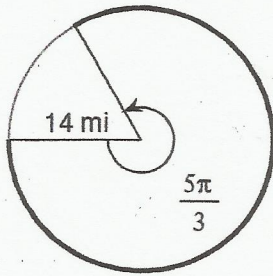
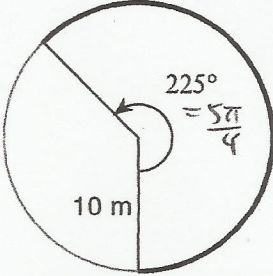


**Directions:** Use the Arc Length Formula:  $s = r \cdot \theta$  or the Sector Area Formula:  $A = \frac{1}{2} \cdot r^2 \cdot \theta$  for the problems below. Round to nearest tenth and include units. Show your work!!

<p>1.)</p> 	<p>a.) Arc Length</p> $s = 14 \left( \frac{5\pi}{3} \right)$ $s = 73.3 \text{ mi}$ <p>b.) Sector Area</p> $A = \frac{1}{2} (14)^2 \left( \frac{5\pi}{3} \right)$ $A = 513.1 \text{ mi}^2$	<p>2.)</p> 	<p>a.) Arc Length</p> $s = 10 \left( \frac{5\pi}{4} \right)$ $s = 39.3 \text{ m}$ <p>b.) Sector Area</p> $A = \frac{1}{2} (10)^2 \left( \frac{5\pi}{4} \right)$ $A = 196.3 \text{ m}^2$
--	---	---	---

- 3.) Find the central angle  $\theta$  (in degrees) if the arc length is 18 cm and the diameter is 6 cm.

$$s = r\theta \rightarrow \frac{18}{3} = \frac{3\theta}{3}$$

$$\theta = 6 \text{ radians} \times \frac{180}{\pi}$$

$$\theta = 343.8^\circ$$

- 4.) If the sector area is  $126.7 \text{ ft}^2$  and the central angle  $\theta$  is  $120^\circ$ , find the length of the radius.

$$A = \frac{1}{2} r^2 \theta \rightarrow 126.7 = \frac{1}{2} r^2 \left( \frac{2\pi}{3} \right)$$

$$3 \times 253.4 = r^2 \left( \frac{2\pi}{3} \right) \times 3$$

$$\frac{760.2}{(2\pi)} = \frac{r^2 (2\pi)}{(2\pi)} \rightarrow \sqrt{\frac{760.2}{2\pi}} = r$$

$$r = 11 \text{ ft}$$

- 5.) Pittsburgh, PA and Miami, FL lie approximately on the same meridian. Pittsburgh has a latitude of  $40.5^\circ \text{ N}$  and Miami has a latitude of  $25.5^\circ \text{ N}$ . The radius of the earth is approximately 3,960 miles. What is the distance between the two cities?

$$\theta = 40.5 - 25.5$$

$$\theta = 15^\circ \times \frac{\pi}{180}$$

$$\theta = \frac{\pi}{12}$$

$$s = 3960 \left( \frac{\pi}{12} \right)$$

$$s = 1036.7 \text{ mi}$$

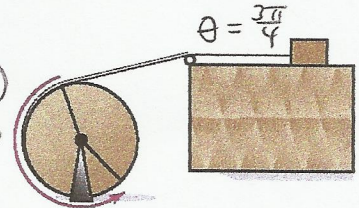


- 6.) A wheel is connected to a box by a cable. What is the radius of the wheel if the box moved 7.8 feet with a  $135^\circ$  angle counterclockwise?

$$7.8 = r \left( \frac{3\pi}{4} \right)$$

$$\frac{31.2}{(3\pi)} = \frac{r (3\pi)}{(3\pi)}$$

$$r = 3.3 \text{ ft}$$

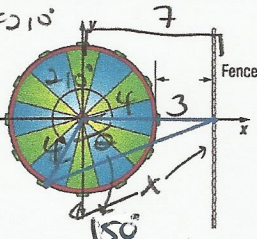


- 7.) Anthony's little brother gets on a carousel that is 8 meters in diameter. As the start of the ride, his brother is 3 meters from the ride entrance in the fence. How far will his brother be from the entrance after the carousel rotates  $\frac{7\pi}{6}$ ?

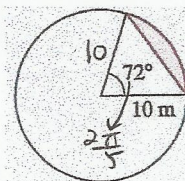
$$x^2 = 4^2 + 7^2 - 2(4)(7) \cos(150^\circ)$$

$$\sqrt{x^2} = \sqrt{13.4974226}$$

$$x = 10.7 \text{ m}$$



- 8.) Using the figure below, find the following:



- a.) Find perimeter of shaded region.

$$s = 10 \left( \frac{2\pi}{5} \right)$$

$$s = 12.6$$

$$x = 11.8$$

$$\text{Perimeter} = 12.6 + 11.8$$

$$= 24.4 \text{ m}$$

- b.) Find area of the shaded region.

$$A = \frac{1}{2} (10)^2 \left( \frac{2\pi}{5} \right)$$

$$A = 62.8$$

$$A = 47.6$$

$$\text{Shaded area} = 62.8 - 47.6$$

$$= 15.2 \text{ m}^2$$

- 9.) Suppose the gondolas on the Navy Pier Ferris wheel were numbered from 1 through 40 consecutively in a counterclockwise fashion. If you were sitting in gondola number 3 and the wheel were to rotate counterclockwise through  $\frac{47\pi}{10}$ , which gondola used to be in the position that you are in now?

$$\frac{47\pi}{10} \times \frac{180}{\pi} = 846^\circ$$

$$360^\circ \div 40 = 9^\circ$$

$$846^\circ \div 9^\circ = 94$$

$$94 - 1 = 93$$

$$93 - 1 = 92$$

$$92 - 1 = 91$$

$$91 - 1 = 90$$

$$90 - 1 = 89$$

$$89 - 1 = 88$$

$$88 - 1 = 87$$

$$87 - 1 = 86$$

$$86 - 1 = 85$$

$$85 - 1 = 84$$

$$84 - 1 = 83$$

$$83 - 1 = 82$$

$$82 - 1 = 81$$

$$81 - 1 = 80$$

$$80 - 1 = 79$$

$$79 - 1 = 78$$

$$78 - 1 = 77$$

$$77 - 1 = 76$$

$$76 - 1 = 75$$

$$75 - 1 = 74$$

$$74 - 1 = 73$$

$$73 - 1 = 72$$

$$72 - 1 = 71$$

$$71 - 1 = 70$$

$$70 - 1 = 69$$

$$69 - 1 = 68$$

$$68 - 1 = 67$$

$$67 - 1 = 66$$

$$66 - 1 = 65$$

$$65 - 1 = 64$$

$$64 - 1 = 63$$

$$63 - 1 = 62$$

$$62 - 1 = 61$$

$$61 - 1 = 60$$

$$60 - 1 = 59$$

$$59 - 1 = 58$$

$$58 - 1 = 57$$

$$57 - 1 = 56$$

$$56 - 1 = 55$$

$$55 - 1 = 54$$

$$54 - 1 = 53$$

$$53 - 1 = 52$$

$$52 - 1 = 51$$

$$51 - 1 = 50$$

$$50 - 1 = 49$$

$$49 - 1 = 48$$

$$48 - 1 = 47$$

$$47 - 1 = 46$$

$$46 - 1 = 45$$

$$45 - 1 = 44$$

$$44 - 1 = 43$$

$$43 - 1 = 42$$

$$42 - 1 = 41$$

$$41 - 1 = 40$$

$$40 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 - 1 = 18$$

$$18 - 1 = 17$$

$$17 - 1 = 16$$

$$16 - 1 = 15$$

$$15 - 1 = 14$$

$$14 - 1 = 13$$

$$13 - 1 = 12$$

$$12 - 1 = 11$$

$$11 - 1 = 10$$

$$10 - 1 = 9$$

$$9 - 1 = 8$$

$$8 - 1 = 7$$

$$7 - 1 = 6$$

$$6 - 1 = 5$$

$$5 - 1 = 4$$

$$4 - 1 = 3$$

$$3 - 1 = 2$$

$$2 - 1 = 1$$

$$1 - 1 = 0$$

$$0 - 1 = 39$$

$$39 - 1 = 38$$

$$38 - 1 = 37$$

$$37 - 1 = 36$$

$$36 - 1 = 35$$

$$35 - 1 = 34$$

$$34 - 1 = 33$$

$$33 - 1 = 32$$

$$32 - 1 = 31$$

$$31 - 1 = 30$$

$$30 - 1 = 29$$

$$29 - 1 = 28$$

$$28 - 1 = 27$$

$$27 - 1 = 26$$

$$26 - 1 = 25$$

$$25 - 1 = 24$$

$$24 - 1 = 23$$

$$23 - 1 = 22$$

$$22 - 1 = 21$$

$$21 - 1 = 20$$

$$20 - 1 = 19$$

$$19 -$$