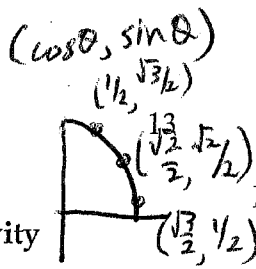


key



Accelerated Pre-Calculus

4.19 Inverses with Calculator Activity

Give answers in degrees.

Name \_\_\_\_\_ Date \_\_\_\_\_

Inverse Sine

1. Find  $\sin^{-1}(\frac{1}{2})$ , a) without a calculator  $\frac{\pi}{6}$  or  $30^\circ$  b) with a calculator (check your mode!)  $30^\circ$

2. How would you solve  $\sin^{-1}(\frac{1}{2})$  for all angles  $0^\circ \leq \theta < 360^\circ$ ? Where else is  $\sin\theta$  positive?  $30^\circ, 150^\circ$  Q1, Q2

How do you find this angle using the angle measurement found in #1? subtract  $180 - 30 = 150^\circ$   
State the two answers to  $\sin^{-1}(\frac{1}{2}) = \theta$ , where  $0^\circ \leq \theta < 360^\circ$   $30^\circ, 150^\circ$

3. Find  $\sin^{-1}(-\frac{1}{2})$ , a) without a calculator  $-30^\circ$  b) with a calculator  $-30^\circ$

Why did your calculator give you that answer instead of  $330^\circ$ ? principal values  $(-90^\circ < \theta < 90^\circ)$  Q4, Q1

4. How would you solve  $\sin^{-1}(-\frac{1}{2})$  if  $0^\circ \leq \theta < 360^\circ$ ? Where else is  $\sin\theta$  negative?

Q3  $\rightarrow 180 + 30^\circ \rightarrow 210^\circ$   
How do you find this angle using the angle measurement found in #3? add or subtract  $30^\circ$  from  $180^\circ$  or  $0^\circ$   
State the two answers to  $\sin^{-1}(-\frac{1}{2}) = \theta$ , where  $0^\circ \leq \theta < 360^\circ$   $210^\circ, 330^\circ$   
Q3, Q4

5. Write a formula that uses the principal value solution for  $\theta = \sin^{-1} x$  to find the second answer in  $[0^\circ, 360^\circ)$ .

$\theta + 180^\circ$

Inverse Tangent

1. Find  $\tan^{-1}(1)$ , a) without a calculator  $45^\circ$  b) with a calculator (check your mode!)  $45^\circ$

2. How would you solve  $\tan^{-1}(1)$  if  $0^\circ \leq \theta < 360^\circ$ ? Where else is  $\tan\theta$  positive?  $180 + 45$   $225^\circ$  Q1, Q3

How do you find this angle using the angle measurement found in #1?  $180 + 45$   
State the two answers to  $\tan^{-1}(1) = \theta$ , where  $0^\circ \leq \theta < 360^\circ$   $45^\circ, 225^\circ$

3. Find  $\tan^{-1}(-1)$ , a) without a calculator  $-45^\circ$  b) with a calculator  $-45^\circ$   
Why did your calculator give you that answer instead of  $315^\circ$ ? Q4 principal values  $(-90^\circ, 90^\circ)$

4. How would you solve  $\tan^{-1}(-1)$  if  $0^\circ \leq \theta < 360^\circ$ ? Where else is  $\tan\theta$  negative?  $-45^\circ$   
Q2, Q4

How do you find this angle using the angle measurement found in #3?  $180 - 45 = 135^\circ$   
State the two answers to  $\tan^{-1}(-1) = \theta$ , where  $0^\circ \leq \theta < 360^\circ$   $135^\circ, 315^\circ$

5. Write a formula that uses the principal value solution for  $\theta = \tan^{-1} x$  to find the second answer in  $[0^\circ, 360^\circ)$ .

$\theta + 180^\circ$

Inverse Cosine ← Q1, Q2

1. Find  $\cos^{-1}(\frac{1}{2})$ , a) without a calculator  $\frac{\pi}{3}$  or  $60^\circ$  b) with a calculator (check your model!)  $60^\circ$

2. How would you solve  $\cos^{-1}(\frac{1}{2})$  if  $0^\circ \leq \theta < 360^\circ$ ? Where else is  $\cos\theta$  positive?

Q1, Q4

How do you find this angle using the angle measurement found in #1?  $360 - 60^\circ$

State the two answers to  $\cos^{-1}(\frac{1}{2}) = \theta$ , where  $0^\circ \leq \theta < 360^\circ$   $300^\circ, 60^\circ$

3. Find  $\cos^{-1}(-\frac{1}{2})$ , a) without a calculator  $120^\circ$  b) with a calculator  $120^\circ$

Why did your calculator give you that answer instead of  $-60^\circ$ ?

principal values Q1, Q2

4. How would you solve  $\cos^{-1}(-\frac{1}{2})$  if  $0^\circ \leq \theta < 360^\circ$ ? Where else is  $\cos\theta$  negative?

Q2, Q3

How do you find this angle using the angle measurement found in #3?  $120^\circ + 60 + 60 = 240^\circ$

State the two answers to  $\cos^{-1}(-\frac{1}{2}) = \theta$ , where  $0^\circ \leq \theta < 360^\circ$   $120^\circ, 240^\circ$

5. Write a formula that uses the principal value solution for  $\theta = \cos^{-1} x$  to find the second answer in  $[0^\circ, 360^\circ)$ .

Examples: Use your formulas to find each for  $0^\circ \leq \theta < 360^\circ$  using a calculator. Round to the nearest degree.

Q1, Q2

a.  $\sin^{-1}(0.1736) \approx 10^\circ$   
 $10^\circ$  and  $170^\circ$

Q2, Q3

b.  $\cos^{-1}(-0.6427) \approx 130^\circ$   
 $230^\circ$

Q2, Q4

c.  $\tan^{-1}(-2.7475) \approx -70^\circ$  and  $110^\circ$ , and  $290^\circ$

Check your answers with the key found at the bottom of the page. Did your formulas work?

Practice: Use a calculator to find two values of  $\theta$ , where  $0^\circ \leq \theta < 360^\circ$ . Round to the nearest degree. Q1, Q4

1.  $\arccos 0.8746$   
 $29^\circ$  and  $331^\circ$

Q1, Q3  $87^\circ$

2.  $\tan^{-1} 19.0811$  and  $267^\circ$

3.  $\sin \theta = 0.8290$   
Q1, Q2

$56^\circ$  and  $124^\circ$

Q2, Q3

4.  $\arctan(-28.6363) \rightarrow -88^\circ$   
 $272^\circ$  and  $92^\circ$

5.  $\sin^{-1}(-0.2250) \rightarrow -13^\circ$   
 $343^\circ$  and  $193^\circ$

6.  $\cos \theta = -0.3907$   $113^\circ$

Q2, Q3  $180 + 67 = 247^\circ$

8.  $\cos^{-1}(-0.9511) \rightarrow 162^\circ$

Q2  $180 + 18 = 198^\circ$

9.  $\tan \theta = -0.6249 \rightarrow -32^\circ$

Q2  $\rightarrow 180 - 32 = 148^\circ$   
Q4  $\rightarrow 360 - 32 = 328^\circ$

Q1, Q2

7.  $\arcsin(0.6691)$   
 $42^\circ, 138^\circ$

(c.)  $110^\circ$  and  $290^\circ$

(b.)  $130^\circ$  and  $230^\circ$

Example Answers: (a.)  $10^\circ$  and  $170^\circ$

4.19

p.14 Classwork Problems

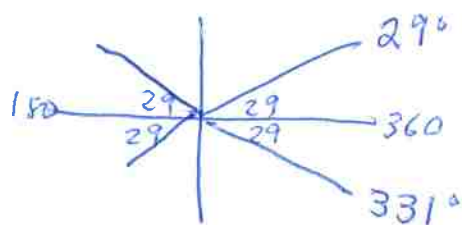
S/A  
T/C

1)  $\arccos 0.8746$

$\cos \theta = 0.8746$

Q1, Q4

$\theta = 29^\circ$



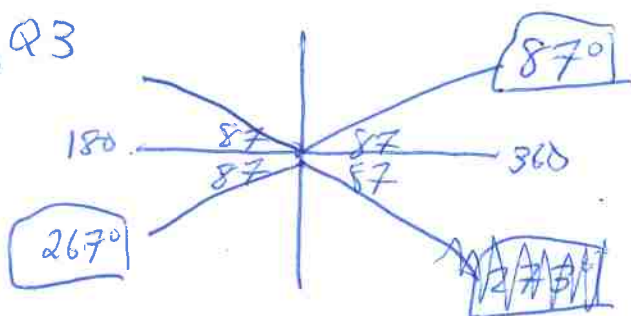
29° and 331°

2)  $\tan^{-1}(19.0811)$

$\tan \theta = 19.0811$

$\theta = 87^\circ$

Q1, Q3



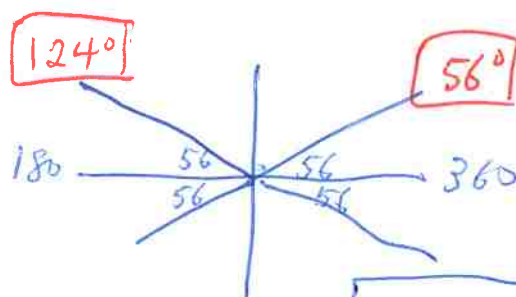
87° and 267°

3)  $\sin \theta = 0.829$

$\theta = \sin^{-1}(0.829)$

$\theta = 56^\circ$

Q1, Q2



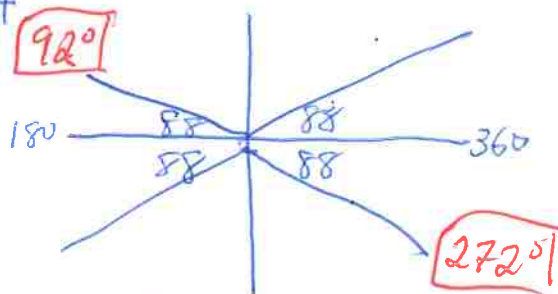
56° and 124°

4)  $\arctan(-28.6363)$

$\tan \theta = -28.6363$

$\theta = -88^\circ$

Q2, Q4



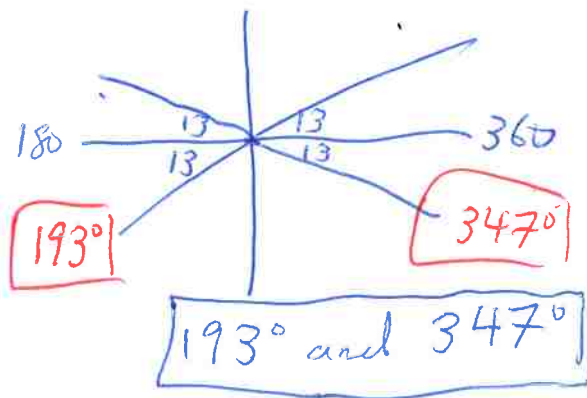
92° and 272°

$$5) \sin^{-1}(-0.2250)$$

Q3, Q4

$$\sin \theta = -0.2250$$

$$\theta = -13^\circ$$

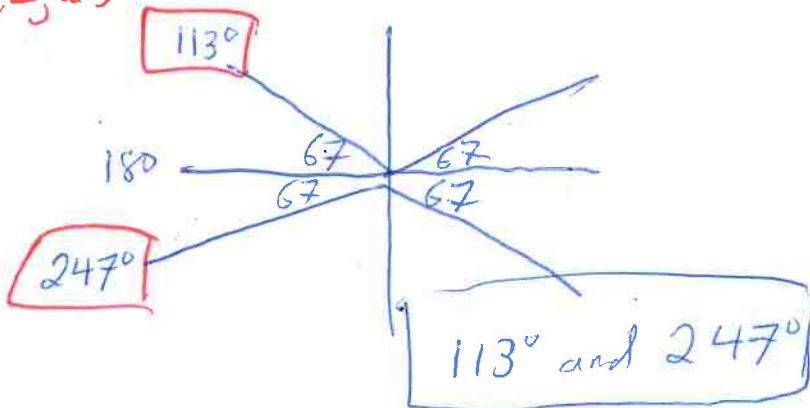


$$6) \cos \theta = -0.3907$$

Q2, Q3

$$\theta = \cos^{-1}(-0.3907)$$

$$\theta = 113^\circ$$

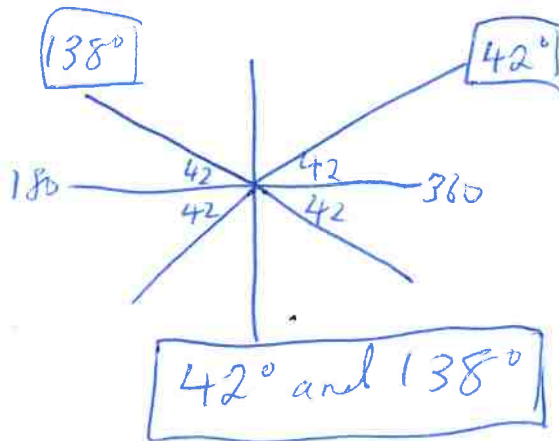


$$7) \arcsin(0.6691)$$

Q1, Q2

$$\sin \theta = 0.6691$$

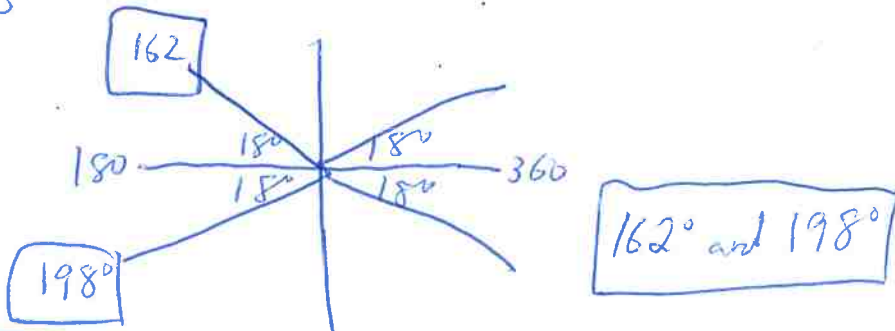
$$\theta = 42^\circ$$



$$8) \cos^{-1}(-0.9511)$$

Q2, Q3

$$\theta = 162^\circ$$



$$9) \tan \theta = -0.6249$$

Q2, Q4

$$\theta = \tan^{-1}(-0.6249)$$

$$\theta = -32^\circ$$

