

# EXERCISES ON OPERATIONS WITH FRACTIONS IN TRIGONOMETRY

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## EXERCISE 1

Please determine whether the following angles fall within the following domains.

1. Does  $\frac{25\pi}{14}$  fall into  $0 \leq x \leq 2\pi$  ?

*Hint:* How might you express  $2\pi$  as a fraction with a denominator of 14?

2. Does  $\frac{33\pi}{16}$  fall into  $0 \leq x \leq 2\pi$  ?

3. Does  $-\frac{15\pi}{9}$  fall into  $-2\pi \leq x \leq 2\pi$  ?

4. Does  $\frac{37\pi}{11}$  fall into  $-\pi \leq x \leq 3\pi$  ?

### Observation

It may be difficult to compare the size of a fraction such as  $\frac{35\pi}{15}$  with the size of a number not expressed as a fraction like  $2\pi$ .

But notice that we can write  $2\pi$  as  $\frac{2}{1} \times \pi$ , and

we can write  $\frac{35\pi}{15}$  as  $\frac{35}{15} \times \pi$ .

Do you think that writing the numbers in this way makes them easier to compare? Why or why not?

## EXERCISE 2

Please evaluate the following,

1.  $2\pi + \frac{\pi}{6}$

*Hint:* How might you express  $2\pi$  as a fraction with a denominator of 6?

2.  $2\pi + \frac{\pi}{3} + \frac{\pi}{6}$

3. Half of  $\frac{\sqrt{2}}{2}$

4. One third of  $\frac{\sqrt{3}}{2}$

*Hint:* To find one fourth of  $\pi$ , we divide it by 4.  
i.e.  $\pi \div 4$

5.  $\sqrt{3} \div \frac{1}{2}$

6. Half of  $-\frac{1}{\sqrt{3}}$

7. Two thirds of  $\frac{\pi}{8}$

## EXERCISE 3

Please find  $\alpha$  ('alpha') by 'peeling back the layers.'

$$5(\sin^2 \alpha) - 3 = -\frac{2}{4}$$

on the domain  $\frac{\pi}{2} \leq \alpha \leq \pi$

### Observations

1. We have been given a domain for  $\alpha$ , why might this be?
2. Since the question has asked us to solve for  $\alpha$ , our aim is to rearrange the equation until we have  $\alpha = \textit{something}$ .
3. What 'layers' on the left-hand side are in the way of our above aim?
  - A. There is a  $-3$ , how might we remove this?
  - B.  $5(\sin^2 \alpha)$  means that  $\sin^2 \alpha$  is being multiplied by 5, how might we remove the 5?
  - C. Is there another way to express  $\sin^2 \alpha$ ?
  - D. How do we 'get rid of' a value like  $\sin \alpha$ ?  
Maybe  $\sin \alpha = \textit{something}$  that we can substitute into our equation instead?