desmos

Unit 7.3, Lesson 1: Notes

Name Ishaan

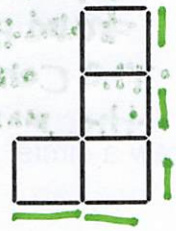
My Notes

Perimeter - distance around the outside of a shape,

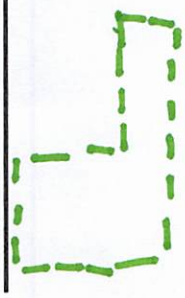
Fence

1. Here is a shape with a side length of 2 toothpicks. Sketch a scaled copy of this shape with a side length of 4 toothpicks.

Bottom Side Length: 2 2+2=4



Bottom Side Length: 4



2. Complete the table with the number of toothpicks needed to build the perimeter and interior of each shape.

Side Length	Perimeter	Interior
2		
4		

3. Explain which relationships are proportional: side length and perimeter, side length and interior toothpicks, both, or neither.

Summary

- ☐ I can explain whether or not the relationship between a side length or a diagonal of a shape and its perimeter is proportional.
- ☐ I can use proportional relationships to figure out missing side lengths, diagonals, and perimeters.

desmos

Unit 7.3, Lesson 2: Notes

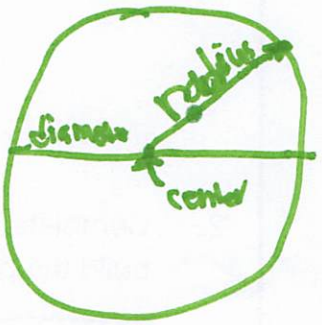
Name Ishaan

My Notes

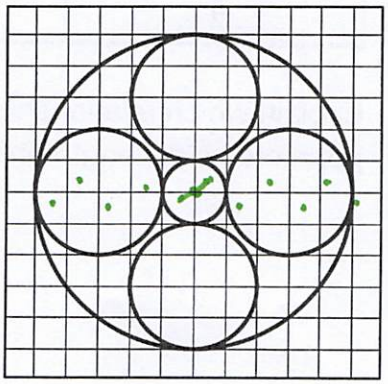
1. What are the characteristics of a **circle**?

- Round, No angles
- 2D
- The radius is the same all the way around the circle
- The center to edge distance is always the same

2. Draw a circle. Label its **center**, **radius**, and **diameter**.



3. Madison made a drawing using circles. Describe her drawing as precisely as you can so that someone who can't see her drawing could recreate it.



The largest circle is 11 units in its diameter, and 4 small circles inside, which has a diameter of 4 units,

Summary

- [ ] I can describe the characteristics of a circle.
- [ ] I can identify the diameter and radius of a circle and explain how they are related.

desmos

Unit 7.3, Lesson 3: Notes Name _____

My Notes

C = circumference

d = diameter

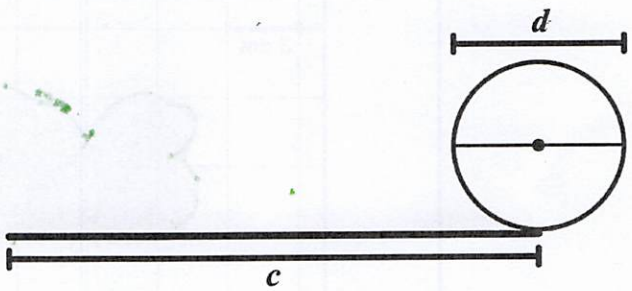
r = d ÷ 2

d = 2 · r

C = π · d or 2πr

d = C/π

1. Describe the relationship between the diameter of a circle, d, and its **circumference**, C.



π = 3.14159265358979323384 or $\frac{22}{7}$

2. List some things you know about π.

The relationship is proportional and has a C.O.P. of π

3. Complete the table with measurements for each object.

Object	Radius (cm)	Diameter (cm)	Circumference (cm)
Coaster	5 x 2 =	10	31.4
Ring	1.2	2.4	7.53
Hoop	23.85	47.7	150

Summary

C = πd or C = 2πr

- [x] I can describe the relationship between the radius, diameter, and circumference of a circle.
- [x] Given the radius, diameter, or circumference of a circle, I can calculate the other two measurements.

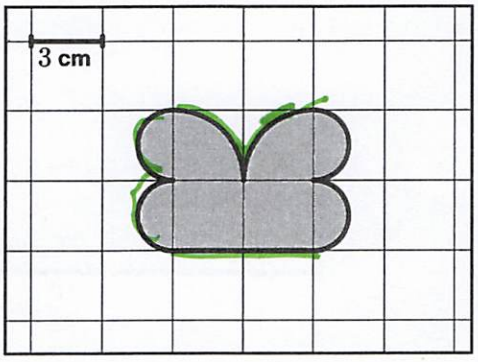
desmos

Unit 7.3, Lesson 4: Notes

Name _____

My Notes

1. Irene calculated the perimeter of the shape below as $9\pi + 6$ centimeters. Explain how you know she is correct.



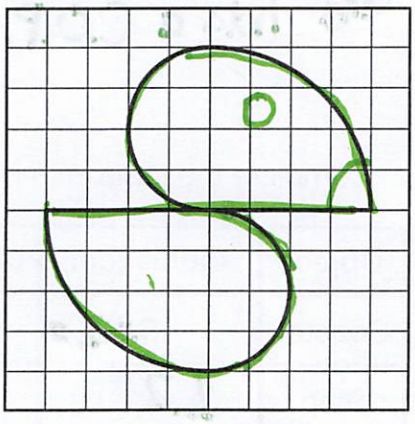
$2 \cdot 0 = 2 \cdot 3\pi$

$\cap = \frac{6\pi}{2} = 3\pi$

$- = 6$

$9\pi + 6$

2. Calculate the perimeter of the shape below. Show all of your thinking.



$\circ = 4\pi$

$\cap = \frac{8\pi}{2}$

$- = 8$

$= 8\pi + 8$

Summary

- Break complicated shape up into smaller pieces.
- Add pieces back up at the end.

- ☑ I can calculate the perimeter of a complex shape that includes parts of circles.
- ☑ I can write perimeter as an expression that includes π, such as $20\pi + 50$.

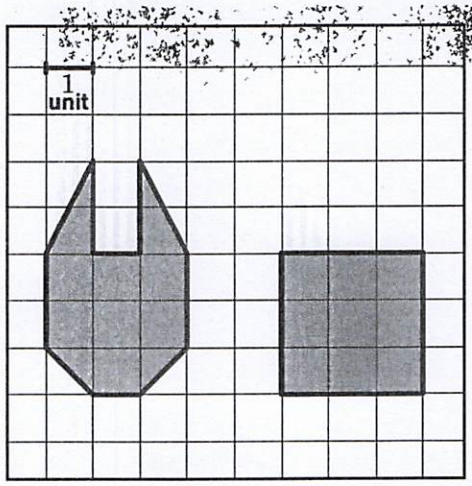
desmos

Unit 7.3, Lesson 5: Notes

Name Ishaan

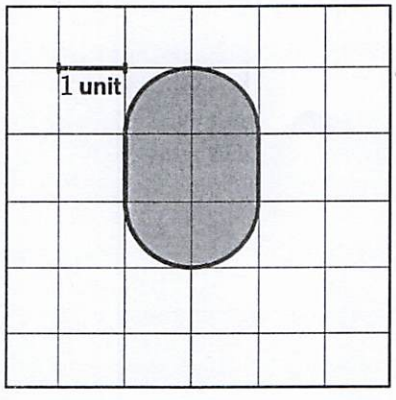
My Notes

1. Tiara says these two figures have the same area. Is Tiara correct? Explain and show your thinking.



She is ihcorrect because the first shape has an area of 10 and the secord an area

2. Do you think the area of this shape is more than 4 square units, less than 4 square units, or exactly 4 square units? Explain your thinking.



3 4 +2

3+2 = 5sq

Summary

• Break caplex shapes ihso smaller pieces and estimate

- [x] I can determine the area of a complex shape using a variety of strategies.
- [x] I can estimate the area of a shape with curved edges.

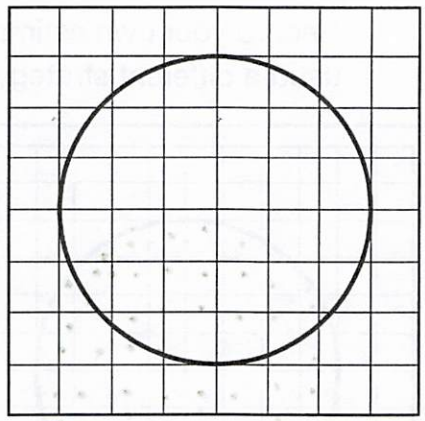
desmos

Unit 7.3, Lesson 6: Notes

Name Isham

My Notes

1. Draw a radius square for this circle.



What is the area of the radius square?

$\pi \approx 3$

2. Estimate the area of this circle using radius squares.

$3 \cdot AR^2$

3.9

≈ 27.9 units

3. What is the formula for the relationship between the radius of a circle and its area?

$A = \pi r^2 = \pi \cdot r \cdot r$

4. Use the formula to calculate the exact area of the circle.

Summary

$A = \pi r^2$

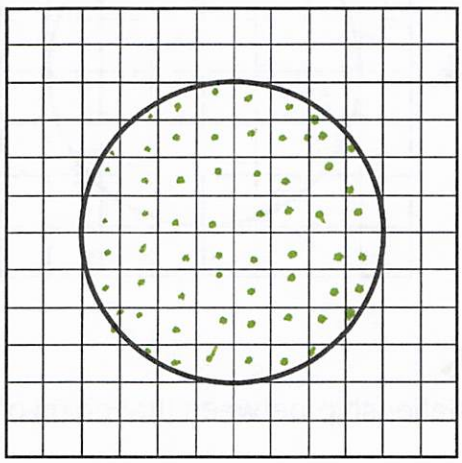
- [x] I can describe the relationship between the radius of any circle and its area.
- [x] I can calculate the area of a circle.

desmos

Unit 7.3, Lesson 6: Radius Squares Name(s) _____

Activity 1: Estimating Circle Area

1. Estimate the number of unit squares it would take to cover Ayaan's circle (shown below). Record your own estimate and strategy. Then, find a person who got a different estimate or used a different strategy, and record their estimate and strategy.



My estimate:

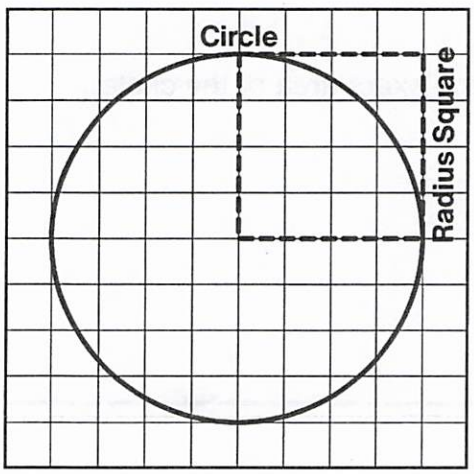
58π

My strategy:

My partner's estimate:

My partner's strategy:

Each circle has a corresponding radius square. Here is the radius square for this circle.



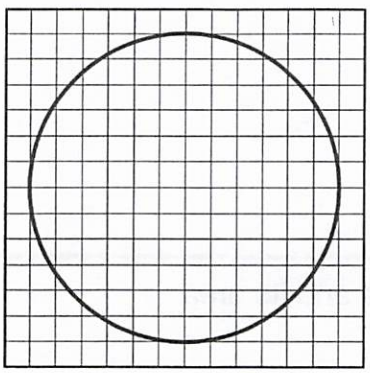
2. Why do you think we call this a radius square?

Because the side lengths are the same lengths as the radius of the circle.

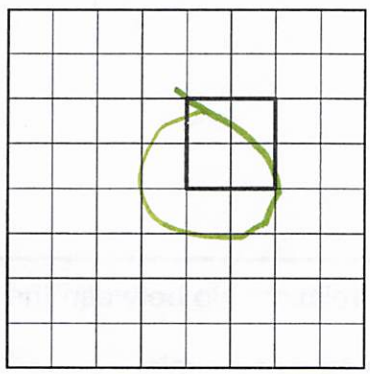
3. For this circle, one radius square has an area of 16 square units. About how many of these radius squares do you think it would take to cover just the circle?

4

4. Draw a radius square for this circle.



5. Draw a circle for this radius square.



desmos

Unit 7.3, Lesson 6: Radius Squares Name(s) _____

Activity 2: Circle vs. Radius Square

For this activity, you will need circles and sets of radius squares.

For each circle and set of radius squares, cut up each radius square and rearrange the pieces so that they cover just the circle. Record what you and your classmates discover in the table below.

	Radius of the Circle	Number of Radius Squares Needed to Cover the Circle
Circle *A*		π = 3.14159265358979323846264
Circle *B*	2	π
Circle *C*	6	π
Circle *D*	5	π

In general, how many radius squares do you think it takes to cover a circle? _____

Activity 2 Synthesis

1. Precious says you can estimate the area of a circle by calculating $3 \cdot r^2$. What do you think each part of her expression means?

$3 \cdot r^2$

3: # of radius that fit in a circle

r^2: radius squared or the area of a radius square

2. Do you agree with Precious? Use your earlier work to help support your thinking.

yes, because 3 is close to π.

π = 3.14159265358979323846264

desmos

Unit 7.3, Lesson 6: Radius Squares Name(s) _____

Activity 3: Circle Area

1. After watching the animation, do you think the formula $A = 3 \cdot r^2$ will give an overestimate or an underestimate for the area of a circle? Use the animation to help support your thinking.

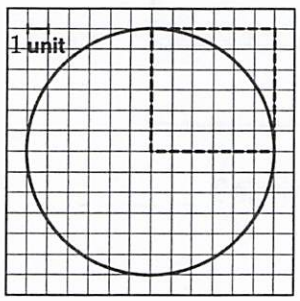
Underestimate

2. Write a formula to calculate the **exact** area of a circle.

$A = \pi \cdot r^2$

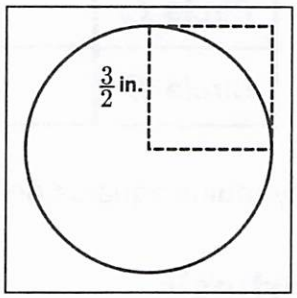
Calculate the exact area of each circle. (These are not drawn to scale.)

3.1



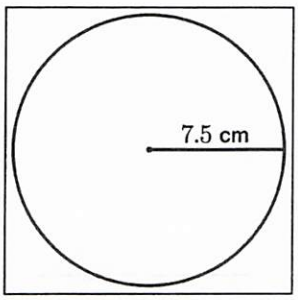
Area: 36π

3.2



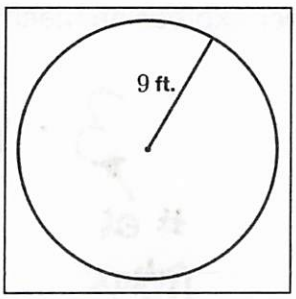
Area: π in^2

3.3



Area: 56.25π cm^2

3.4



Area: 81π ft^2

Are You Ready for More?

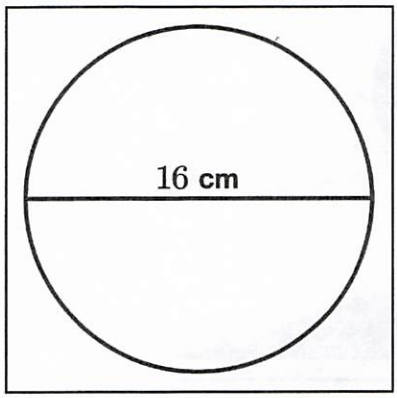
Is there a proportional relationship between the radius of a circle and its area? Use the circles from this activity to help you explain your thinking.

desmos

Unit 7.3, Lesson 6: Radius Squares Name(s) _____

Lesson Synthesis

Describe a strategy to calculate the area of a circle if you know its diameter. Use the circle below to help you with your explanation.



① Divide diameter by 2

$d \div 2 = r$

② $A = \pi r^2 = \pi \cdot r \cdot r$

Cool-Down

Circle A has a diameter of approximately 20 inches.

Which of these could be the area of circle A? Explain your reasoning.

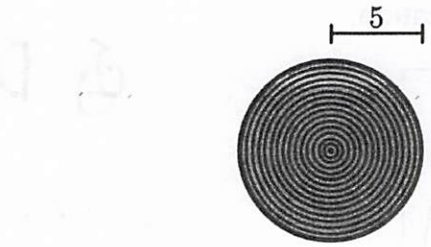
A. About 100 in.^{2}
B. About 300 in.^{2}
C. About 400 in.^{2}
D. About 1 200 in.^{2}

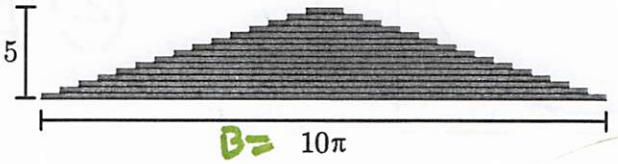
desmos

Unit 7.3, Lesson 7: Notes Name _____

My Notes

Here is a circle cut into rings and unrolled into a triangle shape.





1. Calculate the area of the circle as a triangle.

$\frac{1}{2} \cdot b \cdot h$

$\frac{1}{2} \cdot 10\pi \cdot 5 = \frac{50\pi}{2} = 25\pi$

2. Label the base and the height of the triangle.

3. Calculate the area of the triangle. How is it related to the area of the circle?

$A = \pi r^2$

$= \pi \cdot 5 \cdot 5$

$= 25\pi$

- We can

Summary

- ☐ I can explain whether the relationship between the radius and area of a circle is proportional or not.
- ☐ I can explain the formula of a circle's area by rearranging the circle into a triangle of the same area.

desmos

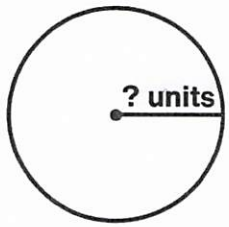
Unit 7.3, Lesson 9: Notes

Name _____

My Notes

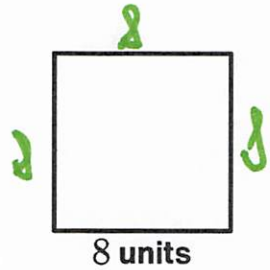
The circle and square have the same perimeter. $= 32$

1.1 What is the radius of the circle?



$C = 32$

$R = \frac{C}{2\pi} = \frac{32}{2\pi} = \frac{16}{\pi}$



1.2 What is the area of each shape?

$A_{\bigcirc} = \pi \cdot r^2 = \pi \cdot \frac{16}{\pi} \cdot \frac{16}{\pi} = \frac{256}{\pi}$

$A_{\square} = 8 \cdot 8 = 64$

2. What are some important things to remember when calculating the circumference and area of circles?

$C = 2\pi r$ or πd

$A = \pi r^2$ or $\frac{C^2}{4\pi}$

$A = \frac{C^2}{4\pi}$

$A = \pi \cdot r^2 = \pi \cdot \frac{C}{2\pi} \cdot \frac{C}{2\pi} \cdot \frac{C^2}{4\pi}$

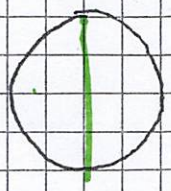
Summary

$R = \frac{C}{2\pi}$

- [ ] I can describe the relationship between perimeter and area for both a circle and a square.
- [ ] I can calculate the area of a circle given its circumference.

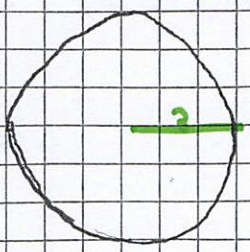
Find the perimeter of the shapes.

① 1



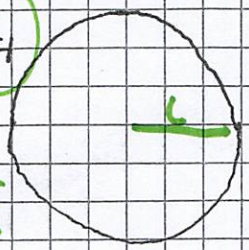
$C = \pi d$

② 1



$C = 2\pi r$

③ 2

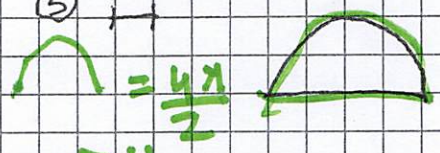


$C = 2\pi \cdot r$
$= 2\pi \cdot 6$

④ 10

$C = 20\pi$
$= d\pi$

⑤ 1

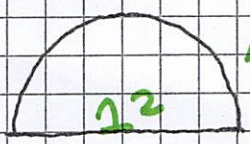


$= \frac{4\pi}{2}$

$= 4$

$2\pi + 4$

⑥ 2

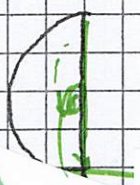


$= 6\pi$

$\rightarrow 12$

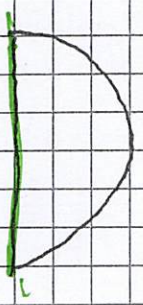
$= 6\pi \cdot 12$

⑦ 10

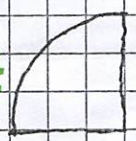


$\frac{10\pi}{2} + 10$

⑧



⑨ 1

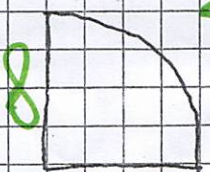


$r = \frac{6\pi}{4}$

3

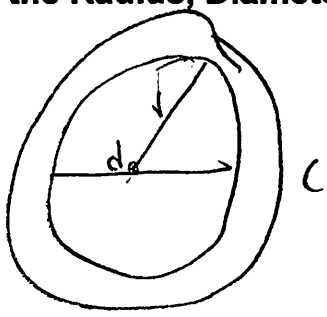
$\frac{6\pi}{4} + 6$

⑩ 2



$= 4\pi + 16$

Draw a Circle. Label the Radius, Diameter, and Circumference



Key Formula for Circumference:

1. The formula to find the circumference of a circle is:

$$C = \underline{\pi} \times \underline{d} \quad \text{or} \quad C = \underline{2r} \times \underline{\pi}$$

- Where r stands for the radius.
- Where d stands for the diameter.
- π is approximately 3.14 or $\frac{22}{7}$ or 3.14159265358979323846.

Steps to Find Circumference:

1. Identify the diameter or the radius of the circle.
   - If you are given the **diameter (d)**, use the formula $C =$ πd.
   - If you are given the **radius (r)**, use the formula $C =$ $2\pi r$.
2. **Plug in** the value for r or d into the formula.
3. **Multiply** by π, approximately 3.14 or $\frac{22}{7}$ or 3.14159265358979323846.

Example Problems:

1. **Problem:** Find the circumference of a circle with a radius of 6 cm.
   - Use the formula $C = 2\pi r$.
   - $C = 2 \times \underline{\pi} \times \underline{6}$
   - $C = \underline{12\pi} \; cm$
2. **Problem:** Find the circumference of a circle with a diameter of 10 inches.
   - Use the formula $C = \pi d$.
   - $C = \underline{\pi} \times \underline{10}$
   - $C = \underline{10\pi} \; inches$

Key Facts to Remember:

- **Radius (r)** is half of the diameter.
- **Diameter (d)** is twice the radius.
- **Circumference** is the distance around the outside of the circle.
- Always use $\pi \approx 3.14$ unless told otherwise.

Quick Practice Problems:

1. A circle has a radius of 8 cm. Its circumference is 16π.
2. The diameter of a circle is 14 inches. Its circumference is 14π.
3. The circumference of a circle is 25.12 cm. The radius of the circle is 8.