

Inverse Trig Functions

Worksheet—Inverse Trigonometric Functions

Find each of the following without using a calculator. HINT: Use the unit circle.

Part A. Special values

1. $\sin^{-1}(0)$

2. $\sin^{-1}(1)$

3. $\sin^{-1}(-1)$

4. $\sin^{-1}\left(\frac{1}{2}\right)$

5. $\sin^{-1}\left(\frac{-1}{2}\right)$

6. $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

7. $\sin^{-1}\left(\frac{-1}{\sqrt{2}}\right)$

8. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

9. $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right)$

10. $\cos^{-1}(0)$

11. $\cos^{-1}(1)$

12. $\cos^{-1}(-1)$

13. $\cos^{-1}\left(\frac{1}{2}\right)$

14. $\cos^{-1}\left(\frac{-1}{2}\right)$

15. $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

16. $\cos^{-1}\left(\frac{-1}{\sqrt{2}}\right)$

17. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

18. $\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$

19. $\tan^{-1}(0)$

20. $\tan^{-1}(1)$

21. $\tan^{-1}(-1)$

22. $\tan^{-1}(\sqrt{3})$

23. $\tan^{-1}(-\sqrt{3})$

24. $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

25. $\tan^{-1}\left(\frac{-1}{\sqrt{3}}\right)$

26. $\sec^{-1}(1)$

27. $\sec^{-1}(-1)$

28. $\sec^{-1}(2)$

29. $\sec^{-1}(-2)$

30. $\sec^{-1}(\sqrt{2})$

31. $\sec^{-1}(-\sqrt{2})$

32. $\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$

33. $\sec^{-1}\left(\frac{-2}{\sqrt{3}}\right)$

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Part B. Composites: $f \circ f^{-1}$ with special values

34. $\sin(\sin^{-1}(-1))$

37. $\cos(\cos^{-1}(0))$

40. $\tan(\tan^{-1}(0))$

43. $\sec(\sec^{-1}(-1))$

35. $\sin\left(\sin^{-1}\left(\frac{1}{2}\right)\right)$

38. $\cos\left(\cos^{-1}\left(\frac{-1}{2}\right)\right)$

41. $\tan(\tan^{-1}(-1))$

44. $\sec(\sec^{-1}(\sqrt{2}))$

36. $\sin\left(\sin^{-1}\left(\frac{-1}{\sqrt{2}}\right)\right)$

39. $\cos\left(\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)\right)$

42. $\tan\left(\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)\right)$

45. $\sec\left(\sec^{-1}\left(-\frac{2}{\sqrt{3}}\right)\right)$

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Part C. Composites: $f \circ f^{-1}$ general

46. $\sin\left(\sin^{-1}\left(\frac{3}{5}\right)\right)$

49. $\cos\left(\cos^{-1}\left(\frac{-4}{5}\right)\right)$

52. $\tan\left(\tan^{-1}\left(\frac{5}{2}\right)\right)$

55. $\sec\left(\sec^{-1}\left(\frac{5}{2}\right)\right)$

47. $\sin\left(\sin^{-1}\left(\frac{-4}{7}\right)\right)$

50. $\cos\left(\cos^{-1}\left(\frac{1}{7}\right)\right)$

53. $\tan\left(\tan^{-1}\left(\frac{2}{\sqrt{7}}\right)\right)$

56. $\sec\left(\sec^{-1}\left(\frac{1}{3}\right)\right)$

48. $\sin\left(\sin^{-1}\left(\frac{10}{3}\right)\right)$

51. $\cos(\cos^{-1}(1.1))$

54. $\tan(\tan^{-1}(135))$

57. $\sec(\sec^{-1}(-27))$

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Part D. Composites: $f^{-1} \circ f$ special values

58. $\sin^{-1}\left(\sin\left(\frac{\pi}{6}\right)\right)$

64. $\cos^{-1}\left(\cos\left(\frac{\pi}{6}\right)\right)$

70. $\tan^{-1}\left(\tan\left(\frac{\pi}{6}\right)\right)$

76. $\sec^{-1}\left(\sec\left(\frac{\pi}{6}\right)\right)$

59. $\sin^{-1}\left(\sin\left(\frac{-\pi}{6}\right)\right)$

65. $\cos^{-1}\left(\cos\left(\frac{-\pi}{6}\right)\right)$

71. $\tan^{-1}\left(\tan\left(\frac{-\pi}{6}\right)\right)$

77. $\sec^{-1}\left(\sec\left(\frac{-\pi}{6}\right)\right)$

60. $\sin^{-1}\left(\sin\left(\frac{5\pi}{6}\right)\right)$

66. $\cos^{-1}\left(\cos\left(\frac{5\pi}{6}\right)\right)$

72. $\tan^{-1}\left(\tan\left(\frac{5\pi}{6}\right)\right)$

78. $\sec^{-1}\left(\sec\left(\frac{5\pi}{6}\right)\right)$

61. $\sin^{-1}\left(\sin\left(\frac{7\pi}{6}\right)\right)$

67. $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$

73. $\tan^{-1}\left(\tan\left(\frac{7\pi}{6}\right)\right)$

79. $\sec^{-1}\left(\sec\left(\frac{7\pi}{6}\right)\right)$

62. $\sin^{-1}\left(\sin\left(\frac{11\pi}{6}\right)\right)$

68. $\cos^{-1}\left(\cos\left(\frac{11\pi}{6}\right)\right)$

74. $\tan^{-1}\left(\tan\left(\frac{11\pi}{6}\right)\right)$

80. $\sec^{-1}\left(\sec\left(\frac{11\pi}{6}\right)\right)$

63. $\sin^{-1}\left(\sin\left(\frac{13\pi}{6}\right)\right)$

69. $\cos^{-1}\left(\cos\left(\frac{13\pi}{6}\right)\right)$

75. $\tan^{-1}\left(\tan\left(\frac{13\pi}{6}\right)\right)$

81. $\sec^{-1}\left(\sec\left(\frac{13\pi}{6}\right)\right)$

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Part E. Composites: $f^{-1} \circ f$ general

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|---|---|--|--|
| 82. $\sin^{-1}\left(\sin\left(\frac{\pi}{10}\right)\right)$ | 90. $\cos^{-1}\left(\cos\left(\frac{\pi}{10}\right)\right)$ | 98. $\tan^{-1}\left(\tan\left(\frac{\pi}{10}\right)\right)$ | 106. $\sec^{-1}\left(\sec\left(\frac{\pi}{10}\right)\right)$ |
| 83. $\sin^{-1}\left(\sin\left(\frac{-\pi}{10}\right)\right)$ | 91. $\cos^{-1}\left(\cos\left(\frac{-\pi}{10}\right)\right)$ | 99. $\tan^{-1}\left(\tan\left(\frac{-\pi}{10}\right)\right)$ | 107. $\sec^{-1}\left(\sec\left(\frac{-\pi}{10}\right)\right)$ |
| 84. $\sin^{-1}\left(\sin\left(\frac{3\pi}{10}\right)\right)$ | 92. $\cos^{-1}\left(\cos\left(\frac{3\pi}{10}\right)\right)$ | 100. $\tan^{-1}\left(\tan\left(\frac{3\pi}{10}\right)\right)$ | 108. $\sec^{-1}\left(\sec\left(\frac{3\pi}{10}\right)\right)$ |
| 85. $\sin^{-1}\left(\sin\left(\frac{9\pi}{10}\right)\right)$ | 93. $\cos^{-1}\left(\cos\left(\frac{9\pi}{10}\right)\right)$ | 101. $\tan^{-1}\left(\tan\left(\frac{9\pi}{10}\right)\right)$ | 109. $\sec^{-1}\left(\sec\left(\frac{9\pi}{10}\right)\right)$ |
| 86. $\sin^{-1}\left(\sin\left(\frac{7\pi}{10}\right)\right)$ | 94. $\cos^{-1}\left(\cos\left(\frac{7\pi}{10}\right)\right)$ | 102. $\tan^{-1}\left(\tan\left(\frac{7\pi}{10}\right)\right)$ | 110. $\sec^{-1}\left(\sec\left(\frac{7\pi}{10}\right)\right)$ |
| 87. $\sin^{-1}\left(\sin\left(\frac{11\pi}{10}\right)\right)$ | 95. $\cos^{-1}\left(\cos\left(\frac{11\pi}{10}\right)\right)$ | 103. $\tan^{-1}\left(\tan\left(\frac{11\pi}{10}\right)\right)$ | 111. $\sec^{-1}\left(\sec\left(\frac{11\pi}{10}\right)\right)$ |
| 88. $\sin^{-1}\left(\sin\left(\frac{13\pi}{10}\right)\right)$ | 96. $\cos^{-1}\left(\cos\left(\frac{13\pi}{10}\right)\right)$ | 104. $\tan^{-1}\left(\tan\left(\frac{13\pi}{10}\right)\right)$ | 112. $\sec^{-1}\left(\sec\left(\frac{13\pi}{10}\right)\right)$ |
| 89. $\sin^{-1}\left(\sin\left(\frac{19\pi}{10}\right)\right)$ | 97. $\cos^{-1}\left(\cos\left(\frac{19\pi}{10}\right)\right)$ | 105. $\tan^{-1}\left(\tan\left(\frac{19\pi}{10}\right)\right)$ | 113. $\sec^{-1}\left(\sec\left(\frac{19\pi}{10}\right)\right)$ |