where the two possible rays consistent with the equation and their corresponding angles are marked.

This forms two right triangles, and because we know the base of each triangle is $\frac{1}{2}$ (signed length is $\frac{-1}{2}$), we recognize this as a special triangle. The acute angle at the center of the circle of these triangles is $\frac{\pi}{3}$ or $60°$.

It remains to determine the value of the two marked angles.

The smaller one is

$$\pi - \frac{\pi}{3} = \frac{2\pi}{3},$$

and the larger one is

$$\pi + \frac{\pi}{3} = \frac{4\pi}{3}.$$

- **Conclusions**:

  If $2\cos\theta = -1$ and θ is in $[0, 2\pi)$, then $\theta = \frac{2\pi}{3}$ or $\theta = \frac{4\pi}{3}$.

18.3 Problems (6 pt Problems)

1. Given the triangle $\triangle ABC$ with corresponding opposite sides a, b, and c, if B is a right angle and a has length 2 inches and c has length 3 inches, solve the triangle.
2. Evaluate $\tan\left(\frac{\pi}{6}\right)$.
3. Find all solutions to $\sin\theta = -\frac{1}{\sqrt{2}}$ which are in $[0, 2\pi)$.

18.4 Exercises

1. Given the triangle $\triangle ABC$ with corresponding opposite sides a, b, and c, if C is a right angle, a has length 2 inches and A has measure $27°$, solve the triangle by estimating your answer using a special triangle and a calculator. All measurements to the nearest tenth.
2. The law of cosines states that for any triangle $\triangle ABC$ with corresponding opposite sides a, b, and c, you can choose an angle (we'll choose C) and the following is true about the measures (generalizing the case when C is a right angle):

   $$c^2 = a^2 + b^2 - 2ab\cos C.$$

   Use this to solve for c if $a = 3$, $b = 5$, and $\angle C = 42°$.

3. The law of sines states that for any triangle $\triangle ABC$ with corresponding opposite sides a, b, and c (associating the label with its measure):

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}.$$

   Use this to solve the triangle with $A = 92°$, $a = 20$ and $c = 15$.

4. Convert $80°$ to radians.

5. Convert $\frac{-3\pi}{10}$ radians to degrees.

6. Evaluate $\cos\left(\frac{7\pi}{6}\right)$.

7. Evaluate $\tan\left(\frac{8\pi}{3}\right)$.

8. Evaluate $\sin\left(\frac{-27\pi}{4}\right)$.

9. If $\sin\theta > 0$ and $\tan\theta = -2$, find all of the remaining trigonometric expressions relative to θ.

10. Find all solutions to $\tan\theta = -\frac{1}{\sqrt{2}}$ which are in $[0, 2\pi)$.

11. Suppose you have a 10 foot ladder. How far does the base need to be away from the wall so that the angle the ladder makes with the ground is $75.5°$?

12. If you are standing 100 feet away from a building and the angle of elevation is $40°$, how high is the building? (First estimate your answer using special triangles).

13. Use any resource to name three places where trigonometry shows up in applications.