

# Trigonometry Exercise 7: CAST Rule

Name \_\_\_\_\_

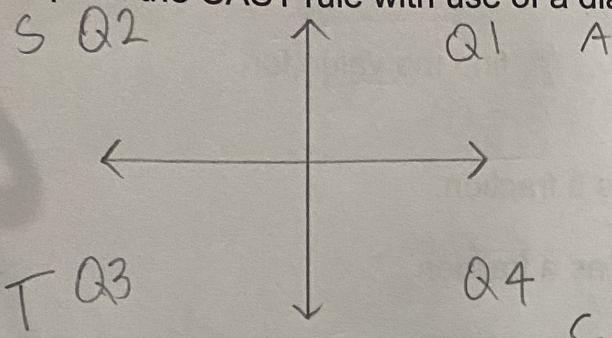
Due Date: \_\_\_\_\_

Answer in the spaces provided on this sheet.

Continued  
on  
paper

[ /36 marks]

1. Explain the CAST rule with use of a diagram and words.



Q1/A

$\sin = +$   
 $\cos = +$   
 $\tan = +$

$\theta$

Q2/S

$\sin = -$   
 $\cos = -$   
 $\tan = -$

$180 - \theta$

Q3/T

$\sin = -$   
 $\cos = +$   
 $\tan = +$

$180 + \theta$

Q4/C

$\sin = -$   
 $\cos = -$   
 $\tan = -$

$360 - \theta$

When calculating ratios, always check which quadrant it is...

2. If  $\sin \theta$  is positive and  $\tan \theta$  is negative, then what quadrant will you find the terminal arm? S
3. If  $\cos \beta$  is positive and  $\sin \beta$  is positive, then what quadrant will you find the terminal arm? A
4. If  $\cot \alpha$  is positive and  $\csc \alpha$  is negative, then what quadrant will you find the terminal arm? T
5. Find 2 values for  $\beta$ ,  $0^\circ \leq \beta \leq 360^\circ$ . Write your answer to the closest degree.

$$(a) \sin \beta = \frac{5}{8} \quad (b) \cos \beta = -\frac{5}{8} \quad (c) \cot \beta = \frac{5}{8} \quad (d) \sec \beta = \frac{13}{9}$$

$$\beta_1 = 39^\circ$$

$$\beta_1 = 129^\circ$$

$$\beta_1 = 238^\circ$$

$$\beta_1 = 46^\circ$$

$$\beta_2 = 141^\circ$$

$$\beta_2 = 309^\circ$$

$$\beta_2 = -122^\circ$$

$$\beta_2 = 314^\circ$$

$$(e) \csc \beta = -\frac{43}{23}$$

$$(f) \tan \beta = \frac{6}{10}$$

$$(g) \sin \beta = -\frac{11}{19}$$

$$(h) \cos \beta = -\frac{165}{205}$$

$$\beta_1 = 148^\circ$$

$$\beta_1 = 31^\circ$$

$$\beta_1 = 145^\circ$$

$$\beta_1 = 324^\circ$$

$$\beta_2 = 392^\circ$$

$$\beta_2 = 211^\circ$$

$$\beta_2 = 395^\circ$$

$$\beta_2 = -36^\circ$$

6. If  $\sin \theta = \frac{7}{9}$  then: (a)  $\cos \theta = \underline{0.63}$

(b)  $\cot \theta = \frac{-0.81}{0.73}$

7. If  $\sec \alpha = \frac{16}{11}$  then: (a)  $\tan \alpha = \underline{1.06}$

(b)  $\sin \alpha = \underline{0.73}$

8. If  $\cos \alpha = -\frac{1}{2}$  then find  $\sin \alpha$  if  $\tan \alpha$  is negative.

$$\sin \alpha = \frac{\sqrt{3}}{2}$$

9. If  $\csc \theta = -\frac{32}{17}$  then find  $\cot \theta$  if  $\cos \theta$  is positive.

$$\cot \theta = \underline{392.09}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\csc^{-1} \theta = \sin^{-1}$$

# Trig Exercise 7

10) Quadrant 3 = T

$$\csc^{-1}\left(-\frac{13}{5}\right) \approx -22.6198$$

$$-22.6198 + 180 = 57.3802 \approx 57$$

$$\begin{aligned} & 3\sin^2 57 - 2\cos 57 \\ &= 3(0.84)(0.84) - 2(0.54) \\ &= 2.1168 - 1.08 \\ &= 1.0368 \\ &= \frac{648}{625} \end{aligned}$$

11) Quadrant 2 = S

$$\sec^{-1}\left(-\frac{\sqrt{85}}{6}\right) \approx 130.6013$$

$$360 - 130.6013 = 329.3987 \approx 329$$

$$\begin{aligned} & \cos^4 329 - 2\sin^2 329 + \cot^3 329 \\ &= (0.86)^4 - 2(-0.52)^2 + (-1.66)^3 \\ &= 0.55 - 0.54 - 4.57 \\ &= -4.56 \\ &= -\frac{114}{25} \end{aligned}$$

12)  $\tan^{-1}\frac{4}{5} \approx 39$

$$\begin{aligned} & \tan\left(\frac{\pi}{2} - 39\right) \\ &= \tan\left(\frac{\pi}{2} - \frac{78}{2}\right) \\ &= \tan\left(\frac{\pi - 78}{2}\right) \\ &\approx -0.7654 \\ &= -\frac{3827}{5000} \end{aligned}$$

$$13) \cos^{-1} -\frac{3}{5} \approx 127^\circ$$

$$\begin{aligned}& \cos\left(\frac{\pi}{2} - 127^\circ\right) \\&= \cos\left(\frac{\pi}{2} - \frac{254}{2}\right) \\&= \cos\left(\frac{\pi - 254}{2}\right) \\&\approx -0.5797 \\&= -\frac{5797}{10000}\end{aligned}$$

$$14a) \cos^{-1}(0.5) = 60^\circ$$

$$360^\circ - 60^\circ = 300^\circ$$

$$60^\circ \pm 360^\circ \text{ and } 300^\circ \pm 360^\circ$$

$$b) \tan^{-1}(-1) = -45^\circ$$

$$180^\circ + -45^\circ = 135^\circ$$

$$-45^\circ \pm 360^\circ \text{ and } 135^\circ \pm 360^\circ$$

$$c) \csc^{-1}(2) = 30^\circ$$

$$180^\circ - 30^\circ = 150^\circ$$

$$30^\circ \pm 360^\circ \text{ and } 150^\circ \pm 360^\circ$$

$$15a) 5 \sin \theta - 2 = 0$$

$$5 \sin \theta = 2$$

$$\sin \theta = \frac{2}{5}$$

$$\theta \approx 23.578^\circ \text{ or } 0.4115$$

$$b) 4 \sin \theta + 1 = 0$$

$$4 \sin \theta = -1$$

$$\sin \theta = -\frac{1}{4}$$

$$\theta = -14.4775^\circ \text{ or } -0.2527$$

$$15c) 6\cos^2\theta - 5\cos\theta - 1 = 0$$

$$6(\cos\theta)(\cos\theta) - 5(\cos\theta) = 1,$$

$$6\cos\theta - 5\cos\theta = \frac{1}{\cos\theta}$$

$$\cos\theta = \frac{1}{\cos\theta}$$

$$(\cos\theta)^2 = 1$$

$$\cos\theta = 1$$

$$\theta = 0 \text{ and } 2\pi/6.283$$

$$d) \sin^2\theta + \sin\theta = -1$$

$$(\sin\theta)(\sin\theta) + (\sin\theta) = -1$$

$$\sin\theta = -\frac{1}{\sin\theta}$$

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

No Solution

$$e) 3\sin^2\theta + 5\sin\theta = 2$$

$$3(\sin\theta)(\sin\theta) + 5(\sin\theta) = 2$$

$$3 \quad 5 = \sin\theta - 5$$

$$f) 16\tan^2\theta - 9 = 0$$

$$(\tan\theta)^2 = \frac{9}{16}$$

$$\tan\theta = \frac{3}{4}$$

$$\theta = 36.87^\circ = 0.644$$

1) ...located in using the first three rows  
and follow the formula in the fourth  
row.