

```

1 package tellscopeV4;
2
3 public class TeleScopeRefract implements ConstantsInterface {
4
5     //constructor for TellsCalculations object
6     TeleScopeRefract(double focalRatio, double lensDiameter, double eyePieceFocalLength)
7     {
8         this.focalRatio = focalRatio;
9         this.lensDiameter = lensDiameter;
10        this.eyePieceFocalLength = eyePieceFocalLength;
11    }
12
13
14
15
16    //variables to store focal ratio, main lens, eyepiece focal length
17    protected double focalRatio;
18    protected double lensDiameter;
19    protected double eyePieceFocalLength;
20    protected double outerDiameter;
21
22    //variables to store calculated results
23    protected double focalLength;
24    protected double tubeLength;
25    protected double distToSecond;
26    protected double secondarySizeMinor;
27    protected double secondarySizeMajor;
28    protected double minMagnitude;
29    protected double minResolution;
30    protected double maxVisibleMagnification;
31    protected double minVisibleMagnification;
32    protected double eyePieceMagnification;
33
34    //variables to store lens diameter and eyepiece length using different scales
35    protected double lensDiameterCm;
36    protected double lensDiameterMm;
37
38
39
40
41    /*
42     * methods to calculate:
43     * focal length
44     * tube length
45     * distance to secondary
46     * secondary size
47     * minimum magnitude
48     * minimum resolution
49     * magnification limits - 2 methods (calcMaxVisibleMag, calcMinVisibleMag)
50     * eyepiece magnification
51     *
52     */
53
54    //calcFocalLength method
55    public double calcFocalLength()
56    {
57        //calculate focal length equation
58        focalLength = lensDiameter * focalRatio;
59
60        //return the focal length
61        return focalLength;
62    }
63
64    //calcTubeLength method
65    public double calcTubeLength()
66    {
67        //calculate tube length equation
68        tubeLength = lensDiameter * focalRatio;
69
70        //return the tube length
71        return tubeLength;
72    }
73
74
75
76    //calcMinMagnitude method
77    public double calcMinMagnitude()
78    {
79
80        //get lens diameter in cm
81        lensDiameterCm = lensDiameter * 2.54;
82
83        //calculate the minimum magnitude equation
84        //minMagnitude = 7.5 + (5 * lensLog);
85        minMagnitude = 7.5 + (5 * Math.log10(lensDiameterCm));
86
87
88        //return the minimum magnitude
89        return minMagnitude;
90    }
91
92    //calcMinResolution method
93    public double calcMinResolution()
94    {

```

TeleScopeRefract.java

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95         //calculate the minimum resolution equation
96         minResolution = 4.56 / lensDiameter;
97
98         //return the minimum resolution
99         return minResolution;
100     }
101
102
103     //calcMaxVisibleMag method
104     public double calcMaxVisibleMag()
105     {
106         //calculate the maximum visible magnitude equation
107
108         maxVisibleMagnification = lensDiameter * 50;
109
110         //return the maximum visible magnification
111         return maxVisibleMagnification;
112     }
113
114
115     //calcMinVisibleMagnitude method
116     public double calcMinVisibleMag()
117     {
118         //calculate the minimum visible magnitude equation
119         minVisibleMagnification = lensDiameter * 4;
120
121         //return the minimum visible magnification
122         return minVisibleMagnification;
123     }
124
125
126     //calcEyepieceMagnification method
127     public double calcEyepieceMagnification()
128     {
129         //get the lens diameter and length of eyepiece in mm
130         lensDiameterMm = lensDiameterCm * 10;
131
132         //calculate the eyepiece magnification equation
133         eyePieceMagnification = lensDiameterMm / eyePieceFocalLength;
134
135
136         //return the eyepiece magnification
137         return eyePieceMagnification;
138     }
139
140
141 }
142

```