Algebra 2/Pre-Calculus

Name_____

Trig Table Problems (Day 9, Circular Trig)

Carefully complete each of the following problems. Show work wherever appropriate. Do all problems without the aid of a calculator.

1. Prove the following identity: $\cos^2\theta + \sin^2\theta = 1$. Your proof should include a diagram.

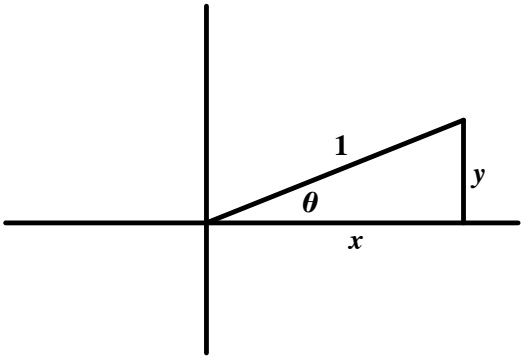
Solution

Start by drawing a diagram with $r = 1$ (as shown to the right). For any angle θ, we know that $x^2 + y^2 = 1$. And since $r = 1$, we also know that $x = \cos\theta$ and $y = \sin\theta$. Thus, by substitution,

$$x^2 + y^2 = 1$$

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

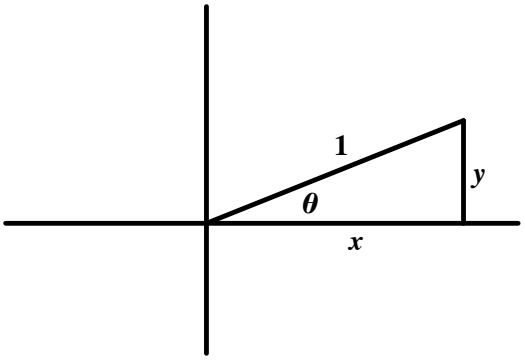
$$\cos^2\theta + \sin^2\theta = 1$$



2. Prove the following identity: $\tan\theta = \frac{\sin\theta}{\cos\theta}$. Your proof should include a diagram.

Solution

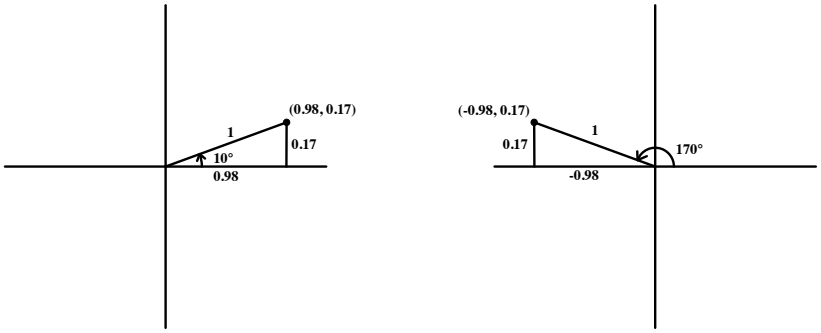
Start by drawing a diagram with $r = 1$ (as shown to the right). We know by definition that $\tan\theta = \frac{y}{x}$. And since $r = 1$, we know that $x = \cos\theta$ and $y = \sin\theta$. Thus, by substitution, $\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}$.



3. Suppose you are told that $\sin(10^\circ) = 0.17$ and $\cos(10^\circ) = 0.98$.

a. Find the values of $\sin(170^\circ)$, $\cos(170^\circ)$, and $\tan(170^\circ)$. Do not use a calculator. Hint: Start by drawing two diagrams, one for 10° and one for 170°.

b. You should have found that $\sin(170^\circ) = 0.17$, $\cos(170^\circ) = -0.98$, and $\tan(170^\circ) = -\frac{17}{98}$. The diagrams for 10° and 170° are drawn below.[1]



Use a similar method to find $\sin(80^\circ)$, $\cos(80^\circ)$, and $\tan(80^\circ)$. Note: Start by making a diagram for 80°.

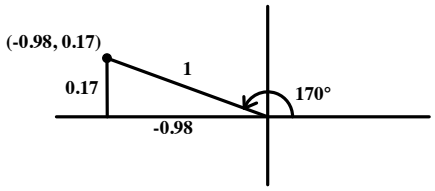
Answers b. $\sin(80^\circ) = 0.98$, $\cos(80^\circ) = 0.17$, $\tan(80^\circ) = \frac{98}{17}$

[1] These diagrams aren't quite drawn to scale. This is because 10° is such a small angle that it would be hard to draw see the label if we drew it perfectly to scale. When drawing diagrams in this class, try to capture the key information, but do now worry about making everything perfectly to scale.

4. Consider the trig table given below.

Angle	sine	cosine
10º	0.17	0.98
50º	0.77	0.64
70º	0.94	0.34

Use the values given above to fill in the table below. The first problem is done for you.
Note: You may check your answers via the calculator. (You will not be able to do this during the quiz, of course!)

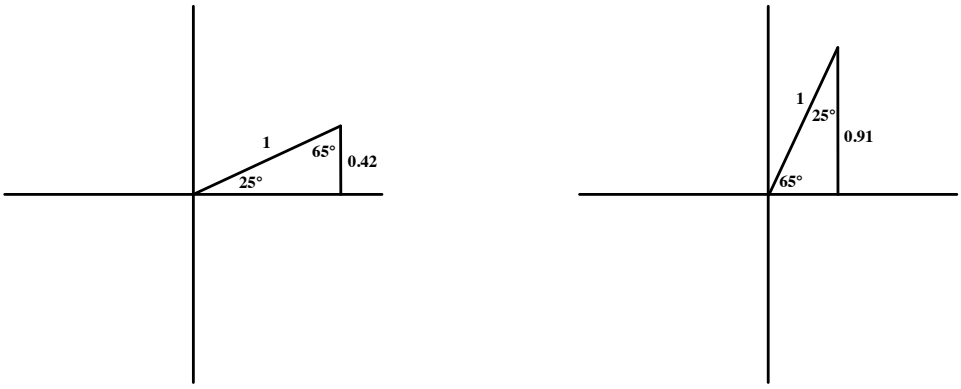
Angle	Drawing	Sine	Cosine	Tangent
170˚		0.17	-0.98	$-\frac{17}{98}$
350˚				
110˚				
500˚				
430˚				

Angle	Drawing	Sine	Cosine	Tangent
250°				
610°				
130°				
110°				
190°				
1270°				

5. Suppose you are told that $\sin(25^\circ) = 0.42$ and $\sin(65^\circ) = 0.91$.

a. Find the value of $\cos(65^\circ)$ without using your calculator. ***Hint:*** Start by two diagrams, one for 65° and one for 25°.

b. You should have found that $\cos(65^\circ) = 0.42$. The diagrams you could have used to see this are provided below.



Now simplify $\cos(90-\theta)$. (Is $\cos(90-\theta)$ equal to $\cos(\theta)$, $\sin(\theta)$, $-\cos(\theta)$, or $-\sin(\theta)$? Explain how you know.)

c. You should have found that $\cos(90-\theta) = \sin(\theta)$. Explain how this identity relates to part **a** of this problem related?

6. Suppose you are told that $\sin(35^\circ) = 0.57$. Find $\cos(55^\circ)$.

Answer $\cos(55^\circ) = 0.57$

7. Suppose you are told that $\sin(40^\circ) = 0.64$ and $\sin(50^\circ) = 0.77$.

a. Find $\tan(40^\circ)$.

b. Find $\tan(50^\circ)$.

c. Find $\tan(130^\circ)$

Answers a. $\tan(40^\circ) = \frac{64}{77}$ b. $\tan(50^\circ) = \frac{77}{64}$ c. $\tan(50^\circ) = -\frac{77}{64}$

8. Use the trig table given on the right to find each of the values given below. Check your answer via the calculator. ***Suggestion:*** Draw a diagram (or possibly multiple diagrams) for each problem.

a. $\sin(104^\circ)$

b. $\cos(82^\circ)$

c. $\sin(124^\circ)$

d. $\tan(28^\circ)$

A	sinA	A	sinA	A	sinA
1	0.018	31	0.515	61	0.875
2	0.035	32	0.530	62	0.883
3	0.052	33	0.545	63	0.891
4	0.070	34	0.559	64	0.899
5	0.087	35	0.574	65	0.906
6	0.105	36	0.588	66	0.914
7	0.122	37	0.602	67	0.921
8	0.139	38	0.616	68	0.927
9	0.156	39	0.629	69	0.934
10	0.174	40	0.643	70	0.940
11	0.191	41	0.656	71	0.946
12	0.208	42	0.669	72	0.951
13	0.225	43	0.682	73	0.956
14	0.242	44	0.695	74	0.961
15	0.259	45	0.707	75	0.966
16	0.276	46	0.719	76	0.970
17	0.292	47	0.731	77	0.974
18	0.309	48	0.743	78	0.978
19	0.326	49	0.755	79	0.982
20	0.342	50	0.766	80	0.985
21	0.358	51	0.777	81	0.988
22	0.375	52	0.788	82	0.990
23	0.391	53	0.799	83	0.993
24	0.407	54	0.809	84	0.995
25	0.423	55	0.819	85	0.996
26	0.438	56	0.829	86	0.998
27	0.454	57	0.839	87	0.999
28	0.470	58	0.848	88	0.999
29	0.485	59	0.857	89	1.000
30	0.500	60	0.866	90	1.000

9. Continue using the trig table from the previous page to answer each of the following questions. Use the calculator to check your answers.

a. $\sin(75^\circ)$

b. $\cos(100^\circ)$

c. $\sin(-575^\circ)$

10. Use the trig table from the last page to solve each of the following equations. Find all solutions for $0^\circ \le \theta < 360^\circ$. ***Note:*** Answers are provided below.

a. $\sin\theta = 0.940$

b. $\sin\theta = -0.616$

c. $\cos\theta = 0.342$

d. $\cos\theta = -0.559$

Answers a. $\theta = 70^\circ$ or $\theta = 110^\circ$ b. $\theta = 218^\circ$ or $\theta = 322^\circ$ c. $\theta = 70^\circ$ or $\theta = 290^\circ$ d. $\theta = 124^\circ$ or $\theta = 236^\circ$