Name _____

The Ripple Effect

Many of you have probably seen water ripples. These occur when we have a focused, downward pressure on the surface of the water. What happens, as a result, is a beautiful expansion of circles.

Imagine that a single drop of water has dripped down onto the surface of a calm pool.

1. Draw a sketch of a ripple that has 6 similar circles (same shape yet different size) around a shared center. As the circles expand out, the distance between each will become 150% of the distance before it. Label these distances (rounded to the nearest hundredths place) in your sketch.

   Fill in the table below to help your processing of this situation. For this table, keep the actual values (not the rounded values).

Distance from Center to Circle #1	0.5 cm
Distance from Circle #1 to Circle #2	
Distance from Circle #2 to Circle #3	
Distance from Circle #3 to Circle #4	
Distance from Circle #4 to Circle #5	
Distance from Circle #5 to Circle #6	

2. What is the radius of this entire pattern at this point? _____

3. What is the diameter of this entire pattern at this point? _____

4. Find the circumference of each circle. For this, you will need to remember the following:

    a. The circumference (distance around) a circle is approximately _____ times (also known as _____) as great as the diameter (distance across) a circle. This means that the formula for circumference of a circle is:

        Circumference = _____ x _____

        OR

        C = _____ OR C = _____

	Radius (rounded to the hundredths place)	Diameter (rounded to the hundredths place)	Circumference
Circle #1			
Circle #2			
Circle #3			
Circle #4			
Circle #5			
Circle #6			

5. How did you find the radius of each circle in the problem above? _____

    _____

    _____

    _____

    _____

6. **EXTENSION PROBLEM** Imagine <u>two drops</u> of water drip into the pool at exactly the same moment and have the same rate of expansion. They drip in 30 centimeters away from one another.

   a. What will be the radius of each ripple by the time they touch? Explain how you know. _____
   _____
   _____
   _____

   b. What will be the diameter of each ripple by the time they touch? Explain how you know. _____
   _____
   _____
   _____

   c. How many circles will be in each ripple by the time they touch? Explain how you decided on your final answer. Continue the table from the last page to help you out. Remember that the distance between circles is 150% of the circle before it. _____
   _____
   _____
   _____
   _____
   _____

	Radius
Circle #6	
Circle #7	
Circle #8	
Circle #9	
Circle #10	

d. Draw a sketch of what the ripples will look like when they touch. You do not need to show each individual circle. Label the radius and diameter of each ripple.

e. What will be circumference of each ripple when they touch? Explain how you solved this. _____
_____
_____
_____
_____

f. One of your friends found the circumference of each circle to be approximately 120.83 cm. What do you think your friend mathematically did to get this approximation? _____
_____
_____
_____
_____

g. Did you notice any patterns in the table from 6c? If so, explain what you see. _____
_____
_____
_____
_____

The Ripple Effect

ANSWER KEY

Many of you have probably seen water ripples. These occur when we have a focused, downward pressure on the surface of the water. What happens, as a result, is a beautiful expansion of circles.

Imagine that a single drop of water has dripped down onto the surface of a calm pool.

1. Draw a sketch of a ripple that has 6 similar circles (same shape yet different size) around a shared center. As the circles expand out, the distance between each will become 150% of the distance before it. Label these distances (rounded to the nearest hundredths place) in your sketch.

   Fill in the table below to help your processing of this situation. For this table, keep the actual values (not the rounded values).

Distance from Center to Circle #1	0.5 cm
Distance from Circle #1 to Circle #2	0.75 cm
Distance from Circle #2 to Circle #3	1.125 cm
Distance from Circle #3 to Circle #4	1.6875 cm
Distance from Circle #4 to Circle #5	2.53125 cm
Distance from Circle #5 to Circle #6	3.796875 cm

   For this image, there should be a total of 6 concentric circles. The distance between each should be represented as slightly larger than the distance between the one before (for the understanding of x 150%). The distances from circle to circle should be labeled as follows:

   0.5 cm—0.75 cm—1.13 cm—1.69 cm—2.53 cm—3.8 cm

2. What is the radius of this entire pattern at this point? 10.4 cm (if used rounded answers) or 10.390625 cm (if used actual answers)

3. What is the diameter of this entire pattern at this point? 20.8 cm (if used rounded answers) or 20.78125 cm (if used actual answers)

4. Find the circumference of each circle. For this, you will need to remember the following:

    a. The circumference (distance around) a circle is approximately 3.14 times (also known as pi) as great as the diameter (distance across) a circle. This means that the formula for circumference of a circle is:

        Circumference = pi x diameter

        OR

        C = πd OR C = π2r

	Radius (rounded to the hundredths place)	Diameter (rounded to the hundredths place) (answers may vary a bit depending on when rounding took place)	Circumference
Circle #1	0.5 cm	1 cm	3.14 cm
Circle #2	0.75 cm	1.5 cm	4.71 cm
Circle #3	1.13 cm	2.26 cm	7.0964 cm
Circle #4	1.69 cm	3.38 cm	10.6132 cm
Circle #5	2.53 cm	5.06 cm	15.8884 cm
Circle #6	3.8 cm	7.6 cm	23.864 cm

5. How did you find the radius of each circle in the problem above? Answers will vary_____

_____

_____

_____

6. **EXTENSION PROBLEM** Imagine <u>two drops</u> of water drip into the pool at exactly the same moment and have the same rate of expansion. They drip in 30 centimeters away from one another.
    a. What will be the radius of each ripple by the time they touch? Explain how you know. The radius of each ripple will be 15 centimeters since each will cover half of the distance between the two ripples.
    b. What will be the diameter of each ripple by the time they touch? Explain how you know. The diameter of each ripple will be 30 centimeters since the diameter is twice the radius.
    c. How many circles will be in each ripple by the time they touch? Explain how you decided on your final answer. Continue the table from the last page to help you out. Remember that the distance between circles is 150% of the circle before it. Answers may vary a bit on this one. Some students will interpret it as 10 circles and some may say slightly more than 9 circles. They will also need to explain their reasoning.

	Radius
Circle #6	3.8 cm
Circle #7	5.7 cm
Circle #8	8.55 cm
Circle #9	12.825 cm
Circle #10	19.2375 cm

    d. Draw a sketch of what the ripples will look like when they touch. You do not need to show each individual circle. Label the radius and diameter of

each ripple. The student's drawing should match up with their answer from 6c.

e. What will be circumference of each ripple when they touch? Explain how you solved this. Answers may vary here. Some students may use a radius of 15 and get 94.2 cm. Some students may use 19.2375 cm (the radius of 10 circles) as the radius and get 120.8115 cm.
f. One of your friends found the circumference of each circle to be approximately 120.83 cm. What do you think your friend mathematically did to get this approximation? The friend rounded the radius 19.2375 to 19.24 before using the formula $C=\pi 2r$. The friend still used the approximation of 3.14 for pi.
g. Did you notice any patterns in the table from 6c? If so, explain what you see. Answers vary