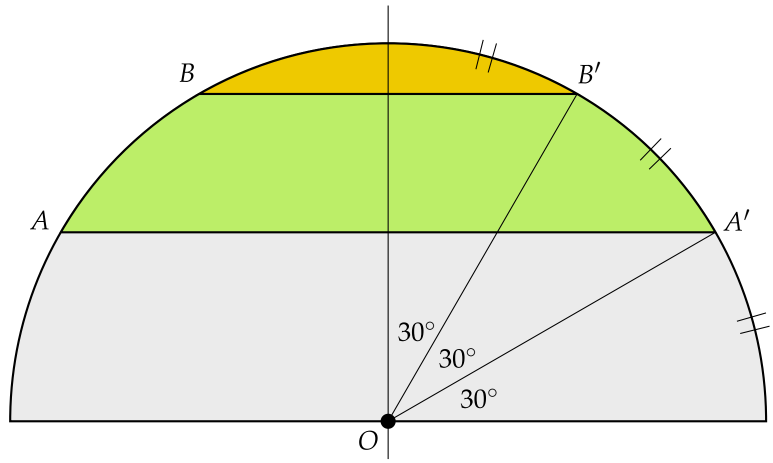


The 'gold' area is given by

$$A = \frac{(\theta - \sin\theta)D^2}{8}$$

where θ is the angle subtended at O by BB', in radians ($\pi/3$) and D is the diameter (12).

$$\begin{aligned} A_{Gold} &= \frac{\left(\frac{\pi}{3} - \sin 60^\circ\right)(24)^2}{8} \\ &= 13.044 \end{aligned}$$

(Yes, I know I'm mixing units here but $\sin 60^\circ = \sin\frac{\pi}{3}$ radians and I like to keep my calculator in degree mode – because I have a habit of forgetting to return to degree mode...)

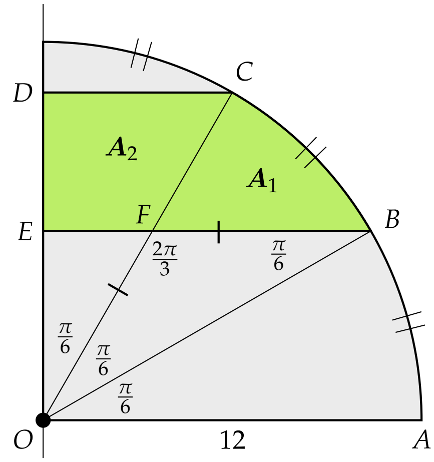
Similarly, the 'gold and green' areas are given by:

$$\begin{aligned} A_{Green+Gold} &= \frac{\left(\frac{2\pi}{3} - \sin 120^\circ\right)(24)^2}{8} \\ &= 88.443 \end{aligned}$$

So, the 'green' area ($AA'B'B$) is simply the difference between the two areas:

$$A_{Green} = 88.443 - 13.044 = 75.399$$

But the original question only wants half of this so the answer is 37.7 units.



$$\boldsymbol{A_1} = \text{Area } OBC - \text{Area } OBF$$
$$\text{Area } OBC = \frac{\pi/6}{2\pi} \cdot \pi(12)^2 = 12\pi$$

For $\triangle OBF$:

$$\begin{aligned}
\frac{BF}{\sin \pi/6} &= \frac{12}{\sin 2\pi/3} \\
\Rightarrow \frac{BF}{1/2} &= \frac{12}{\sqrt{3}/2} \\
\Rightarrow BF &= \frac{12}{\sqrt{3}} \\
OE &= 12\cos \pi/3 = 6 \\
\Rightarrow \text{Area } \triangle OBF &= \frac{1}{2} \cdot \left(\frac{12}{\sqrt{3}}\right) \cdot 6 = \frac{36}{\sqrt{3}}
\end{aligned}$$

Thus:

$$\boldsymbol{A_1} = 12\pi - \frac{36}{\sqrt{3}}$$

Now, for $\boldsymbol{A_2}$

$$\begin{aligned}
OD &= 12\cos \pi/6 = 12 \cdot \frac{\sqrt{3}}{2} = 6\sqrt{3} \\
\Rightarrow DE &= OD - OE = 6\sqrt{3} - 6 \\
CD &= 12\sin \pi/6 = 6 \\
BE &= 12\cos \pi/6 = 6\sqrt{3} \\
\Rightarrow \text{Area } \triangle OCD &= \frac{1}{2} \cdot CD \cdot OD = \frac{1}{2} \cdot 6 \cdot 6\sqrt{3} = 18\sqrt{3} \\
\text{and area } \triangle OEF &= \frac{1}{2} \cdot EF \cdot OE = \frac{1}{2} \cdot \left(6\sqrt{3} - \frac{12}{\sqrt{3}}\right) \cdot 6 \\
&= 18\sqrt{3} - \frac{36}{\sqrt{3}} \\
\Rightarrow \boldsymbol{A_2} &= 18\sqrt{3} - 18\sqrt{3} + \frac{36}{\sqrt{3}} = \frac{36}{\sqrt{3}} \\
\text{Finally, } \boldsymbol{A_1} + \boldsymbol{A_2} &= 12\pi - \frac{36}{\sqrt{3}} + \frac{36}{\sqrt{3}} = \boldsymbol{12\pi}
\end{aligned}$$