Worksheet Extra Practice Trig Ratios of ANY Angles
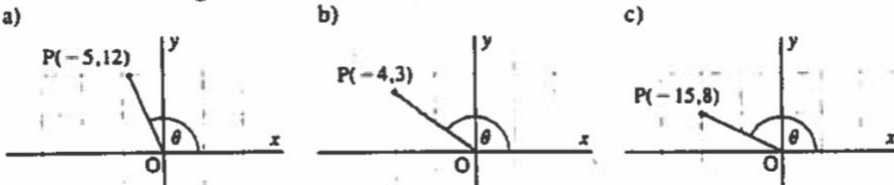
1. Use a calculator to find the value of each trigonometric ratio to 3 decimal places.
   a) $\sin 98°$ b) $\tan 113°$ c) $\cos 124°$ d) $\sec 174°$ e) $\csc 161°$ f) $\cot 143°$

2. For each obtuse angle θ, state the six trigonometric ratios.
   a)   b)   c)

   P(-5,12)   P(-4,3)   P(-15,8)

3. Evaluate each trigonometric ratio. Give exact answers.
   a) $\cos 120°$ b) $\sin 150°$ c) $\cot 135°$ d) $\csc 150°$ e) $\sec 135°$ f) $\sin 135°$
   g) $\tan 120°$ h) $\cot 120°$ i) $\sin 120°$ j) $\cot 150°$ k) $\csc 135°$ l) $\sec 120°$

4. Evaluate each trigonometric ratio to 2 decimal places.
   a) $\cos 110°$ b) $\cot 95°$ c) $\csc 138°$ d) $\tan 108°$ e) $\sin 142°$ f) $\tan 170°$
   g) $\sec 115°$ h) $\cot 130°$ i) $\csc 165°$ j) $\cos 140°$ k) $\sec 175°$ l) $\sin 100°$

5. Given θ is an obtuse angle and the value of one trigonometric ratio, find the other trigonometric ratios.
   a) $\sin \theta = \frac{15}{17}$; find $\tan \theta$ and $\sec \theta$ b) $\tan \theta = -\frac{7}{24}$; find $\cos \theta$ and $\csc \theta$

   c) $\sec \theta = -\frac{13}{5}$; find $\sin \theta$ and $\cot \theta$ d) $\cot \theta = -\frac{20}{21}$; find $\cos \theta$ and $\csc \theta$

   e) $\cos \theta = -\frac{40}{41}$; find $\sin \theta$ and $\cot \theta$ f) $\csc \theta = \frac{5}{4}$; find $\tan \theta$ and $\sec \theta$

6. Find each value of θ if θ is obtuse.
   a) $\sin \theta = \frac{1}{\sqrt{2}}$ b) $\sec \theta = -2$ c) $\tan \theta = -\sqrt{3}$ d) $\cos \theta = -\frac{1}{\sqrt{2}}$

   e) $\csc \theta = 2$ f) $\cot \theta = -\sqrt{3}$ g) $\cot \theta = -1$ h) $\sin \theta = \frac{\sqrt{3}}{2}$

   i) $\cos \theta = -\frac{\sqrt{3}}{2}$ j) $\sec \theta = -\frac{2}{\sqrt{3}}$ k) $\tan \theta = -1$ l) $\csc \theta = \sqrt{2}$

7. Find each value of θ to the nearest degree if θ is obtuse.
   a) $\sin \theta = 0.906$ b) $\cos \theta = -0.574$ c) $\tan \theta = -3.732$
   d) $\cot \theta = -1.428$ e) $\csc \theta = 1.743$ f) $\sec \theta = -2.669$
   g) $\tan \theta = -0.532$ h) $\sin \theta = 0.978$ i) $\cot \theta = -0.123$
   j) $\csc \theta = 1.086$ k) $\cos \theta = -0.777$ l) $\sec \theta = -1.010$

8. Given θ is an obtuse angle and the value of one trigonometric ratio, find the other trigonometric ratio, and θ to the nearest degree.
   a) $\sin \theta = \frac{3}{\sqrt{13}}$; find $\sec \theta$ and θ b) $\cot \theta = -\frac{3}{7}$; find $\cos \theta$ and θ

   c) $\cos \theta = -\frac{2}{9}$; find $\cot \theta$ and θ d) $\csc \theta = \frac{\sqrt{5}}{2}$; find $\tan \theta$ and θ

   e) $\tan \theta = -3$; find $\csc \theta$ and θ f) $\sec \theta = -\frac{53}{45}$; find $\sin \theta$ and θ

9. If θ is an acute angle defined by $P(x,y)$, use x, y, and r to define the six trigonometric ratios of: a) $(180° + \theta)$ b) $(360° - \theta)$.

10. State the value of each ratio exactly. Draw a diagram to illustrate each angle.
    a) $\sin 225°$ b) $\cos 240°$ c) $\cot 210°$
    d) $\sin 270°$ e) $\tan 300°$ f) $\sec 315°$
    g) $\cos 180°$ h) $\csc 330°$ i) $\sec 360°$

11. State two values of θ to the nearest degree for each trigonometric ratio.
    a) $\sin \theta = 0.906$ b) $\cos \theta = -0.616$ c) $\tan \theta = -5.671$
    d) $\csc \theta = -2.924$ e) $\sec \theta = 1.743$ f) $\cot \theta = 2.145$
    g) $\tan \theta = -0.700$ h) $\sec \theta = -1.155$ i) $\sin \theta = -0.966$
    j) $\cos \theta = -0.423$ k) $\csc \theta = 1.035$ l) $\cot \theta = -2.747$

ANSWERS:

1. a) 0.990   b) −2.356   c) −0.559
   d) −1.006   e) 3.072   f) −1.327
2. a) $\sin \theta = \frac{12}{13}$, $\cos \theta = -\frac{5}{13}$, $\tan \theta = -\frac{12}{5}$,
   $\csc \theta = \frac{13}{12}$, $\sec \theta = -\frac{13}{5}$, $\cot \theta = -\frac{5}{12}$
   b) $\sin \theta = \frac{3}{5}$, $\cos \theta = -\frac{4}{5}$, $\tan \theta = -\frac{3}{4}$,
   $\csc \theta = \frac{5}{3}$, $\sec \theta = -\frac{5}{4}$, $\cot \theta = -\frac{4}{3}$
   c) $\sin \theta = \frac{8}{17}$, $\cos \theta = -\frac{15}{17}$, $\tan \theta = -\frac{8}{15}$,
   $\csc \theta = \frac{17}{8}$, $\sec \theta = -\frac{17}{15}$, $\cot \theta = -\frac{15}{8}$

3. a) $-\frac{1}{2}$ b) $\frac{1}{2}$ c) −1   d) 2   e) $-\sqrt{2}$
   f) $\frac{1}{\sqrt{2}}$ g) $-\sqrt{3}$ h) $-\frac{1}{\sqrt{3}}$ i) $\frac{\sqrt{3}}{2}$
   j) $-\sqrt{3}$ k) $\sqrt{2}$ l) −2   4. a) −0.34
   b) −0.09   c) 1.49   d) −3.08   e) 0.62
   f) −0.18   g) −2.37   h) −0.84   i) 3.86
   j) −0.77   k) −1.00   l) 0.98

5. a) $-\frac{15}{8}, -\frac{17}{8}$ b) $-\frac{24}{25}, \frac{25}{7}$ c) $\frac{12}{13}, -\frac{5}{12}$
   d) $-\frac{20}{29}, \frac{29}{21}$ e) $\frac{9}{41}, -\frac{40}{9}$ f) $-\frac{4}{3}, -\frac{5}{3}$

6. a) 135°   b) 120°   c) 120°   d) 135°
   e) 150°   f) 150°   g) 135°   h) 120°
   i) 150°   j) 150°   k) 135°   l) 135°
7. a) 115°   b) 125°   c) 105°   d) 145°
   e) 145°   f) 112°   g) 152°   h) 102°
   i) 97°   j) 113°   k) 141°   l) 172°

8. a) $-\frac{\sqrt{13}}{2}$, 124°   b) $-\frac{3}{\sqrt{58}}$, 113°
   c) $-\frac{2}{\sqrt{77}}$, 103°   d) -2, 117°
   e) $\frac{\sqrt{10}}{3}$, 108°   f) $\frac{28}{53}$, 148°

9. a) $\sin(180° + \theta) = -\frac{y}{r}$, $\csc(180° + \theta) = -\frac{r}{y}$
   $\cos(180° + \theta) = -\frac{x}{r}$, $\sec(180° + \theta) = -\frac{r}{x}$
   $\tan(180° + \theta) = \frac{y}{x}$, $\cot(180° + \theta) = \frac{x}{y}$
   b) $\sin(360° - \theta) = -\frac{y}{r}$, $\csc(360° - \theta) = -\frac{r}{y}$
   $\cos(360° - \theta) = \frac{x}{r}$, $\sec(360° - \theta) = \frac{r}{x}$
   $\tan(360° - \theta) = -\frac{y}{x}$, $\cot(360° - \theta) = -\frac{x}{y}$

10. a) $-\frac{1}{\sqrt{2}}$ b) $-\frac{1}{2}$ c) $\sqrt{3}$ d) −1
    e) $-\sqrt{3}$ f) $\sqrt{2}$ g) −1   h) −2   i) 1
11. a) 65°, 115°   b) 128°, 232°   c) 100°, 280°
    d) 200°, 340°   e) 55°, 305°   f) 25°, 205°
    g) 145°, 325°   h) 150°, 210°   i) 255°, 285°
    j) 115°, 245°   k) 75°, 105°   l) 160°, 340°