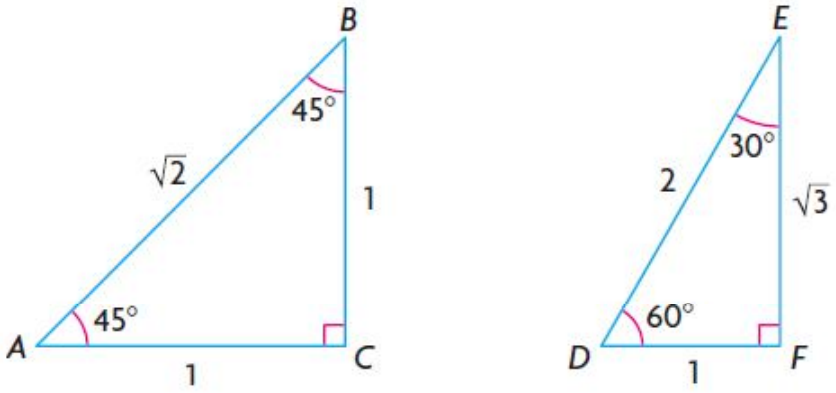
Mathematics 11U 5.2 – Special Triangles

Homework: pg 287 #4,5,6,7,9,13,14,15

There are two special triangles: Exact value = no decimal



θ	sin θ	cos θ	tan θ
30°			
45°			
60°			

Determine the exact values of the following:

1. $\sin 30 + \cos^2 45 - \tan 45$

2. $\tan 30 \times \csc 60 - \sec 60$

Determine the exact values of the following:

3. $\sin^2 60 + \cos^2 60$

Determine the following angle:

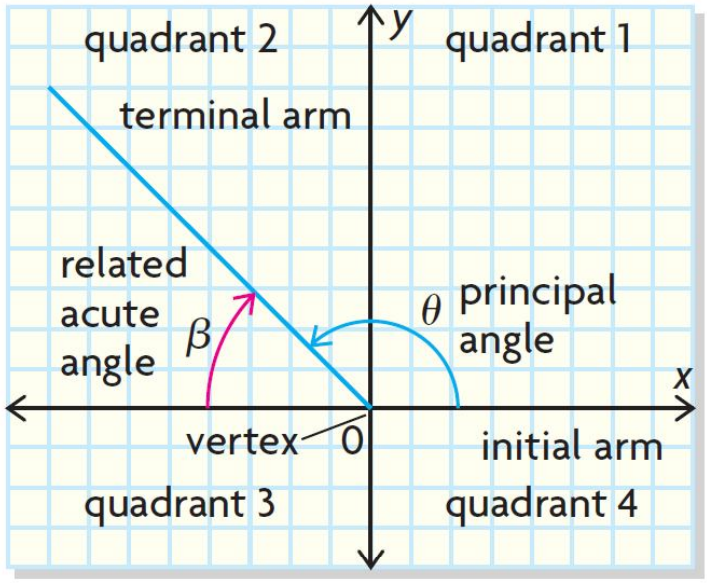
4. $\sqrt{2}\sin\theta = 1$

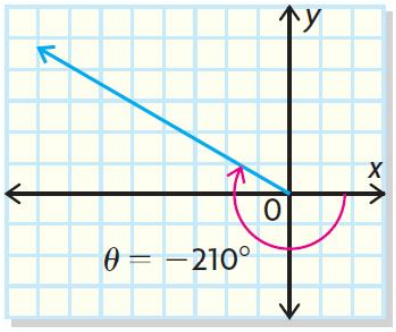
5.3 & 5.4 – Trigonometric Ratios for Angles over 90° Homework: pg 299 #1,2,6,8,9

The Big Idea: Every ratio exists twice between 0° and 360°

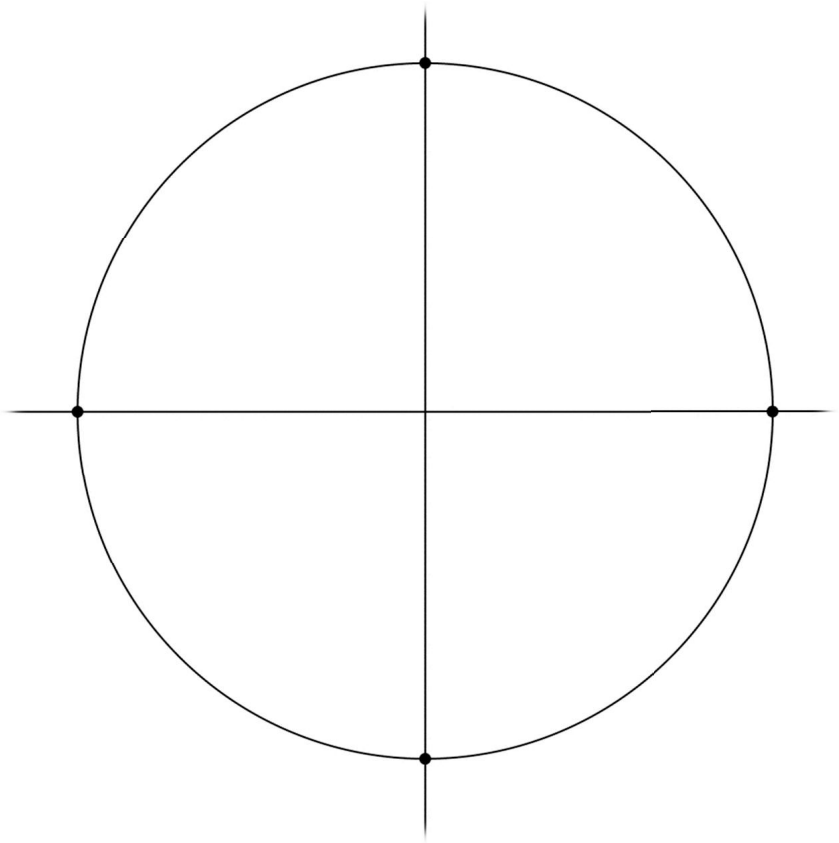
$\sin 30 =$ $\sin 150 =$

Lots of Terminology:





Looking at trig ratios on a Cartesian Plane:



Find the second equivalent trig ratio:

1. $\sin 20$
2. $\cos 280$
3. $\tan 110$
4. $\csc 192$
5. $\sec 18$
6. $\cot 215$

Each point lies on the terminal arm of angle θ in standard position.

i) Draw a sketch of each angle θ.
ii) Determine the value of r to the nearest tenth.
iii) Determine the primary trigonometric ratios for angle θ.
iv) Calculate the value of θ to the nearest degree.

Use each trigonometric ratio to determine BOTH values of θ between 0^o and 360^o.

1. $\sin\theta = 1.8942$

Use each trigonometric ratio to determine BOTH values of θ between 0^o and 360^o.

2. $\cos\theta = -0.8931$

Use each trigonometric ratio to determine BOTH values of θ between 0^o and 360^o.

3. $\csc\theta = -4.2013$

5.5 – Trigonometric Identities Mr. Hagen's Favourite!!! Homework: Attached Sheet

Here's an example question:

$\sin\theta + \cos\theta\cot\theta = \csc\theta$

Our first identity:

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

Our second identity:

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

Prove:

$\cos\theta \tan\theta = \sin\theta$

Prove:

$1 + \tan^2\theta = \sec^2\theta$

Prove:

$$\sec^2\theta + \csc^2\theta = \sec^2\theta \csc^2\theta$$

Second last question to prove:

$$\cos\theta + \cos\theta \tan^2\theta = \sec\theta$$

Last question to prove:

$$\cos^4\theta - \sin^4\theta = 1 - 2\sin^2\theta$$

Do: 2 from #1-5, 2 from #6-10,
2 from #11-15, etc... 3 from #50-57

Math 11U Trigonometric Identities

All of these identities use the reciprocal ratios, quotient identities, and/or the Pythagorean Identities.

1. $\sin A \cot A = \cos A$
2. $\cos A \tan A = \sin A$
3. $\cot\theta \sec\theta = \csc\theta$
4. $\sin\theta \sec\theta = \tan\theta$
5. $\cos A \csc A = \cot A$
6. $\cot A \sec A \sin A = 1$
7. $(1 - \cos^2 A)\csc^2 A = 1$
8. $(1 - \sin^2\theta)\sec^2\theta = 1$
9. $\cot^2\theta\,(1 - \cos^2\theta) = \cos^2\theta$
10. $(1 - \cos^2 A)\sec^2 A = \tan^2 A$
11. $(1 + \tan^2 A)\cos^2 A = 1$
12. $(\sec^2 A - 1)\cot^2 A = 1$
13. $(1 - \cos^2\theta)(1 + \tan^2\theta) = \tan^2\theta$
14. $\sin^2 A\,(1 + \cot^2 A) = 1$
15. $(\csc^2\theta - 1)\tan^2\theta = 1$
16. $\sin^2\theta \cot^2\theta + \sin^2\theta = 1$
17. $(1 - \cos^2 A)(1 + \cot^2 A) = 1$
18. $(1 + \tan^2 A)(1 - \sin^2 A) = 1$
19. $\sin^2\theta \sec^2\theta = \sec^2\theta - 1$
20. $\csc^2\theta \tan^2\theta - 1 = \tan^2\theta$
21. $\frac{1}{\sin^2 A} + \frac{1}{\csc^2 A} = 1$
22. $\frac{1}{\cos^2\theta} - \frac{1}{\cot^2\theta} = 1$
23. $\frac{\sin A}{\csc A} + \frac{\cos A}{\sec A} = 1$
24. $\frac{\sec A}{\cos A} - \frac{\tan A}{\cot A} = 1$
25. $\sin^4\theta - \cos^4\theta = 2\sin^2\theta - 1$
26. $\sec^4\theta - 1 = 2\tan^2\theta + \tan^4\theta$
27. $\csc^4 A - 1 = 2\cot^2 A + \cot^4 A$
28. $(\tan A \csc A)^2 - (\sin A \sec A)^2 = 1$
29. $(\sec\theta \cot\theta)^2 - (\cos\theta \csc\theta)^2 = 1$
30. $\tan^2\theta - \cot^2\theta = \sec^2\theta - \csc^2\theta$
31. $\frac{\sin A \cot^2 A}{\cos A} = \frac{1}{\tan A}$
32. $\frac{\sec^2 A \cot A}{\csc^2 A} = \tan A$
33. $\sec\theta - \tan\theta \sin\theta = \cos\theta$
34. $\tan\theta + \cot\theta = \sec\theta \csc\theta$
35. $(\cos A + \sin A)^2 + (\cos A - \sin A)^2 = 2$
36. $(1 + \tan A)^2 + (1 - \tan\theta)^2 = 2\sec^2\theta$
37. $(\cot\theta - 1)^2 + (\cot\theta + 1)^2 = 2\csc^2\theta$
38. $\sin^2\theta\,(1 - \cot\theta)^2 + \cos^2\theta(1 + \tan\theta)^2 = 2$
39. $\cos^2 A\,(\sec^2 A - \tan^2 A) + \sin^2 A\,(\csc^{-1} A - \cot^{-1} A) = 1$
40. $\cot^2 A + \cot^4 A = \csc^4 A - \csc^2 A$
41. $\frac{\tan^2\theta}{1+\tan^2\theta} \times \frac{1+\cot^2\theta}{\cot^2\theta} = \sin^2\theta \sec^2\theta$
42. $\frac{1}{1-\sin\theta} + \frac{1}{1+\sin\theta} = 2\sec^2\theta$

43. $\frac{\tan A}{\sec A-1}+\frac{\tan A}{\sec A+1}=2\csc A$

44. $\frac{1}{1+\sin^2 A}+\frac{1}{1+\csc^2 A}=1$

45. $(\sec\theta+\csc\theta)(\sin\theta+\cos\theta)=\sec\theta\csc\theta+2$

46. $(\cos\theta-\sin\theta)(\csc\theta-\sec\theta)=\sec\theta\csc\theta-2$

47. $(1+\cot A+\csc A)(1+\cot A-\csc A)=2\cot A$

48. $(\sec A+\tan A-1)(\sec A-\tan A+1)=2\tan A$

49. $(\sin A+\csc A)^2+(\cos A+\sec A)^2=\tan^2 A+\cot^2 A+7$

50. $(\tan\theta+\sec\theta)^2=\frac{1+\sin\theta}{1-\sin\theta}$

51. $\sin^4\theta+2\cos^2\theta-\cos^4\theta=1$

52. $(1+\tan^2 A)(1-\tan^2 A)=2\sec^2 A-\sec^4 A$

53. $\cos^3 A+\sin^3 A=(\cos A+\sin A)(1-\sin A\cos A)$

54. $\sin^4\theta-2\sin^2\theta=\cos^4\theta-1$

55. $\frac{\sqrt{1-\cos^2\theta}}{\cos\theta}\times\sqrt{\sec^2\theta-1}=\tan^2\theta$

56. $\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2\sec A$

57. $\sin^2 A\tan A+\cos^2 A\cot A+2\sin A\cos A=\tan A+\cot A$