SEND - IN ASSIGNMENT

UNIT 6

TRIGONOMETRIC EQUATIONS & IDENTITIES

Name: _____

Teacher:_____

If you are cross enrolled, state your other school besides DESK.

_____

Date that you submitted this assignment:

_____

- Show all work if you want full marks for the questions ☺

Total $\frac{\_\_\_\_\_}{77}$ **=** **_____%**

- **The last page in this assignment is A SUMMARY OF BASIC IDENTITIES AND FORMULAE**
- When submitting the assignment, you do not need to include the formulae page.

All answers rounded to 2 decimal places unless otherwise stated.
Show all work where possible.

1. Within the domain $0 \leq x < 2\pi$, how many solutions are there for the following equations.

   a) $\cos 4x = 0.38$

   a) _____
   1 mark

   b) $\sin \frac{4}{3}x = -0.35$

   b) _____
   1 mark

   c) $\tan \frac{1}{2}x = 5$

   c) _____
   1 mark

2. For the equation $\sin 2x = 0.62$

   a) solve for x, where $0 \leq x < 2\pi$

   a) _____
   2 marks

   b) determine the general solution.

   b) _____
   2 marks

3. For the equation $3\cos x = 0.65x$, sketch the graph and determine all solutions for x.

   3) _____
   3 marks

4. Solve the following equations **algebraically**, where $0° \leq x < 360°$. Sketch a graph to indicate which quadrant(s) you would find your solution(s).

Give answers as exact solutions.

a) $\sqrt{3}\tan x + 1 = 0$

a) _____

2 marks

b) $\sqrt{3}\sec x = -2$

b) _____

2 marks

c) $3\cos x = \cos x - 1$

c) _____

2 marks

5. Solve the following equations **algebraically**, where $0 \leq x < 2\pi$. Sketch a graph.
Give answers as exact solutions.

a) $\cos 2x = \frac{-\sqrt{3}}{2}$

a) _____
3 marks

b) $csc^2x + cscx - 2 = 0$

b) _____
3 marks

c) $\sin x \tan 2x = \sin x$

c) _____
3 marks

d) $2\cos^2 x + 3\sin x - 3 = 0$ (Hint: Pythagorean Identity)

d) _____

3 marks

e) $4\cos^2 x = 3$

e) _____

3 marks

f) $\csc\frac{x}{2} = -\frac{2}{\sqrt{3}}$

f) _____

3 marks

6. Simplify using the sum and difference identities.

a) $\cos\left(\frac{3\pi}{2} - x\right)$

a) _____

2 marks

b) If tan x is 2, simplify $\tan\left(\frac{\pi}{3} - x\right)$. Answer in exact value and rationalize the denominator.

b) _____

3 marks

c) $\sin\left(\frac{\pi}{3} - x\right) - \cos\left(\frac{\pi}{6} + x\right)$

c) _____

3 marks

d) $\cos 3x \cos 5x - \sin 3x \sin 5x$

d) _____

2 marks

e) Find the exact value of $\sin\left(\frac{11\pi}{12}\right)$ Hint: use sum identity

e) _____

3 marks

f) Given that $\sin A = \frac{12}{13}$ is in quadrant 2, and $\sec B = \frac{5}{4}$ is in quadrant 4, what is the value of cos (A + B)?

f) _____

3 marks

7. Write the following as a single trigonometric function.

a) $10 \sin 4x \cos 4x$

a) _____

2 marks

c) $4 - 8cos^2 6x$

b) _____

2 marks

c) $\frac{4\tan 3x}{1-tan^2 3x}$

c) _____

2 marks

8. If $\cos\theta = -\frac{15}{17}$ and θ is in Quadrant II. Evaluate $\tan 2\theta$.

8. _____

3 marks

9. Prove the following identities.

a) $\frac{csc^2\theta - 1}{csc^2\theta} = cos^2\theta$

3 marks

b) $\frac{1}{1-\cos\theta} + \frac{1}{1+\cos\theta} = 2csc^2\theta$

3 marks

c) $\frac{1}{\sec\theta \tan\theta} = \csc\theta - \sin\theta$

3 marks

d) $\frac{\sin\theta+\cos\theta\cot\theta}{\cos\theta\csc\theta}=\sec\theta$

3 marks

e) $\frac{sin^2\theta-\tan\theta}{cos^2\theta-\cot\theta}=tan^2\theta$

3 marks

f) $\cot x - \tan x = \frac{4\,cos^2 x - 2}{\sin 2x}$

3 marks

A SUMMARY OF BASIC IDENTITIES AND FORMULAE

Pythagorean Identities:

$$\sin^2\theta + \cos^2\theta = 1 \qquad 1 + \tan^2\theta = \sec^2\theta \qquad 1 + \cot^2\theta = \csc^2\theta$$

Reciprocal and Quotient Identities:

$$\sec\theta = \frac{1}{\cos\theta} \qquad \csc\theta = \frac{1}{\sin\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta} \qquad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

Addition Identities:

$$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta \qquad \sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$
$$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$

$$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} \qquad \tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

Double Angle Identities:

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$
$$= 2\cos^2\theta - 1$$
$$= 1 - 2\sin^2\theta$$

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$$