Single Pure – Trigonometric Equations

Patrons are reminded that drawing the relevant graph is a good idea and that $\tan\theta \equiv \dfrac{\sin\theta}{\cos\theta}$. Also, $(\cos \text{something})^2$ is written as $\cos^2 \text{something}$.

Give all answers as either exact or to 1 decimal place.

1. Solve $\sin\theta = \frac{1}{2}$ for $0° < \theta < 720°$. — $\theta = 30°$ or $\theta = 150°$ or $\theta = 390°$ or $\theta = 510°$
2. Solve $\cos\theta = \frac{\sqrt{3}}{2}$ for $-360° < \theta < 360°$. — $\theta = \pm 30°$ or $\theta = \pm 330°$
3. Solve $\sin\theta = \frac{1}{\sqrt{2}}$ for $-360° < \theta < 360°$. — $\theta = -315°$ or $\theta = -225°$ or $\theta = 45°$ or $\theta = 135°$
4. Solve $\tan\theta = \frac{1}{\sqrt{3}}$ for $0° < \theta < 360°$. — $\theta = 30°$ or $\theta = 210°$
5. Solve $2\sin\theta + 1 = 0$ for $0° < \theta < 720°$. — $\theta = 210°$ or $\theta = 330°$ or $\theta = 570°$ or $\theta = 690°$
6. Solve $\cos^2\theta = 1$ for $0° < \theta < 720°$. — $\theta = 180°$ or $\theta = 360°$ or $\theta = 540°$
7. Solve $\sin^2\theta - 3 = 1$ for $-360° < \theta < 360°$. — no solutions
8. Solve $\sin\theta = \frac{2}{3}$ for $0° < \theta < 360°$. — $\theta = 41.8°$ or $\theta = 138.2°$
9. Solve $2\tan\theta + 1 = 6$ for $-360° < \theta < 360°$. — $\theta = -291.8°$ or $\theta = -111.8°$ or $\theta = 68.2°$ or $\theta = 248.2°$
10. Solve $3\sin\theta + 1 = 0$ for $0° < \theta < 360°$. — $\theta = 199.5°$ or $\theta = 340.5°$
11. Solve $3\sin\theta = 5\cos\theta$ for $0° < \theta < 720°$. — $\theta = 59.0°$ or $\theta = 239.0°$ or $\theta = 419.0°$ or $\theta = 599.0°$
12. Solve $5\cos^2\theta = 1$ for $-360° < \theta < 0°$. — $\theta = -296.6°$ or $\theta = -243.4°$ or $\theta = -116.6°$ or $\theta = -63.4°$