Trigonometric Values Given A Point

$$x^2 + y^2 = r^2 \rightarrow r = \sqrt{(\quad)^2 + (\quad)^2}$$

$$\sin\theta = \frac{y}{r} \qquad \cos\theta = \frac{x}{r} \qquad \tan\theta = \frac{y}{x} \qquad \csc\theta = \frac{r}{y} \qquad \sec\theta = \frac{r}{x} \qquad \cot\theta = \frac{x}{y}$$

Find the exact values (no decimals of the six trigonometric functions of an angle θ in standard position whose terminal side contains the given point.

x y 1. (4, -3) $r = \sqrt{(4)^2 + (-3)^2}$ $r = 5$ $\sin\theta = -3/5$ $\csc\theta = 5/-3$ $\cos\theta = 4/5$ $\sec\theta = 5/4$ $\tan\theta = -3/4$ $\cot\theta = 4/-3$	x y 2. (-12, 5) $r = \sqrt{(-12)^2 + (5)^2}$ $r = 13$ $\sin\theta = 5/13$ $\csc\theta = 13/5$ $\cos\theta = -12/13$ $\sec\theta = 13/-12$ $\tan\theta = 5/-12$ $\cot\theta = -12/5$
x y 3. (-5, -7) $r = \sqrt{(-5)^2 + (-7)^2}$ $r = \sqrt{74}$ $\sin\theta = \frac{-7\sqrt{74}}{74}$ $\csc\theta = \sqrt{74}/-7$ $\cos\theta = \frac{-5\sqrt{74}}{74}$ $\sec\theta = \sqrt{74}/-5$ $\tan\theta = -7/-5 = \frac{7}{5}$ $\cot\theta = 5/7$	x y 4. (2, 3) $r = \sqrt{(2)^2 + (3)^2}$ $r = \sqrt{13}$ $\sin\theta = \frac{3\sqrt{13}}{13}$ $\csc\theta = \sqrt{13}/3$ $\cos\theta = \frac{2\sqrt{13}}{13}$ $\sec\theta = 13/2$ $\tan\theta = 3/2$ $\cot\theta = 2/3$
x y 5. (15, 8) $r = \sqrt{(15)^2 + (8)^2}$ $r = 17$ $\sin\theta = 8/17$ $\csc\theta = 17/8$ $\cos\theta = 15/17$ $\sec\theta = 17/15$ $\tan\theta = 8/15$ $\cot\theta = 15/8$	x y 6. (5, 2) $r = \sqrt{(5)^2 + (2)^2}$ $r = \sqrt{29}$ $\sin\theta = 2\sqrt{29}/29$ $\csc\theta = \sqrt{29}/2$ $\cos\theta = \frac{5\sqrt{29}}{29}$ $\sec\theta = \sqrt{29}/5$ $\tan\theta = 2/5$ $\cot\theta = 5/2$

Key

7. (-1, -7) $r = \sqrt{(-1)^2 + (-7)^2}$ $r = \sqrt{50} = 5\sqrt{2}$ $\sin\theta = \frac{-7\sqrt{2}}{10}$ $\csc\theta = -5\sqrt{2}/7$ $\cos\theta = \frac{-\sqrt{2}}{10}$ $\sec\theta = -5\sqrt{2}$ $\tan\theta = -7/-1 = 7$ $\cot\theta = -1/-7 = 1/7$	8. (-1, 1) $r = \sqrt{(-1)^2 + (1)^2}$ $r = \sqrt{2}$ $\sin\theta = \sqrt{2}/2$ $\csc\theta = \sqrt{2}$ $\cos\theta = -\sqrt{2}/2$ $\sec\theta = -\sqrt{2}$ $\tan\theta = \frac{\sqrt{2}}{-\sqrt{2}} = -1$ $\cot\theta = \frac{-\sqrt{2}}{\sqrt{2}} = -1$
9. (-8, 6) $r = \sqrt{(-8)^2 + (6)^2}$ $r = 10$ $\sin\theta = 6/10 = \frac{3}{5}$ $\csc\theta = 10/6 = 5/3$ $\cos\theta = -8/10 = \frac{-4}{5}$ $\sec\theta = 10/-8 = -5/4$ $\tan\theta = \frac{6}{-8} = \frac{-3}{4}$ $\cot\theta = -8/6 = \frac{-4}{3}$	10. (-9 , 40) $r = \sqrt{(-9)^2 + (40)^2}$ $r = 41$ $\sin\theta = 40/41$ $\csc\theta = 41/40$ $\cos\theta = -9/41$ $\sec\theta = 41/-9$ $\tan\theta = 40/-9$ $\cot\theta = -9/40$
11. (7, -24) $r = \sqrt{(7)^2 + (-24)^2}$ $r = 25$ $\sin\theta = -24/25$ $\csc\theta = 25/-24$ $\cos\theta = 7/25$ $\sec\theta = 25/7$ $\tan\theta = -24/7$ $\cot\theta = 7/-24$	12. (-2, -2) $r = \sqrt{(-2)^2 + (-2)^2}$ $r = 2\sqrt{2}$ or $\sqrt{8}$ $\sin\theta = -\sqrt{2}/2$ $\csc\theta = -\sqrt{2}$ $\cos\theta = -\sqrt{2}/2$ $\sec\theta = -\sqrt{2}$ $\tan\theta = \frac{-\sqrt{2}}{\sqrt{2}}$ $\cot\theta = -\sqrt{2}/\sqrt{2} = -1$
13. (12, 9) $r = \sqrt{(12)^2 + (9)^2}$ $r = 15$ $\sin\theta = 9/15 = 3/5$ $\csc\theta = 15/9 = 5/3$ $\cos\theta = 12/15 = \frac{4}{5}$ $\sec\theta = 12/15 = 5/4$ $\tan\theta = 9/12 = \frac{3}{4}$ $\cot\theta = 12/9 = 4/3$	14. (-30, 16) $r = \sqrt{(-30)^2 + (16)^2}$ 34 $\sin\theta = 16/34$ $8/17$ $\csc\theta = 34/16 = 17/8$ $\cos\theta = -30/34$ $-15/17$ $\sec\theta = 34/-30 = 17/-15$ $\tan\theta = \frac{16}{-30} = \frac{-8}{15}$ $\cot\theta = -30/16 = -15/8$