

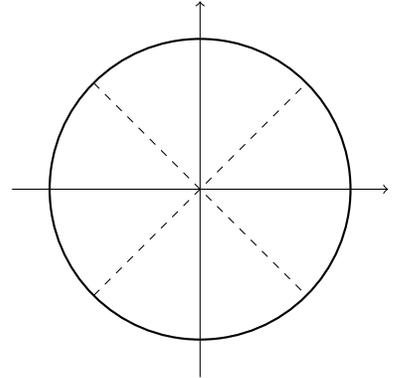
Trig practice final #1

Use only the formulas listed on the study guide.

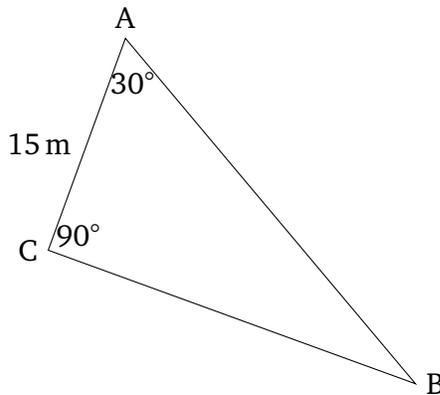
No calculators!

1. Let  $\phi = -480^\circ$ .

- (a) Determine a co-terminal angle between  $0^\circ$  and  $360^\circ$ .
- (b) State the value of the co-terminal angle in radians.
- (c) Sketch  $\phi$  on the unit circle and state the coordinates of the corresponding point.
- (d) Give the exact value of  $\sec \phi$  and  $\cot \phi$ .



2. Determine sides  $a$  and  $c$  of the following triangle. (Use exact values.)



3. Periodic functions:

- (a) Of the six trigonometric functions, which ones are considered even functions?
- (b) Which of these has a period of  $\pi$ ? (circle the ones that do)

$$f(x) = \sin(2x) \quad f(x) = \sin(x/2) \quad f(x) = \tan x \quad f(x) = \tan(2x)$$

- (c) Let  $f(x) = -3 \cos(2(x - \pi/4)) + 2$ , determine:
  - i. Period
  - ii. Amplitude
  - iii. Reflections (i.e. is it reflected across the  $x$ - or  $y$ -axis?)
  - iv. Horizontal and vertical shifts

4. Let  $A$  and  $B$  be two acute angles (i.e.  $0^\circ < A < 90^\circ$  and  $0^\circ < B < 90^\circ$ ). Suppose that  $\cos A = \frac{3}{5}$  and  $\tan B = \frac{2}{3}$ . Determine the exact (and simplified) value of
- $$\sin \frac{A}{2} \qquad \tan(A+B) \qquad \cos(2B)$$

5. Solve each equation for all values of  $x$  in the interval  $[0, 2\pi)$  (express  $x$  in radians).

(a)  $(\sec x - 2)(\cos x + \frac{\sqrt{3}}{2}) = 0$

(b)  $4 \sin^2 x = 1$

6. A triangle has two angles measuring  $135^\circ$  and  $15^\circ$ ; the side between these two angles is 5ft long. Determine the exact length of the longest side of the triangle.

7. (a) Convert each complex number from standard form to trigonometric form ( $r(\cos \phi + i \sin \phi)$ ), use degrees and exact values).

$$z_1 = 2 - 2i$$

$$z_2 = \sqrt{3} + i$$

- (b) Determine the product  $(z_1)(z_2)$ , leaving it trigonometric form (degrees, exact values).

- (c) Determine  $(z_1)^4$ . Then translate the answer back into standard form ( $a + bi$ ).

8. Consider two vectors  $\mathbf{u} = \langle 3, 10 \rangle$  and  $\mathbf{v} = \langle 4, 6 \rangle$ .

- (a) Find  $\mathbf{r} = 2\mathbf{u} - \mathbf{v}$ .

- (b) State the magnitude and direction angle of  $\mathbf{r}$ .

9. Show work, use radians & pure numbers (i.e. no degrees)

(a)  $\csc \frac{5\pi}{6}$

(d)  $\sec^{-1} \left( -\frac{2}{\sqrt{3}} \right)$

(b)  $\cot \left( -\frac{2\pi}{3} \right)$

(e)  $\tan(\arccos(2/3))$

(f)  $\sin(\sec^{-1} 3)$

(c)  $\arcsin \left( \frac{\sqrt{3}}{2} \right)$

(g)  $\sin^{-1}(\cos(5\pi/6))$

10. The angle of elevation from an observation tower to a plane is  $10^\circ$ . The plane is 2 miles high. How far away from the tower is the city directly below the plane. Draw a picture, solve the problem (show your work, state exact answer, use units).

11. Polar coordinates:

- (a) Change these from polar to rectangular coordinates:  $(6, \pi/4)$  and  $(-4, \pi/6)$
- (b) Change these from rectangular to polar coordinates:  $(-3, 3)$  and  $(1, -\sqrt{3})$  (choose the representation with  $r \geq 0$  and  $0 \leq \theta < 2\pi$ )
- (c) Give four different polar coordinates for the point  $(3, \pi/3)$  (which is currently expressed in polar coordinates)
- (d) Sketch the five points above on a polar coordinate system

