

## Steps for buiding the Balance Scale

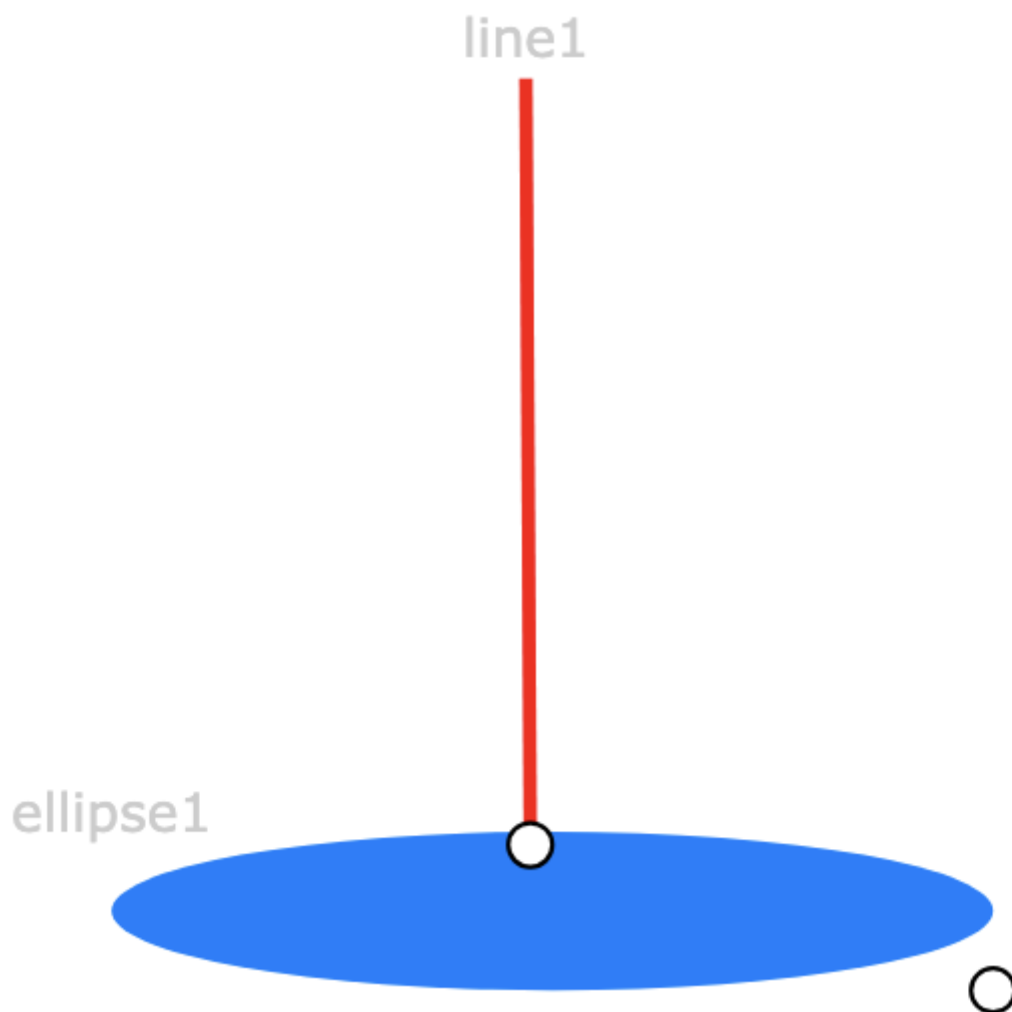
1. Draw an ellipse.

```
main = [ ellipse { 0, 211, 306, 378, 100, 18}];
```



2. Draw the middle line.

```
main =  
[  
  ellipse { 0, 211, 306, 378, 100, 18},  
  line { 0, 0, 300, 189, 301, 363}  
];
```



3. Revise the code. Since the line is not straight enough, which is hard to adjust in SVG, we can manually change 301 to 300 in the code.

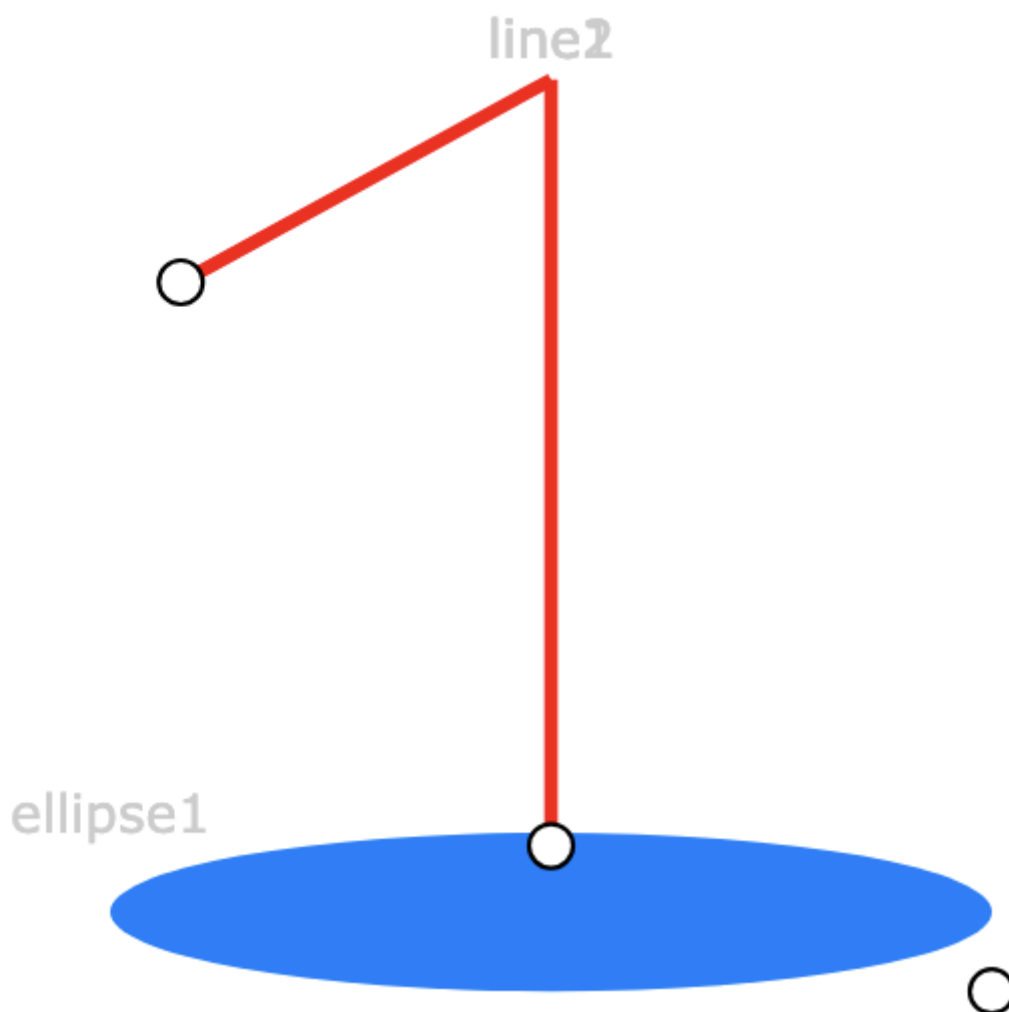
```
main =  
[  
  ellipse { 0, 211, 306, 378, 100, 18},  
  line { 0, 0, 300, 189, 300, 363}  
];
```

4. Refact the code. Since the middle of the ellipse should be the bottom of the middle line. We abstract the `x` of the middle line as a variable `middle_line_x`, and set the ellipse's center point's `x` as `middle_line_x`.

```
main =  
let *middle_line_x = 300 in  
[  
  ellipse { 0, 211, *middle_line_x, 378, 100, 18},  
  line { 0, 0, const *middle_line_x, 189, const *middle_line_x, 363}  
];
```

5. Draw the left line, and drag the left line to align with the middle line.

```
main =  
let *middle_line_x = 300 in  
[  
  ellipse { 0, 211, *middle_line_x, 378, 100, 18}  
, line { 0, 0, const *middle_line_x, 189, const *middle_line_x, 363}  
, line { 0, 0, 300, 189, 216, 235}];
```



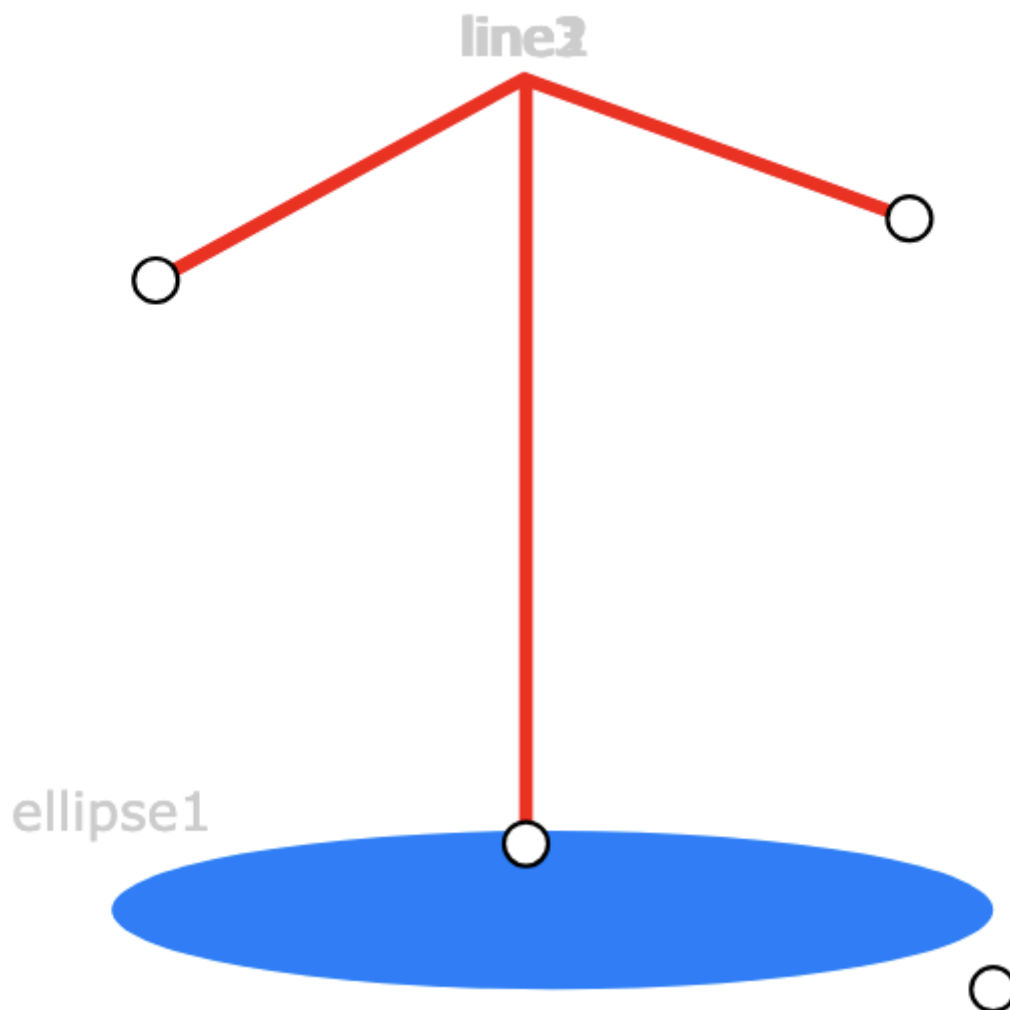
6. Refactor: Build the relationship with the middle line.

```
main =  
let *middle_line_x = 300 in  
let *middle_line_y1 = 189 in  
[  
  ellipse { 0, 211, 306, 378, 100, 18}  
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
```

```
*middle_line_x, 363}  
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 216, 235}}];
```

7. Draw the right line, and drag the right line to align with the middle line.

```
main =  
let *middle_line_x = 300 in  
let *middle_line_y1 = 189 in  
[  
  ellipse { 0, 211, 306, 378, 100, 18},  
  line { 0, 0, const *middle_line_x, const *middle_line_y1, const  
*middle_line_x, 363},  
  line { 0, 0, const *middle_line_x, const *middle_line_y1, 216, 235},  
  line { 0, 0, 299, 189, 378, 244}}];
```

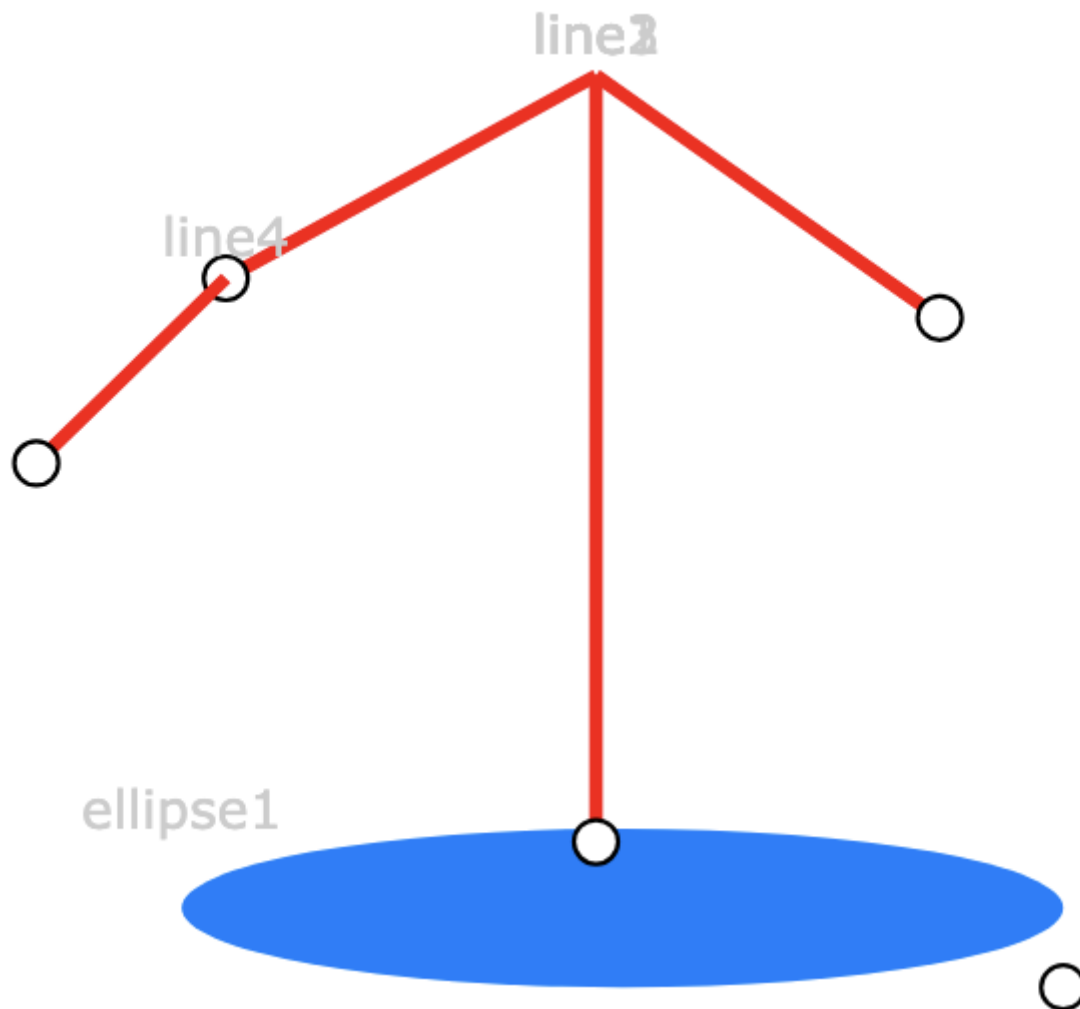


8. Refactor: Build the relationship with the middle line.

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 216, 235}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
];
```

9. Add the left-Left line.

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 216, 235}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
, line { 0, 0, 216, 235, 173, 277}];
```



## 10. Refactor

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, *left_line_x2,
*left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
, line { 0, 0, *left_line_x2, *left_line_y2, 173, 277}];
```

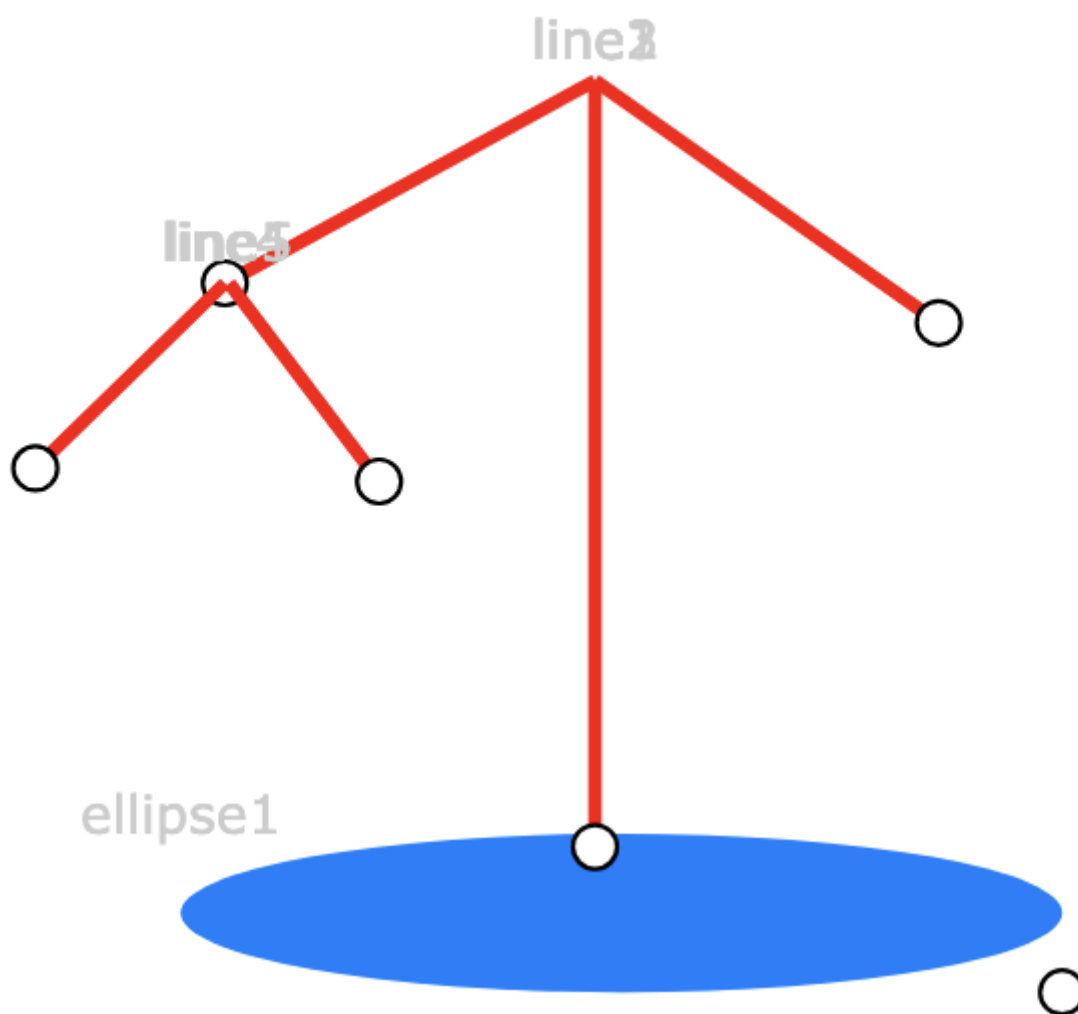
## 11. Add the left-right line.

```
main =
let *middle_line_x = 300 in
```

```

let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
[
  ellipse { 0, 211, 306, 378, 100, 18},
  line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363},
  line { 0, 0, const *middle_line_x, const *middle_line_y1, *left_line_x2,
*left_line_y2},
  line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244},
  line { 0, 0, *left_line_x2, *left_line_y2, 173, 277},
  line { 0, 0, 217, 235, 251, 280}];

```



## 12. Refactor

```

main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 277 in

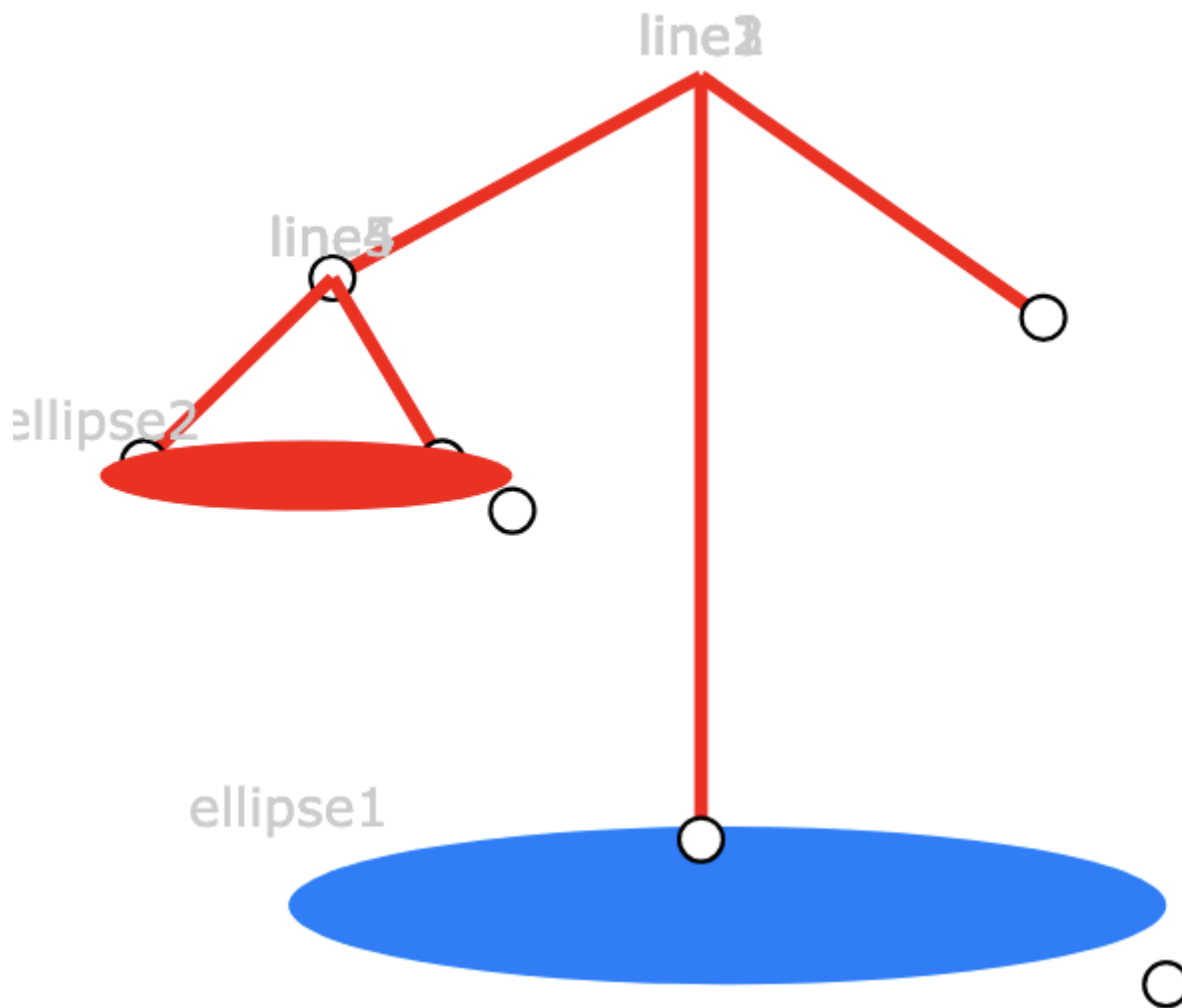
```

```
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
, line { 0, 0, const *left_line_x2, const *left_line_y2, 173, const
*left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, 241, const
*left_twoline2_y}
];
```

13. Add the left ellipse.

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 277 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
, line { 0, 0, const *left_line_x2, const *left_line_y2, 173, const
*left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, 241, const
*left_twoline2_y}
, ellipse { 0, 0, 210, 280, 47, 8}];
```





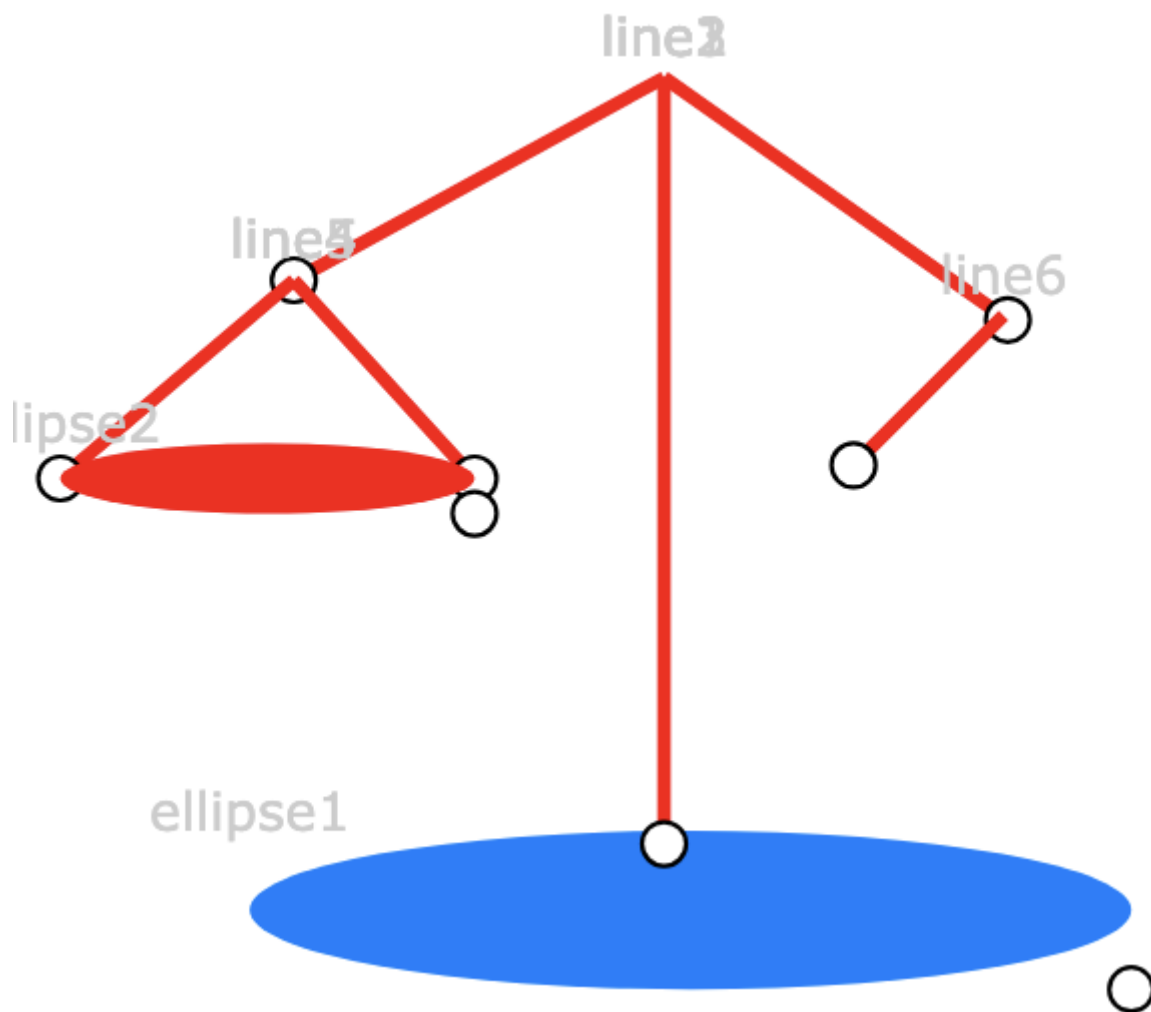
#### 14. Refactor

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 280 in
let *left_ellipse_cx = 210 in
let *ellipse_rx = 47 in
let *ellipse_ry = 8 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
```

```
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
];
```

15. Add the right-left line.

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 280 in
let *left_ellipse_cx = 210 in
let *ellipse_rx = 47 in
let *ellipse_ry = 8 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, 378, 244}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
, line { 0, 0, 377, 243, 343, 277}];
```



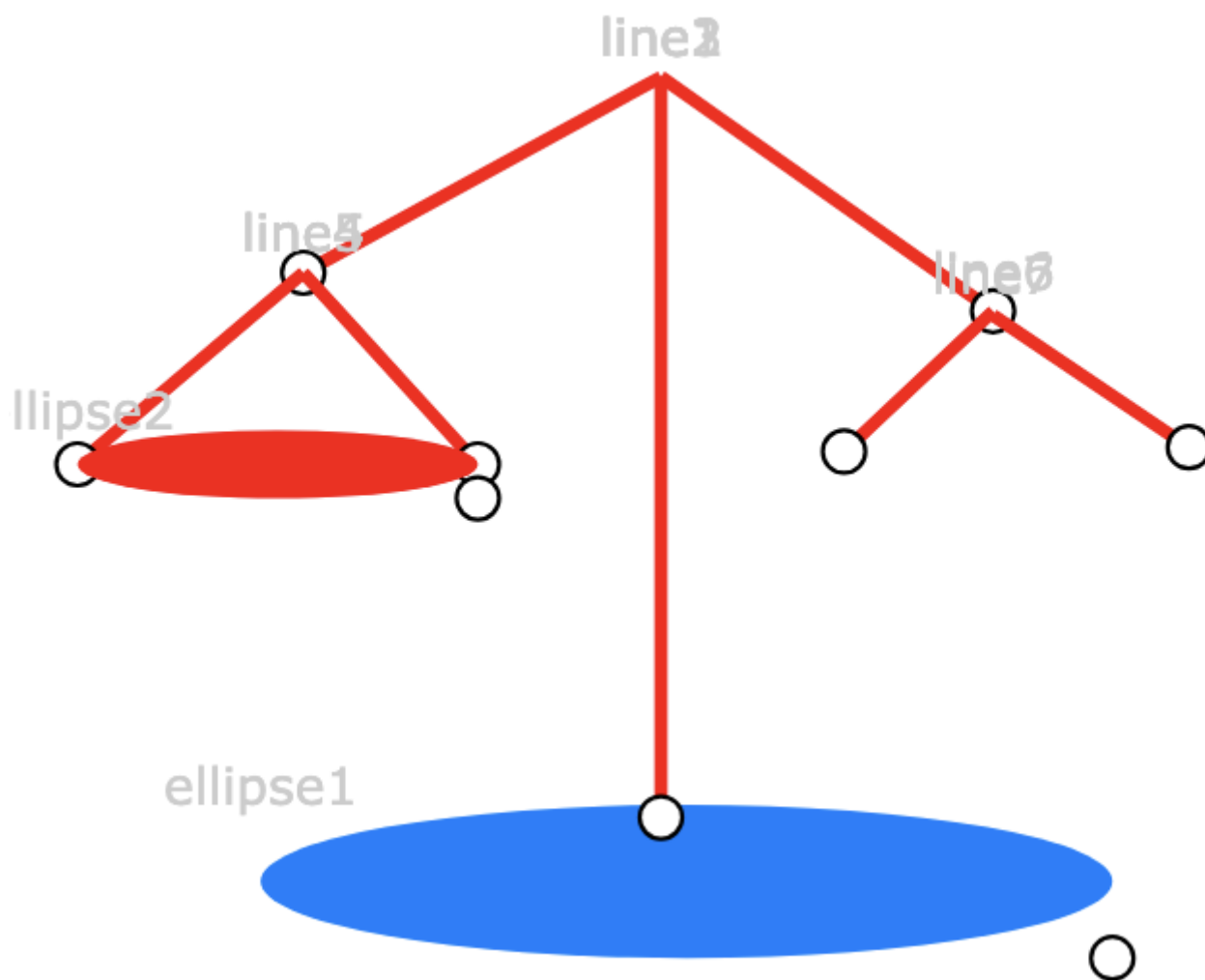
## 16. Refactor

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 280 in
let *left_ellipse_cx = 210 in
let *ellipse_rx = 47 in
let *ellipse_ry = 8 in
let *right_line_x2 = 378 in
let *right_line_y2 = 244 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1,
*right_line_x2, *right_line_y2}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
```

```
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
, line { 0, 0, *right_line_x2, *right_line_y2, 343, 277}}];
```

17. Draw the right-right line.

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 280 in
let *left_ellipse_cx = 210 in
let *ellipse_rx = 47 in
let *ellipse_ry = 8 in
let *right_line_x2 = 378 in
let *right_line_y2 = 244 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1,
*right_line_x2, *right_line_y2}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
, line { 0, 0, *right_line_x2, *right_line_y2, 343, 277}
, line { 0, 0, 378, 245, 424, 276}]];
```



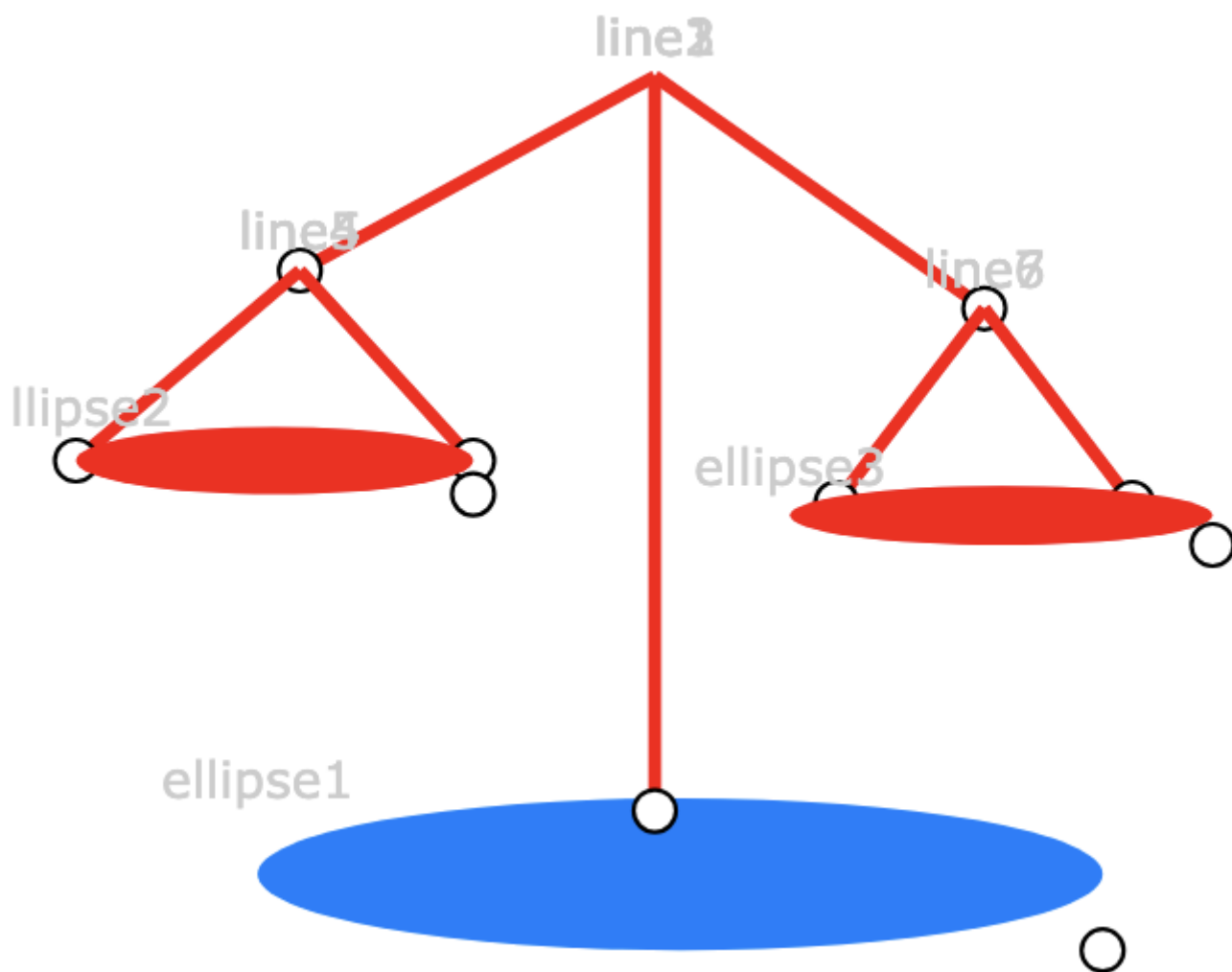
## 18. Refactor

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 280 in
let *left_ellipse_cx = 210 in
let *ellipse_rx = 47 in
let *ellipse_ry = 8 in
let *right_line_x2 = 378 in
let *right_line_y2 = 244 in
let *right_twoline2_y = 290 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1,
*right_line_x2, *right_line_y2}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
```

```
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
, line { 0, 0, const *right_line_x2, const *right_line_y2, 343, const
*right_twoline2_y}
, line { 0, 0, const *right_line_x2, const *right_line_y2, 413, const
*right_twoline2_y}}];
```

#### 19. Draw the right ellipse.

```
main =
let *middle_line_x = 300 in
let *middle_line_y1 = 189 in
let *left_line_x2 = 216 in
let *left_line_y2 = 235 in
let *left_twoline2_y = 280 in
let *left_ellipse_cx = 210 in
let *ellipse_rx = 47 in
let *ellipse_ry = 8 in
let *right_line_x2 = 378 in
let *right_line_y2 = 244 in
let *right_twoline2_y = 290 in
[
  ellipse { 0, 211, 306, 378, 100, 18}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*middle_line_x, 363}
, line { 0, 0, const *middle_line_x, const *middle_line_y1, const
*left_line_x2, const *left_line_y2}
, line { 0, 0, const *middle_line_x, const *middle_line_y1,
*right_line_x2, *right_line_y2}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
, line { 0, 0, const *right_line_x2, const *right_line_y2, 343, const
*right_twoline2_y}
, line { 0, 0, const *right_line_x2, const *right_line_y2, 413, const
*right_twoline2_y}, ellipse { 0, 0, 382, 293, 50, 7}];
```



## 20. Refactor

```
main =
  let *middle_line_x = 300 in
  let *middle_line_y1 = 189 in
  let *middle_line_y2 = 363 in
  let *left_line_x2 = 216 in
  let *left_line_y2 = 235 in
  let *left_twoline2_y = 280 in
  let *right_line_x2 = 378 in
  let *right_line_y2 = 244 in
  let *right_twoline2_y = 295 in
  let *left_ellipse_cx = 210 in
  let *right_ellipse_cx = 375 in
  let *ellipse_rx = 47 in
  let *ellipse_ry = 8 in
  [
    ellipse { 0, 211, const *middle_line_x, const *middle_line_y2, 100, 18},
    line { 0, 0, const *middle_line_x, const *middle_line_y1, const
  *middle_line_x, const *middle_line_y2}
    , line { 0, 0, const *middle_line_x, const *middle_line_y1, const
  *left_line_x2, const *left_line_y2}
    , line { 0, 0, const *middle_line_x, const *middle_line_y1, const
```

```

*right_line_x2, const *right_line_y2}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx-*ellipse_rx), const *left_twoline2_y}
, line { 0, 0, const *left_line_x2, const *left_line_y2, const
(*left_ellipse_cx+*ellipse_rx), const *left_twoline2_y}
, ellipse { 0, 0, const *left_ellipse_cx, const *left_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
, line { 0, 0, const *right_line_x2, const *right_line_y2, const
(*right_ellipse_cx-*ellipse_rx), const *right_twoline2_y}
, line { 0, 0, const *right_line_x2, const *right_line_y2, const
(*right_ellipse_cx+*ellipse_rx), const *right_twoline2_y}
, ellipse { 0, 0, const *right_ellipse_cx, const *right_twoline2_y, const
*ellipse_rx, const *ellipse_ry}
];

```

