

Goal: Add and subtract expressions involving fractions

1. $\frac{5}{21x} + \frac{w}{24x^4}$

State the ANSWER in EXACT RADIANS

2. $\frac{5x}{21x+42} - \frac{x-7}{24x+48}$

State the ANSWER in EXACT RADIANS

3. $\frac{2x}{3x^2-12x-15} + \frac{x-2}{3x^2-75}$

State the ANSWER in EXACT RADIANS

4. $\frac{\pi}{2} - \frac{3\pi}{16}$

State the ANSWER in EXACT RADIANS

5. $\pi - \frac{3\pi}{16}$

State the ANSWER in EXACT RADIANS

6. $2\pi - \frac{3\pi}{16}$

State the ANSWER in EXACT RADIANS

7. $\frac{7\pi}{15} - 2\pi$

8. $\pi - \frac{7\pi}{5}$

9. $\frac{31\pi}{16} - 2\pi$

Goal: Multiply and divide expressions involving fractions

10. $\frac{20w^5}{57x} \div \frac{95w}{12x^4}$

11. $\frac{28x-140}{21x+42} \div \frac{14x-70}{24x+48}$

12. $\frac{2x^2-4x}{3x^2-12x-15} \div \frac{5x-10}{3x^2-75}$

13. $\frac{5x^2-80}{6x^2+12x-48} \cdot \frac{24x^2-24x-144}{18x^2-144x+288}$

14. $\frac{15x-45}{21x+42} \cdot \frac{6x^2-18x}{50x^5+100x^4}$

15. $\frac{x+7}{x-1} \cdot \frac{5x^2+5x}{x^2-2x-63} \div \frac{6x+42}{5x^2-405}$

Goal: Graphing Rational Functions: State the parts of each of the rational functions and sketch and label related graphs

$y = \frac{5x+10}{2x-4}$

1. Y intercept
2. X intercept(s)
3. Vertical asymptote(s)
4. Horizontal asymptote
5. Slant Asymptote if possible
6. Hole if possible

$y = \frac{x^2+10x-24}{x^2+4x-12}$

7. Y intercept
8. X intercept(s)
9. Vertical asymptote(s)
10. Horizontal asymptote
11. Slant Asymptote if possible
12. Hole if possible

$y = \frac{5x^2+20x+20}{x-4}$

13. Y intercept
14. X intercept(s)
15. Vertical asymptote(s)
16. Horizontal asymptote
17. Slant Asymptote if possible
18. Hole if possible

$y = \frac{x+4}{x^2+4x-24}$

19. Y intercept
20. X intercept(s)
21. Vertical asymptote(s)
22. Horizontal asymptote
23. Slant Asymptote if possible
24. Hole if possible

Goal: Determine the coterminal angles related to a given angle in degrees or radians

IF YOU ARE GIVEN RADIANS YOU ARE EXPECTED TO ANSWER IN RADIANS

100000°

25. Smallest Positive Coterminal Angle
26. Negative Coterminal Angle closest to 0
27. ALL coterminal angles

-52000°

28. Smallest Positive Coterminal Angle
29. Negative Coterminal Angle closest to 0
30. ALL coterminal angles

$\frac{7254\pi}{18}$

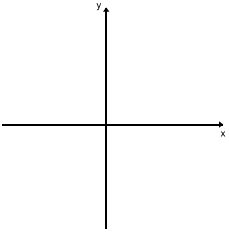
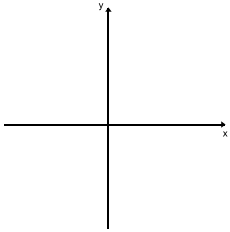
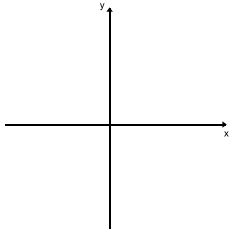
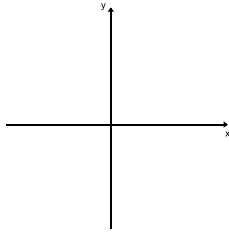
31. Smallest Positive Coterminal Angle
32. Negative Coterminal Angle closest to 0
33. ALL coterminal angles

$\frac{-4572\pi}{20}$

34. Smallest Positive Coterminal Angle
35. Negative Coterminal Angle closest to 0
36. ALL coterminal angles

Goal: Sketch angles and determine the number of rotations

18750°	-9453°	$\frac{754\pi}{15}$	$\frac{-457\pi}{23}$
37. Number of Rotations	39. Number of Rotations	41. Number of Rotations	43. Number of Rotations
38. Sketch	40. Sketch	42. Sketch	44. Sketch

Goal: Determine the exact and the approximate measure of the reference angle and the angle formed by a point in the coordinate plane and the x axis.

A (-7, 24)					B (0,6)					C (5,-7)				
45. Classify the LARGEST related angle					46. Classify the LARGEST related angle					47. Classify the LARGEST related angle				
Q1	Q2	Q3	Q4	On axes	Q1	Q2	Q3	Q4	On axes	Q1	Q2	Q3	Q4	On axes
48. Exact reference angle		51. Approximate reference angle			54. Exact reference angle		57. Approximate reference angle			60. Exact reference angle		63. Approximate reference angle		
49. Exact angle stated with a positive angle		52. Approximate angle stated with a positive angle			55. Exact angle stated with a positive angle		58. Approximate angle stated with a positive angle			61. Exact angle stated with a positive angle		64. Approximate angle stated with a positive angle		
50. Negative Coterminal angle closest to 0		53. All Coterminal Angles (must state the variable restriction)			56. Negative Coterminal angle closest to 0		59. All Coterminal Angles (must state the variable restriction)			62. Negative Coterminal angle closest to 0		65. All Coterminal Angles (must state the variable restriction)		

D (-8, -6)					E (-6,0)					F (0,-7)				
66. Classify the LARGEST related angle					67. Classify the LARGEST related angle					68. Classify the LARGEST related angle				
Q1	Q2	Q3	Q4	On axes	Q1	Q2	Q3	Q4	On axes	Q1	Q2	Q3	Q4	On axes
69. Exact reference angle		72. Approximate reference angle			75. Exact reference angle		78. Approximate reference angle			81. Exact reference angle		84. Approximate reference angle		
70. Exact angle stated with a positive angle		73. Approximate angle stated with a positive angle			76. Exact angle stated with a positive angle		79. Approximate angle stated with a positive angle			82. Exact angle stated with a positive angle		85. Approximate angle stated with a positive angle		
71. Negative Coterminal angle closest to 0		74. All Coterminal Angles (must state the variable restriction)			77. Negative Coterminal angle closest to 0		80. All Coterminal Angles (must state the variable restriction)			83. Negative Coterminal angle closest to 0		86. All Coterminal Angles (must state the variable restriction)		

Goal: Determine the exact measure of the SPECIAL reference angle and the SPECIAL angle formed by a point in the coordinate plane and the x axis.

$$G\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)$$

87. Circle the most appropriate
30/60/90 45/45/90 Quadrantal angle

90. Classify the LARGEST related angle by quadrant or presence on axes

Q1	Q2	Q3	Q4	On axes
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93. Circle the angle that is related to given point

30°	120°	210°	300°	0°
45°	135°	225°	315°	90°
60°	150°	240°	330°	180°
				270°

96. Circle the angle that is related to given point in radians

$\frac{\pi}{6}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\frac{5\pi}{3}$	0
$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{7\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{3}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{11\pi}{6}$	$\frac{3\pi}{2}$

$$H\left(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$$

88. Circle the most appropriate
30/60/90 45/45/90 Quadrantal angle

91. Classify the LARGEST related angle by quadrant or presence on axes

Q1	Q2	Q3	Q4	On axes
----	----	----	----	---------

94. Circle the angle that is related to given point

30°	120°	210°	300°	0°
45°	135°	225°	315°	90°
60°	150°	240°	330°	180°
				270°

97. Circle the angle that is related to given point in radians

$\frac{\pi}{6}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\frac{5\pi}{3}$	0
$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{7\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{3}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{11\pi}{6}$	$\frac{3\pi}{2}$

$$I(0, -1)$$

89. Circle the most appropriate
30/60/90 45/45/90 Quadrantal angle

92. Classify the LARGEST related angle by quadrant or presence on axes

Q1	Q2	Q3	Q4	On axes
----	----	----	----	---------

95. Circle the angle that is related to given point

30°	120°	210°	300°	0°
45°	135°	225°	315°	90°
60°	150°	240°	330°	180°
				270°

98. Circle the angle that is related to given point in radians

$\frac{\pi}{6}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\frac{5\pi}{3}$	0
$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{7\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{3}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{11\pi}{6}$	$\frac{3\pi}{2}$

$$J\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$$

99. Circle the most appropriate
30/60/90 45/45/90 Quadrantal angle

102. Classify the LARGEST related angle by quadrant or presence on axes

Q1	Q2	Q3	Q4	On axes
----	----	----	----	---------

105. Circle the angle that is related to given point

30°	120°	210°	300°	0°
45°	135°	225°	315°	90°
60°	150°	240°	330°	180°
				270°

108. Circle the angle that is related to given point in radians

$\frac{\pi}{6}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\frac{5\pi}{3}$	0
$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{7\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{3}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{11\pi}{6}$	$\frac{3\pi}{2}$

$$K\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$$

100. Circle the most appropriate
30/60/90 45/45/90 Quadrantal angle

103. Classify the LARGEST related angle by quadrant or presence on axes

Q1	Q2	Q3	Q4	On axes
----	----	----	----	---------

106. Circle the angle that is related to given point

30°	120°	210°	300°	0°
45°	135°	225°	315°	90°
60°	150°	240°	330°	180°
				270°

109. Circle the angle that is related to given point in radians

$\frac{\pi}{6}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\frac{5\pi}{3}$	0
$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{7\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{3}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{11\pi}{6}$	$\frac{3\pi}{2}$

$$L(1, 0)$$

101. Circle the most appropriate
30/60/90 45/45/90 Quadrantal angle

104. Classify the LARGEST related angle by quadrant or presence on axes

Q1	Q2	Q3	Q4	On axes
----	----	----	----	---------

107. Circle the angle that is related to given point

30°	120°	210°	300°	0°
45°	135°	225°	315°	90°
60°	150°	240°	330°	180°
				270°

110. Circle the angle that is related to given point in radians

$\frac{\pi}{6}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	$\frac{5\pi}{3}$	0
$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{7\pi}{4}$	$\frac{\pi}{2}$
$\frac{\pi}{3}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{11\pi}{6}$	$\frac{3\pi}{2}$

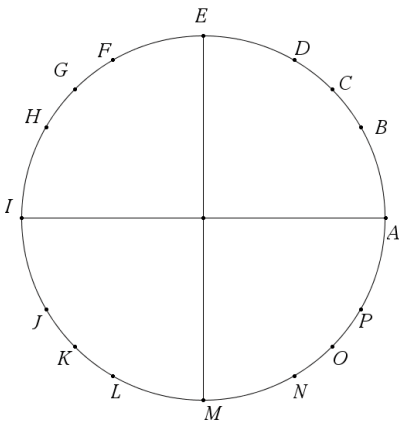
Goal: Know all of trigonometric ratios related to SPECIAL angle measurements

136. Complete Table

Degree	0°	30°	45°	60°	90°	120°	135°	150°	180°
Exact Radian									
Sin									
Cos									
Tan									
Degree	180°	210°	225°	240°	270°	300°	315°	330°	360°
Exact Radian									
Sin									
Cos									
Tan									

Goal: Be able to determine all of the points on the unit circle

137. Complete the table with the exact fraction coordinates related to the SPECIAL angles related to the UNIT CIRCLE



A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P				

Level Two Questions about rational function's graphs: Things that make you think!

Assume m, n, p are positive integers

$$\text{You are given } y = \frac{x-n}{x^2-m}$$

138. Give an example of n and m that would create a hole in your rational function's graph
139. Give an example of n and m that DO NOT create a hole in your rational function's graph, but still have vertical asymptotes that are integers
140. Explain why $y = \frac{x-n}{x^2-m}$ has a horizontal asymptote of 0, regardless of the value of n or m
141. Give a value of n and m that guarantee that there is NO x intercept

$$\text{You are given } y = \frac{x^2-nx}{x^2-mx+p}$$

142. Give an example of $n, m,$ and p that would create a hole in your rational function's graph
143. Give an example of $n, m,$ and p that DO NOT create a hole in your rational function's graph, but still have vertical asymptotes that are integers
144. Explain why $y = \frac{x^2-nx}{x^2-mx+p}$ has a horizontal asymptote of 1, regardless of the value of n, m, p
145. Explain why this rational function's graph must pass through the origin

$$\text{You are given } y = \frac{nx^2-n}{mx^2+px}$$

146. Give an example of $n, m,$ and p that would create a hole in your rational function's graph
147. Give an example of $n, m,$ and p that DO NOT create a hole in your rational function's graph, but still have vertical asymptotes that are integers
148. Explain why $y = \frac{nx^2-n}{mx^2+px}$ has a horizontal asymptote of $y = \frac{n}{m}$, regardless of the value of n, m, p
149. Explain why this rational function's graph WILL NOT pass through the origin

$$\text{You are given } y = \frac{nx^2+n}{mx^2+px}$$

150. Give an example of $n, m,$ and p that would create a hole in your rational function's graph
151. Give an example of $n, m,$ and p that DO NOT create a hole in your rational function's graph, but still have vertical asymptotes that are integers
152. Explain why $y = \frac{nx^2+n}{mx^2+px}$ has a horizontal asymptote of $y = \frac{n}{m}$, regardless of the value of n, m, p
153. Explain why this rational function's graph WILL NOT pass through the origin
154. Explain why this rational function WILL NOT have a x intercept

Level Two Questions about operations with rational expressions: Things that make you think!

Assume $m, n, p, q, r, s, t,$ and u are DIFFERENT positive integers

$$\text{You are given } \frac{mx - n}{px + q} \cdot \frac{rx + s}{tx - u}$$

155. Determine values of m, n, p, q, r, s, t, u that will yield a number for an answer when this is completely simplified
156. Determine values of m, n, p, q, r, s, t, u that will yield a linear expression in the numerator and a linear expression in the denominator for an answer when this is completely simplified

$$\text{You are given } \frac{mx - n}{px + q} \cdot \frac{rx + s}{tx - u}$$

157. Determine values of m, n, p, q, r, s, t, u that will yield an expression without a linear term in the numerator and an expression without a linear term in the denominator for an answer when this is completely simplified.

Level Two Questions about radians: Things that make you think!

158. Define a radian and support your definition with a picture
159. Explain why mathematicians and students should want their EXACT radian measures to be expressed with π , instead of without π . Use pictures to support your explanation

The exam itself

- You will be asked to answer at least two level 2 questions on the midterm.
- There will be a variety of formats of questions ranging from multiple choice, matching, and free response.
- You will need to bring a scientific calculator to class.
- No extended time on this exam unless specifically allowed by an IEP or a 504
- Any extended time given related to IEP or 504 must be completed on the same day outside of class time.
- You will be given a unit circle and special angles chart on the day of the midterm, but you will be required to complete one prior to the exam for a portion of the midterm grade.