The Final Exam consists of **22 multiple-choice questions** and **10 long-answer and graphing** problems. **Multiple-choice** problems can be done in a few steps. Some examples are:

1. Find the exact value in radians: \( \sin^{-1} \left( \frac{1}{2} \right) \)

2. If \( \sin \theta > 0 \) and \( \tan \theta < 0 \), in what quadrant does \( \theta \) terminate?

3. Determine the period (or domain, range, amplitude, phase shift) of the function \( y = -4 \sin(3x + \pi) \)

Other examples could include questions on fundamental identities, the unit circle, triangle notation, vector notation

For the **long-answer and graphing** problems, work must be shown and complete solutions given. Some examples are:

1. Sketch the graph of the function \( y = 3 \cos 2x \) over a two-period interval. Identify the domain, range, amplitude, period, and phase shift. Identify any maximum/minimum point(s) and x-intercept(s).

2. Find all exact real solutions, in radians: \( \sin 4x + 2 = 3 \)

3. Verify the identity: \( \tan x + \cot x = \sec x \csc x \)

In general, expect

- 2 - 3 graphs: 1 sine, 1 cosine, 1 other
- 1 - 2 identities to verify
- 1 - 2 trig equations to solve
- 1 - 2 Right triangle applications
- 1 Law of Sines/Law of Cosines application
- 1 - 2 Vector questions

The final exam will cover the sections from the eBook which are listed. A sampling of exercises from the chapter reviews and chapter tests is included for practice. (In our EWA course, choose eBook, then Chapter 1 (or 2 or 3). The Review Exercises and Chapter Test are listed there. Answers can be found starting on p. A-25 in the eBook.)

**Chapter 1: Trigonometry - Sections 1.1 – 1.8**

*Important:*

- Know how to find co-terminal angles; convert from radians to degrees and back; arc length; definitions of Trig functions
- Know the unit circle
- Be able to graph Trig functions and transformations without a calculator
- Given the graph, be able to write the equation for a Trig function
- Know the domains and ranges for \( \sin(x) = \sin^{-1}(x), \cos(x) = \cos^{-1}(x), \tan(x) = \tan^{-1}(x) \)
- Know how to solve applications involving right triangles

p. 202 – Chapter 1 Review
1, 9, 15, 19, 23, 27, 33, 39, 43, 49, 53, 56, 63, 67, 71, 77, 78, 87, 91, 93, 95, 97, 98

p. 205 – Chapter 1 Test
1, 4 – 13, 16, 17

**Chapter 2: Analytic Trigonometry - Sections 2.1 – 2.5**

*Important:*

- Know the identities: Fundamental (p. 210), Sum & Difference (p. 236)
- Be able to use the identities (provided): Double-Angle, Power-Reducing, Half-Angle, Product-to-Sum, Sum-to-Product
- Use identities listed to simplify expressions, evaluate expressions, verify identities, and solve equations, both all solutions and solutions in \( [0,2\pi] \).

p. 253 – Chapter 2 Review
7, 10, 13, 17, 20, 23, 27, 33, 34, 38, 41, 43, 49, 51, 53, 57, 62, 63, 70, 72, 75, 77, 81, 82

p. 255 – Chapter 2 Test
1 – 4, 7 – 10, 14 – 20, 23, 24

**Chapter 3: Additional Topics in Trigonometry - Sections 3.1 – 3.3**

*Important:*

- Know the equations for the Law of Sines (p. 262) and Law of Cosines (p. 271); use them to solve oblique triangles
- Know vector notation, component form, linear combination of \( i \) and \( j \)
- Be able to perform operations with vectors; find resultant, magnitude and direction angle

p. 302 – Chapter 3 Review
1 – 19 odd, 21 – 37 odd, 38, 39, 43 – 75 odd, 107, 108

p. 306 – Chapter 3 Test
1 - 16
Here are some “sample” multiple-choice questions, along with the review sheet reference problem in ( ).

1. (Ch 1 Review, #1) Name a positive angle and a negative angle that are coterminal with \( \theta = \frac{13\pi}{5} \)

A) \( \frac{3\pi}{5}, \frac{-7\pi}{5} \)  B) \( \frac{23\pi}{5}, \frac{-14\pi}{5} \)  C) \( \frac{\pi}{5}, \frac{-17\pi}{5} \)  D) All of these

2. (Ch 1 Review, #27) Determine the exact value of \( \cos \left( \frac{11\pi}{4} \right) \)

A) \( -\frac{\sqrt{2}}{2} \)  B) \( \frac{\sqrt{2}}{2} \)  C) \( \frac{\sqrt{2}}{2} \)  D) \( -\frac{\sqrt{2}}{2} \)

3. (Ch 1 Review, #49) Given that \( \sin \alpha = -\frac{5}{13} \) and \( \alpha \)’s terminal side is in quadrant III, determine the exact value of \( \cos \alpha \).

A) \( \frac{12}{13} \)  B) \( \frac{8}{13} \)  C) \( -\frac{12}{13} \)  D) \( -\frac{8}{13} \)

4. (Ch 1 Review, #87) Find the exact value of \( \tan \left( \sin^{-1} \frac{4}{5} \right) \)

A) \( \frac{3}{4} \)  B) \( \frac{4}{3} \)  C) \( \frac{3}{5} \)  D) \( \frac{5}{3} \)

5. (Ch 1 Review, #12) Which of the following is the equation of the sine graph with amplitude 2 and period \( \pi \)?

A) \( y = 2\sin(x - \pi) \)  B) \( y = \frac{1}{2}\sin(4x) \)  C) \( y = 2\sin(\pi x) \)  D) \( y = 2\sin(2x) \)

6. (Ch 2 Review, #51) Find the exact value of \( \cos \left( \frac{11\pi}{16} \right) \cos \left( \frac{7\pi}{16} \right) + \sin \left( \frac{11\pi}{16} \right) \sin \left( \frac{7\pi}{16} \right) \)

A) \( \frac{\sqrt{3}}{2} \)  B) \( \frac{1}{2} \)  C) \( \frac{\sqrt{2}}{2} \)  D) \( 1 \)

7. (Ch 3 Review, #71) Find the magnitude of vector \( \mathbf{v} = \langle -3, 4, 7 \rangle \)

A) 25  B) 5  C) 1  D) 7

Answers: 1-A, 2-D, 3-C, 4-B, 5-D, 6-C, 7-B