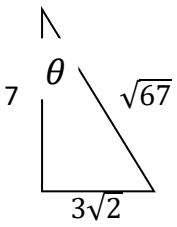
MODULE 11 – TRIGONOMETRIC FUNCTIONS

Revisit Right Triangle Trigonometry (using a table…old school)

θ is many times used as a variable to represent an angle measurement. We will be using θ to represent an unknown angle in these examples.

Practice:
* Write all three trigonometric equations for each triangle using SOH-CAH-TOA. Assume a right triangle.

1.

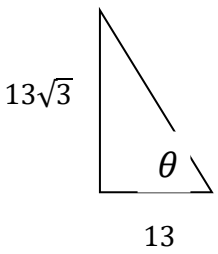


$sin\theta =$	$cos\theta =$	$tan\theta =$

Also use the Pythagorean Theorem to verify the side lengths of this right triangle.

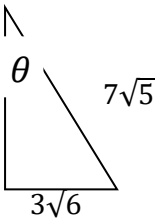
* Write all three trigonometric equations for each triangle using SOH-CAH-TOA. Assume all triangles are right triangles.

2.



$sin\theta =$	$cos\theta =$	$tan\theta =$

3. This time write the trig. ratios (fractions) as a decimal.



$sin\theta =$	$cos\theta =$	$tan\theta =$

Use the trig. table on the next page to identify the angle measurement of θ.

$\theta =$ _____

Trig Table

Angle	Sine	Cosine	Tangent	Angle	Sine	Cosine	Tangent	Angle	Sine	Cosine	Tangent
1	0.0175	0.9998	0.0175	31	0.5150	0.8572	0.6009	61	0.8746	0.4848	1.8040
2	0.0349	0.9994	0.0349	32	0.5299	0.8480	0.6249	62	0.8829	0.4695	1.8807
3	0.0523	0.9986	0.0524	33	0.5446	0.8387	0.6494	63	0.8910	0.4540	1.9626
4	0.0698	0.9976	0.0699	34	0.5592	0.8290	0.6745	64	0.8988	0.4384	2.0503
5	0.0872	0.9962	0.0875	35	0.5736	0.8192	0.7002	65	0.9063	0.4226	2.1445
6	0.1045	0.9945	0.1051	36	0.5878	0.8090	0.7265	66	0.9135	0.4067	2.2460
7	0.1219	0.9925	0.1228	37	0.6018	0.7986	0.7536	67	0.9205	0.3907	2.3559
8	0.1392	0.9903	0.1405	38	0.6157	0.7880	0.7813	68	0.9272	0.3746	2.4751
9	0.1564	0.9877	0.1584	39	0.6293	0.7771	0.8098	69	0.9336	0.3584	2.6051
10	0.1736	0.9848	0.1763	40	0.6428	0.7660	0.8391	70	0.9397	0.3420	2.7475
11	0.1908	0.9816	0.1944	41	0.6561	0.7547	0.8693	71	0.9455	0.3256	2.9042
12	0.2079	0.9781	0.2126	42	0.6691	0.7431	0.9004	72	0.9511	0.3090	3.0777
13	0.2250	0.9744	0.2309	43	0.6820	0.7314	0.9325	73	0.9563	0.2924	3.2709
14	0.2419	0.9703	0.2493	44	0.6947	0.7193	0.9657	74	0.9613	0.2756	3.4874
15	0.2588	0.9659	0.2679	45	0.7071	0.7071	1.0000	75	0.9659	0.2588	3.7321
16	0.2756	0.9613	0.2867	46	0.7193	0.6947	1.0355	76	0.9703	0.2419	4.0108
17	0.2924	0.9563	0.3057	47	0.7314	0.6820	1.0724	77	0.9744	0.2250	4.3315
18	0.3090	0.9511	0.3249	48	0.7431	0.6691	1.1106	78	0.9781	0.2079	4.7046
19	0.3256	0.9455	0.3443	49	0.7547	0.6561	1.1504	79	0.9816	0.1908	5.1446
20	0.3420	0.9397	0.3640	50	0.7660	0.6428	1.1918	80	0.9848	0.1736	5.6713
21	0.3584	0.9336	0.3839	51	0.7771	0.6293	1.2349	81	0.9877	0.1564	6.3138
22	0.3746	0.9272	0.4040	52	0.7880	0.6157	1.2799	82	0.9903	0.1392	7.1154
23	0.3907	0.9205	0.4245	53	0.7986	0.6018	1.3270	83	0.9925	0.1219	8.1443
24	0.4067	0.9135	0.4452	54	0.8090	0.5878	1.3764	84	0.9945	0.1045	9.5144
25	0.4226	0.9063	0.4663	55	0.8192	0.5736	1.4281	85	0.9962	0.0872	11.4301
26	0.4384	0.8988	0.4877	56	0.8290	0.5592	1.4826	86	0.9976	0.0698	14.3007
27	0.4540	0.8910	0.5095	57	0.8387	0.5446	1.5399	87	0.9986	0.0523	19.0811
28	0.4695	0.8829	0.5317	58	0.8480	0.5299	1.6003	88	0.9994	0.0349	28.6363
29	0.4848	0.8746	0.5543	59	0.8572	0.5150	1.6643	89	0.9998	0.0175	57.2900
30	0.5000	0.8660	0.5774	60	0.8660	0.5000	1.7321				

TABLE 1. 1. MATHEMATICAL CONSTANTS

n(prime)		$\sqrt{n}$			
2		1. 4142	13562	37309	50488
3		1. 7320	50807	56887	72935
5		2. 2360	67977	49978	96964
7		2. 6457	51311	06459	05905
11		3. 3166	24790	35539	98491
13		3. 6055	51275	46398	92931
17		4. 1231	05625	61766	05498
19		4. 3588	98943	54067	35522
23		4. 7958	31523	31271	95416
29		5. 3851	64807	13450	40313
31		5. 5677	64362	83002	19221
37		6. 0827	62530	29821	96890
41		6. 4031	24237	43284	86865
43		6. 5574	38524	30200	06523
47		6. 8556	54600	40104	41249
53		7. 2801	09889	28051	82711
59		7. 6811	45747	86860	81758
61		7. 8102	49675	90665	43941
67		8. 1853	52771	87244	99700
71		8. 4261	49773	17635	86306
73		8. 5440	03745	31753	11679
79		8. 8881	94417	31558	88501
83		9. 1104	33579	14429	88819
89		9. 4339	81132	05660	38113
97		9. 8488	57801	79610	47217

n		e^n				
1		2. 7182	81828	45904	52353	60287
2		7. 3890	56098	93065	02272	30427
3	(1)	2. 0085	53692	31876	67740	92853
4	(1)	5. 4598	15003	31442	39078	11026
5	(2)	1. 4841	31591	02576	60342	11156
6	(2)	4. 0342	87934	92735	12260	83872
7	(3)	1. 0966	33158	42845	85992	63720
8	(3)	2. 9809	57987	04172	82747	43592
9	(3)	8. 1030	83927	57538	40077	09997
10	(4)	2. 2026	46579	48067	16516	95790

$10^{1/2}$		3. 1622	77660	16837	93320	
$10^{1/3}$		2. 1544	34690	03188	37219	
$10^{1/4}$		1. 7782	79410	03892	28012	
$10^{1/5}$		1. 5848	93192	46111	34853	
$100^{1/3}$		4. 6415	88833	61277	88924	*
$100^{1/5}$		2. 5118	86431	50958	01112	
$1000^{1/4}$		5. 6234	13251	90349	08040	
$1000^{1/5}$		3. 9810	71705	53497	25077	*
$2^{1/3}$		1. 2599	21049	89487	31648	
$3^{1/3}$		1. 4422	49570	30740	83823	
$2^{1/4}$		1. 1892	07115	00272	10667	
$3^{1/4}$		1. 3160	74012	95249	24608	*
$2^{-1/2}$	(− 1)	7. 0710	67811	86547	52440	
$3^{-1/2}$	(− 1)	5. 7735	02691	89625	76451	
$5^{-1/2}$	(− 1)	4. 4721	35954	99957	93928	

$e^{\pi/2}$		4. 8104	77380	96535	16555
$e^{\pi/4}$		2. 1932	80050	73801	54566
$e^{-\pi/2}$	(− 1)	2. 0787	95763	50761	90855
$e^{-\pi/4}$	(− 1)	4. 5593	81277	65996	23677
$e^{1/2}$		1. 6487	21270	70012	81468
$e^{-1/2}$	(− 1)	6. 0653	06597	12633	42360
$e^{1/3}$		1. 3956	12425	08608	95286
$e^{-1/3}$	(− 1)	7. 1653	13105	73789	25043

n		e^{-n}				
1	(− 1)	3. 6787	94411	71442	32159	55
2	(− 1)	1. 3533	52832	36612	69189	39
3	(− 2)	4. 9787	06836	78639	42979	34
4	(− 2)	1. 8315	63888	87341	80293	71
5	(− 3)	6. 7379	46999	08546	70966	36
6	(− 3)	2. 4787	52176	66635	84230	45
7	(− 4)	9. 1188	19655	54516	20800	31
8	(− 4)	3. 3546	26279	02511	83882	13
9	(− 4)	1. 2340	98040	86679	54949	76
10	(− 5)	4. 5399	92976	24848	51535	59

TABLE 1.1. MATHEMATICAL CONSTANTS—Continued

n		ln n				
47		3. 8501	47601	71005	85868	209507
53		3. 9702	91913	55212	18341	444691
59		4. 0775	37443	90571	94506	160504
61		4. 1108	73864	17331	12487	513891
67		4. 2046	92619	39096	60596	700720
71		4. 2626	79877	04131	54213	294545
73		4. 2904	59441	14839	11290	921089
79		4. 3694	47852	46702	14941	729455
83		4. 4188	40607	79659	79234	754722
89		4. 4886	36369	73213	98383	178155
97		4. 5747	10978	50338	28221	167216
$\ln\pi$		1. 1447	29885	84940	01741	43427
$\ln\sqrt{2\pi}$	(−1)	9. 1893	85332	04672	74178	03296

n		$\log_{10} n$				
47		1. 6720	97857	93571	74644	142
53		1. 7242	75869	60078	90456	329
59		1. 7708	52011	64214	41902	606
61		1. 7853	29835	01076	70338	857
67		1. 8260	74802	70082	64341	491
71		1. 8512	58348	71907	52860	928
73		1. 8633	22860	12045	59010	743
79		1. 8976	27091	29044	14279	948
83		1. 9190	78092	37607	39038	327
89		1. 9493	90006	64491	27847	235
97		1. 9867	71734	26624	48517	843
$\log_{10}\pi$	(−1)	4. 9714	98726	94133	85435	126
$\log_{10}e$	(−1)	4. 3429	44819	03251	82765	112

n		n ln 10				
1		2. 3025	85092	99404	56840	17991
2		4. 6051	70185	98809	13680	35983
3		6. 9077	55278	98213	70520	53974
4		9. 2103	40371	97618	27360	71966
5	(1)	1. 1512	92546	49702	28420	08996
6	(1)	1. 3815	51055	79642	74104	10795
7	(1)	1. 6118	09565	09583	19788	12594
8	(1)	1. 8420	68074	39523	65472	14393
9	(1)	2. 0723	26583	69464	11156	16192

n		$n\pi$				
1		3. 1415	92653	58979	32384	626
2		6. 2831	85307	17958	64769	252
3		9. 4247	77960	76937	97153	879
4	(1)	1. 2566	37061	43591	72953	850
5	(1)	1. 5707	96326	79489	66192	313
6	(1)	1. 8849	55592	15387	59430	775
7	(1)	2. 1991	14857	51285	52669	238
8	(1)	2. 5132	74122	87183	45907	701
9	(1)	2. 8274	33388	23081	39146	163

n		π^n				
1		3. 1415	92653	58979	32384	62643
2		9. 8696	04401	08935	86188	34491
3	(1)	3. 1006	27668	02998	20175	47632
4	(1)	9. 7409	09103	40024	37236	44033
5	(2)	3. 0601	96847	85281	45326	27413
6	(2)	9. 6138	91935	75304	43703	02194
7	(3)	3. 0202	93227	77679	20675	14206
8	(3)	9. 4885	31016	07057	40071	28576
9	(4)	2. 9809	09933	34462	11666	50940
10	(4)	9. 3648	04747	60830	20973	71669

n		π^{-n}				
1	(−1)	3. 1830	98861	83790	67153	776
2	(−1)	1. 0132	11836	42337	77144	387
3	(−2)	3. 2251	53443	31994	89184	422
4	(−2)	1. 0265	98225	46843	35189	152
5	(−3)	3. 2677	63643	05338	54726	282
6	(−3)	1. 0401	61473	29585	22960	898
7	(−4)	3. 3109	36801	77566	76432	595
8	(−4)	1. 0539	03916	53493	66633	172
9	(−5)	3. 3546	80357	20886	91287	398
10	(−5)	1. 0678	27922	68615	33662	040

$\pi/2$		1. 5707	96326	79489	66192	31322
$\pi/3$		1. 0471	97551	19659	77461	54214
$\pi/4$	(−1)	7. 8539	81633	97448	30961	56608
$\pi^{1/2}$		1. 7724	53850	90551	60272	98167
$\pi^{1/3}$		1. 4645	91887	56152	32630	20143
$\pi^{1/4}$		1. 3313	35363	80038	97127	97535
$\pi^{2/3}$		2. 1450	29397	11102	56000	77444
$\pi^{3/4}$		2. 3597	30492	41469	68875	78474
$\pi^{3/2}$		5. 5683	27996	83170	78452	84818
π^{e}	(1)	2. 2459	15771	83610	45473	42715
$(2\pi)^{1/2}$		2. 5066	28274	63100	05024	15765
$(\pi/2)^{1/2}$		1. 2533	14137	31550	02512	07883
$\pi(2)^{-1/2}$		2. 2214	41469	07918	31235	07940

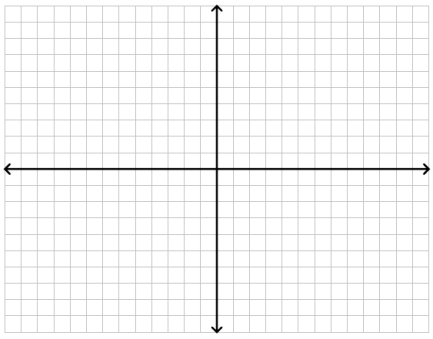
$3\pi/2$		4. 7123	88980	38468	98576	939
$4\pi/3$		4. 1887	90204	78639	09846	168
$\pi(2)^{1/2}$		4. 4428	82938	15836	62470	158
$\pi^{-1/2}$	(−1)	5. 6418	95835	47756	28694	807
$\pi^{-1/3}$	(−1)	6. 8278	40632	55295	68146	702
$\pi^{-1/4}$	(−1)	7. 5112	55444	64942	48285	870
$\pi^{-2/3}$	(−1)	4. 6619	40770	35411	61438	198
$\pi^{-3/4}$	(−1)	4. 2377	72081	23757	59679	100
$\pi^{-3/2}$	(−1)	1. 7958	71221	25166	56168	908
π^{-e}	(−2)	4. 4525	26726	69229	06151	352
$(2\pi)^{-1/2}$	(−1)	3. 9894	22804	01432	67793	994
$(2/\pi)^{1/2}$	(−1)	7. 9788	45608	02865	35587	989
$2^{1/2}/\pi$	(−1)	4. 5015	81580	78553	03477	759

Module 11: Lessons 1 & 2 – Angles in Standard Position

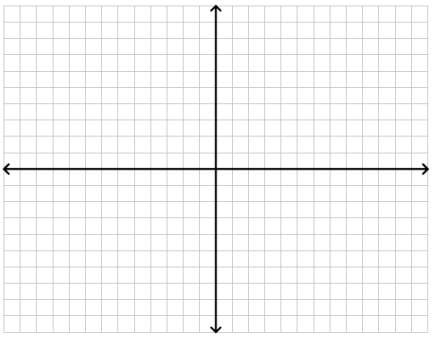
Notes:

Standard Position: An **angle** is in **standard position** if its vertex is located at the origin and one ray is on the positive x-axis. The ray on the x-axis is called the *initial side* and the other ray is called the *terminal side*.

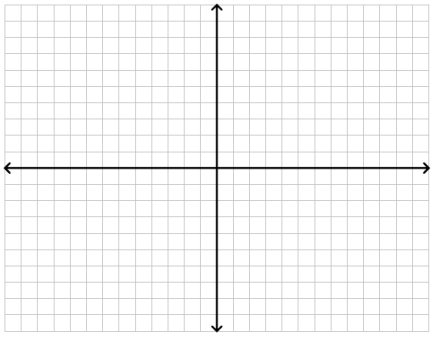
a. Practice drawing a 45^o angle in standard position with your teacher.



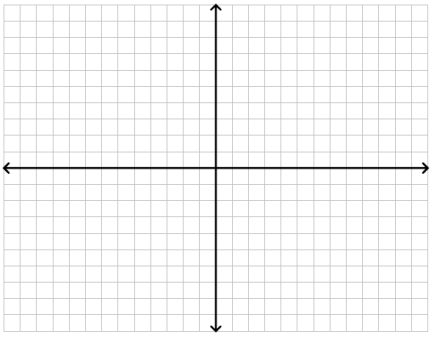
b. Label the terminal rays of each angle as you rotate counter-clockwise every 45^o.



c. Label the terminal rays of each angle as you rotate counter-clockwise every 30^o.

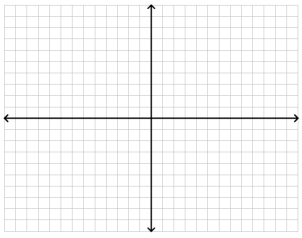


d. Practice drawing a -120^o angle in standard position with your teacher.

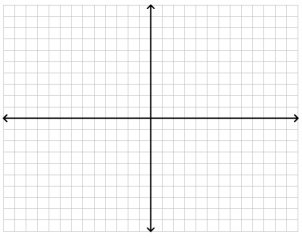


* Practice – Graph each of the following angles in standard position.

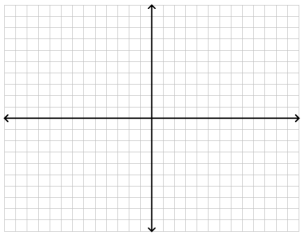
1. 120^o



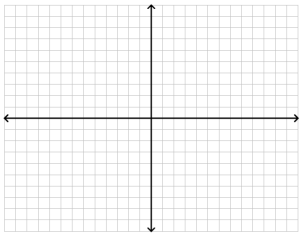
2. -45^o



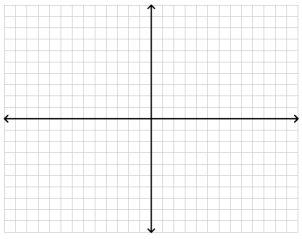
3. 210^o



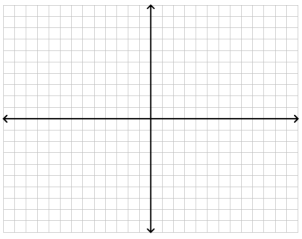
4. 345^o



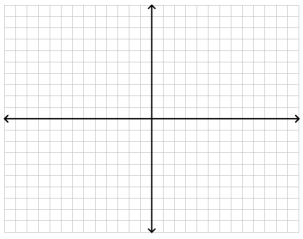
5. -15^o



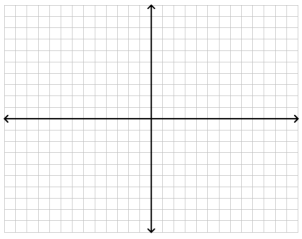
6. 150^o



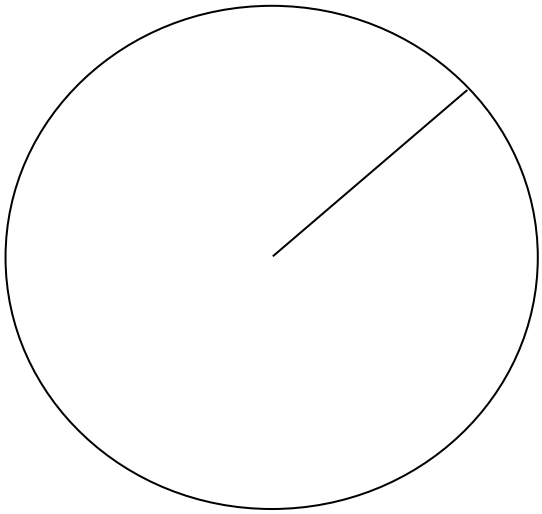
7. 315^o



8. 705^o

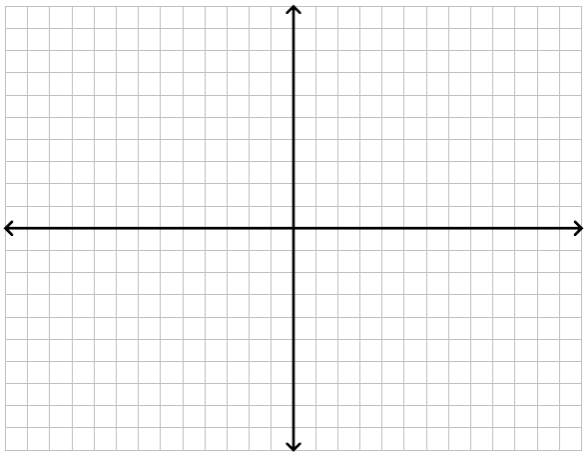


What is a radian?

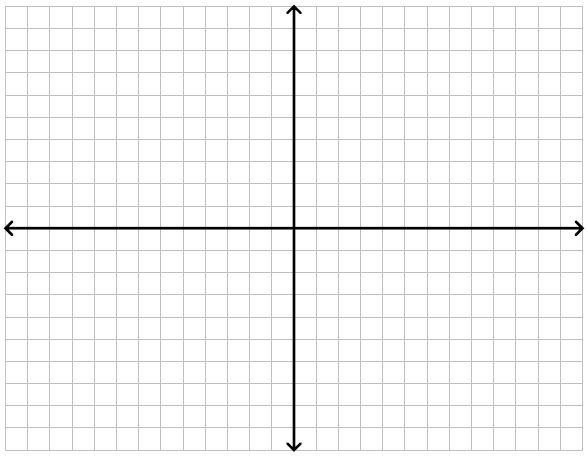


Angles in Standard Position (Radians)

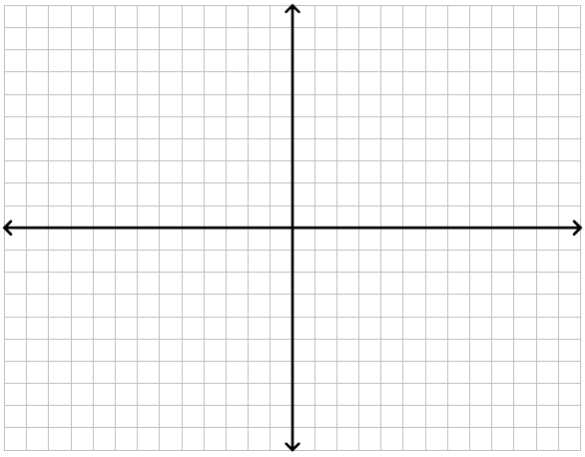
Count by $\frac{\pi}{3}$ for one full rotation.



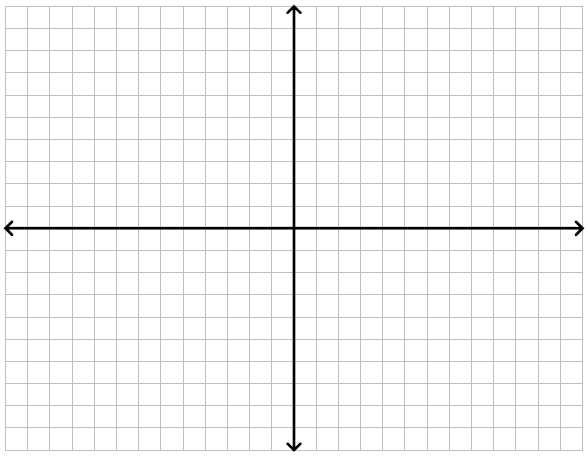
Count by $\frac{\pi}{4}$ for one full rotation.



Count by $\frac{\pi}{2}$ for one full rotation.



Count by $\frac{\pi}{6}$ for one full rotation.



Notes:

Conversion Bank

1 inch = 2.54 cm	1 mile = 1.61 kilometers	2π radians = 360 degrees
1 barrel = 31.5 gallons	1 gallon = 3.7854 liters	π radians = 180 degrees

* Convert each of the following.

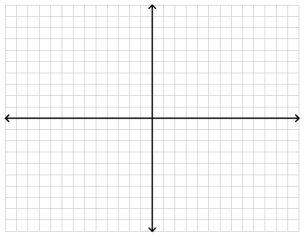
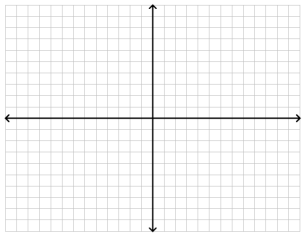
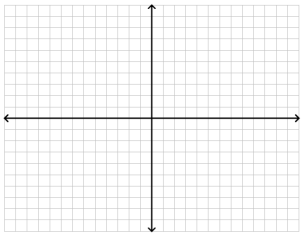
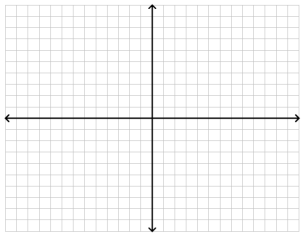
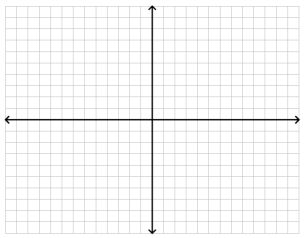
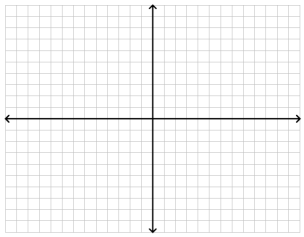
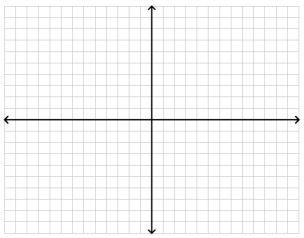
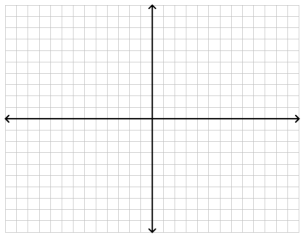
1. How many degrees are in 4.4π radians?	2. How many meters are in 100 yards?
3. How many gallons are in a 2-liter bottle of soda?	4. How many miles are in a 5K race?

Convert each angle measurement in radians to degrees.

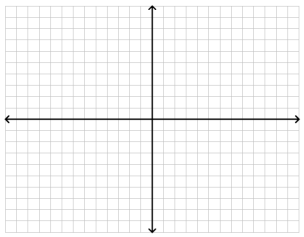
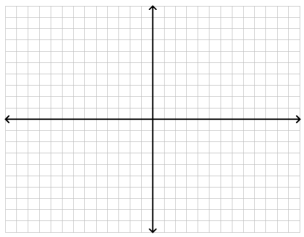
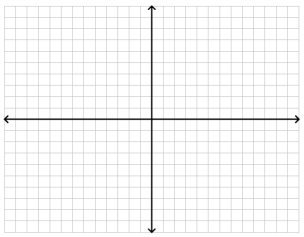
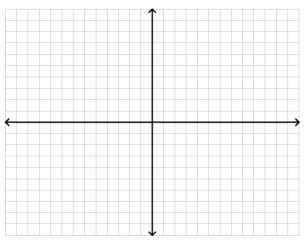
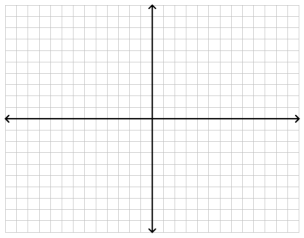
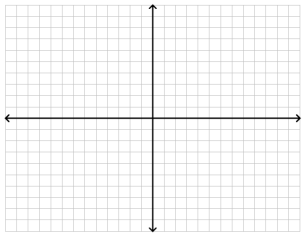
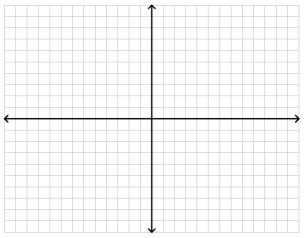
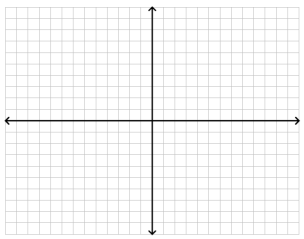
5. $\frac{\pi}{7}$ radians	6. $\frac{\pi}{5}$ radians	7. $\frac{\pi}{12}$ radians
8. $.8\pi$ radians	9. 7 radians	10. 3π radians

Coterminal Angles - angles in standard position (initial ray on the positive x-axis) that have a common terminal ray.

Identify at least two coterminal angles for each angle. If the stated angle is in degrees, give your answers in degrees. If the angle is in radians, give your answers in radians.

1. 120^o 	2. $-\frac{\pi}{4}$ 	3. 210^o 	4. π 
5. -15^o 	6. $\frac{4\pi}{3}$ 	7. 315^o 	8. $\frac{3\pi}{4}$ 

Graph each of the following angles in standard position. Be accurate even though you are estimating the angle.

1. 10^o 	2. $\frac{\pi}{3}$ 	3. 240^o 	4. $\frac{2\pi}{3}$ 
5. -100^o 	6. $\frac{\pi}{7}$ 	7. 500^o 	8. $\frac{6\pi}{5}$ 

Coterminal Angles - *Coterminal angles* are angles in standard position (angles with the initial side on the positive x-axis) that have a common terminal side.

9. Identify at least two coterminal angles for each angle in problems 1-8 on the previous page.	10. Identify two other angles measurements that are coterminal with a 30^o angle in standard position.

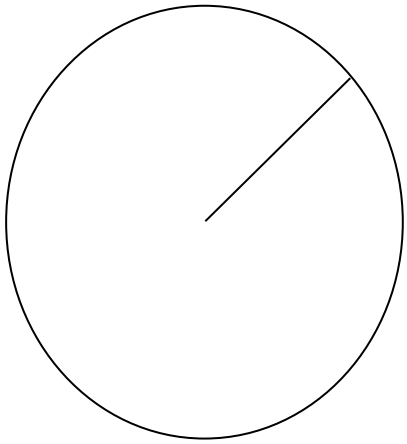
Conversions (including radians & degrees)

Notes:

Conversions – Many times when you do not know a direct conversion from one unit to the next, you can use unit conversions. (*This is an organized way of working through conversions*.)

Converting Radians to Degrees –

Looking at the circle and radius drawn on the right; if you were to take that radius and bend it around the circle, how many of those lengths do think would fit around the circle?



Your Estimate _____

Actual Value _____

Therefore, there are _____ radians per revolution or every 360 degrees.

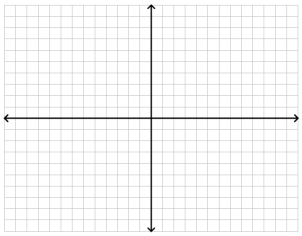
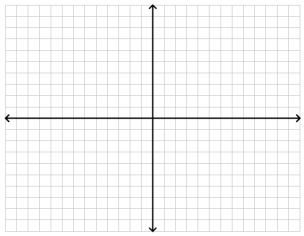
Fractions to use when converting radians and degrees

---

* Convert each from radians to degrees or degrees to radians.

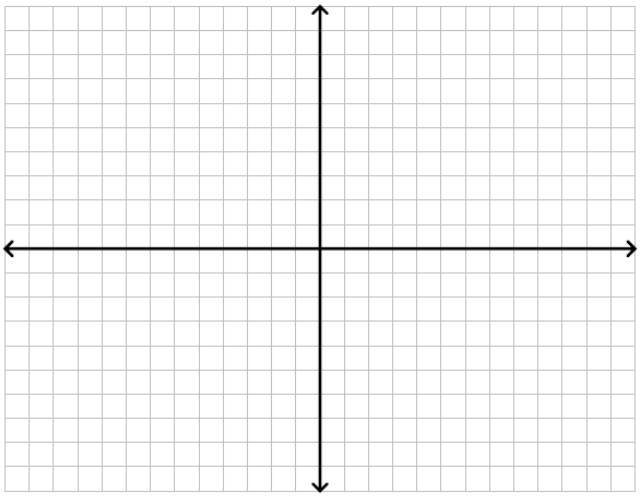
Ex. 4: 2.5π radians	Ex. 5: 60 degrees	Ex. 6: 2 radians	Ex. 7: 150^o

* Review –

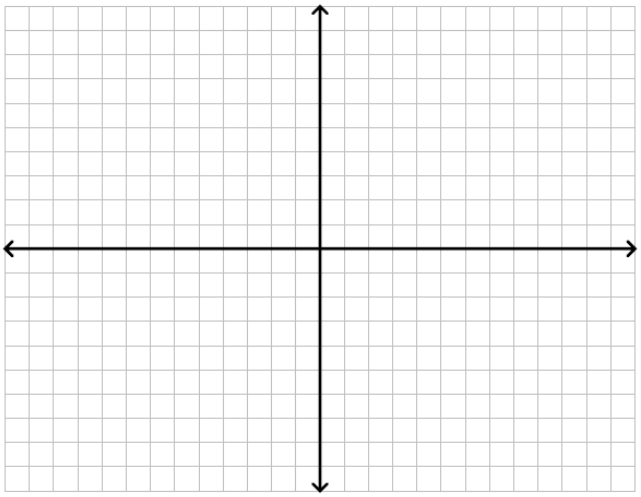
1. Graph 45^o in standard position.	2. Graph 30^o in standard position.	3. Convert 30^o to radians.	4. Convert 45^o to radians.
			

Notes:

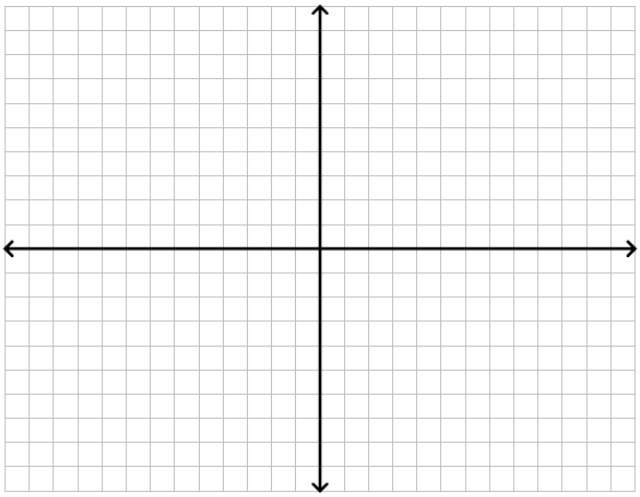
a. Label the terminal rays of each angle as you rotate counter-clockwise every $\frac{\pi}{4}$ radians.



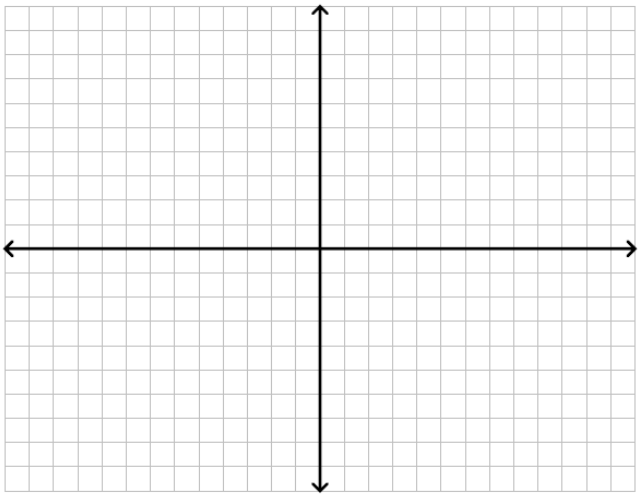
b. Label the terminal rays of each angle as you rotate counter-clockwise every $\frac{\pi}{6}$ radians.



c. Label the terminal rays of each angle as you rotate counter-clockwise every $\frac{\pi}{3}$ radians.



d. Label the terminal rays of each angle as you rotate counter-clockwise every $\frac{\pi}{8}$ radians.

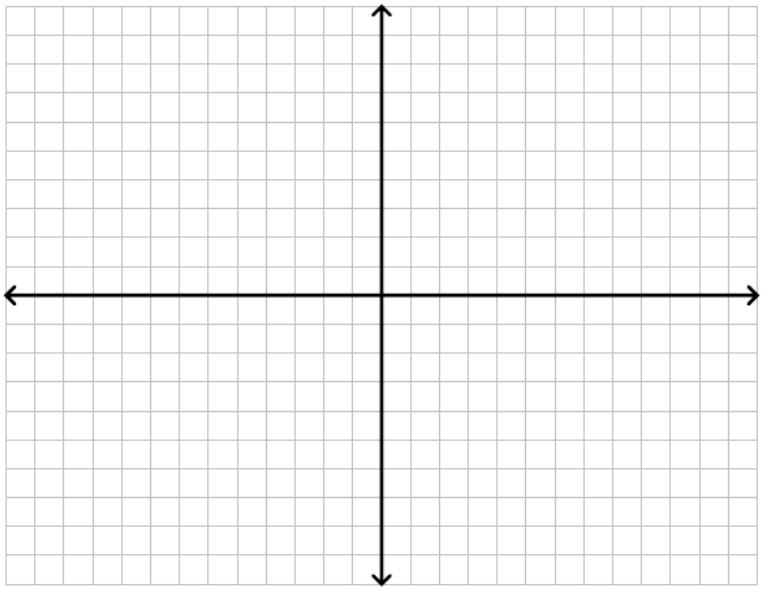


Your own Unique Solutions

You are making up your own problems to solve. Therefore to get credit, your problems and results should be completely different from every other student who turns in their assignment. Be original and creative with what you do here.

1. Choose a unique and original angle measure, and draw that angle in standard position.

Your angle measure: _____ degrees



2. Choose a unique and original angle measure in **RADIANS**. Convert this radian angle measure to degrees while also showing work or how you did it.

Your angle measure: _____ radians

Reciprocal Trigonometric Functions

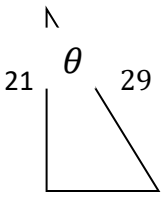
Quick Review of SOH-CAH-TOA

These Trigonometric Functions also have reciprocals.

The cosecant: $\frac{1}{\sin\theta} = \csc\theta$	The secant: $\frac{1}{\cos\theta} = \sec\theta$	The cotangent: $\frac{1}{\tan\theta} = \cot\theta$

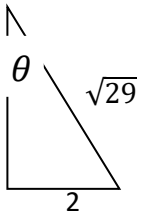
Assume each triangle is a right triangle. Write all three trigonometric equations for each triangle using SOH-CAH-TOA.

1.



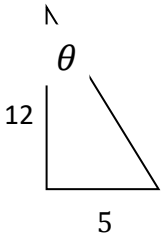
$\sin\theta =$	$\csc\theta =$
$\cos\theta =$	$\sec\theta =$
$\tan\theta =$	$\cot\theta =$

2.



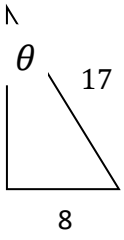
$\sin\theta =$	$\csc\theta =$
$\cos\theta =$	$\sec\theta =$
$\tan\theta =$	$\cot\theta =$

3.



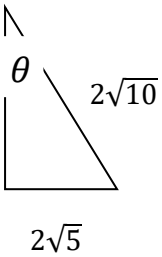
$\sin\theta =$	$\csc\theta =$
$\cos\theta =$	$\sec\theta =$
$\tan\theta =$	$\cot\theta =$

4.



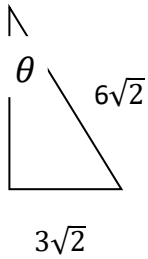
$\sin\theta =$	$\csc\theta =$
$\cos\theta =$	$\sec\theta =$
$\tan\theta =$	$\cot\theta =$

5.



$\sin\theta =$	$\csc\theta =$
$\cos\theta =$	$\sec\theta =$
$\tan\theta =$	$\cot\theta =$

6.



$\sin\theta =$	$\csc\theta =$
$\cos\theta =$	$\sec\theta =$
$\tan\theta =$	$\cot\theta =$

Trigonometry in the First Quadrant

Reference Triangle for 30^o and 60^o.	Reference Triangle for 45^o.

Notes:

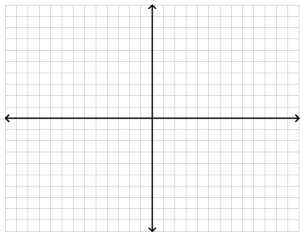
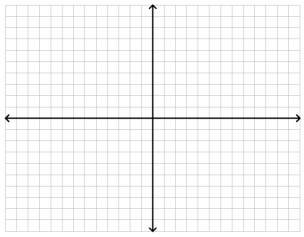
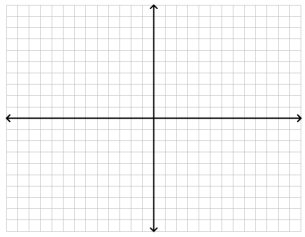
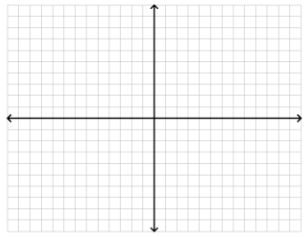
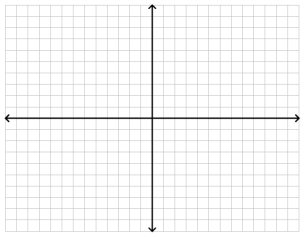
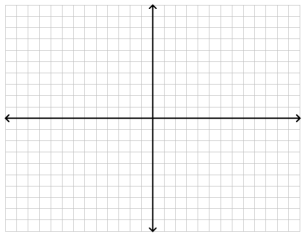
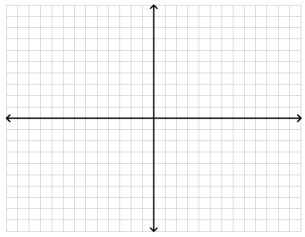
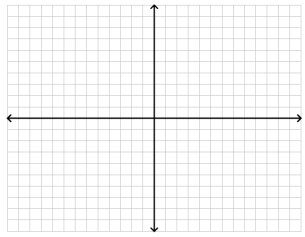
To Evaluate a trig. expression without a calculator:

1. Draw the angle in standard position.
2. Create a "Reference" Right Triangle by dropping an altitude from the terminal ray to the x-axis.
3. Use a Special Right Triangle and a Trigonometric Ratio to determine the value.

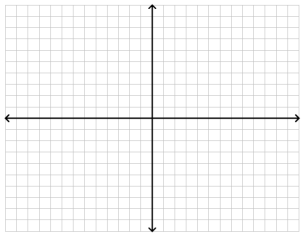
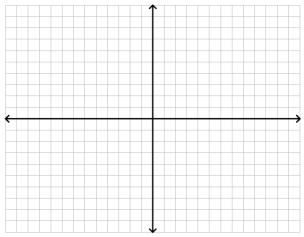
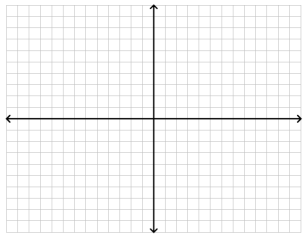
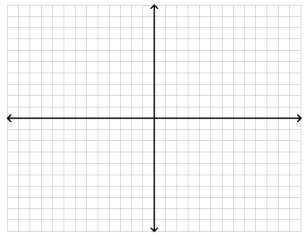
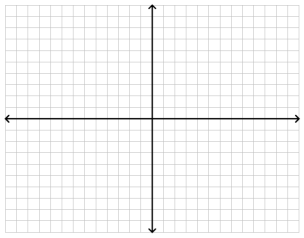
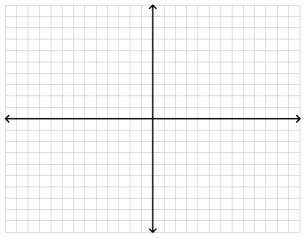
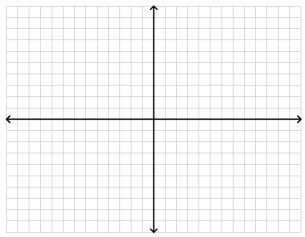
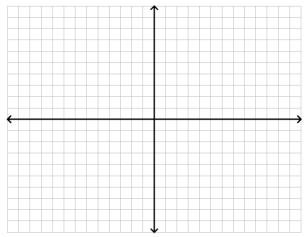
* Practice – Evaluate each trig. expression without a calculator.

1. $sin\ 30^o =$	2. $cos\ 45^o =$	3. $tan\ 60^o =$	4. $sin\ 45^o =$
5. $tan\ 45^o =$	6. $sin\ 60^o =$	7. $cos\ 60^o =$	8. $cos\ 30^o =$
9. $tan\ 30^o =$	10. $csc\ 60^o =$	11. $sec\ 45^o =$	12. $cot\ 30^o =$

* Practice –Draw each reference triangle and evaluate the expression.

1. $\sin\frac{\pi}{4} =$ 	2. $\cos\frac{\pi}{3} =$ 	3. $\tan\frac{\pi}{6} =$ 	4. $\cos\frac{\pi}{4} =$ 
5. $\tan\frac{\pi}{4} =$ 	6. $\sin\frac{\pi}{3} =$ 	7. $\csc\frac{\pi}{3} =$ 	8. $\sec\frac{\pi}{4} =$ 

Solve for values of θ between $0°$ *and* $90°$ (*quadrant I*).

1. $If\ \sin\theta = \frac{1}{2}, find\ \cos\theta$ 	2. $If\ \cos\theta = \frac{2}{3}, find\ \sin\theta$ 	3. $If\ \sin\theta = \frac{4}{5}, find\ \cos\theta$ 	4. $If\ \sin\theta = \frac{3}{4}, find\ \sec\theta$ 
5. $If\ \cos\theta = \frac{2}{3}, find\ \csc\theta$ 	6. $If\ \cos\theta = \frac{4}{5}, find\ \tan\theta$ 	7. $If\ \tan\theta = 4, find\ \sin\theta$ 	8. $If\ \cot\theta = 2, find\ \tan\theta$ 

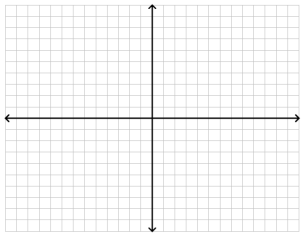
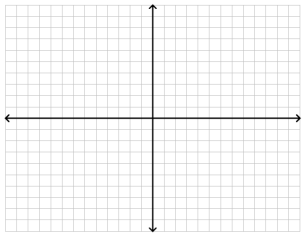
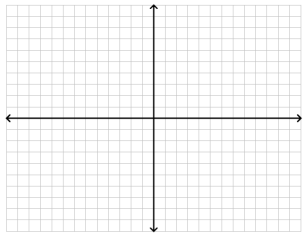
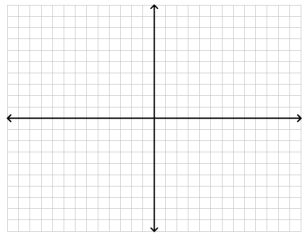
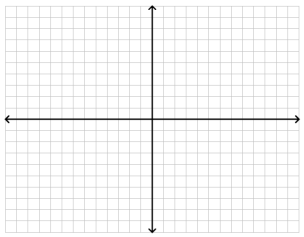
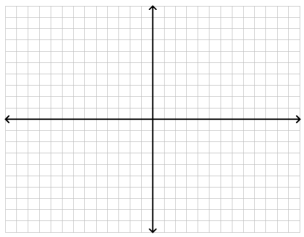
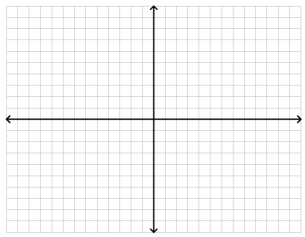
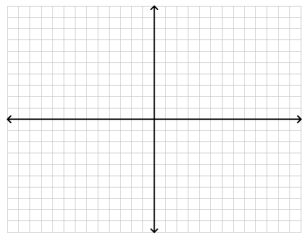
Trigonometry in All Quadrants

Notes:

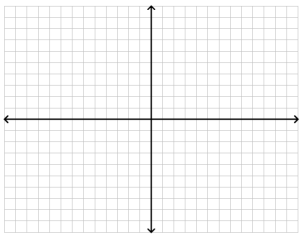
To Evaluate a trig. expression without a calculator:

1. Draw the angle in standard position.
2. Create a "Reference" Right Triangle by dropping an altitude from the terminal ray to the x-axis.
3. Use a Special Right Triangle and a Trigonometric Ratio to determine the value.
4. **Pay Close Attention to Positive and Negative Values.**

* Practice – Evaluate each trig. expression without a calculator.

1. $sin\ 30^o$ 	2. $cos\ 210^o$ 	3. $tan\ 315^o$ 	4. $sin\ 150^o$ 
5. $tan\ 300^o$ 	6. $sin\ 225^o$ 	7. $cos\ 120^o$ 	8. $cos\ 390^o$ 

What do you notice about the signs of each trigonometric function in each quadrant?



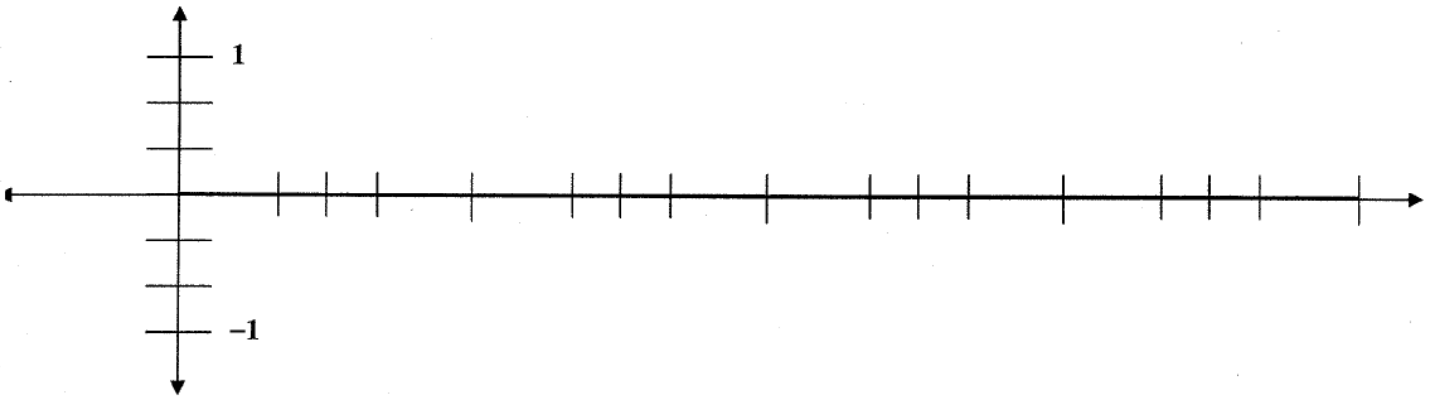
Determine the quadrant.

1. $\cos\theta > 0, \sin\theta > 0$	2. $\tan\theta > 0, \sin\theta < 0$	3. $\cot\theta < 0, \sin\theta < 0$
4. $\tan\theta < 0, \cos\theta < 0$	5. $\csc\theta < 0, \cos\theta < 0$	6. $\sec\theta > 0, \cot\theta > 0$

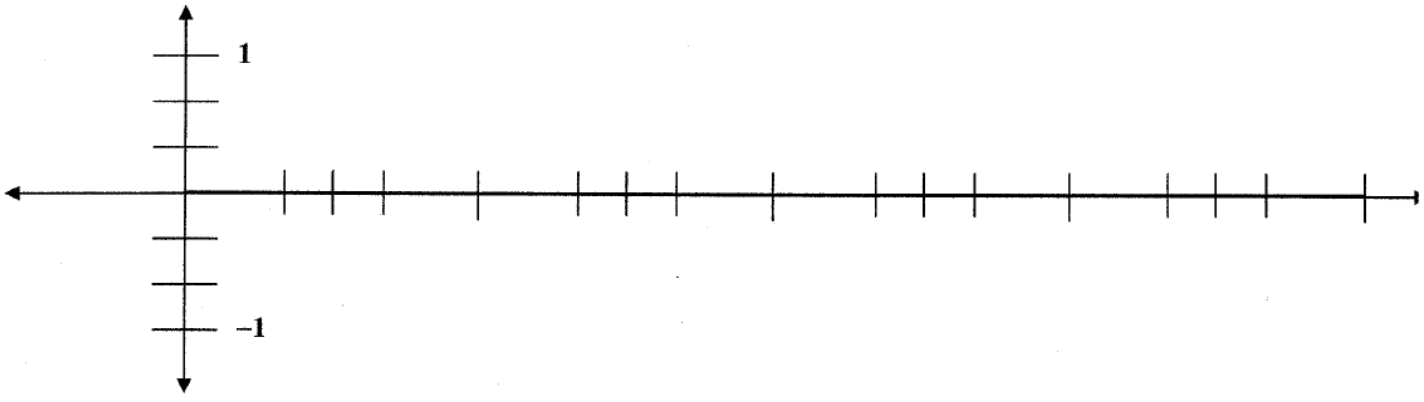
Module 11: Lessons 3 – Graphing Sine and Cosine Functions

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
$y = \sin x$	0				1				0				-1				0
$y = cos\ x$	1				0				-1				0				1

Graph: $y = \sin x$. The sine graph is smooth and rounded. Use the points from the t-table to help sketch its graph.



Graph: $y = \cos x$. The cosine graph is smooth and rounded. Use the points from the t-table to help sketch its graph.

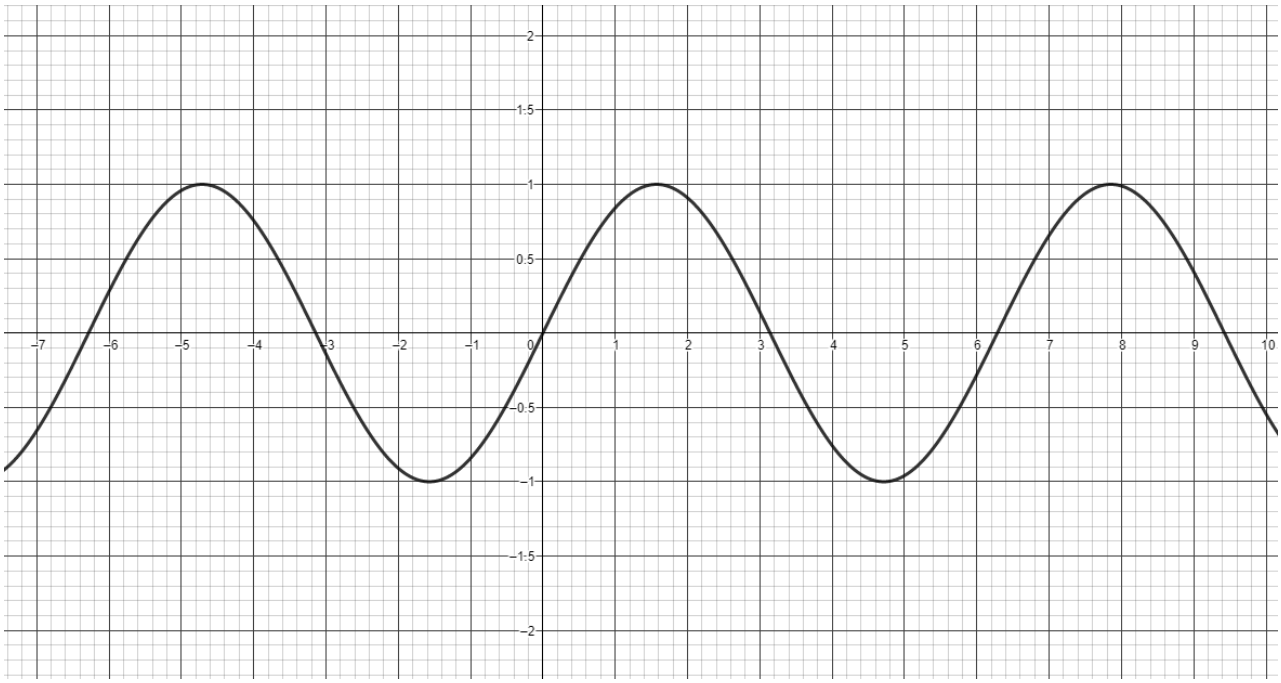


Streamline the Graphing Process (One Period)

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

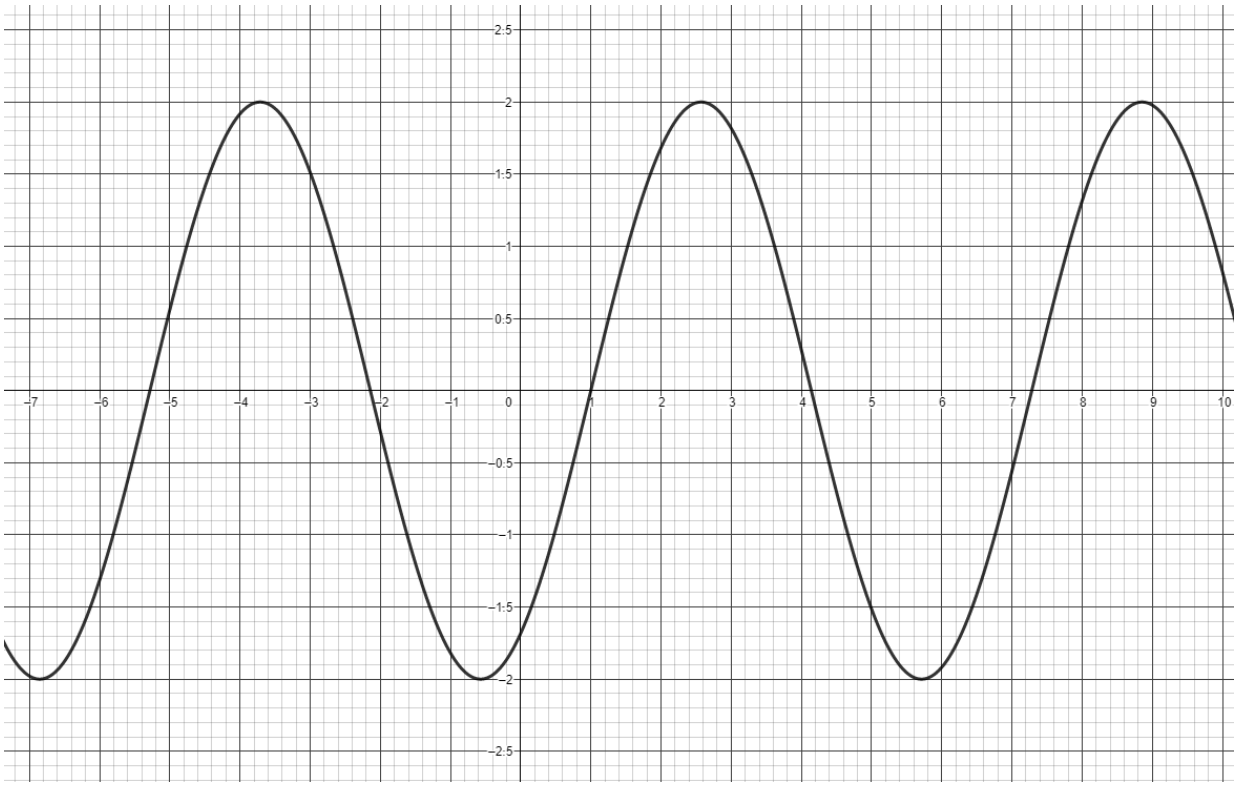
Matching Sine Wave Functions

Reference: Sine Wave Parent Function $y = \sin(x)$



Duplicate each wave form using the parent function $y = \sin(x)$ and your understanding of transformations. Write your function equation in the space provided.

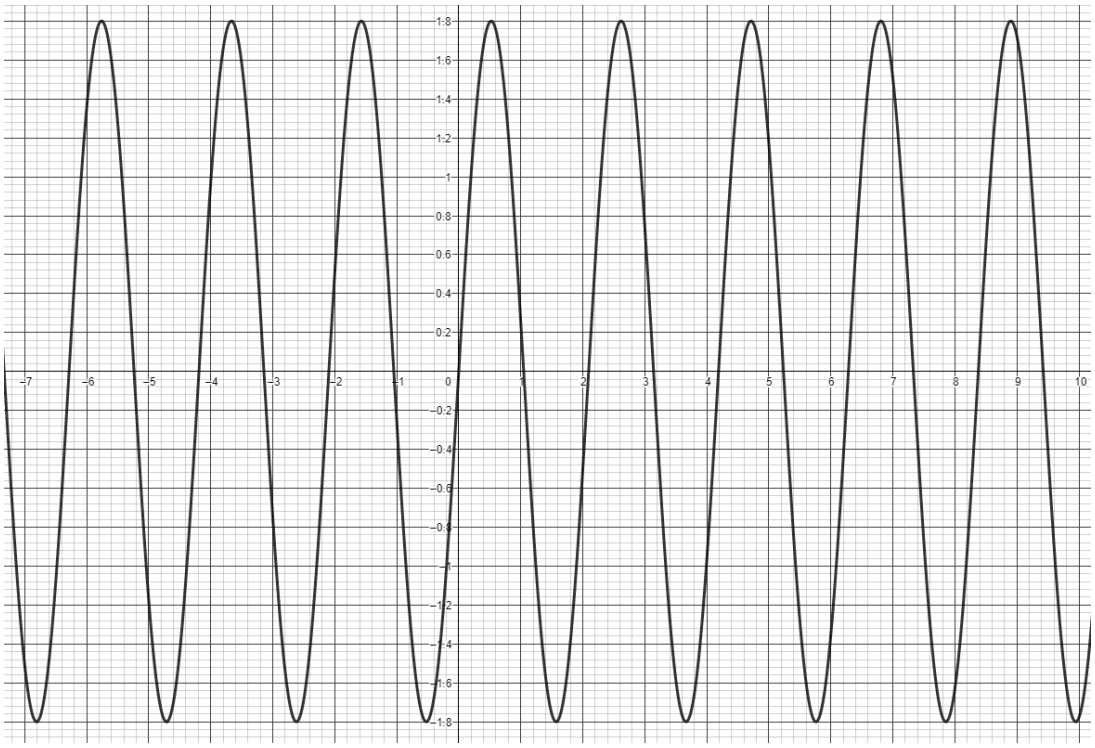
1.



Duplicate each wave form using the parent function $y = \sin(x)$ and your understanding of transformations.

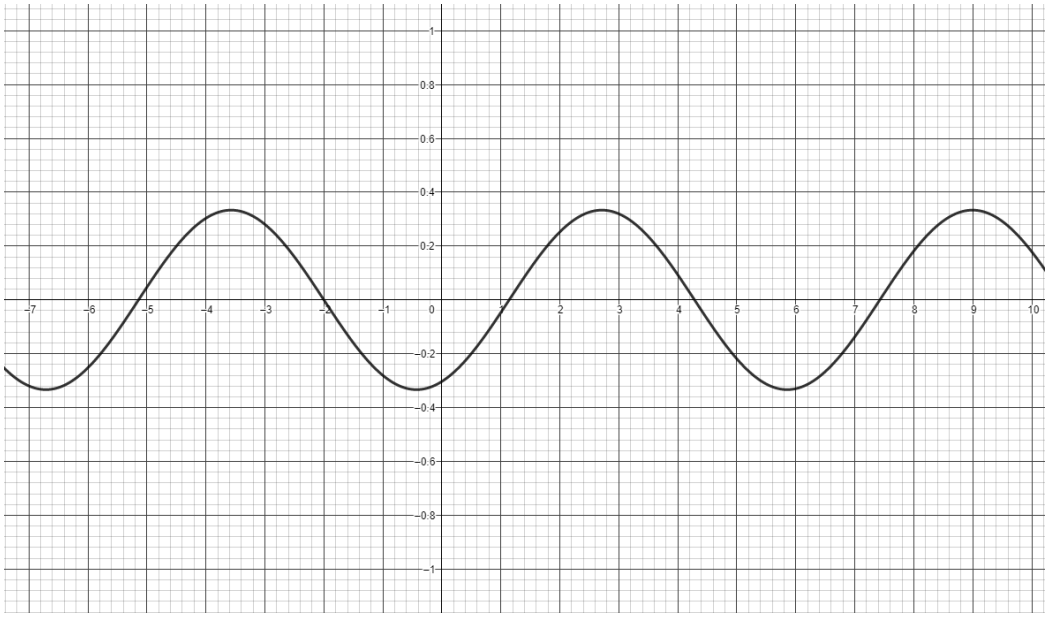
Write your function equation in the space provided.

2.



Duplicate each wave form using the parent function $y = \sin(x)$ and your understanding of transformations. Write your function equation in the space provided.

3.



r. Find the following information for the function: $y = -\sin\left(\frac{x}{3} - \pi\right) - 4$. *NOTE*: $-\sin\left(\frac{x}{3} - \pi\right) - 4 = -\sin\frac{1}{3}(x - 3\pi) - 4$

Amplitude: _____ Domain: _____

Period: _____ Range: _____

Phase Shift: _____ Appropriate interval to graph one complete wave: _____

Vertical Shift: _____ y-intercept: _____

s. Find the following information for the function: $y = 3\cos\left(2\pi x + \frac{\pi}{3}\right) + 2$. *NOTE*: $3\cos\left(2\pi x + \frac{\pi}{3}\right) + 2 = 3\cos 2\pi\left(x + \frac{1}{6}\right) + 2$

Amplitude: _____ Domain: _____

Period: _____ Range: _____

Phase Shift: _____ Appropriate interval to graph one complete wave: _____

Vertical Shift: _____ y-intercept: _____