Ch. 15 - Board Problems

1. Write the quadratic equation.

2. WHAT ARE THE SOLUTIONS TO

$8n^2 + 4n - 16 = -n^2$

3. Write vertex form of a quadratic equation.

PUT equation into vertex form.

$y = 2x^2 - 3x - 5$

4. WRITE STANDARD FORM OF A QUADRATIC EQUATION.

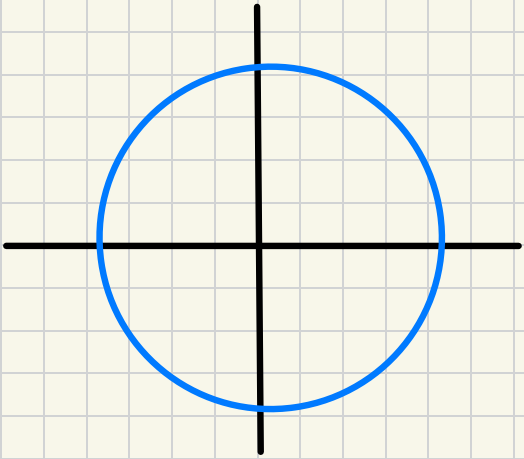
PUT EQUATION INTO STANDARD FORM.

$y = 2(x+3)^2 + 8$

Ch. 15 - Radian Measure

A radian is the _____

_____



1 radian ≈ _____

180° = _____

= _____

1° = _____

Converting Between Degrees → Radians

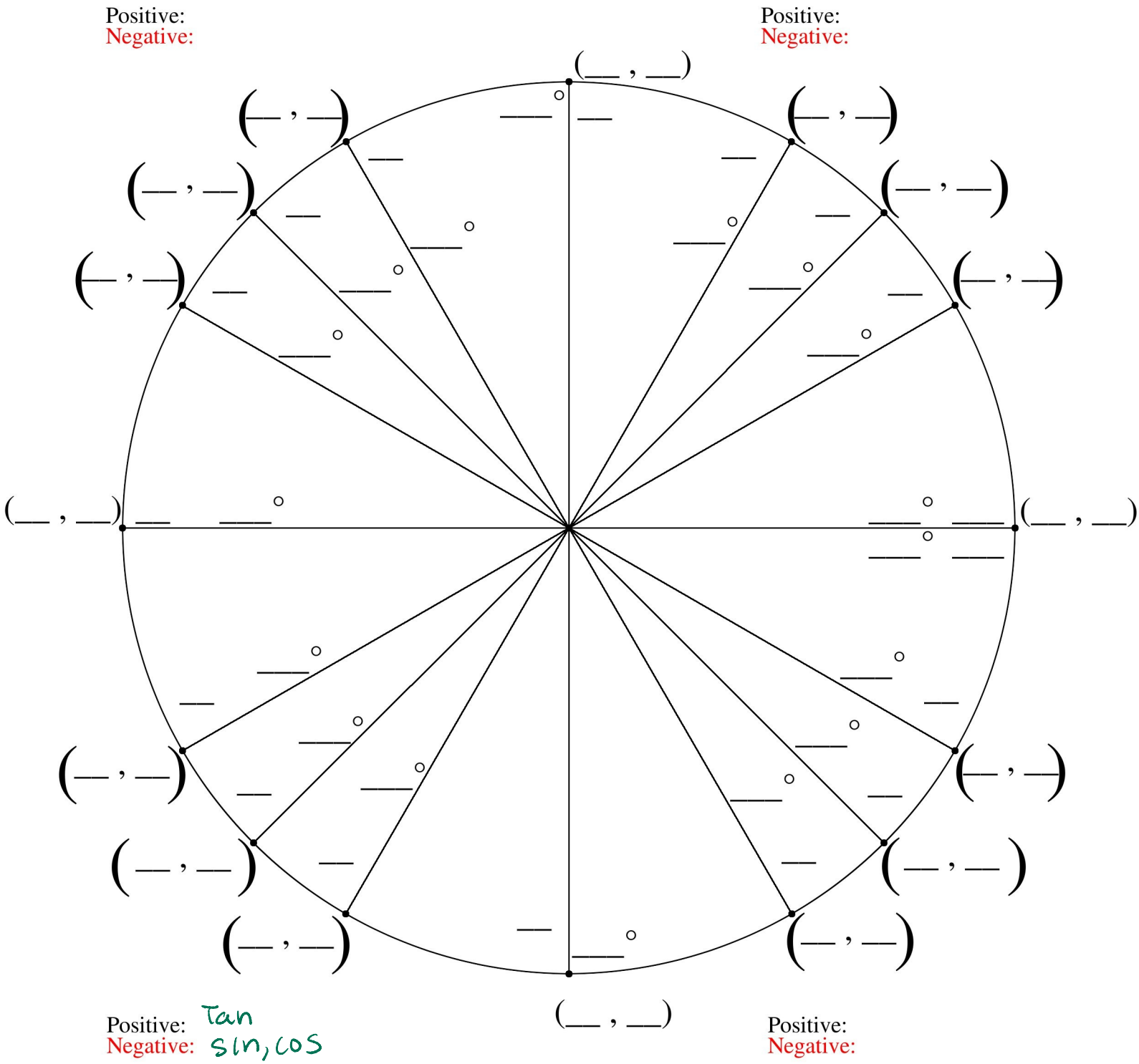
60°

30°

45°

240°

Fill in The Unit Circle



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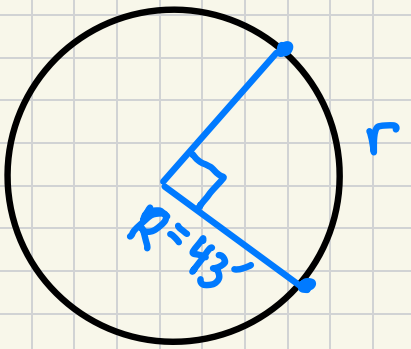
Converting From Radians → Degrees

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

$\frac{2\pi}{3}$

$\frac{11\pi}{8}$

How can we use radians?



1. Change ° → radians

$= \frac{r}{R}$

Example 4

Change $11\pi/6$ to degrees.

$$\frac{11\pi r}{6} \times \frac{180^\circ}{\pi r} = 330^\circ \qquad \frac{11\pi r}{6} = 330^\circ$$

In the future, you can identify radians by the fact that they have π in them. We will not keep putting an r in equations involving unit multipliers.

Practice Problems 1

Find the radian measure of each angle. (1 degree = $\pi/180$ radians.)

1. 30°
2. 135°
3. 60°
4. 315°
5. -120°
6. -300°

Find the degree measure of each angle. (1 radian = $180/\pi$ degrees.)

7. $\frac{\pi}{4}$
8. $\frac{5\pi}{6}$
9. $\frac{8\pi}{3}$
10. $-\frac{2\pi}{5}$
11. $-\frac{9\pi}{4}$
12. $\frac{11\pi}{9}$

Radians may also be expressed as decimals using 3.14 for π. Then $\pi/4$, which is equivalent to 45°, may be written as $3.14 \div 4 = .785$. To be more accurate, we could use the π key on a calculator and get $3.141592654 \div 4 = .785398163$, but for brevity and clarity, I am going to represent π as 3.14.

Practice Problems 2

Find the decimal equivalent for the following radians. Use 3.14 for π.

1. $\frac{\pi}{2}$
2. $\frac{\pi}{3}$
3. $\frac{2\pi}{3}$
4. $\frac{\pi}{6}$

It is strongly suggested that you memorize the degree-radian equivalents for 30°, 45°, 60°, and 90°. You may also learn the multiples of these angles, but if you know $\pi/6 = 30°$, it is fairly easy to find $5\pi/6 = 150°$. These equivalents will be used a great deal in upcoming lessons.

Practice Problems 3

Fill in the table with the missing information. Give the radians with π and in decimal form. Give trig functions in decimals to three places.

	degrees	radians (fraction)	radians (decimal)	sin	cos	tan	csc	sec	cot
1.	45°								
2.		$\frac{\pi}{2}$							
3.	30°		.524						

Practice Problems 4

1. The radius is 50' and the central angle is 120°. Find the distance of the arc opposite the 120° angle.

2. The radius is 77' and the central angle is 30°. Find the distance of the arc opposite the 30° angle.

3. The radius is 77' and the central angle is 150°. Find the distance of the arc opposite the 150° angle.

State the decimal trigonometric ratios for the given radians to three places. Use the inverse key on your calculator to get values for csc, sec, and cot.

		decimal radians	sin	cos	tan	csc	sec	cot
13)	$\frac{\pi}{3}$							
14)	$\frac{2\pi}{3}$							

Find the distance between the two cities assuming they have the same longitude. Use 4,000 miles for the radius of the earth and 3.14 for π. Remember to express θ in radians.

Example 1

Cairo, Egypt: 30° N

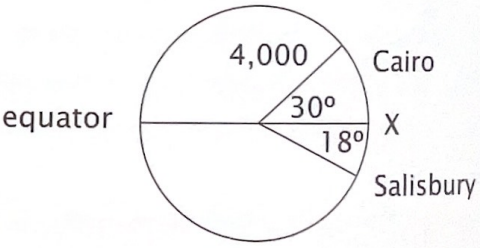
Salisbury, Zimbabwe: 18° S

$$30° + 18° = 48°$$

$$48° \times \frac{\pi}{180°} = \frac{4\pi}{15} \text{ radians}$$

$$\frac{X}{4{,}000} = \frac{4\pi}{15} \qquad X = \frac{4(3.14)(4000)}{15}$$

$$X = 3{,}349 \text{ miles}$$



15. Moscow, Russia: 55° N
    Nairobi, Kenya: 3° S

16. Stanley, Falkland Islands: 52° S
    Buenos Aires, Argentina: 35° S

Find the radian measure of each angle. Use 1 degree = $\frac{\pi}{180}$ radians.

1. 330°

2. -75°

3. -190°

4. 90°

Find the degree measure of each angle. Use 1 radian = $\frac{180}{\pi}$ degrees.

5. $\frac{7\pi}{5}$

6. $\frac{3\pi}{2}$

7. $\frac{-4\pi}{3}$

8. $\frac{-10\pi}{7}$

Find the decimal equivalent for radians #1–4 to three places. Use 3.14 for π.

9.

10.

11.

12.