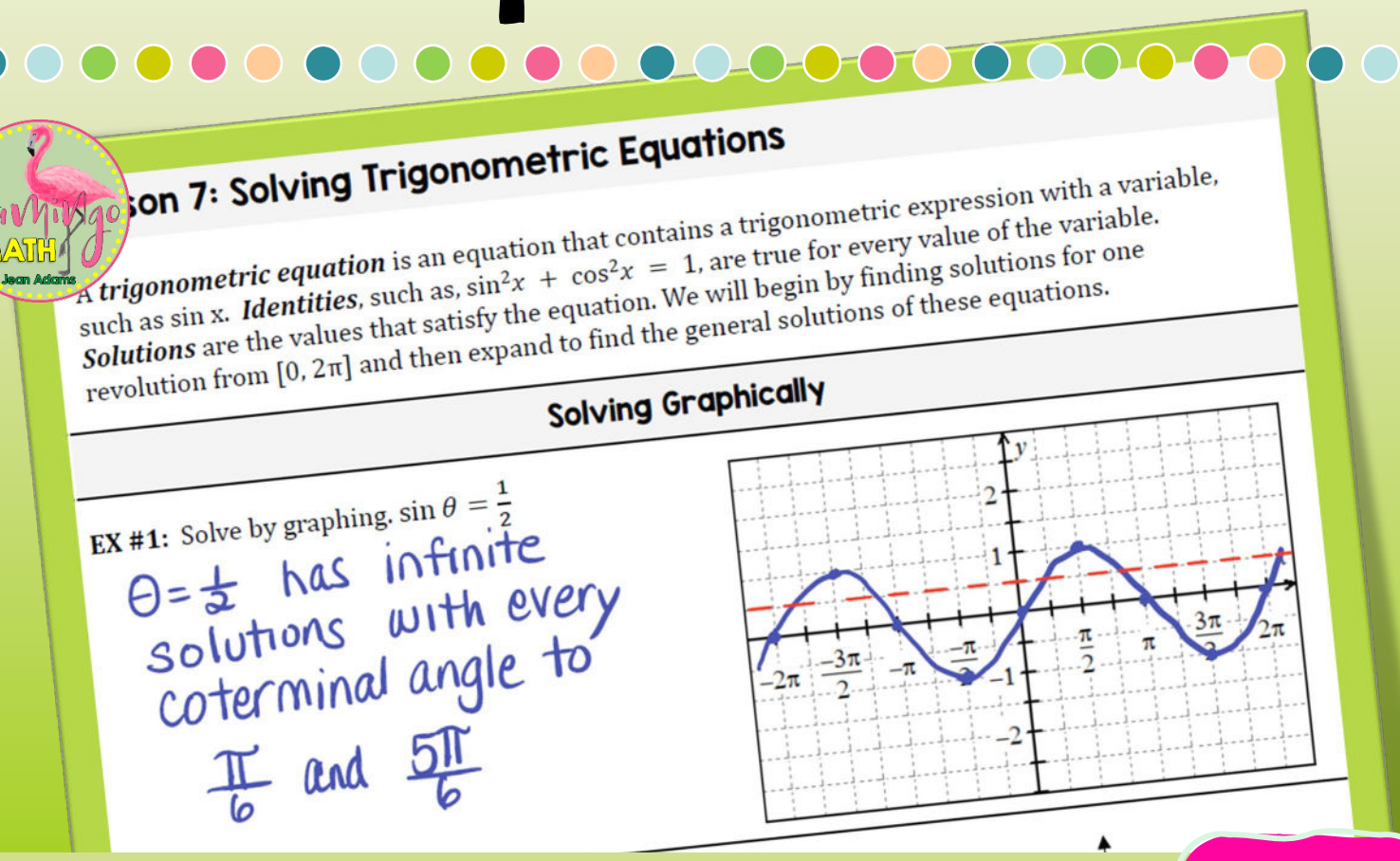
Precalculus Honors

Solving Trigonometric Equations



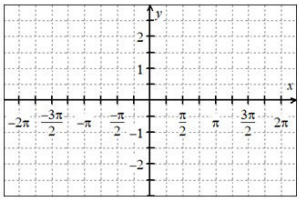
Completely Editable 5.7

Lesson 7: Solving Trigonometric Equations

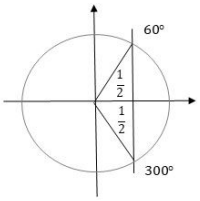
A ***trigonometric equation*** is an equation that contains a trigonometric expression with a variable, such as sin x. ***Identities***, such as, $\sin^2 x + \cos^2 x = 1$, are true for every value of the variable. ***Solutions*** are the values that satisfy the equation. We will begin by finding solutions for one revolution from [0, 2π] and then expand to find the general solutions of these equations.

Solving Graphically

EX #1: Solve by graphing. $\sin\theta = \frac{1}{2}$



EX #2: Solve. $2\cos x - 1 = 0$



Collecting Like Terms

EX #3: Solve. $\sin x + \sqrt{2} = -\sin x$

EX #4: Solve. $18\cos x - 7 = 14\cos x - 5$

Various Techniques

EX #5: Solve. $4\sin^2 x - 1 = 0$

EX #6: Solve. $3\tan^2 x - 1 = 0$

EX #7: Solve. $2\sin x\cos x - \sin x = 0$

Equations in Quadratic Form and Identities

EX # 8: Solve. $\cot\theta\cos^2\theta = 2\cot\theta$

EX #9: Solve. $2\sin^2 x = 2 + \cos x$

Solve Quadratics by Factoring

EX #10: Solve. $2\sin^2 x - \sin x - 1 = 0$

EX #11: Solve. $6\cos^2 x - \cos x - 2 = 0$

Multiple Angles

EX #12: Solve on $0 \le x \le 360°$ $\tan 2x = \sqrt{3}$

EX #13: Solve on [0, 2π]. $\sin\frac{x}{3} = \frac{1}{2}$

NOTES

5.7 **Solving Trigonometric Equations Homework**

Name _____

Date _____ Period _____

Problems 1 – 8, Solve each equation on the interval $0 \le \theta \le 2\pi$.

1. $1 - \cos\theta = \frac{1}{2}$
2. $4\cos^2\theta = 1$
3. $4\sin^2\theta - 3 = 0$
4. $\sqrt{3}\cot\theta + 1 = 0$
5. $\cos(2\theta) = -\frac{1}{2}$
6. $\tan\frac{\theta}{2} = \sqrt{3}$
7. $\cos\left(2\theta - \frac{\pi}{2}\right) = -1$
8. $\sin\left(3\theta + \frac{\pi}{6}\right) = 1$

Problems 9 – 12, Solve each equation. Give a general formula for all the solutions.

9. $\sin(2\theta) = -\frac{1}{2}$
10. $\cos\theta = -\frac{\sqrt{3}}{2}$
11. $\tan\frac{\theta}{2} = -1$
12. $\sin\frac{\theta}{2} = \frac{\sqrt{3}}{2}$

Problems 13 – 16, Use a graphing utility to solve each equation. Round answers to two decimal places.

13. $x + 5\cos x = 0$
14. $x^2 + 3\sin x = 0$
15. $\sin x - \cos x = x$
16. $x^2 = x + 3\cos(2x)$

Problems 17 – 24, Solve each equation on the interval $0 \le \theta \le 2\pi$.

17. $2\sin^2\theta - \sin\theta - 1 = 0$
18. $2\cos^2\theta + \cos\theta = 0$
19. $(\tan\theta - 1)(\sec\theta - 1) = 0$
20. $\cos\theta + \sin\theta = 0$
21. $\sin\theta = \csc\theta$
22. $\tan\theta = \cot\theta$
23. $\cos^2\theta + \sin\theta = 2$
24. $\cos(2\theta) + 3 = 5\cos\theta$
25. $2\cos^2\theta - 7\cos\theta - 4 = 0$
26. $\tan^2\theta = \frac{3}{2}\sec\theta$

Practice Sets

Lesson Warm-Ups

Name Date Period

3. Find the general solution.

$\sin(\theta) = \frac{\sqrt{2}}{2}$

Name _____ Date _____ Period _____

Lesson 5.7: Solving Trigonometric Equations **Warm-Up # 2**

1. Solve on $[0,2\pi]$:

$2\cos(\theta) + 1 = 0$

2. Solve on $[0,2\pi]$:

$3\tan^2(\theta) - 9 = 0$

3. Find the general solution.

$\cos(\theta) = \frac{\sqrt{3}}{2}$

Daily Lesson Quiz

5.7. Solving Trig Equations **Form A**

Name _____

Date _____ Period _____

1. Solve on $[0,2\pi]$ $2\sin\theta + 1 = 0$

2. Solve on $[0,2\pi]$ $\tan^2\theta = \frac{1}{3}$

3. Find the general solution $\sin\theta = \frac{\sqrt{3}}{2}$

Grade:

5.7. Solving Trig Equations **Form B**

Name _____

Date _____ Period _____

1. Solve on $[0,2\pi]$ $2\cos\theta - 1 = 0$

2. Solve on $[0,2\pi]$ $\tan^2\theta = 3$

3. Find the general solution $\cos\theta = \frac{\sqrt{2}}{2}$

Grade: