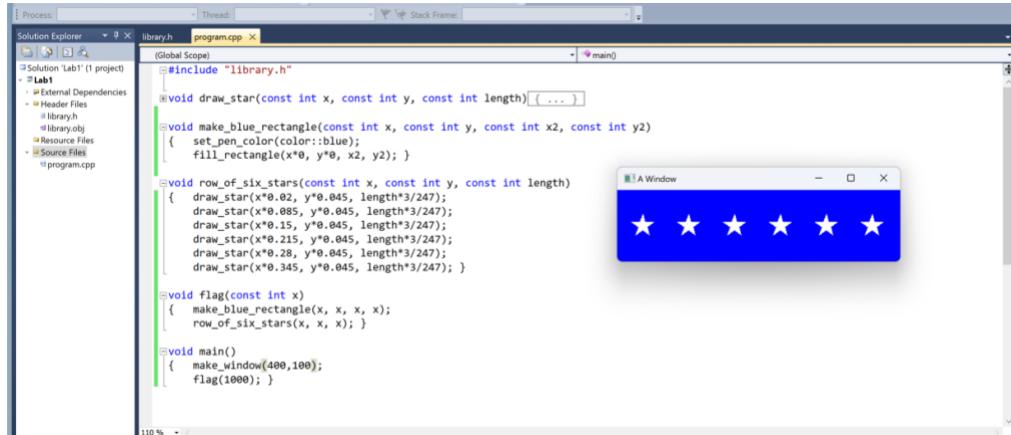
void flag(const int x)
```

```

    make_blue_rectangle(x, x, x, x);
    row_of_six_stars(x, x, x); }

void main()
{
    make_window(400,100);
    flag(1000); }

```



```

#include "library.h"
void draw_star(const int x, const int y, const int length)
{
    set_pen_width(1);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
}
void make_blue_rectangle(const int x, const int y, const int x2, const int y2)
{
    set_pen_color(color::blue);
    fill_rectangle(x,y,x2,y2); }

void row_of_six_stars(const int x, const int y, const int length)
{
    draw_star(x*0.02, y*0.045, length*3/247);
    draw_star(x*0.15, y*0.045, length*3/247);
    draw_star(x*0.215, y*0.045, length*3/247);
    draw_star(x*0.28, y*0.045, length*3/247);
    draw_star(x*0.345, y*0.045, length*3/247); }

void flag(const int x)
{
    make_blue_rectangle(x, x, x, x);
    row_of_six_stars(x, x); }

void main()
{
    make_window(400,100);
    flag(1000); }

```

```

draw_distance(length);
turn_right_by_degrees(54);
note_position();
set_pen_color(color::white);
fill_shape(); }

void make_blue_rectangle(const int x, const int y, const int x2, const int y2)
{
    set_pen_color(color::blue);
    fill_rectangle(x*0, y*0, x2, y2); }

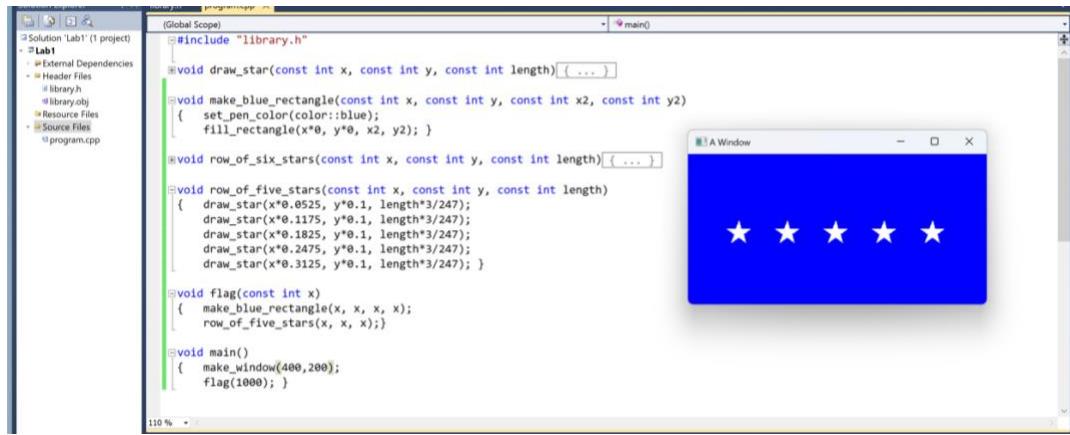
void row_of_six_stars(const int x, const int y, const int length)
{
    draw_star(x*0.02, y*0.045, length*3/247);
    draw_star(x*0.085, y*0.045, length*3/247);
    draw_star(x*0.15, y*0.045, length*3/247);
    draw_star(x*0.215, y*0.045, length*3/247);
    draw_star(x*0.28, y*0.045, length*3/247);
    draw_star(x*0.345, y*0.045, length*3/247); }

void row_of_five_stars(const int x, const int y, const int length)
{
    draw_star(x*0.0525, y*0.1, length*3/247);
    draw_star(x*0.1175, y*0.1, length*3/247);
    draw_star(x*0.1825, y*0.1, length*3/247);
    draw_star(x*0.2475, y*0.1, length*3/247);
    draw_star(x*0.3125, y*0.1, length*3/247); }

void flag(const int x)
{
    make_blue_rectangle(x, x, x, x);
    row_of_five_stars(x, x, x); }

void main()
{
    make_window(400,200);
    flag(1000); }

```



## 6. Block of Stars.

```
#include "library.h"

void draw_star(const int x, const int y, const int length)
{
    set_pen_width(1);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(54);
    note_position();
    set_pen_color(color::white);
    fill_shape(); }

void make_blue_rectangle(const int x, const int y, const int x2, const int y2)
{
    set_pen_color(color::blue);
    fill_rectangle(x*0, y*0, x2, y2); }

void row_of_six_stars(const int x, const int y, const int length)
{
    draw_star(x*0.02, y*0.045, length);
    draw_star(x*0.085, y*0.045, length);
    draw_star(x*0.15, y*0.045, length);
    draw_star(x*0.215, y*0.045, length);
    draw_star(x*0.28, y*0.045, length);
    draw_star(x*0.345, y*0.045, length); }
```

```

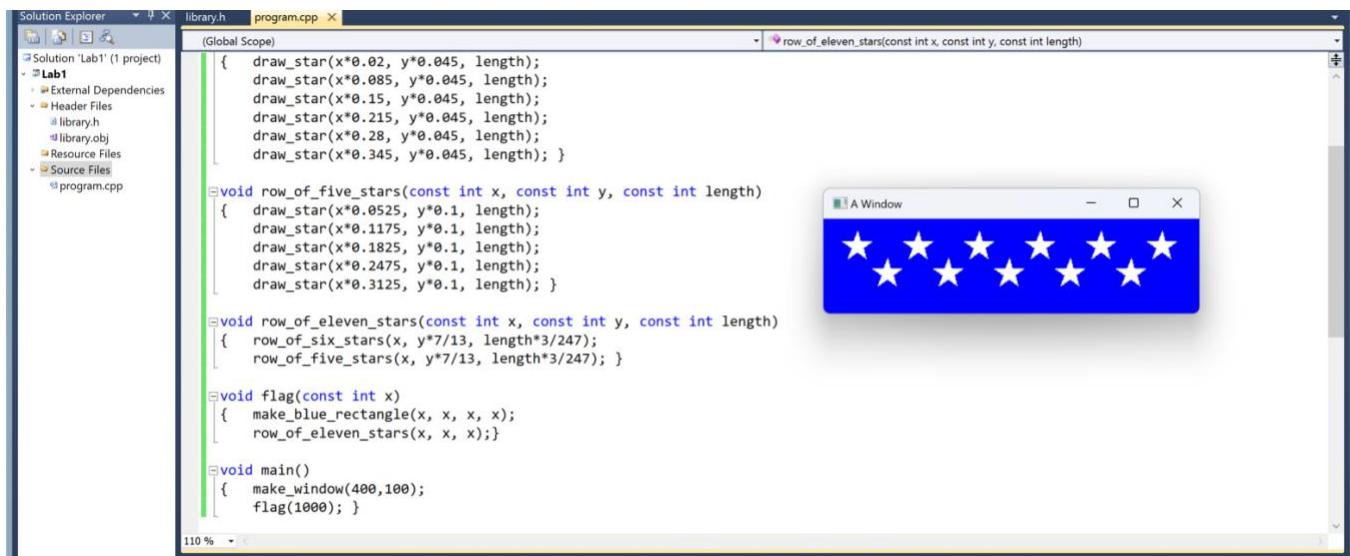
void row_of_five_stars(const int x, const int y, const int length)
{
    draw_star(x*0.0525, y*0.1, length);
    draw_star(x*0.1175, y*0.1, length);
    draw_star(x*0.1825, y*0.1, length);
    draw_star(x*0.2475, y*0.1, length);
    draw_star(x*0.3125, y*0.1, length); }

void row_of_eleven_stars(const int x, const int y, const int length)
{
    row_of_six_stars(x, y*7/13, length*3/247);
    row_of_five_stars(x, y*7/13, length*3/247); }

void flag(const int x)
{
    make_blue_rectangle(x, x, x, x);
    row_of_eleven_stars(x, x, x);}

void main()
{
    make_window(400,100);
    flag(1000); }

```



## 7. The American Flag

```
#include "library.h"

void draw_star(const int x, const int y, const int length)
{
    set_pen_width(1);
    start_shape();
    move_to(x,y);
    turn_right_by_degrees(90);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(144);
    note_position();
    draw_distance(length);
    turn_left_by_degrees(72);
    note_position();
    draw_distance(length);
    turn_right_by_degrees(54);
    note_position();
    set_pen_color(color::white);
    fill_shape(); }

void row_of_six_stars(const int x, const int y, const int length)
{
    draw_star(x*0.02, y*0.045, length);
    draw_star(x*0.085, y*0.045, length);
    draw_star(x*0.15, y*0.045, length);
    draw_star(x*0.215, y*0.045, length);
    draw_star(x*0.28, y*0.045, length);
    draw_star(x*0.345, y*0.045, length); }

void row_of_five_stars(const int x, const int y, const int length)
{
    draw_star(x*0.0525, y*0.1, length);
    draw_star(x*0.1175, y*0.1, length);
    draw_star(x*0.1825, y*0.1, length); }
```

```

draw_star(x*0.2475, y*0.1, length);
draw_star(x*0.3125, y*0.1, length); }

void make_red_rectangle(const int x, const int y, const int x2, const int y2)
{
    set_pen_color(color::red);
    fill_rectangle(x*2/5, y*0, x2, y2*1/13*10/19);
    fill_rectangle(x*2/5, y*2/13*10/19, x2, y2*3/13*10/19);
    set_pen_color(color::white);
    fill_rectangle(x*2/5, y*3/13*10/19, x2, y2*4/13*10/19);
    set_pen_color(color::red);
    fill_rectangle(x*2/5, y*4/13*10/19, x2, y2*5/13*10/19);
    set_pen_color(color::white);
    fill_rectangle(x*2/5, y*5/13*10/19, x2, y2*6/13*10/19);
    set_pen_color(color::red);
    fill_rectangle(x*2/5, y*6/13*10/19, x2, y2*7/13*10/19);
    set_pen_color(color::white);
    fill_rectangle(x*0, y*7/13*10/19, x2, y2*8/13*10/19);
    set_pen_color(color::red);
    fill_rectangle(x*0, y*8/13*10/19, x2, y2*9/13*10/19);
    set_pen_color(color::white);
    fill_rectangle(x*0, y*9/13*10/19, x2, y2*10/13*10/19);
    set_pen_color(color::red);
    fill_rectangle(x*0, y*10/13*10/19, x2, y2*11/13*10/19);
    set_pen_color(color::white);
    fill_rectangle(x*0, y*11/13*10/19, x2, y2*12/13*10/19);
    set_pen_color(color::red);
    fill_rectangle(x*0, y*12/13*10/19, x2, y2*10/19);
    set_pen_color(color::white);
    fill_rectangle(x*0, y*10/19, x2, y2*1);
    fill_rectangle(x, y*0, x2, y2*10/19);}

void make_blue_rectangle(const int x, const int y, const int x2, const int y2)
{
    set_pen_color(color::blue);
    fill_rectangle(x*0, y*0, x2*2/5, y2*7/13*10/19); }

void row_of_eleven_stars(const int x, const int y, const int length)
{
    row_of_six_stars(x, y, length);
    row_of_five_stars(x, y, length); }

void all_stars(const int x, const int y, const int length)
{
    row_of_eleven_stars(x, y*7/13, length*3/247);
    row_of_six_stars(x, y*3.5*7/13, length*3/247);
    row_of_five_stars(x, y*2.1*7/13, length*3/247);
    row_of_six_stars(x, y*5.8*7/13, length*3/247);
    row_of_five_stars(x, y*3.15*7/13, length*3/247);
    row_of_six_stars(x, y*8.2*7/13, length*3/247);
    row_of_five_stars(x, y*4.2*7/13, length*3/247);
    row_of_six_stars(x, y*10.5*7/13, length*3/247);
}

void flag(const int x)
{
    make_window(x,x*10/19);
    make_red_rectangle(x, x, x, x);
    make_blue_rectangle(x, x, x, x);
    all_stars(x,x,x); }

```

```
void main()
{    flag(1200); }
```

