NCEA Math Lesson Plan

Grade: 9-12 **Subject:** Algebra 2/Trigonometry

Domain:
Functions

Topic:
Functions and relations–graphing and analyzing

Standard Number(s) and Description:
F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

Vocabulary to be Highlighted:
Function, relation, domain, range, intersect, transformation, logarithm, circle, center, radius, axis, asymptote, quadrants

Mathematical Practices (#):
1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

Essential Question:
Can students graph and analyze functions?

Materials/Tools (include technology):
Graph paper
Graphing calculators
Colored pencils
Compasses
Rulers

Connections to Other Math Domains:

Connections to Other Subject Areas:
Religion
Art
History

Catholic Identity Component:
Students will learn about the significance of stained glass windows in Catholic Church history.

Resources (attachments):
YouTube video on the reason for stained glass in churches:
https://www.youtube.com/watch?v=i2kYfuOuKXI

Worksheet with instructions for graphing activity (below)

Answer key for teacher's reference (below)

Activities/Timeline:
Entry activity: Show the video and discuss the reasons that many churches have stained glass windows.

Activity:
1. Pass out the graph paper, worksheets, colored pencils, and compasses.
2. Have the students break up into pairs.
3. Have the students graph the given equations and answer the questions.

Individual Assignment: Complete the assignment with precision.

Differentiation/Modification:
Answer the questions as a whole class. Students could create their own graphs.

Formative Assessment (what to look for, how/when to look):

Summative Assessment:
Check for understanding and accuracy as the students are working. Formally assess the finished product. Include similar questions on graphing in a test.

Handout

A) Graph the following:

1. $x^2 + y^2 = 36$

2. $f(x) = \frac{5}{x}$

3. $f(x) = \frac{-2}{3} x$

4. $(x - 5)^2 + (y - 7)^2 = 4$

5. $(x - 5)^2 + (y + 7)^2 = 4$

6. $(x + 5)^2 + (y - 7)^2 = 4$

7. $(x + 5)^2 + (y + 7)^2 = 4$

8. $f(x) = -12$

9. $f(x) = 12$

10. $x = 18$

11. $x = -18$

12. $y = \log(x - 2)$

13. $y = 10^{x+2} - 1$

14. $f(x) = \frac{2}{3} x$

B) Color the picture created from the domain $-18 \leq x \leq 18$ and the range $-12 \leq y \leq 12$.

C) Answer the following questions:

1. What are the intercepts of equation #1?
2. What are the asymptotes of equations #2?
3. Use your graphing calculator to determine the points of intersection of equation # 2 and equation #14.
4. What is the domain and range of equation #12?
5. Describe a transformation from equation #4 to equation #5.
6. Classify each of the above equations.

Answer Key