SUM, DIFFERENCE, DOUBLE & HALF ANGLE IDENTITIES

Use the angle sum identity to find the exact value of each.

1) $\tan \frac{17\pi}{12}$

2) $\sin \frac{19\pi}{12}$

3) $\tan \frac{13\pi}{12}$

4) $\sin \frac{7\pi}{12}$

5) $\tan \frac{7\pi}{12}$

6) $\cos \frac{7\pi}{12}$

7) $\sin \frac{17\pi}{12}$

8) $\tan \frac{19\pi}{12}$

9) $\cos \frac{13\pi}{12}$

10) $\sin \frac{13\pi}{12}$

11) $\tan \frac{11\pi}{12}$

12) $\cos \frac{17\pi}{12}$

13) $\tan \frac{5\pi}{12}$

14) $\sin \frac{11\pi}{12}$

15) $\sin \frac{5\pi}{12}$

16) $\cos \frac{5\pi}{12}$

17) $\cos \frac{11\pi}{12}$

18) $\cos \frac{19\pi}{12}$

Use the angle difference identity to find the exact value of each.

19) $\sin -\frac{\pi}{12}$

20) $\cos -\frac{7\pi}{12}$

21) $\cos \frac{7\pi}{12}$

22) $\tan -\frac{7\pi}{12}$

23) $\sin \frac{7\pi}{12}$

24) $\sin \frac{\pi}{12}$

25) $\tan -\frac{\pi}{12}$

26) $\cos -\frac{\pi}{12}$

27) $\tan -\frac{5\pi}{12}$

28) $\cos \frac{\pi}{12}$

29) $\cos \frac{5\pi}{12}$

30) $\tan \frac{7\pi}{12}$

31) $\sin -\frac{5\pi}{12}$

32) $\tan \frac{\pi}{12}$

33) $\sin \frac{5\pi}{12}$

34) $\cos -\frac{5\pi}{12}$

35) $\sin -\frac{7\pi}{12}$

36) $\tan \frac{5\pi}{12}$

Use a double-angle identity to find the exact value of each expression.

37) $\sin \theta = \frac{4\sqrt{21}}{21}$ and $0 < \theta < \frac{\pi}{2}$
Find $\cos 2\theta$

38) $\cos \theta = \frac{4}{5}$ and $0 < \theta < \frac{\pi}{2}$
Find $\sin 2\theta$

39) $\cos \theta = \frac{24}{25}$ and $\frac{3\pi}{2} < \theta < 2\pi$
Find $\tan 2\theta$

40) $\tan \theta = \frac{8}{15}$ and $0 < \theta < \frac{\pi}{2}$
Find $\cos 2\theta$

41) $\sin\theta = \frac{3\sqrt{10}}{10}$ and $\frac{\pi}{2} < \theta < \pi$
Find $\cos 2\theta$

42) $\sin\theta = -\frac{3}{5}$ and $\frac{3\pi}{2} < \theta < 2\pi$
Find $\cos 2\theta$

43) $\tan\theta = -\frac{3}{4}$ and $\frac{\pi}{2} < \theta < \pi$
Find $\sin 2\theta$

44) $\sin\theta = -\frac{7}{25}$ and $\pi < \theta < \frac{3\pi}{2}$
Find $\cos 2\theta$

45) $\tan\theta = \frac{3}{4}$ and $\pi < \theta < \frac{3\pi}{2}$
Find $\tan 2\theta$

46) $\tan\theta = -\frac{3}{4}$ and $\frac{\pi}{2} < \theta < \pi$
Find $\tan 2\theta$

47) $\tan\theta = -\frac{3}{4}$ and $\frac{3\pi}{2} < \theta < 2\pi$
Find $\tan 2\theta$

48) $\tan\theta = 2\sqrt{6}$ and $0 < \theta < \frac{\pi}{2}$
Find $\tan 2\theta$

49) $\cos\theta = \frac{2\sqrt{42}}{17}$ and $0 < \theta < \frac{\pi}{2}$
Find $\sin 2\theta$

50) $\tan\theta = \frac{7}{24}$ and $\pi < \theta < \frac{3\pi}{2}$
Find $\cos 2\theta$

51) $\cos\theta = -\frac{4}{5}$ and $\pi < \theta < \frac{3\pi}{2}$
Find $\sin 2\theta$

52) $\sin\theta = \frac{3}{5}$ and $0 < \theta < \frac{\pi}{2}$
Find $\tan 2\theta$

53) $\tan\theta = \frac{3}{4}$ and $0 < \theta < \frac{\pi}{2}$

Find $\tan 2\theta$

54) $\sin\theta = \frac{6}{23}$ and $0 < \theta < \frac{\pi}{2}$

Find $\tan 2\theta$

Use a half-angle identity to find the exact value of each expression.

55) $\tan\theta = -\frac{5}{12}$ and $270° < \theta < 360°$

Find $\cos\frac{\theta}{2}$

56) $\sin\theta = -\frac{7}{25}$ and $180° < \theta < 270°$

Find $\cos\frac{\theta}{2}$

57) $\cos\theta = -\frac{15}{17}$ and $90° < \theta < 180°$

Find $\cos\frac{\theta}{2}$

58) $\tan\theta = \frac{3}{4}$ and $0° < \theta < 90°$

Find $\tan\frac{\theta}{2}$

59) $\sin\theta = -\frac{3}{5}$ and $180° < \theta < 270°$

Find $\sin\frac{\theta}{2}$

60) $\tan\theta = \frac{\sqrt{6}}{12}$ and $180° < \theta < 270°$

Find $\cos\frac{\theta}{2}$

61) $\cos\theta = \frac{4}{5}$ and $0° < \theta < 90°$

Find $\tan\frac{\theta}{2}$

62) $\cos\theta = \frac{15}{17}$ and $270° < \theta < 360°$

Find $\sin\frac{\theta}{2}$

63) $\sin\theta = \frac{5}{13}$ and $0° < \theta < 90°$

Find $\sin\frac{\theta}{2}$

64) $\cos\theta = \frac{12}{13}$ and $270° < \theta < 360°$

Find $\tan\frac{\theta}{2}$

65) $\tan\theta = \frac{3}{2}$ and $180° < \theta < 270°$

Find $\tan\frac{\theta}{2}$

66) $\tan\theta = \frac{3}{4}$ and $0° < \theta < 90°$

Find $\cos\frac{\theta}{2}$

67) $\tan\theta = -\frac{\sqrt{3}}{3}$ and $270° < \theta < 360°$

Find $\tan\frac{\theta}{2}$

68) $\cos\theta = -\frac{15}{17}$ and $180° < \theta < 270°$

Find $\tan\frac{\theta}{2}$

69) $\tan\theta = -\frac{3}{5}$ and $270° < \theta < 360°$

Find $\sin\frac{\theta}{2}$

70) $\sin\theta = -\frac{3}{5}$ and $270° < \theta < 360°$

Find $\cos\frac{\theta}{2}$

71) $\cos\theta = \frac{4}{5}$ and $270° < \theta < 360°$

Find $\cos\frac{\theta}{2}$

72) $\tan\theta = 1$ and $0° < \theta < 90°$

Find $\sin\frac{\theta}{2}$

Answers to SUM, DIFFERENCE, DOUBLE & HALF ANGLE IDENTITIES

1) $2+\sqrt{3}$

2) $\frac{-\sqrt{6}-\sqrt{2}}{4}$

3) $2-\sqrt{3}$

4) $\frac{\sqrt{6}+\sqrt{2}}{4}$

5) $-2-\sqrt{3}$

6) $\frac{\sqrt{2}-\sqrt{6}}{4}$

7) $\frac{-\sqrt{6}-\sqrt{2}}{4}$

8) $-2-\sqrt{3}$

9) $\frac{-\sqrt{6}-\sqrt{2}}{4}$

10) $\frac{\sqrt{2}-\sqrt{6}}{4}$

11) $\sqrt{3}-2$

12) $\frac{\sqrt{2}-\sqrt{6}}{4}$

13) $2+\sqrt{3}$

14) $\frac{\sqrt{6}-\sqrt{2}}{4}$

15) $\frac{\sqrt{6}+\sqrt{2}}{4}$

16) $\frac{\sqrt{6}-\sqrt{2}}{4}$

17) $\frac{-\sqrt{6}-\sqrt{2}}{4}$

18) $\frac{\sqrt{6}-\sqrt{2}}{4}$

19) $\frac{\sqrt{2}-\sqrt{6}}{4}$

20) $\frac{\sqrt{2}-\sqrt{6}}{4}$

21) $\frac{\sqrt{2}-\sqrt{6}}{4}$

22) $2+\sqrt{3}$

23) $\frac{\sqrt{6}+\sqrt{2}}{4}$

24) $\frac{\sqrt{6}-\sqrt{2}}{4}$

25) $\sqrt{3}-2$

26) $\frac{\sqrt{6}+\sqrt{2}}{4}$

27) $-2-\sqrt{3}$

28) $\frac{\sqrt{6}+\sqrt{2}}{4}$

29) $\frac{\sqrt{6}-\sqrt{2}}{4}$

30) $-2-\sqrt{3}$

31) $\frac{-\sqrt{6}-\sqrt{2}}{4}$

32) $2-\sqrt{3}$

33) $\frac{\sqrt{6}+\sqrt{2}}{4}$

34) $\frac{\sqrt{6}-\sqrt{2}}{4}$

35) $\frac{-\sqrt{6}-\sqrt{2}}{4}$

36) $2+\sqrt{3}$

37) $-\frac{11}{21}$

38) $\frac{24}{25}$

39) $-\frac{336}{527}$

40) $\frac{161}{289}$

41) $-\frac{4}{5}$

42) $\frac{7}{25}$

43) $-\frac{24}{25}$

44) $\frac{527}{625}$

45) $\frac{24}{7}$

46) $-\frac{24}{7}$

47) $-\frac{24}{7}$

48) $-\frac{4\sqrt{6}}{23}$

49) $\frac{44\sqrt{42}}{289}$

50) $\frac{527}{625}$

51) $\frac{24}{25}$

52) $\frac{24}{7}$

53) $\frac{24}{7}$

54) $\frac{12\sqrt{493}}{457}$

55) $-\frac{5\sqrt{26}}{26}$

56) $-\frac{\sqrt{2}}{10}$

57) $\frac{\sqrt{17}}{17}$

58) $\frac{1}{3}$

59) $\frac{3\sqrt{10}}{10}$

60) $-\frac{\sqrt{50-20\sqrt{6}}}{10}$

61) $\frac{1}{3}$

62) $\frac{\sqrt{17}}{17}$

63) $\frac{\sqrt{26}}{26}$

64) $-\frac{1}{5}$

65) $\frac{-\sqrt{13}-2}{3}$

66) $\frac{3\sqrt{10}}{10}$

67) $-2+\sqrt{3}$

68) -4

69) $\frac{\sqrt{578-85\sqrt{34}}}{34}$

70) $-\frac{3\sqrt{10}}{10}$

71) $-\frac{3\sqrt{10}}{10}$

72) $\frac{\sqrt{2-\sqrt{2}}}{2}$