

Honors Math 3

Unit 7 Trigonometry (Answers)

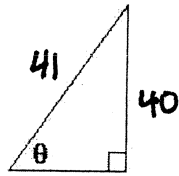
Day	Date	Lesson	Classwork	Homework						
W	4/29	Right Triangle Trig. Special Right Triangles	Warm-up p. 1-5	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW- Practice with Right Triangles	100	92	84	76	68	60
100	92	84	76	68	60					
Th	4/30	Right Triangle Special Right Triangles Applications	Warm-up p. 1-5	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW-Notes on Trig. Identities/Unit Circle	100	92	84	76	68	60
100	92	84	76	68	60					
F	5/1	Unit Circle Pythagorean Identity	Warm-up Paper Plate Activity	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW- Notes on Converting/Angles in the Coord. Plane	100	92	84	76	68	60
100	92	84	76	68	60					
M	5/4	Convert Radians-Degrees Degrees, Minutes, Seconds Angle Measurement	Warm-up p. 6-15	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW-Review and Practice	100	92	84	76	68	60
100	92	84	76	68	60					
Tu	5/5	Quiz	Quiz Begin Activity	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW-Notes on Graphing Sine and Cosine	100	92	84	76	68	60
100	92	84	76	68	60					
W	5/6	Unwrapping the Unit Circle Graphing	Spaghetti Activity	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW-Notes on Writing Equations of Sine and Cosine	100	92	84	76	68	60
100	92	84	76	68	60					
Th	5/7	Graphing Sine and Cosine Writing Equations	Warm-up p. 16-19	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW-Review previous pages in packet	100	92	84	76	68	60
100	92	84	76	68	60					
F	5/8	Graphing Sine and Cosine Writing Equations	Warm-up p. 20-23	<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>100</td> <td>92</td> <td>84</td> <td>76</td> <td>68</td> <td>60</td> </tr> </table> HW-Review for Trig. Test	100	92	84	76	68	60
100	92	84	76	68	60					
M	5/11	Review	Review	Review for Trig. Unit Test Rework problems in the packet!!						
Tu	5/12	Test	Test	HW-Notes to begin Unit 8						

ICM Trigonometry Worksheet #1

Use the definitions of the trigonometric functions to label the correct sides of the triangle. Then find the length of the third side and the values of the other five trigonometric functions.

1) If $\cos \theta = \frac{9}{41}$, find the following:

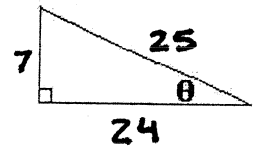
$$\begin{aligned} \sin \theta &= \frac{40}{41} \\ \tan \theta &= \frac{40}{9} \\ \cot \theta &= \frac{9}{40} \\ \sec \theta &= \frac{41}{9} \\ \csc \theta &= \frac{41}{40} \end{aligned}$$



$$\begin{aligned} 41^2 - 9^2 &= a^2 \\ 1600 &= a^2 \\ 40 &= a \end{aligned}$$

2) If $\tan \theta = \frac{7}{24}$, find the following:

$$\begin{aligned} \sin \theta &= \frac{7}{25} \\ \cos \theta &= \frac{24}{25} \\ \cot \theta &= \frac{24}{7} \\ \sec \theta &= \frac{25}{24} \\ \csc \theta &= \frac{25}{7} \end{aligned}$$

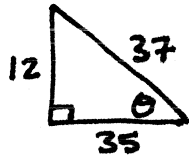


$$\begin{aligned} 7^2 + 24^2 &= c^2 \\ 625 &= c^2 \\ 25 &= c \end{aligned}$$

In the problems below, you will also need to draw your triangle for reference.

3) If $\csc \theta = \frac{37}{12}$, find the following:

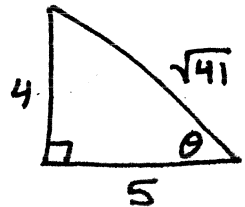
$$\begin{aligned} \sin \theta &= \frac{12}{37} \\ \cos \theta &= \frac{35}{37} \\ \tan \theta &= \frac{12}{35} \\ \cot \theta &= \frac{35}{12} \\ \sec \theta &= \frac{37}{35} \end{aligned}$$



$$\begin{aligned} 37^2 - 12^2 &= b^2 \\ 1225 &= b^2 \\ 35 &= b \end{aligned}$$

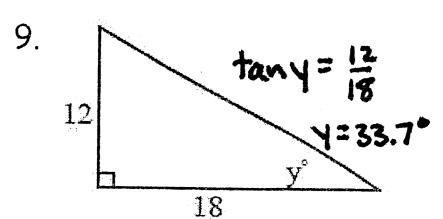
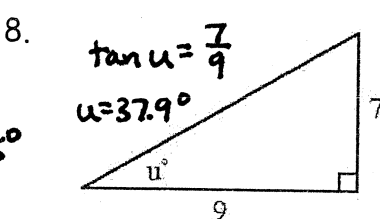
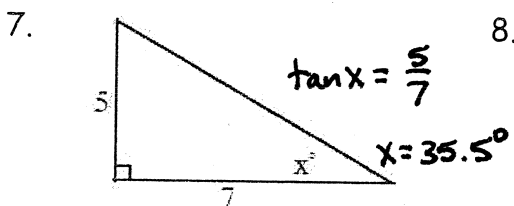
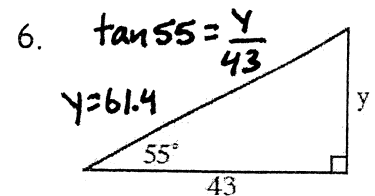
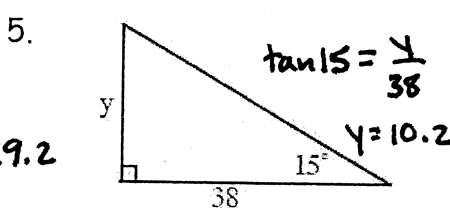
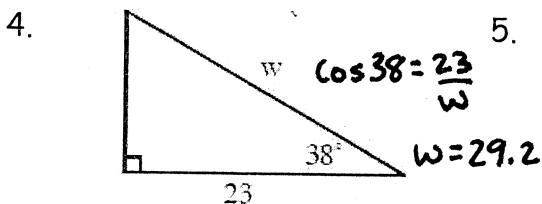
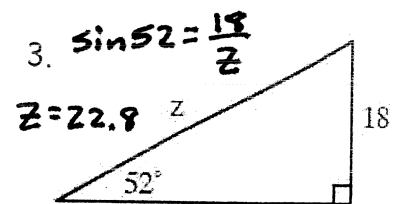
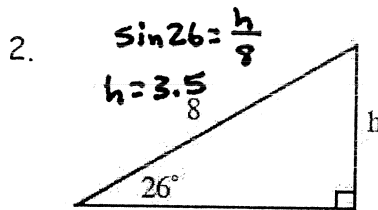
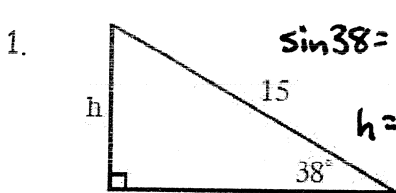
4) If $\cot \theta = \frac{5}{4}$, find the following:

$$\begin{aligned} \sin \theta &= \frac{4}{\sqrt{41}} \\ \cos \theta &= \frac{5}{\sqrt{41}} \\ \tan \theta &= \frac{4}{5} \\ \sec \theta &= \frac{\sqrt{41}}{5} \\ \csc \theta &= \frac{\sqrt{41}}{4} \end{aligned}$$



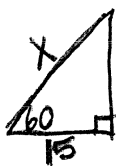
$$\begin{aligned} 4^2 + 5^2 &= c^2 \\ 41 &= c^2 \\ \sqrt{41} &= c \end{aligned}$$

Use trig ratios to solve for the missing side or angle. Round to the nearest tenth.



Draw a triangle and label for each problem. Show your work. Round to the nearest tenth.

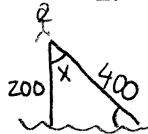
1.



A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up at his precious damsel, the angle of elevation to her window is 60 degrees. How long does the ladder have to be?

$$\cos 60 = \frac{15}{X} \quad X \cos 60 = 15 \quad X = 30$$

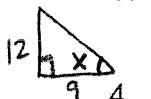
2.



You are 200 yards from a river. Rather than walking directly to the river, you walk 400 yards along a straight path to the river's edge. Find the acute angle between path and the river's edge.

$$\cos X = \frac{200}{400} \quad \cos^{-1}\left(\frac{200}{400}\right) = X \quad X = 60 \quad 90^\circ - 60^\circ = 30^\circ$$

3.



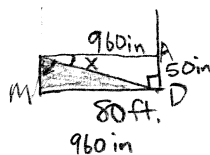
A 12 meter flagpole casts a 9 meter shadow. Find the angle of elevation of the sun.

$$\tan X = \frac{12}{9} \quad X = \tan^{-1}\left(\frac{12}{9}\right) \quad X = 53.1^\circ$$

Suppose you're flying a kite, and it gets caught at the top of the tree. You've let out all 100 feet of string for the kite, and the angle that the string makes with the ground is 75 degrees. Instead of worrying about how to get your kite back, you wonder.

"How tall is that tree?" $\sin 75 = \frac{X}{100} \quad 100 \sin 75 = X \quad X = 96.6$

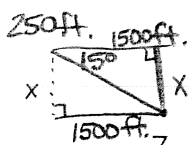
5.



Suppose that Mike and Dave are making measurements for the road-paving crew. They need to know how much the land slopes downward along a particular stretch of road. Dave walks 80 feet from Mike and holds up a long pole, perpendicular to the ground, that has markings every inch along it. Mike looks at the pole through a sighting instrument. Looking straight across, parallel to the horizon, Mike sights a point on the pole 50 inches above the ground- call it point A. Then Mike looks through the instrument at the bottom of the pole, creating an angle of depression. Which is the angle of depression or slope of the road, to where Mike is standing?

$$\tan X = \frac{50}{960} \quad \tan^{-1}\left(\frac{50}{960}\right) = 2.98 \quad \text{Slope of the road} = 90 - 2.98 = 87^\circ$$

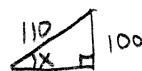
6.



A submersible traveling at a depth of 250 feet dives at an angle of 15° with respect to a line parallel to the water's surface. It travels a horizontal distance of 1500 feet during the dive. What is the depth of the submersible after the dive?

$$\tan 15^\circ = \frac{X}{1500} \quad 1500 \tan 15^\circ = X \quad X = 401.9 + 250 = 651.9 \text{ ft.}$$

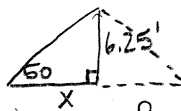
7.



A fire department's longest ladder is 110 feet long, and the safety regulation states that they can use it for rescues up to 100 feet off the ground. What is the maximum safe angle of elevation for the rescue ladder?

$$\sin X = \frac{100}{110} \quad \sin^{-1}\left(\frac{100}{110}\right) = X \quad X = 65.4^\circ$$

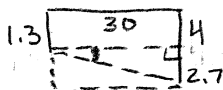
8.



Brothers Bob and Tom Katz buy a tent that has a center pole 6.25 feet high. If the sides of the tent are supposed to make a 50° angle with the ground, how wide is the tent?

$$\tan 50 = \frac{6.25}{X} \quad X \tan 50 = 6.25 \quad X = 5.24 (2) = 10.5 \text{ feet}$$

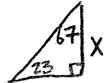
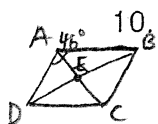
9.



A swimming pool is 30 meters long and 12 meters wide. The bottom of the pool is slanted so that the water depth is 1.3 meters at the shallow end and 4 meters at the deep end. Find the angle of depression of the bottom of the pool.

$$\tan X = \frac{2.7}{30} \quad \tan^{-1}\left(\frac{2.7}{30}\right) = 5.1^\circ$$

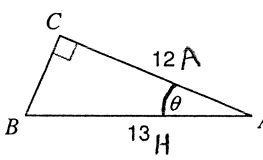
In rhombus ABCD, diagonals AC and BD meet at point E. If the measure of angle DAB is 46°, find the length of EB.

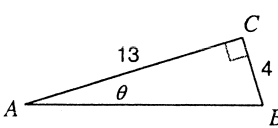


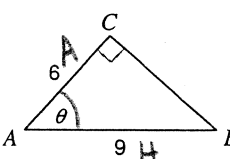
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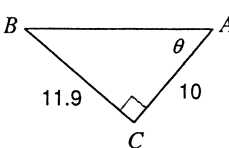
Right Triangle Trig. - Finding Missing Sides and Angles Date _____ Period _____

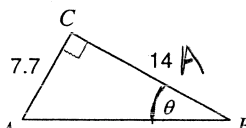
Find the measure of each angle indicated. Round to the nearest tenth.

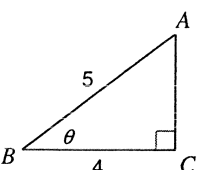
1)  $\cos \theta = \frac{12}{13}$
 $\cos^{-1}\left(\frac{12}{13}\right) = \theta$
 $22.6^\circ = \theta$

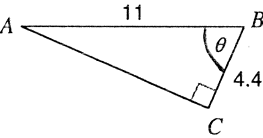
2)  $\tan \theta = \frac{4}{13}$
 $\theta = 17.1^\circ$

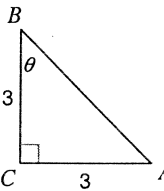
3)  $\cos \theta = \frac{6}{9}$
 $\theta = 48.2^\circ$

4)  $\tan \theta = \frac{11.9}{10}$
 $\theta = 50^\circ$

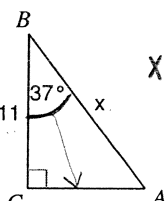
5)  $\tan \theta = \frac{7.7}{14}$
 $\theta = 28.8$

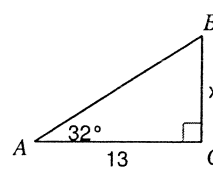
6)  $\cos \theta = \frac{4}{5}$
 $\theta = 36.9^\circ$

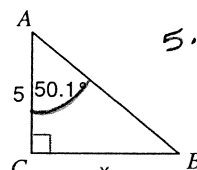
 $\cos \theta = \frac{4.4}{11}$
 $\theta = 66.4^\circ$

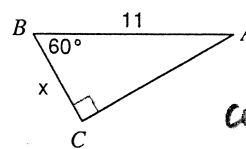
8)  $\tan \theta = \frac{3}{3}$
 $\theta = 45^\circ$

Find the measure of each side indicated. Round to the nearest tenth.

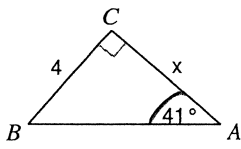
9)  $x \cdot \cos 37^\circ = \frac{11 \cdot x}{x}$
 $x \cdot \cos 37^\circ = 11$
 $\frac{x \cdot \cos 37^\circ}{\cos 37^\circ} = \frac{11}{\cos 37^\circ}$
 13.8°

10)  $\tan 32^\circ = \frac{x}{13}$
 $13 \tan 32^\circ = x$
 $x = 8.1$

11)  $5 \cdot \tan 50.1^\circ = \frac{x}{5} \cdot 5$
 $6.0 = x$

12)  $\cos 60^\circ = \frac{x}{11}$
 $11 \cos 60^\circ = x$
 $5.5 = x$

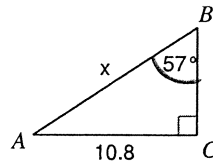
13)



$$\tan 41^\circ = \frac{4}{x}$$

$$4.6 = x$$

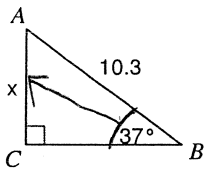
14)



$$\sin 57^\circ = \frac{10.8}{x}$$

$$x = 12.9$$

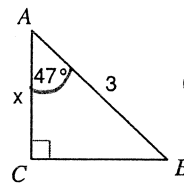
15)



$$\sin 37^\circ = \frac{x}{10.3}$$

$$6.2 = x$$

16)

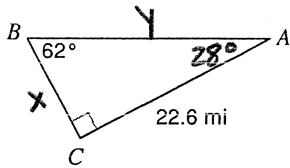


$$\cos 47^\circ = \frac{x}{3}$$

$$2.0 = x$$

Solve each triangle. Round answers to the nearest tenth.

17)



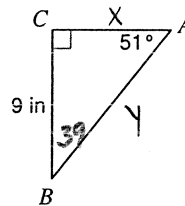
$$\tan 62^\circ = \frac{22.6}{x}$$

$$x = 12.0$$

$$\sin 62^\circ = \frac{22.6}{y}$$

$$y = 25.6$$

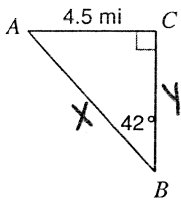
18)



$$\sin 51^\circ = \frac{9}{y} \quad y = 11.6$$

$$\tan 51^\circ = \frac{9}{x} \quad x = 7.3$$

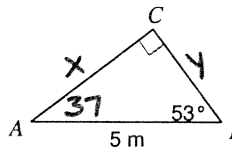
19)



$$\tan 42^\circ = \frac{4.5}{y} \quad y = 5$$

$$\sin 42^\circ = \frac{4.5}{x} \quad x = 6.7$$

20)



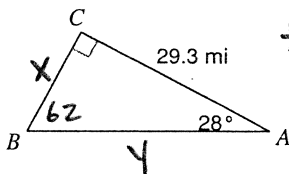
$$\sin 53^\circ = \frac{x}{5}$$

$$x = 4$$

$$\cos 53^\circ = \frac{y}{5}$$

$$y = 3$$

21)

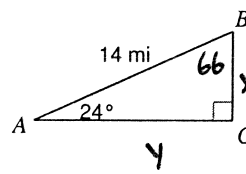


$$\tan 28^\circ = \frac{x}{29.3} \quad x = 15.6$$

$$\cos 28^\circ = \frac{29.3}{y}$$

$$y = 33.2$$

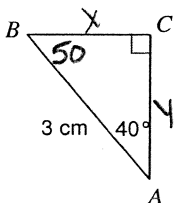
22)



$$\sin 24^\circ = \frac{x}{14} \quad x = 5.7$$

$$\cos 24^\circ = \frac{y}{14} \quad y = 12.8$$

23)



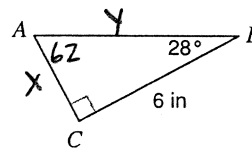
$$\sin 40^\circ = \frac{x}{3}$$

$$x = 1.9$$

$$\cos 40^\circ = \frac{y}{3}$$

$$y = 2.3$$

24)



$$\tan 28^\circ = \frac{x}{6}$$

$$x = 3.2$$

$$\cos 28^\circ = \frac{6}{y}$$

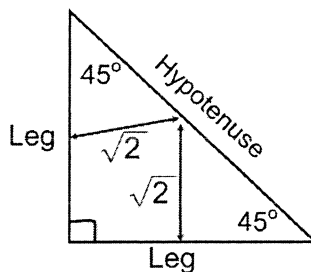
$$y = 6.8$$

Trigonometry Prerequisite: Special Right Triangles

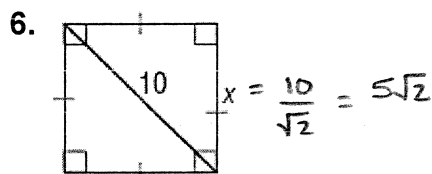
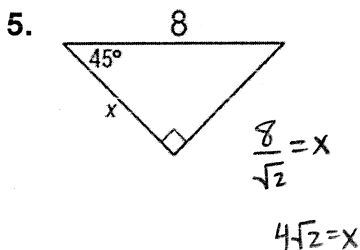
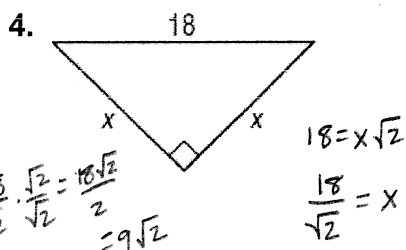
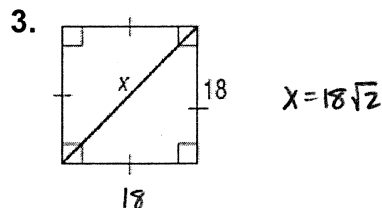
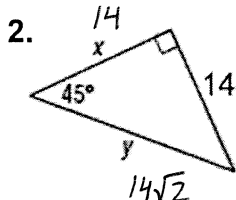
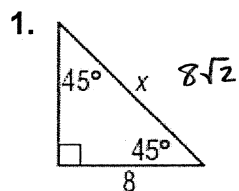
Special Right Triangles: 45° - 45° - 90°

Hypotenuse = Leg * $\sqrt{2}$ $\sqrt{2}$

Leg = $\frac{\text{hypotenuse}}{\sqrt{2}}$



Find the value of x in each triangle.

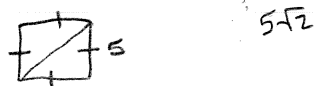


Sketch the figure that is described. Find the requested measure.

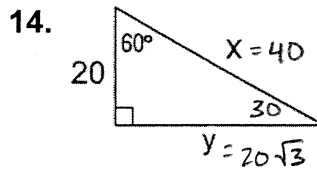
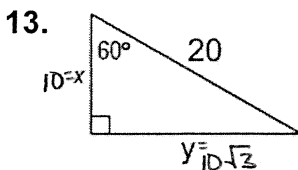
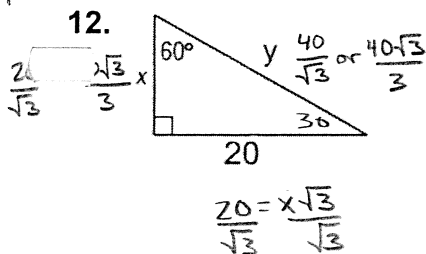
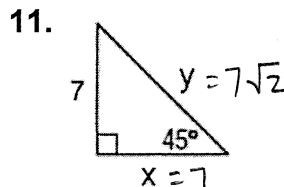
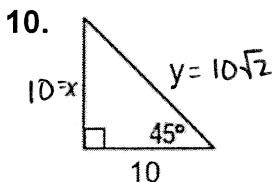
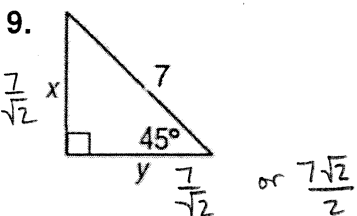
7. The perimeter of a square is 48 meters. Find the length of a diagonal.



8. The perimeter of a square is 20 cm. Find the length of a diagonal.



Find the value of x and y in each figure.

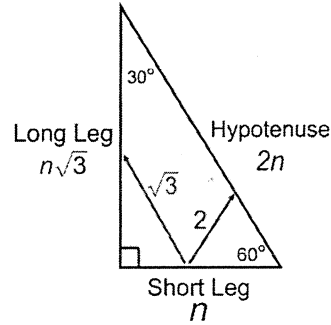


Trigonometry Prerequisite: Special Right Triangles

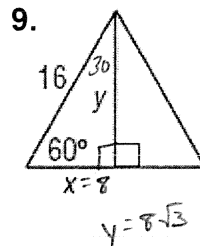
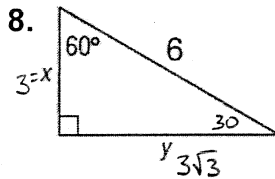
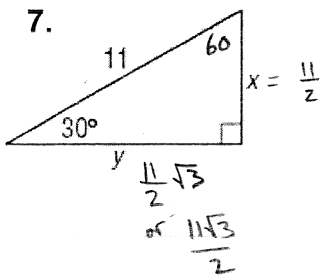
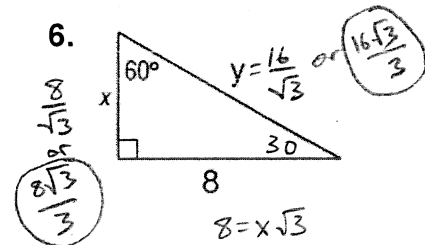
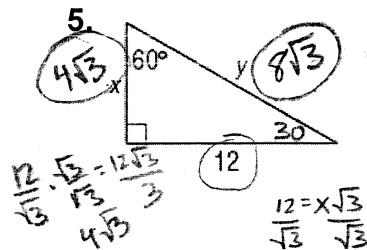
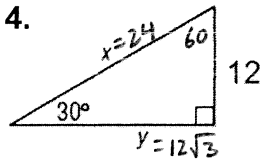
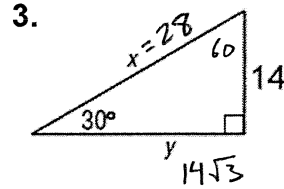
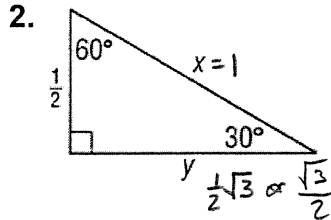
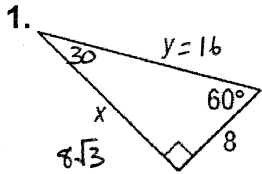
Special Right Triangles: 30° - 60° - 90°

Hypotenuse = 2 * Short Leg

Long Leg = Short Leg * $\sqrt{3}$

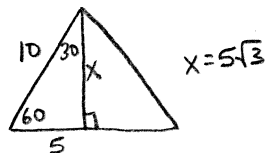


Find the value of x and y in each triangle.

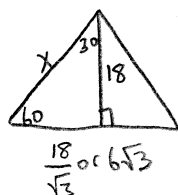


Sketch the figure that is described. Then, find the requested measure.

10. An equilateral triangle has a side length of 10 inches. Find the length of the triangles altitude.



11. The altitude of an equilateral triangle is 18 inches. Find the length of a side.

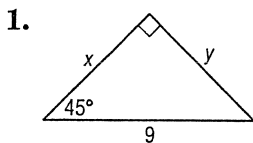


$$x = \frac{36}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{36\sqrt{3}}{3} = 12\sqrt{3}$$

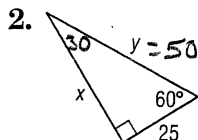
7-3 Practice

Special Right Triangles

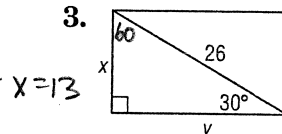
Find x and y .



y and $x = \frac{9}{\sqrt{2}}$ or $\frac{9\sqrt{2}}{2}$

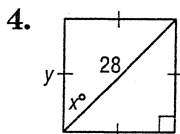


$x = 25\sqrt{3}$

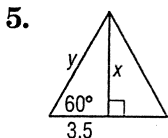


$x = 13$

$y = 13\sqrt{3}$

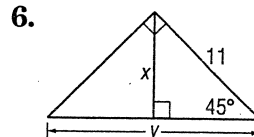


$x = 45^\circ$ $y = \frac{28}{\sqrt{2}}$ or $14\sqrt{2}$



$y = 7$

$x = 3.5\sqrt{3}$ or $\frac{7\sqrt{3}}{2}$



$x = \frac{11}{\sqrt{2}}$ or $\frac{11\sqrt{2}}{2}$

$y = 11\sqrt{2}$

For Exercises 7-9, use the figure at the right.

7. If $a = 4\sqrt{3}$, find b and c .

$b = 12$

$c = 8\sqrt{3}$

8. If $x = 3\sqrt{3}$, find a and CD .

$a = 6\sqrt{3}$

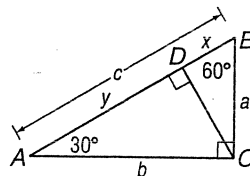
$CD = 9$

9. If $a = 4$, find CD , b , and y .

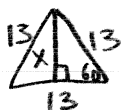
$CD = 2\sqrt{3}$

$b = 4\sqrt{3}$

$y = 6$



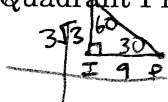
10. The perimeter of an equilateral triangle is 39 centimeters. Find the length of an altitude of the triangle.



$\sin 60 = \frac{x}{13}$

$x = 11.3$

11. $\triangle MIP$ is a 30° - 60° - 90° triangle with right angle at I , and \overline{IP} the longer leg. Find the coordinates of M in Quadrant I for $I(3, 3)$ and $P(12, 3)$.



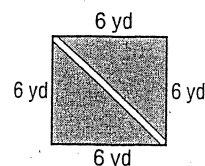
$9 = x\sqrt{3}$

$\frac{9\sqrt{3}}{3} = 3\sqrt{3}$

$M(3, 3 + 3\sqrt{3})$

12. $\triangle TJK$ is a 45° - 45° - 90° triangle with right angle at J . Find the coordinates of T in Quadrant II for $J(-2, -3)$ and $K(3, -3)$.

13. **BOTANICAL GARDENS** One of the displays at a botanical garden is an herb garden planted in the shape of a square. The square measures 6 yards on each side. Visitors can view the herbs from a diagonal pathway through the garden. How long is the pathway?



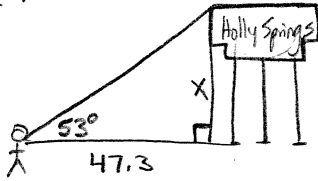
RIGHT TRIANGLE WORKSHEET

↓ Answers on Sep. Page ↓

1. Suppose you have been assigned to measure the height of the local water tower. Climbing makes you dizzy, so you decide to do the whole job at ground level. From a point 47.3 meters from the base of the water tower, you find that you must look up at an angle of 53° to see the top of the tower. How tall is the tower? Draw the triangle.
2. A ship is passing through the Strait of Gibraltar. At its closest point of approach, Gibraltar radar determines that it is 2400 meters away. Later, the radar determines that it is 2650 meters away. By what angle did the ship's bearing from Gibraltar change? How far did the ship travel during the two observations?
3. You lean a ladder 6.7 meters long against the wall. It makes an angle of 63° with the level ground. How high up is the top of the ladder?
4. You must order a new rope for the flagpole. To find out what length of rope is needed, you observe that pole casts a shadow 11.6 meters long on the ground. The angle between the sun's rays and the ground is 36.8° . How tall is the pole?
5. Your cat is trapped on a tree branch 6.5 meters above the ground. Your ladder is only 6.7 meters long. If you place the ladder's tip on the branch, what angle will the ladder make with the ground?
6. The tallest freestanding structure in the world is the 553 meter tall CN tower in Toronto, Ontario. Suppose that at a certain time of day it casts a shadow 1100 meters long on the ground. What is the angle of elevation of the sun at that time of day?
7. Scientists estimate the heights of features on the moon by measuring the lengths of the shadows they cast on the moon's surface. From a photograph, you find that the shadow cast on the inside of a crater by its rim is 325 meters long. At the time the photograph was taken, the sun's angle to the horizontal surface was 23.6° . How high does the rim rise above the inside of the crater?
8. A beam of gamma rays is to be used to treat a tumor known to be 5.7 cm beneath the patient's skin. To avoid damaging a vital organ, the radiologist moves the source over 8.3 cm. At what angle to the patient's skin must the radiologist aim the gamma ray source to hit the tumor? How far will the gamma rays have to pass through the body to hit the tumor?
9. When surveyors measure land that slopes significantly, the distance which is measured will be longer than the horizontal distance which must be drawn on a map. Suppose that the distance from the top edge of the Okapi Creek bed to the edge of the water is 37.8 meters. The land slopes downward at 27.6° to the horizontal. a) What is the horizontal distance from the top of the banks to the edge of the creek? b) How far is the surface of the creek below the level of the surrounding land?
10. From a point on the North Rim of the Grand Canyon, a surveyor, sighting the South Rim a little below the North Rim, measures the angle to be 1.3° . From an aerial photograph, he determines that the horizontal distance between the two points is 1600 meters. How many meters is the South Rim below the North Rim?
11. A submarine at the surface of the ocean makes an emergency dive, its path making an angle of 21° with the surface. If it goes for 300 meters along its downward path, how deep will it be? What horizontal distance is it from its starting point?
12. An observer 5.2 kilometers from the launch pad observes a missile ascending. At a particular, the angle of elevation is 37.6° . How high is the missile?
13. Suppose that you are on a salvage ship in the Gulf of Mexico. Your sonar system has located a sunken Spanish galleon at a slant distance of 683 meters from your ship, with an angle to the horizontal of 27.8° . How deep is the water at the galleon's location? How far must you sail to be directly above the galleon?

p.5 Unit 7

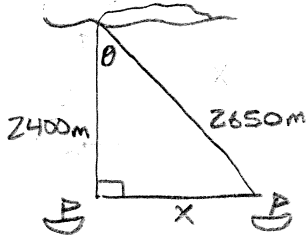
①



$$\tan 53^\circ = \frac{X}{47.3}$$

$$X = 62.8 \text{ m plus your height}$$

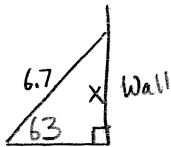
②



$$\cos \theta = \frac{2400}{2650} \quad \theta = 25^\circ$$

$$\sin 25^\circ = \frac{X}{2650} \quad X = 1119.93 \text{ m} \approx 1120 \text{ m}$$

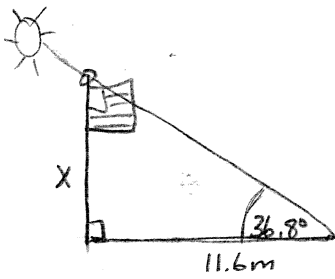
③



$$\sin 63^\circ = \frac{X}{6.7}$$

$$X = 5.97 \text{ m}$$

④



$$\tan 36.8^\circ = \frac{X}{11.6}$$

$$X = 8.7 \text{ m}$$

⑤

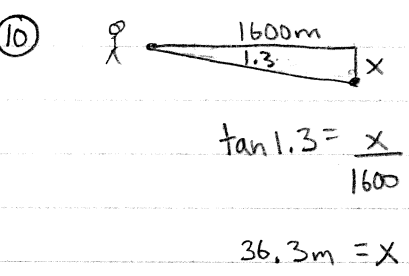
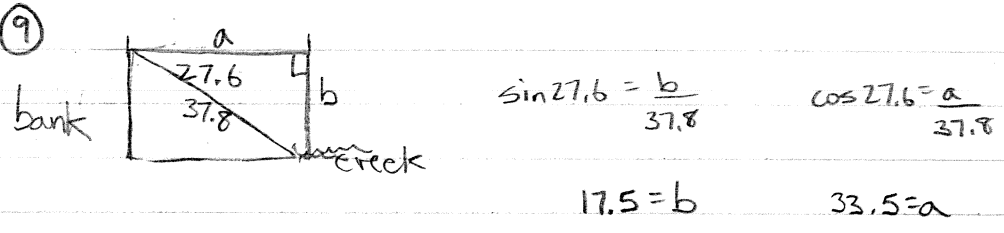
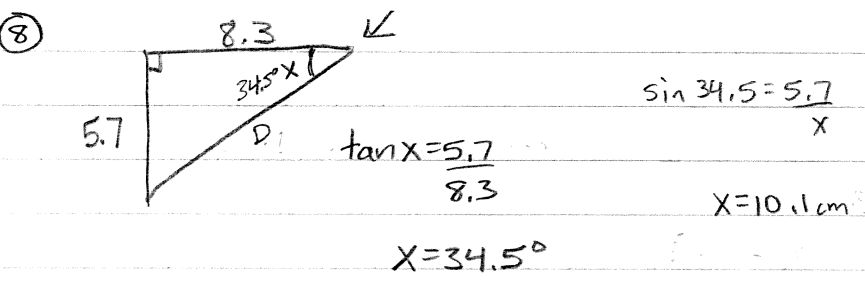
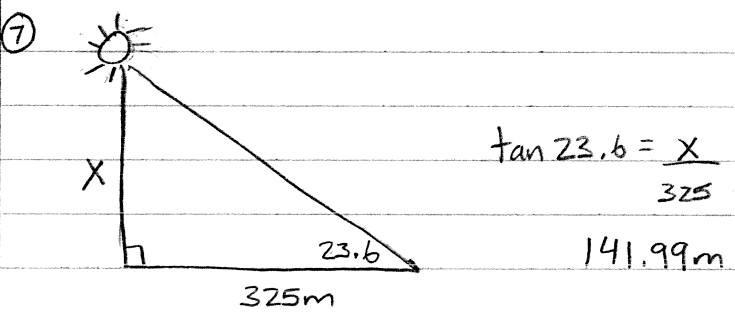
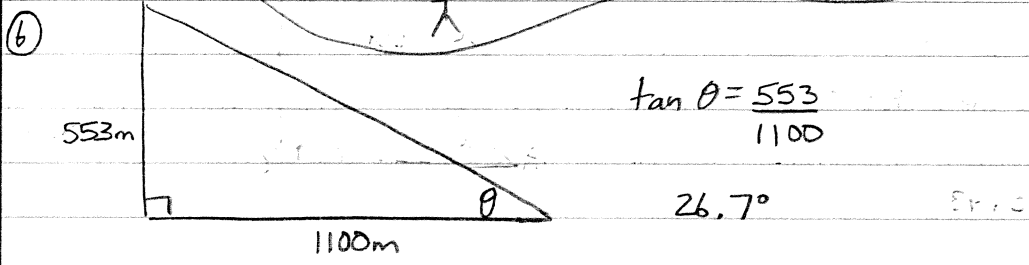
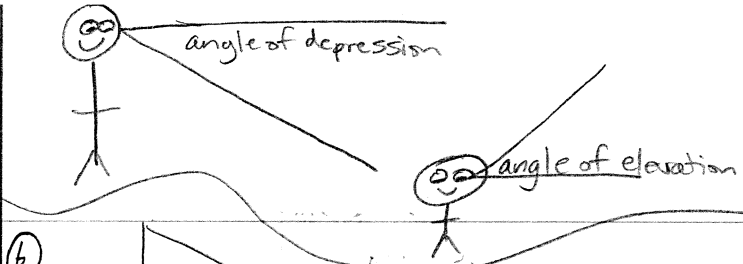


$$\sin \theta = \frac{6.5}{6.7}$$

$$\theta = 76^\circ$$

$$\sin^{-1} \sin \theta = \sin^{-1} \left(\frac{6.5}{6.7} \right)$$

$$\theta =$$



p. 6 Unit 7

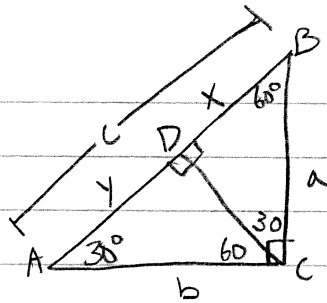
⑦ $a = 4\sqrt{3}$ find b and c

$$b = 4\sqrt{3}(\sqrt{3}) = 4\sqrt{9} = 4(3) = 12$$

$$b = 12$$

$$c = 4\sqrt{3}(2) = 8\sqrt{3}$$

$$c = 8\sqrt{3}$$



⑧ $x = 3\sqrt{3}$ find a and CD

$$a = 3\sqrt{3}(2) = 6\sqrt{3}$$

$$CD = 3\sqrt{3}(\sqrt{3}) = 3\sqrt{9} = 3(3) = 9$$

⑨ $a = 4$ find CD , b , and y

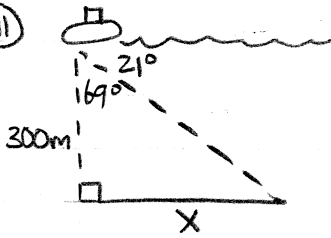
$$4 = 2x, x = 2 \quad CD = 2\sqrt{3} \text{ (short side of } \triangle ADC)$$

(short side)

$$b = 4\sqrt{3}$$

$$y = 2\sqrt{3}(\sqrt{3}) = 2\sqrt{9} = 2(3) = 6$$

11



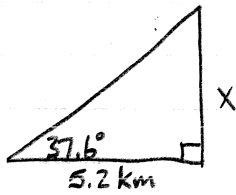
$$90^\circ - 21^\circ = 69^\circ$$

$$\tan 69 = \frac{X}{300}$$

$$300 \tan 69 = X$$

$$\boxed{781.5 = X}$$

12

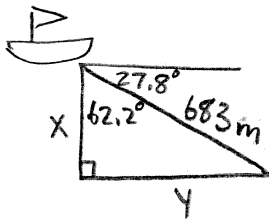


$$\tan 37.6 = \frac{X}{5.2}$$

$$5.2 \tan 37.6 = X$$

$$\boxed{4 \text{ km} = X}$$

13



$$90^\circ - 27.8^\circ = 62.2^\circ$$

$$\cos 62.2 = \frac{X}{683}$$

$$683 \cos 62.2 = X$$

$$\boxed{318.5 \text{ m} = X}$$

(how deep galleon's location is)

$$\sin 62.2 = \frac{Y}{683}$$

$$683 \sin 62.2 = Y$$

$$\boxed{604.2 \text{ m} = Y}$$

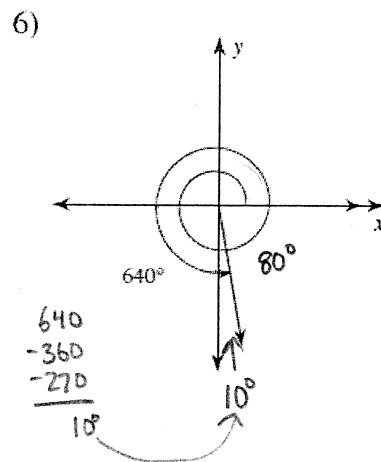
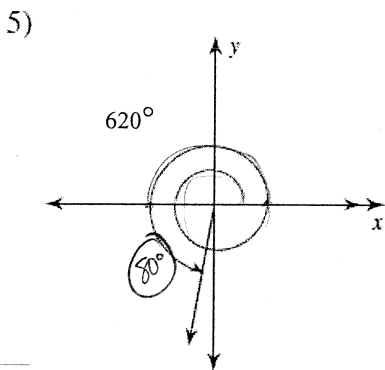
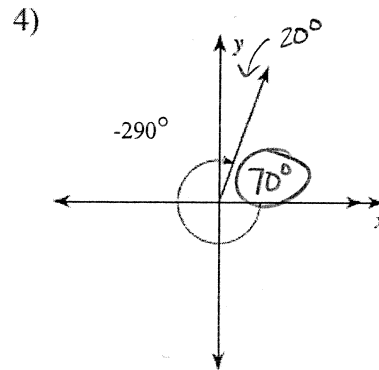
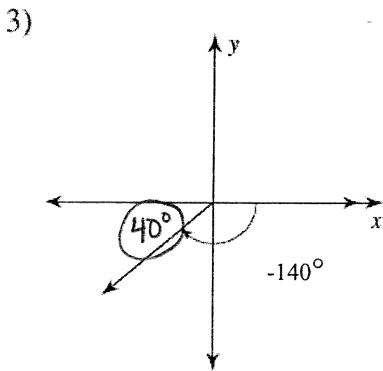
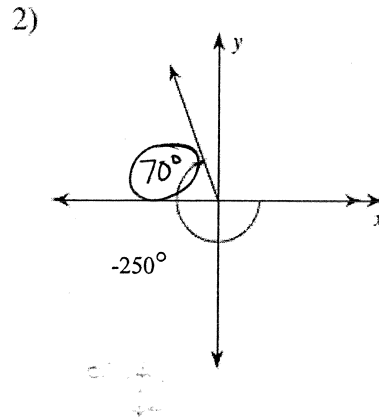
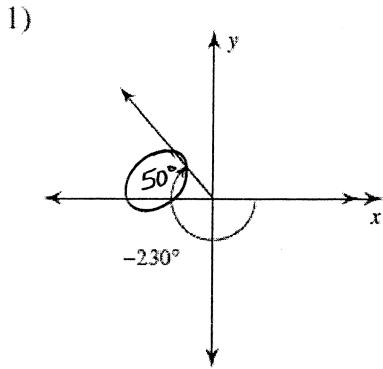
(how far you must travel)

5.1: Homework

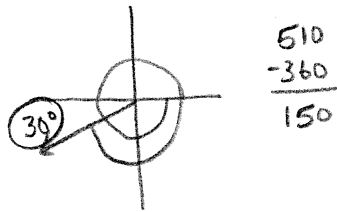
Coterminal Angles and Reference Angles

Date _____ Period _____

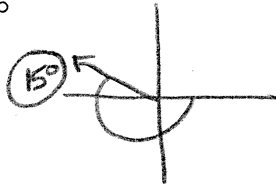
Find the reference angle.



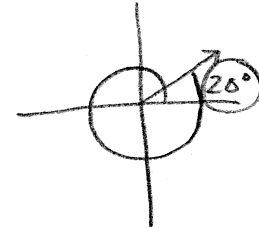
7) -510°



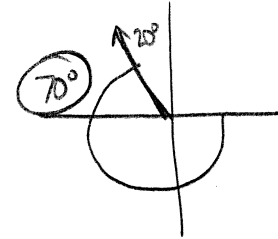
9) -195°



8) 380°

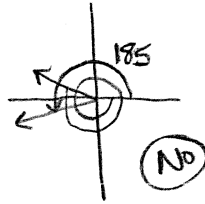


10) -250°

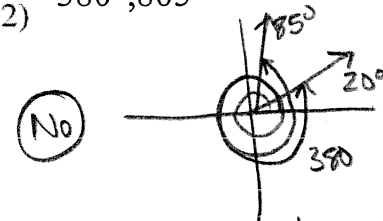


State if the given angles are coterminal.

11) $185^\circ, -545^\circ$



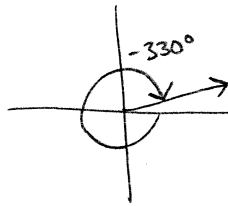
12) $380^\circ, 805^\circ$



Find a coterminal angle between 0° and 360° .

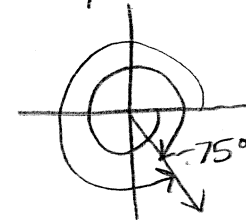
13) -330°

30°



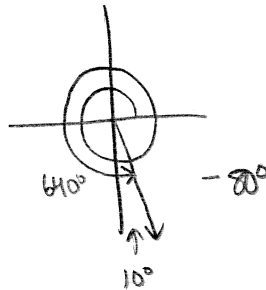
14) -435°

285°

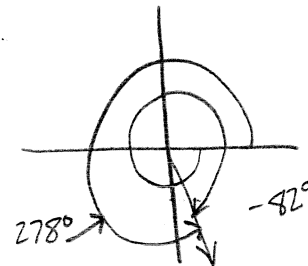


15) 640°

280°



16) -442°



Draw each angle in standard position, and find its reference angle.

a) $\theta = 50^\circ$

b) $\theta = 120^\circ$

c) $\theta = 165^\circ$

d) $\theta = 240^\circ$

e) $\theta = 90^\circ$

f) $\theta = -180^\circ$

g) $\theta = 45^\circ$

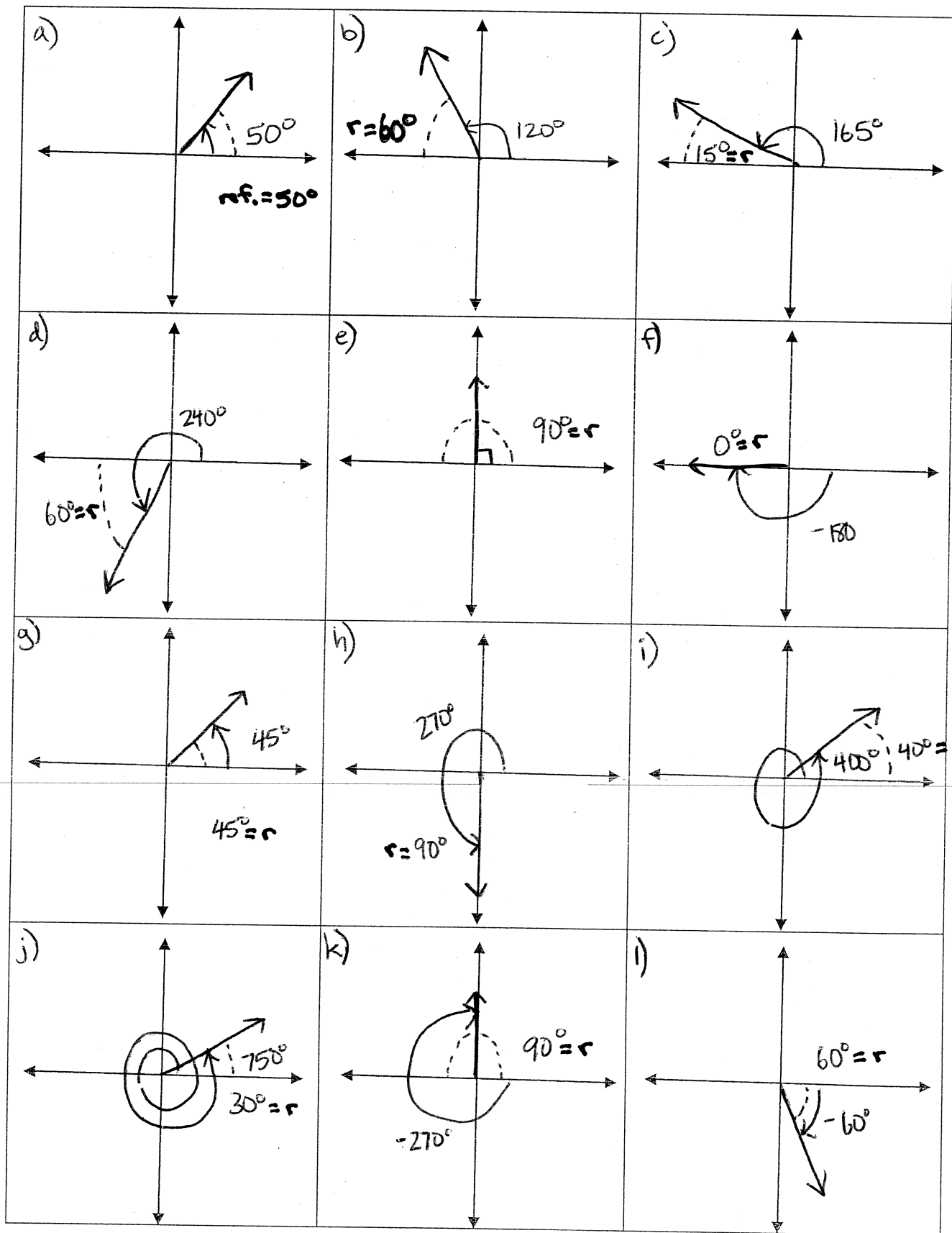
h) $\theta = 270^\circ$

i) $\theta = 400^\circ$

j) $\theta = 750^\circ$

k) $\theta = -270^\circ$

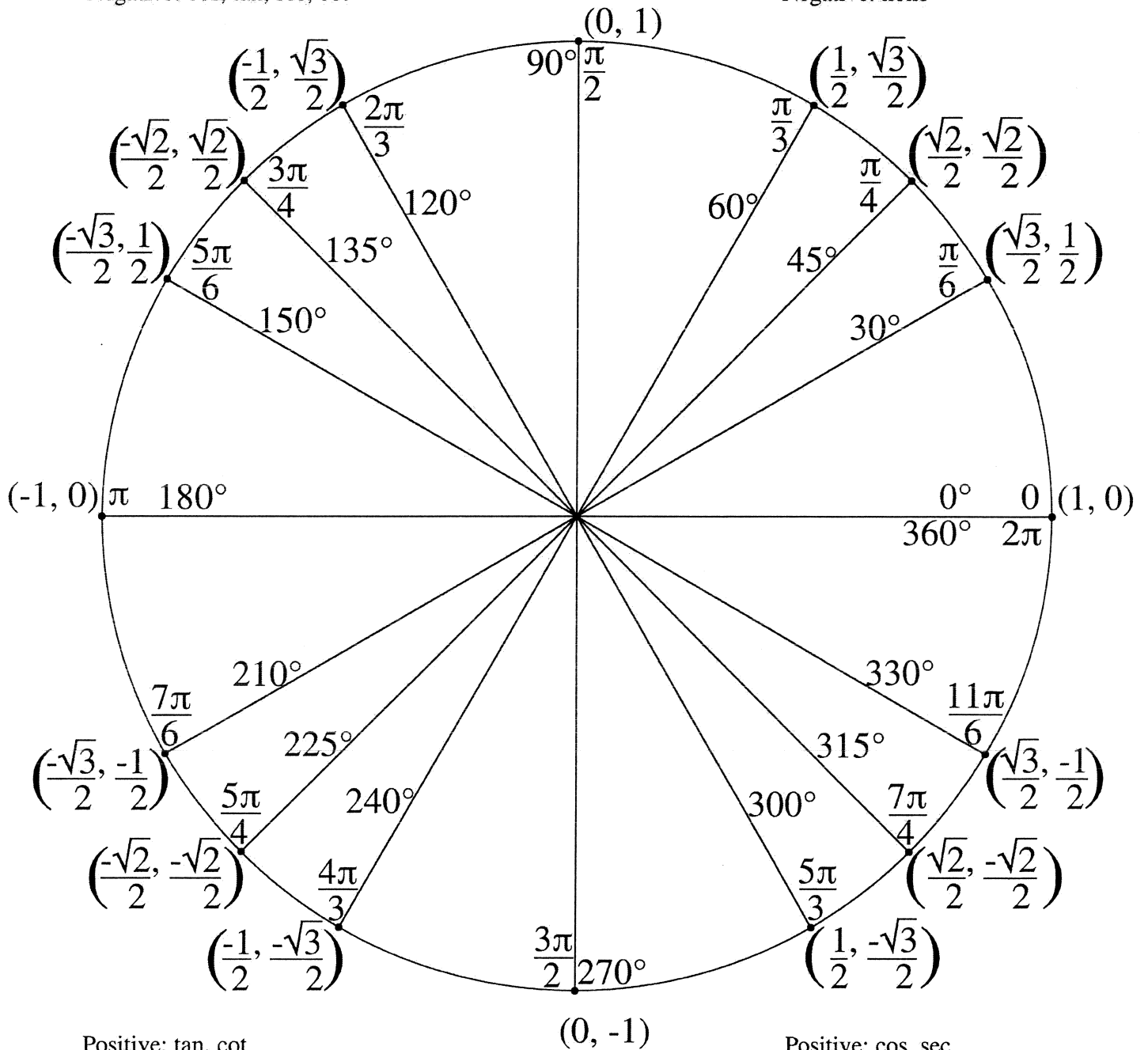
l) $\theta = -60^\circ$



The Unit Circle

Positive: sin, csc
Negative: cos, tan, sec, cot

Positive: sin, cos, tan, sec, csc, cot
Negative: none



Positive: tan, cot
Negative: sin, cos, sec, csc

Positive: cos, sec
Negative: sin, tan, csc, cot

ICM Trigonometry Worksheet #3

$$\tan = \frac{\sin}{\cos}$$

$$\sec = \frac{1}{\cos}$$

$$\cot = \frac{\cos}{\sin}$$

$$\csc = \frac{1}{\sin}$$

Part 1: Use a unit circle to fill in the table with exact values.

θ (deg)	θ rad	$\cos(\theta)$	$\sin(\theta)$	$\tan(\theta)$	$\sec(\theta)$	$\csc(\theta)$	$\cot(\theta)$
0°	0π	1	0	$\frac{0}{1} = 0$	1	undef.	$\frac{1}{0} = \text{undef.}$
30°	$\frac{\pi}{6}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{3}}$	$\frac{2}{\sqrt{3}} / \frac{2\sqrt{3}}{3}$	2	$\sqrt{3}$
I 45°	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	$\frac{2}{\sqrt{2}} / \sqrt{2}$	$\frac{2}{\sqrt{2}} / \sqrt{2}$	1
60°	$\frac{\pi}{3}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\sqrt{3}$	2	$\frac{2}{\sqrt{3}} / \frac{2\sqrt{3}}{3}$	$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
90°	$\frac{\pi}{2}$	0	1	$\frac{1}{0} = \text{undef.}$	undef.	1	$\frac{0}{1} = 0$
120°	$\frac{2\pi}{3}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\sqrt{3}$	-2	$\frac{2}{\sqrt{3}} / \frac{2\sqrt{3}}{3}$	$\frac{-1}{\sqrt{3}} / \frac{-\sqrt{3}}{3}$
II 135°	$\frac{3\pi}{4}$	$-\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	-1	$\frac{-2}{\sqrt{2}} / -\sqrt{2}$	$\frac{2}{\sqrt{2}} / \sqrt{2}$	-1
150°	$\frac{5\pi}{6}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{3}} / \frac{-\sqrt{3}}{3}$	$\frac{-2}{\sqrt{3}} / \frac{-2\sqrt{3}}{3}$	2	$-\sqrt{3}$
180°	π	-1	0	0	-1	undef.	undef.
210°	$\frac{7\pi}{6}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{3}} / \frac{\sqrt{3}}{3}$	$\frac{-2}{\sqrt{3}} / \frac{-2\sqrt{3}}{3}$	-2	$\sqrt{3}$
225°	$\frac{5\pi}{4}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	1	$\frac{-2}{\sqrt{2}} / -\sqrt{2}$	$\frac{-2}{\sqrt{2}} / -\sqrt{2}$	1
III 240°	$\frac{4\pi}{3}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$\sqrt{3}$	-2	$\frac{-2}{\sqrt{3}} / \frac{-2\sqrt{3}}{3}$	$\frac{1}{\sqrt{3}} / \frac{\sqrt{3}}{3}$
270°	$\frac{3\pi}{2}$	0	-1	-1	undef.	-1	0
300°	$\frac{5\pi}{3}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\sqrt{3}$	2	$\frac{-2}{\sqrt{3}} / \frac{-2\sqrt{3}}{3}$	$\frac{-1}{\sqrt{3}} / \frac{-\sqrt{3}}{3}$
315°	$\frac{7\pi}{4}$	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	-1	$\frac{2}{\sqrt{2}} / \sqrt{2}$	$\frac{-2}{\sqrt{2}} / -\sqrt{2}$	-1
330°	$\frac{11\pi}{6}$	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{-1}{\sqrt{3}} / \frac{-\sqrt{3}}{3}$	$\frac{2}{\sqrt{3}} / \frac{2\sqrt{3}}{3}$	-2	$-\sqrt{3}$
360°	2π	1	0	0	1	undef.	$\frac{1}{0} = \text{undef.}$

Part 2: Use the unit circle to find each value.

1. $\sin(45^\circ) = \frac{\sqrt{2}}{2}$

2. $\cos(30^\circ) = \frac{\sqrt{3}}{2}$

3. $\tan(60^\circ) = \sqrt{3}$

4. $\sec(120^\circ) = -2$
 $\frac{1}{\cos(120^\circ)}$

5. $\cot(225^\circ) = 1$

6. $\csc(330^\circ) = -2$

7. $\cos(270^\circ) = 0$

8. $\tan(90^\circ) = 1$

9. $\sin(180^\circ) = 0$

10. $\csc(-45^\circ) = -\sqrt{2}$
 $\frac{1}{\sin(-45^\circ)} = -\frac{2}{\sqrt{2}}$

11. $\sec(-150^\circ) = -\frac{2\sqrt{3}}{3}$
 $\frac{1}{\cos(-150^\circ)} = \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}}$

12. $\cot(-120^\circ) = \frac{\sqrt{3}}{3}$
 $\frac{\cos(-120^\circ)}{\sin(-120^\circ)} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

13. $\tan(570^\circ) = \frac{\sqrt{3}}{3}$
 $\frac{-360}{210} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

14. $\cos(495^\circ) = -\frac{\sqrt{2}}{2}$
 $\frac{-360}{135} = -\frac{\sqrt{2}}{2}$

15. $\sin(660^\circ) = -\frac{\sqrt{3}}{2}$
 $\frac{-360}{300} = -\frac{\sqrt{3}}{2}$

16. $\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

17. $\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

18. $\tan\left(\frac{\pi}{4}\right) = 1$

19. $\sec\left(\frac{3\pi}{4}\right) = -\sqrt{2}$
 $\frac{-2}{\sqrt{2}} = -\sqrt{2}$

20. $\cot\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{3}$
 $-\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

21. $\csc\left(\frac{7\pi}{6}\right) = -2$
 $\frac{1}{\sin\left(\frac{7\pi}{6}\right)} = -2$

22. $\cos\left(\frac{\pi}{2}\right) = 0$

23. $\tan(\pi) = 0$

24. $\sin\left(\frac{3\pi}{2}\right) = -1$

25. $\csc\left(-\frac{2\pi}{3}\right) = -120$
 $\frac{180}{\pi} = 60$
 -120

26. $\sec\left(-\frac{5\pi}{4}\right) = -\sqrt{2}$
 $\frac{1}{\cos(-225^\circ)} = \frac{1}{-\frac{\sqrt{2}}{2}} = -\sqrt{2}$

27. $\cot\left(-\frac{11\pi}{6}\right) = \sqrt{3}$
 $\frac{180}{\pi} = 30$
 $-11(30) = -330$
 $-330 = 60 + 30 = 90$
 $\cot(90^\circ) = \sqrt{3}$

28. $\tan\left(\frac{11\pi}{4}\right) = -1$
 $\frac{180}{\pi} = 45$
 $11(45) = 495$
 $\tan(495^\circ) = \tan(135^\circ) = -1$

29. $\cos\left(\frac{17\pi}{3}\right) = \frac{1}{2}$
 $\frac{180}{\pi} = 60$
 $17(60) = 1020$
 $600 + 420 = 1020$
 $1020 - 720 = 300$
 $\cos(300^\circ) = \frac{1}{2}$

30. $\sin\left(\frac{19\pi}{6}\right) = -\frac{1}{2}$
 $\frac{180}{\pi} = 30$
 $19(30) = 570$
 $300 + 270 = 570$
 $570 - 360 = 210$
 $\sin(210^\circ) = -\frac{1}{2}$

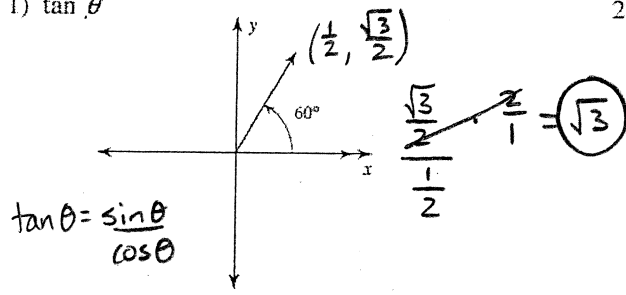


Exact Trig Values of Special Angles

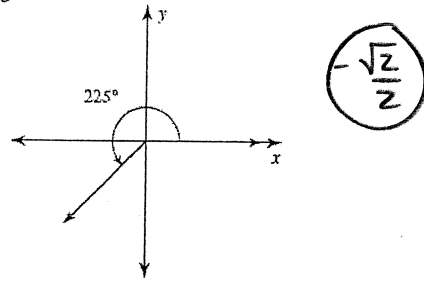
Date _____ Period _____

Find the exact value of each trigonometric function.

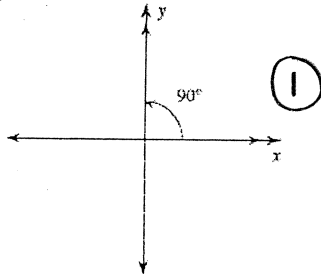
1) $\tan \theta$



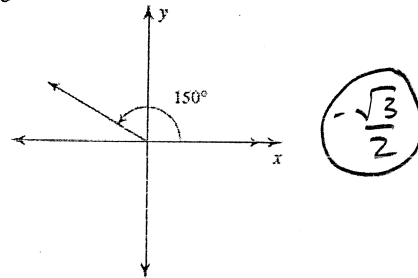
2) $\sin \theta$



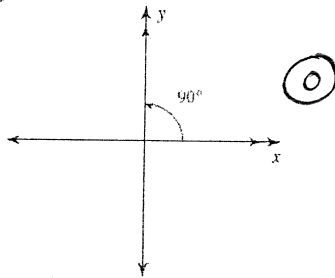
3) $\sin \theta$



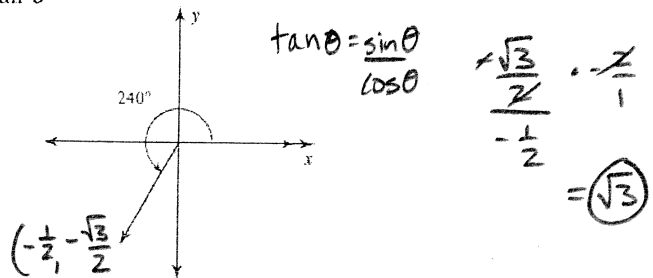
4) $\cos \theta$



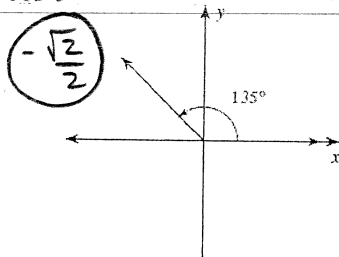
5) $\cos \theta$



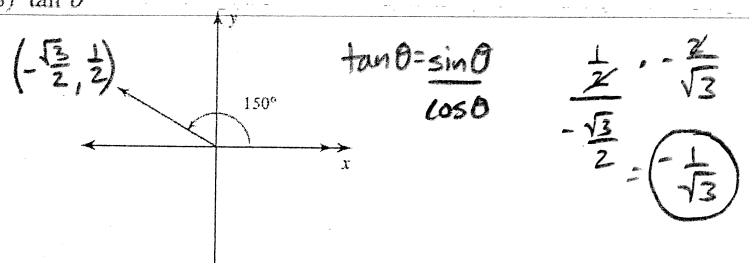
6) $\tan \theta$



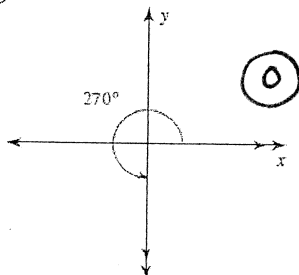
7) $\cos \theta$



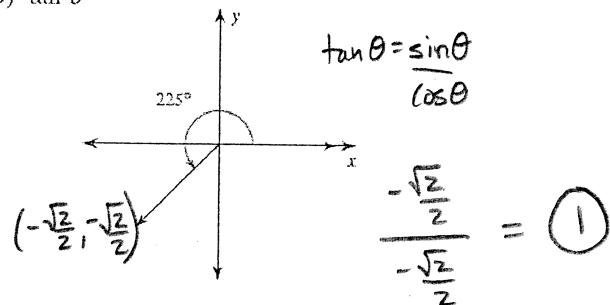
8) $\tan \theta$



9) $\cos \theta$



10) $\tan \theta$



11) $\cos 270^\circ$

12) $\sin 0$

Angles and Angle Measure

Date _____ Period _____

Convert each degree measure into radians and each radian measure into degrees.

1) $325^\circ \cdot \frac{\pi}{180} = \frac{65\pi}{36}$

2) $340^\circ \cdot \frac{\pi}{180} = \frac{17\pi}{9}$

3) $60^\circ \cdot \frac{\pi}{180} = \frac{\pi}{3}$

4) $-\frac{4\pi}{3} \cdot \frac{180}{\pi} = -240^\circ$

5) $\frac{23\pi}{12} \cdot \frac{180}{\pi} = 345^\circ$

6) $\frac{10\pi}{3} \cdot \frac{180}{\pi} = 600^\circ$

7) $570^\circ \cdot \frac{\pi}{180} = \frac{19\pi}{6}$

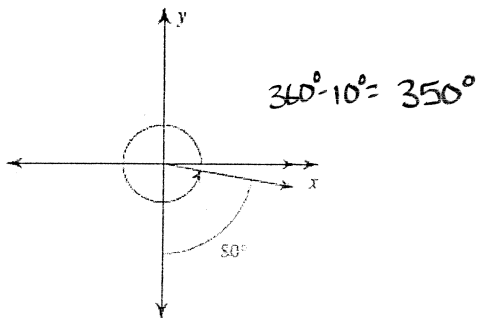
8) $-315^\circ \cdot \frac{\pi}{180} = -\frac{7\pi}{4}$

9) $\frac{\pi}{2} \cdot \frac{180}{\pi} = 90^\circ$

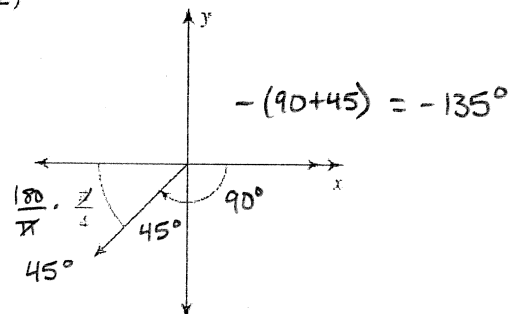
10) $-\frac{180^\circ}{180} \cdot \frac{\pi}{180} = -\pi$

Find the measure of each angle.

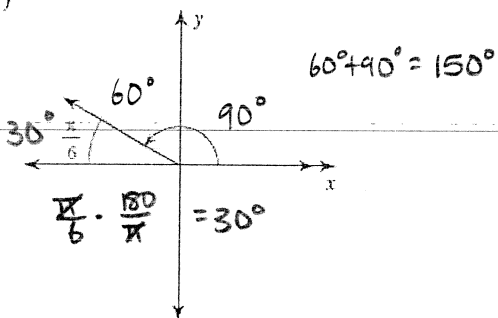
11)



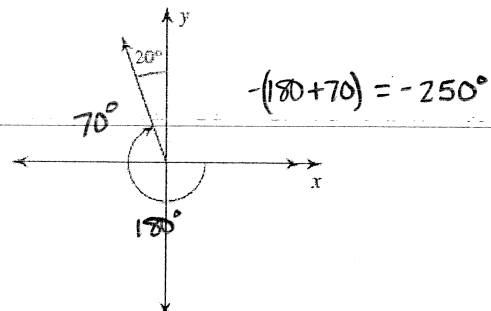
12)



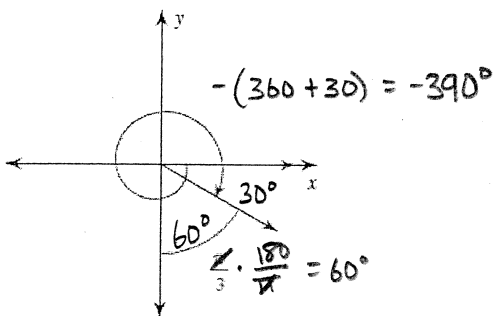
13)



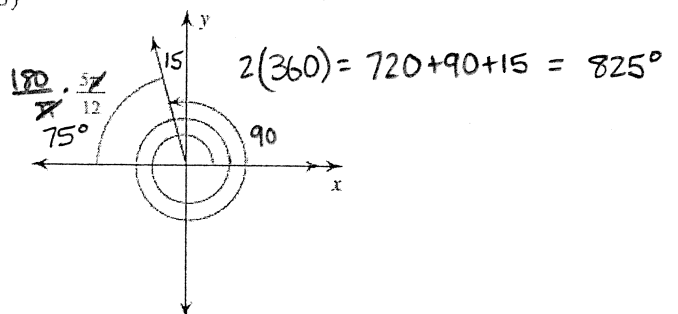
14)



15)



16)



Trigonometry Worksheet #4

Convert to radians:

1. $35^\circ \cdot \frac{\pi}{180}$

$\frac{7\pi}{36}$

2. $-410^\circ \cdot \frac{\pi}{180}$

$-\frac{41\pi}{18}$

3. 147° (use a calculator)

$147 \cdot \frac{\pi}{180}$

$\frac{49\pi}{60}$

Convert to degrees:

4. $\frac{5\pi}{8} \cdot \frac{180}{\pi}$

112.5°

5. $-\frac{7\pi}{6} \cdot \frac{180}{\pi}$

-210°

6. 6.56 (use a calculator)

6.56

Find two other angles, one negative and one positive, which are coterminal to θ .

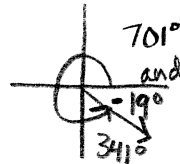
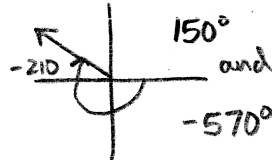
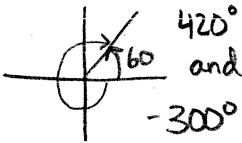
7. $\theta = 60^\circ$

8. $\theta = -210^\circ$

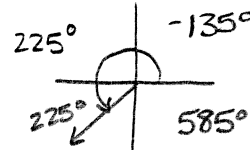
9. $\theta = 341^\circ$

10. $\theta = \frac{5\pi}{4}$

11. $\theta = -\pi$



$\frac{5\pi}{4} \cdot \frac{180}{\pi}$



180°
and
 -540°

Name the quadrant in which the angle θ lies.

12. $\sin\theta > 0, \cos\theta < 0$

$(-, +)$ II

13. $\sin\theta < 0, \tan\theta < 0$

$\tan = \frac{\sin}{\cos} = \frac{-}{+} = -$ (I, -) IV

14. $\csc\theta > 0, \cos\theta < 0$

$\frac{1}{\sin} + \cos -$

$(-, +)$ II

15. $\sec\theta < 0, \sin\theta > 0$

$\frac{1}{\cos} - \sin +$

$(-, +)$ II

		(\cos, \sin) X, Y	
II	- +	I	+ +
III	- -	IV	+ -

Find the exact value of each of the six trig functions of the given angle.

16. $5\pi/6$ (150°)

$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$

$\sin\theta = \frac{1}{2}$

$\cos\theta = -\frac{\sqrt{3}}{2}$

$\tan\theta = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}}$

$\csc\theta = 2$

$\sec\theta = -\frac{2}{\sqrt{3}}$

$\cot\theta = -\sqrt{3}$

17. 585° (225°)

$(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

$\sin\theta = -\frac{\sqrt{2}}{2}$

$\cos\theta = -\frac{\sqrt{2}}{2}$

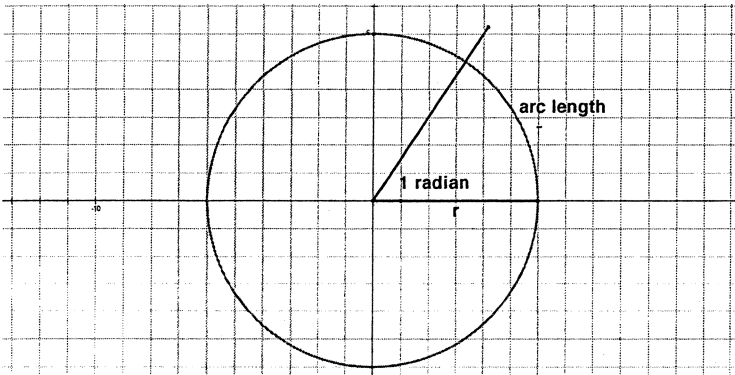
$\tan\theta = 1$

$\csc\theta = -\frac{2}{\sqrt{2}}$

$\sec\theta = -\frac{2}{\sqrt{2}}$

$\cot\theta = 1$

When a central angle intercepts an arc that has the same length as a radius of the circle, the measure of angle is defined to be one radian.



The circumference of a circle is $2\pi r$, where r is the length of a radius. There are 2π radians in one complete revolution about a point and one complete revolution equals 360° .

2π radians = 360° π radians = 180° 1 radian $\approx 57.3^\circ$

Convert each degree measure to radian measure.

Convert each radian measure to degree

a. $120^\circ \cdot \frac{\pi}{180} = \frac{2\pi}{3}$

b. $-245^\circ \cdot \frac{\pi}{180} = -\frac{49\pi}{36}$

a. $\frac{\pi}{3}$ radians

b. $-\frac{3\pi}{4}$ radians

$\frac{\pi}{3} \cdot \frac{180}{\pi} = 60^\circ$

$-\frac{3\pi}{4} \cdot \frac{180}{\pi} = -135^\circ$

Quadrant I if $0 < \theta < \frac{\pi}{2}$

Quadrant II if $\frac{\pi}{2} < \theta < \pi$

Quadrant III if $\pi < \theta < \frac{3\pi}{2}$

Quadrant IV if $\frac{3\pi}{2} < \theta < 2\pi$

In which quadrant or on which axis does the terminal side of the angle lie?

a. $\frac{4\pi}{3}$
Quadrant III

b. $-\frac{5\pi}{4}$
Quadrant II

c. $\frac{9\pi}{2}$ ~~$\frac{180}{\pi}$~~ $90 = 810^\circ$
y-axis

1 minute (1') = $\left(\frac{1}{60}\right)^\circ$ 1 second (1'') = $\left(\frac{1}{60}\right)'$ or $\left(\frac{1}{3600}\right)^\circ$

Convert each angle measure as indicated.
12.464° to degrees, minutes and seconds, to the nearest second.


$12^\circ 27' 50.4''$

b. $23^{\circ}42'45''$ to decimal degrees, to the nearest tenth. 23.7125°

In which quadrant, or on which axis, does the terminal side of the each angle lie?

1. 150° II 2. 210° III 3. -60°
 4. 180° x-axis IV

5. -240° II

6. 540°  x-axis

7. 2π x-axis
(360°)

8. $\frac{\pi}{3}$ I

9. $\frac{3\pi}{4}$ II

10. $\frac{7\pi}{2}$ $\frac{180}{2} 60$
 $420^{\circ} + 60$
 I

11. $\frac{5\pi}{4}$ III

12. $\frac{10\pi}{3}$ $\frac{180}{3} 60$
 $600 - 360$
 240 III

Convert each degree measure to radian measure.

13. 150° $\frac{\pi}{180}$ $\frac{5\pi}{6}$

14. 210° $\frac{\pi}{180}$ $\frac{7\pi}{6}$

15. 45° $\frac{\pi}{180}$ = $\frac{\pi}{4}$

16. 240° $\frac{\pi}{180}$
 $\frac{4\pi}{3}$

Each radian measure to degree measure.

17. $\frac{\pi}{6}$ $\frac{180}{\pi}$ 30°

18. $\frac{\pi}{4}$ $\frac{180}{\pi}$ = 45°

19. $\frac{5\pi}{6}$ $\frac{180}{\pi}$ 150°

20. $\frac{7\pi}{6}$ $\frac{180}{\pi}$ 210°

Convert to degrees, minutes, and seconds, to the nearest second.

21. 23.42°
 $23^{\circ} 25' 12''$
 $.42(60) = 25.2$
 $.2(60) = 12$

22. 15.27°
 $15^{\circ} 16' 12''$
 $.27(60) = 16.2$
 $.2(60) = 12$

23. 48.35°
 $48^{\circ} 21' 0''$
 $.35(60) = 21$

24. 62.73°
 $62^{\circ} 43' 48''$
 $.73(60) = 43.8$
 $.8(60) = 48$

Convert to decimal degrees, to the nearest tenth of a degree.

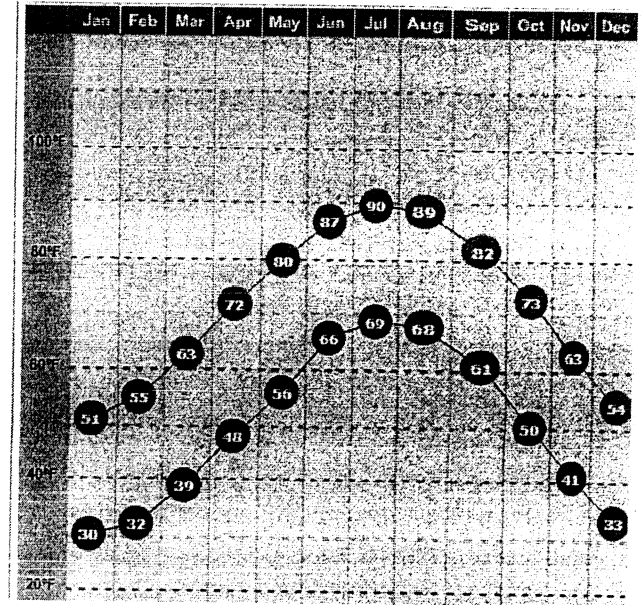
25. $14^{\circ}33'45''$
 14.6°
 $14 + \frac{33}{60} + \frac{45}{3600}$

26. $38^{\circ}24'36''$
 38.4°
 $38 + \frac{24}{60} + \frac{36}{3600}$

27. $35^{\circ}45'10''$
 35.8°
 $35 + \frac{45}{60} + \frac{10}{3600}$

28. $28^{\circ}32'20''$
 28.5°
 $28 + \frac{32}{60} + \frac{20}{3600}$

1. The graph to the right shows the average high and low temperature in Raleigh from January to December.



a. How would you describe the climate of Raleigh, NC?

Raleigh, NC has variable temperatures depending on the season.

b. If you wanted to visit Raleigh, and prefer average highs in the 70's, when would you go?

April or October

c. Estimate the lowest and highest average **high** temperature. When did these values occur?

$$\text{lowest } \frac{51+54}{2} = \frac{105}{2} = 52.5$$

$$\text{highest } \frac{(87+90+89)}{3} = 88.7$$

d. What is the range of these temperatures?

$$51^{\circ} - 90^{\circ}$$

e. Estimate the lowest and highest average **low** temperature. When did these values occur?

$$\text{low} = \frac{30+33}{2} = \frac{63}{2} = 31.5 \quad \text{high} = \frac{66+69+68}{3} = 67.7$$

f. What is the range of these temperatures?

$$30^{\circ} - 69^{\circ}$$

2. In mathematics, a function that repeats itself in regular intervals, or **periods**, is called **periodic**.

a. If you were to continue the temperature graphs above, what would you consider its interval, or period, to be?

12 months or 1 year

b. Choose either the high or low average temperatures and sketch the graph for three intervals, or periods.



c. What function have you graphed that looks similar to this graph?

Cosine

3. How do you think New York City's averages would compare to Raleigh's?

They would have a vertical shift down - representing lower temperatures that still vary depending on the month of the year.

4. Using the data, use your graphing calculator to find a sine function that models the data. Record your functions here. (Let Jan = 1, Feb = 2, etc.)

c. Average high temp: $y = 19.9 \sin(.5x - 1.9) + 70.3$

d. Average low temp: $y = 19.5 \sin(.5x - 2.2) + 49.6$

Stat → Edit

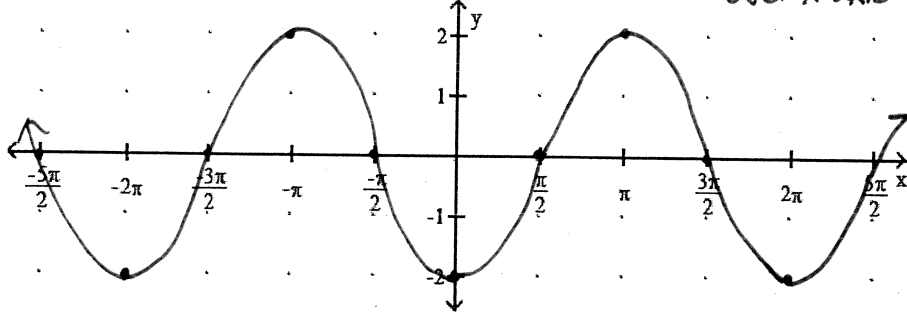
L1	L2
1/2	temp.
3	⋮
⋮	⋮
12	⋮

Stat → Calc

sin reg
enter

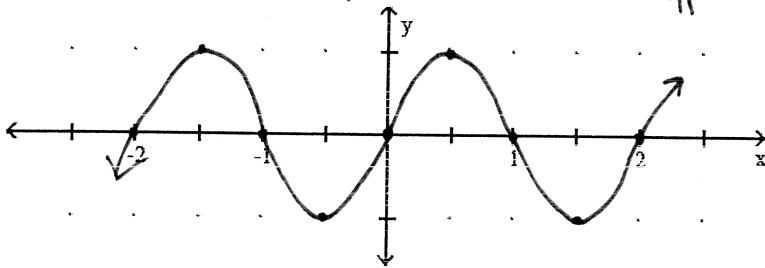
1) Graph the function.

$y = -2 \cos x$ $A = 2$ reflected over x-axis



2) Graph the function.

$y = \sin \pi x$ $P = \frac{2\pi}{\pi} = 2$



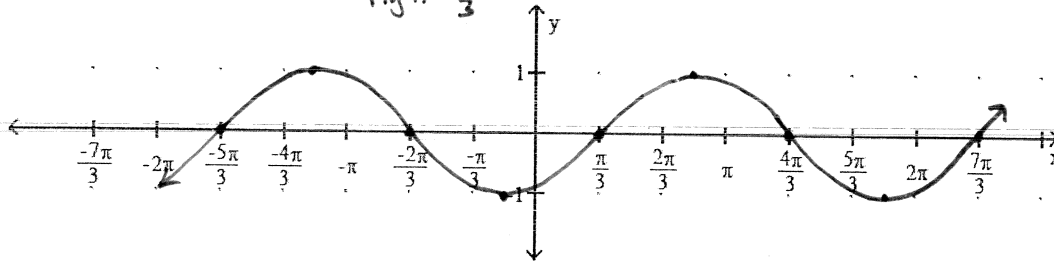
3) Give the Amplitude and period of the function:

a) $y = \cos 3x$
 $A = 1$
 $P = \frac{2\pi}{3}$

b) $y = 5 \sin \frac{1}{4}x$
 $A = 5$
 $P = \frac{2\pi}{\frac{1}{4}} = 2\pi \cdot \frac{4}{1} = 8\pi$

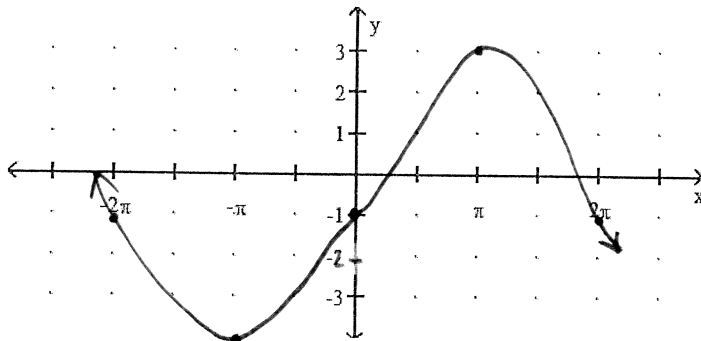
4) Graph the function.

$y = \sin(x - \frac{\pi}{3})$
 right $\frac{\pi}{3}$



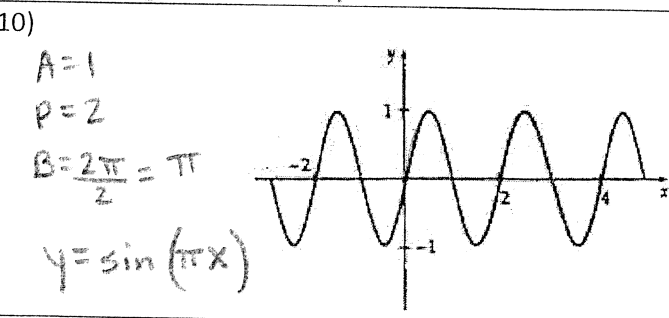
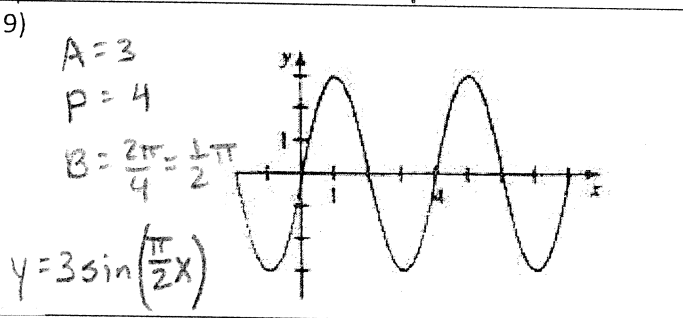
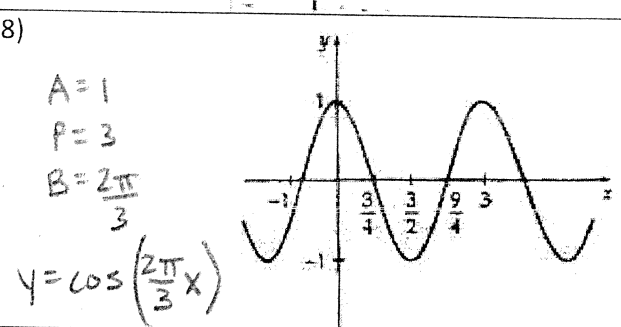
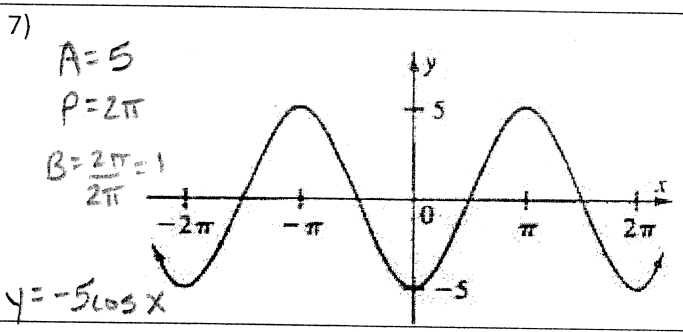
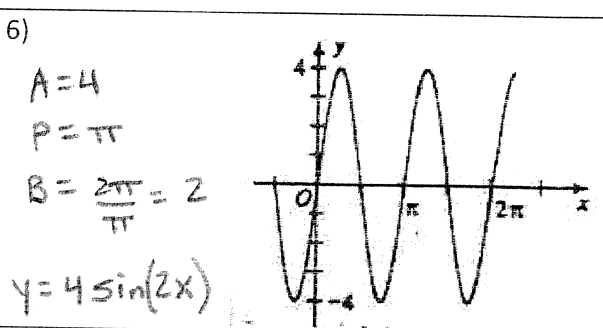
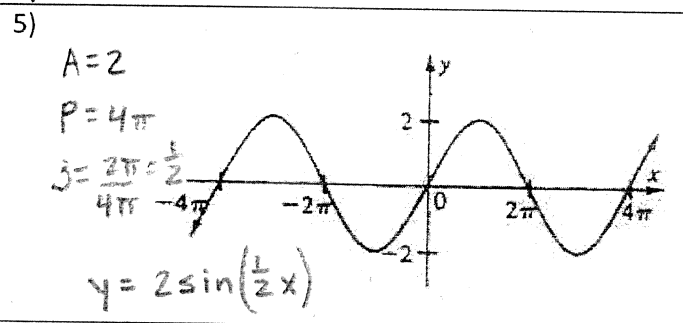
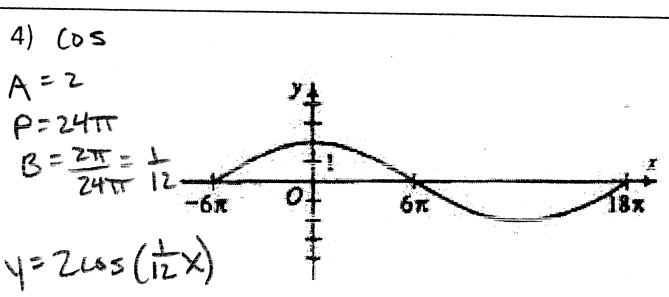
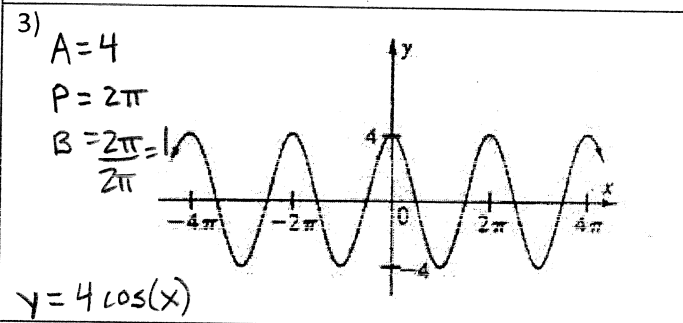
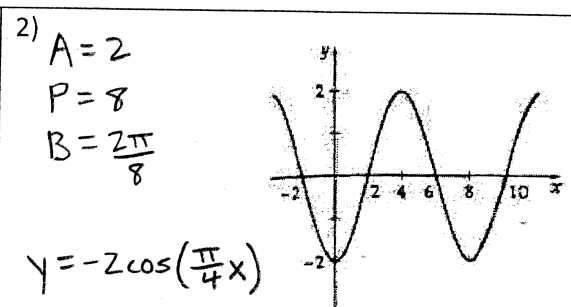
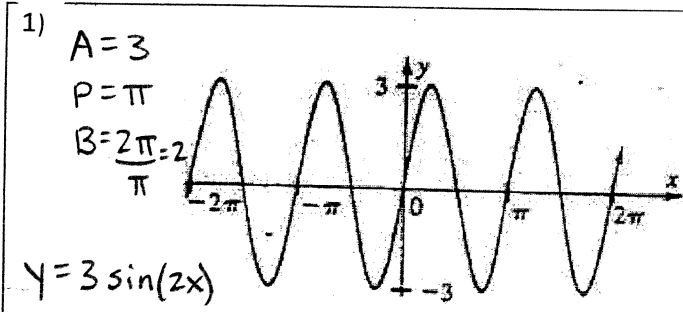
5) Graph the function.

$y = 1 - 2 \cos x$ Up 1
 Reflects over x-axis
 $A = 2$



Writing Sine and Cosine Equations From Graphs

Write the amplitude, period, and an equation for each graph.

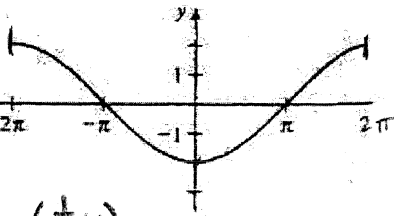


11)

$$A=2$$

$$P=4\pi$$

$$B=\frac{2\pi-1}{4\pi}$$



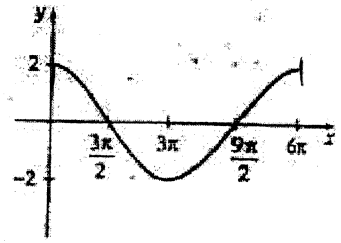
$$y = -2 \cos\left(\frac{1}{2}x\right)$$

12)

$$A=2$$

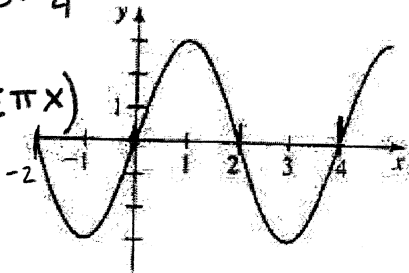
$$P=6\pi$$

$$B=\frac{2\pi}{6\pi}$$



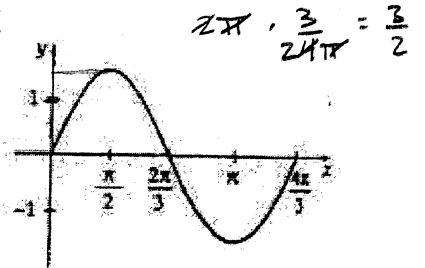
$$y = 2 \cos\left(\frac{1}{3}x\right)$$

13) $A=3$ $B=\frac{2\pi}{4}$
 $P=4$



$$y = 3 \sin\left(\frac{1}{2}\pi x\right)$$

14) $A=1.5$ $B=\frac{2\pi}{4\pi/3}$
 $P=\frac{4}{3}\pi$

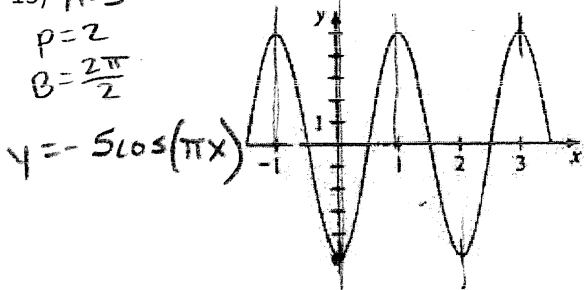


$$y = 1.5 \sin\left(\frac{3}{2}x\right)$$

15) $A=5$

$$P=2$$

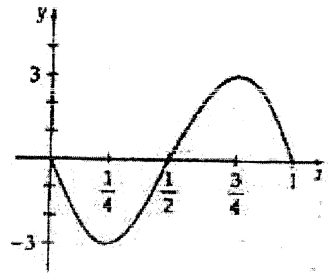
$$B=\frac{2\pi}{2}$$



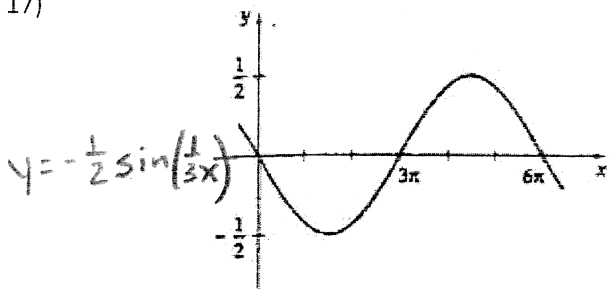
$$y = -5 \cos(\pi x)$$

16)

$$y = -3 \sin(2\pi x)$$



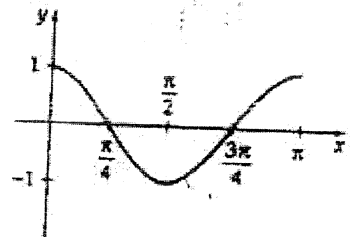
17)



$$y = -\frac{1}{2} \sin\left(\frac{1}{3}x\right)$$

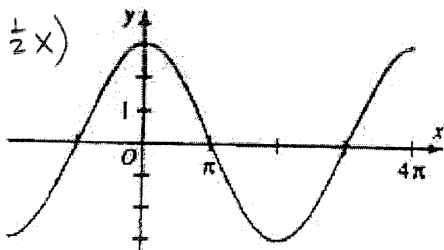
18)

$$y = \cos 2x$$



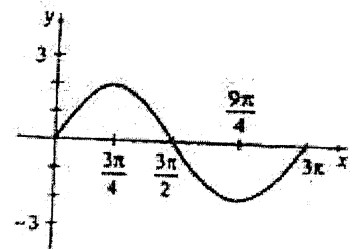
19)

$$y = 3 \cos\left(\frac{1}{2}x\right)$$



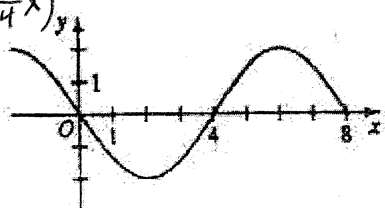
20)

$$y = 2 \sin\left(\frac{2}{3}x\right)$$



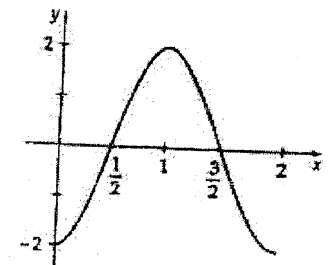
21)

$$y = -2 \sin\left(\frac{\pi}{4}x\right)$$



22)

$$y = -2 \cos(\pi x)$$



ICM Trigonometry Worksheet #8

Without using a calculator, give an exact value for θ .

$$1. \theta = \sin^{-1} \frac{1}{2}$$

$$\sin \theta = \frac{1}{2} \quad (30^\circ)$$

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

$$\sin \theta = 1 \quad (90^\circ)$$

$$3. \theta = \cos^{-1} \frac{\sqrt{3}}{2}$$

$$\cos \theta = \frac{\sqrt{3}}{2} \quad (30^\circ \text{ or } 330^\circ)$$

$$4. \theta = \cos^{-1} \left(-\frac{1}{2}\right)$$

$$\cos \theta = -\frac{1}{2} \quad (120^\circ \text{ or } 240^\circ)$$

$$5. \theta = \tan^{-1} 1$$

$$\tan \theta = 1 \quad (45^\circ \text{ or } 225^\circ)$$

$$6. \theta = \tan^{-1} \frac{\sqrt{3}}{3} \text{ or } \frac{1}{\sqrt{3}}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} \quad (30^\circ)$$

$$7. \theta = \sin^{-1} \left(-\frac{1}{2}\right)$$

$$\sin \theta = -\frac{1}{2} \quad (210^\circ \text{ or } 330^\circ)$$

$$8. \theta = \sin^{-1}(-1)$$

$$\sin \theta = -1 \quad (270^\circ)$$

$$9. \theta = \sin^{-1} \left(-\frac{\sqrt{3}}{2}\right)$$

$$\sin \theta = -\frac{\sqrt{3}}{2} \quad (240^\circ \text{ or } 300^\circ)$$

$$10. \theta = \cos^{-1}(-1)$$

$$\cos \theta = -1 \quad (180^\circ)$$

$$11. \theta = \cos^{-1} \left(-\frac{\sqrt{3}}{2}\right)$$

$$\cos \theta = -\frac{\sqrt{3}}{2} \quad (150^\circ)$$

$$12. \theta = \cos^{-1} 1$$

$$\cos \theta = 1 \quad (0^\circ \text{ or } 360^\circ)$$

$$13. \theta = \tan^{-1}(-1)$$

$$\tan \theta = -1 \quad (135^\circ \text{ or } 315^\circ)$$

$$14. \theta = \tan^{-1}(-\sqrt{3})$$

$$\tan \theta = -\frac{\sqrt{3}}{1} = -\frac{\sqrt{3}}{2} = \frac{-\sqrt{3}}{2} \quad (120^\circ \text{ or } 300^\circ)$$

$$15. \theta = \tan^{-1} \sqrt{3}$$

$$\tan \theta = \frac{\sqrt{3}}{1} = \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{1} \quad (120^\circ \text{ or } 240^\circ)$$

Use your **calculator** to find a value of θ to the nearest hundredth of a radian.

$$16. \theta = \sin^{-1} 0.5683 \quad .60$$

$$21. \theta = \cos^{-1} 0.8888 \quad .48$$

$$17. \theta = \sin^{-1} 0.5000 \quad .52$$

$$22. \theta = \tan^{-1} 0.5000 \quad .46$$

$$18. \theta = \sin^{-1}(-0.8671) \quad -1.05$$

$$23. \theta = \tan^{-1}(-1.5000) \quad -.98$$

$$19. \theta = \cos^{-1} 0.1234 \quad 1.45$$

$$24. \theta = \tan^{-1}(-2.3456) \quad -1.17$$

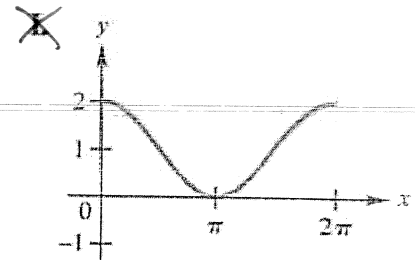
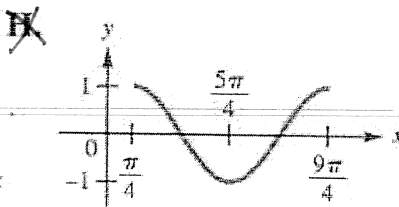
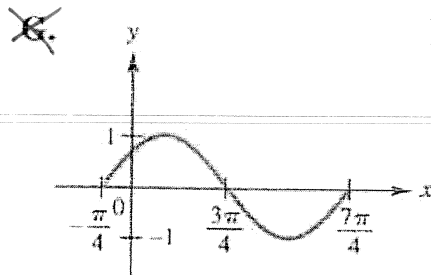
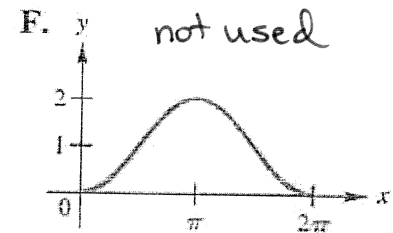
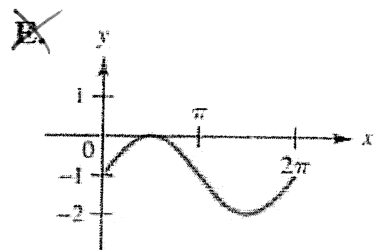
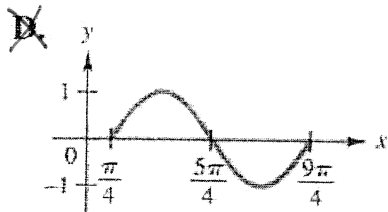
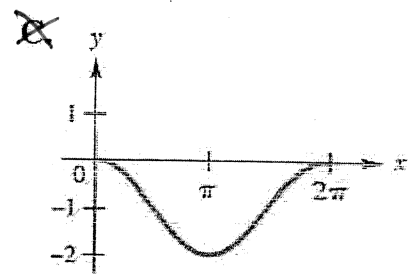
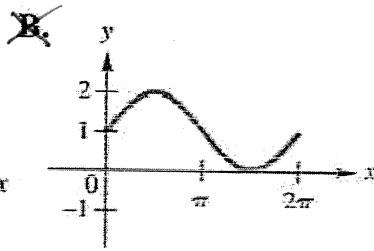
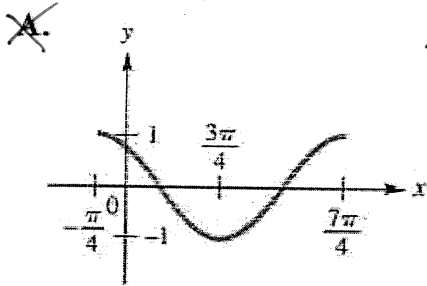
$$20. \theta = \cos^{-1}(-0.2845) \quad 1.96$$

$$25. \theta = \tan^{-1}(0.4872) \quad .45$$

Trigonometry Worksheet #6

I. Match each graph to its function. One graph will not be used.

1. $y = \sin\left(x - \frac{\pi}{4}\right)$ starts at 0 right $\frac{\pi}{4}$
2. $y = \sin\left(x + \frac{\pi}{4}\right)$ starts at 0 left $\frac{\pi}{4}$
3. $y = \cos\left(x - \frac{\pi}{4}\right)$ starts at 1 right $\frac{\pi}{4}$
4. $y = \cos\left(x + \frac{\pi}{4}\right)$ starts at 1 left $\frac{\pi}{4}$
5. $y = 1 + \sin x$ Shifts Up 1 starts at 0
6. $y = -1 + \sin x$ Shifts down 1 starts at 0
7. $y = 1 + \cos x$ Up 1 Starts at 1
8. $y = -1 + \cos x$ down 1 starts at 1



II. Match each graph to its function.

~~(i)~~ $y = \sin(x/2)$ $\frac{2\pi}{1/2} = 4\pi$

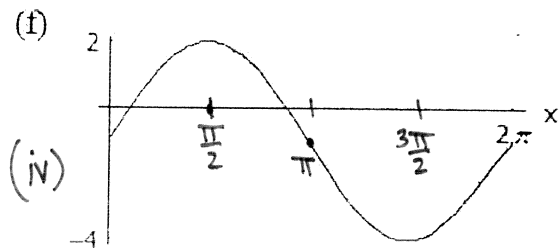
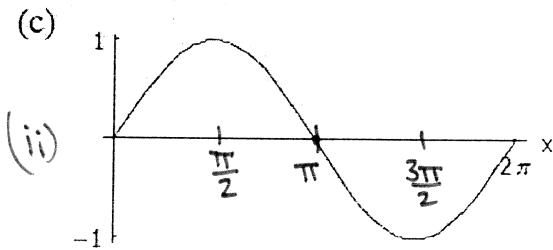
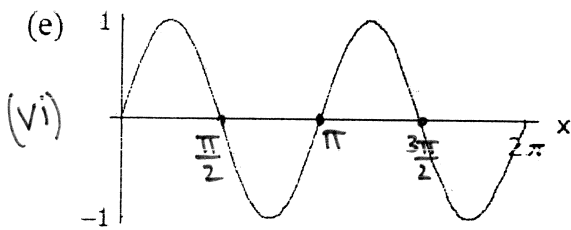
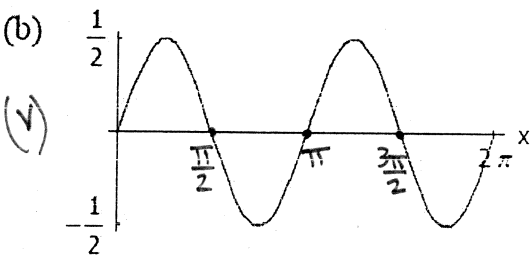
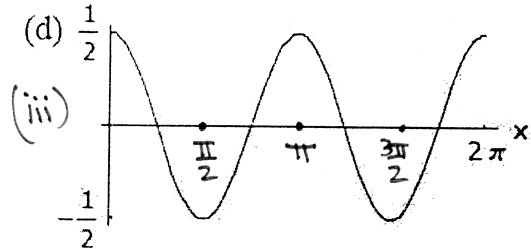
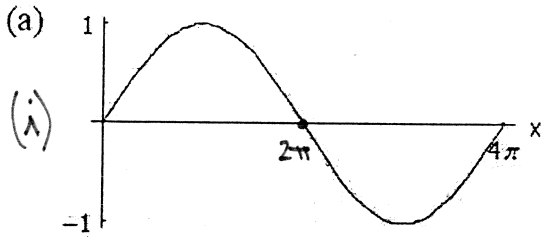
(ii) $y = \cos(x - \pi/2)$ right $\frac{\pi}{2}$

~~(iii)~~ $y = \frac{1}{2} \cos(2x)$
 $A = \frac{1}{2}$ $P = \frac{2\pi}{2} = \pi$

~~(iv)~~ $y = 3\sin(x) - 1$ $A = 3$ *down 1*

~~(v)~~ $y = \frac{1}{2} \sin(2x)$ $A = \frac{1}{2}$ $P = \frac{2\pi}{2} = \pi$

~~(vi)~~ $y = \sin(2x - 2\pi)$ *right 2π*
 $P = \frac{2\pi}{2} = \pi$



III. For each given function:

- Identify the parent graph and describe the transformations on the parent graph to obtain a graph of the given function.
- Name the domain and range.
- Find the amplitude, period, and phase shift.
- ~~Identify any asymptotes.~~
- Sketch a graph.

1. $f(x) = -3 \cos x - 1$ $y = \cos x$ $A = 3$ *reflected over x-axis* $P = \frac{2\pi}{1} = 2\pi$
down 1

2. $g(x) = \frac{1}{3} \sin(2x) + 4$ $y = \sin x$ $A = \frac{1}{3}$ $P = \frac{2\pi}{2} = \pi$ *Up 4*

~~3.~~ $h(x) = 2 - \tan(x - \frac{\pi}{4})$ $y = \tan x$ *Up 2* *reflects over x-axis*
right $\frac{\pi}{4}$ $P = \frac{2\pi}{1} = 2\pi$