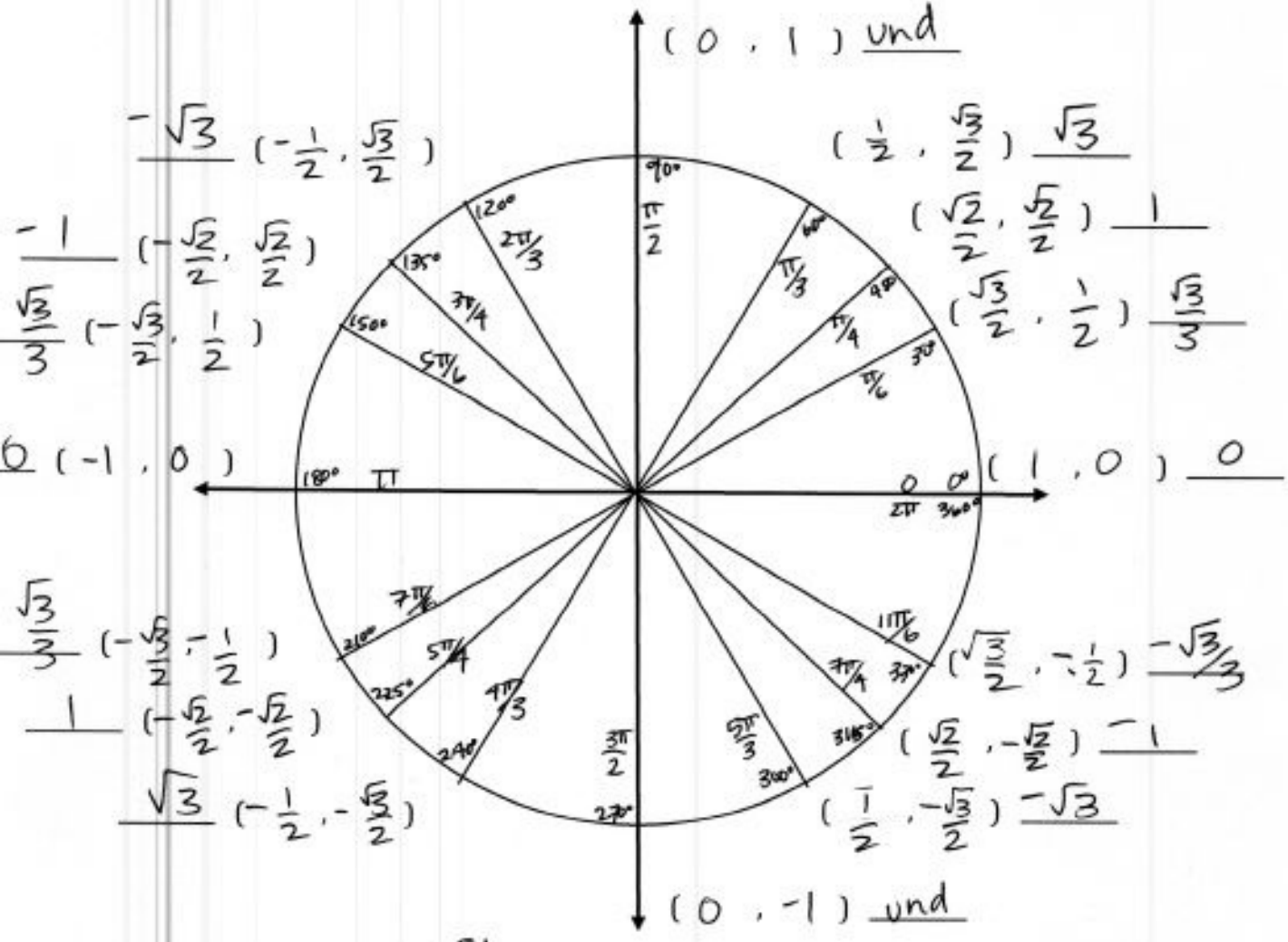
Q4 Summative Review
Secondary Math 3H

Name: Key
Class: _____



Q1

Find the exact value acute (acute angle only)

1. $\sin^{-1}\left(\frac{1}{2}\right)$ $\pi/6$
2. $\tan^{-1}\left(\sqrt{3}\right)$ $\pi/3$
3. $\sin\left(\tan^{-1}\frac{\sqrt{3}}{3}\right)$ $\tan^{-1}\frac{\sqrt{3}}{3} = \pi/6$, $\sin(\pi/6) = \frac{1}{2}$
4. $\cos^{-1}\left(\sin\frac{\pi}{3}\right)$ $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \pi/6$

Evaluate the following for θ

5. $\cos\theta = -\frac{\sqrt{2}}{2}; 0 \le \theta \le \pi$ $3\pi/4$
6. $\sec\theta = -\sqrt{2}; \pi \le \theta \le 2\pi$ $5\pi/4$
7. $\tan\theta = \sqrt{3}; \pi \le \theta \le 2\pi$ $4\pi/3$

Evaluate the following without a calculator

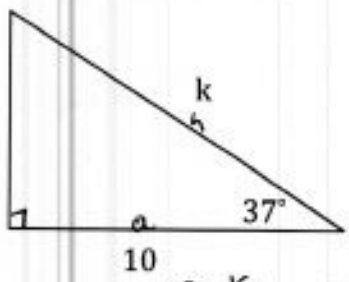
8. $\csc\frac{5\pi}{4} = -\sqrt{3}$
9. $\cos\frac{11\pi}{6} = \frac{\sqrt{3}}{2}$
10. $\sin\frac{3\pi}{2} = -1$
11. $\cot\frac{\pi}{3} = \frac{\sqrt{3}}{3}$

State which quadrants the following functions are positive in

12. Sine: I, II
13. Cosine: I, IV
14. Tangent: I, III

Solve for the missing value

15.

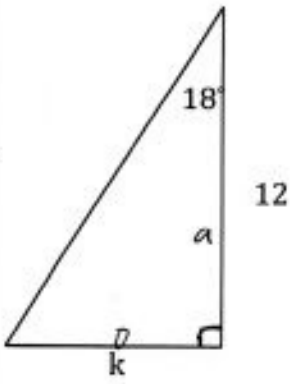


$K\cos 37 = \frac{10}{K} \cdot K$

$\frac{K\cos 37}{\cos 37} = \frac{10}{\cos 37}$

$K = 12.5$

16.



$12 \cdot \tan 18 = \frac{K}{12} \cdot 12$

$K = 3.9$

Convert the following into radians or degrees.

17. $320° \cdot \frac{\pi}{180} = \frac{16\pi}{9}$

18. $-20° \cdot \pi/180 = \frac{-\pi}{9}$

19. $\frac{2\pi}{7} \cdot \frac{180}{\pi} = \frac{360°}{7}$ or $51.43°$

20. $-\frac{\pi}{5} \cdot \frac{180}{\pi}$

$-36°$

State the amplitude, phase shift, period, and vertical shift of each of the following

21. $f(x) = \cos\left(\frac{1}{2}(\theta + \pi)\right)$

$a = 1$

P.S. → left π

per → $\frac{2\pi}{1/2} = 4\pi$

V.S → none

22. $f(x) = -3\sin(\theta - 4) + 1$

$a = 3$

P.S. → right 4

per → $\frac{2\pi}{1} = 2\pi$

V.S. → up 1

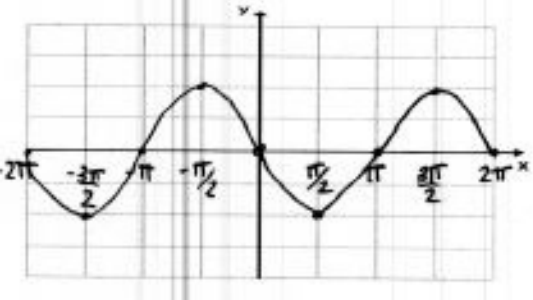
Graph the following

23. $f(x) = -2\sin(\theta)$

$a = 2$, v. ref.

per $= 2\pi$

no P.S or V.S.

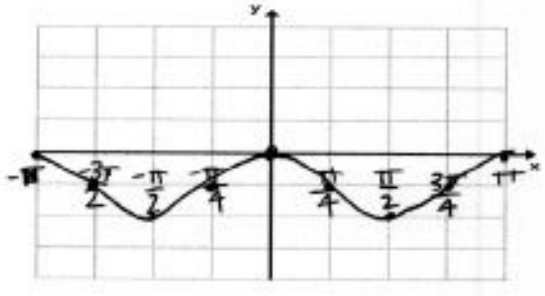


24. $f(x) = \cos(2\theta) - 1$

$a = 1$

per $= \frac{2\pi}{2} = \pi$

down 1

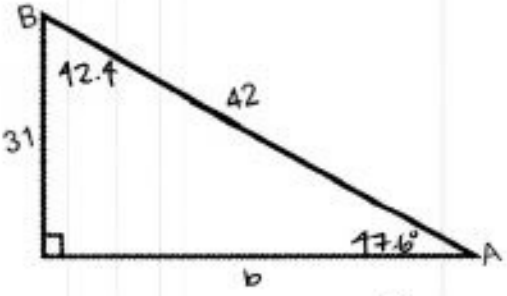


Write the following equations:

25. Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

26. Law of Cosines: $a^2 = b^2 + c^2 - 2bc\cos A$
$b^2 = a^2 + c^2 - 2ac\cos B$
$c^2 = a^2 + b^2 - 2ab\cos C$

27. Find side b.

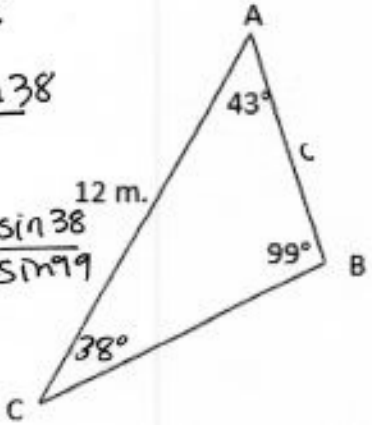


$31^2 + b^2 = 42^2$
$b^2 = 803$
$b = 28.3$

OR

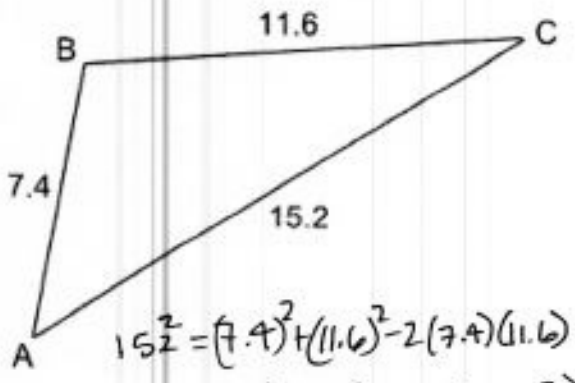
$\frac{\sin 90}{42} = \frac{\sin A}{31}$
$\frac{31}{42} = \frac{42\sin A}{42}$
$\frac{31}{42} = \sin A$
$\sin^{-1}\left(\frac{31}{42}\right) = A$
$A = 47.6°$
$B = 42.4°$, so
$\frac{\sin 90}{42} = \frac{\sin 42.4}{b}$
$b = 28.3$

28. Find side c.



$\frac{\sin 99}{12} = \frac{\sin 38}{c}$
$\frac{c\cdot\sin 99}{\sin 99} = \frac{12\sin 38}{\sin 99}$
$c = 7.5$

29. Find angle B.



$15.2^2 = (7.4)^2 + (11.6)^2 - 2(7.4)(11.6)\cos B$
$B = \cos^{-1}\left(\frac{15.2^2 - 7.4^2 - 11.6^2}{-2(7.4)(11.6)}\right) = 104.1°$

30. Find side a, given b=55, c=20 and $\angle A = 110°$

$a^2 = 55^2 + 20^2 - 2(55)(20)\cos 110°$
$a = 64.6$

Evaluate:

31. $\tan 75°$

$\tan(30+45) = \frac{\tan 30 + \tan 45}{1 - \tan 30\tan 45}$
$= \frac{\frac{\sqrt{3}}{3} + 1}{1 - \frac{\sqrt{3}}{3}} = \frac{\sqrt{3}+3}{3-\sqrt{3}}$

32. $\cos 15° = \cos(45-30)$
$\cos 45\cos 30 + \sin 45\sin 30$
$\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2}\cdot\frac{1}{2}$
$\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$ or $\frac{\sqrt{6}+\sqrt{2}}{4}$

33. $\sin 75°$
$\sin(30+45) =$
$\sin 30\cos 45 + \cos 30\sin 45$
$\frac{1}{2}\cdot\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}$
$\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$ or $\frac{\sqrt{2}+\sqrt{6}}{4}$

Prove the following identities:

34. $(\sec^2 x+\csc^2 x)-(\tan^2 x+\cot^2 x)=2$

$1+\tan^2 x+1+\cot^2 x-\tan^2 x-\cot^2 x$

$1+1=2$ ✓

35. $\dfrac{1-\sin^2\theta}{\sin^2\theta}=\cot^2\theta$

$\dfrac{\cos^2\theta}{\sin^2\theta}=\cot^2\theta$ ✓

36. $\sin x(\tan x+\cot x)=\sec x$

$\sin x\tan x+\sin x\cot x$

$\sin x\cdot\dfrac{\sin x}{\cos x}+\sin x\cdot\dfrac{\cos x}{\sin x}$

$\dfrac{\sin^2 x}{\cos x}+\cos x\cdot\left(\dfrac{\cos x}{\cos x}\right)$

$\dfrac{\sin^2 x+\cos^2 x}{\cos x}=\dfrac{1}{\cos x}=\sec x$ ✓

37. $\dfrac{1}{\sin^2 y}-\dfrac{\cos^2 y}{\sin^2 y}=1$

$\dfrac{1-\cos^2 y}{\sin^2 y}=\dfrac{\sin^2 y}{\sin^2 y}=1$ ✓

38. $\dfrac{\sec x-\cos x}{\tan x}=\sin x$

$\left(\dfrac{1}{\cos x}-\cos x\right)\cdot\dfrac{1}{\tan x}$

$\left(\dfrac{1}{\cos x}-\cos x\right)\cot x$

$\left(\dfrac{1}{\cos x}-\cos x\right)\cdot\dfrac{\cos x}{\sin x}$

$\dfrac{1}{\sin x}-\dfrac{\cos^2 x}{\sin x}=\dfrac{1-\cos^2 x}{\sin x}=\dfrac{\sin^2 x}{\sin x}=\sin x$ ✓

39. $\sin 2x=2\sin x\cos x$

$\sin(x+x)=\sin x\cos x+\cos x\sin x$

$=2\sin x\cos x$ ✓

40. $\cos 2x=\cos^2 x-\sin^2 x$

$\cos(x+x)=\cos x\cos x-\sin x\sin x$

$=\cos^2 x-\sin^2 x$ ✓

41. $\tan 2x=\dfrac{2\tan x}{1-\tan^2 x}$

$\tan(x+x)=\dfrac{\tan x+\tan x}{1-\tan x\tan x}$

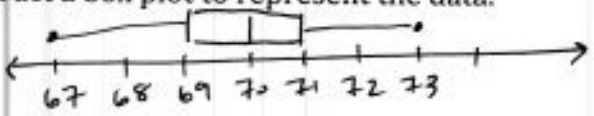
$=\dfrac{2\tan x}{1-\tan^2 x}$ ✓

In the next 3 problems, use the following data to answer the questions.
Height in inches of 14 college baseball players: 70, 69, 72, 70, 68, 71, 70, 69, 71, 70, 67, 69, 71, 73.

42. Find the mean, median, mode, and standard deviation.

70 70 70 1.51

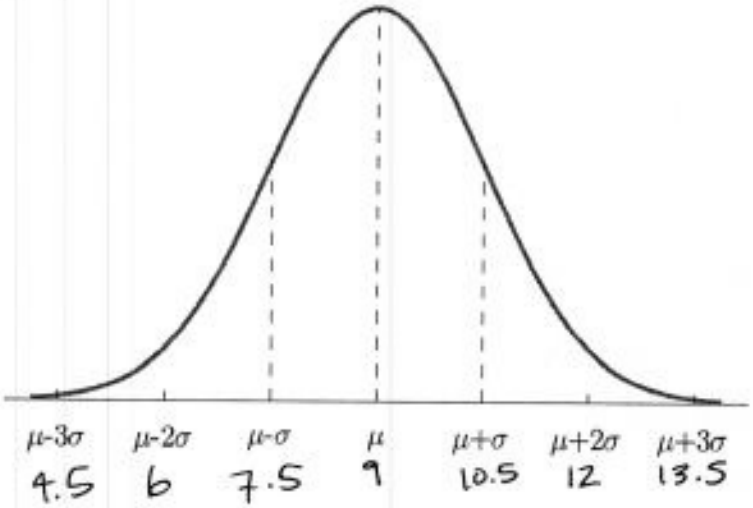
43. Construct a box plot to represent the data.



44. Are there any outliers? If not, what numbers would be considered outliers?

IQR = 71 − 69 = 2 1.5(2) = 3 Q1 − 3 = 69 − 3 = 66 or less Q3 + 3 = 71 + 3 = 74 or more no outliers

At a shoe factory, the number of various shoe sizes produced is normally disturbed with a mean of size 9 and a standard deviation of 1.5 sizes.



45. What is the probability that a shoe size will be larger than size 10.5 if a supervisor chooses a shoe at random?

50 − 34 16%

46. What is the probability that a shoe size will be smaller than size 6 if a supervisor chooses a shoe at random?

50 − 34 − 13.5 = 2.5%

47. What is the probability that a shoe size will be between sizes 7.5 and 12 if a supervisor chooses a shoe at random?

81.5%