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**The Amateur Astronom...**

Authored by Richard J. Bartlett

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# *The Amateur Astronomer's Notebook*

*A Journal for Recording and Sketching Astronomical Observations*

Richard J. Bartlett

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First Edition, October 2014

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# Introduction

About this Book

I’ve been looking for a halfway-decent astronomical journal for some time now. I’ve looked through a few bookstores, searched online, looked at other astronomers’ ideas... and then I started to look through my own journals from when I was a kid.

And I realized I just wanted something simple. I didn’t want to spend fifteen minutes logging all the equipment, the location, the weather, the time of moonrise or if there was a chance of condensation forming on my eyepieces before the end of the night.

And as simple as my childhood journal was, I remembered what I liked about it. I liked sketching what I saw. I liked the idea of recording it all on paper, just as Galileo used to do, four hundred years ago. Nowadays, of course, we have computers and we can type everything into a Word document – and even scan those sketches into the computer – but it’s not the same.

I hate to sound like a grumpy old astronomer (and I realize the irony/hypocrisy given that I’ve published ebooks) but I like the idea of having a good old-fashioned pen-and-paper journal.

So here it is. Here’s the journal I’ve been looking for. It’s pretty plain and simple and I like it that way.

I’ve included a few lines for some basic information (such as the sky conditions and equipment) and have left a few lines for additional notes if you feel inclined. There are five circles for sketches – it doesn’t have to be the view through the eyepiece either. Maybe it’s a naked eye view, or the finderscope, or a lunar or planetary disc – however you want to use it.

And in case you’re looking for ideas for your next observing session, at the back you’ll also find an appendix of hundreds of deep sky objects, including multiple stars, open and globular clusters, nebulae and galaxies – because as a kid I was always hoping to find something new to look at. If I’ve missed your favorite object, please feel free to email me at the address below.

(Unfortunately, time and formatting issues prevent me from including the co-ordinates for each and every object, but as you might expect, these can easily be found online and any good go-to ‘scope should be able to point you in the right direction. Unless otherwise stated, the images are my own. I’m not an artist but, in the interests of honesty, I thought it would be fun to take images of the selected objects and make them look like sketches.)

If you have any comments or suggestions, please feel free to email me at *astronomywriter@gmail.com*.

Clear skies,

Richard J. Bartlett

October 21<sup>st</sup>, 2014

About Transparency and Seeing

*Transparency* is a rating to describe the ability to see faint objects through the atmosphere. For example, many deep sky objects such as nebulae and galaxies may require good transparency to be visible. Transparency can be adversely affected by anything in the air, such as high altitude clouds. Conversely, transparency is often best after a storm because the moisture removes the particles of dust from the air.

There’s no widely accepted rating system for transparency; many astronomers use a rating from 1 to 10, with 10 being perfectly clear down to 1 being completely overcast (obviously not the best time to observe.) Others use a similar, five point scale.

*Seeing* describes the steadiness of the air itself. For example, if you observe an object like the Moon through a telescope on a warm evening, especially when it is close to the horizon, you may see it shimmer and it may appear distorted. That’s because the air isn’t steady and it causes distortions that affect your ability to see details.

Many astronomers use the Antoniadi Scale for rating the seeing conditions:

I – Perfect seeing without a quiver.

II – Slight undulations with calm lasting several seconds.

III – Moderate seeing with larger air tremors that cause the image to blur.

IV – Poor seeing with constant troublesome undulations.

V – Very bad seeing, hardly stable enough to sketch the object.

Ultimately both rating systems are a matter of personal preference and there’s nothing to stop you from using your own!

About Limiting Magnitude

Limiting magnitude is, quite simply, the magnitude of the faintest object you can see with your naked eye. From a city, this might be a star of about magnitude 3, but far away from the city lights, under clear, dark skies, you may have a limiting magnitude closer to 6.

Let’s put this into perspective. Under a clear sky in a dark, rural location, you’ll probably be able to see around 3,000 stars up to magnitude 6. However, from a city the view is severely limited; many urban astronomers are limited to seeing stars of magnitude 3 or brighter and on any given night there may only be about 100 of those visible.

Light pollution is choking astronomy.

Also by the Author

*2015 An Astronomical Year* is an astronomical eBook for everyone that details hundreds of night sky events throughout the year. It was designed for both the general public (with highlighted text and graphics to showcase the best events) and astronomers of all levels. It includes details of the lunar phases and eclipses, as well as conjunctions, oppositions, magnitude and apparent diameter changes for the planets and major asteroids.

*2015 An Astronomical Year* is also available in paperback. However, please be aware that due to the cost of printing in color, the book does *not* contain images and is purely text only.

*The Astronomical Almanac (2015-2019): A Comprehensive Guide to Night Sky Events* provides details of thousands of astronomical events from 2015 through to 2019. Designed for astronomers of all levels, this guide includes almost daily data and information on the Moon and planets, as well as Pluto, Ceres, Pallas, Juno and Vesta. (Also available in paperback.) Like the paperback version of *2015 An Astronomical Year*, it is purely text only.

*Echoes of Earth* – a collection of science fiction, mythological and philosophical short stories that I wrote many, many moons ago. (i.e, in the mid 1990’s.)

The Author Online

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The Astronomical Year: <http://theastronomicalyear.wordpress.com/>

Facebook: <https://www.facebook.com/pages/Richard-J-Bartlett/1506578736250881>

Twitter (@astronomywriter): <https://twitter.com/astronomywriter>

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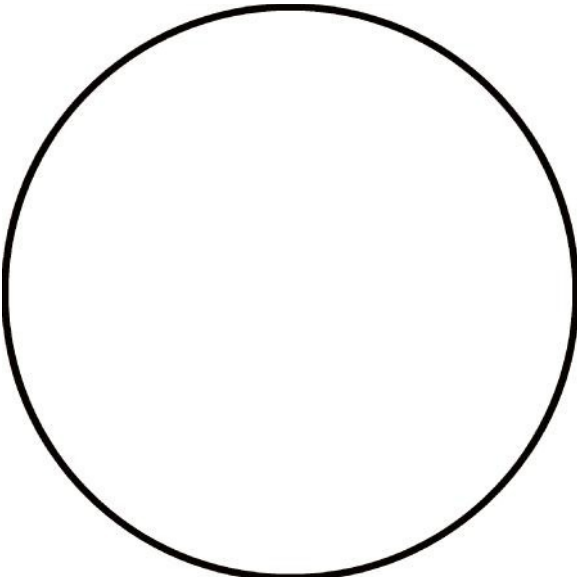
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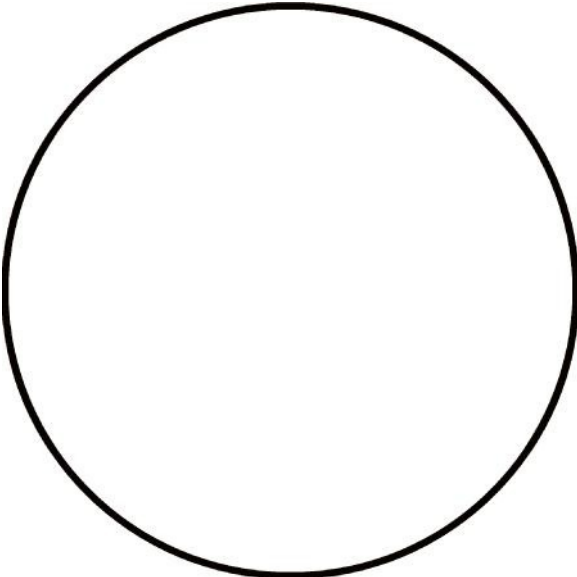
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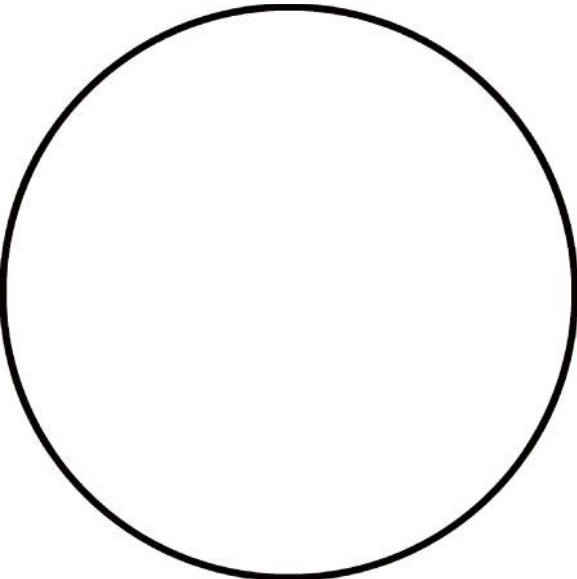
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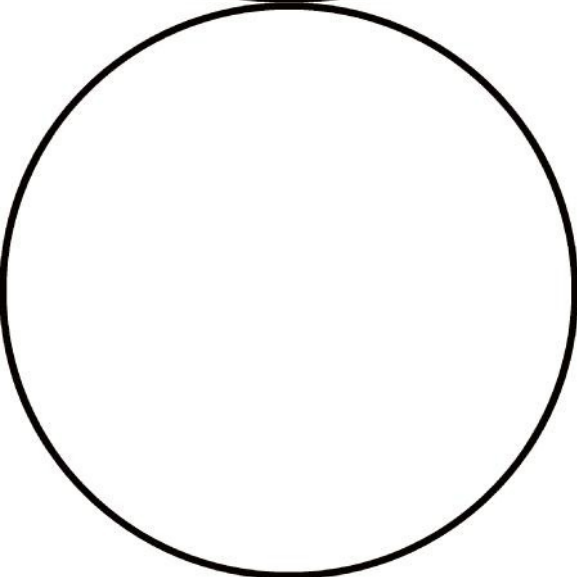
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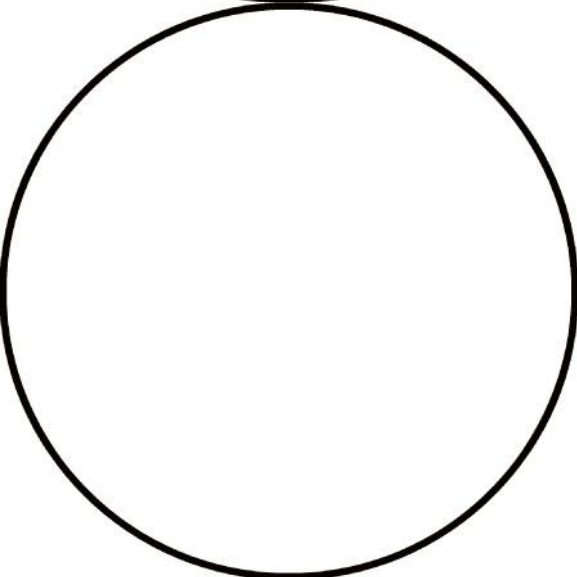
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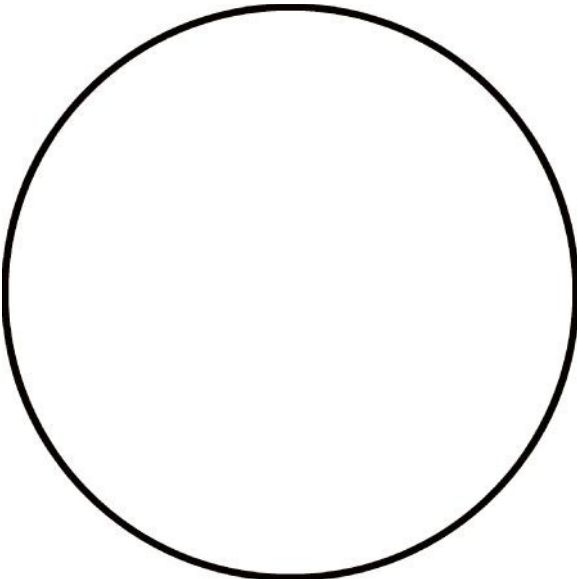
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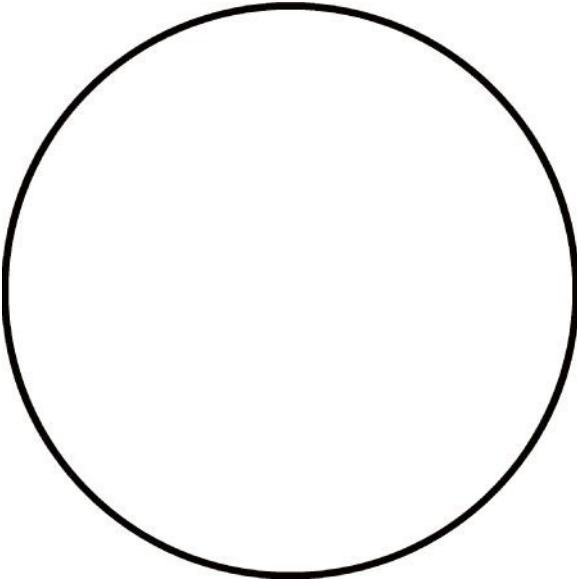
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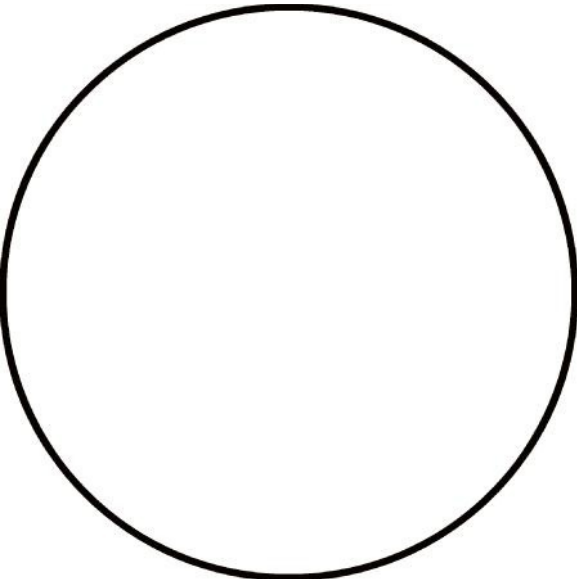
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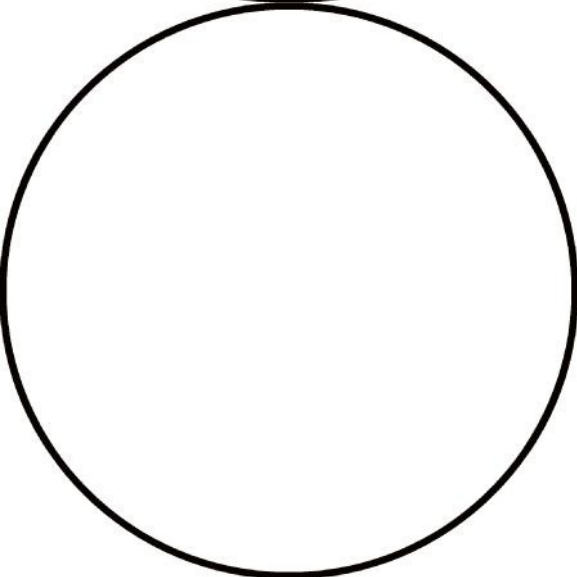
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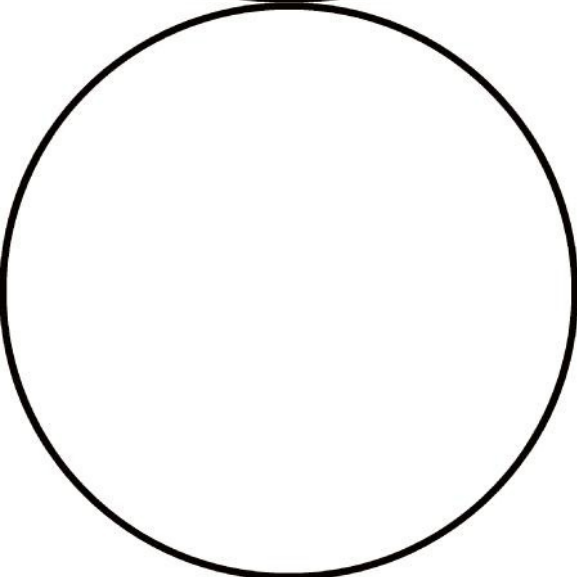
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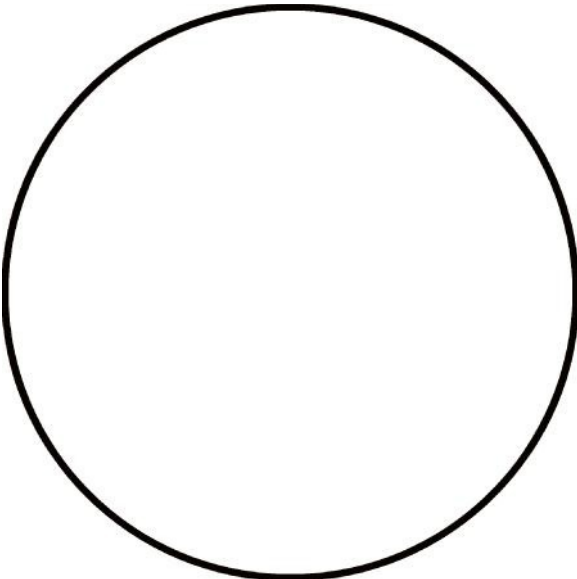
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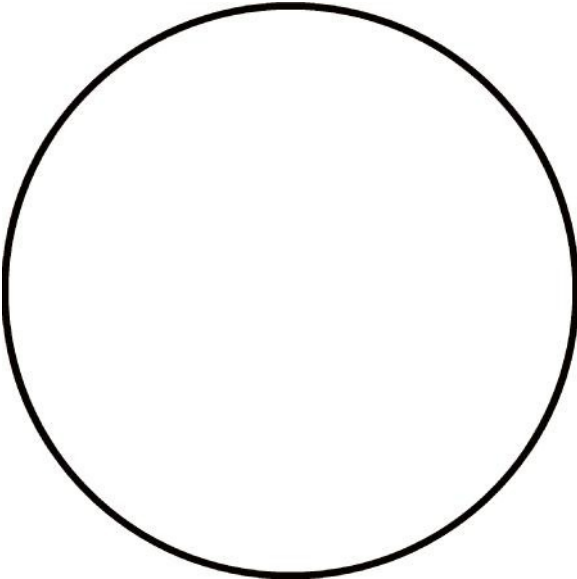
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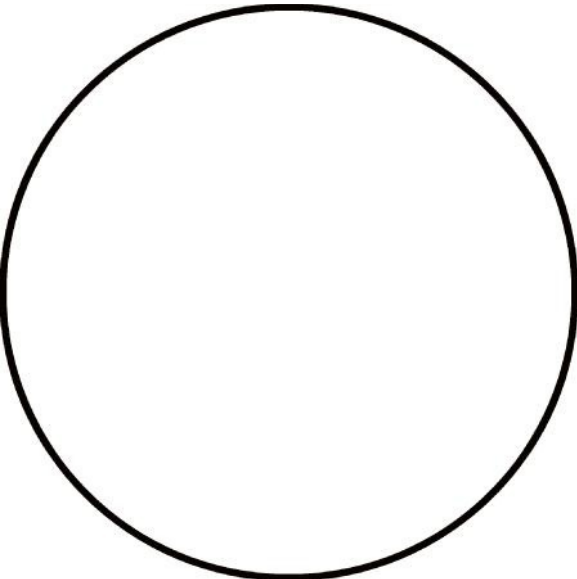
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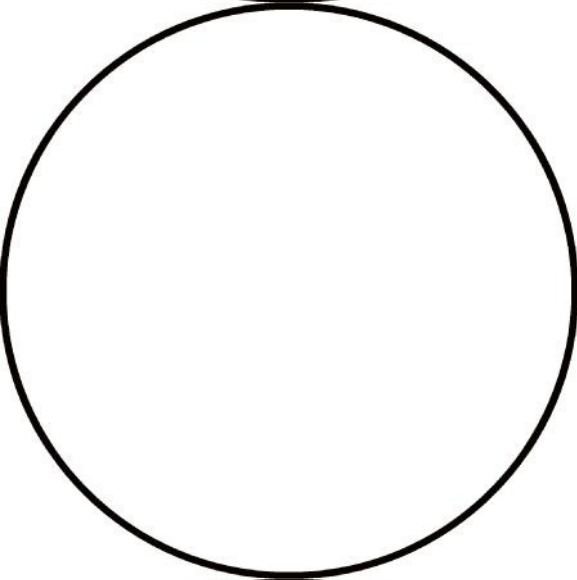
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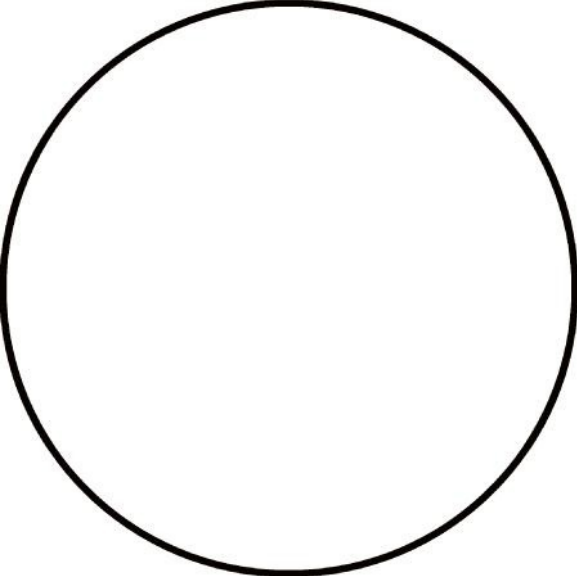
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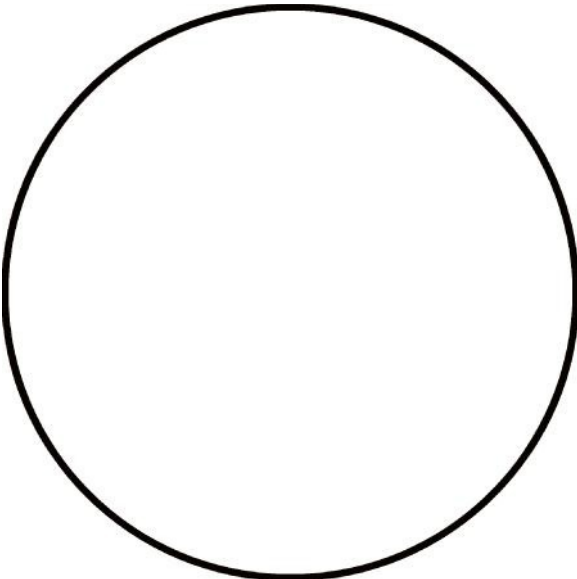
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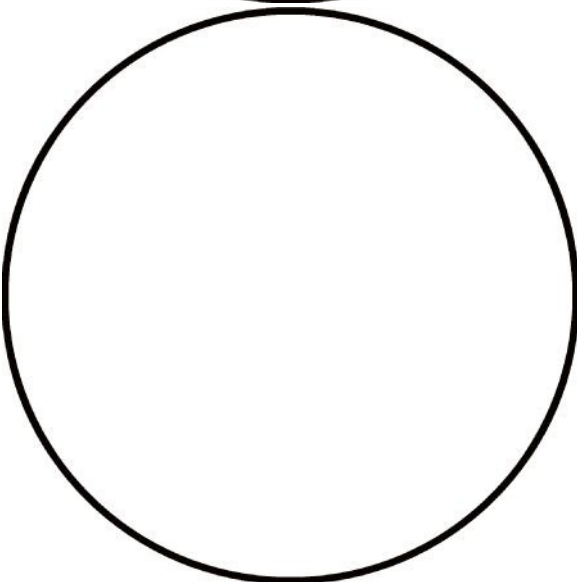
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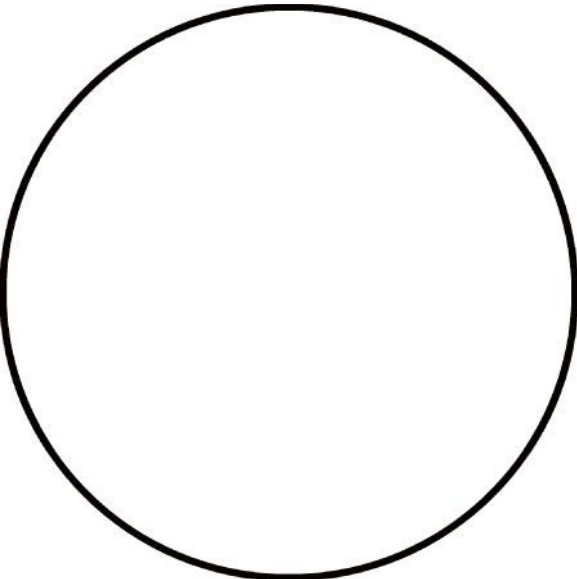
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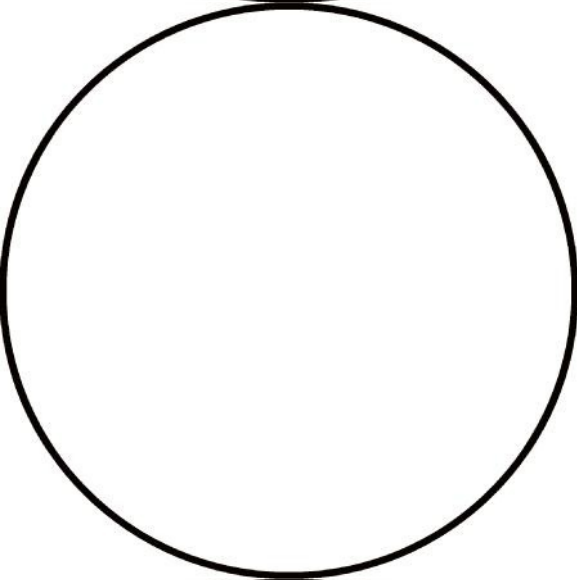
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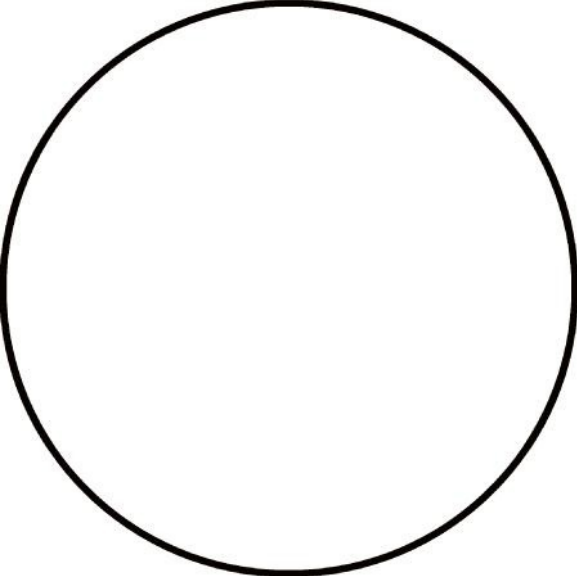
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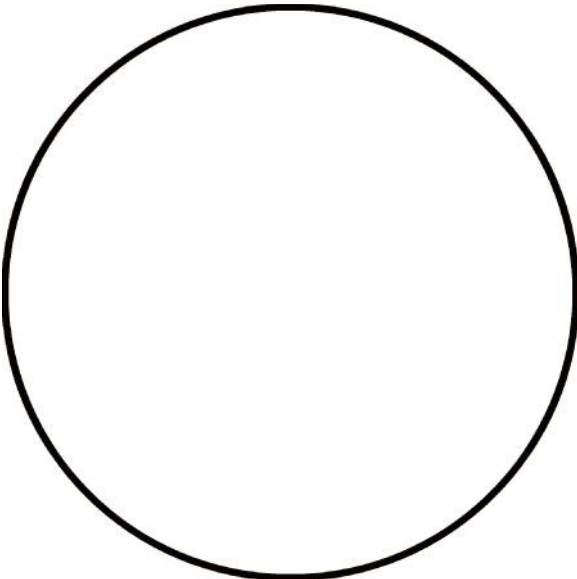
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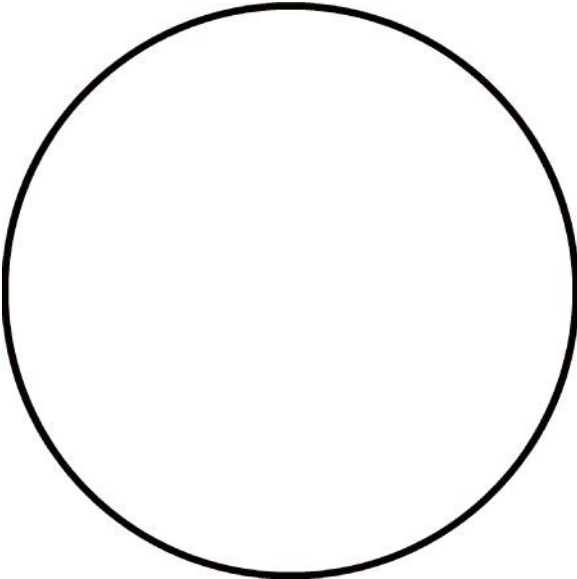
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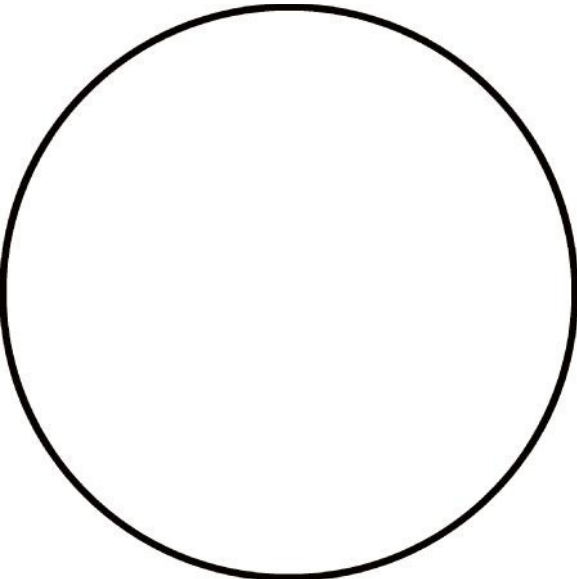
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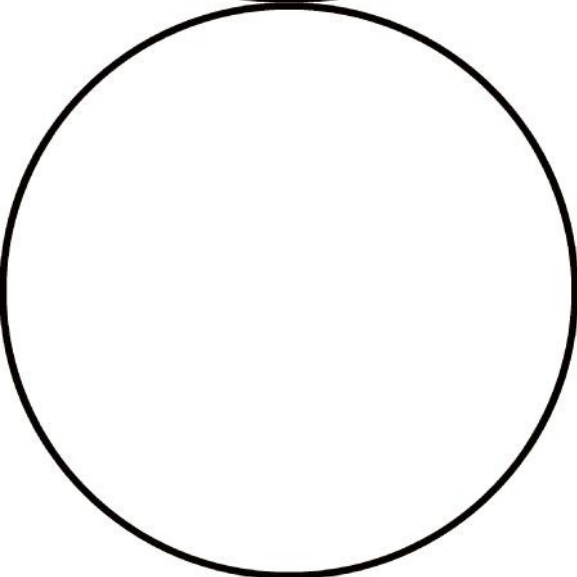
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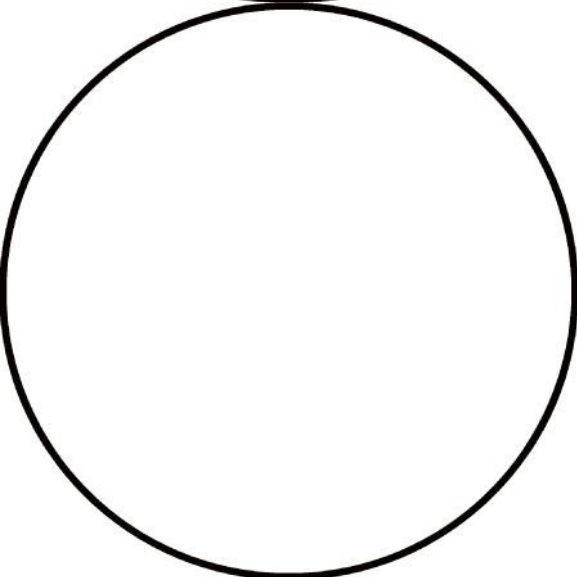
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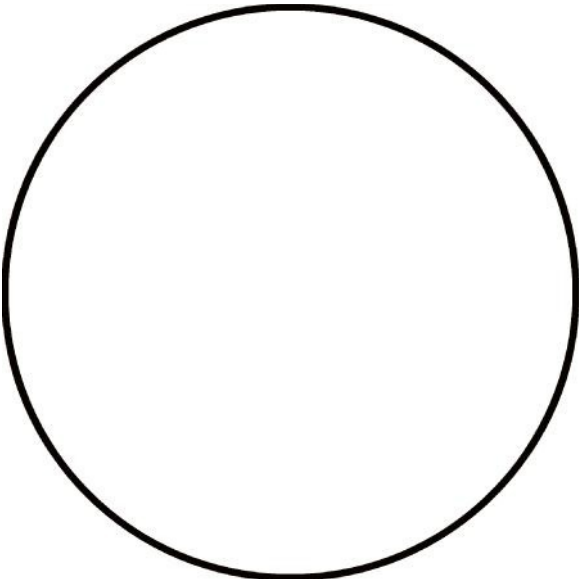
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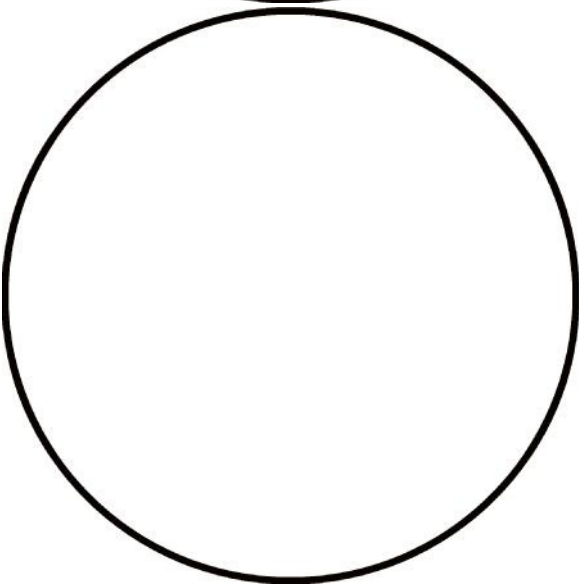
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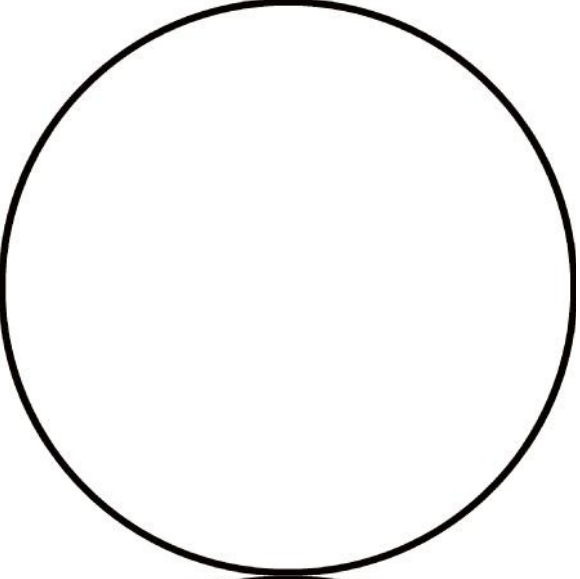
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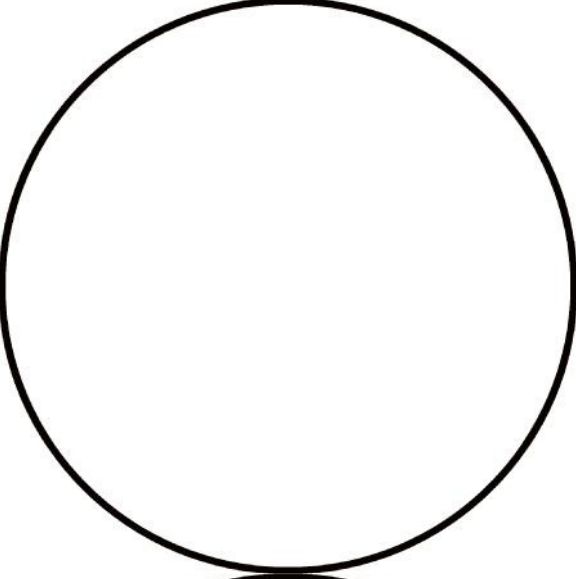
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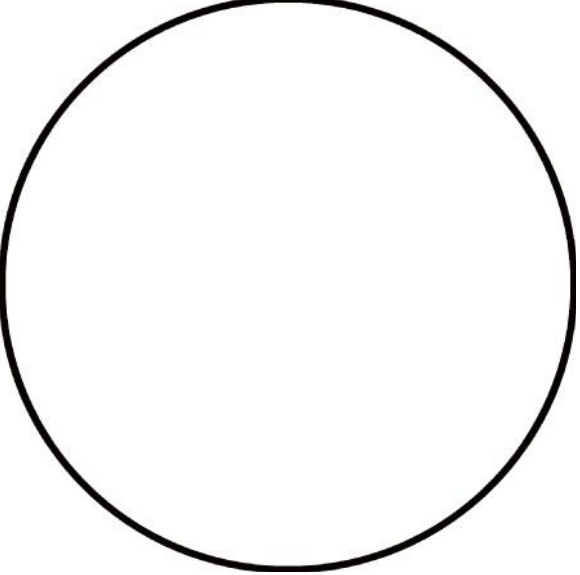
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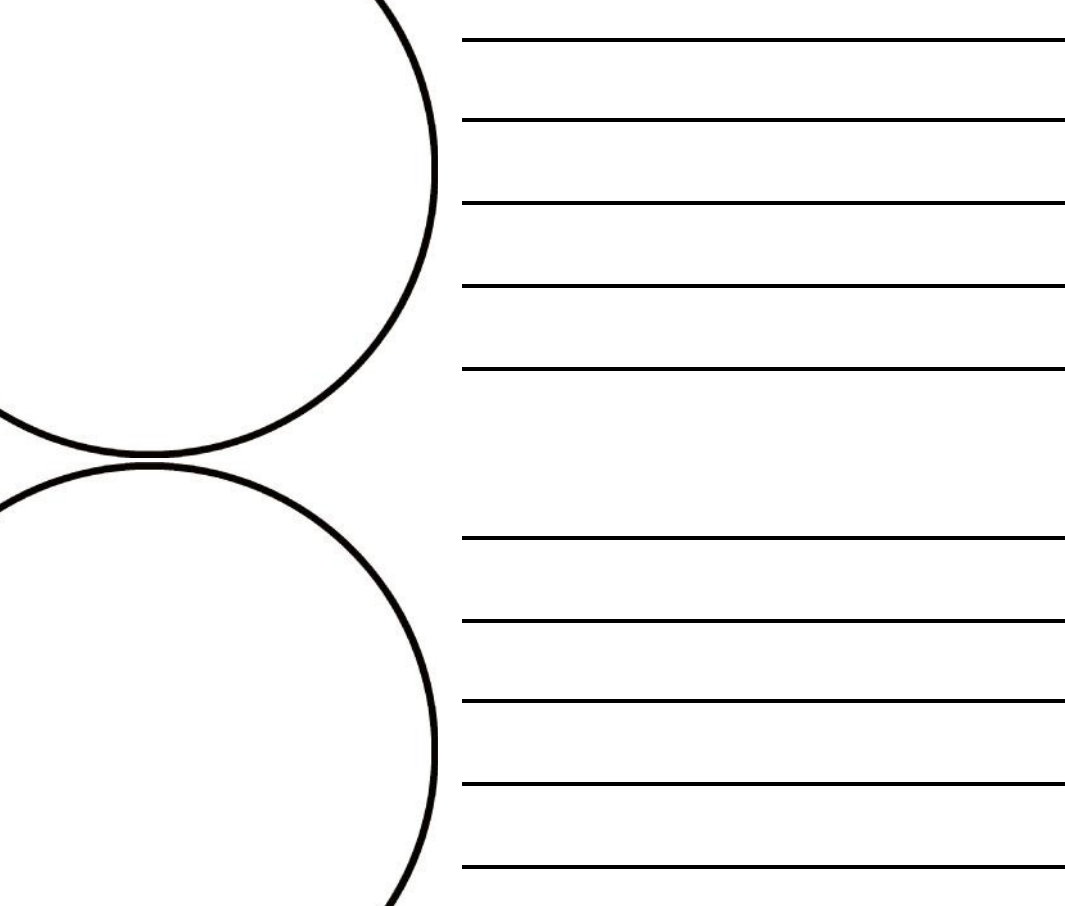


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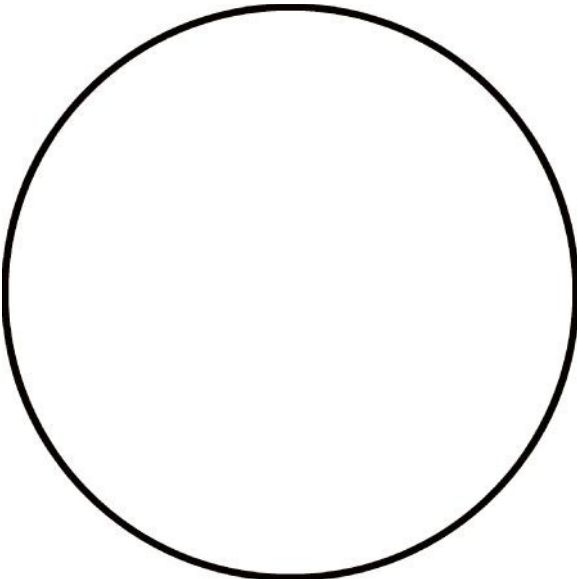
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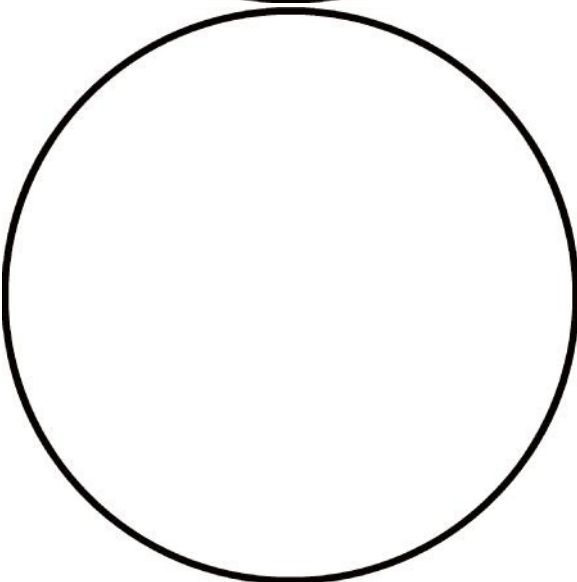
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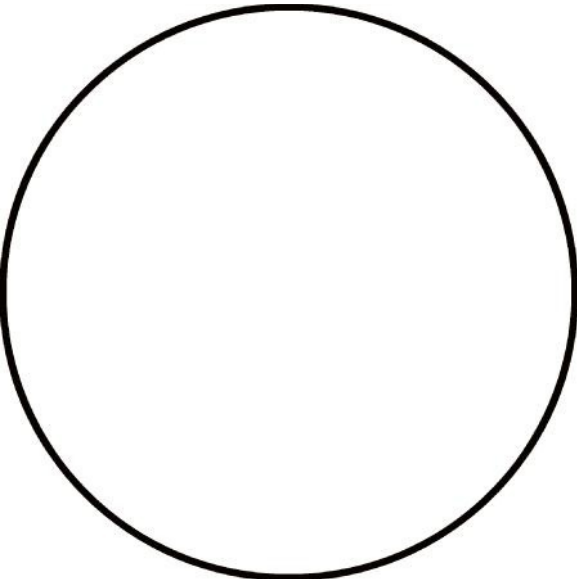
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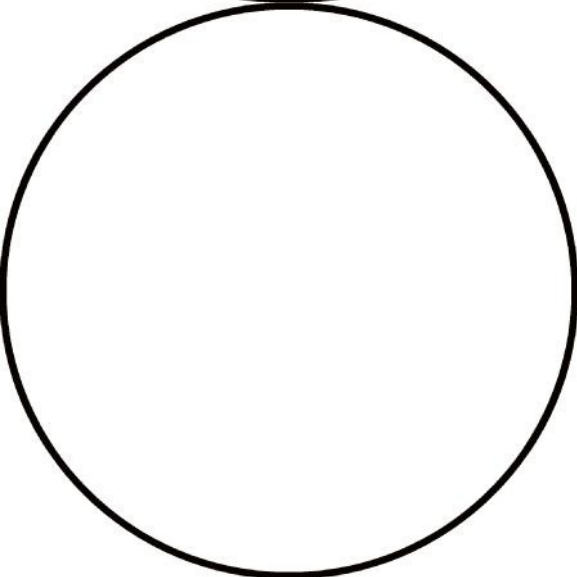
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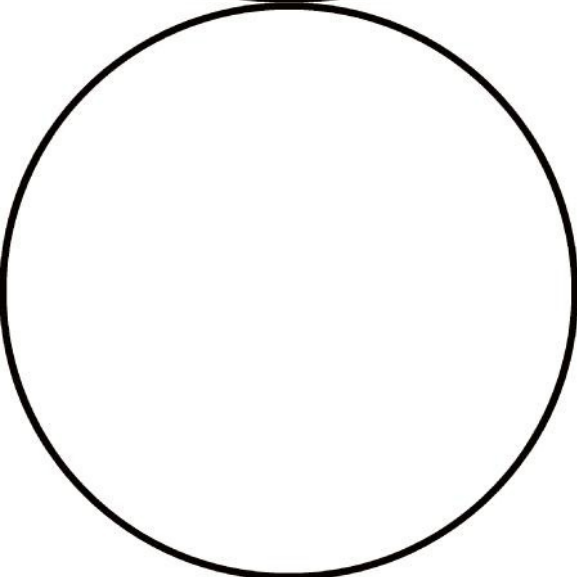
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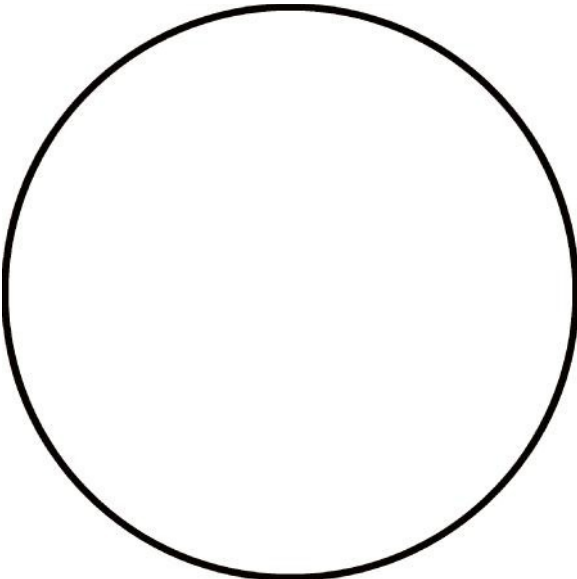
Lunar Phase: \_\_\_\_\_ Equipment: \_\_\_\_\_

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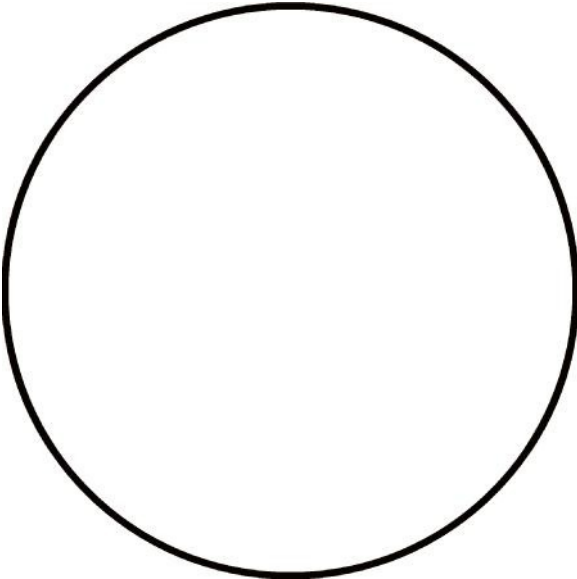
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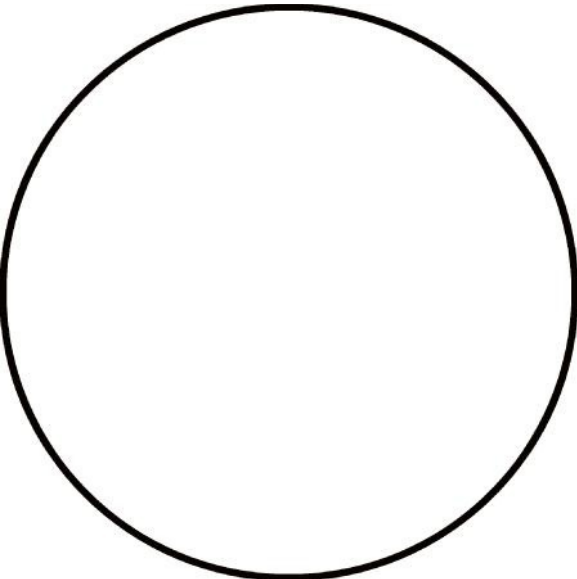
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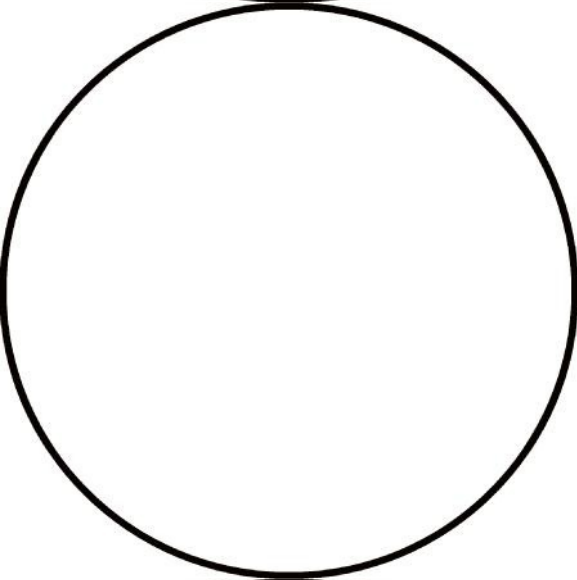
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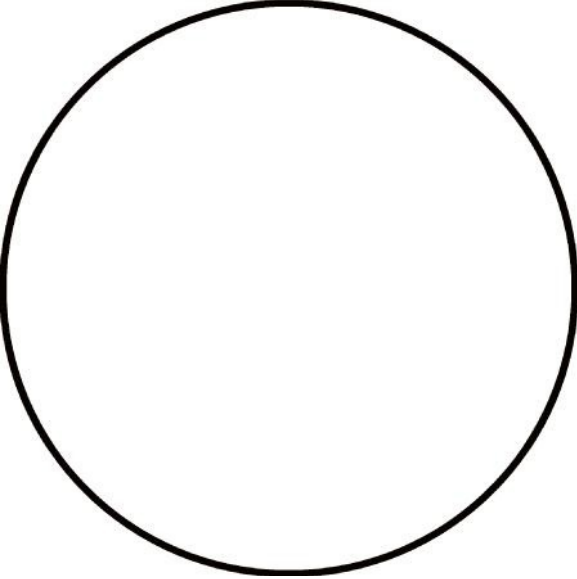
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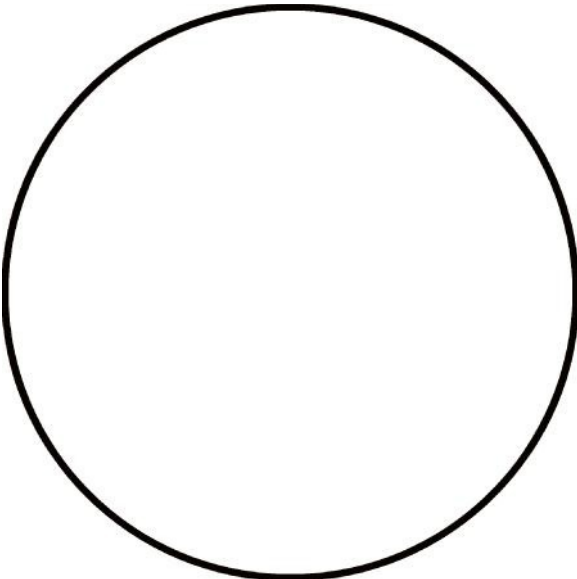
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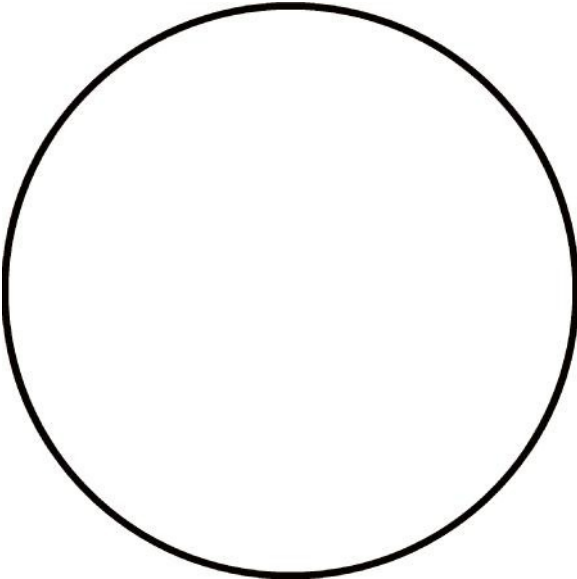
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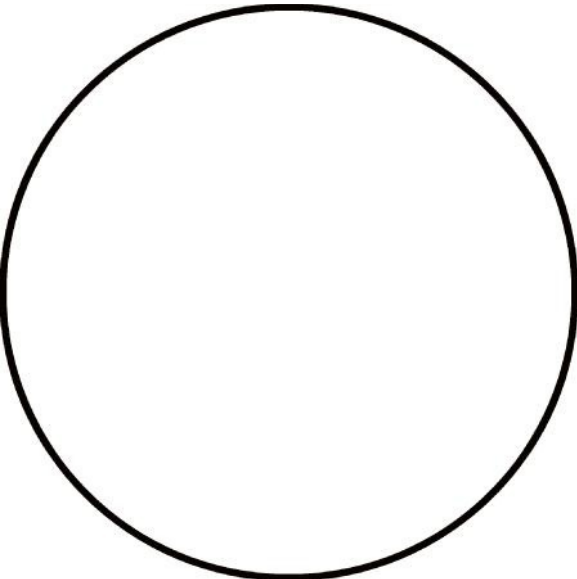
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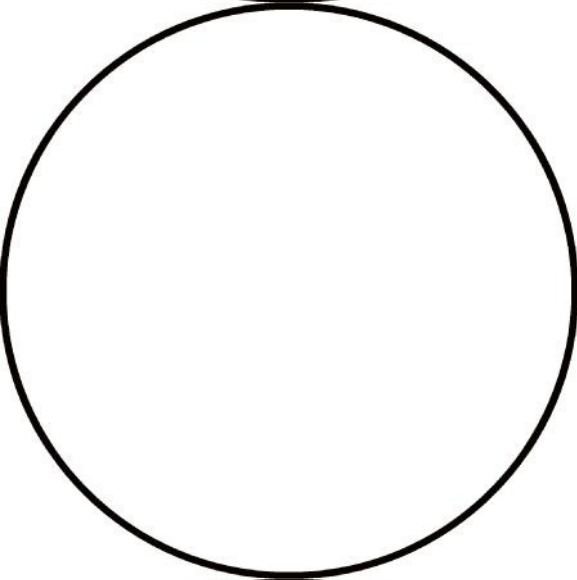
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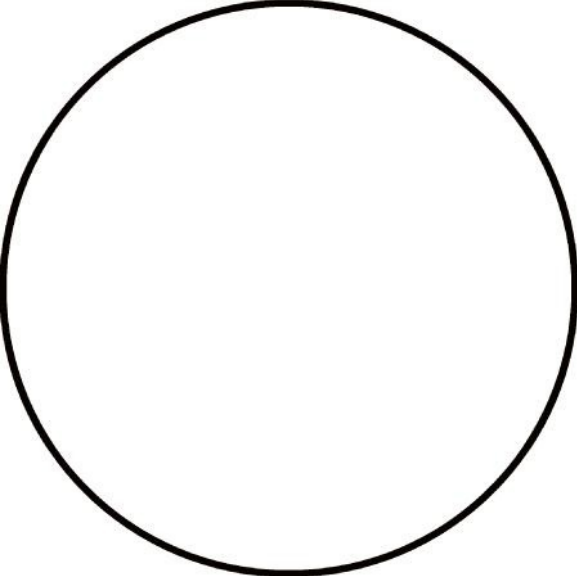
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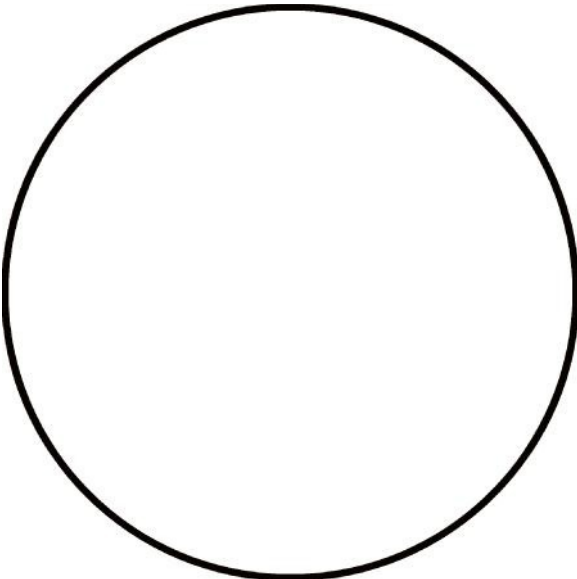
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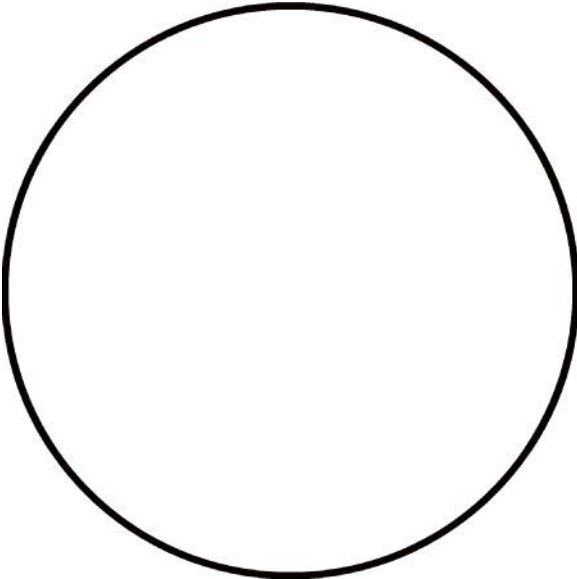
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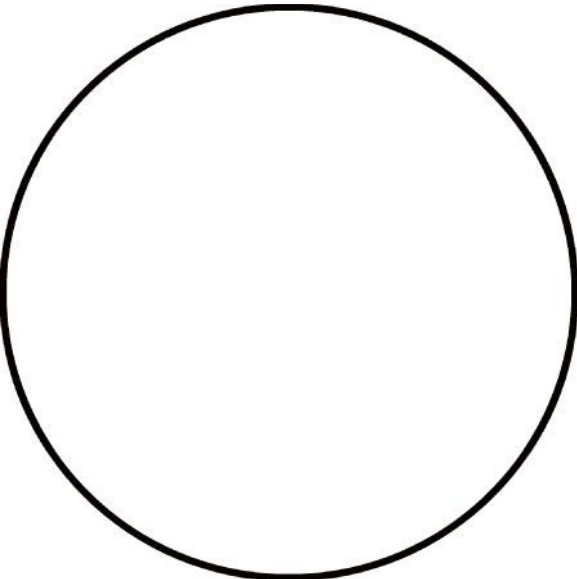
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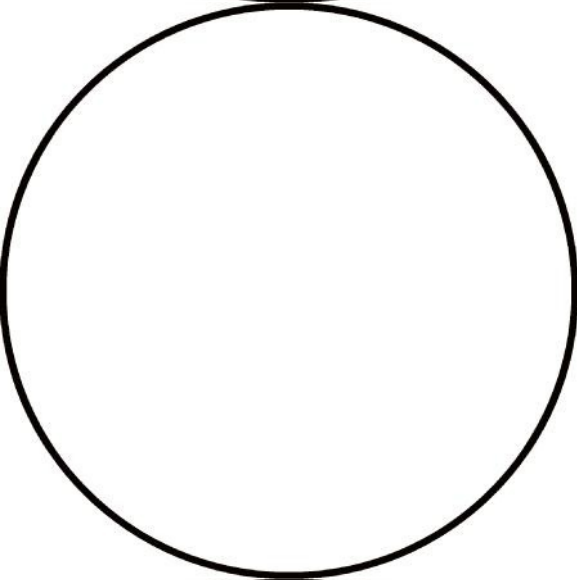
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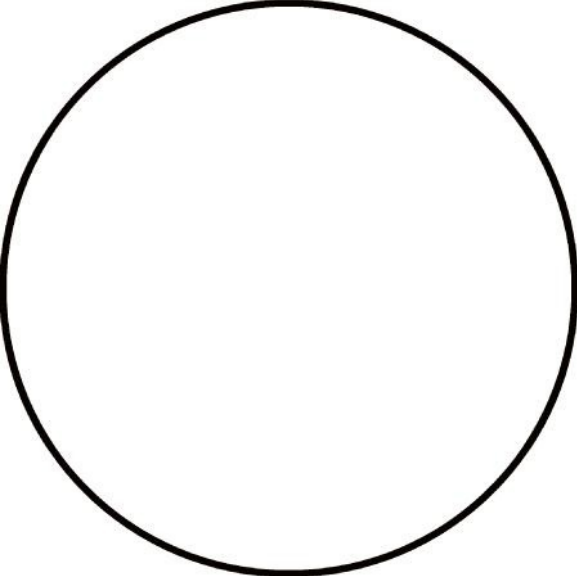
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]

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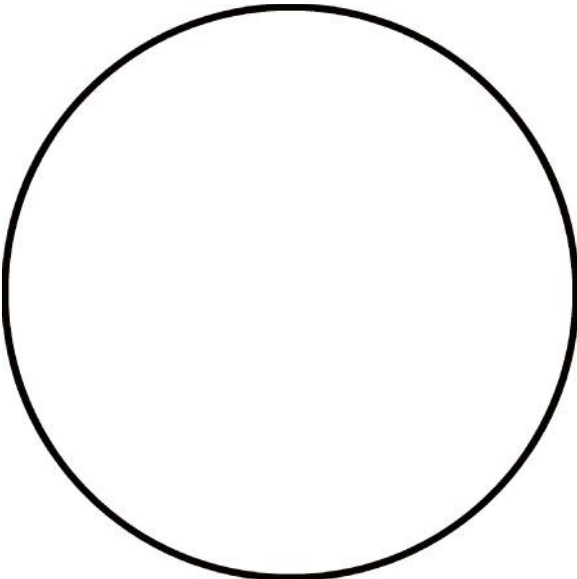
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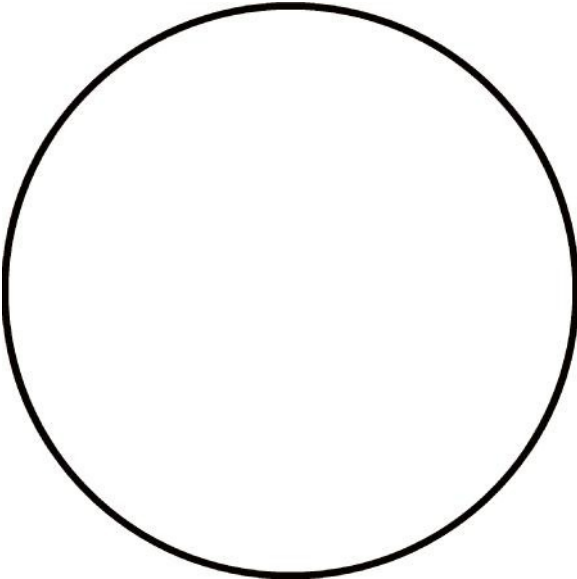
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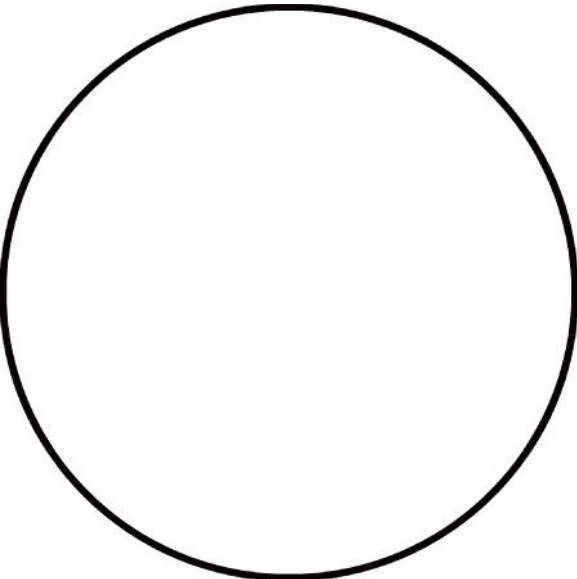
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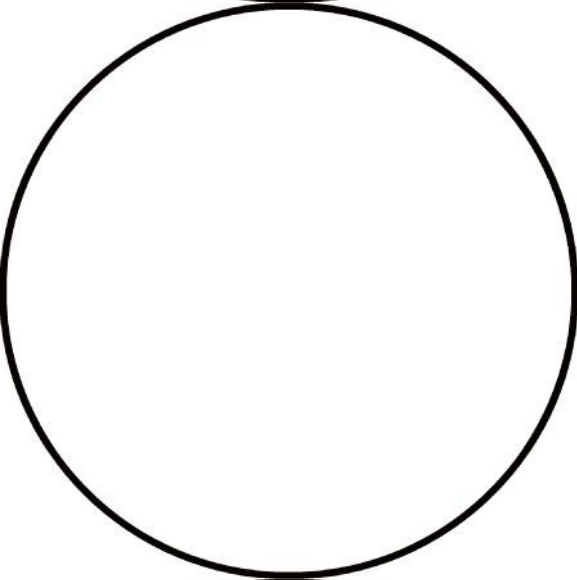
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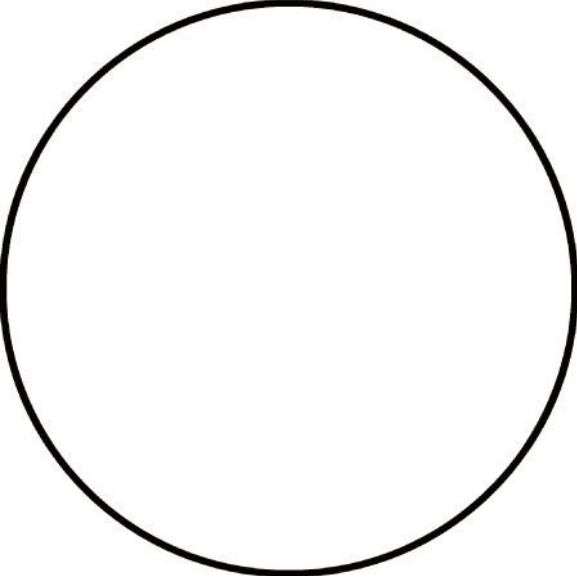
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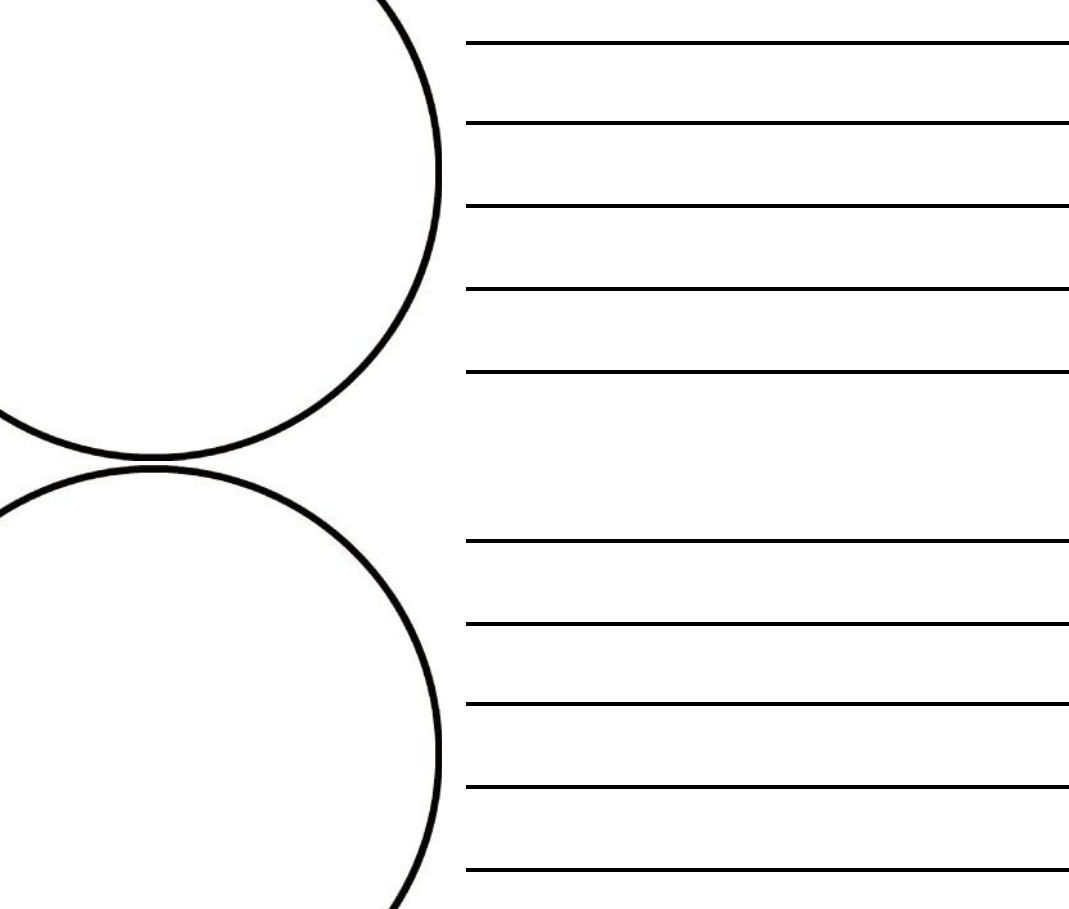


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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image shows a blank sheet of white paper designed for writing or drawing. On the left side, there are four sets of horizontal ruling lines, each set consisting of two parallel lines. To the right of the ruled area, there are three large, identical circles arranged vertically, one above the other. Each circle is outlined with a thick black border and is currently empty.



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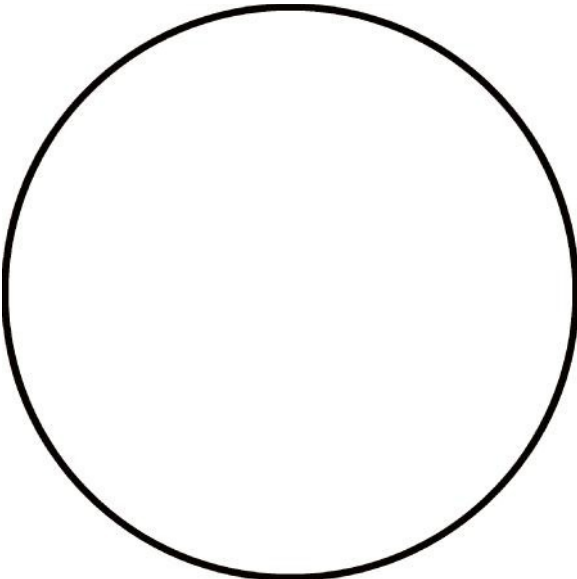
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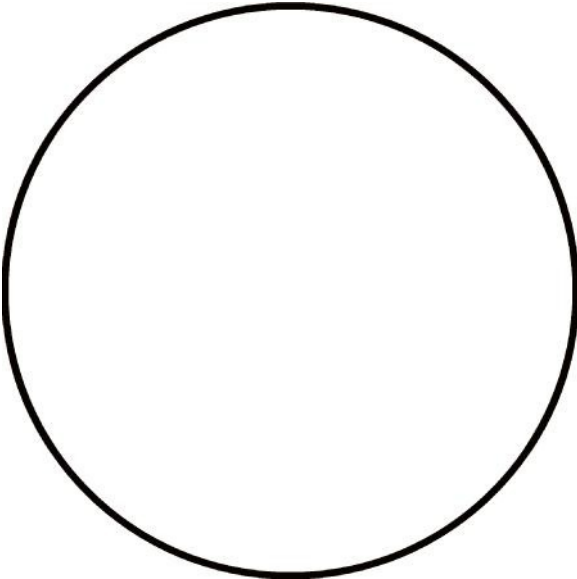
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]



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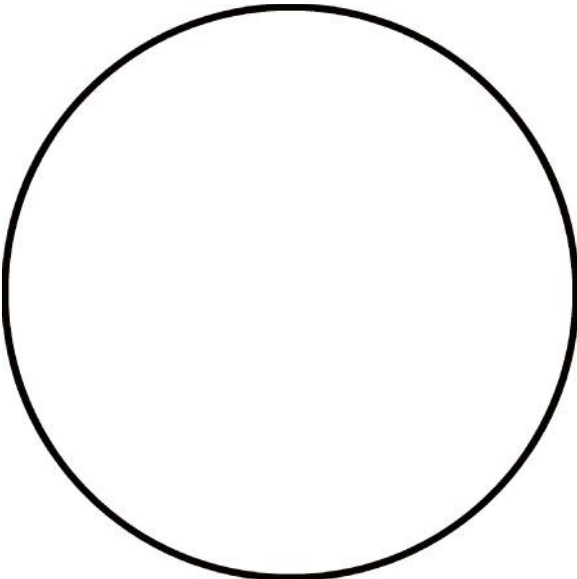
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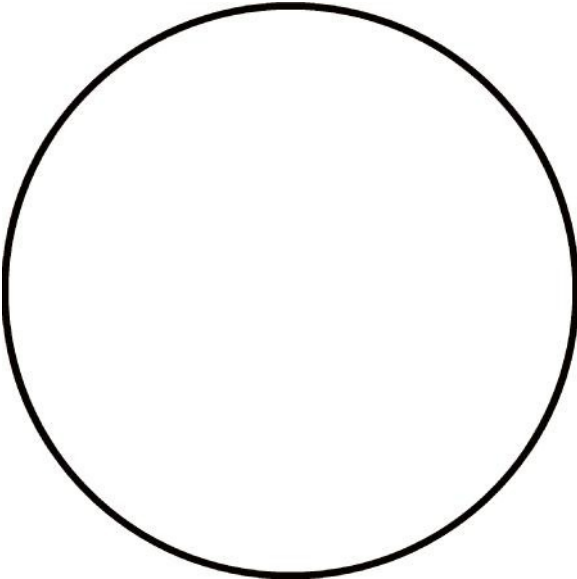
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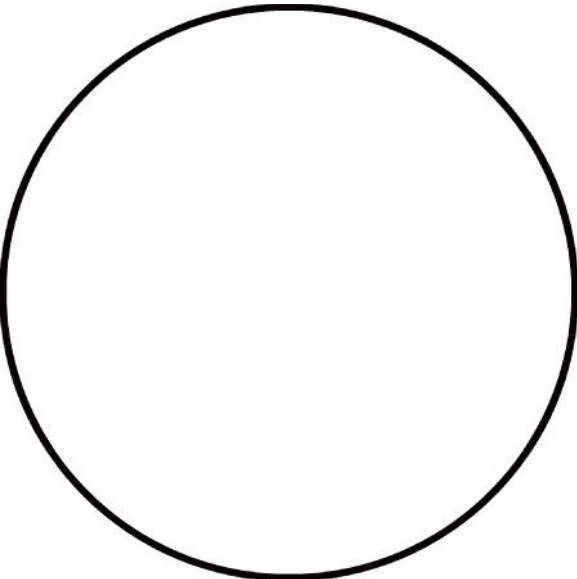
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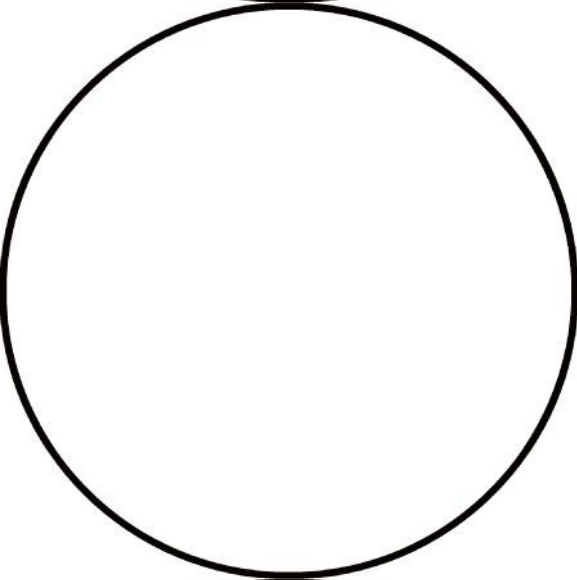
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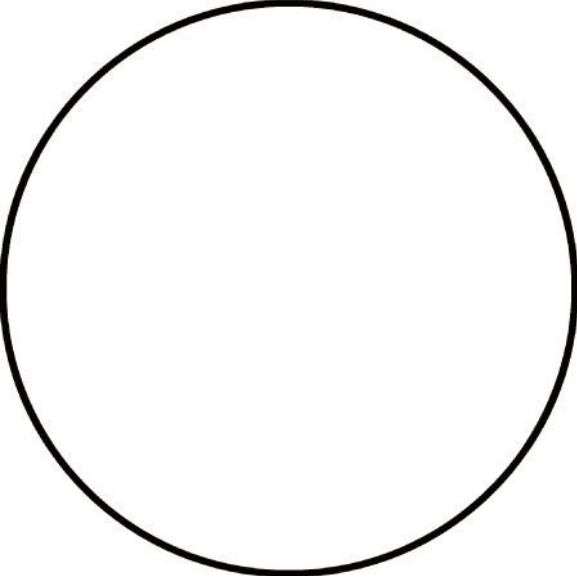
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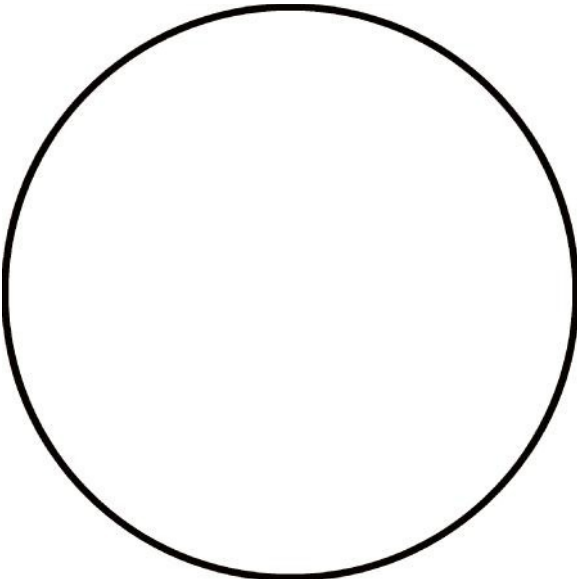
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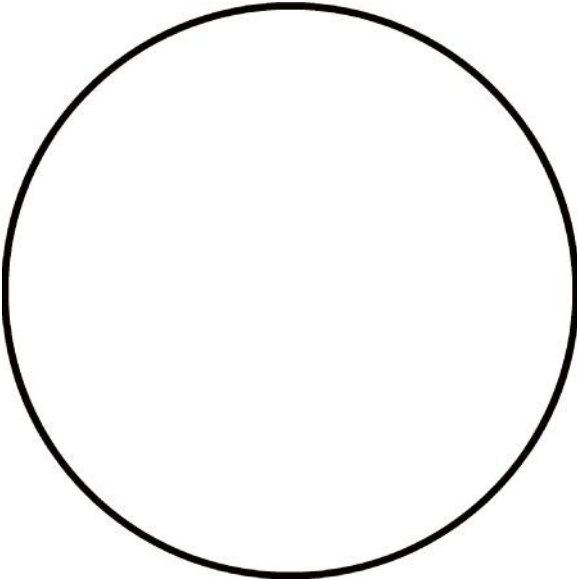
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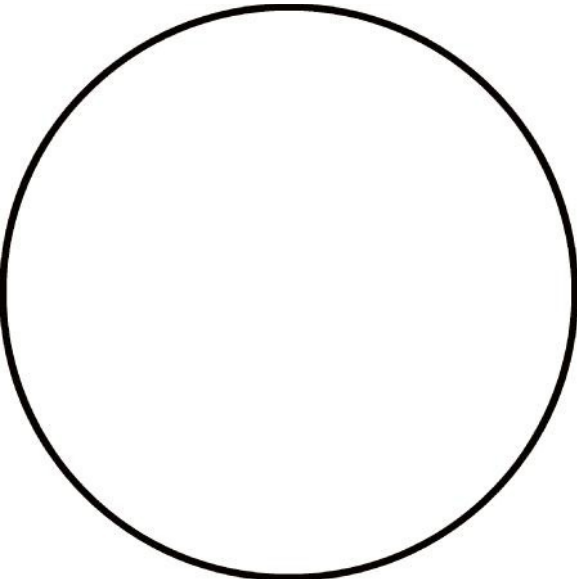
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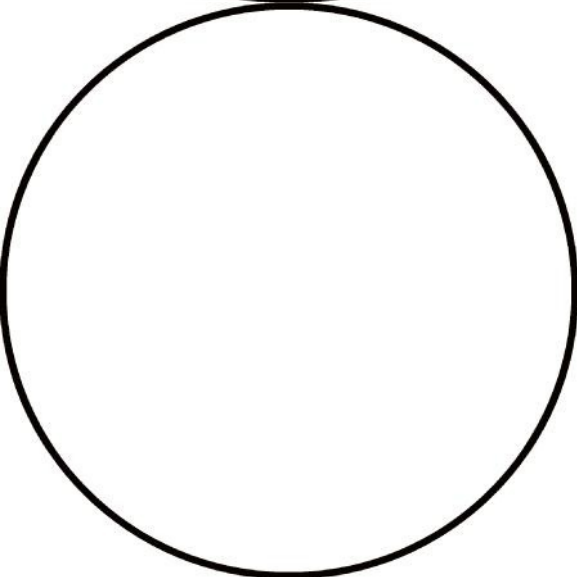
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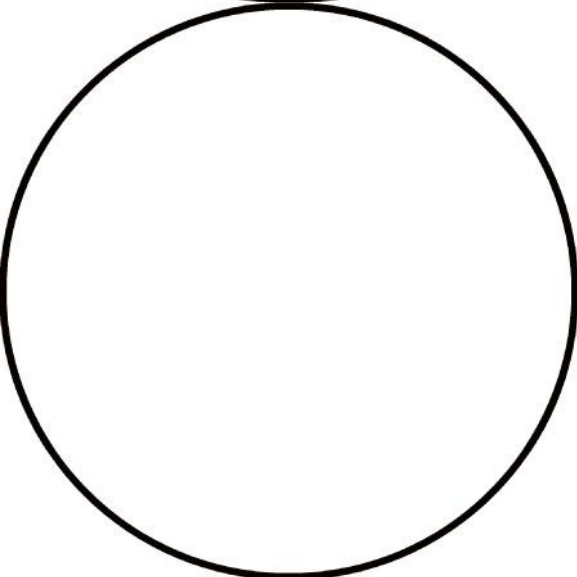
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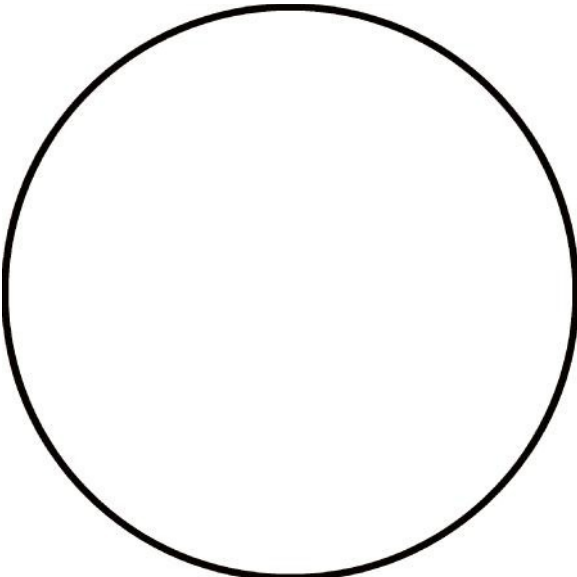
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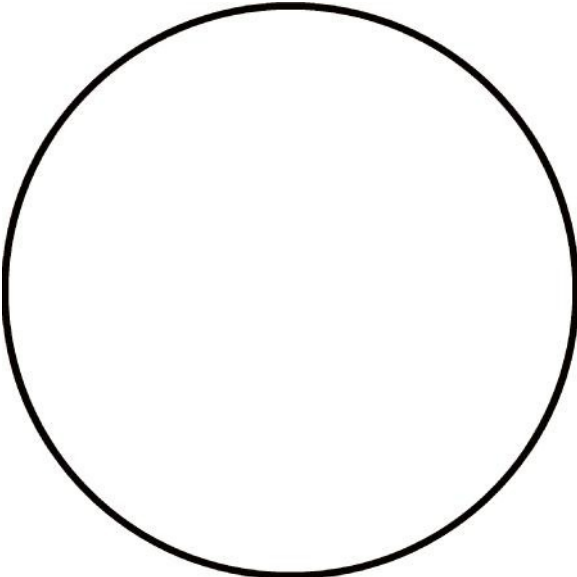
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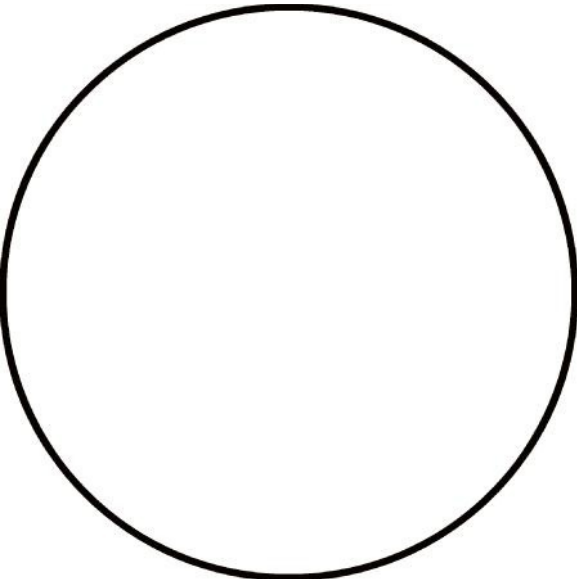
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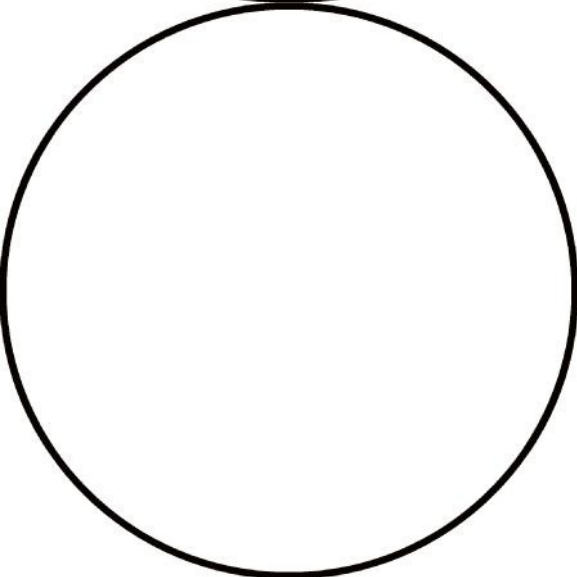
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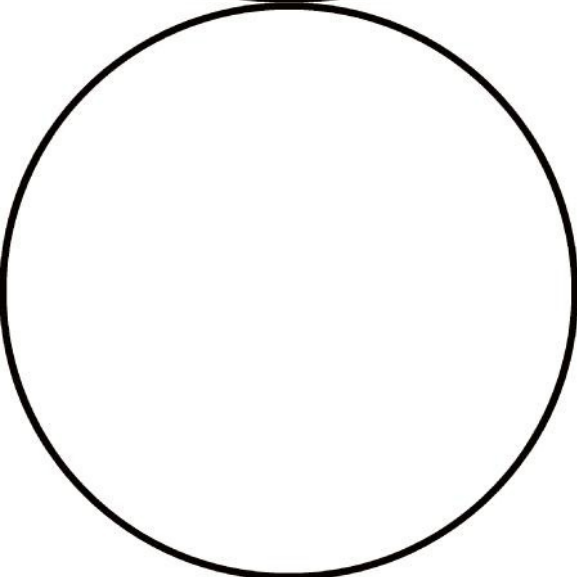
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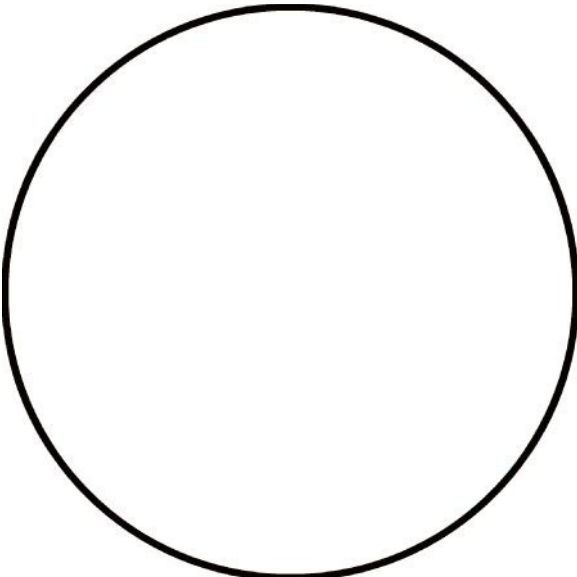
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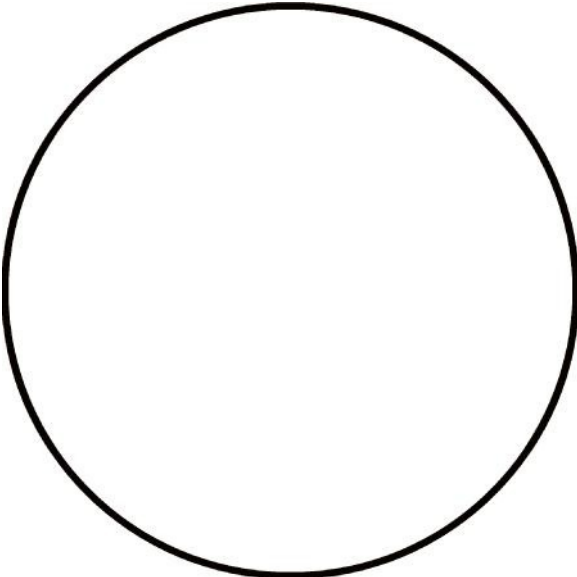
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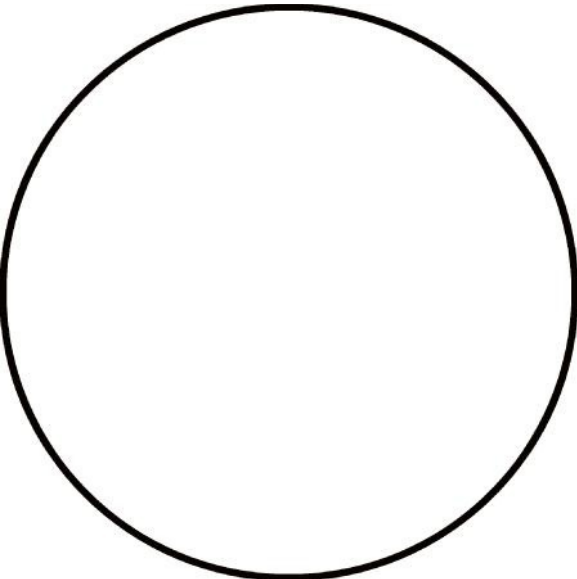
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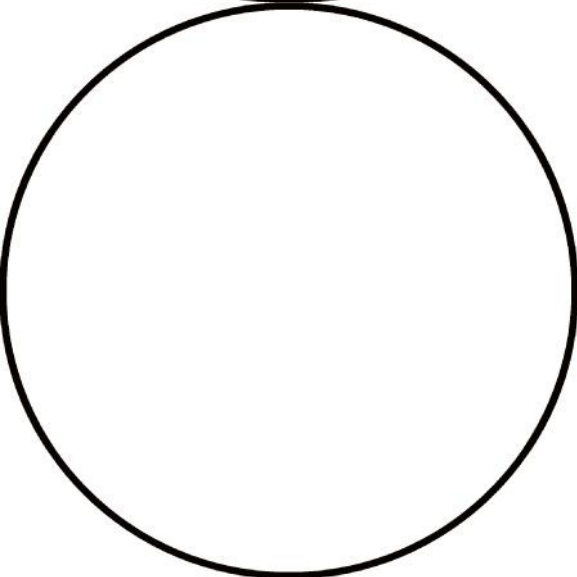
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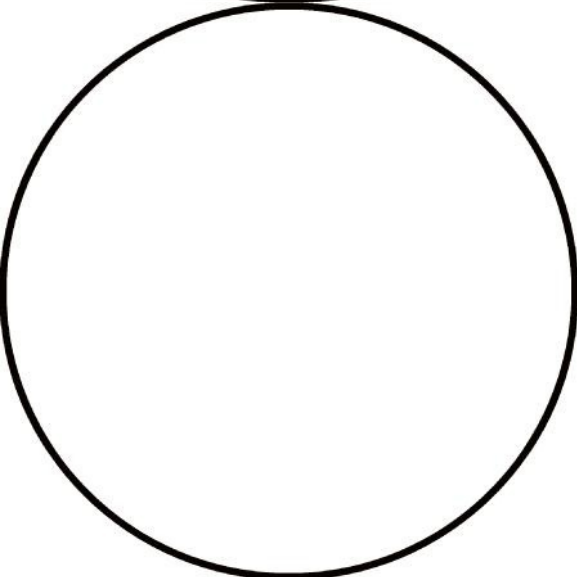
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]

Date:	_____	Transparency:	_____
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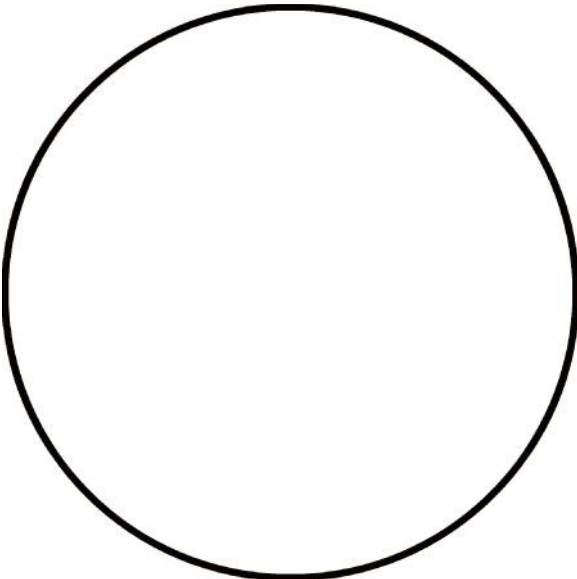
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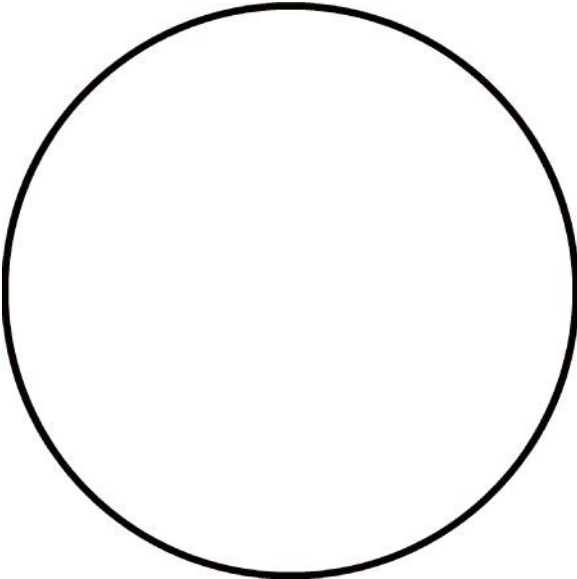
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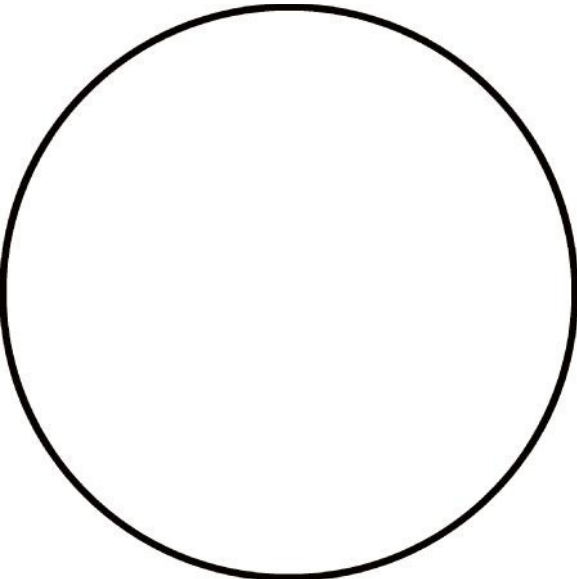
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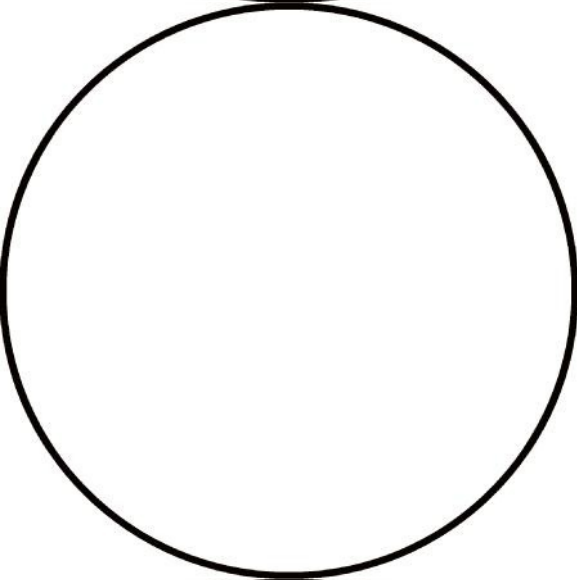
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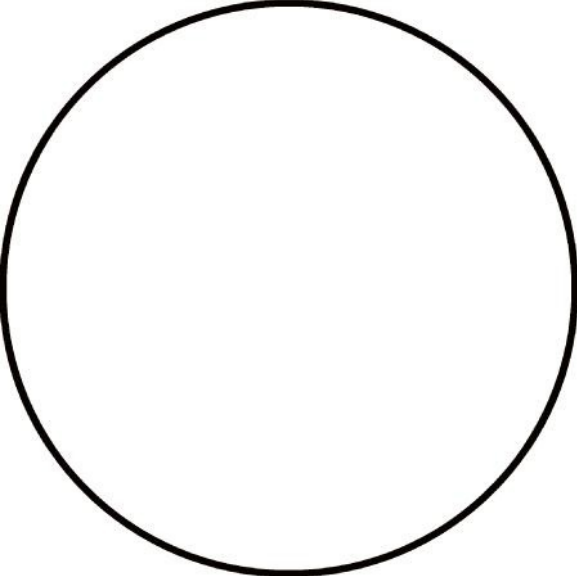
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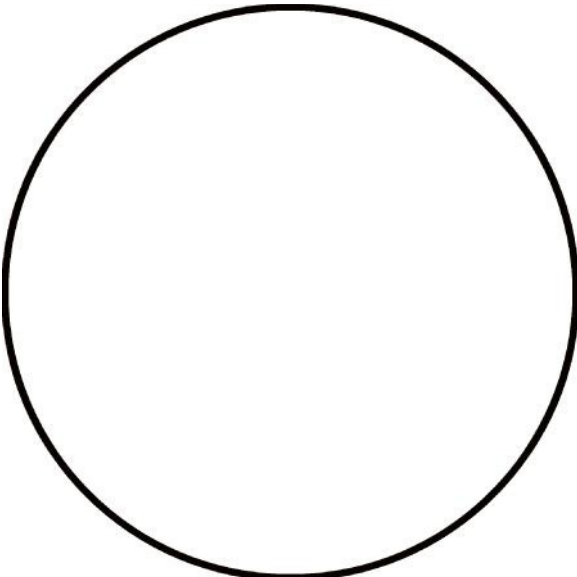
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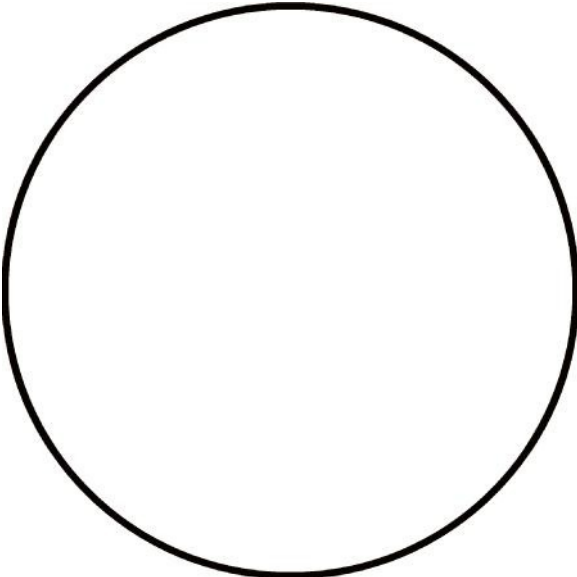
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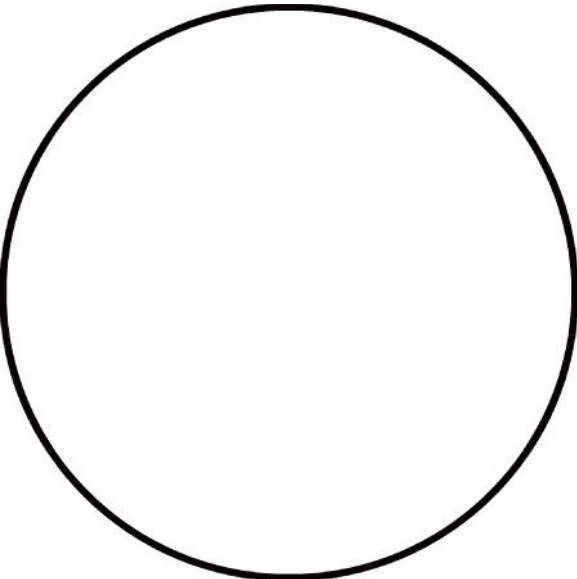
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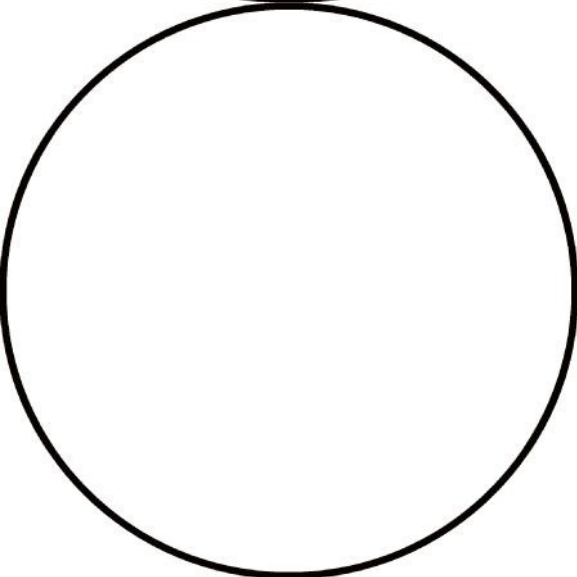
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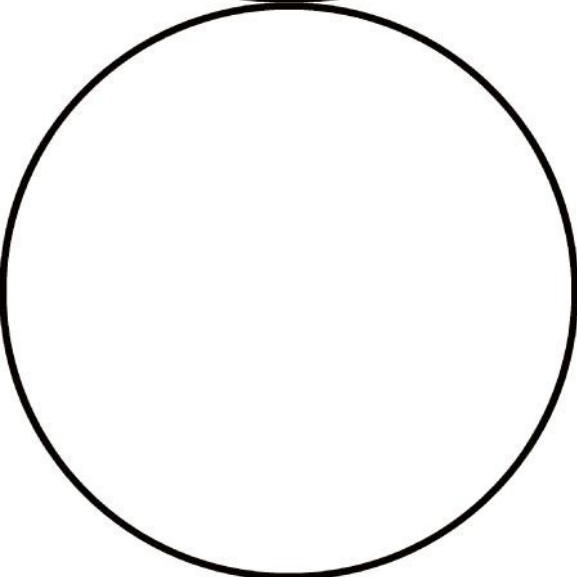
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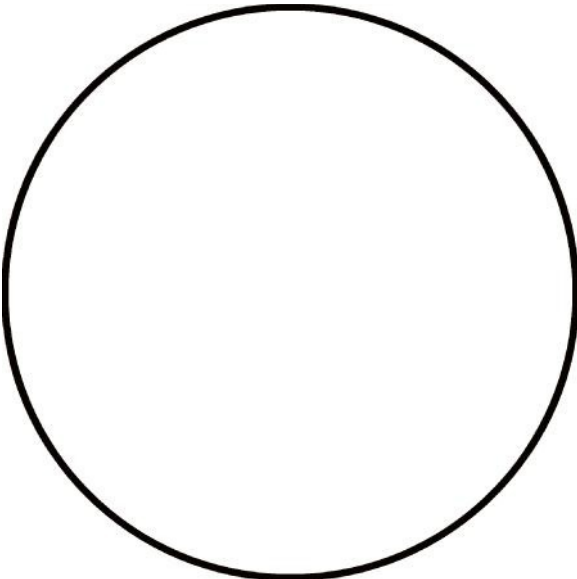
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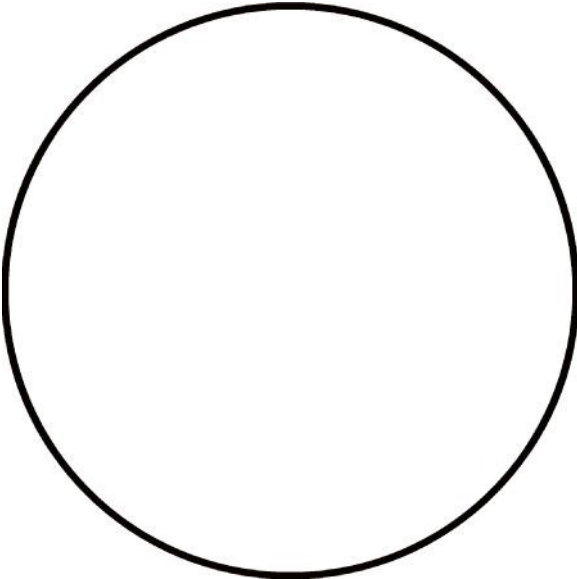
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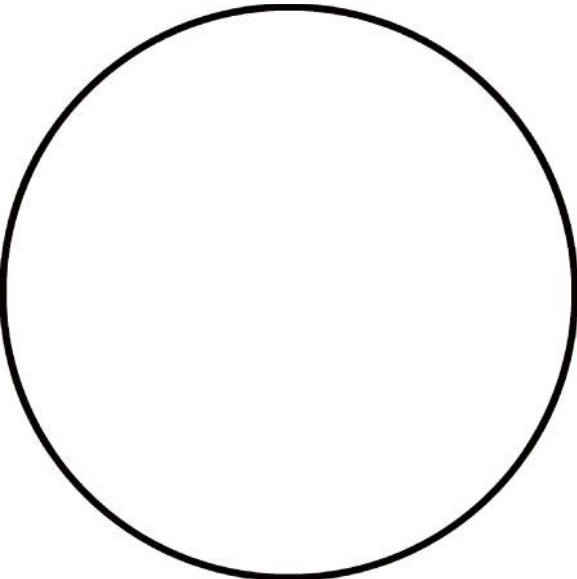
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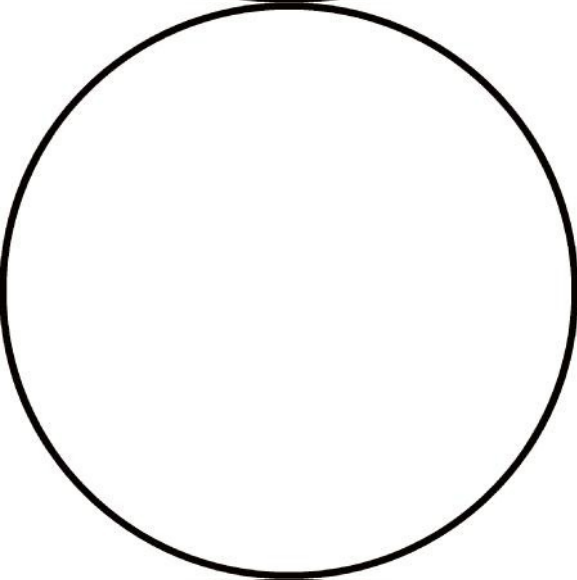
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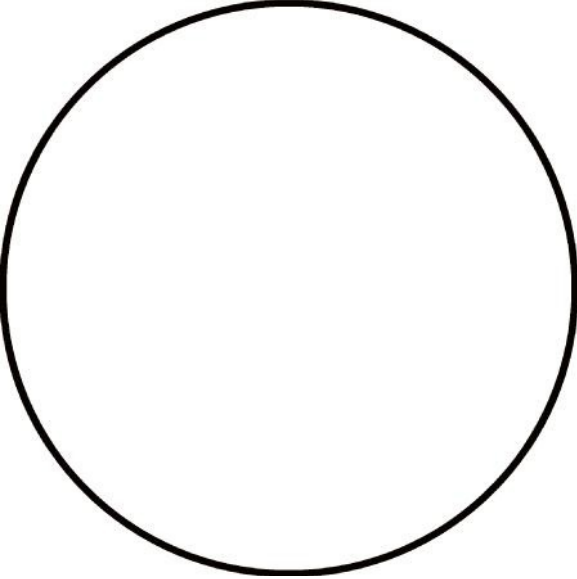
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A large, empty circle with a thin black outline, centered on the page. It is intended for a student to draw a picture related to their writing.

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Date:	_____	Transparency:	_____
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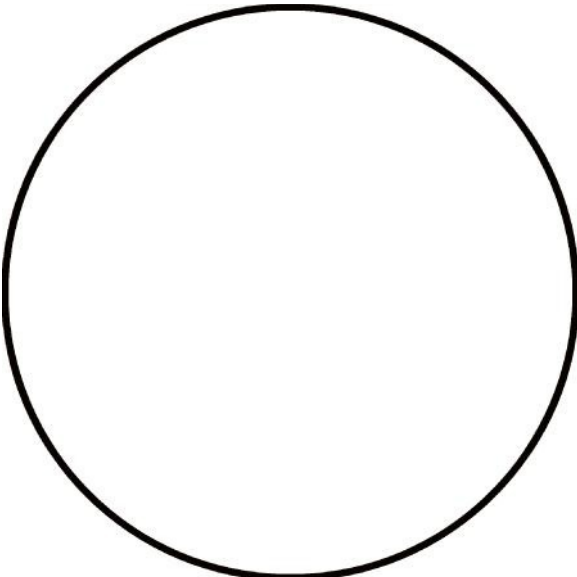
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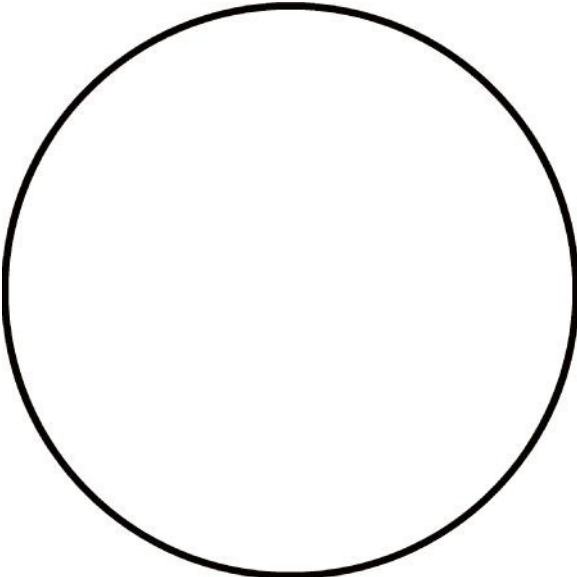
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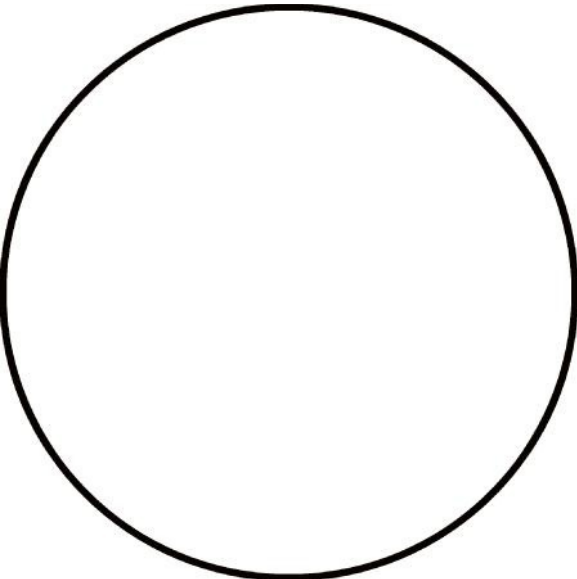
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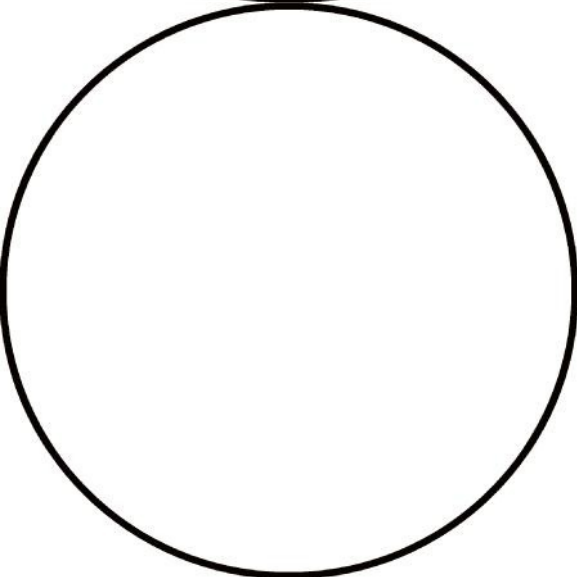
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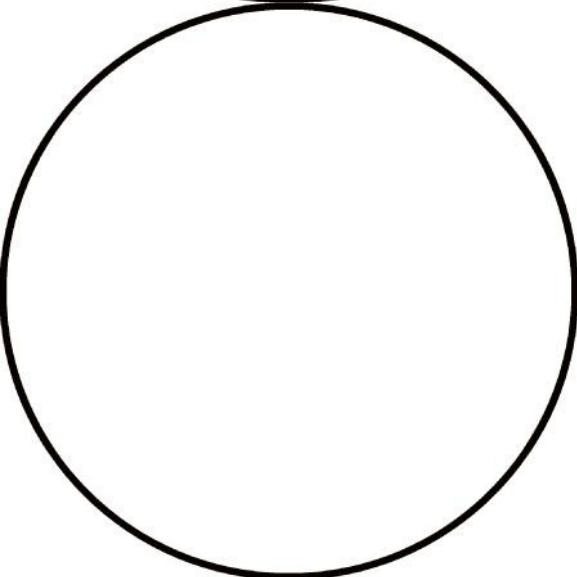
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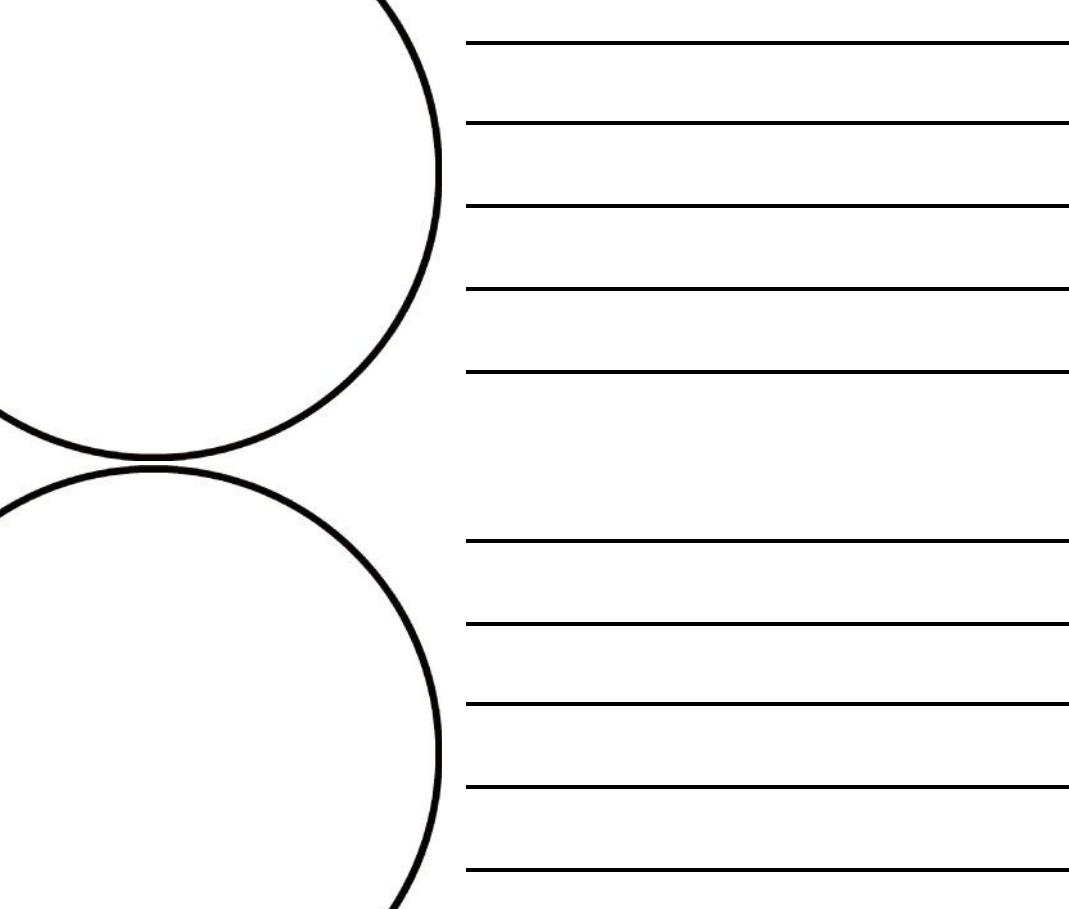


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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

Date:	_____	Transparency:	_____
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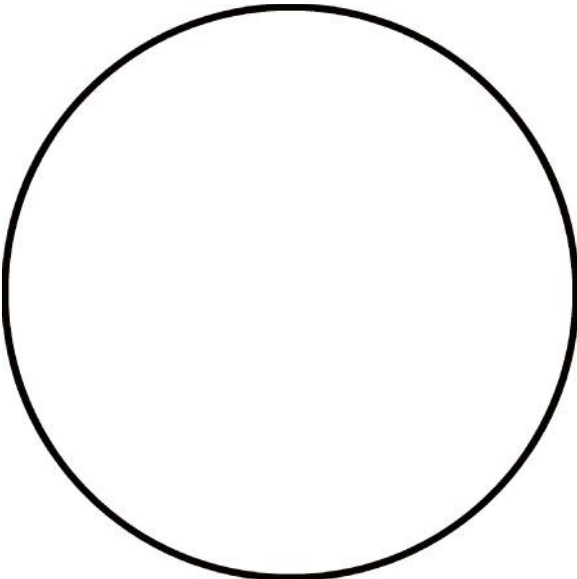
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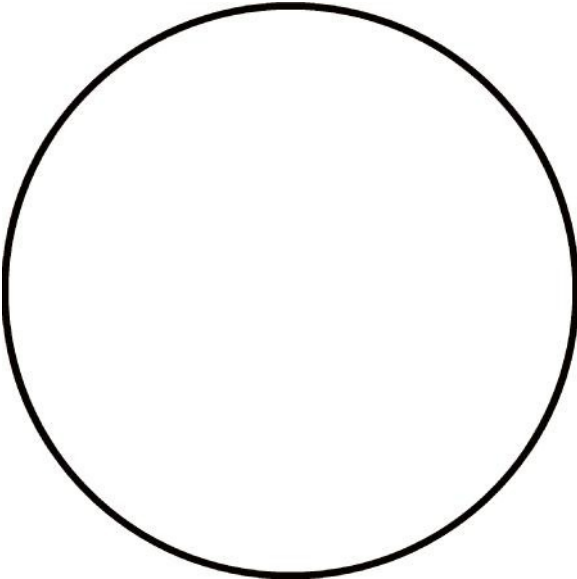
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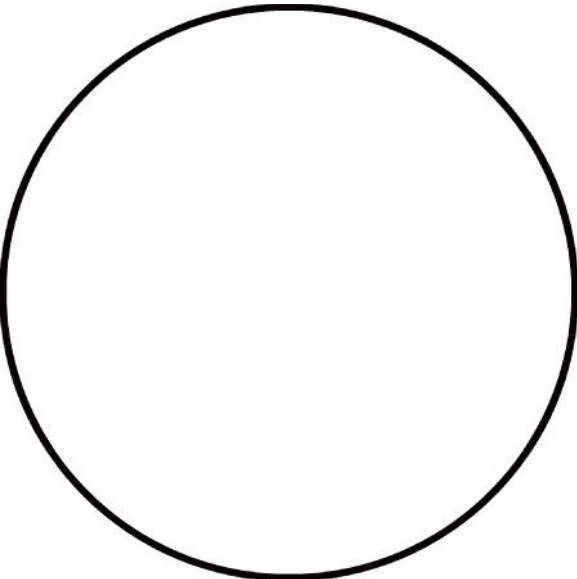
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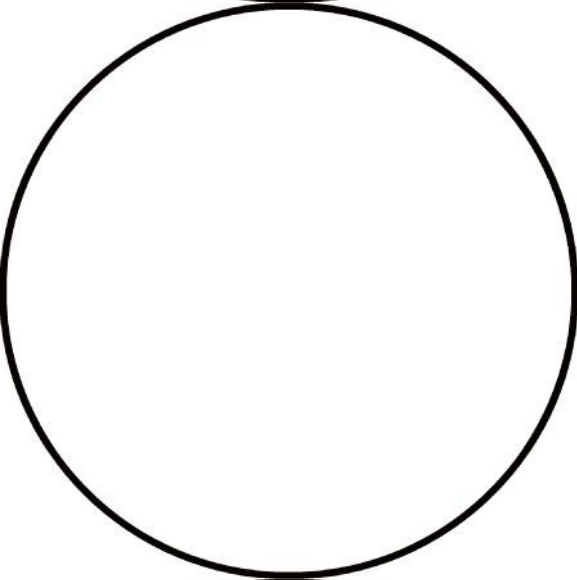
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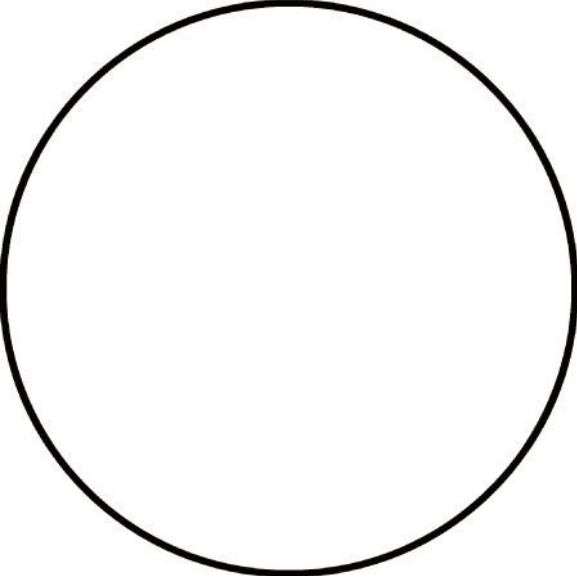
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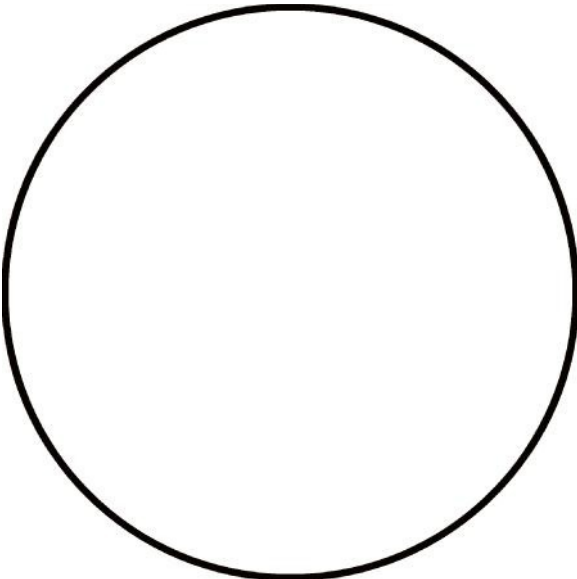
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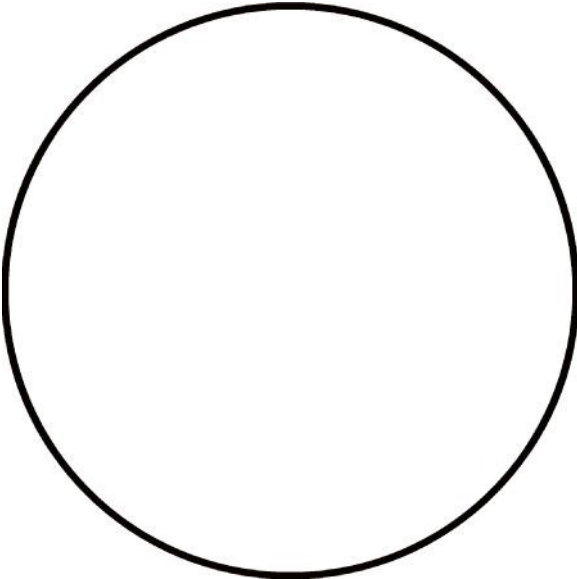
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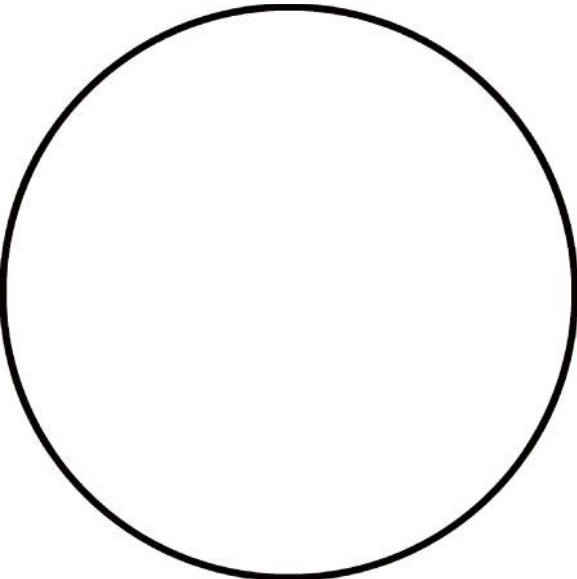
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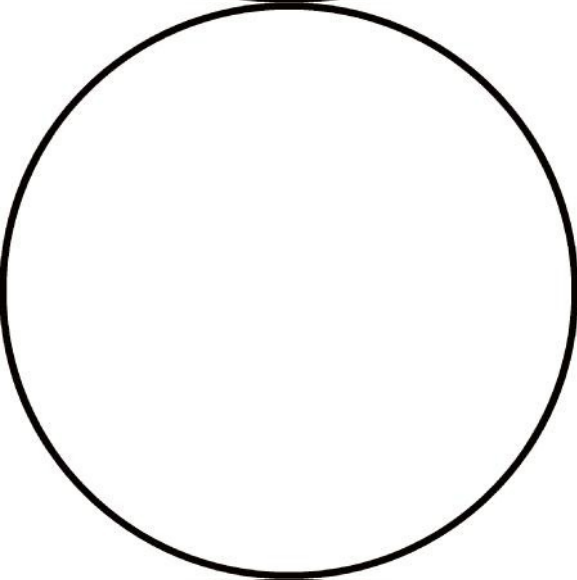
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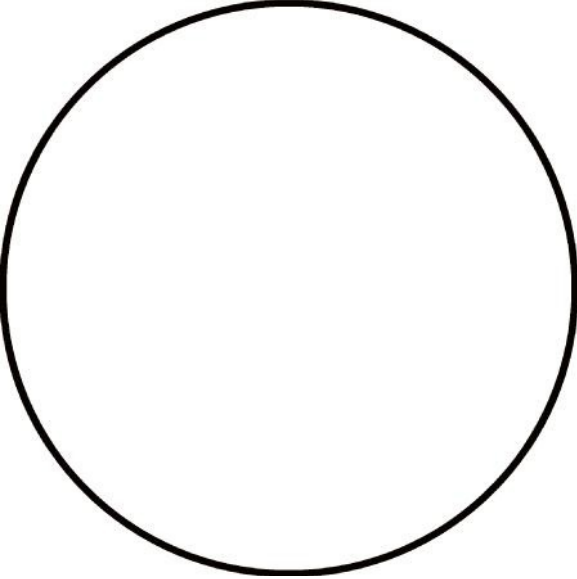
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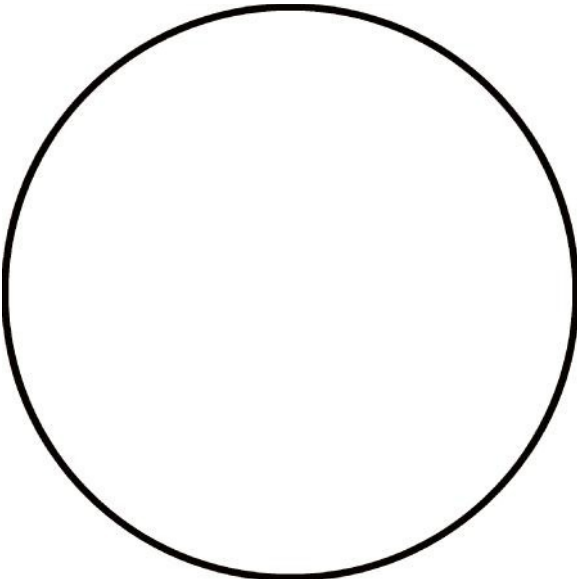
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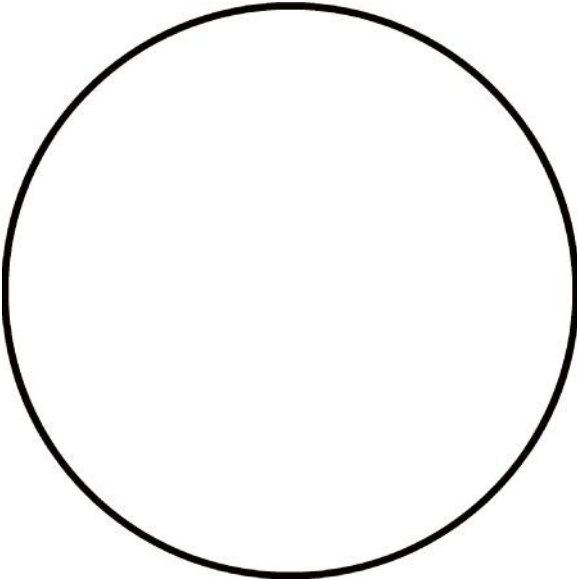
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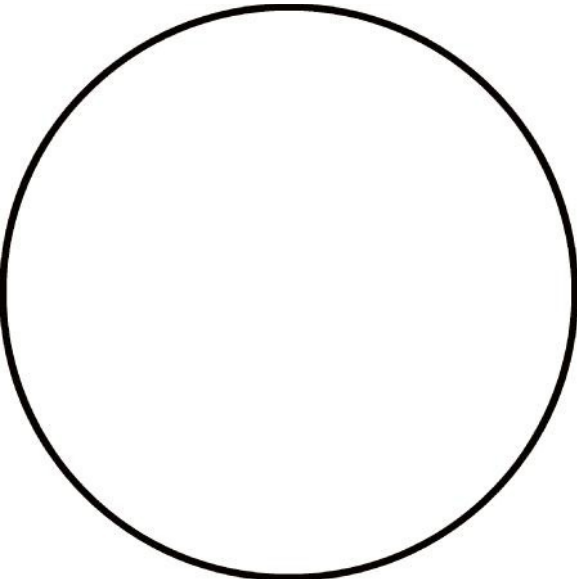
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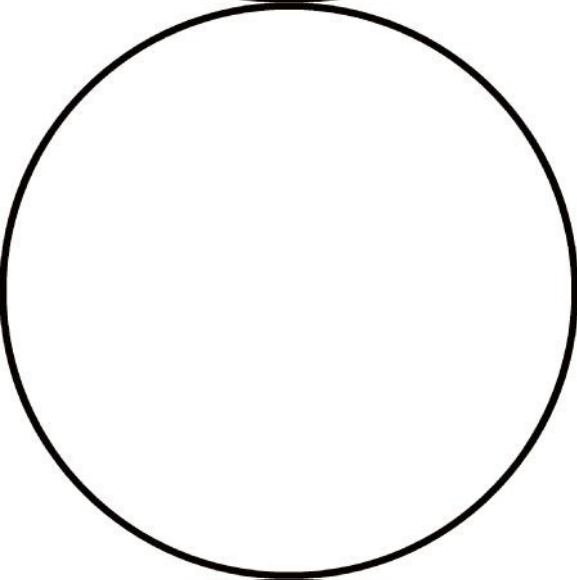
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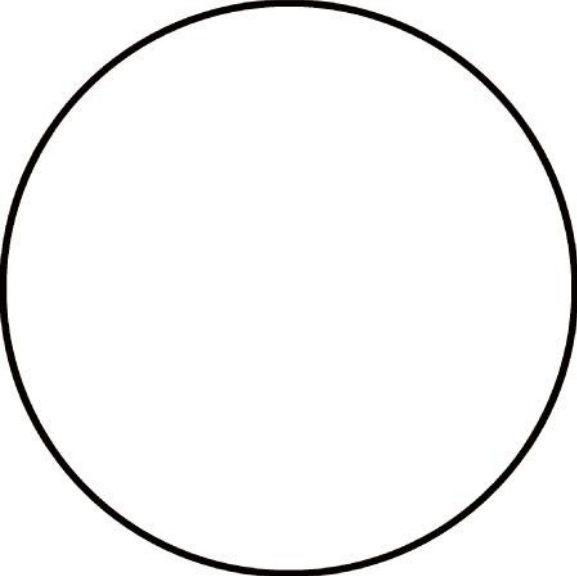
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Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
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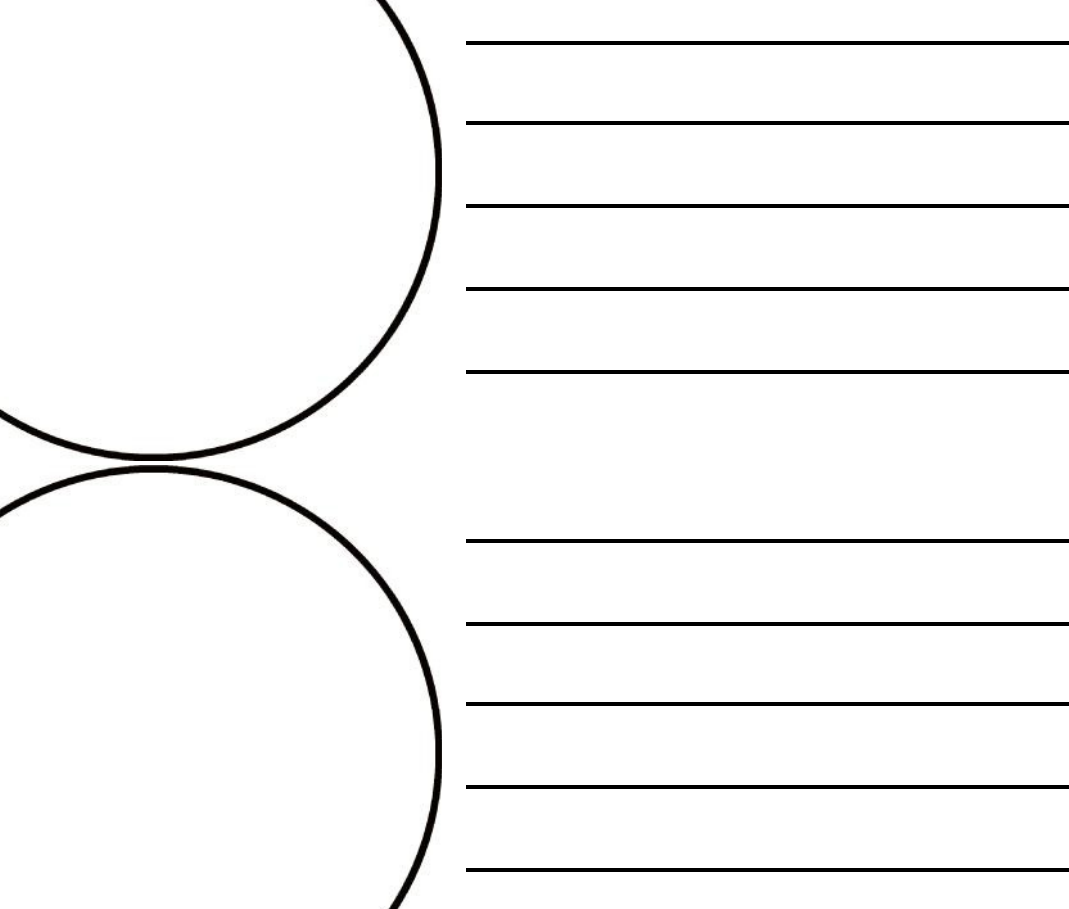
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Date:	_____	Transparency:	_____
Time:	_____	Seeing:	_____
Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

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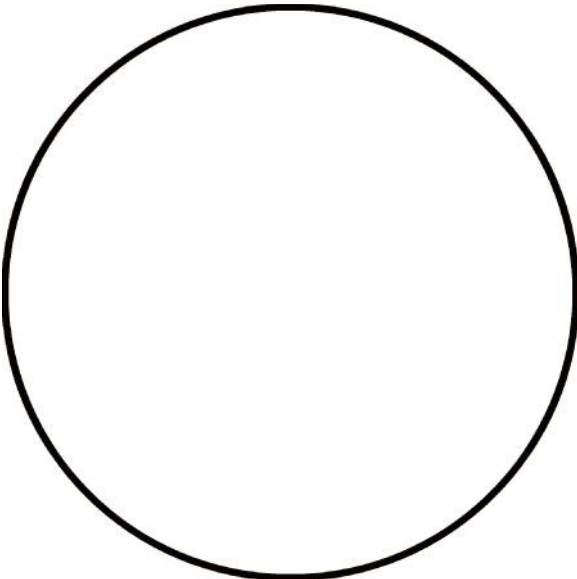
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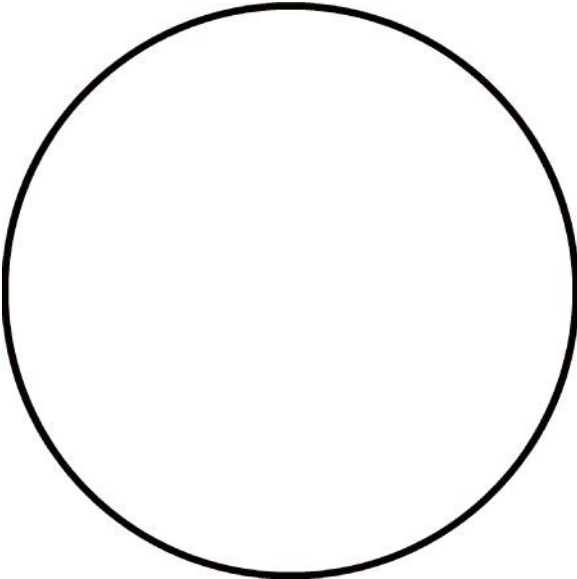
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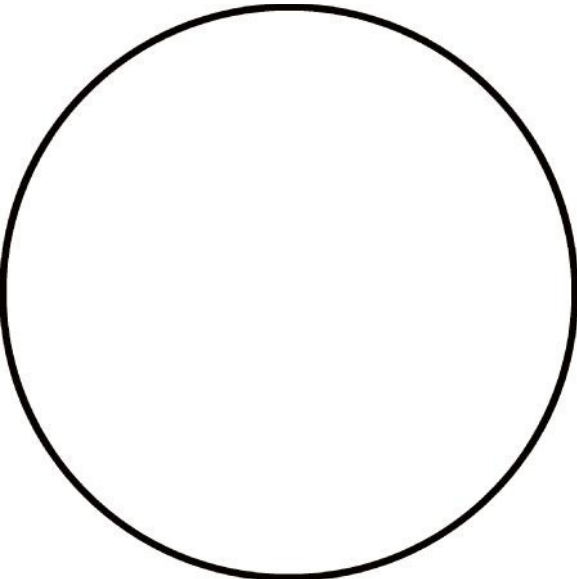
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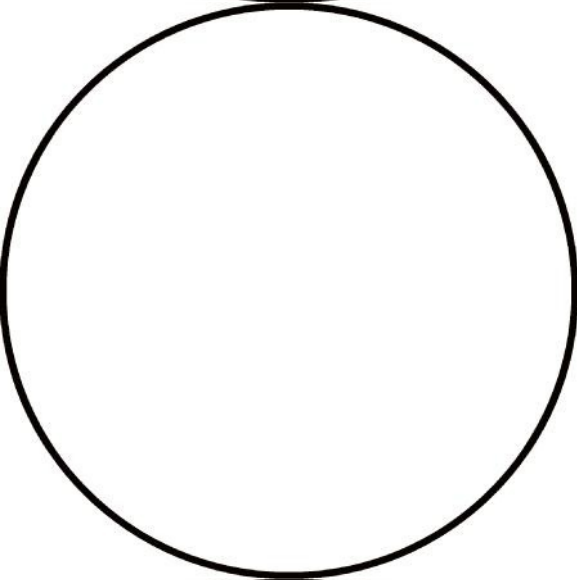
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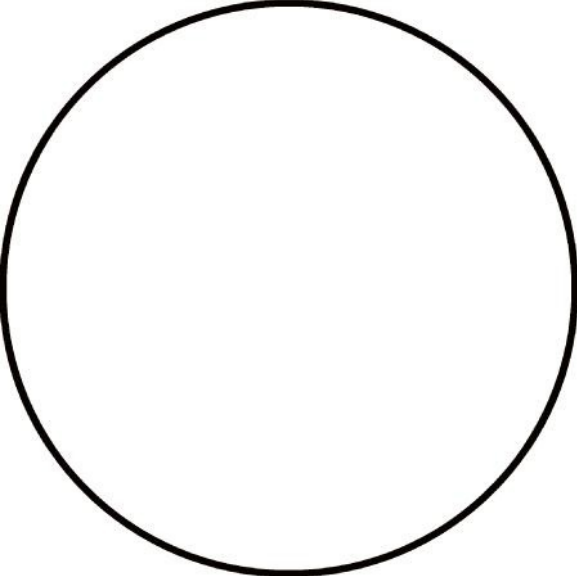
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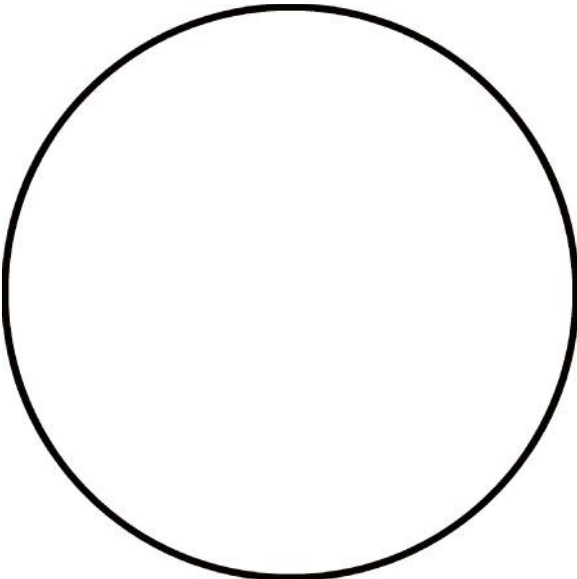
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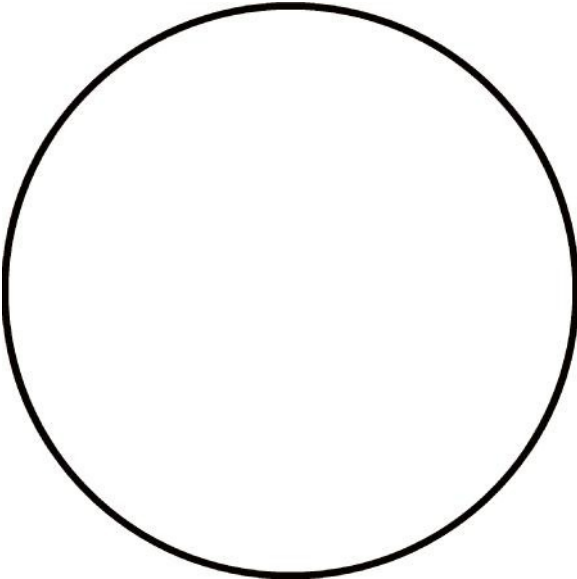
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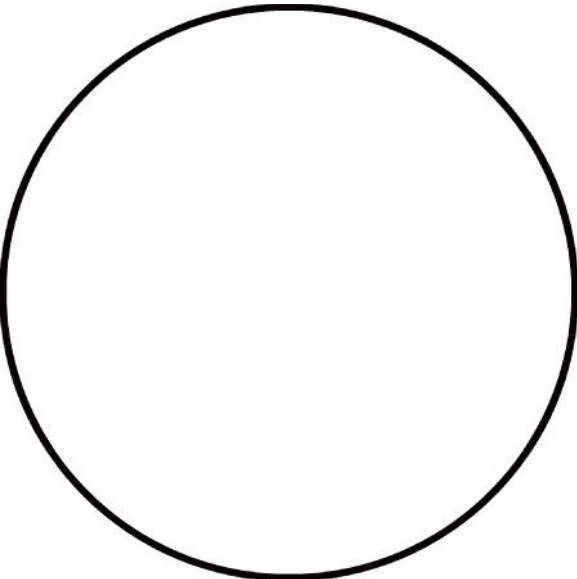
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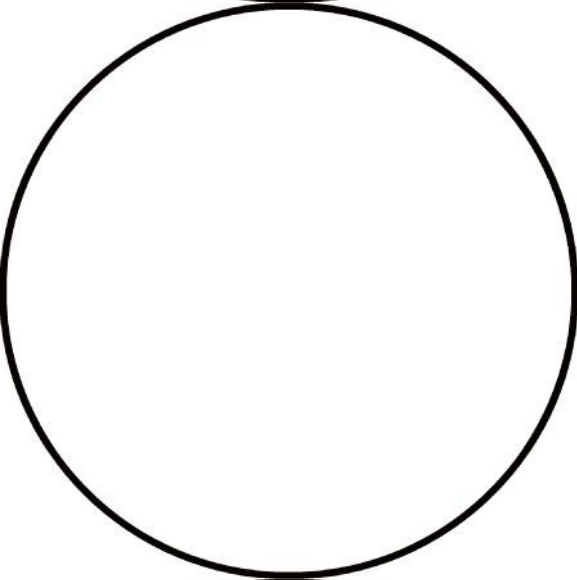
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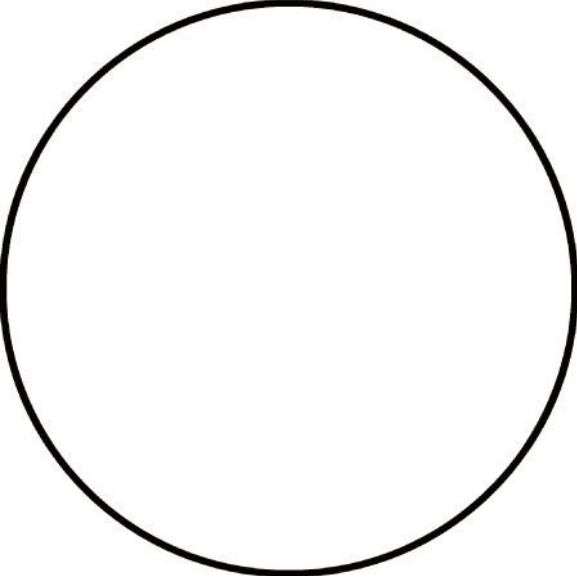
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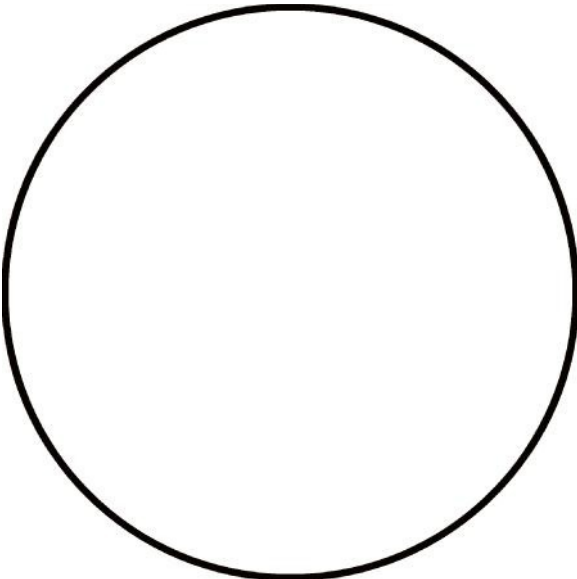
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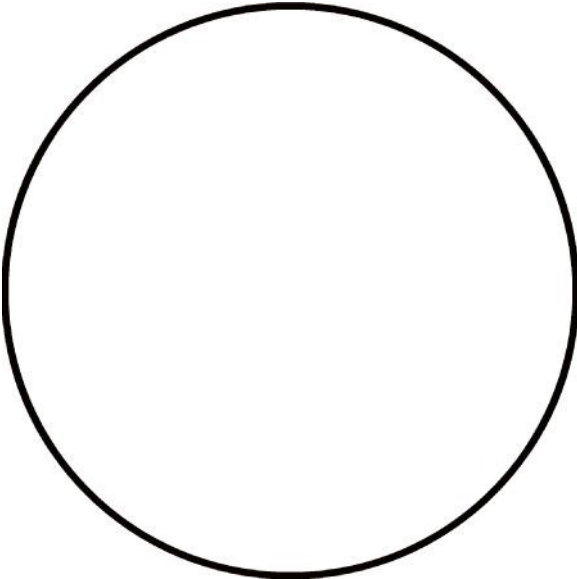
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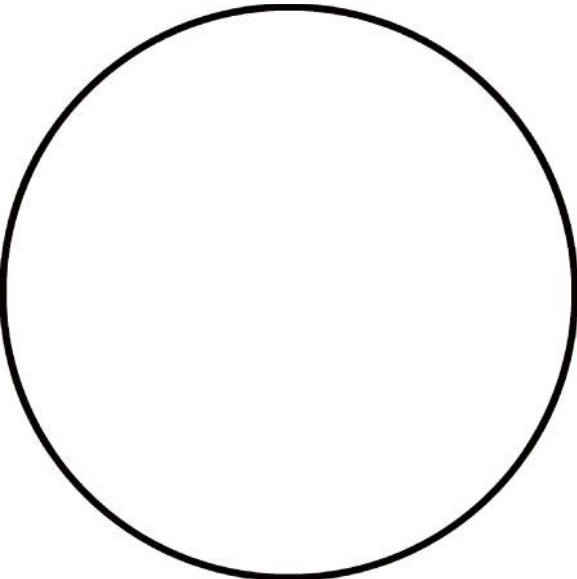
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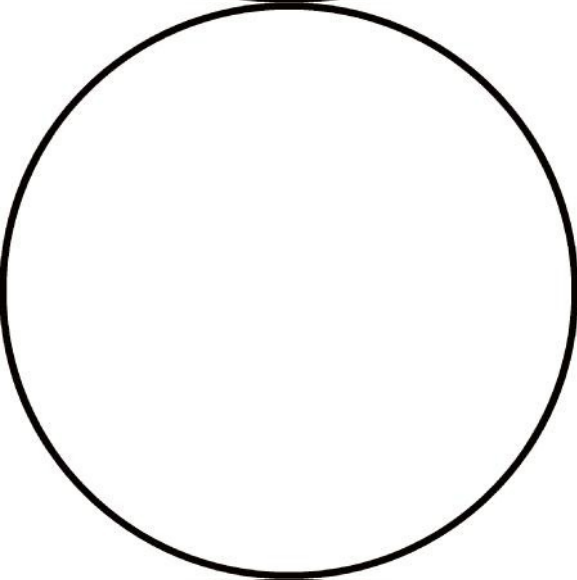
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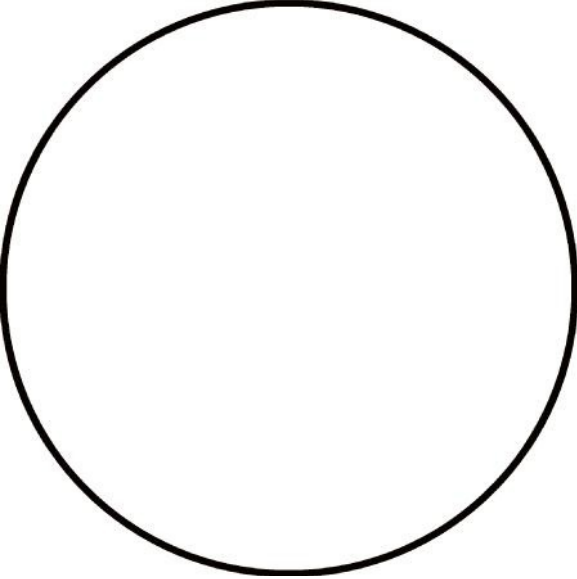
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]

Date:	_____	Transparency:	_____
Time:	_____	Seeing:	_____
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Date:	_____	Transparency:	_____
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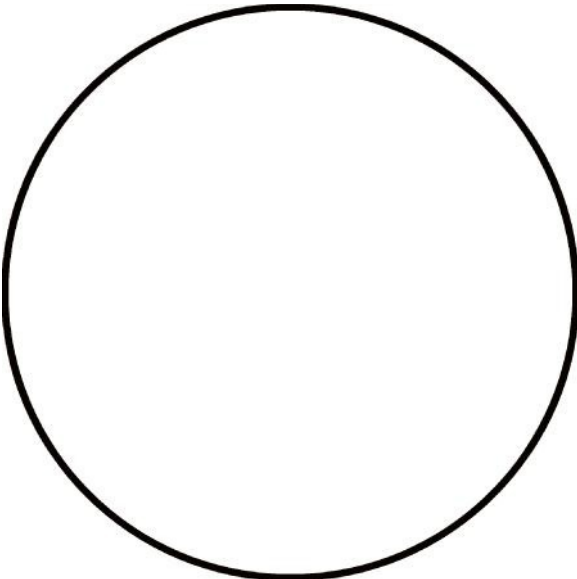
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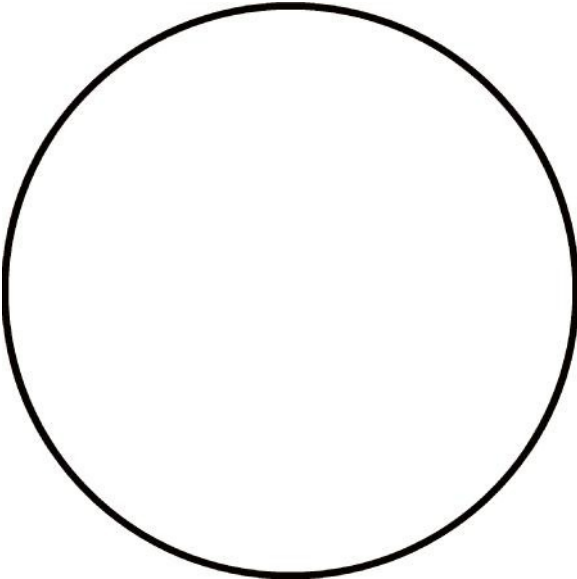
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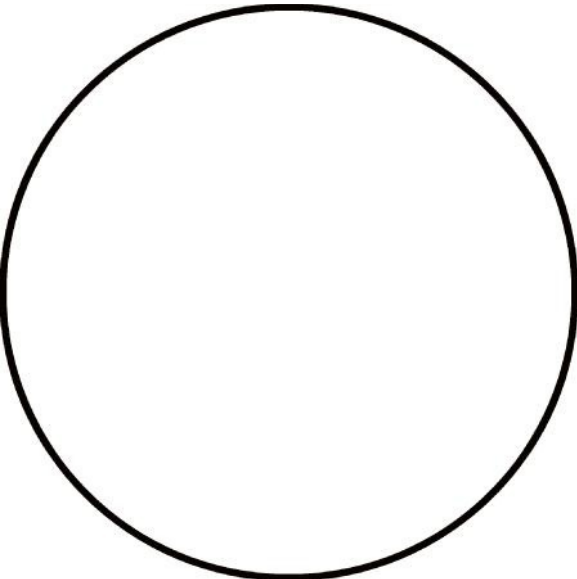
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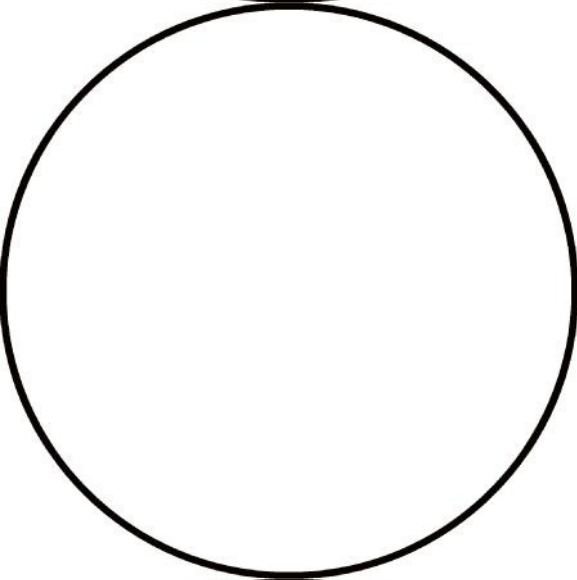
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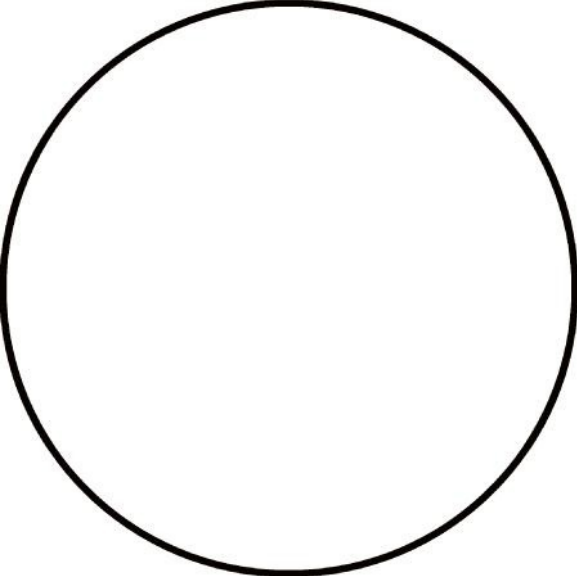
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]

Date:	_____	Transparency:	_____
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Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

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Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]

Date:	_____	Transparency:	_____
Time:	_____	Seeing:	_____
Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]



Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image shows a blank sheet of white paper designed for writing or drawing. On the left side, there are four horizontal rows of blue lines, each row containing five lines. To the right of these lines are three large, empty black-outlined circles arranged vertically. The circles are positioned such that they overlap slightly with the bottom-most row of lines.

Date:	_____	Transparency:	_____
Time:	_____	Seeing:	_____
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Limiting Magnitude:	_____	Eyepieces:	_____

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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.This image shows a blank sheet of white paper designed for writing or drawing. On the left side, there are ten horizontal black lines spaced evenly apart, providing a guide for handwriting. On the right side, there are three large, identical circles stacked vertically, each touching the one above and below it. These circles are likely intended for students to draw or write about a specific topic. The entire page is otherwise blank and white.

Date: \_\_\_\_\_ Transparency: \_\_\_\_\_

Time: \_\_\_\_\_ Seeing: \_\_\_\_\_

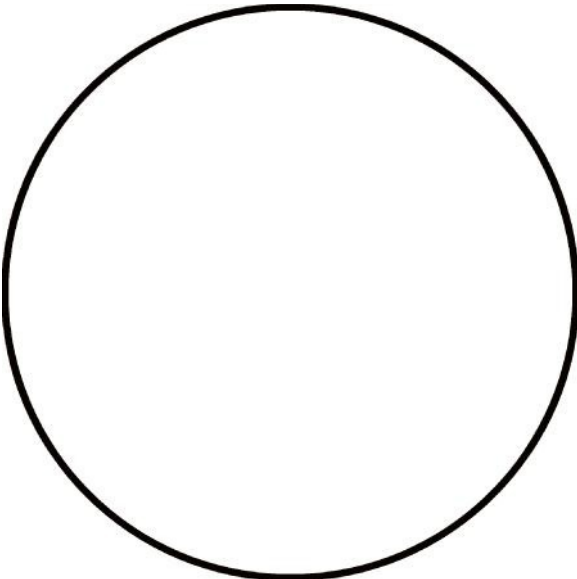
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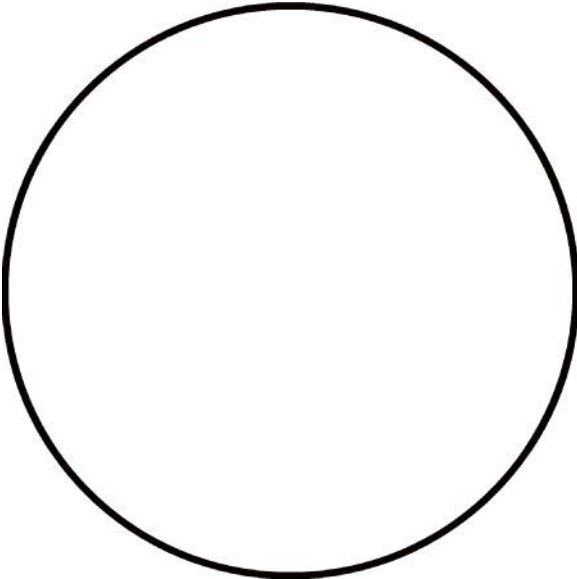
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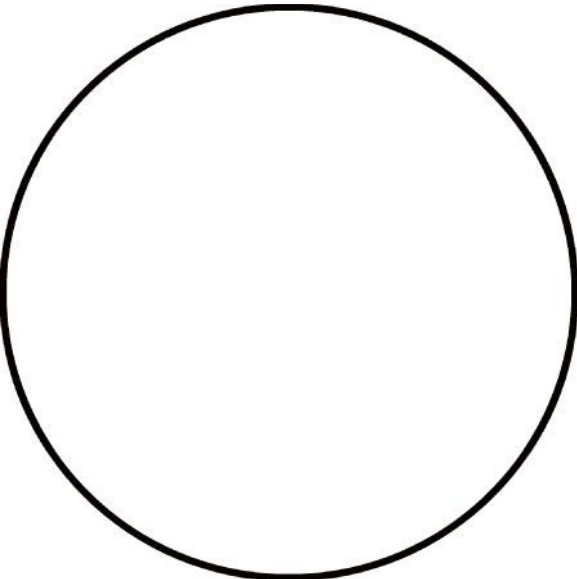
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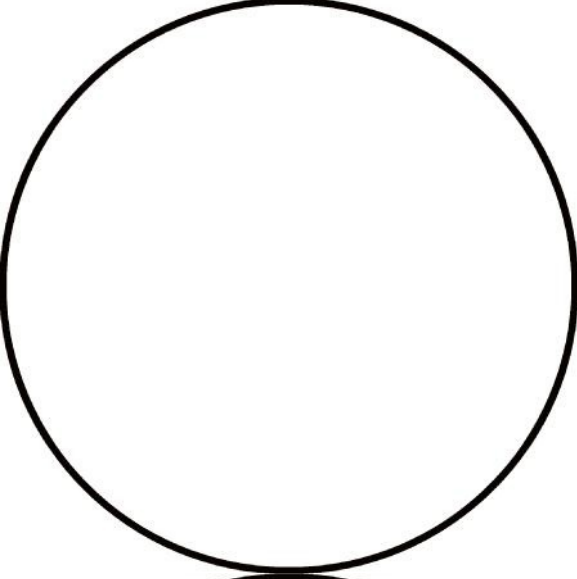
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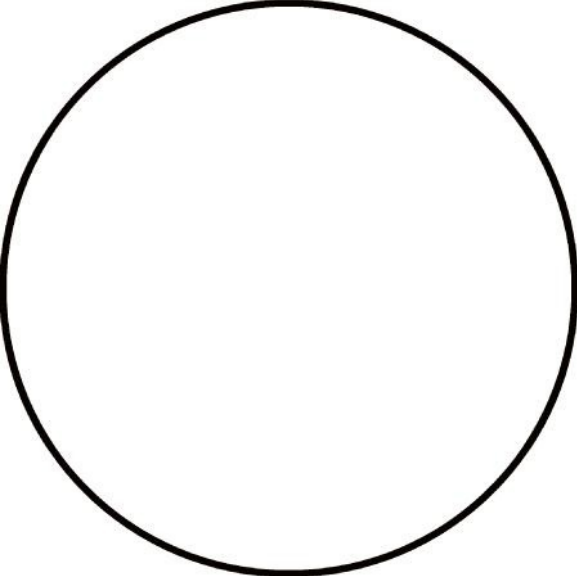
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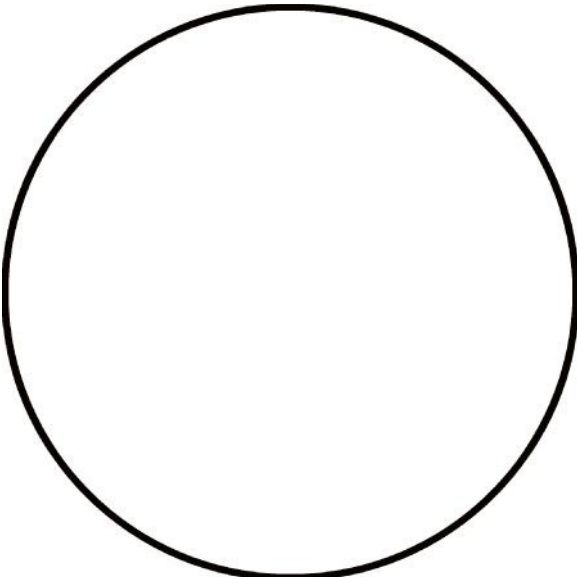
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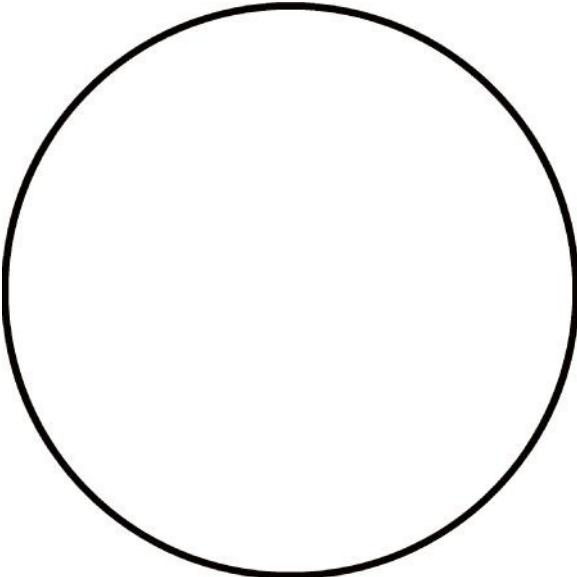


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Limiting Magnitude: \_\_\_\_\_ Eyepieces: \_\_\_\_\_

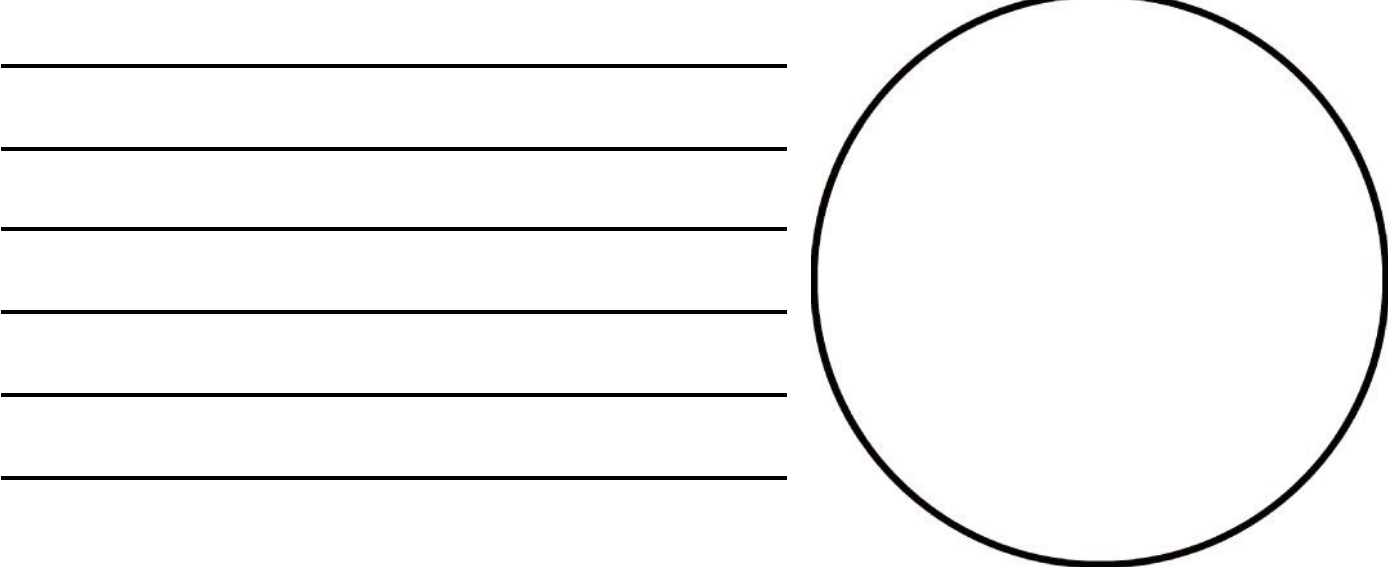
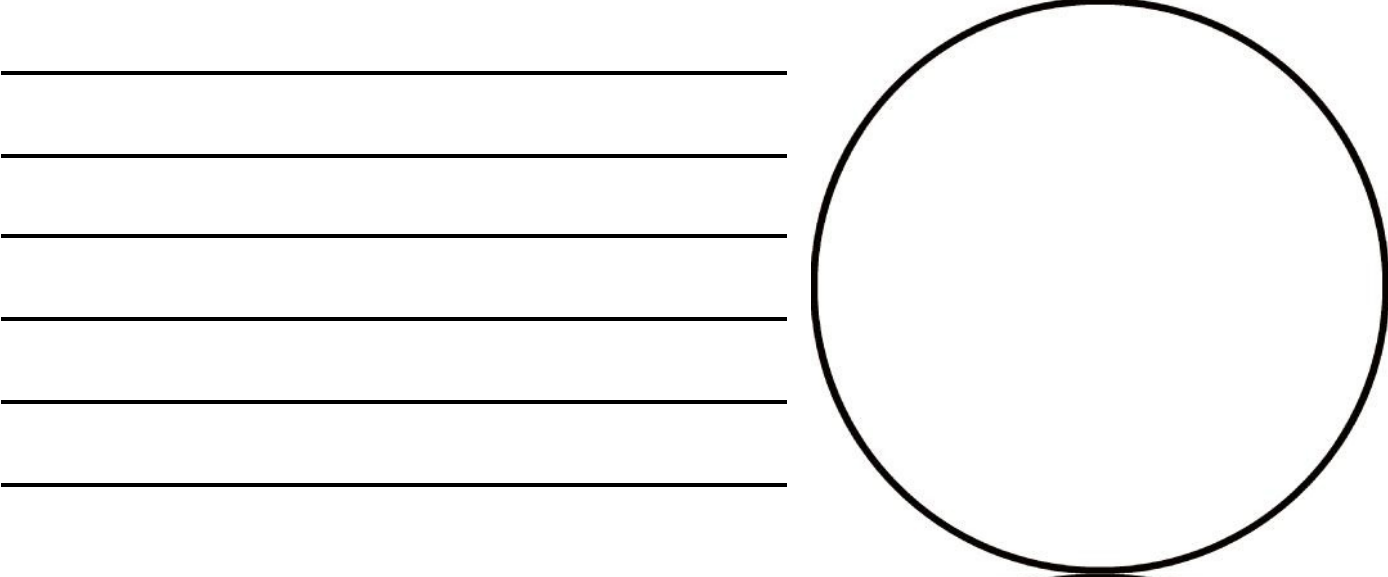
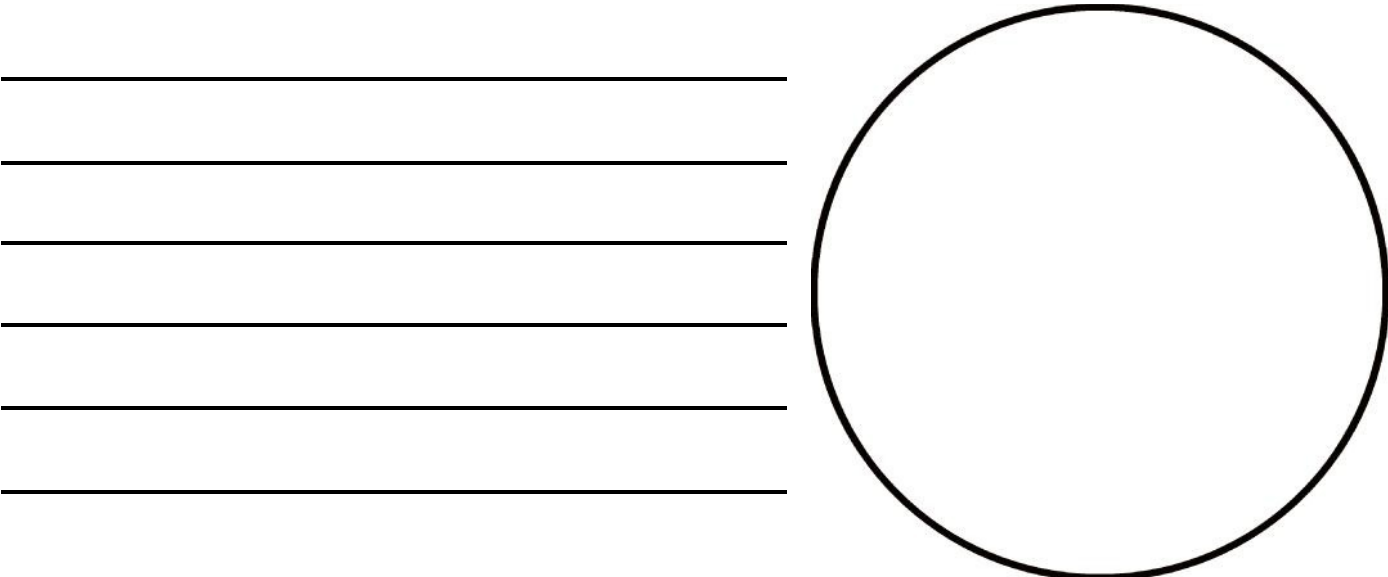
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A large, empty circle with a thick black outline, centered on the page. It occupies most of the width and height of the drawing area.

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A large, empty circle with a thin black outline, centered on the page. It is intended for a student to draw a picture related to their writing.

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A large, empty circle with a thick black outline, centered on the page. It is intended for a student to draw a picture related to their writing.



Date:	_____	Transparency:	_____
Time:	_____	Seeing:	_____
Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

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Date: \_\_\_\_\_ Transparency: \_\_\_\_\_

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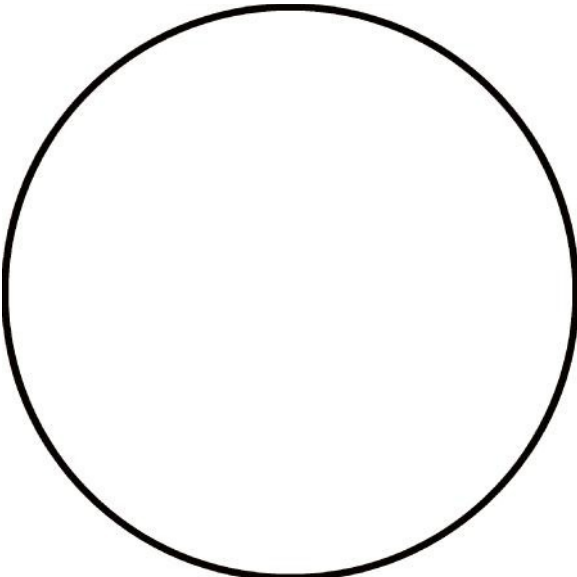
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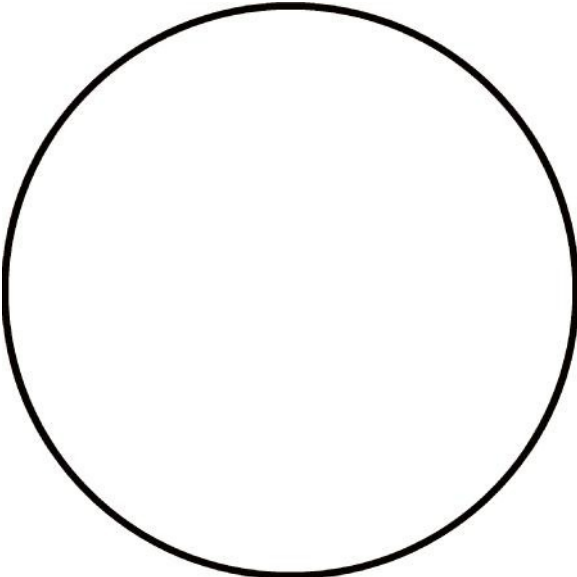
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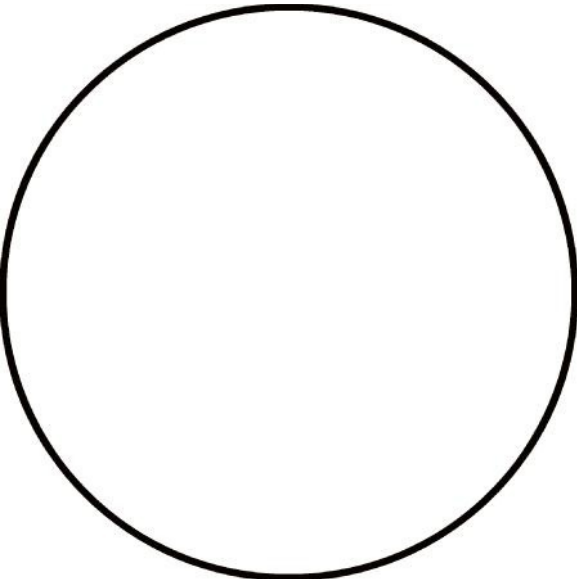
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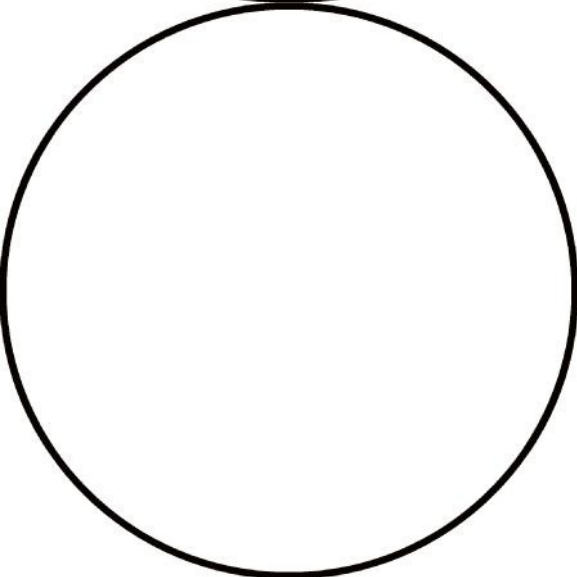
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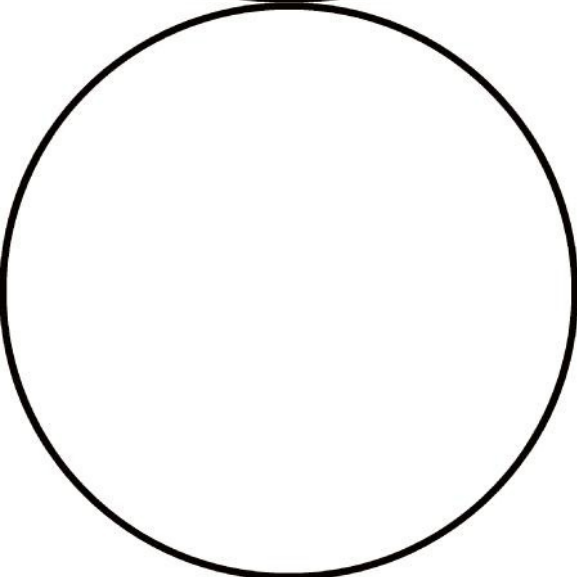
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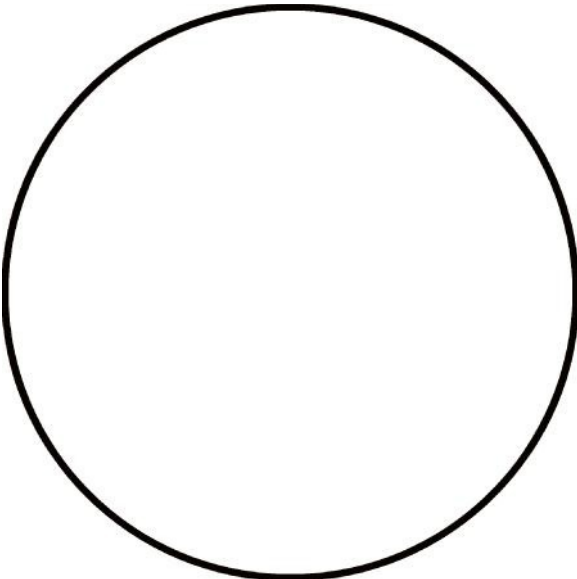
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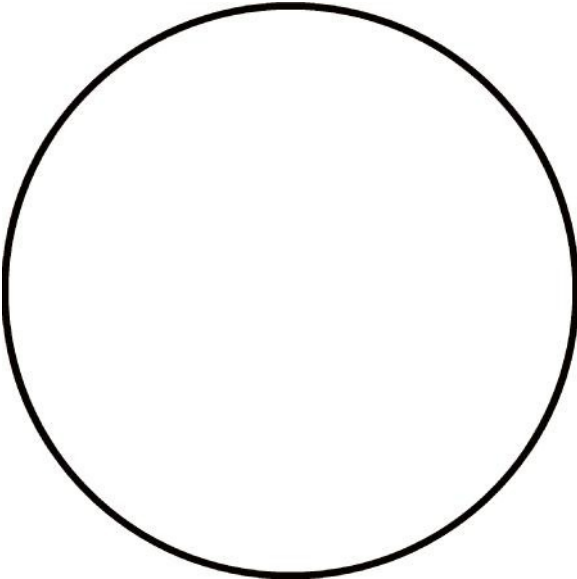
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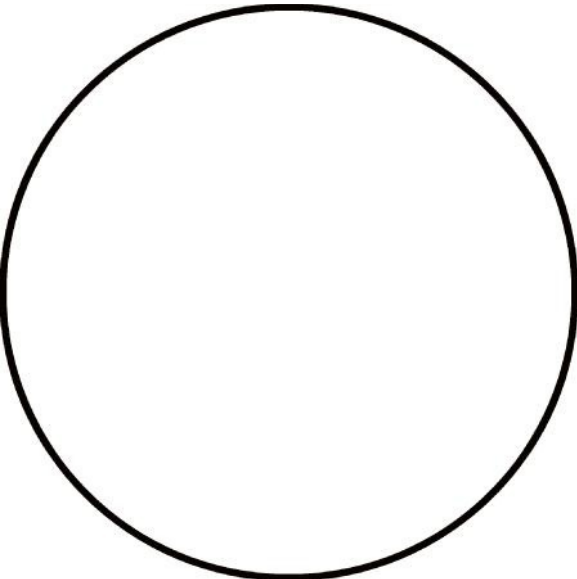
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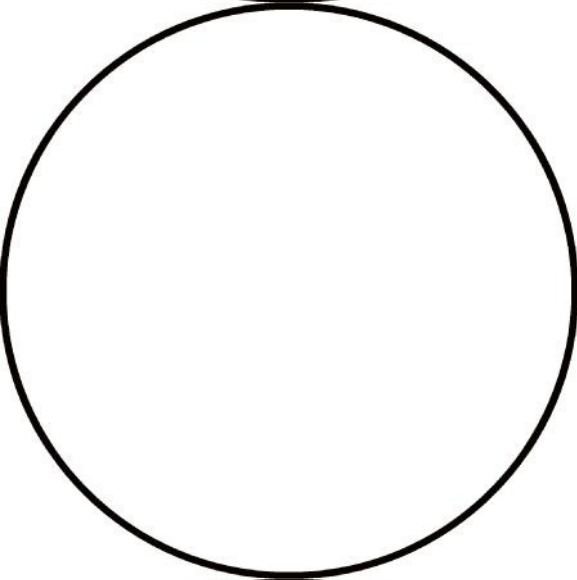
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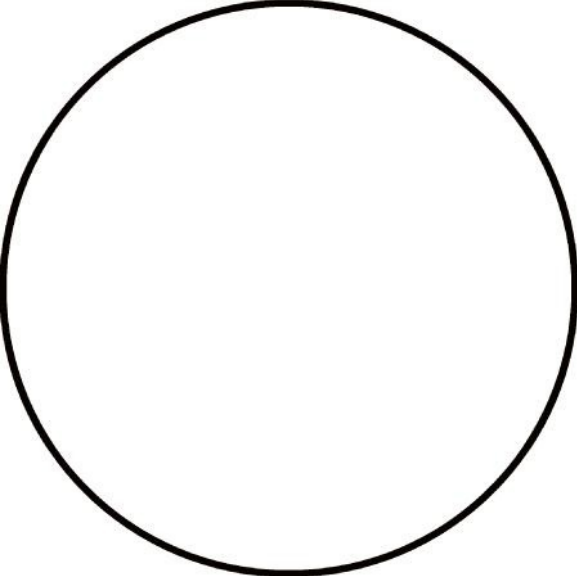
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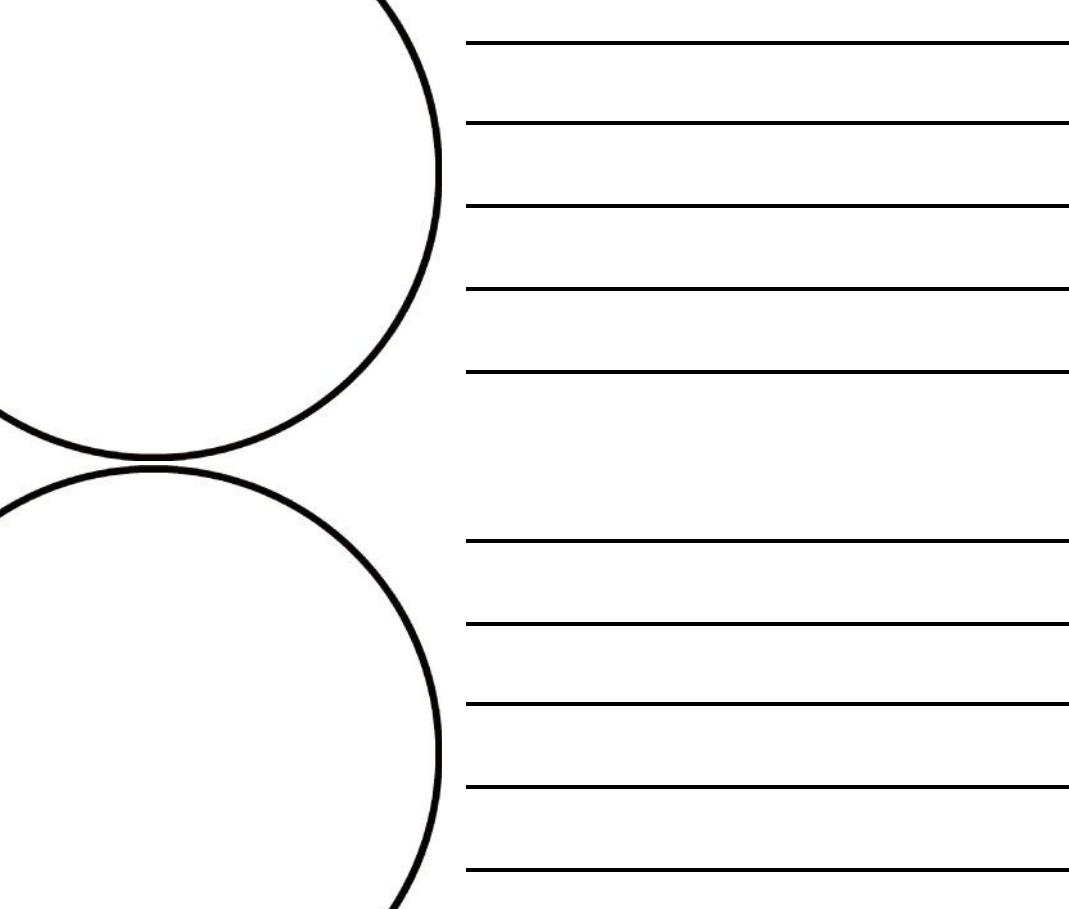


Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image is a worksheet template for a story arc. It consists of a vertical column of 15 horizontal lines on the left side, intended for writing a story. To the right of the lines are three large, empty circles arranged vertically, intended for drawing a picture for each part of the story.

Date:	_____	Transparency:	_____
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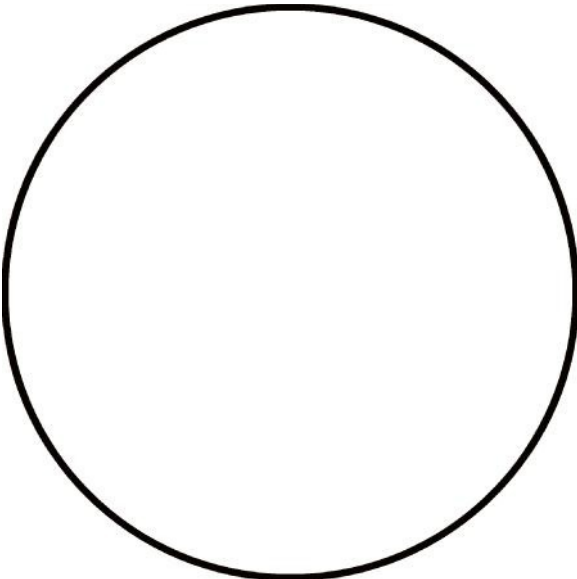
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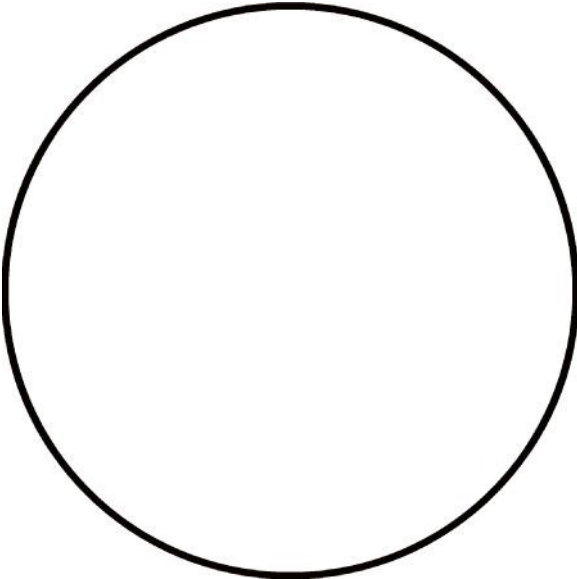
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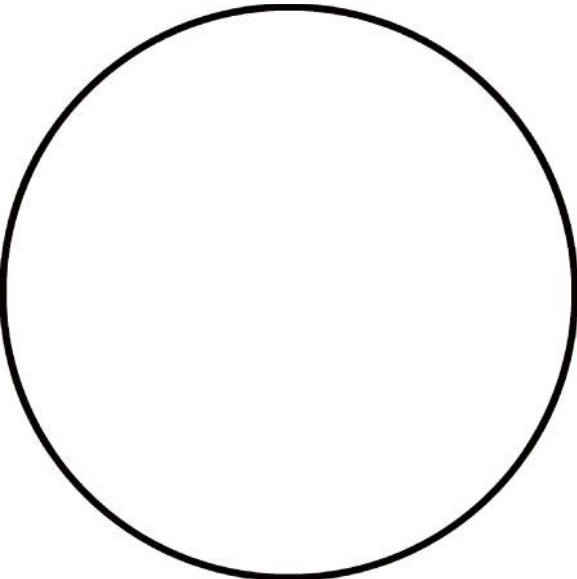
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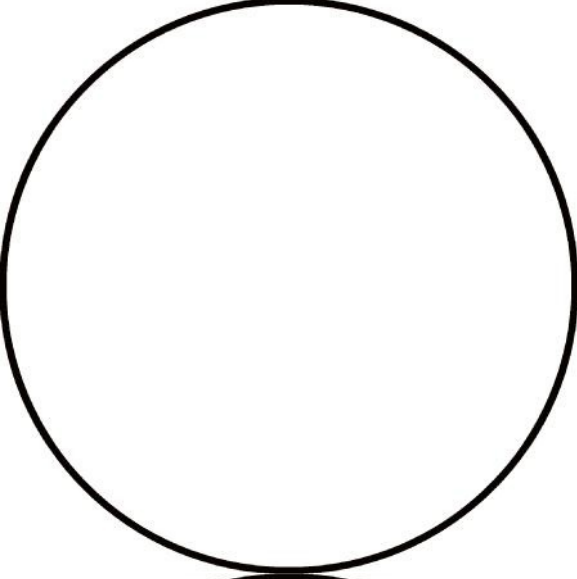
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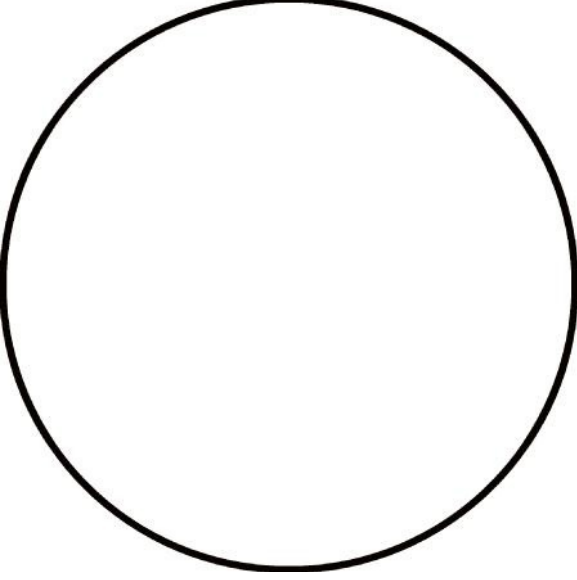
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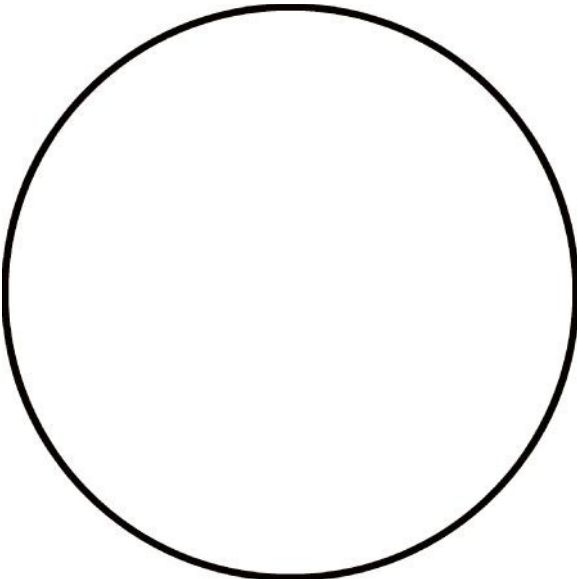
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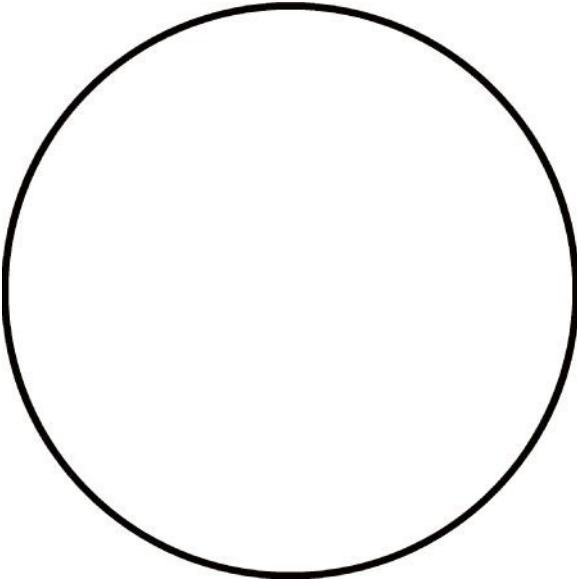
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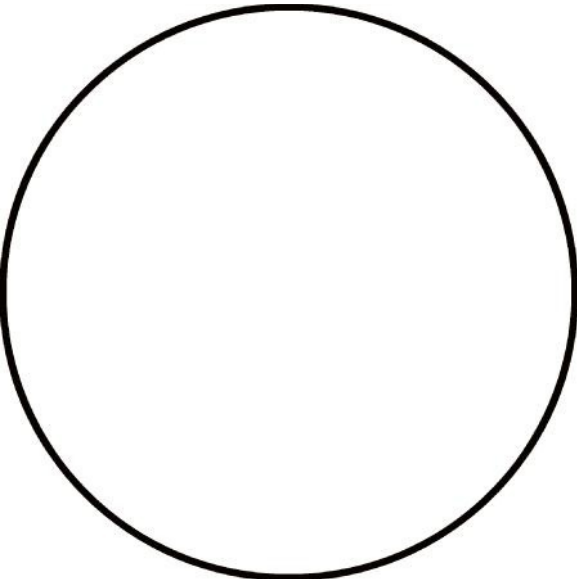
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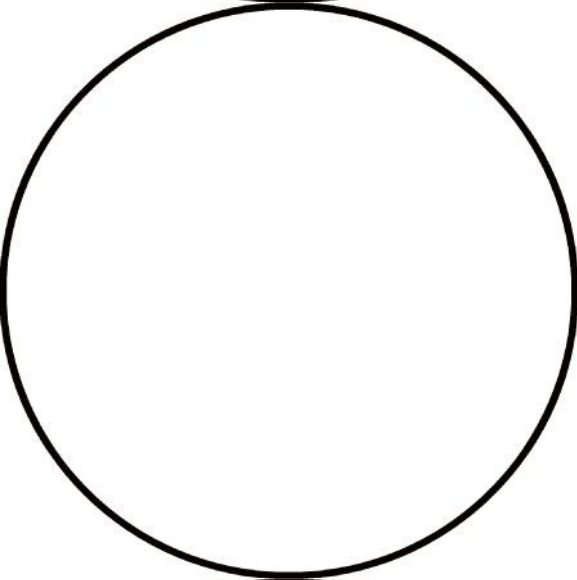
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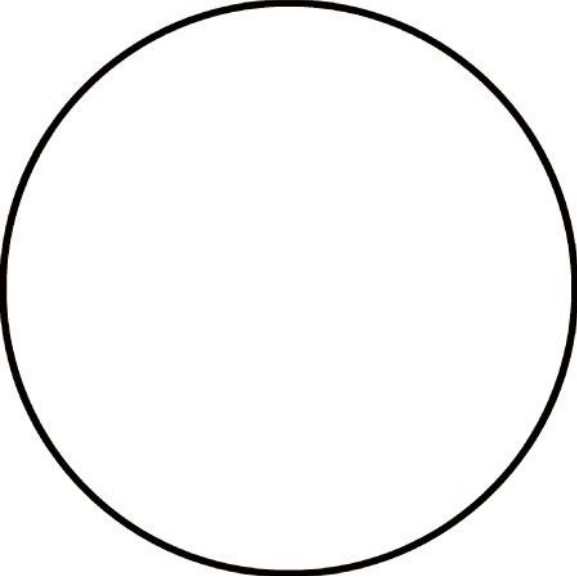
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image is a worksheet template for a story arc. It consists of a vertical column of 15 horizontal lines on the left side, intended for writing a story. To the right of the lines are three large, empty circles arranged vertically, intended for drawing a picture for each part of the story.

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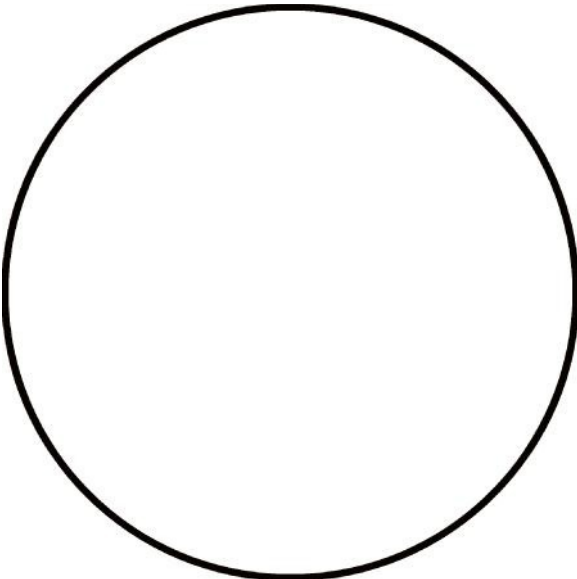
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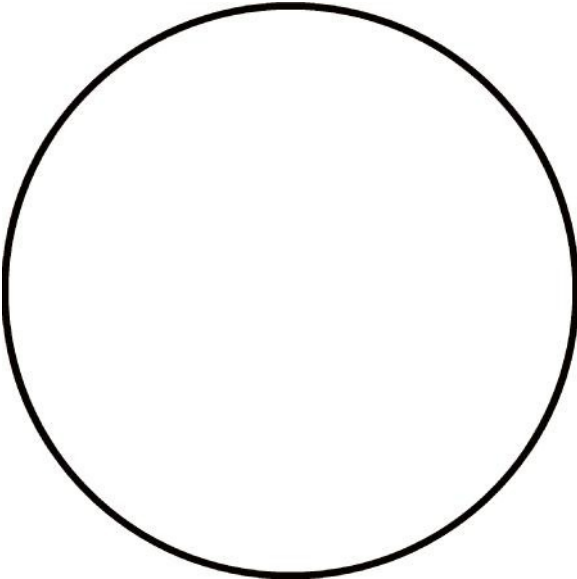
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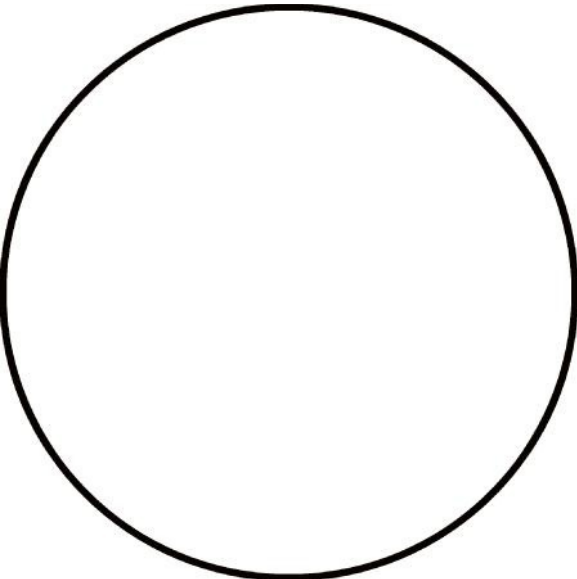
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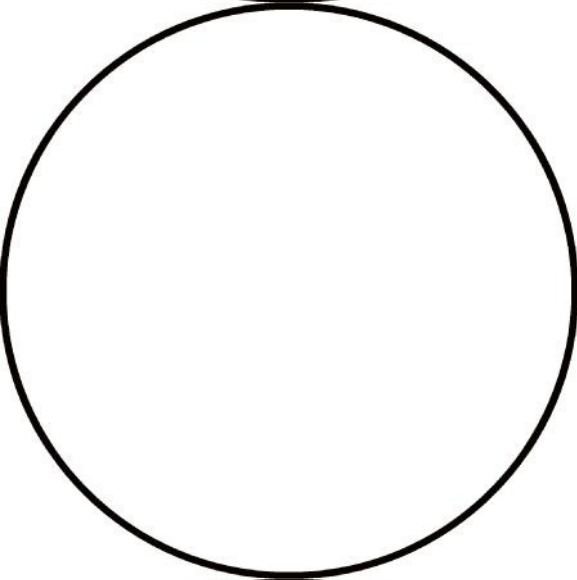
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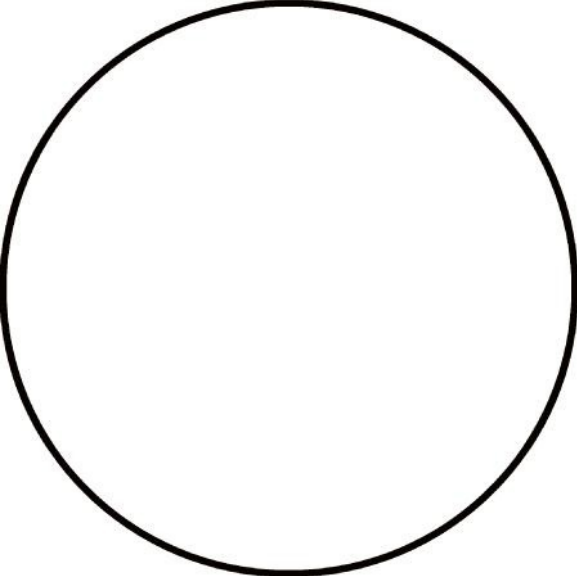
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, separated by a small gap.[illegible]

Date:	_____	Transparency:	_____
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Date:	_____	Transparency:	_____
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Limiting Magnitude:	_____	Eyepieces:	_____

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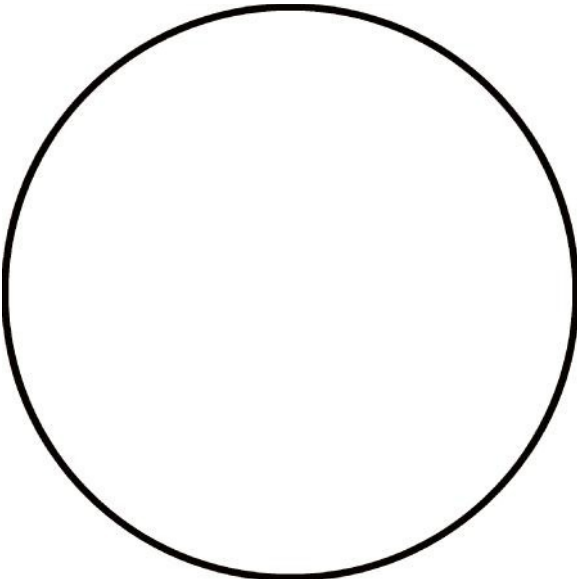
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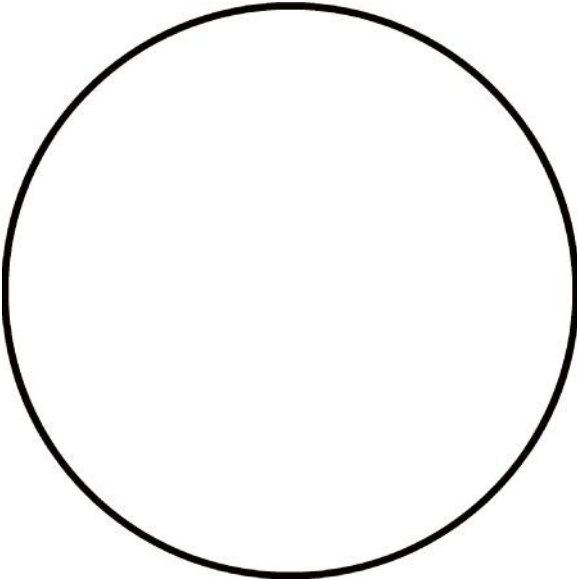
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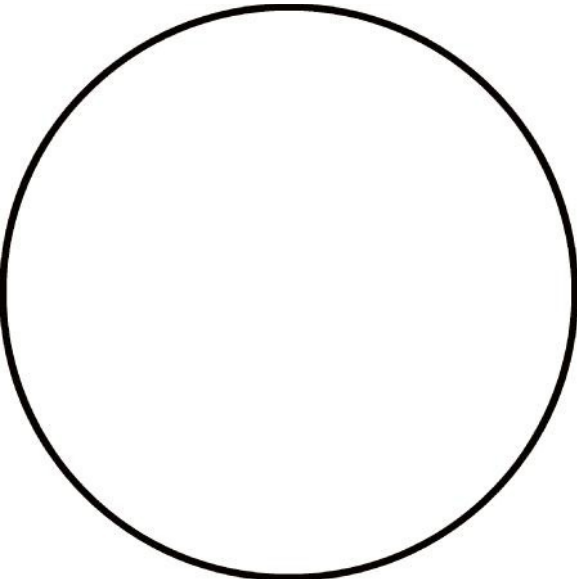
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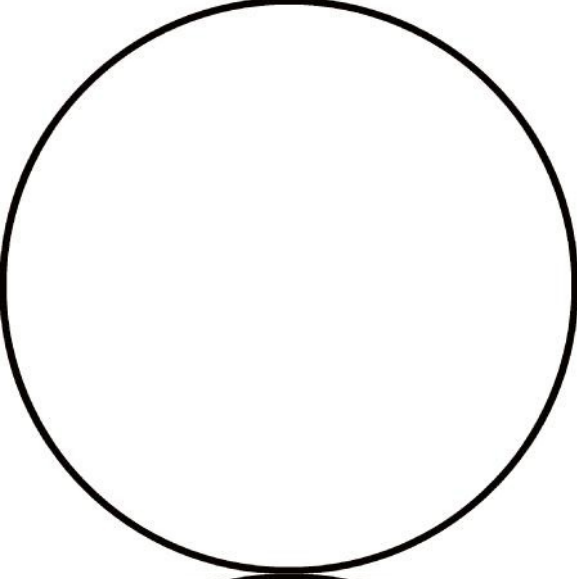
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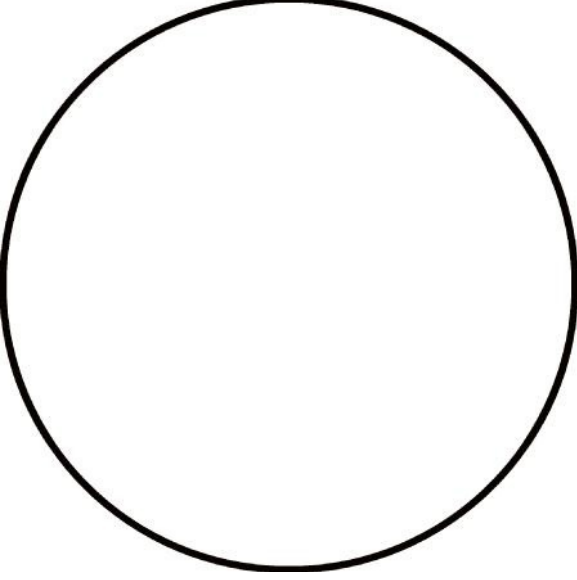
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Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
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A large, empty circle with a thin black outline, centered on the page. It is intended for a student to draw a picture related to their writing.

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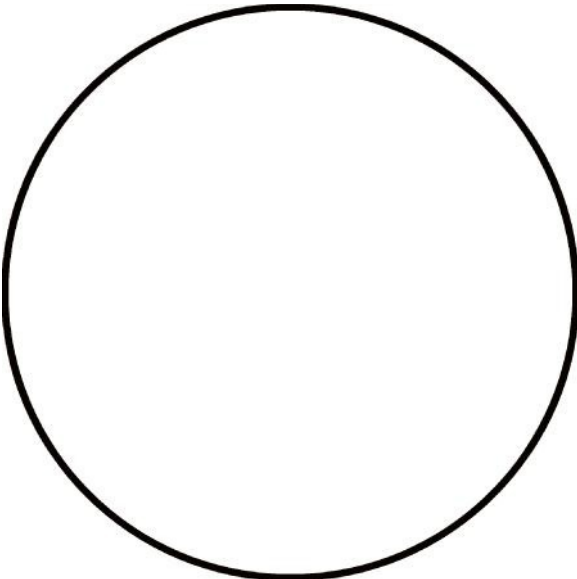
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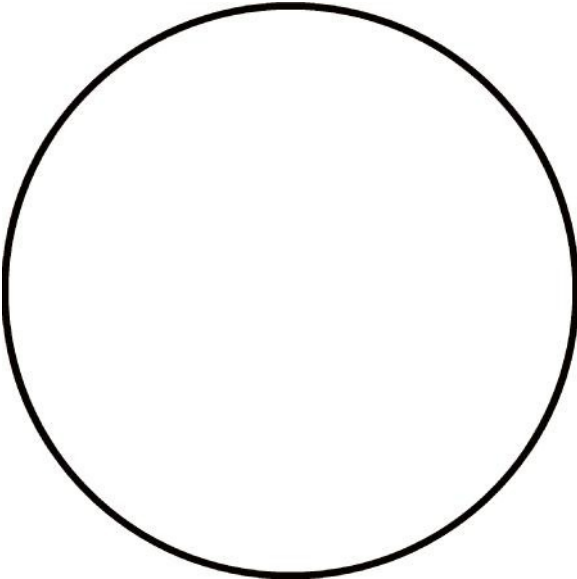
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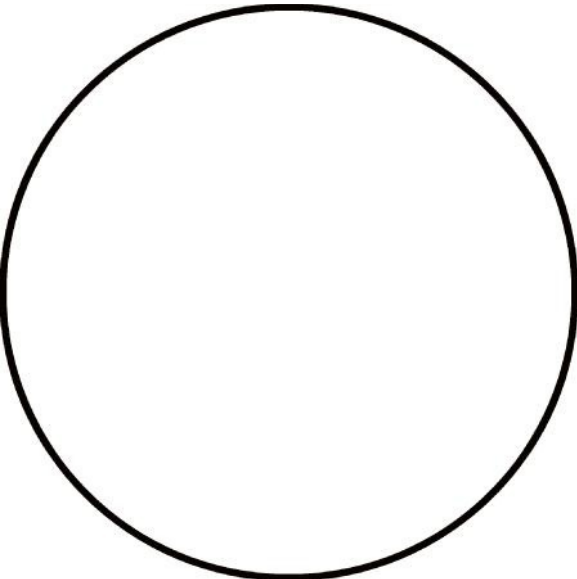
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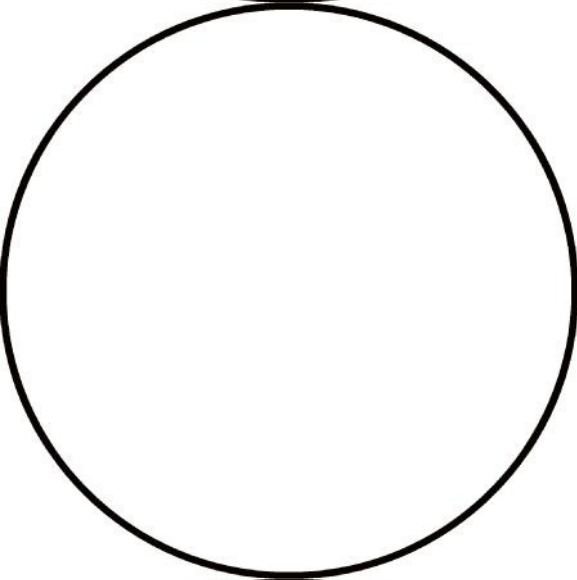
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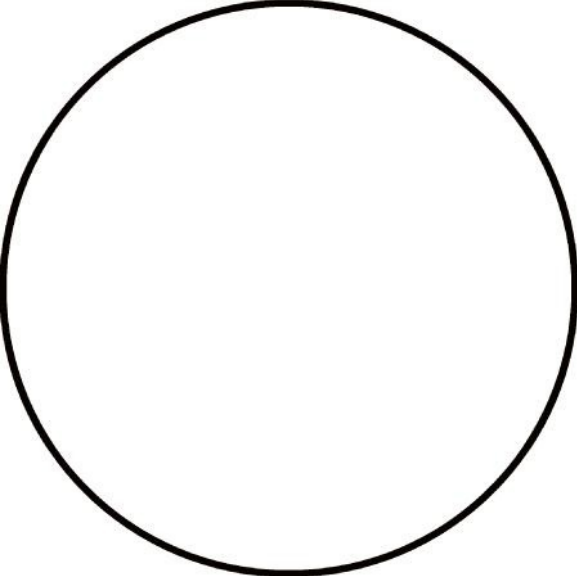
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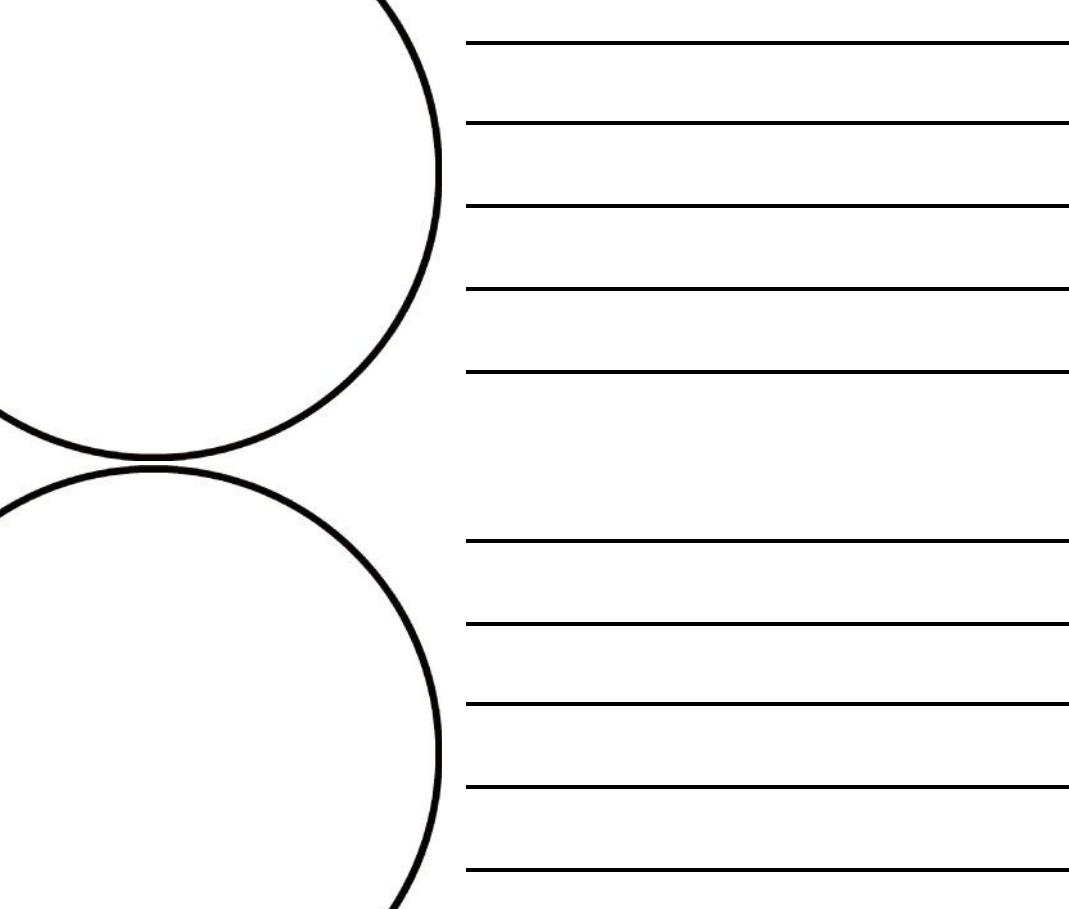


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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

Date: \_\_\_\_\_ Transparency: \_\_\_\_\_

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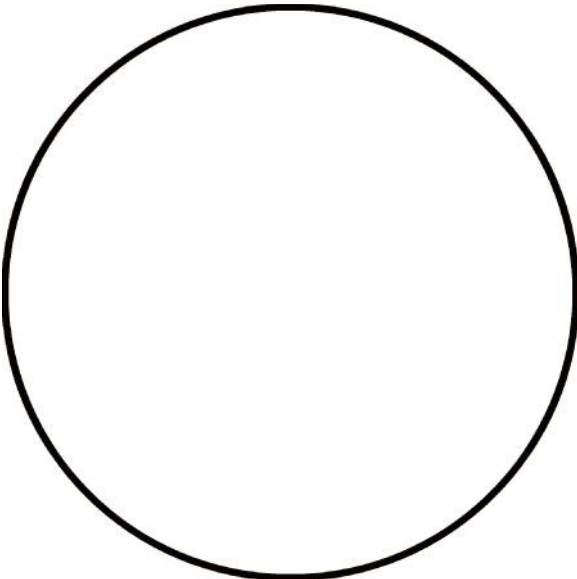
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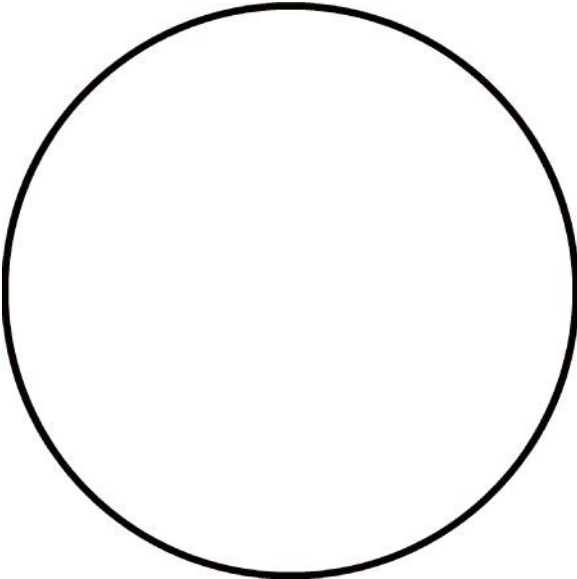
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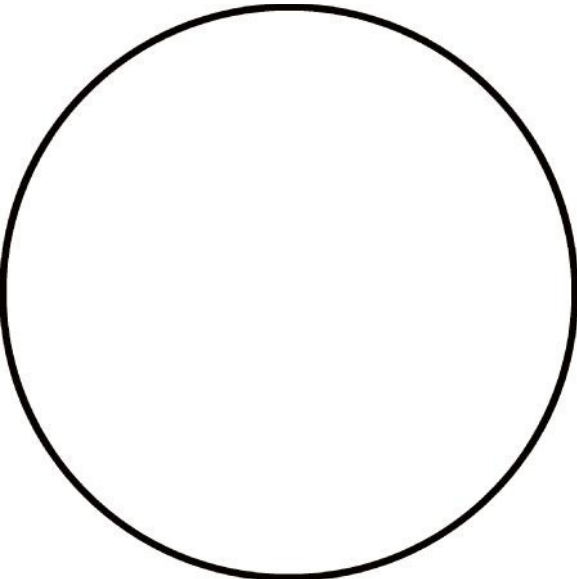
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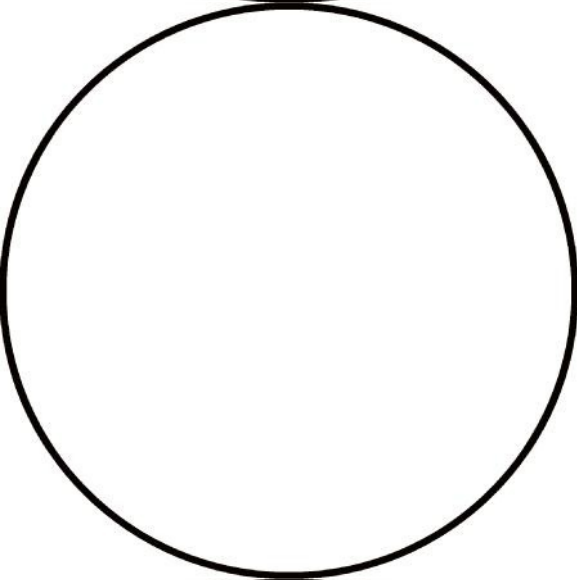
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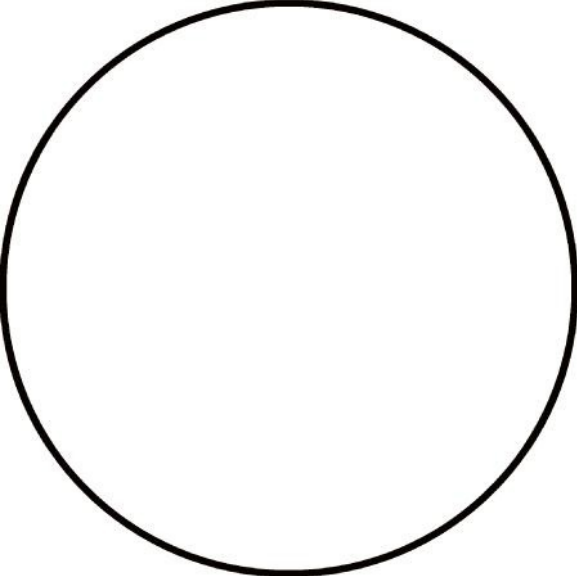
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

Date:	_____	Transparency:	_____
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Lunar Phase:	_____	Equipment:	_____
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Date: \_\_\_\_\_ Transparency: \_\_\_\_\_

Time: \_\_\_\_\_ Seeing: \_\_\_\_\_

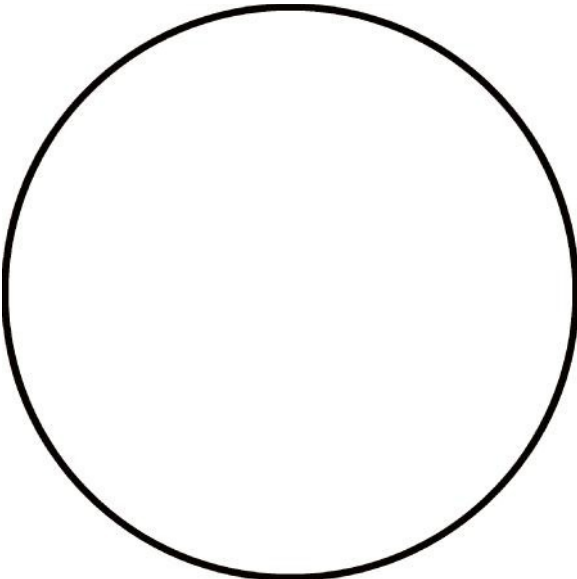
Lunar Phase: \_\_\_\_\_ Equipment: \_\_\_\_\_

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Magnitude: \_\_\_\_\_ Eyepieces: \_\_\_\_\_

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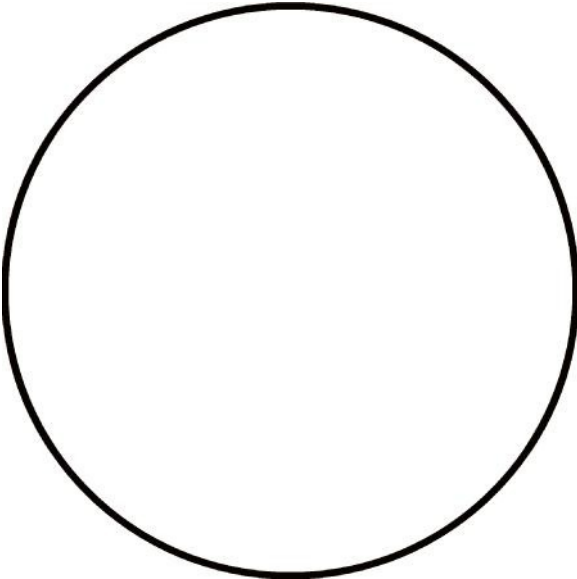
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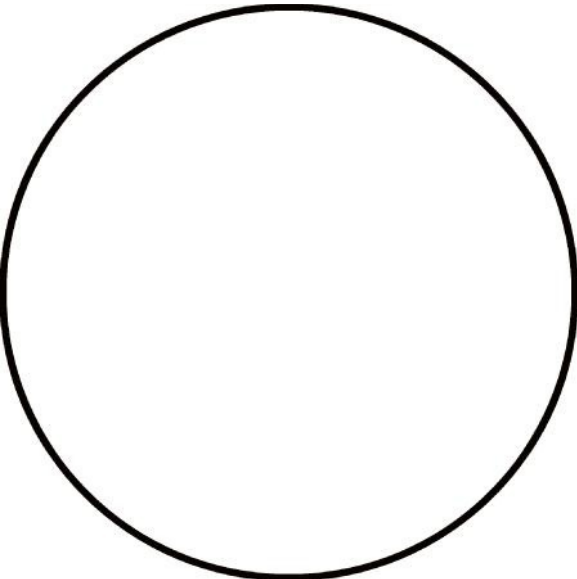
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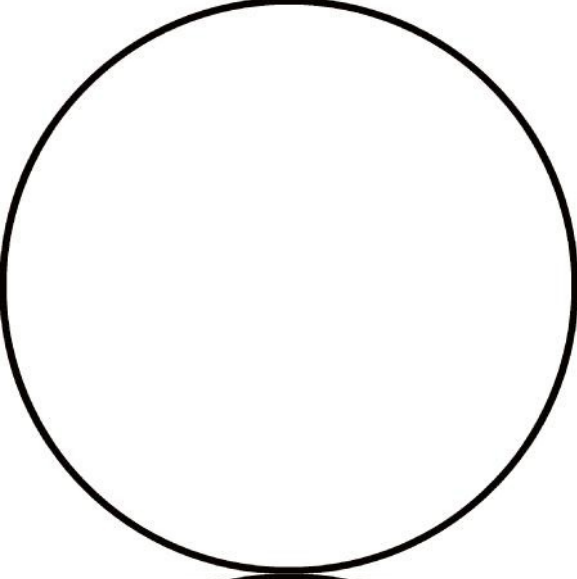
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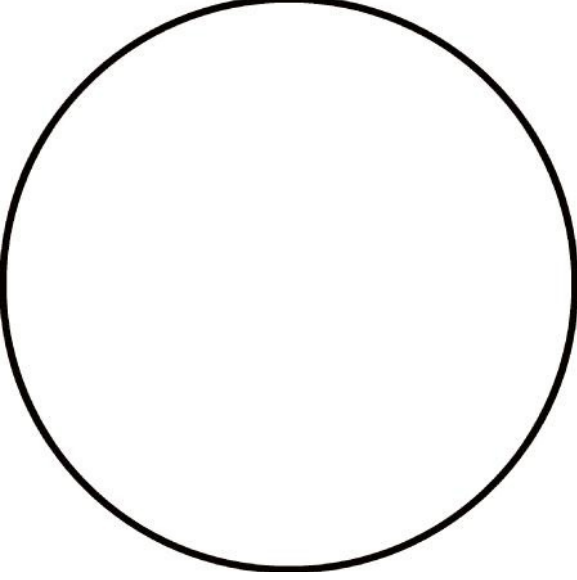
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The image contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image is a worksheet template for a story arc. It consists of three large, empty circles arranged vertically on the right side, which serve as containers for the beginning, middle, and end of a story. To the left of these circles is a series of horizontal lines for writing. The lines are organized into three groups, each corresponding to one of the circles: the top group has 6 lines, the middle group has 6 lines, and the bottom group has 6 lines. This layout allows a student to write a narrative that progresses through the three stages of the story arc.

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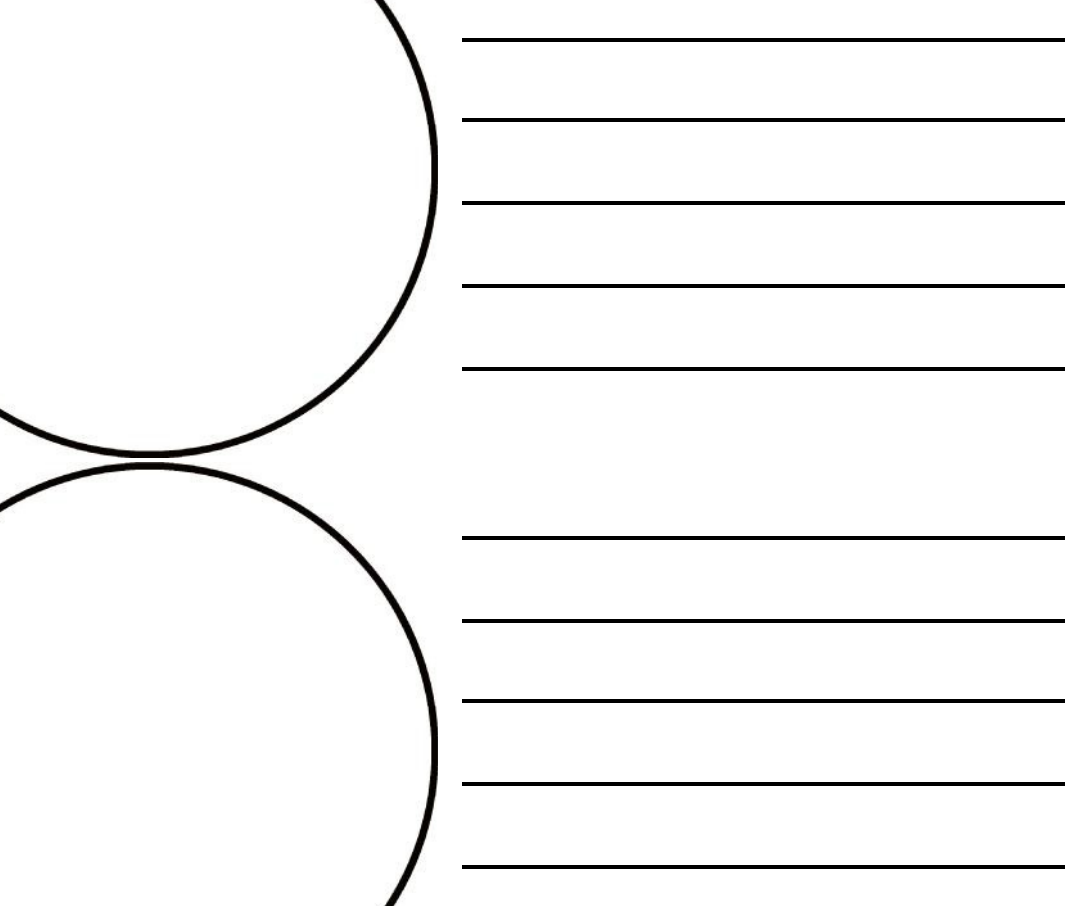
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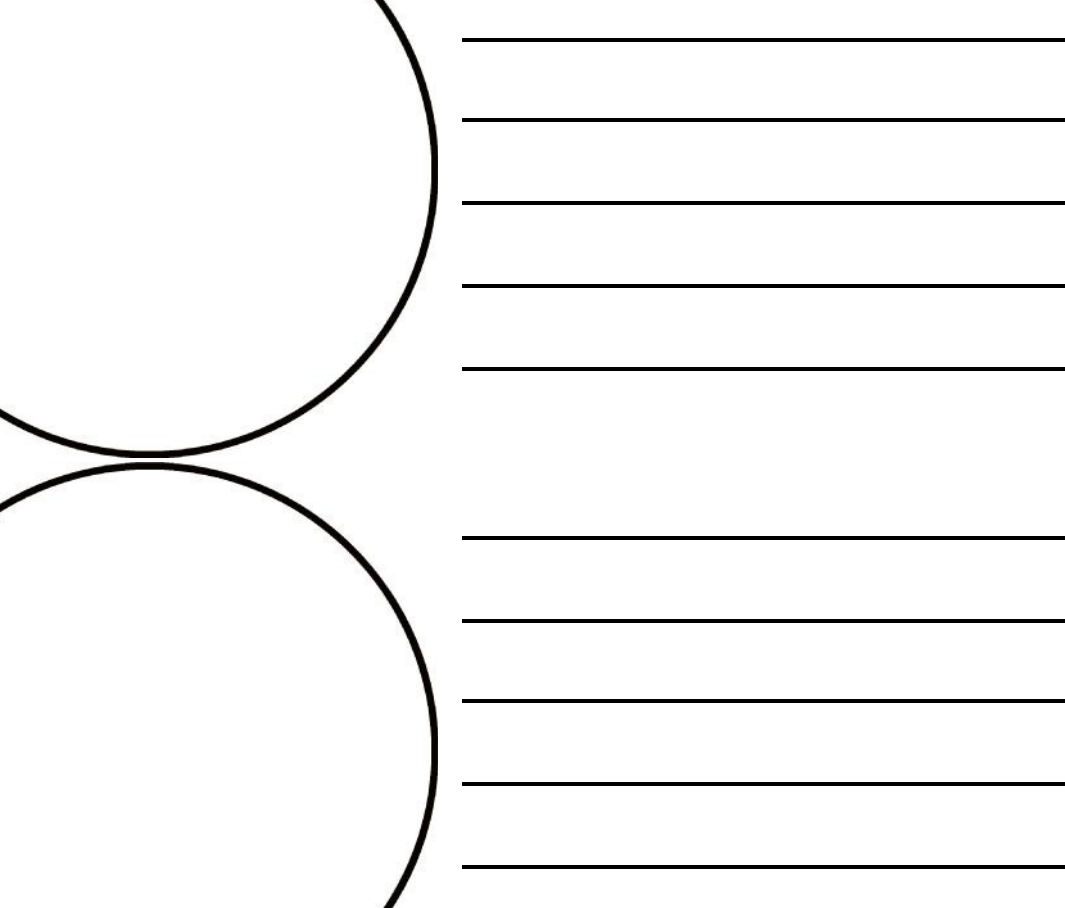
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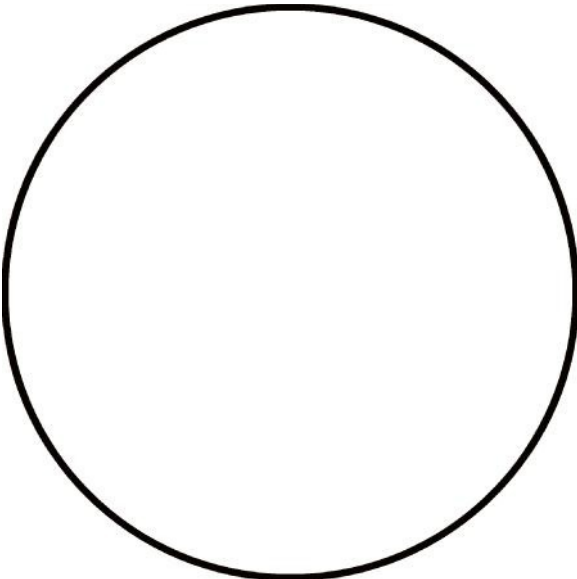
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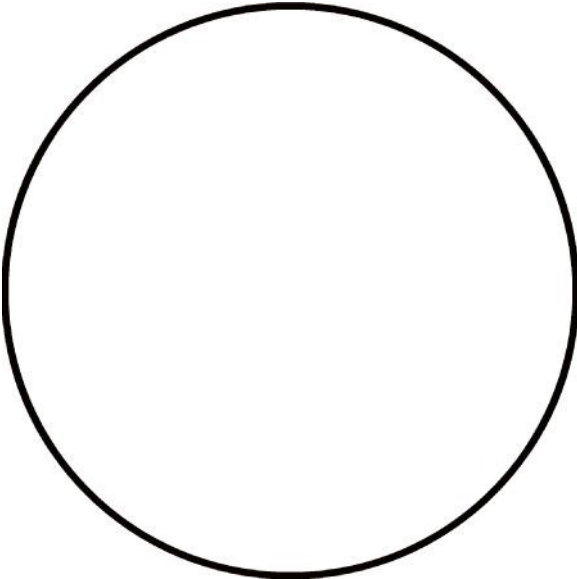
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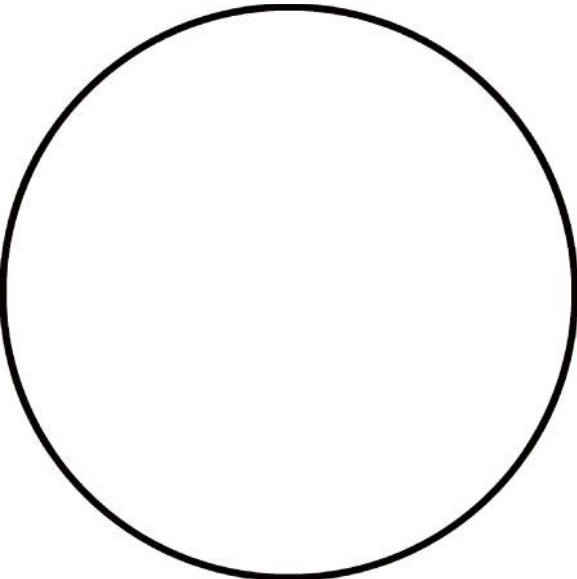
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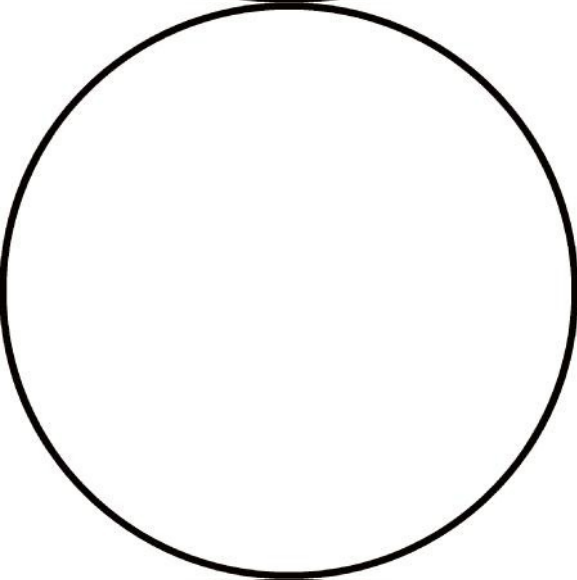
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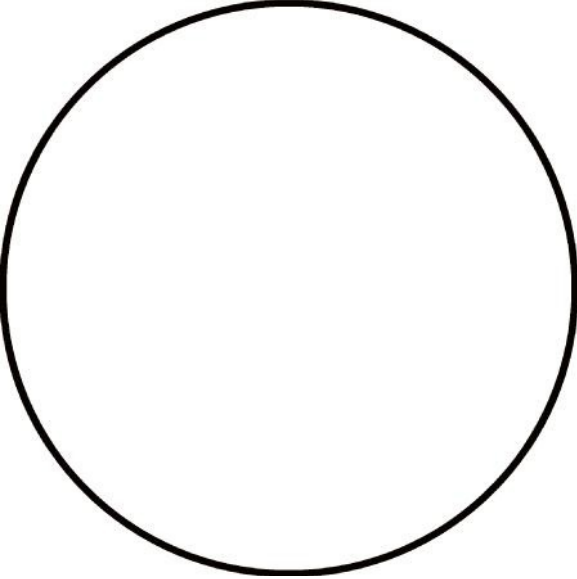
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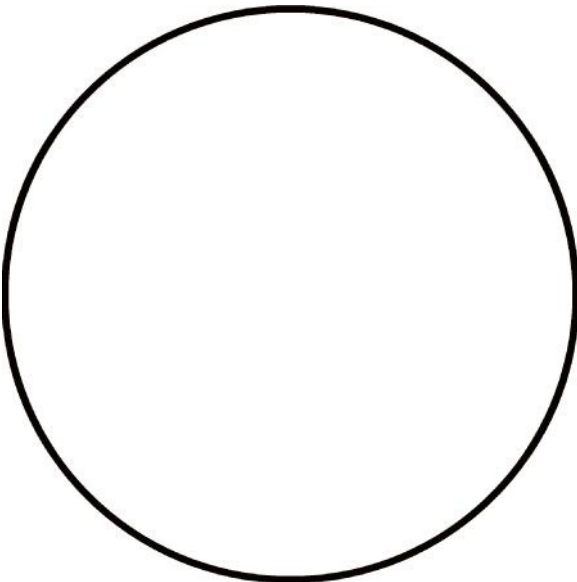
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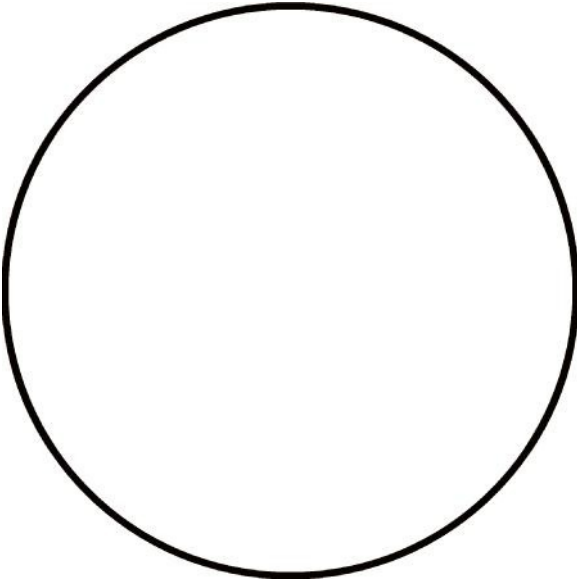
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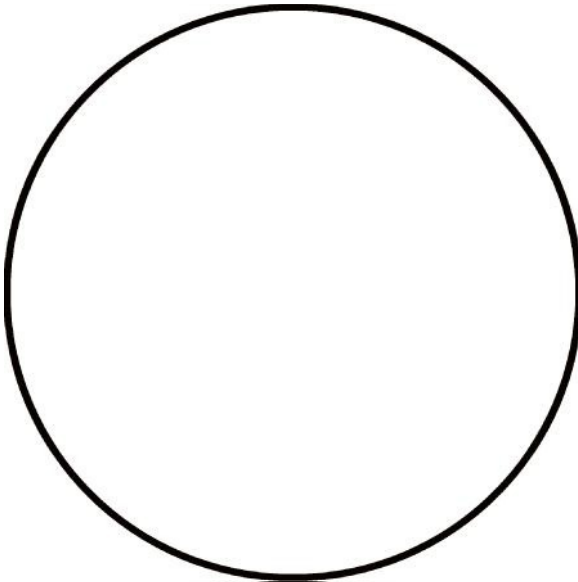
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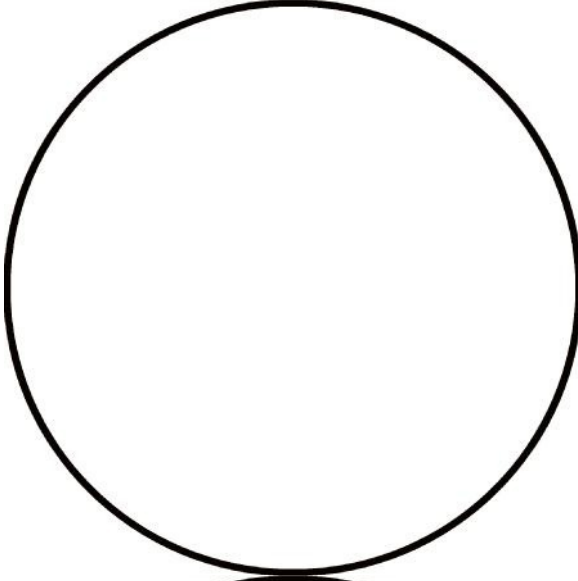
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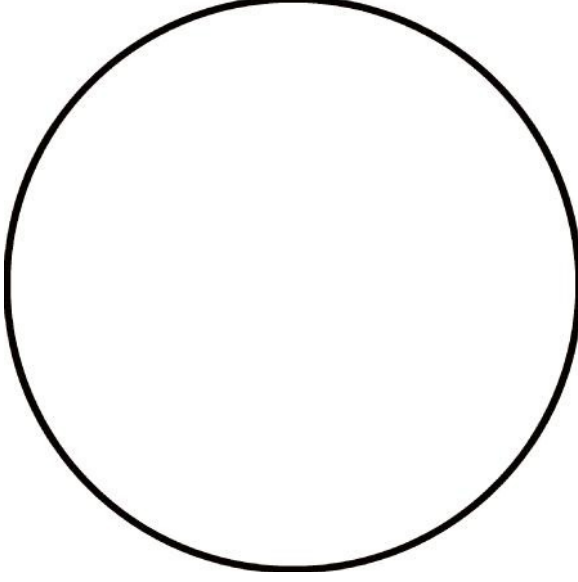
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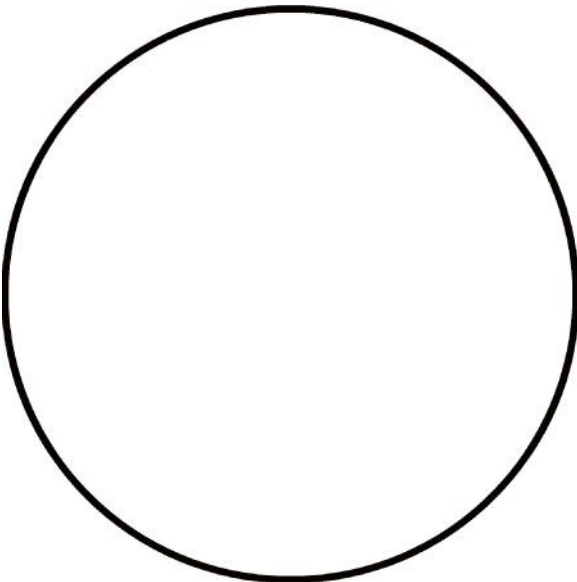
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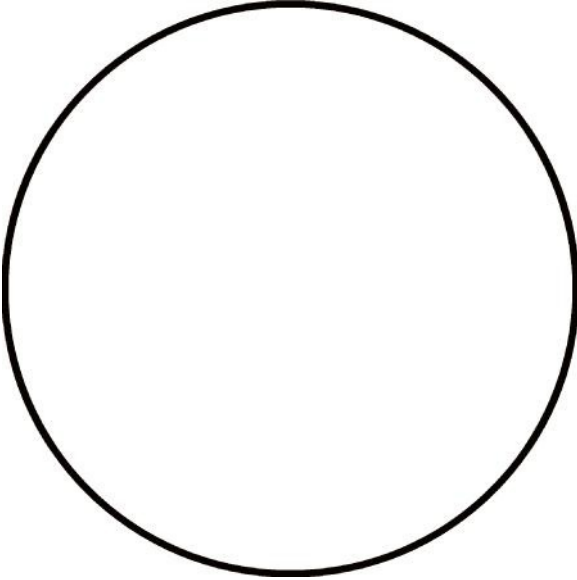
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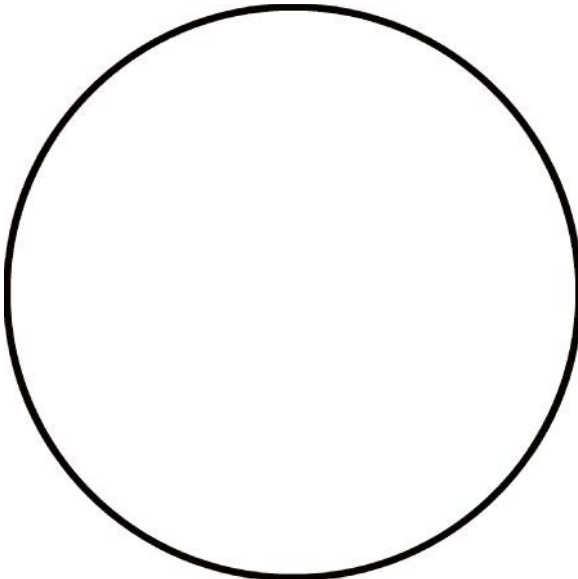
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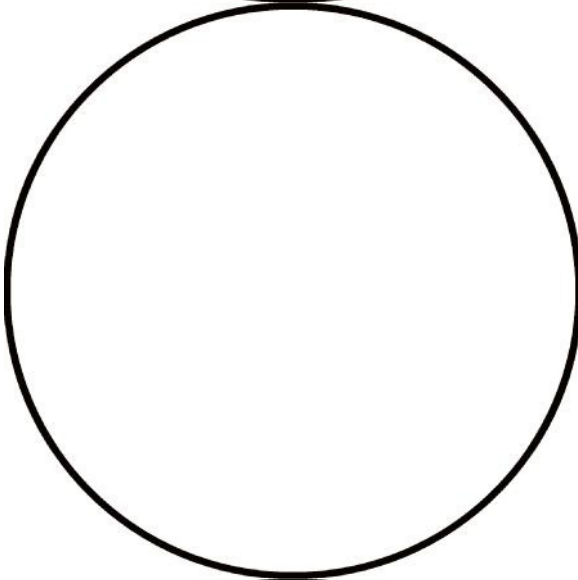
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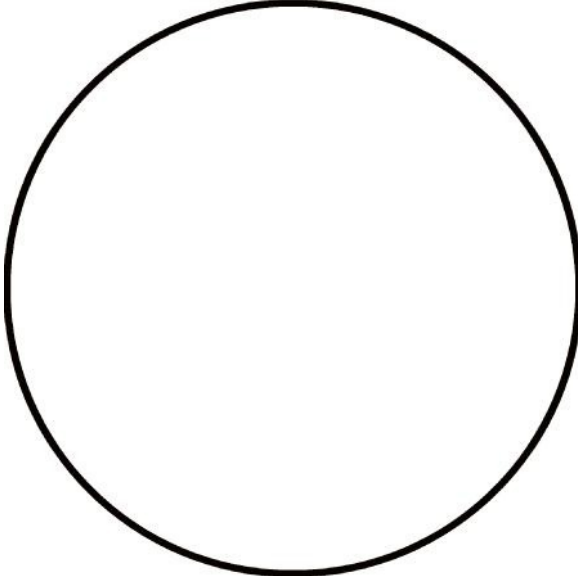
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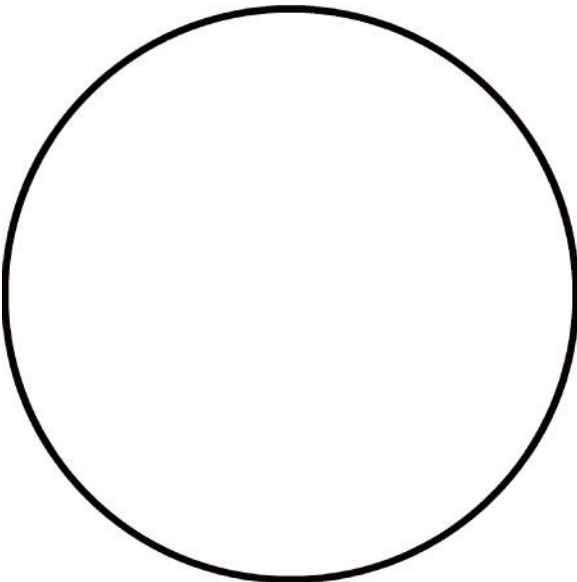
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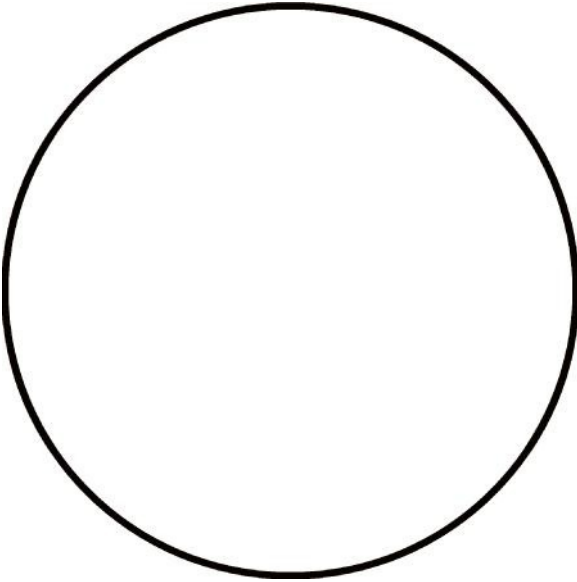
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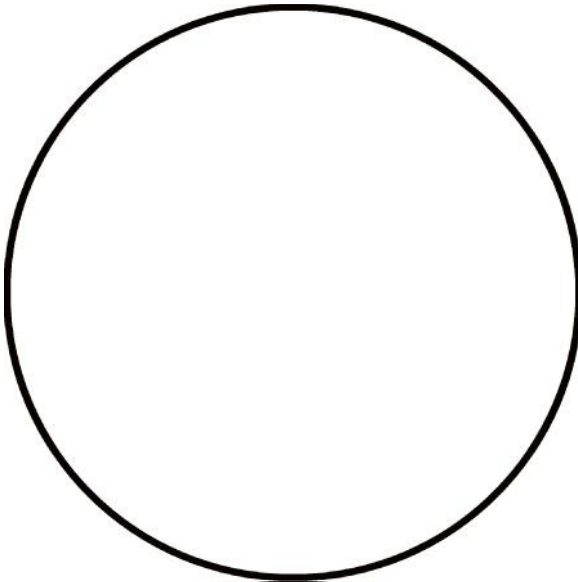
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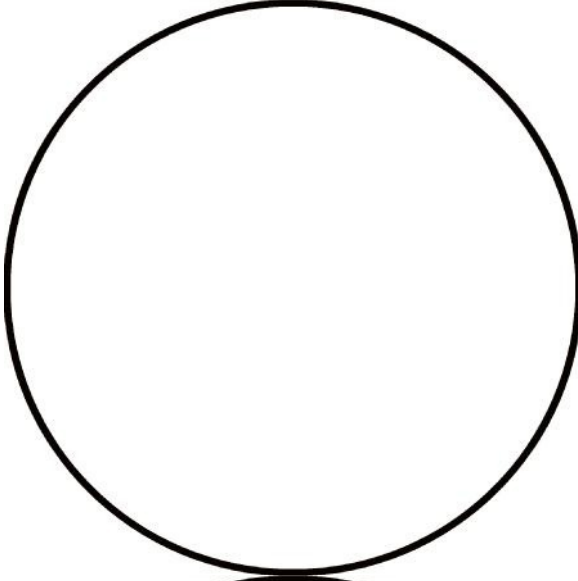
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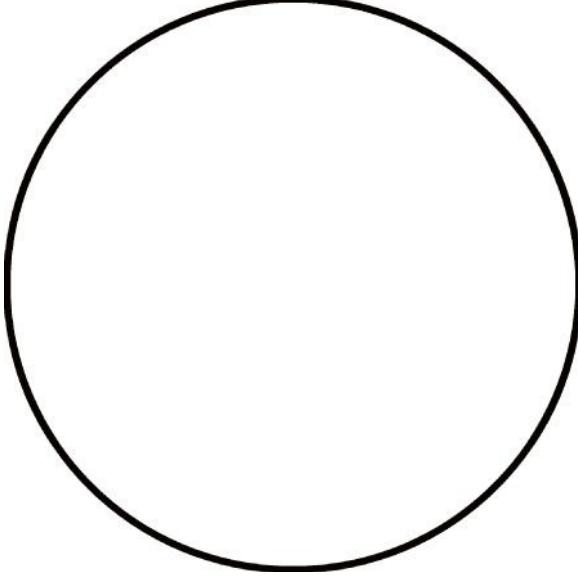
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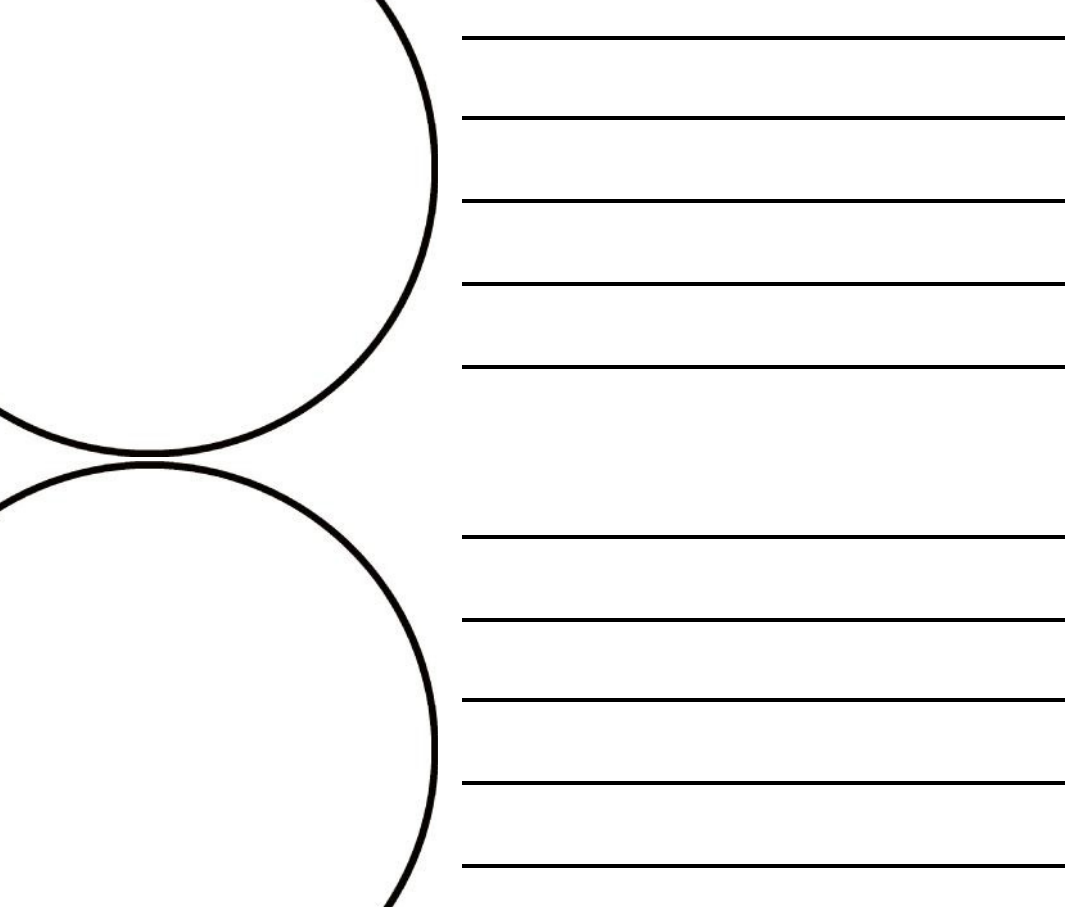


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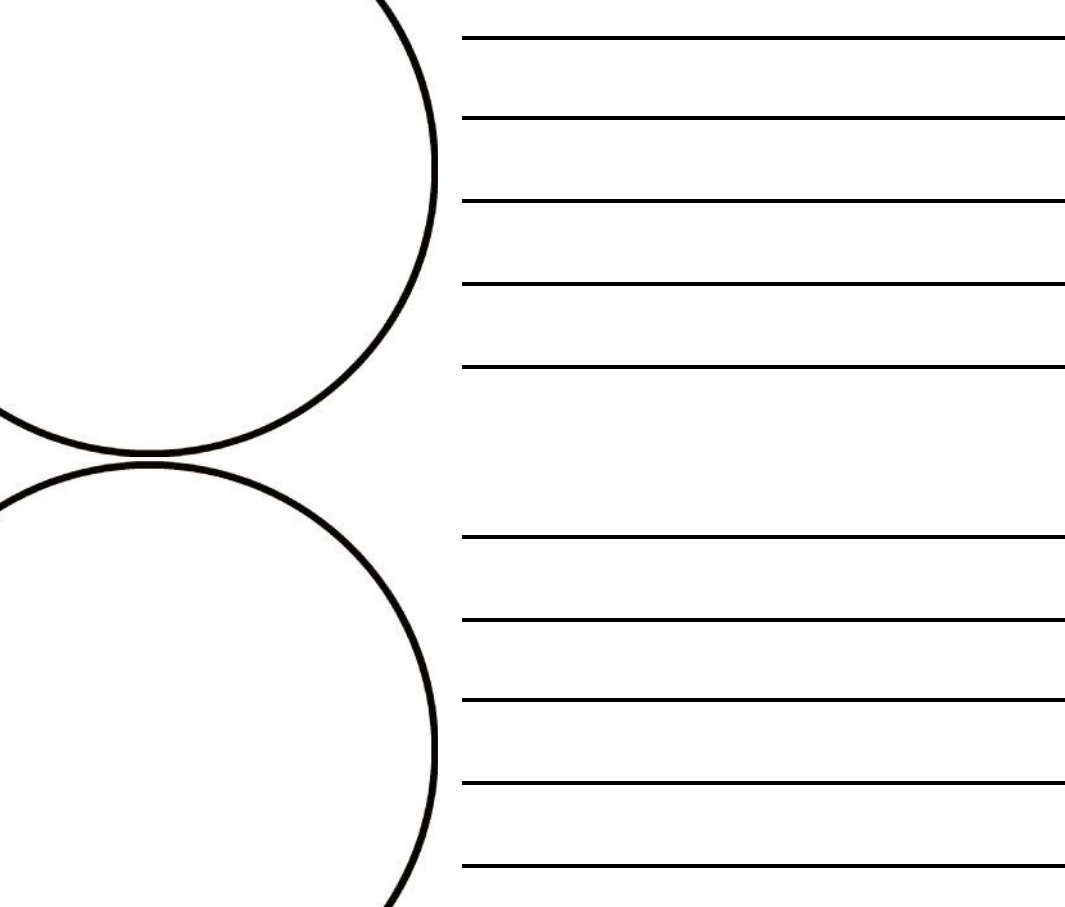
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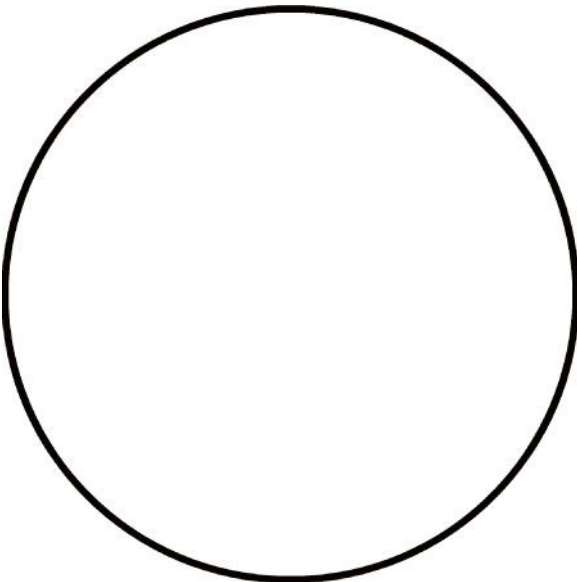
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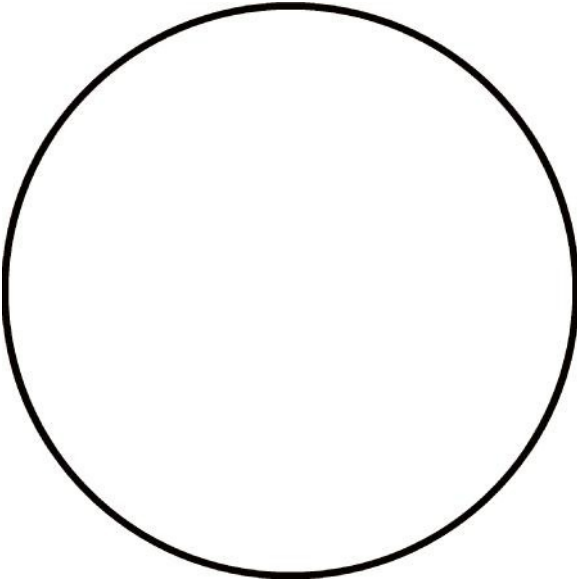
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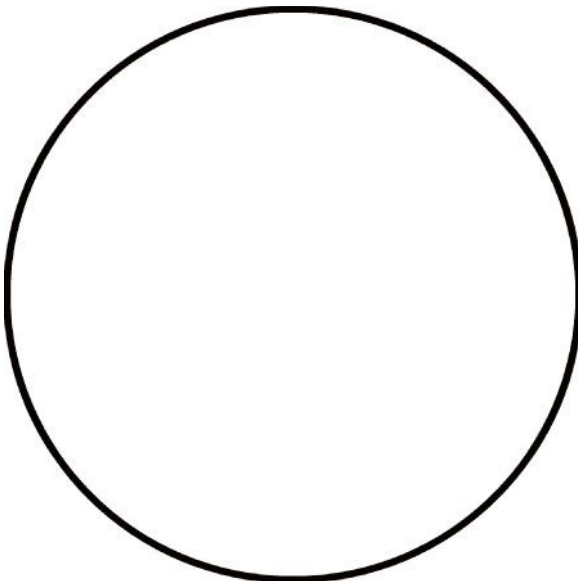
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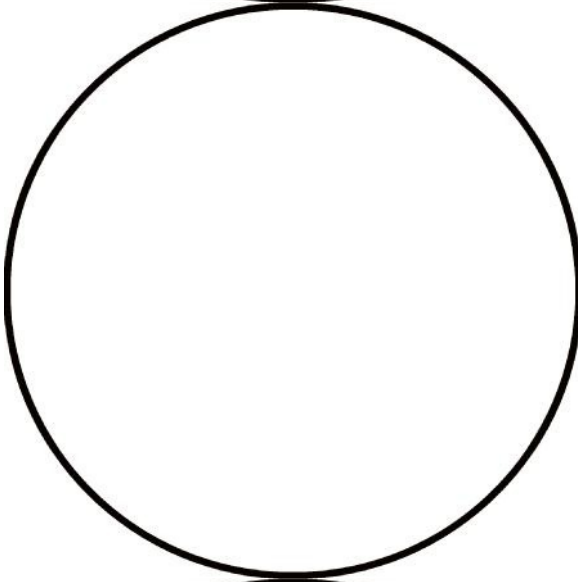
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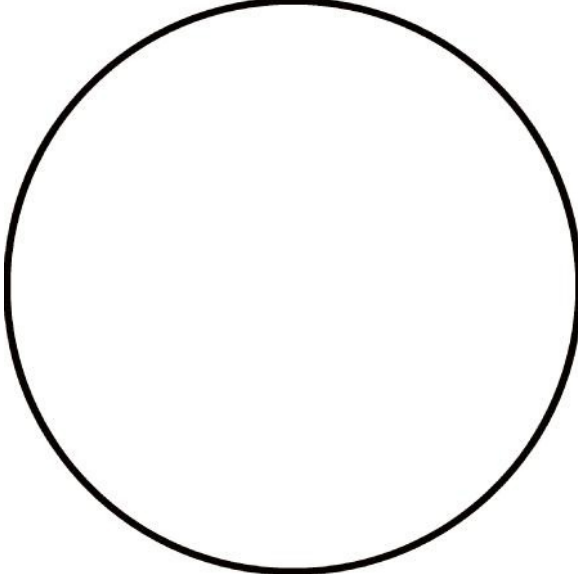
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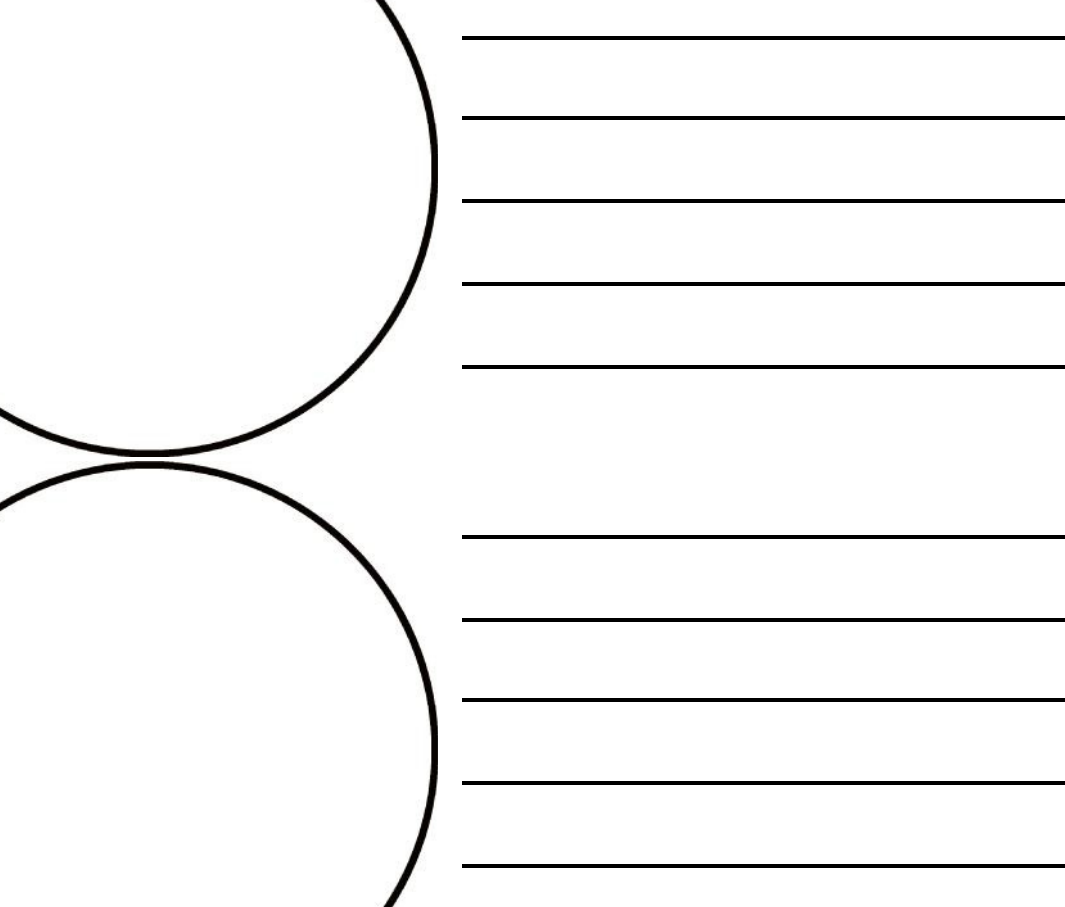


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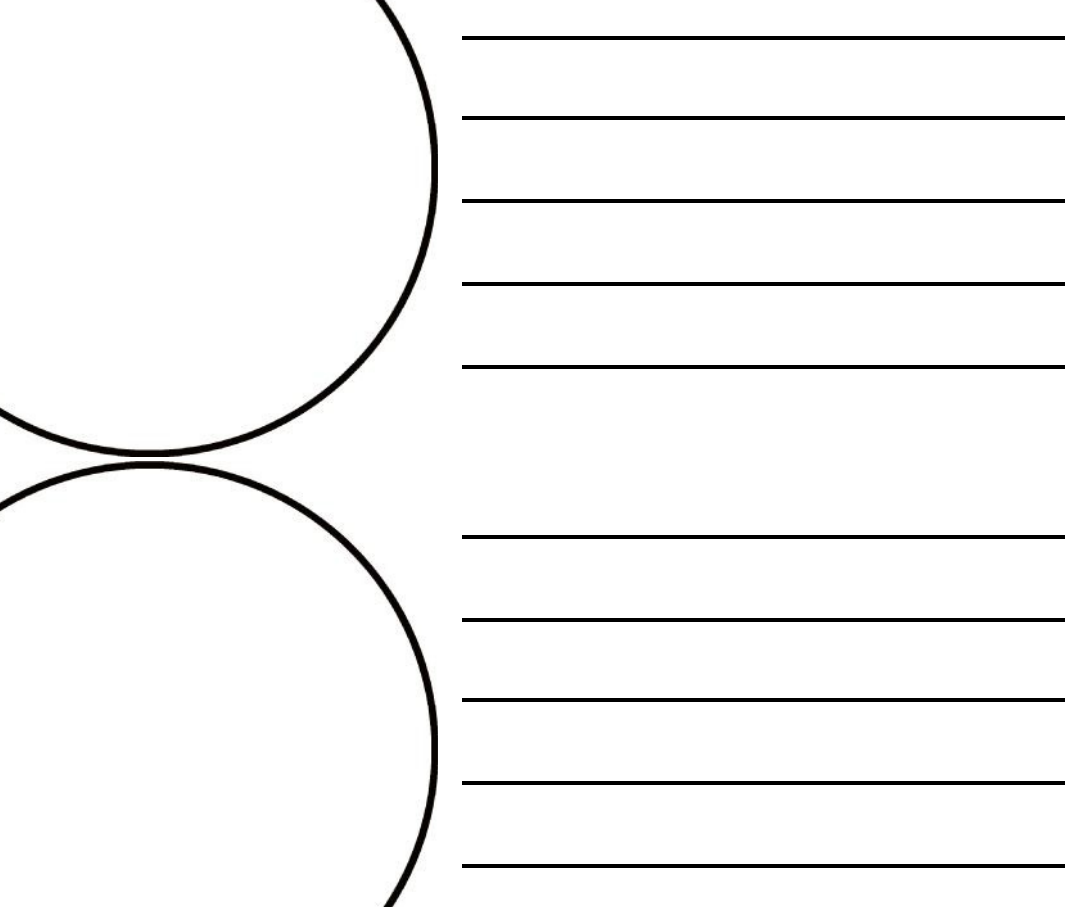


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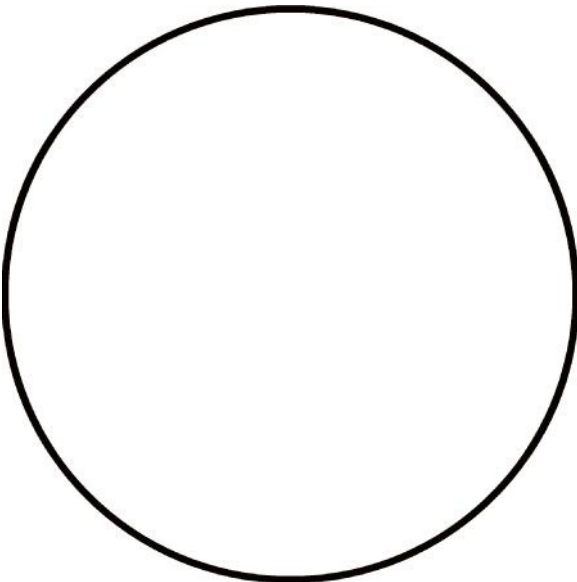
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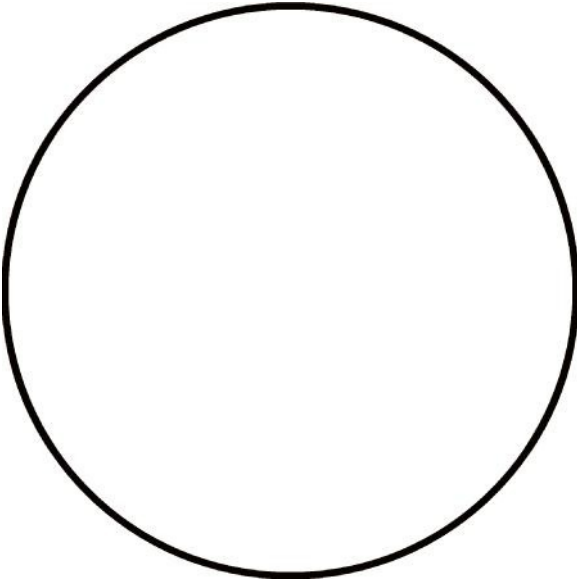
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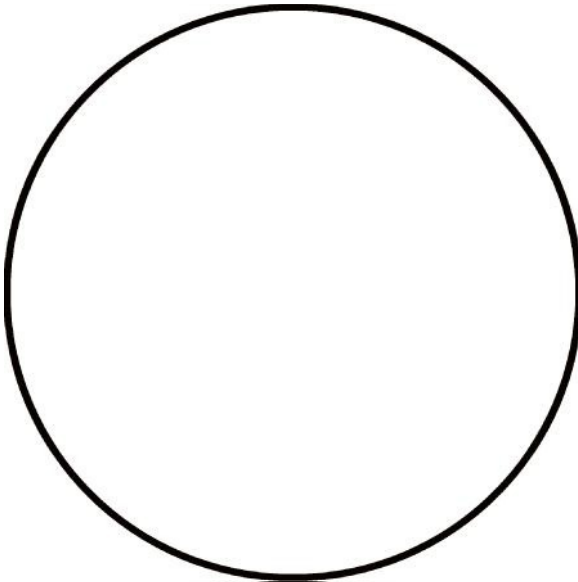
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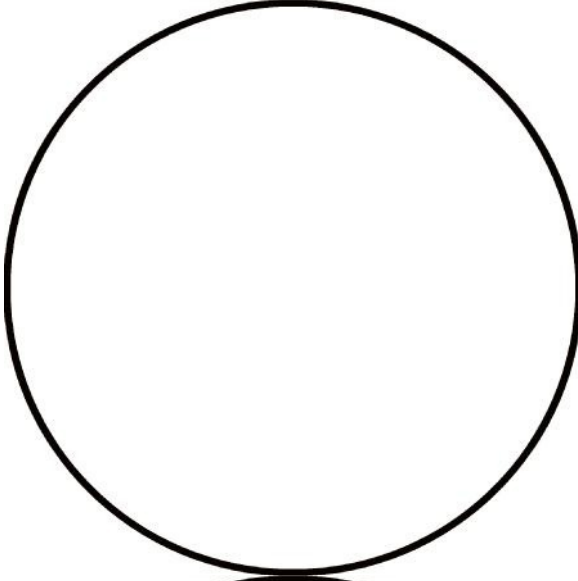
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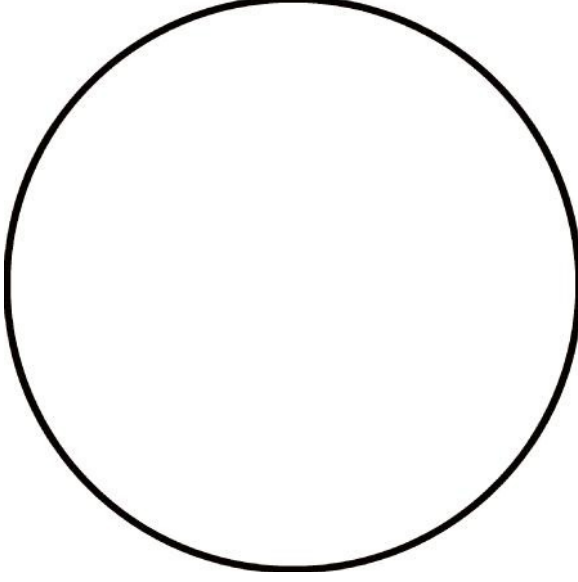
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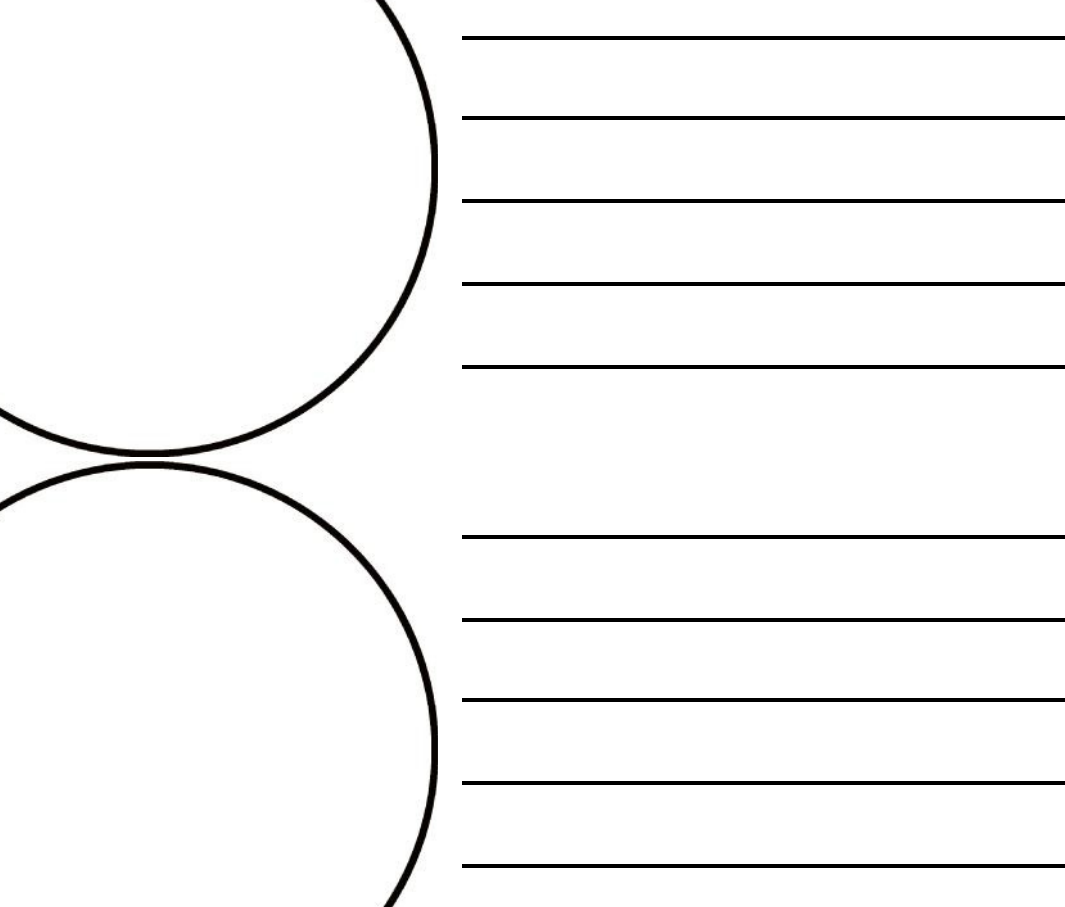


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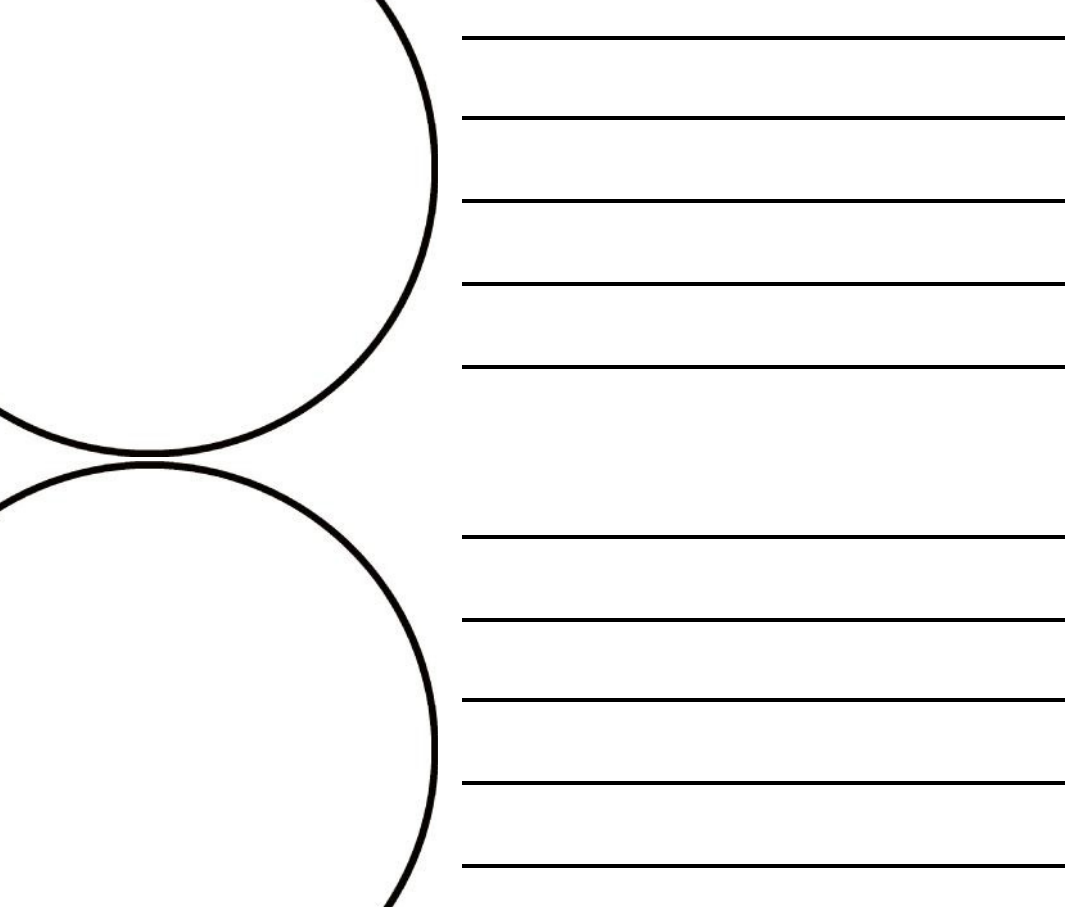
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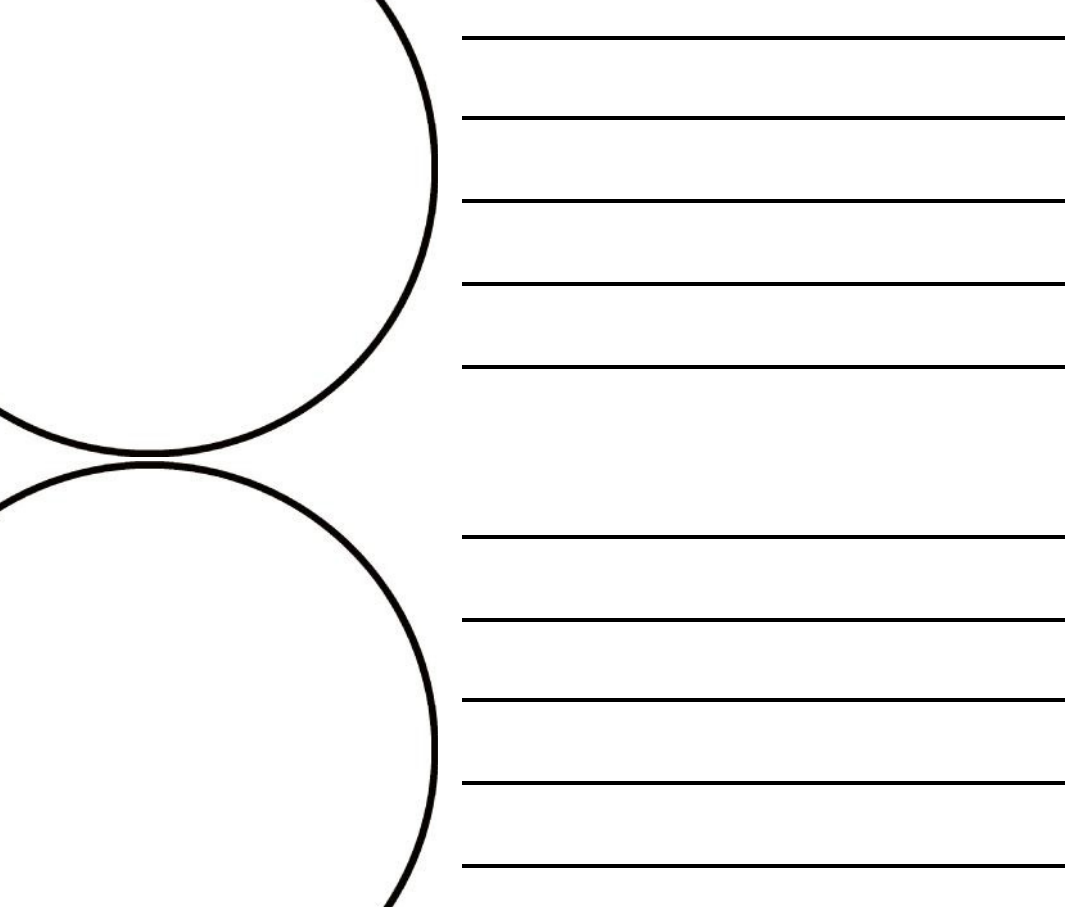
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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

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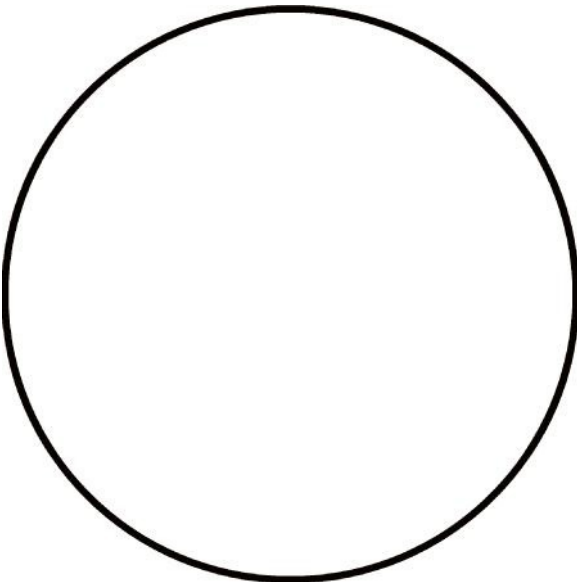
Lunar Phase: \_\_\_\_\_ Equipment: \_\_\_\_\_

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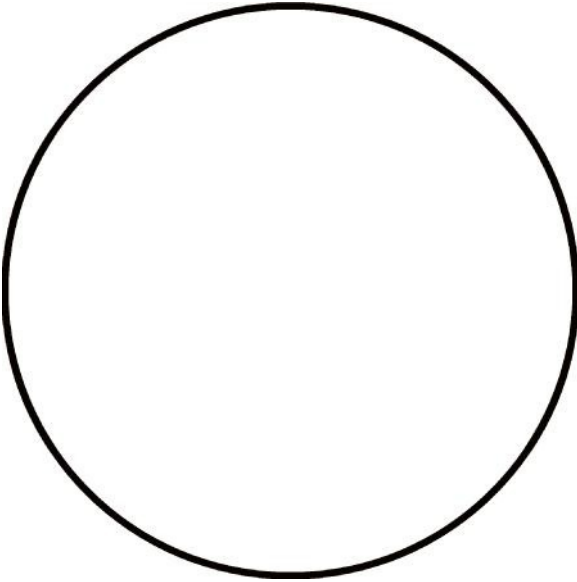
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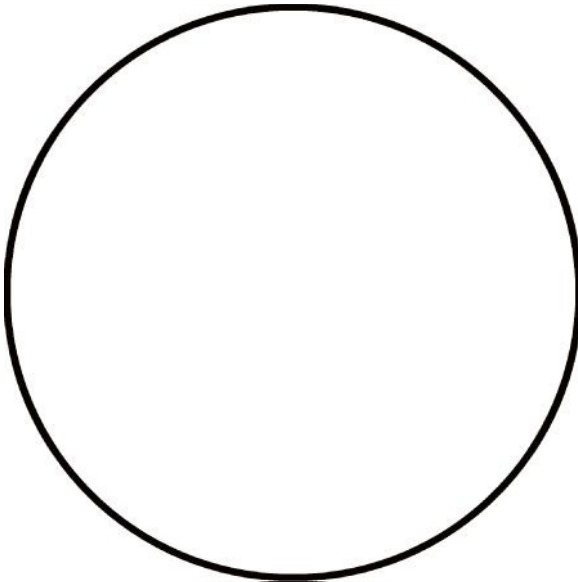
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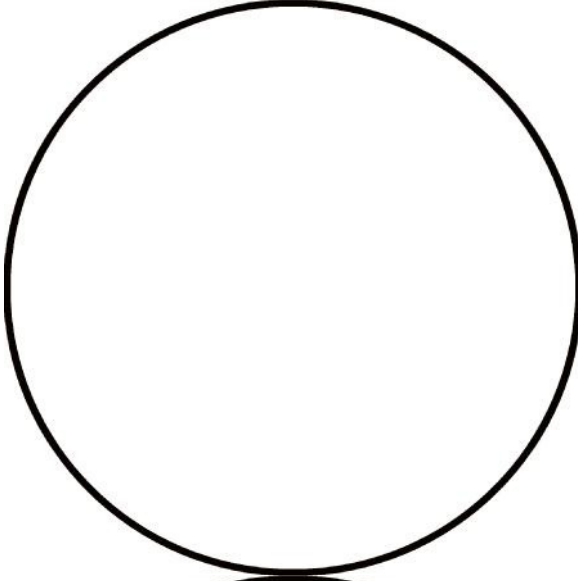
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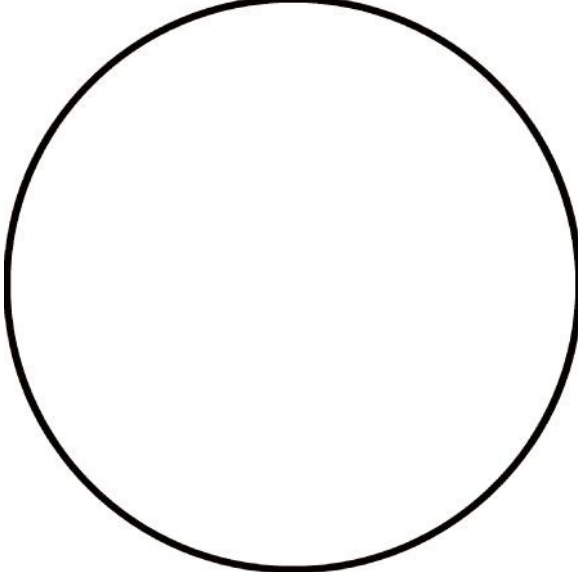
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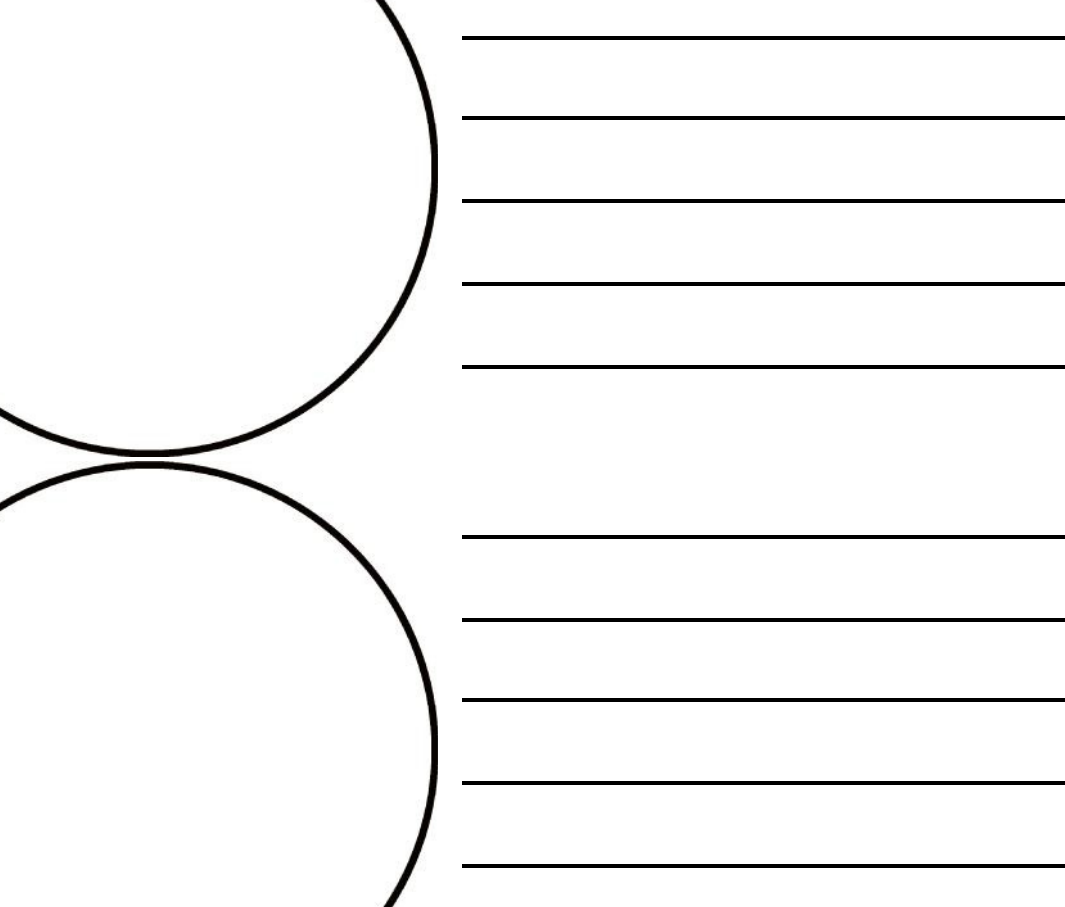


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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

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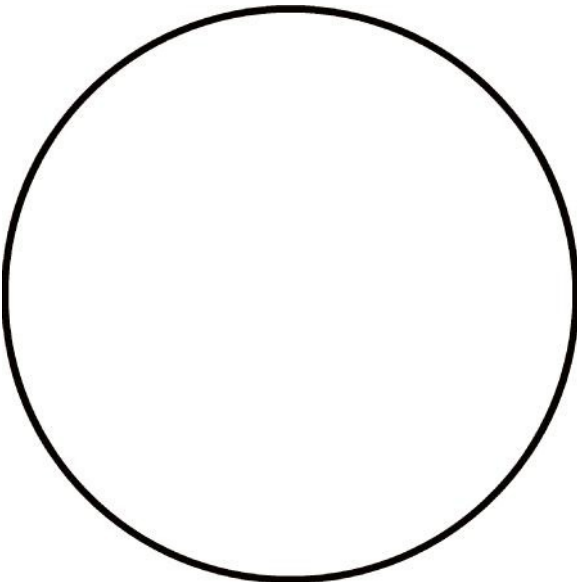
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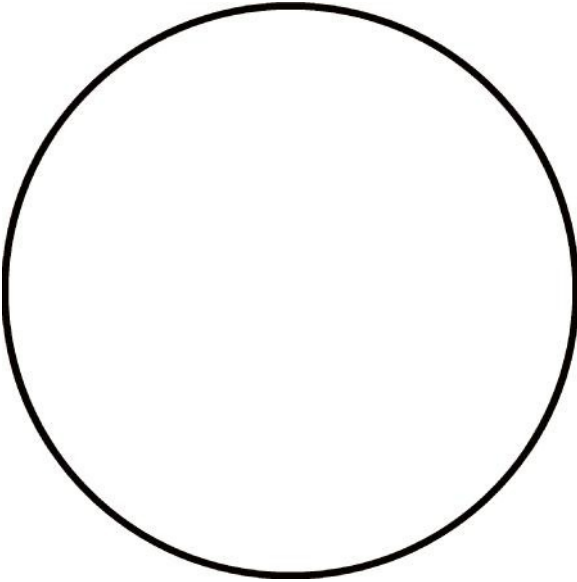
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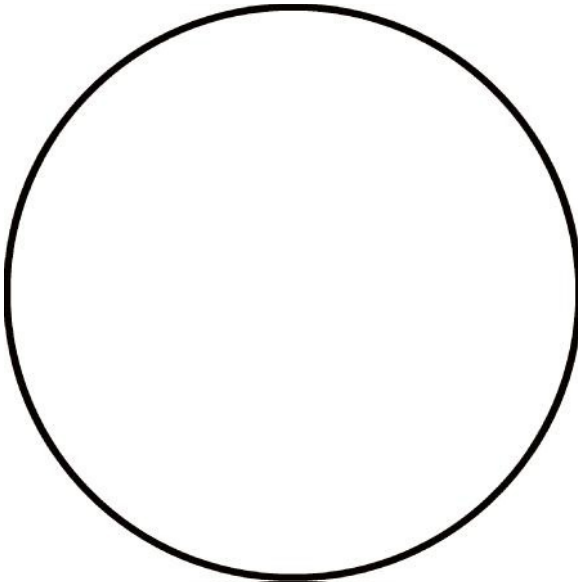
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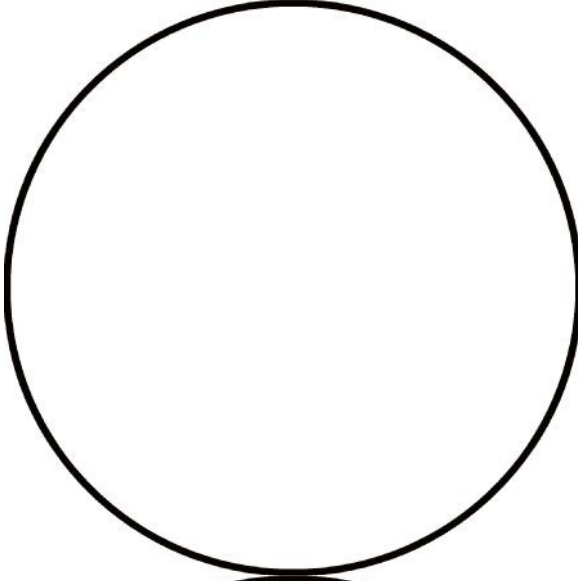
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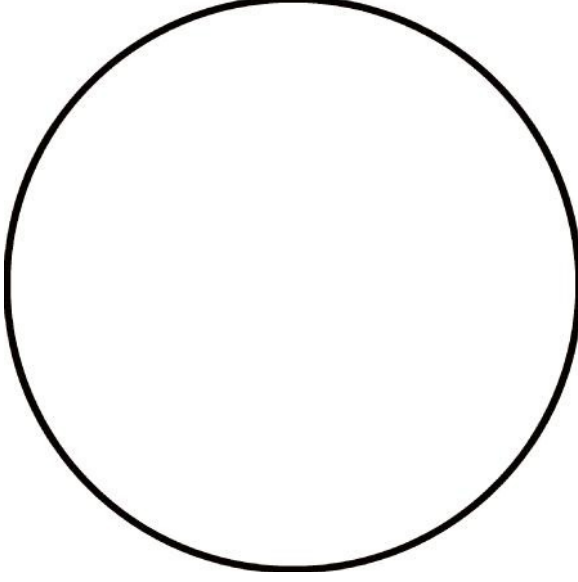
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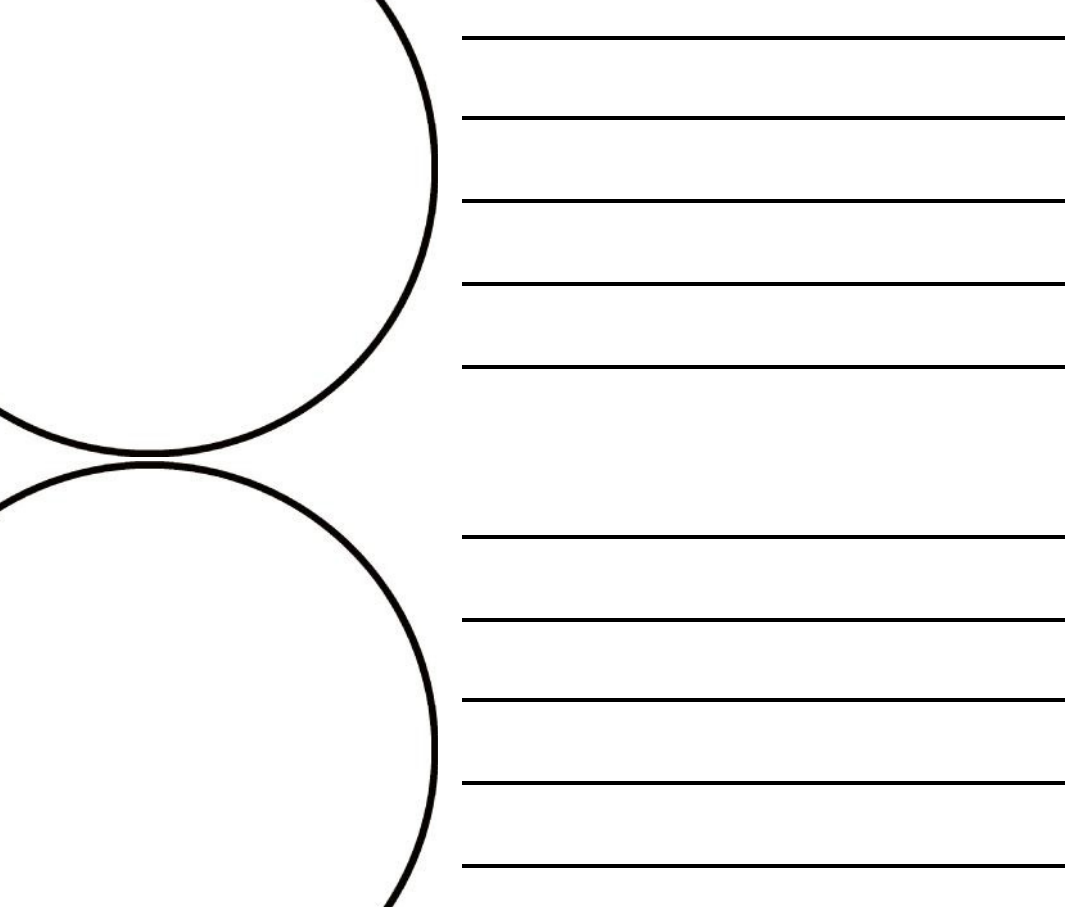
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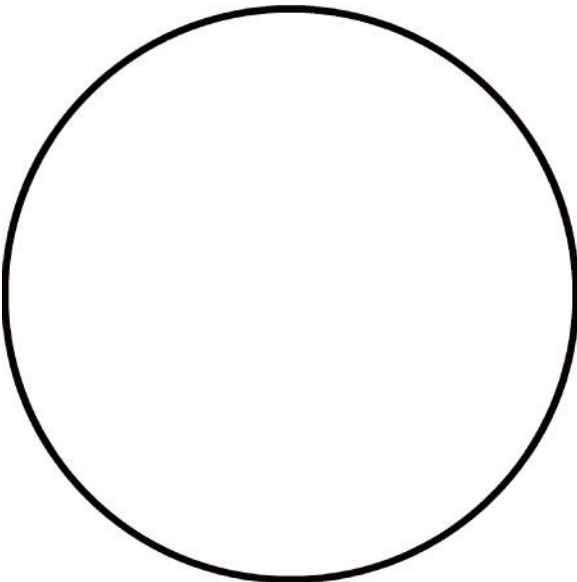
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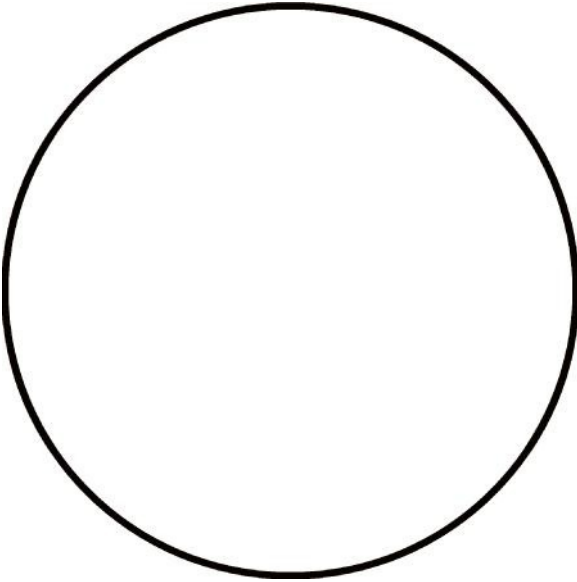
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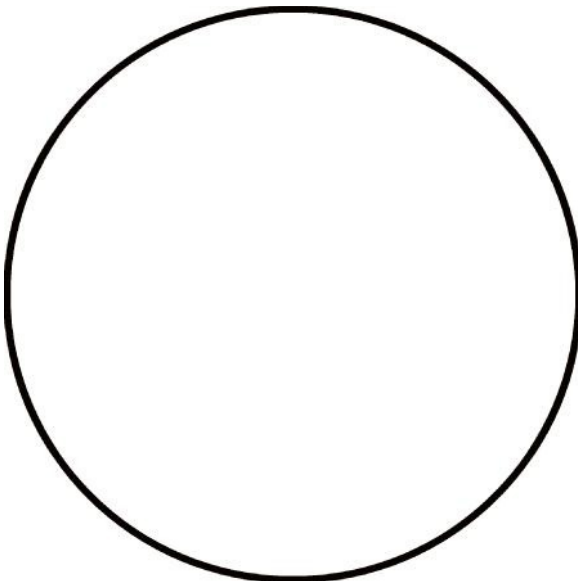
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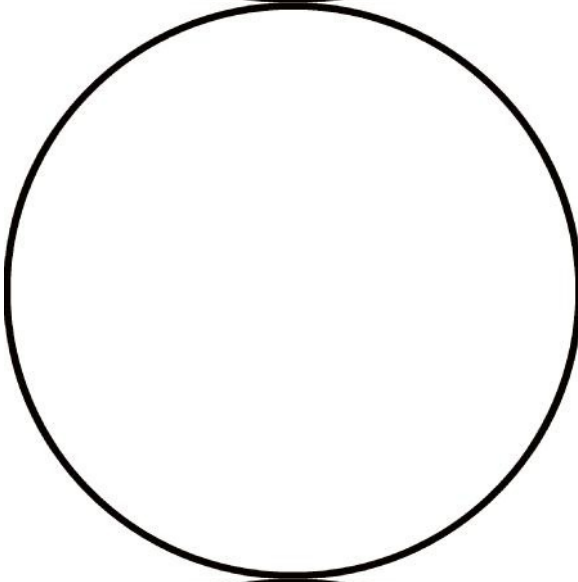
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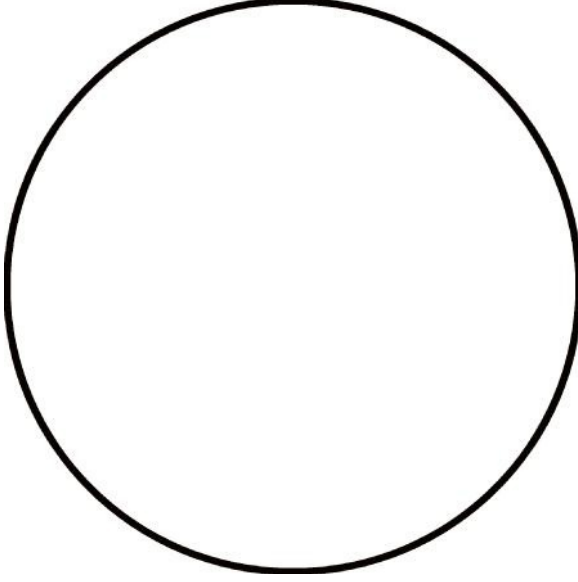
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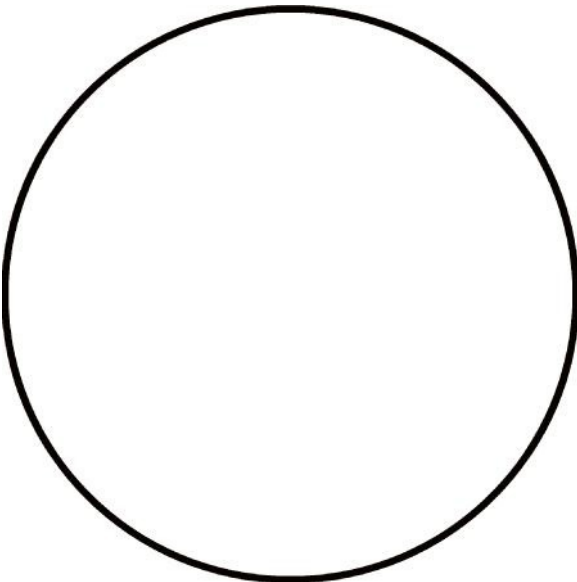
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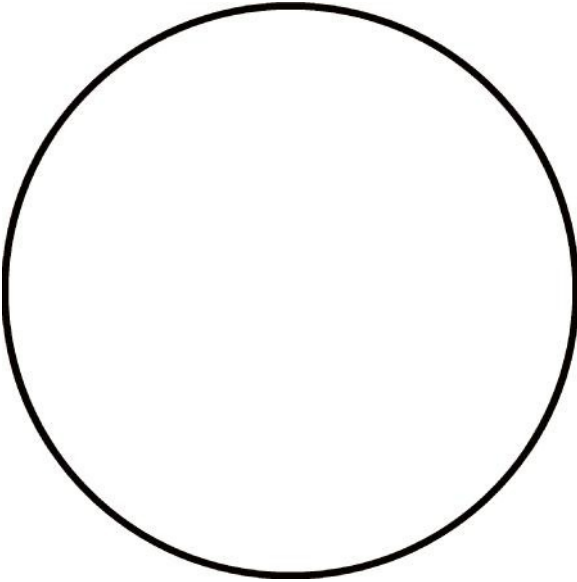
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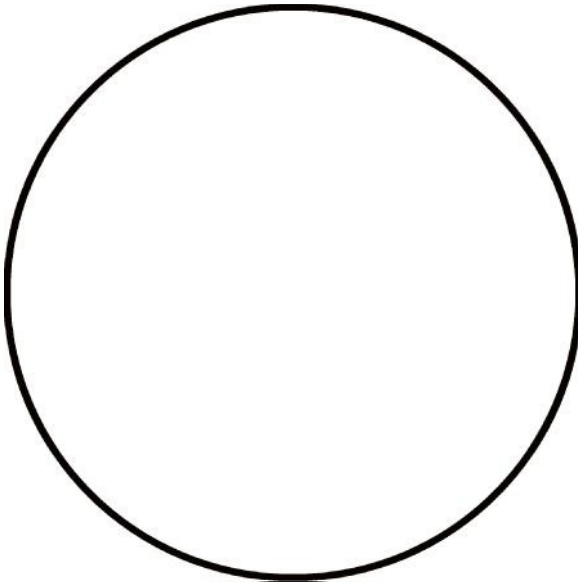
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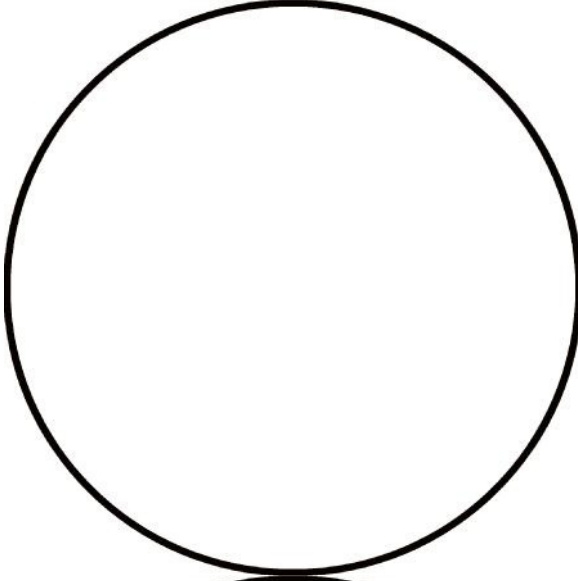
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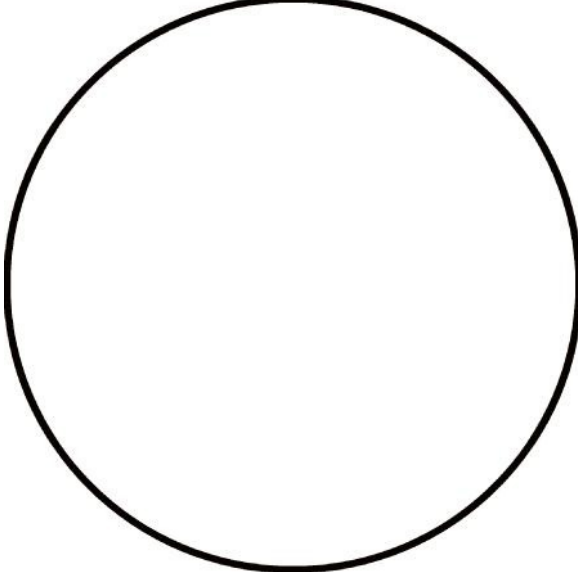
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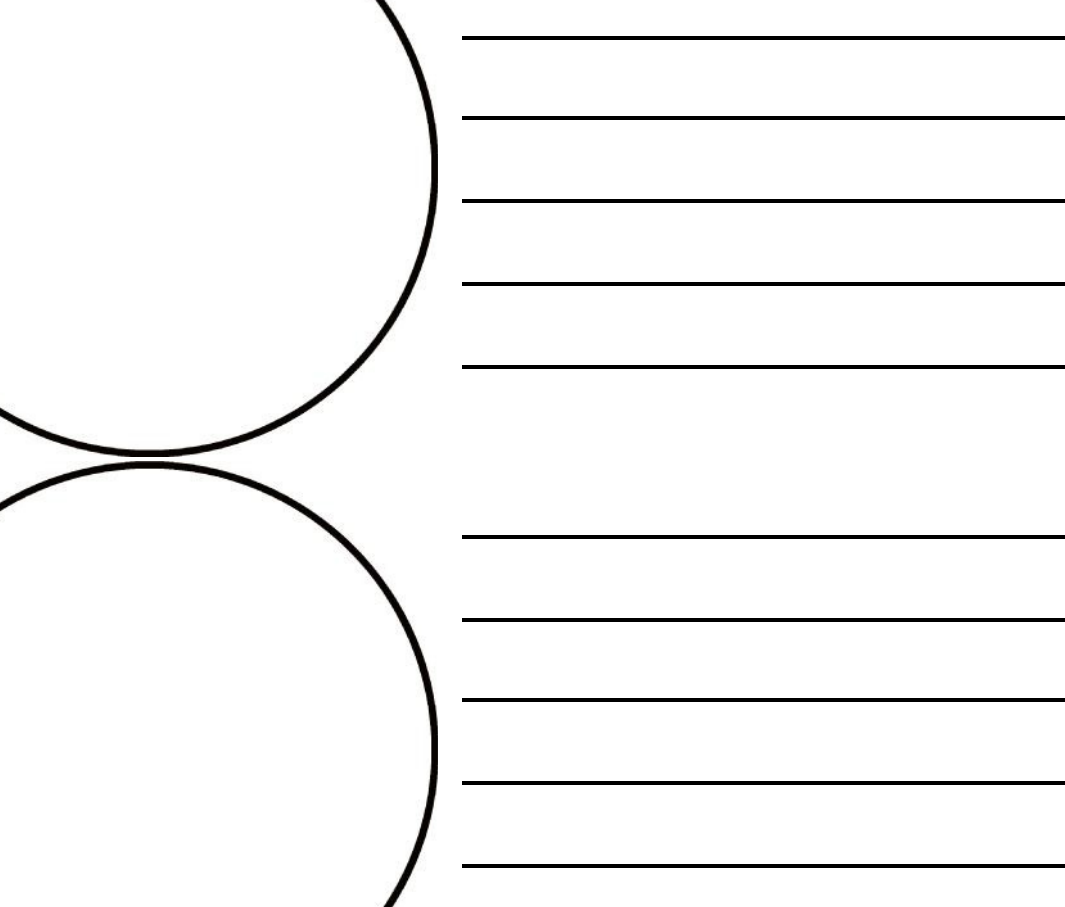
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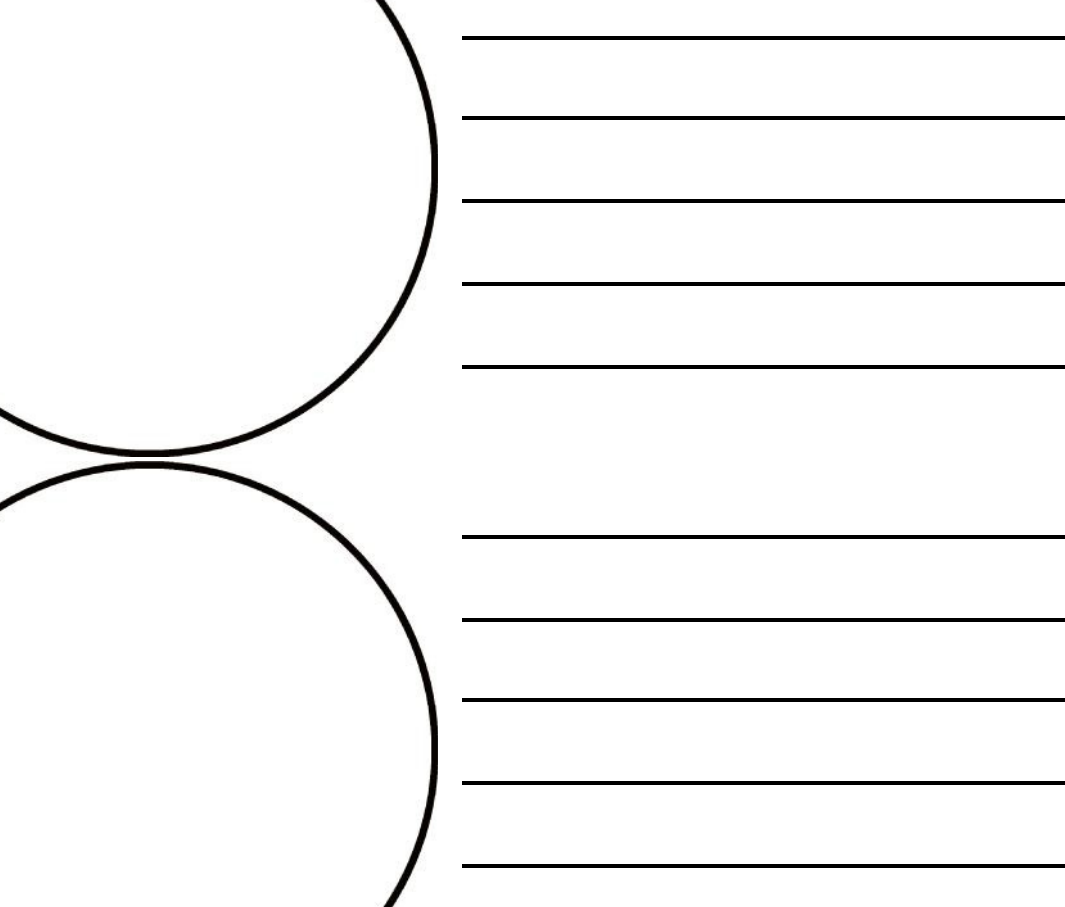
The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image shows a blank sheet of white paper designed for writing or drawing. On the left side, there are four sets of horizontal ruling lines, each set consisting of two parallel lines. To the right of the ruled area, there are three large, identical circles arranged vertically, one above the other. The circles are outlined in black and are currently empty.

Date:	_____	Transparency:	_____
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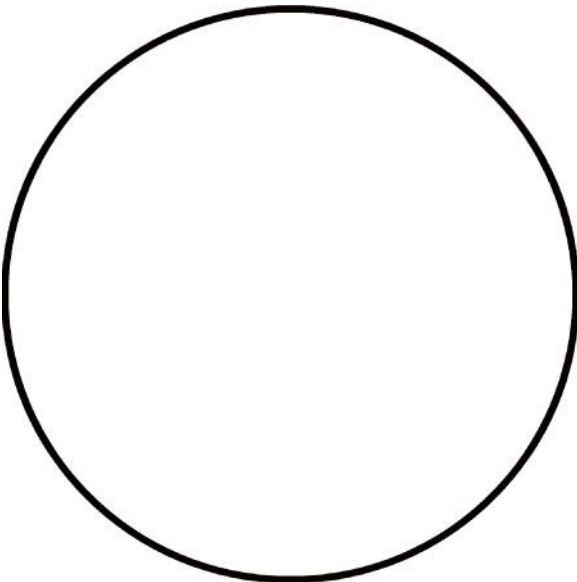
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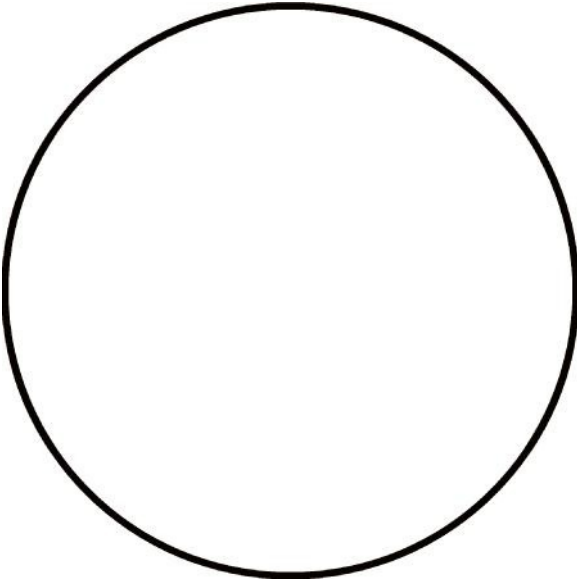
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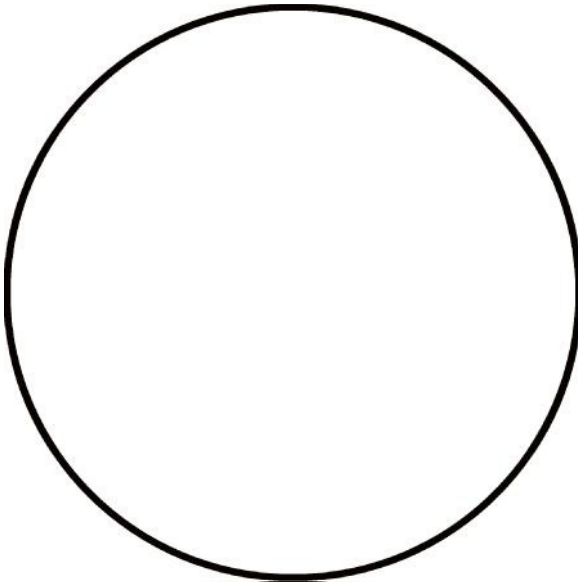
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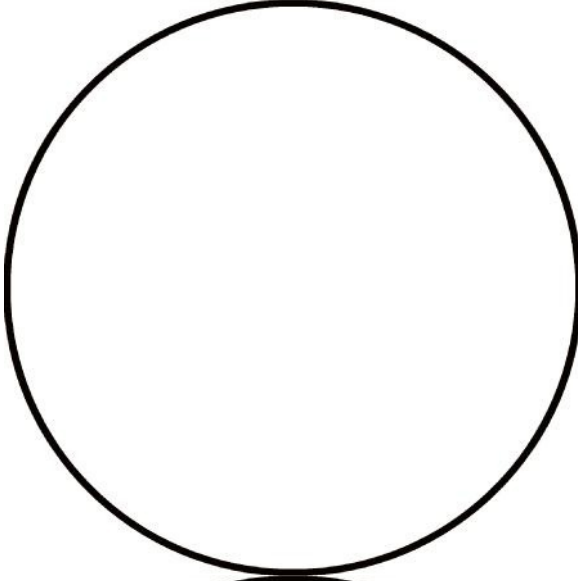
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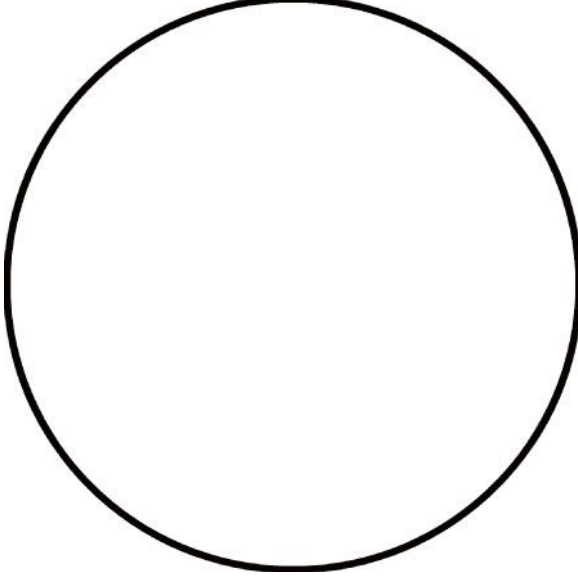
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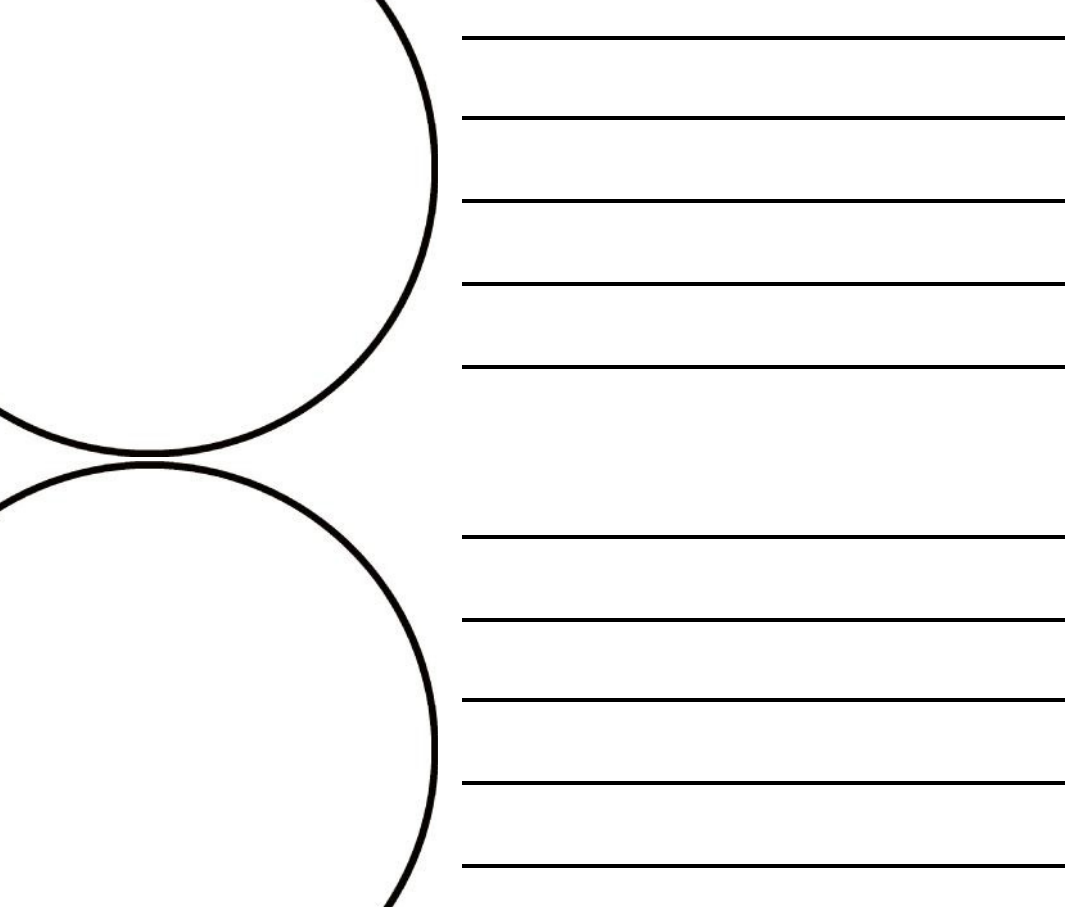


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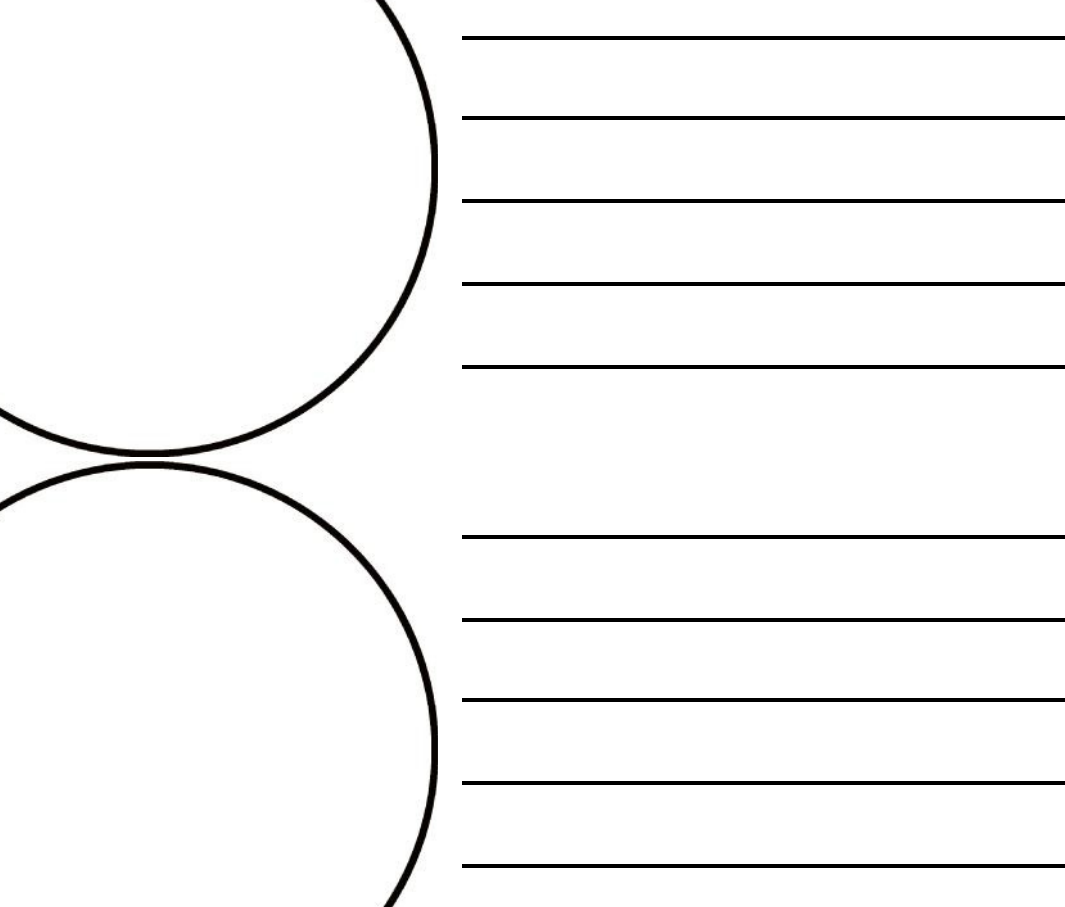
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Date:	_____	Transparency:	_____
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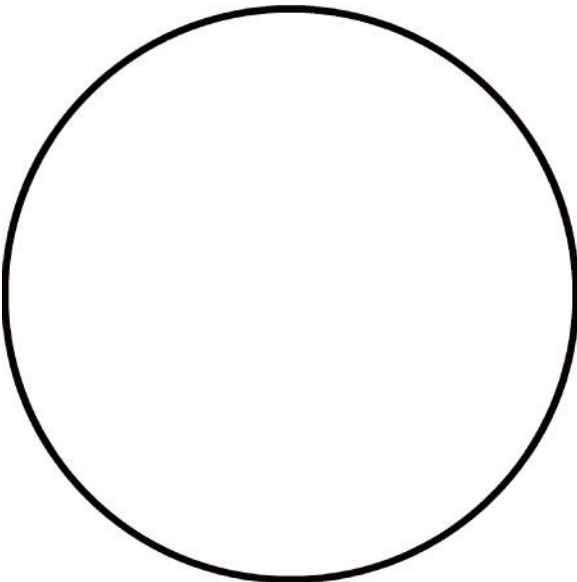
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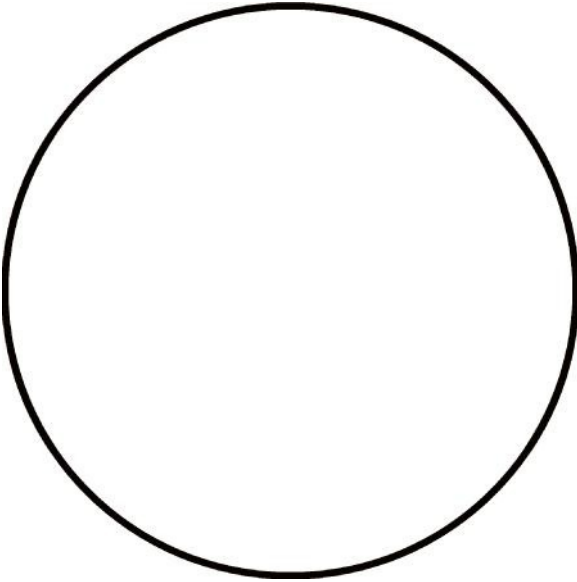
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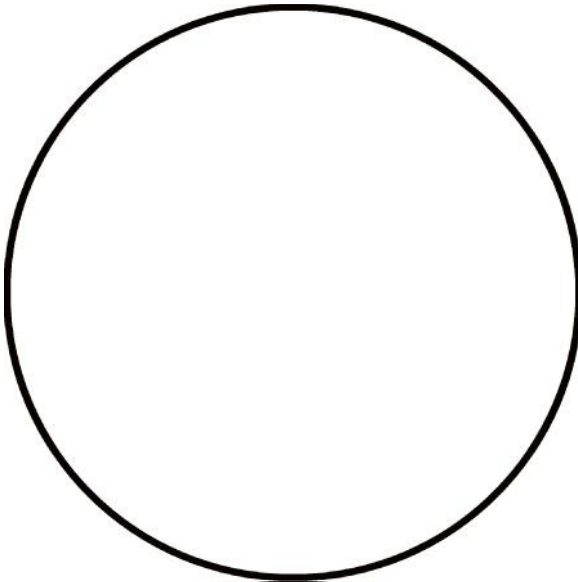
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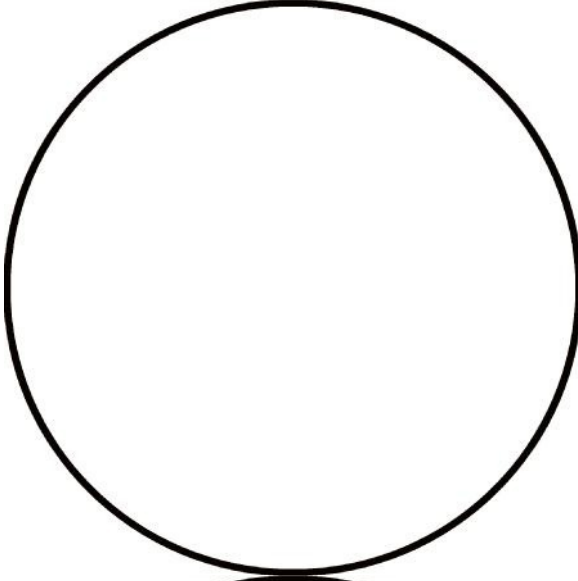
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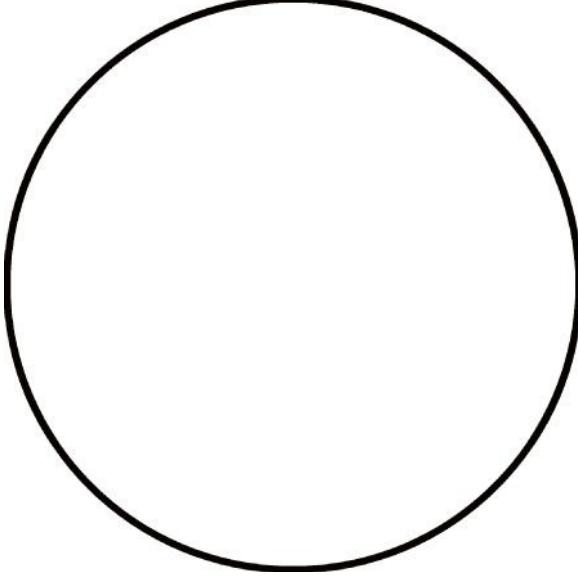
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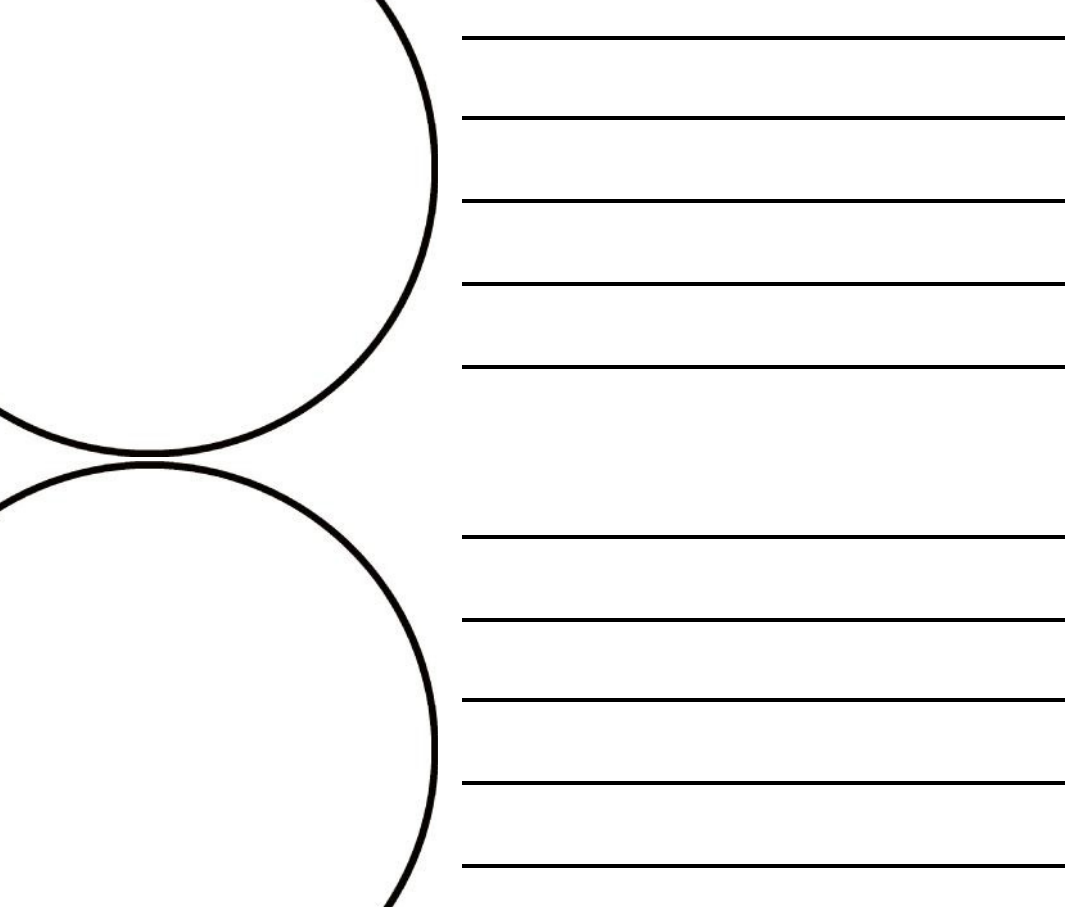


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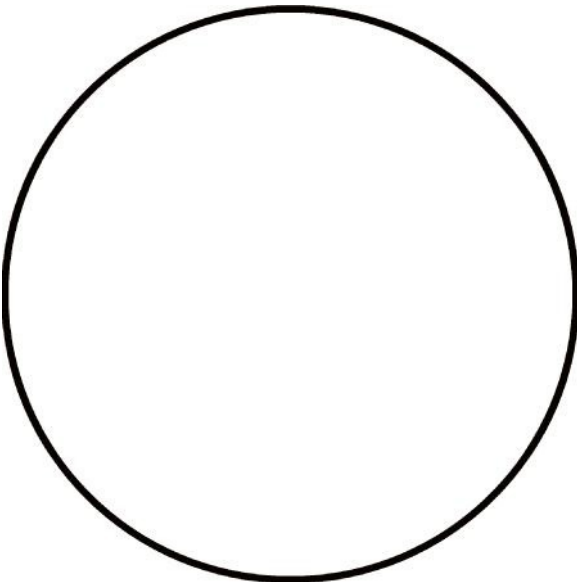
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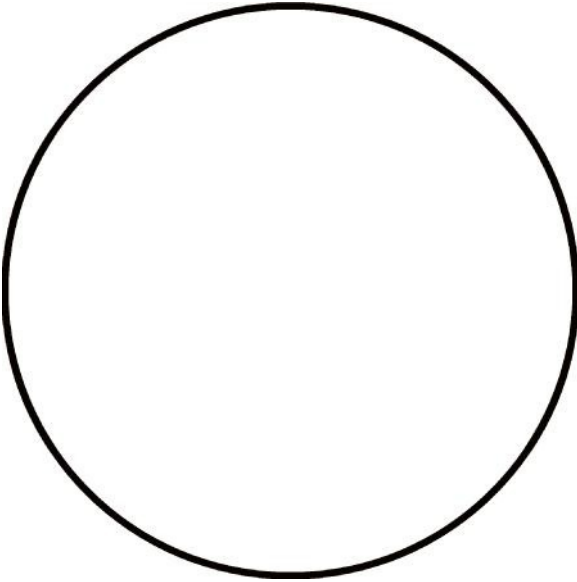
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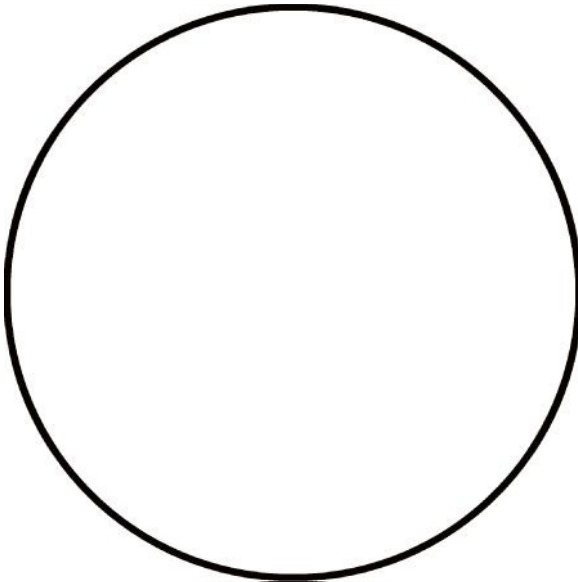
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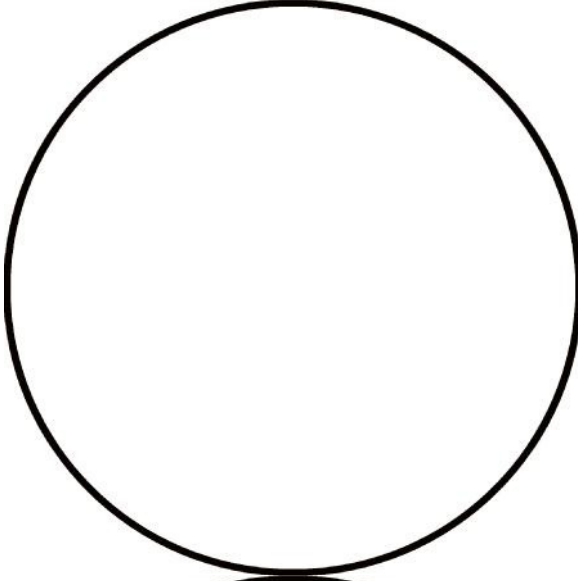
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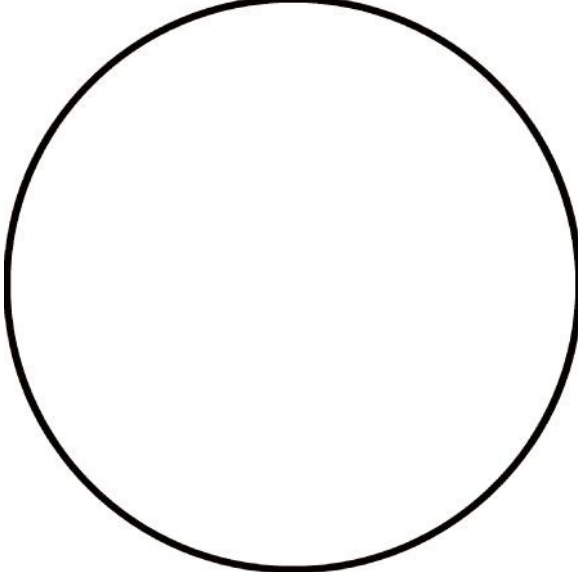
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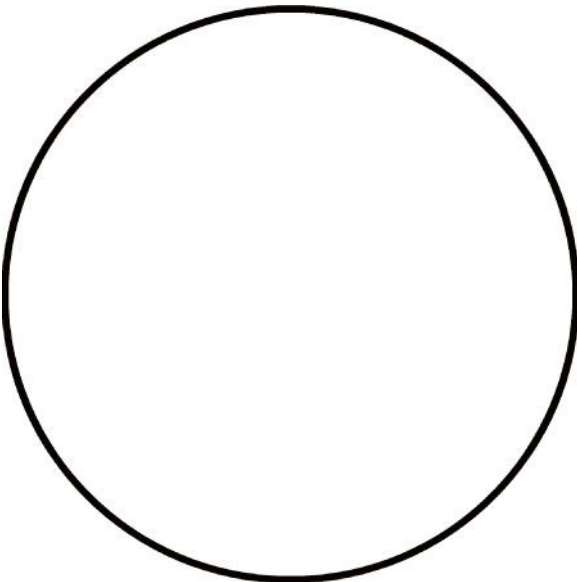
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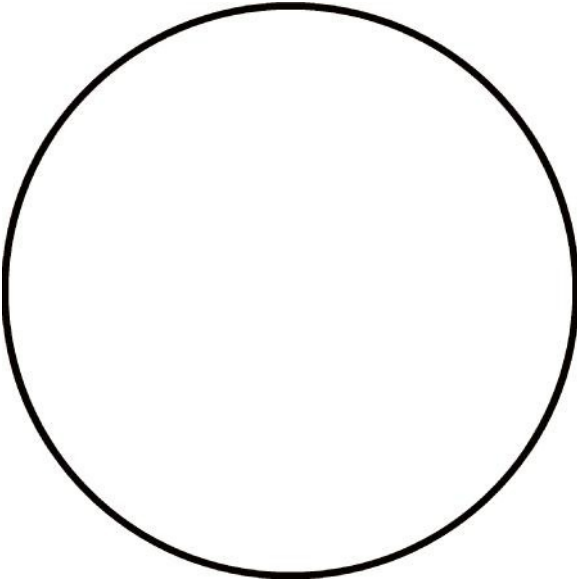
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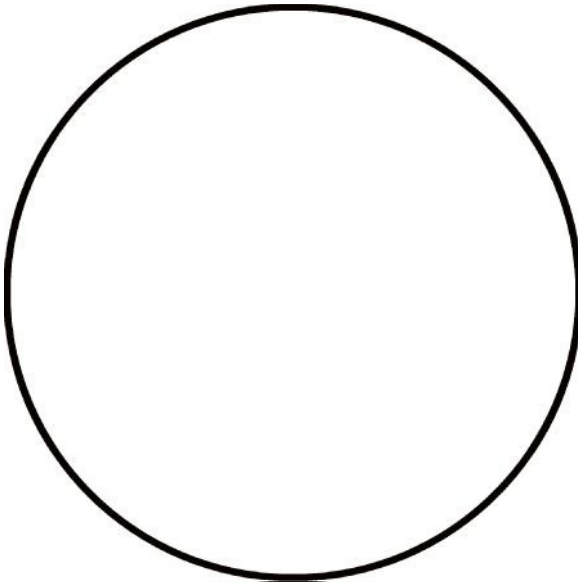
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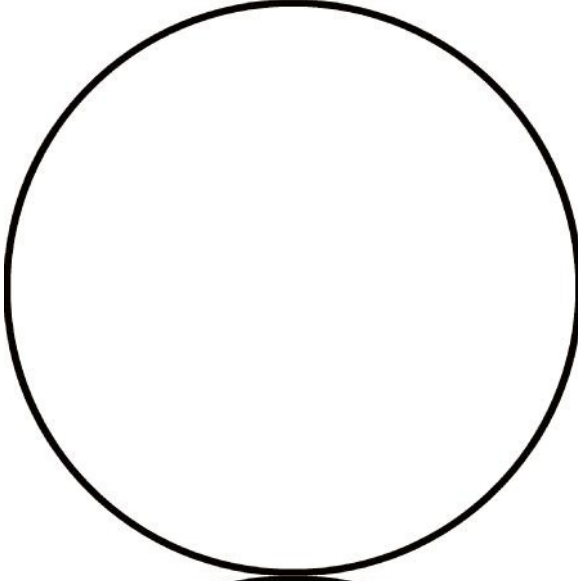
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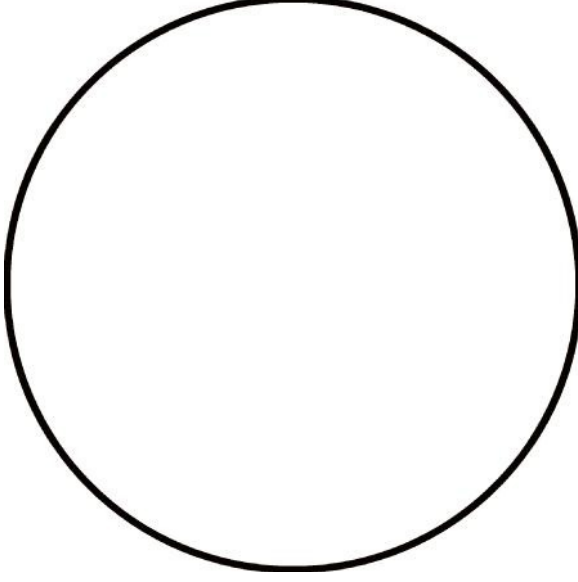
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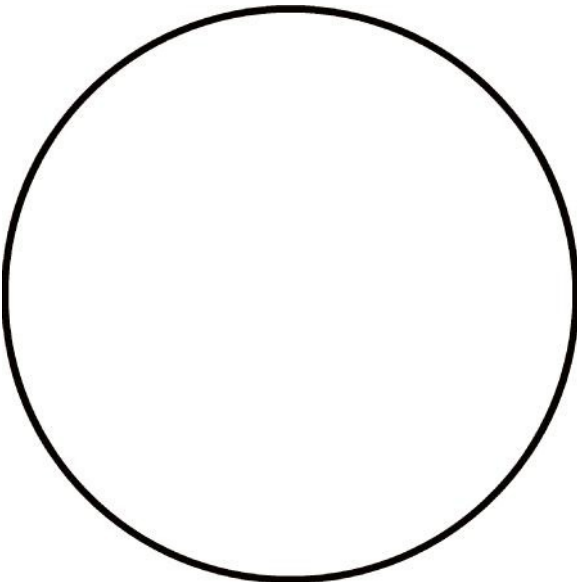
Lunar Phase: \_\_\_\_\_ Equipment: \_\_\_\_\_

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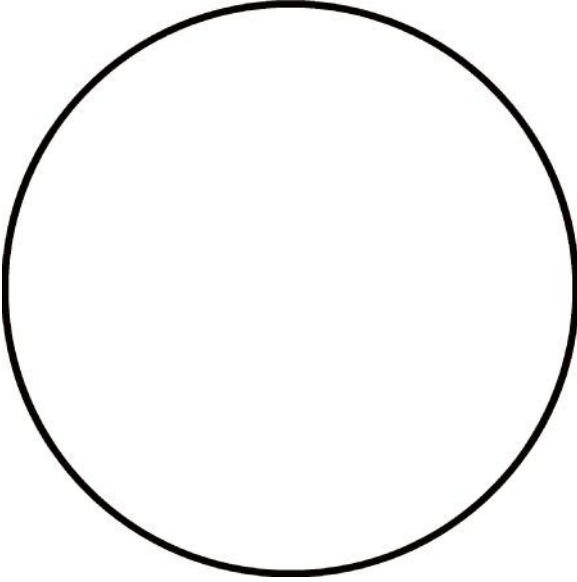
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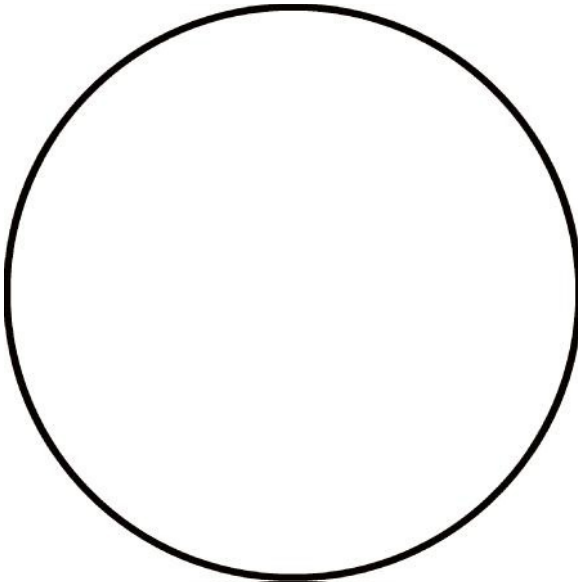
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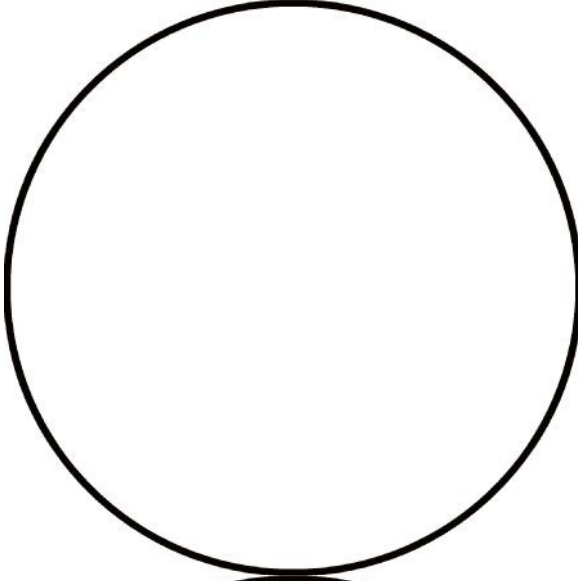
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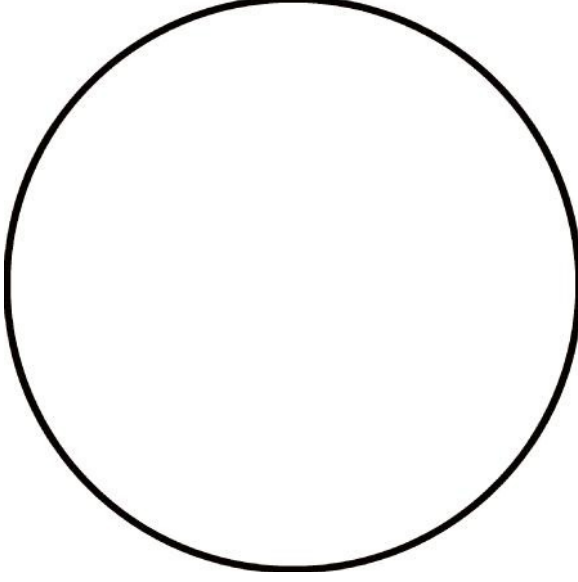
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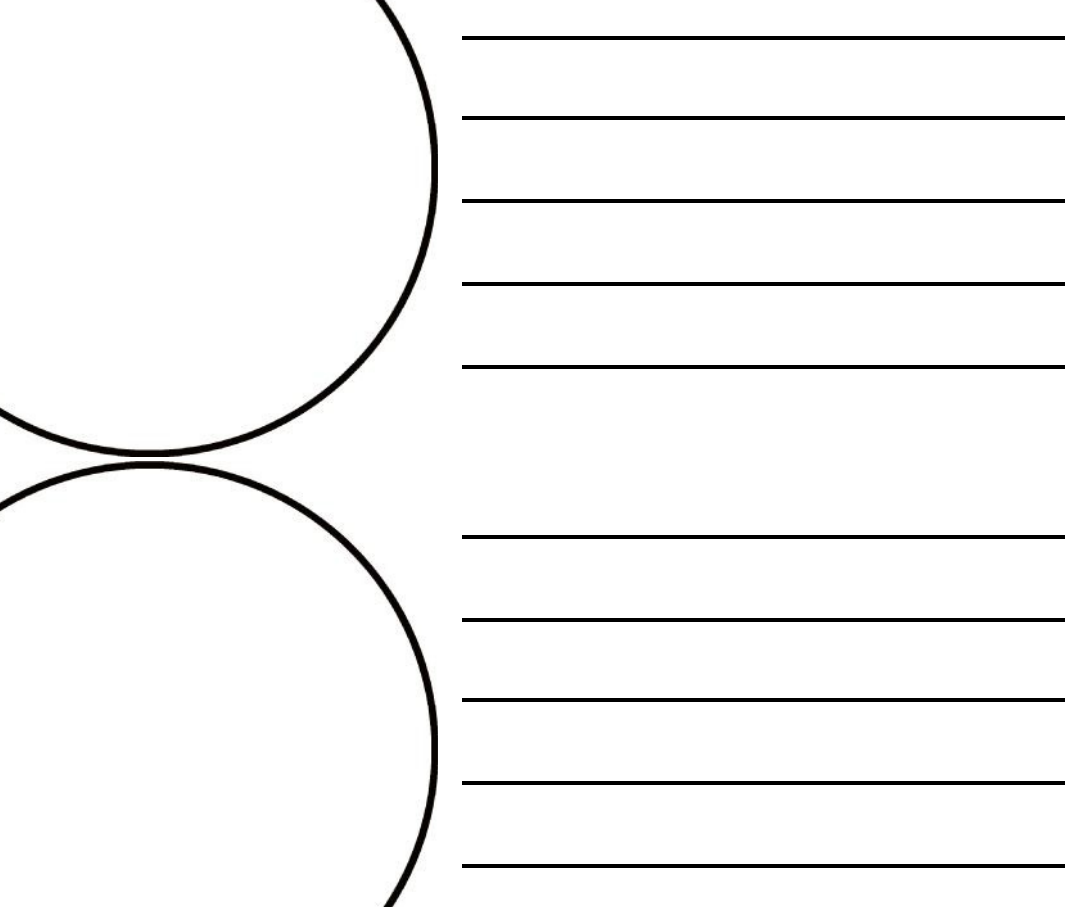


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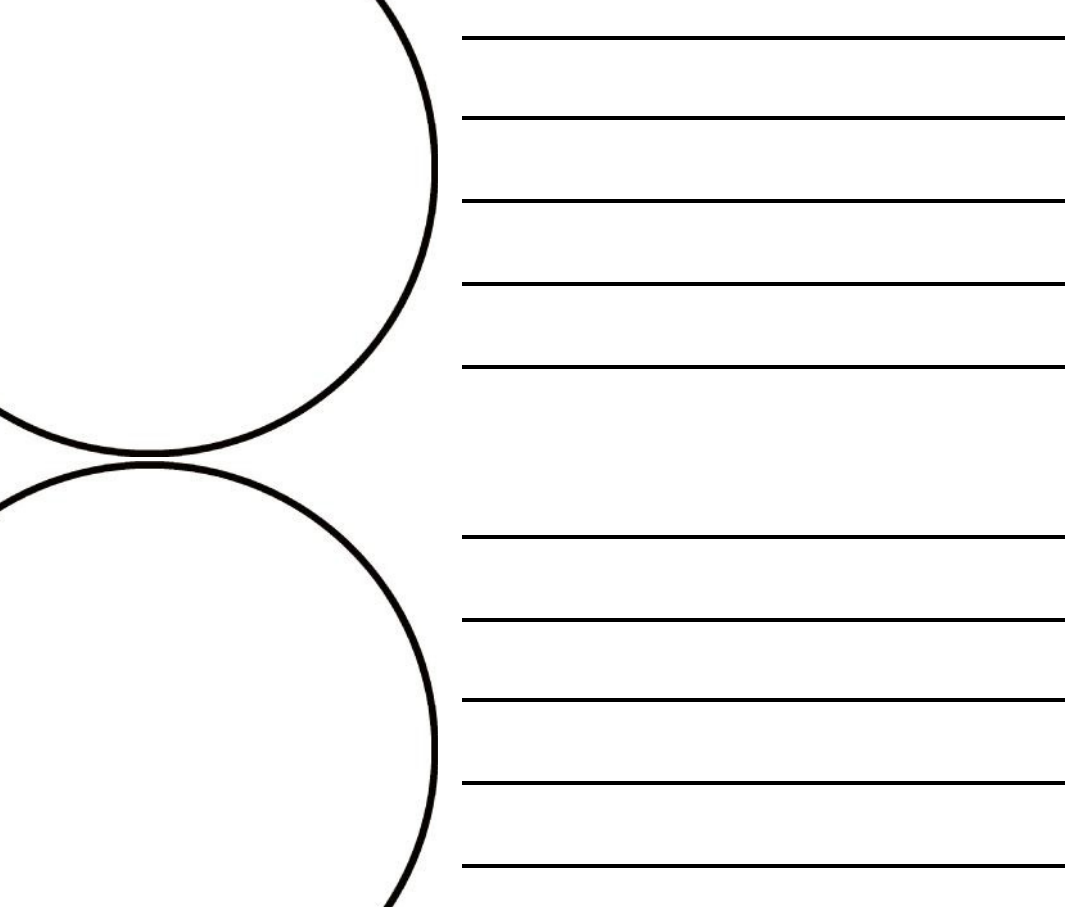
The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

Date:	_____	Transparency:	_____
Time:	_____	Seeing:	_____
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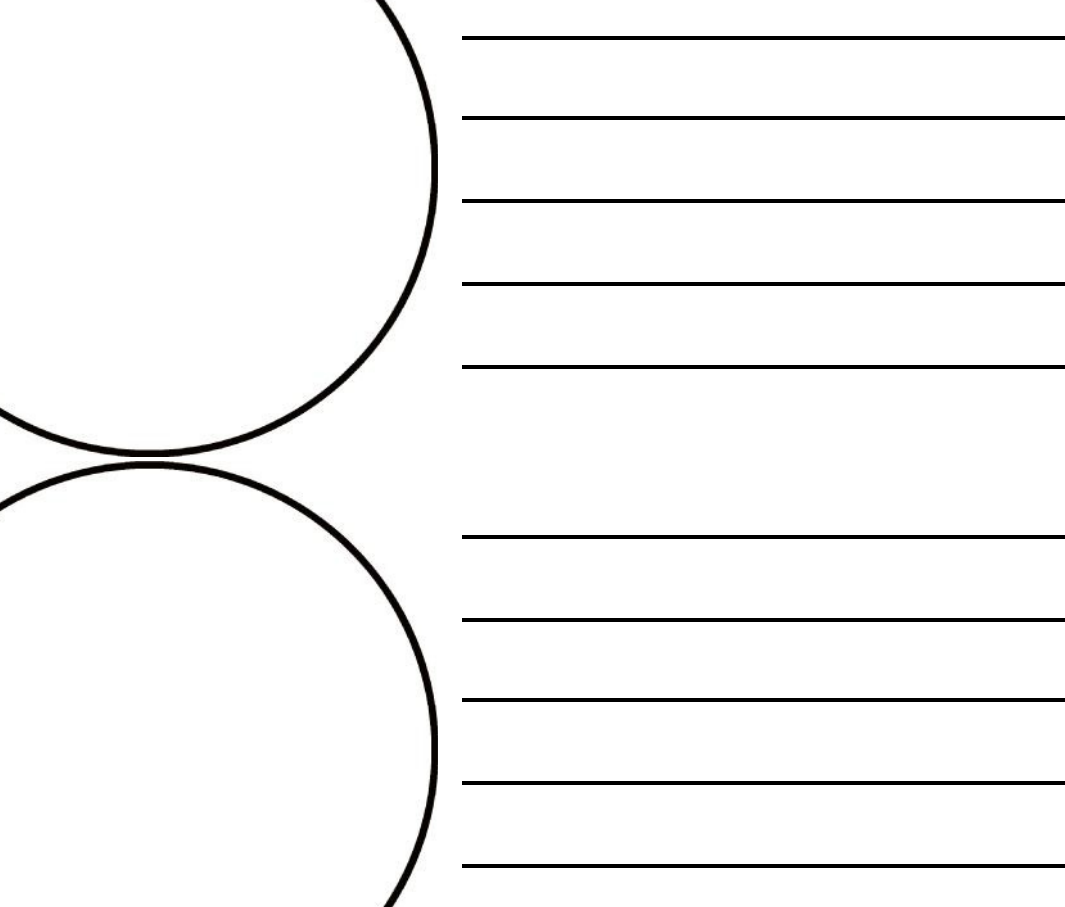
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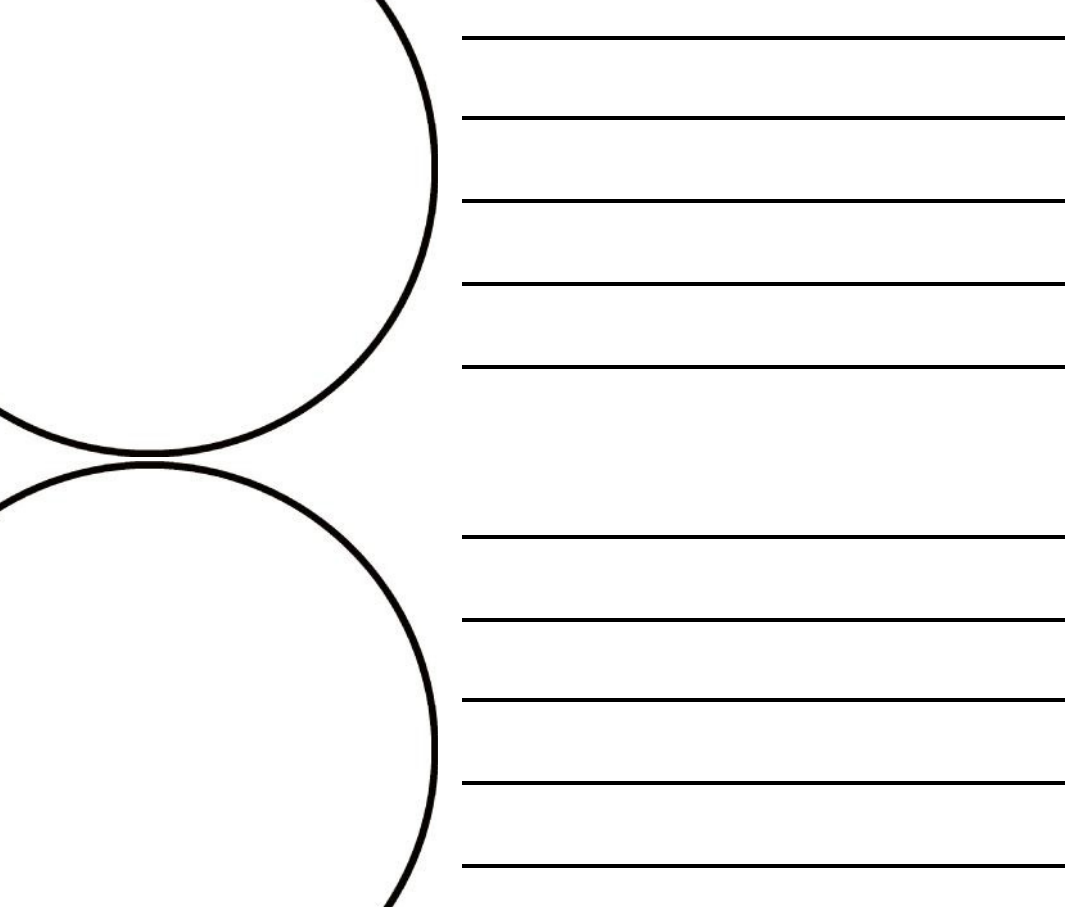
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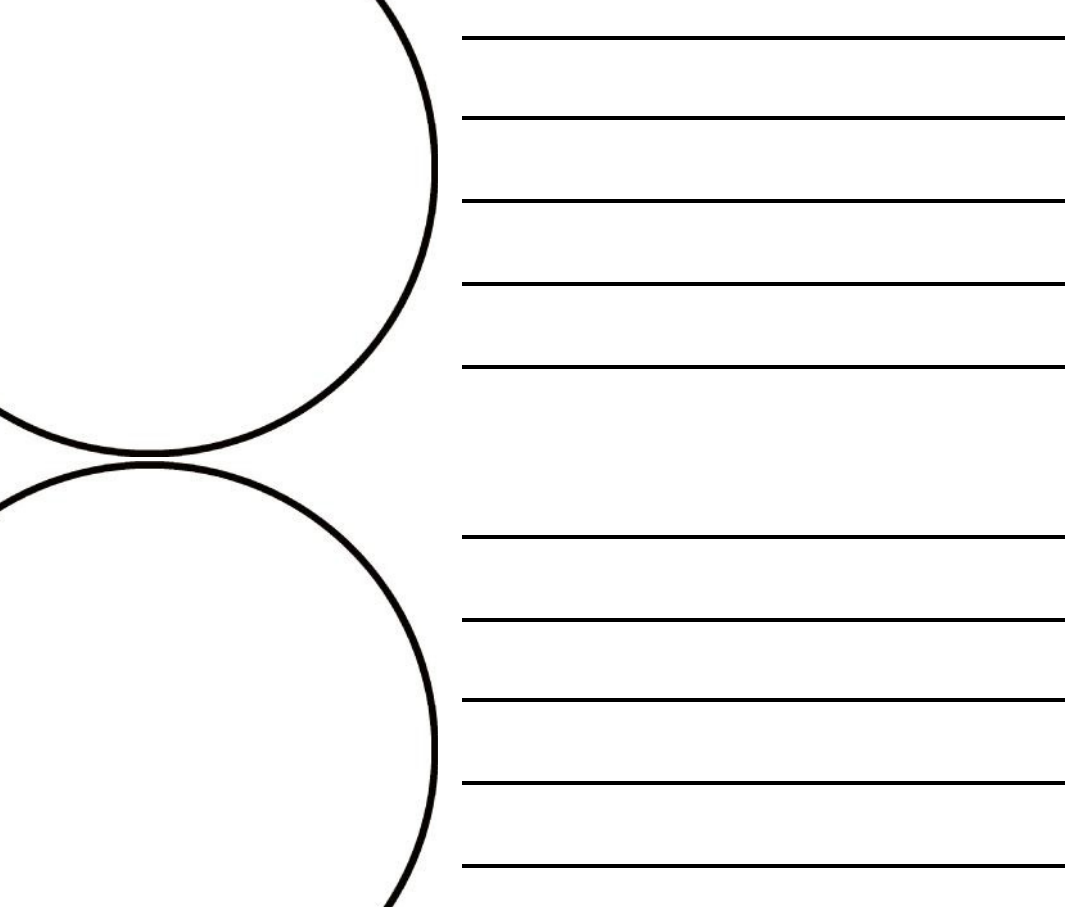
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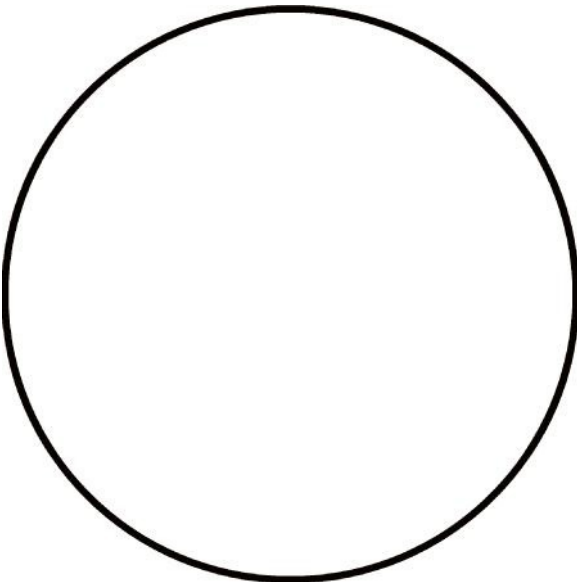
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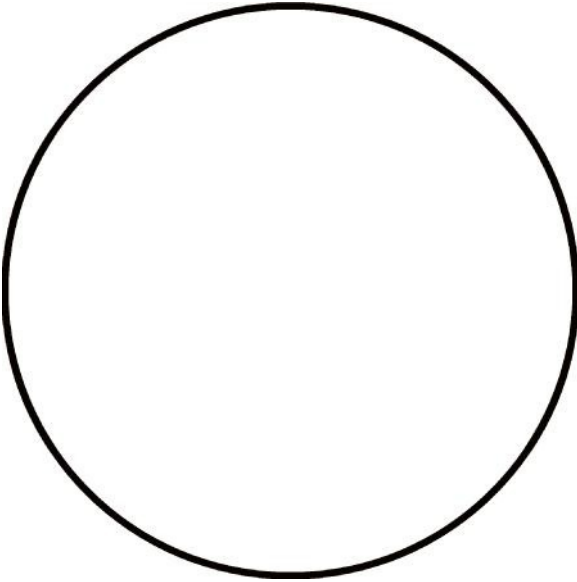
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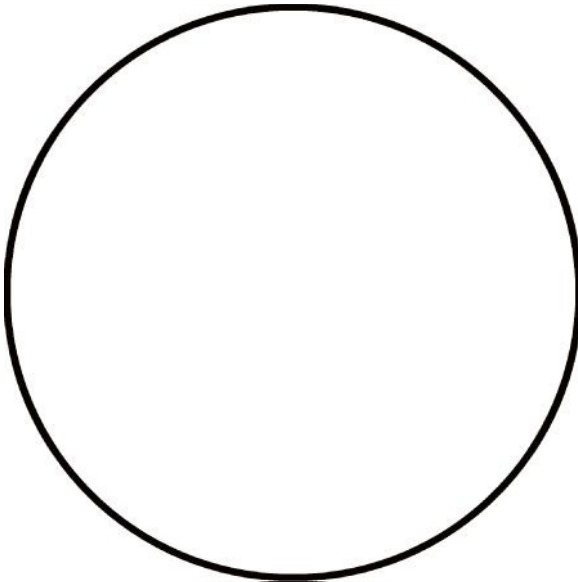
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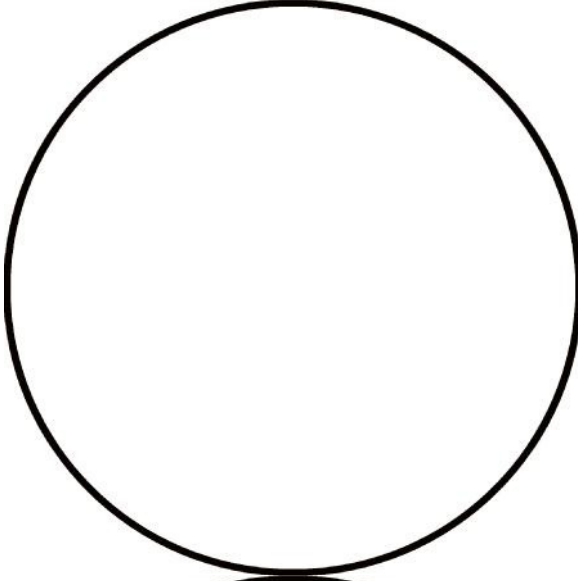
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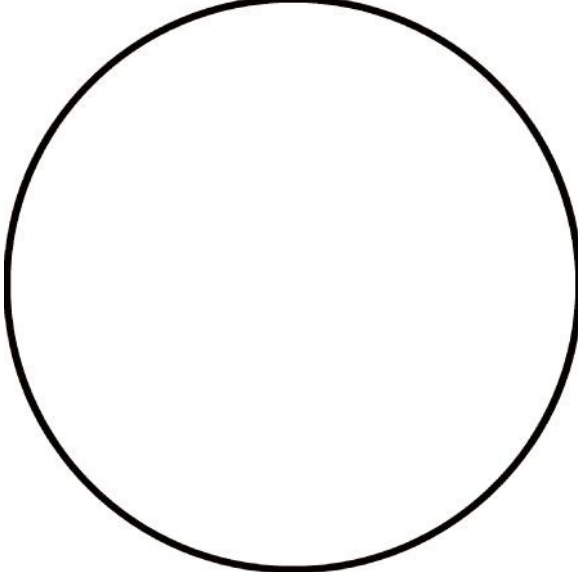
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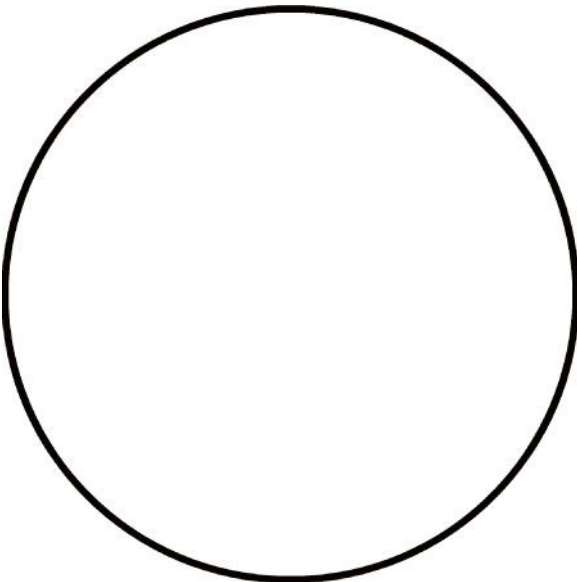
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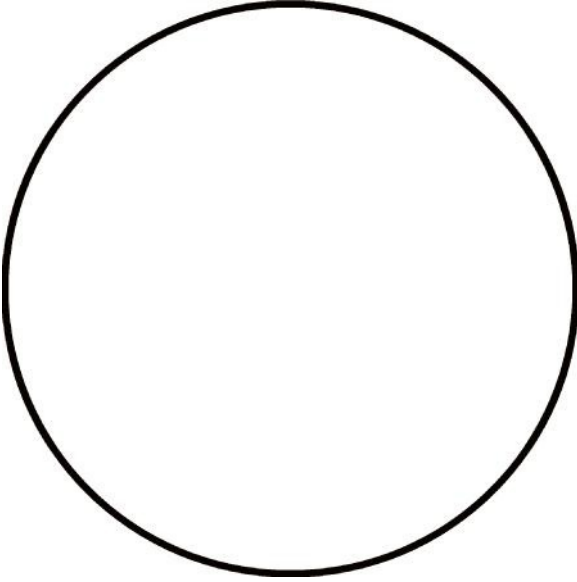
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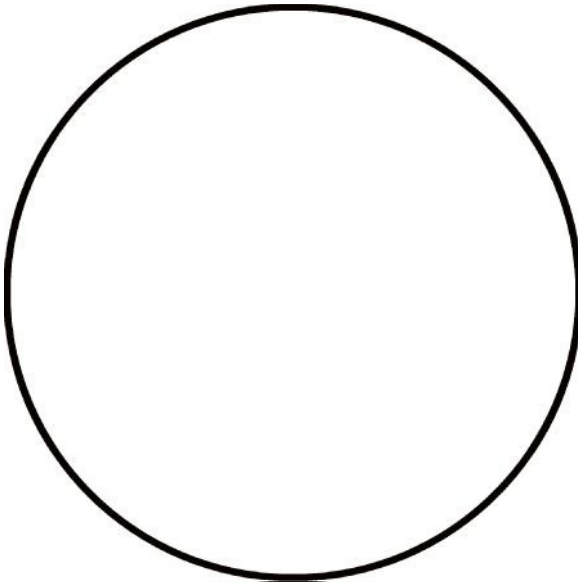
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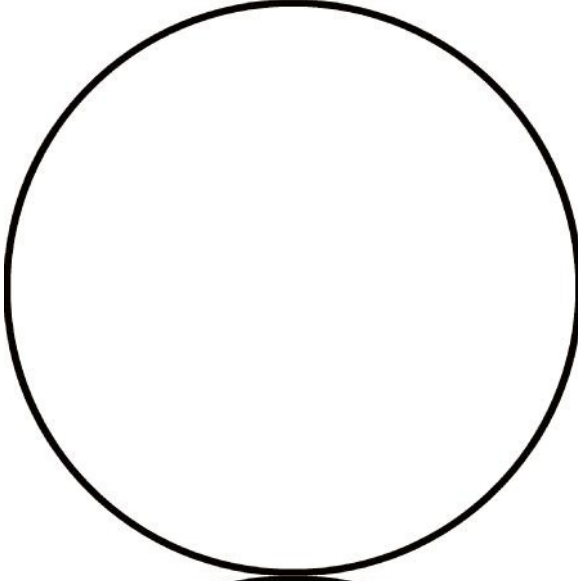
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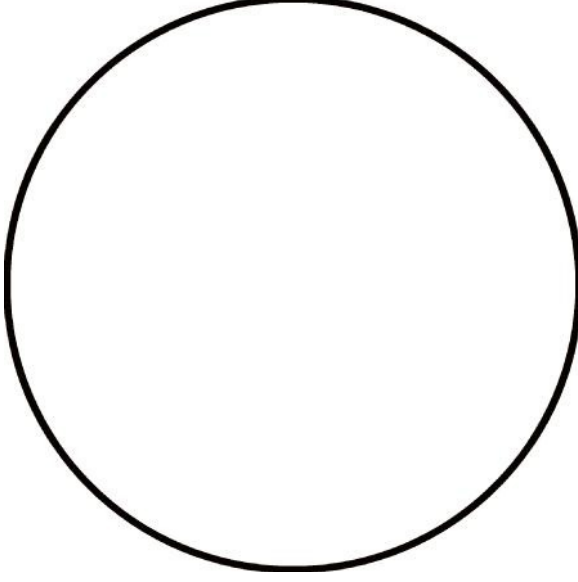
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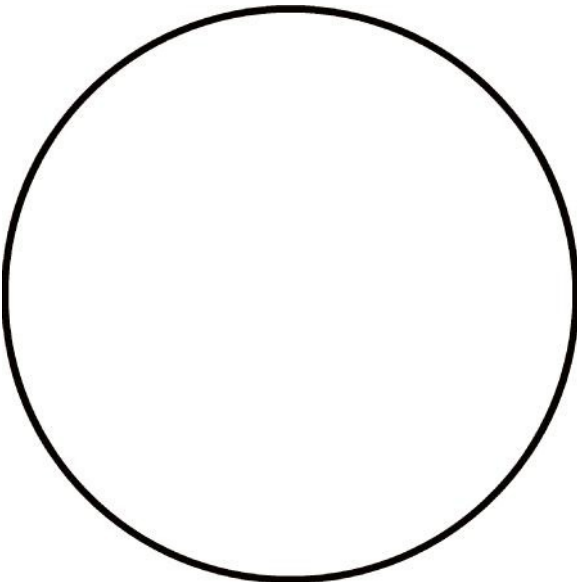
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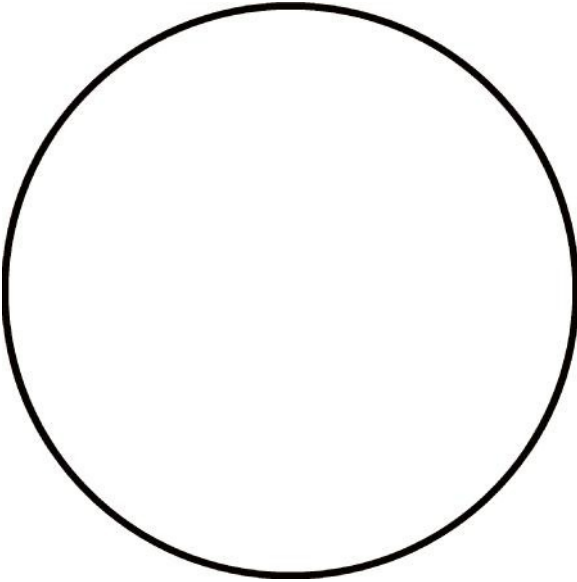
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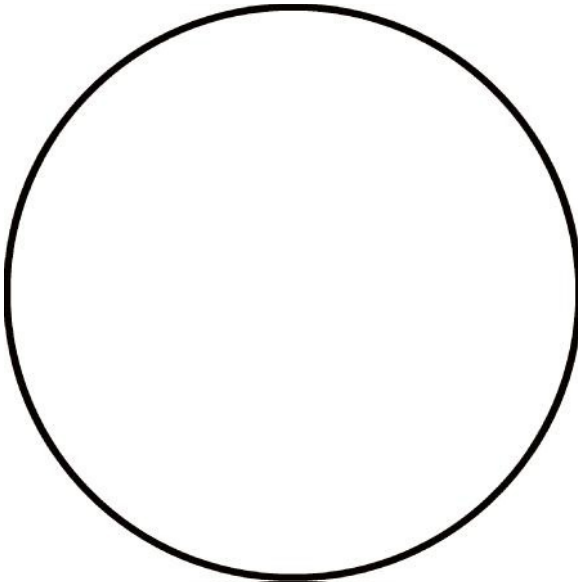
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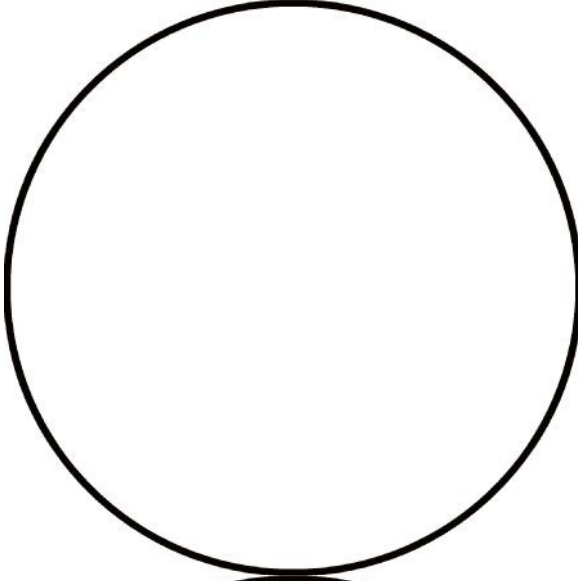
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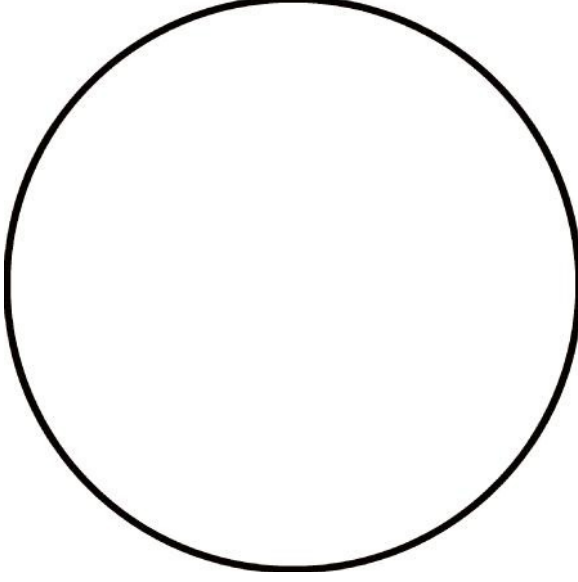
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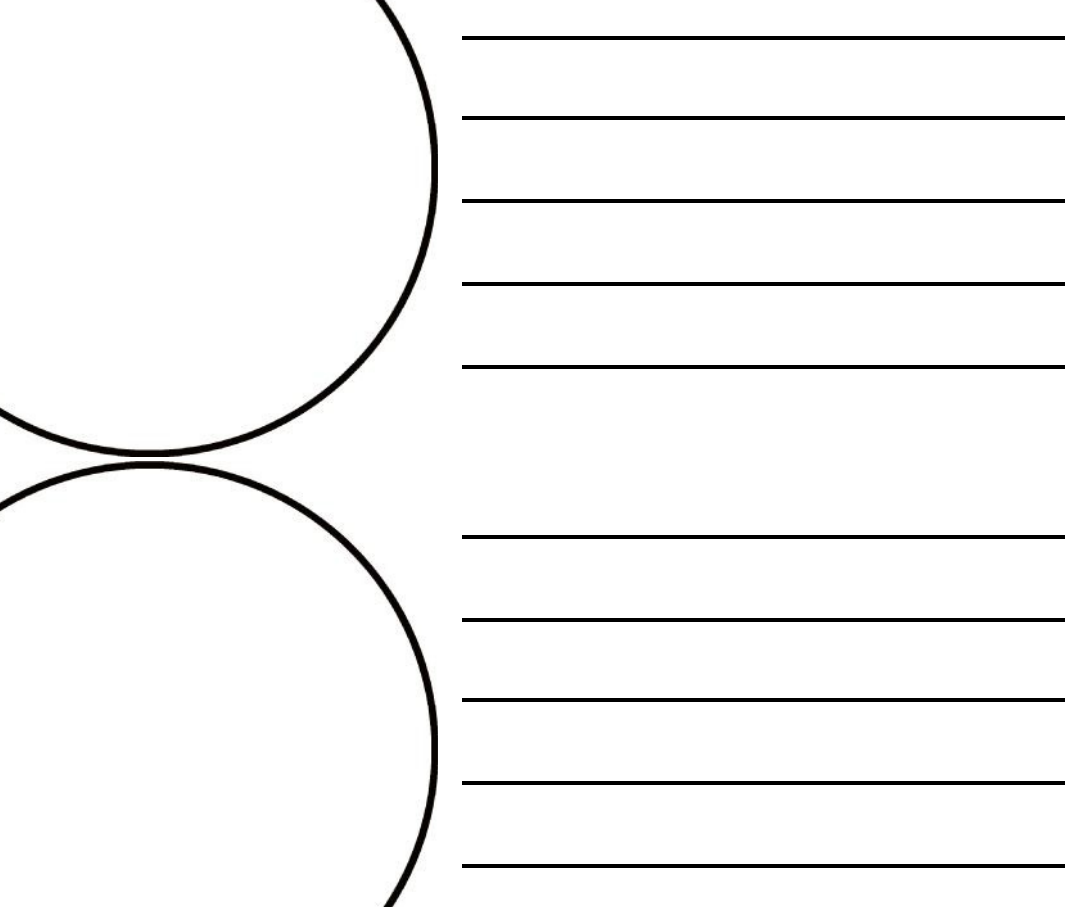


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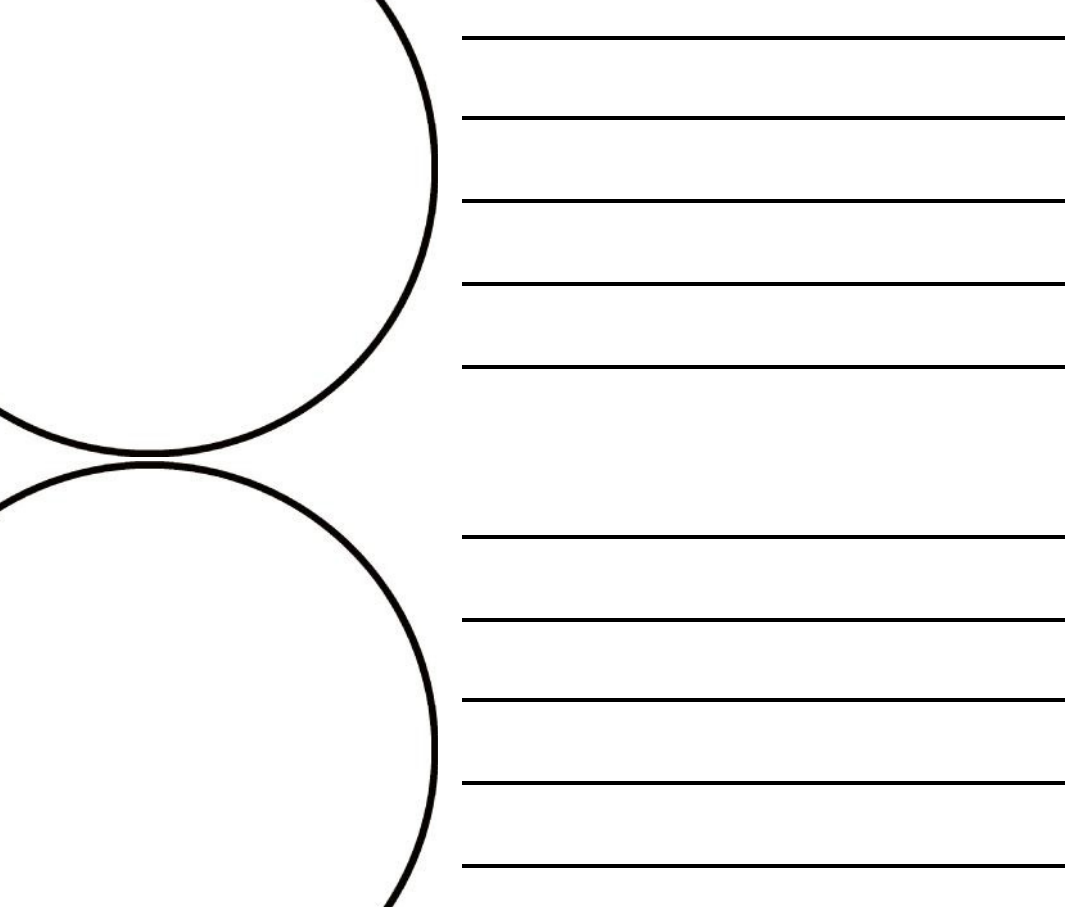
The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image shows a blank sheet of white paper designed for writing or drawing. On the left side, there are horizontal blue lines spaced evenly apart, typical of notebook paper. On the right side, there are three large, empty circles stacked vertically, each touching the others at their top and bottom points. These circles are likely intended for students to draw or write about a specific topic.

Date:	_____	Transparency:	_____
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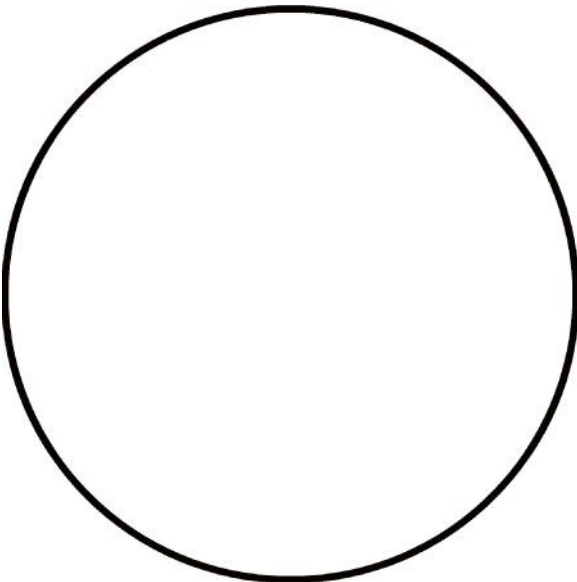
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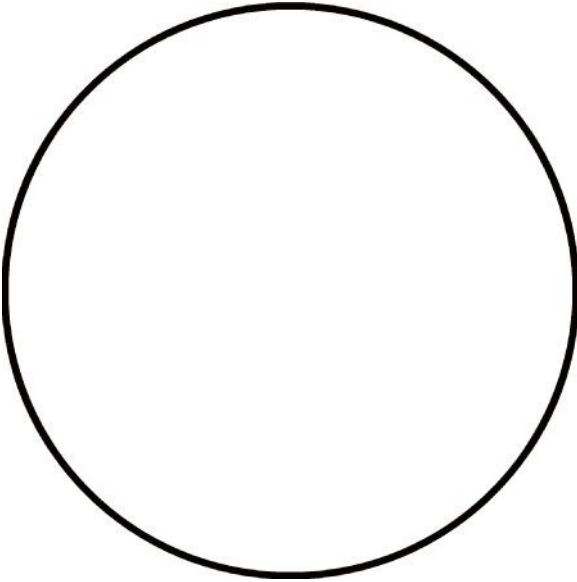
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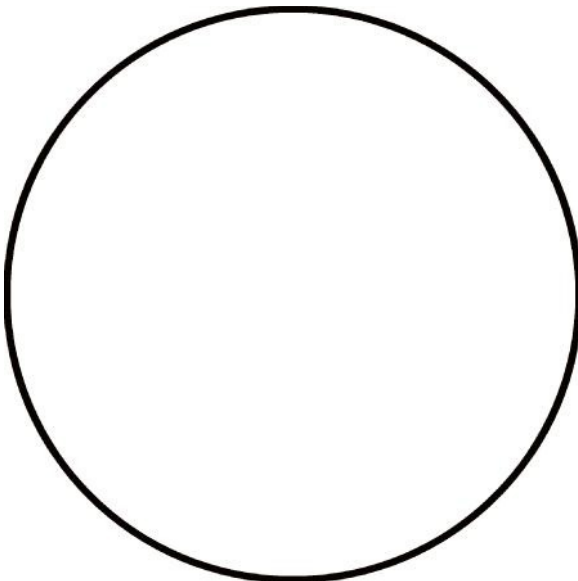
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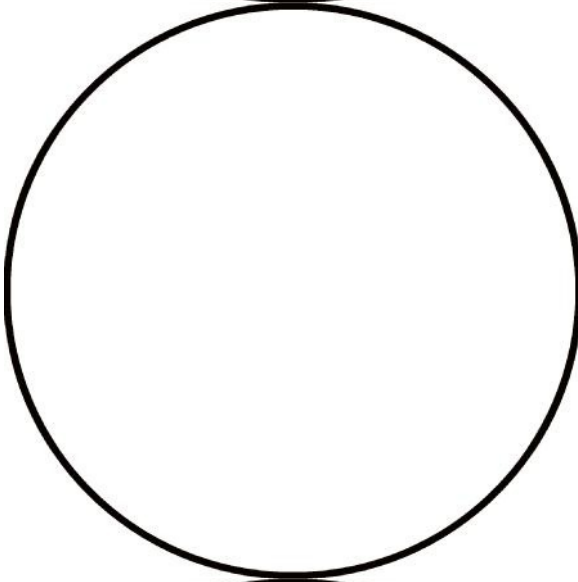
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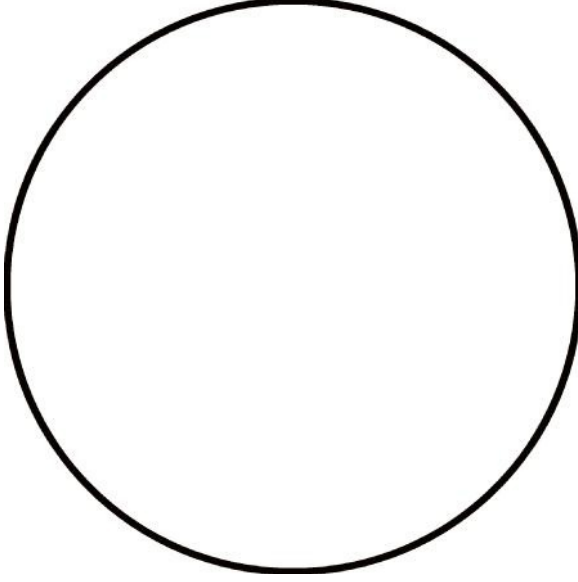
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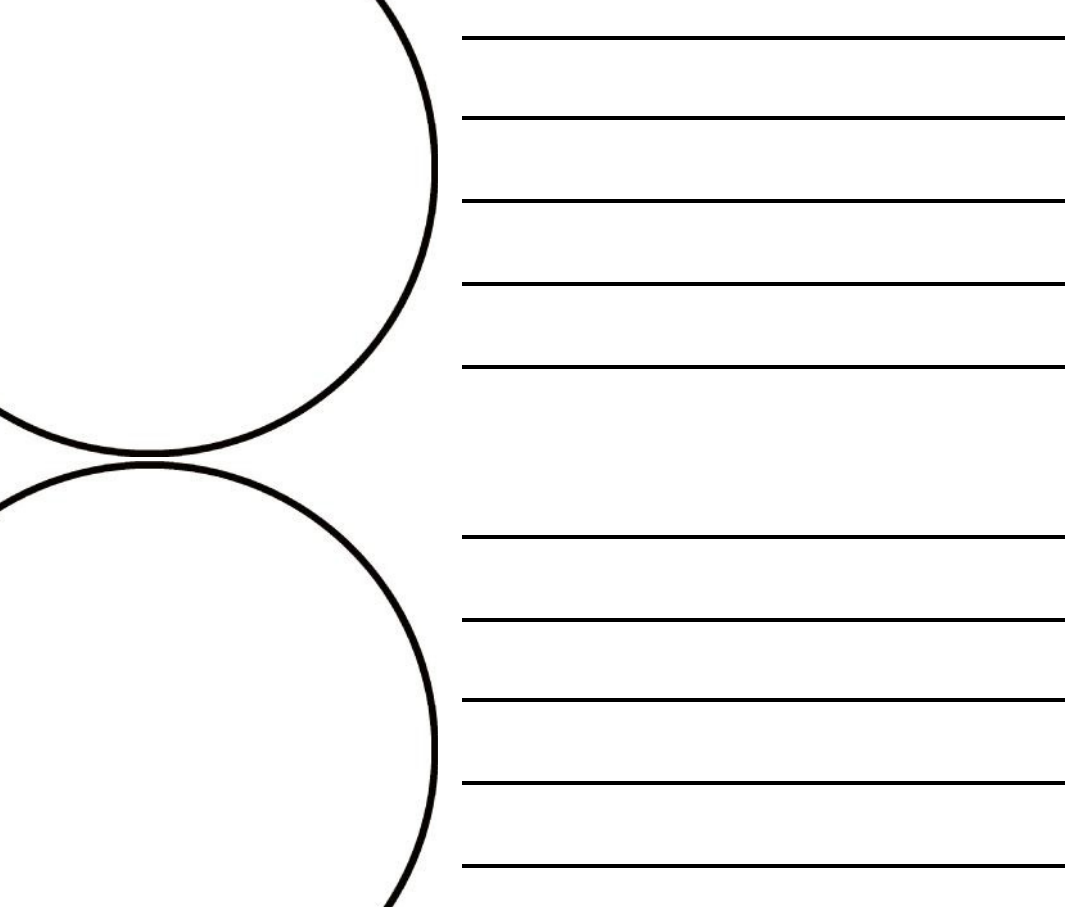


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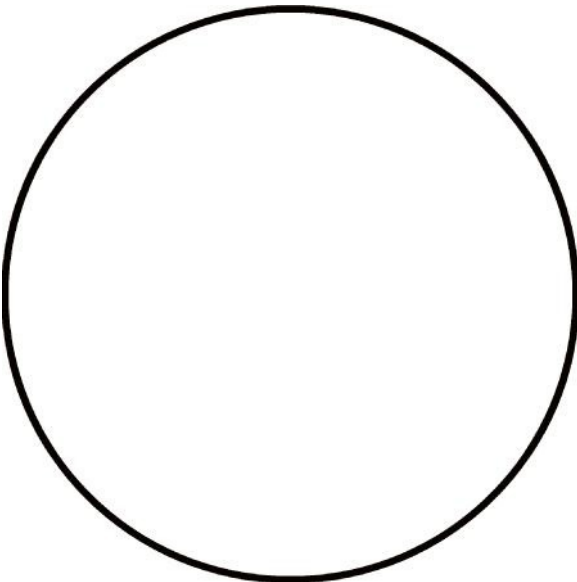
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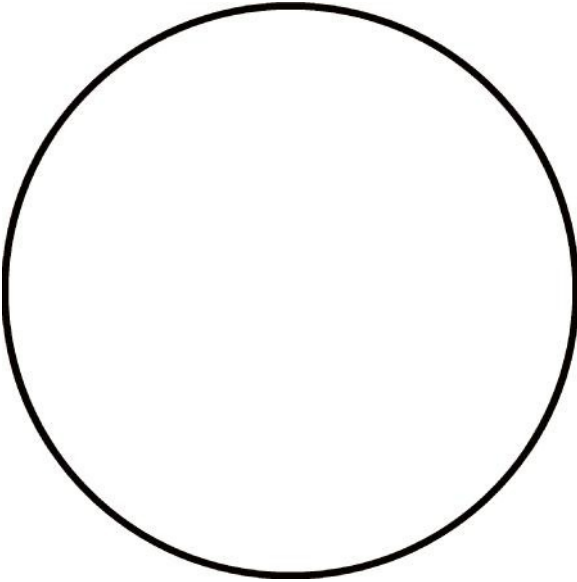
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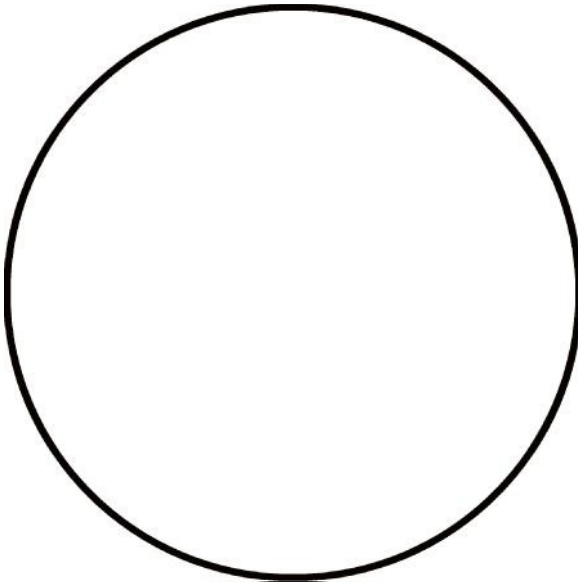
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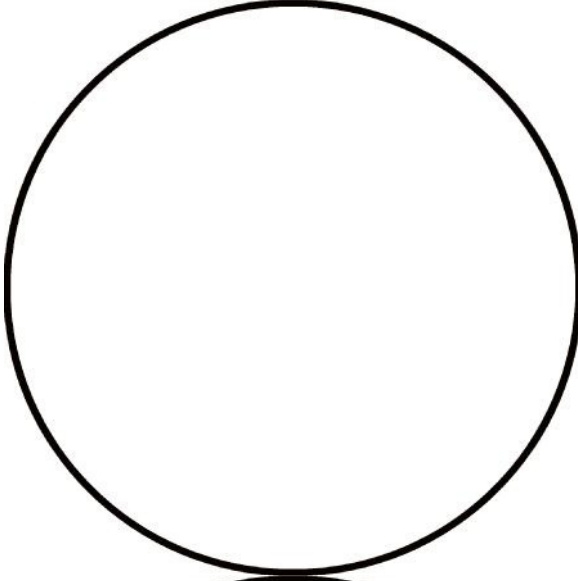
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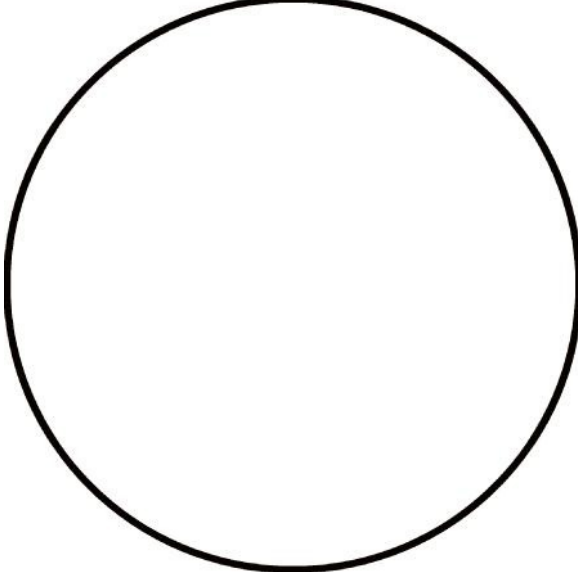
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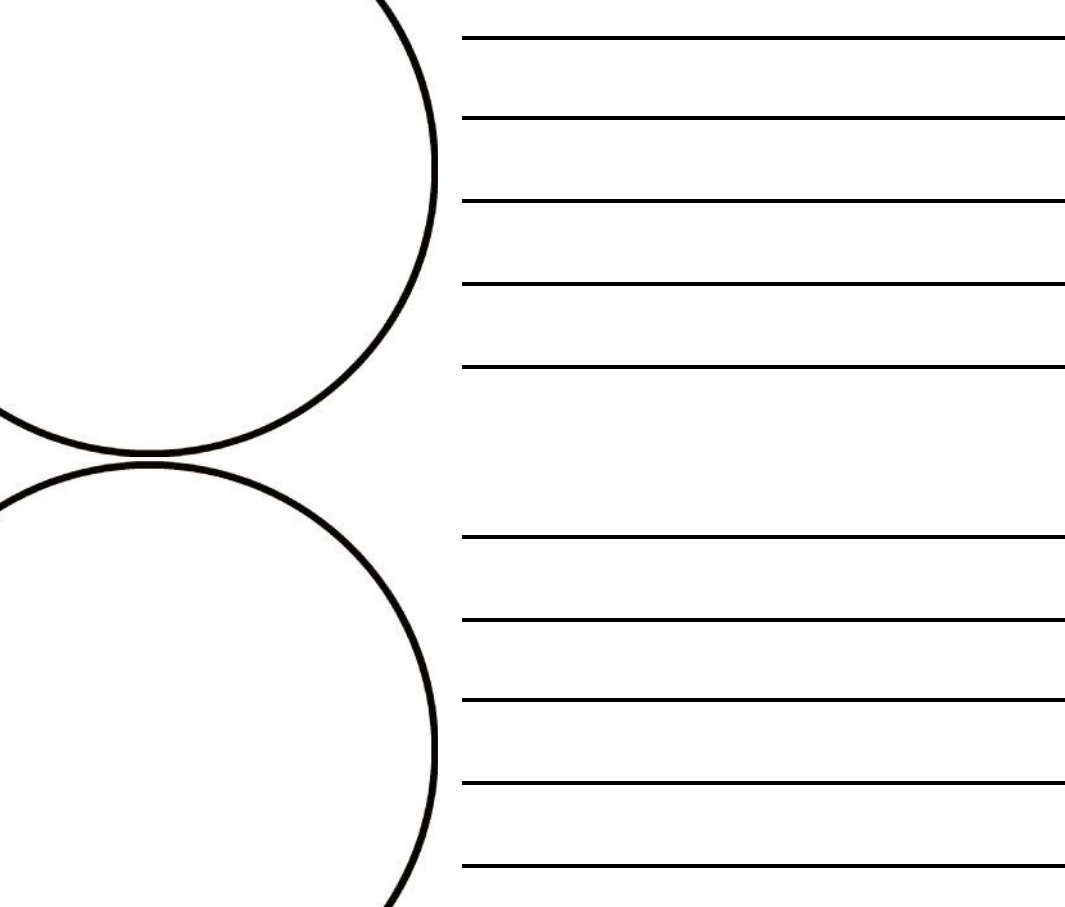


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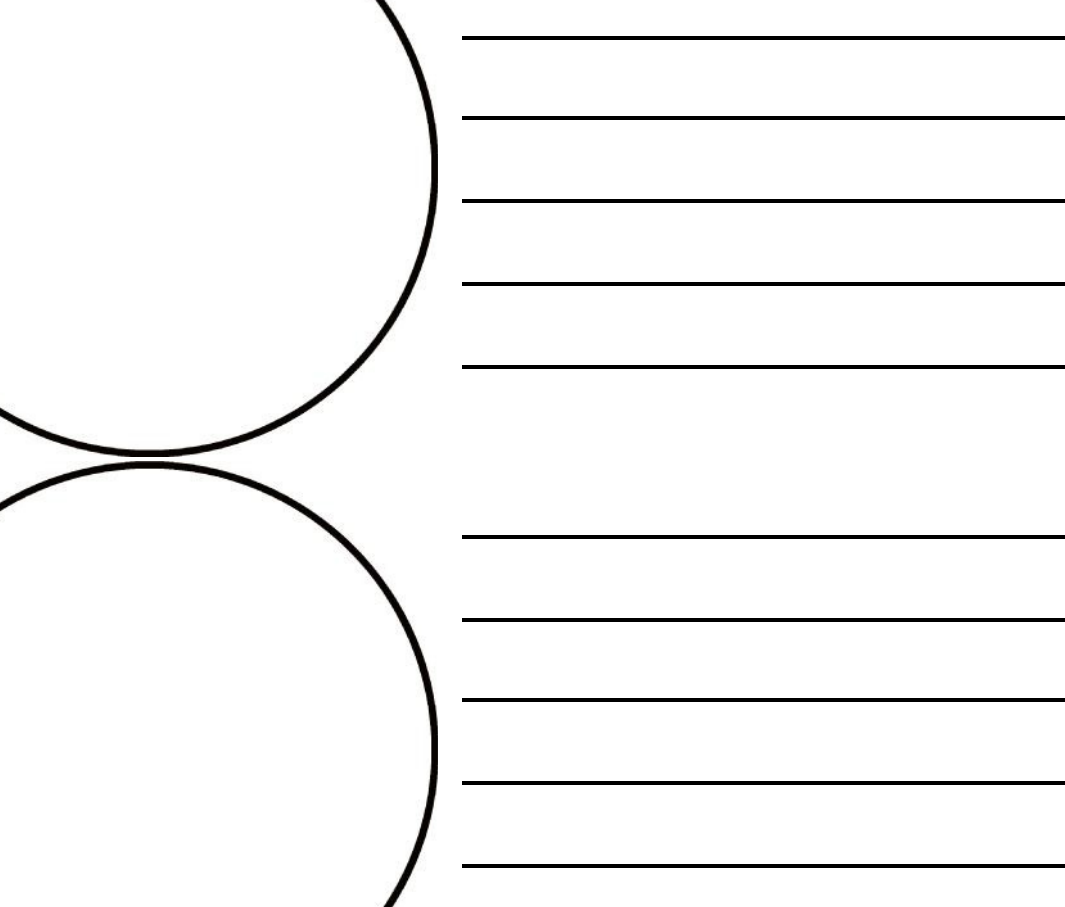
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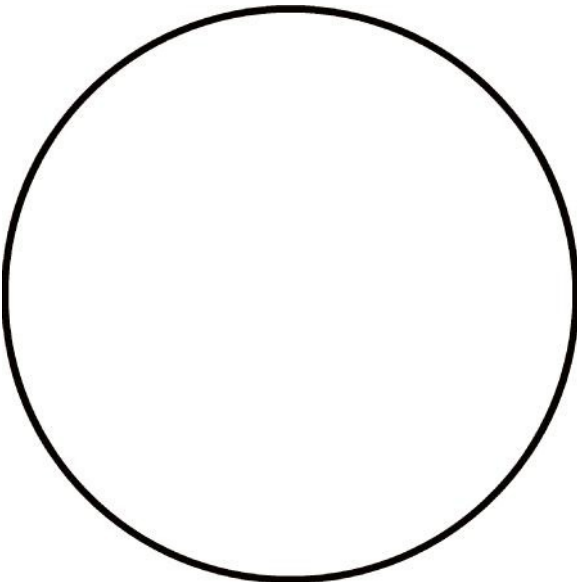
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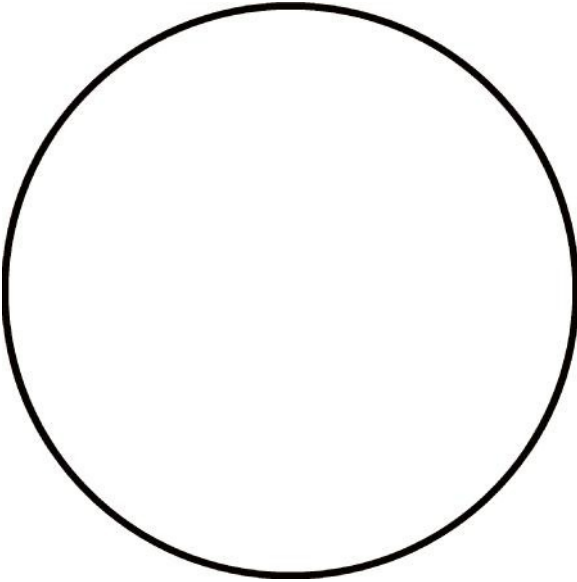
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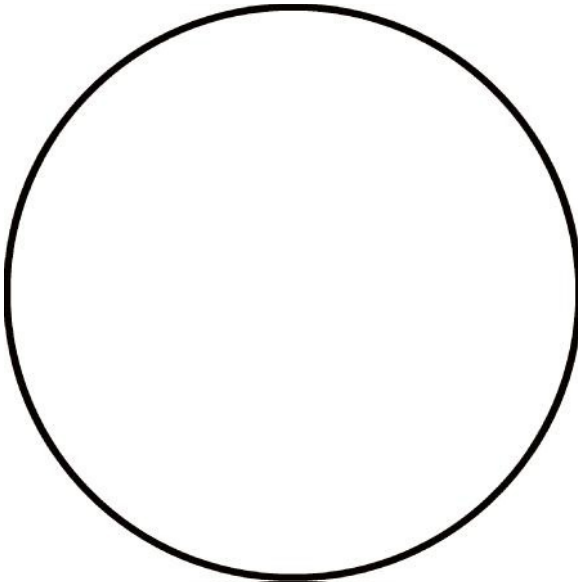
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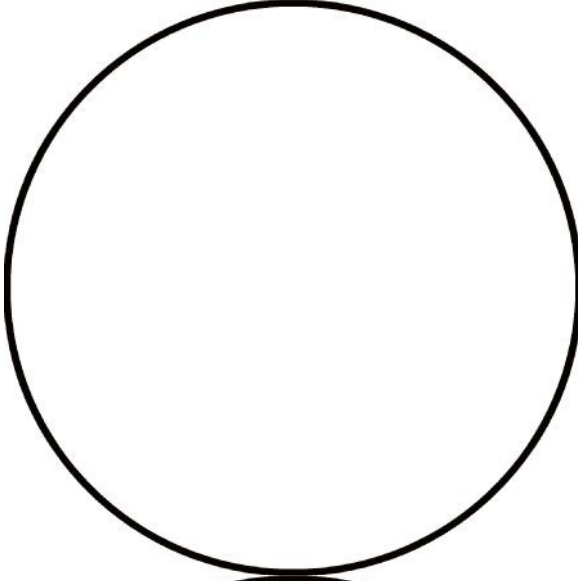
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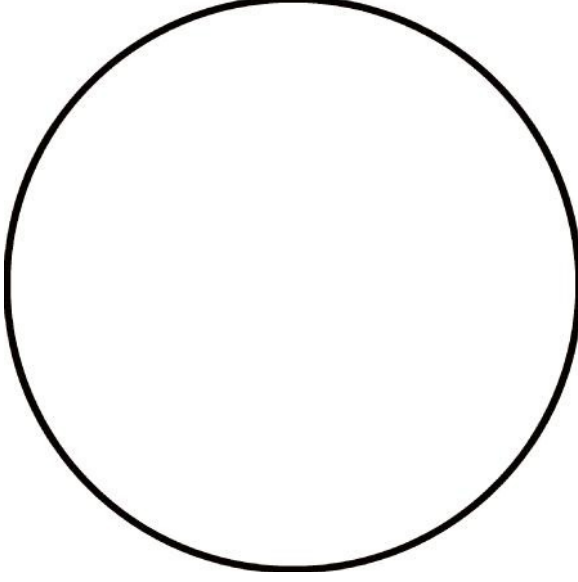
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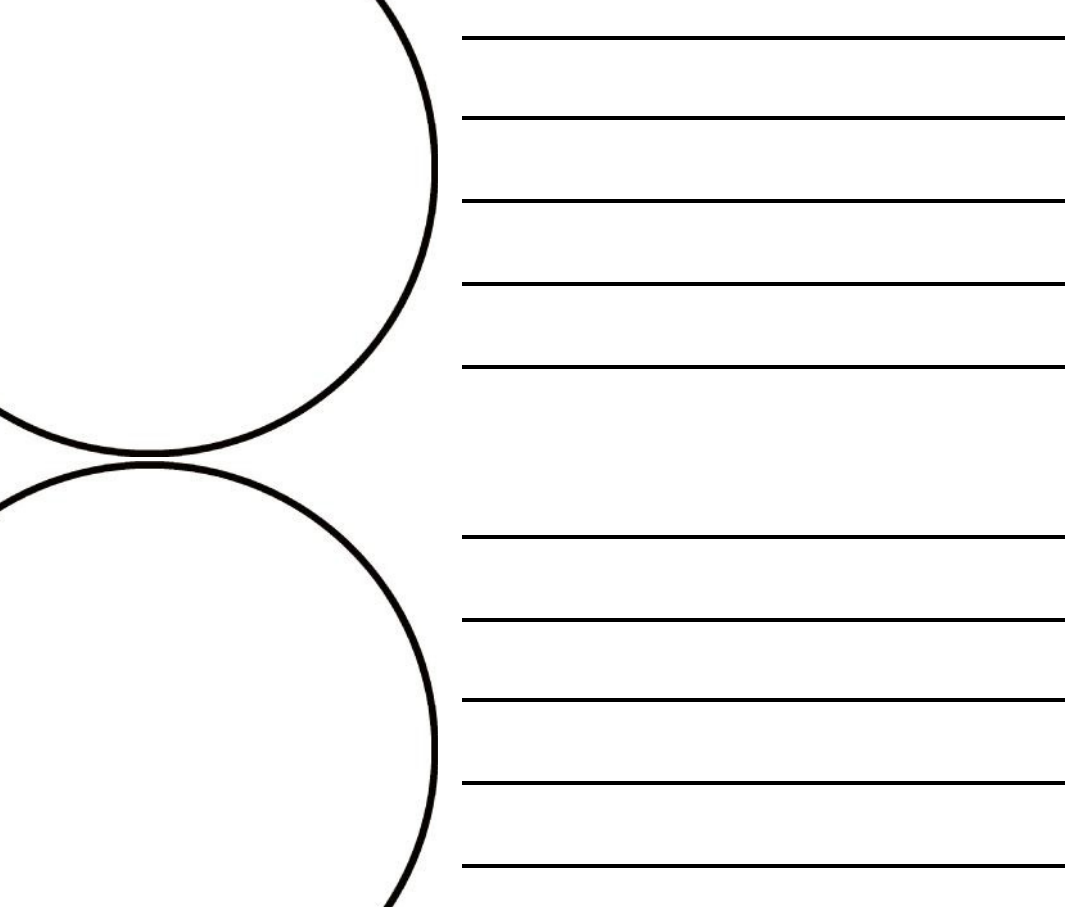
A large, empty circle with a thick black outline, centered on the page. It is intended for a student to draw a picture related to their writing.

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Time:	_____	Seeing:	_____
Lunar Phase:	_____	Equipment:	_____
Limiting Magnitude:	_____	Eyepieces:	_____

Notes: \_\_\_\_\_

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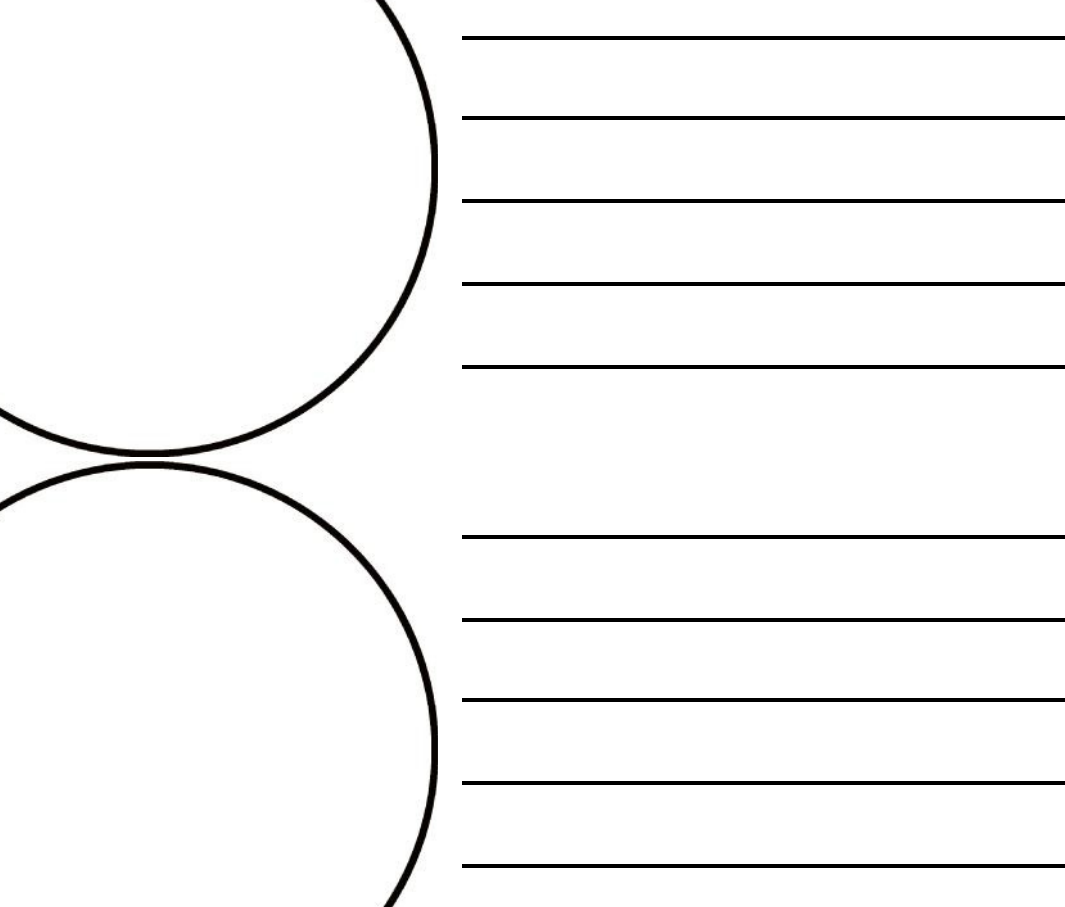
The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.[illegible]

Date: \_\_\_\_\_ Transparency: \_\_\_\_\_  
 Time: \_\_\_\_\_ Seeing: \_\_\_\_\_  
 Lunar Phase: \_\_\_\_\_ Equipment: \_\_\_\_\_  
 Limiting Eyepieces: \_\_\_\_\_  
 Magnitude: \_\_\_\_\_

Notes: \_\_\_\_\_

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The page contains two large, empty circles stacked vertically on the left side, intended for drawing. To the right of these circles is a series of horizontal lines for writing, organized into two groups of five lines each, corresponding to the two circles.This image shows a blank sheet of white paper designed for writing or drawing. On the left side, there are two sets of horizontal blue lines, each set containing five lines. To the right of these lines, there are three large, empty black-outlined circles arranged vertically. The circles are positioned such that they overlap slightly with the right edge of the lined area. The overall layout suggests a template for a notebook page or a worksheet where students can write on the lines and draw or illustrate within the circles.

Suggested Deep Sky Objects

Andromeda

Galaxies:

- M31 (Andromeda Galaxy), M32, M110, NGC 891, NGC 7640

Multiple Stars:

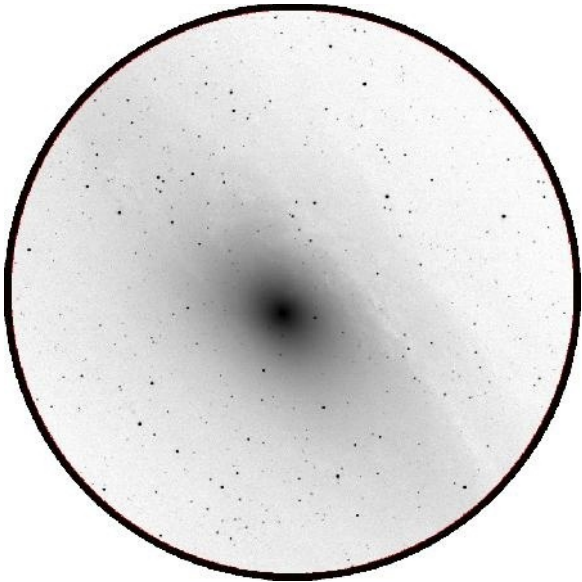
- Almach (Gamma Andromedae), 56 Andromedae, 59 Andromedae

Open Clusters:

- NGC 752

Planetary Nebulae:

- NGC 7662



M31, the Andromeda Galaxy

Aquarius

Asterism:

- M73

Globular Clusters:

- M2, M72

Multiple Stars:

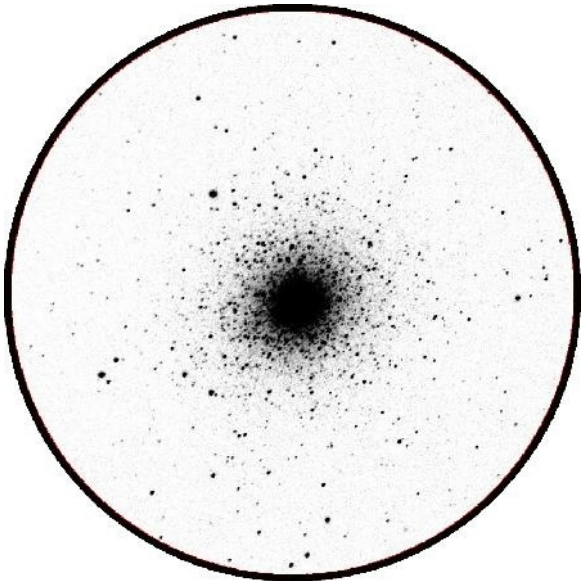
- Zeta Aquarii, KV Aquarii

Planetary Nebulae:

- NGC 7009 (Saturn Nebula), NGC 7293 (Helix Nebula)

Variable Stars:

- KV Aquarii



M2

Aquila

Notable Stars:

- Altair (Alpha Aquilae), V Aquilae

Auriga

Multiple Stars:

- Epsilon Aurigae, Omega Aurigae, Sigma Aurigae, 14 Aurigae, 26 Aurigae, Struve 698, Struve 737

Nebulae:

- IC 405 (Flaming Star Nebula)

Notable Stars:

- Capella (Alpha Aurigae)

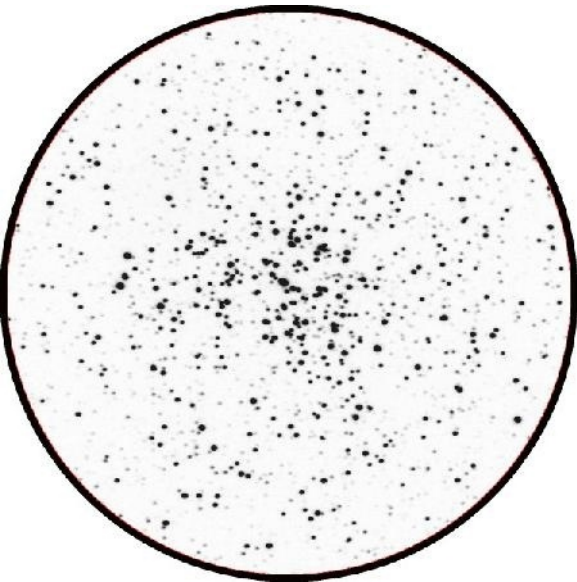
Open Clusters:

- M36, M37, M38, NGC 1664, NGC 1857, NGC 1893, NGC 1907

Aries

Multiple stars:

- Mesarthim (Gamma Arietis), Lambda Arietis, Pi Arietis



M37

Boötes

Galaxies:

- NGC 5529, NGC 5557, NGC 5676

Globular Clusters:

- NGC 5466

Multiple Stars:

- Alkalurops (Mu Boötis), Izar (Epsilon Boötis), Iota Boötis, Kappa Boötis, Pi Boötis, Upsilon Boötis, Xi Boötis, Struve 1825, Struve 1835

Camelopardalis

Asterism:

- Kemble 1 (Kemble’s Cascade)

Galaxies:

- NGC 2403, IC 342

Open Clusters:

- NGC 1501, NGC 1502



Cancer

Multiple Stars:

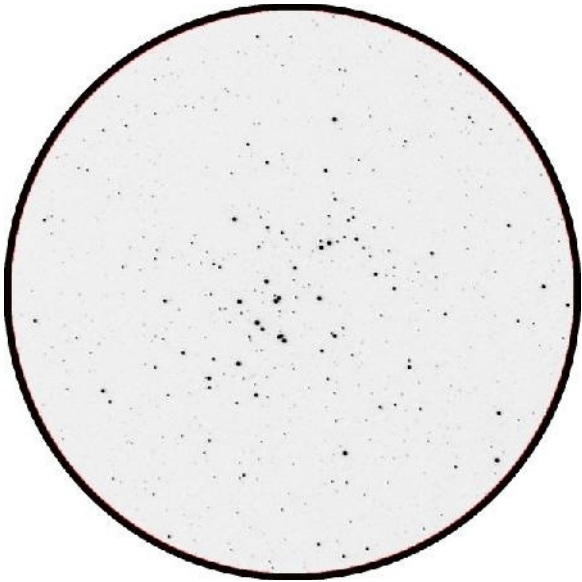
- Asellus Borealis (Gamma Cancri), Tegmine (Zeta Cancri), Delta Cancri, Iota Cancri, Phi<sup>2</sup> Cancri, 24 Cancri, 57 Cancri, Struve 1266

Open Clusters:

- M44 (Praesepe), M67

Variable Stars:

- VZ Cancri



M44, the Praesepe  
(Original Image: Eclipse.sx)

Canes Venatici

Galaxies:

- M51 (Whirlpool Galaxy), M63 (Sunflower Galaxy), M94, M106, NGC 4449, NGC 4485/4490, NGC 5005, NGC 5033

Globular Clusters:

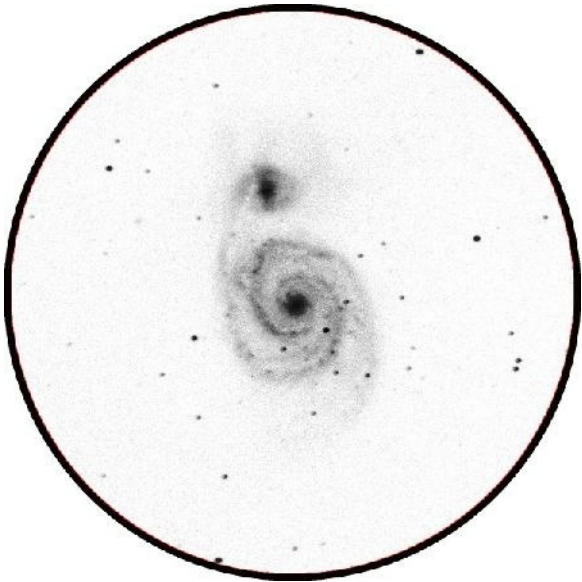
- M3

Multiple Stars:

- Cor Caroli (Alpha Canum Venaticorum), 2 Canum Venaticorum, Struve 1702

Notable Stars:

- La Superba (Y Canum Venaticorum)



M51, the Whirlpool Galaxy

Canis Major

Multiple Stars:

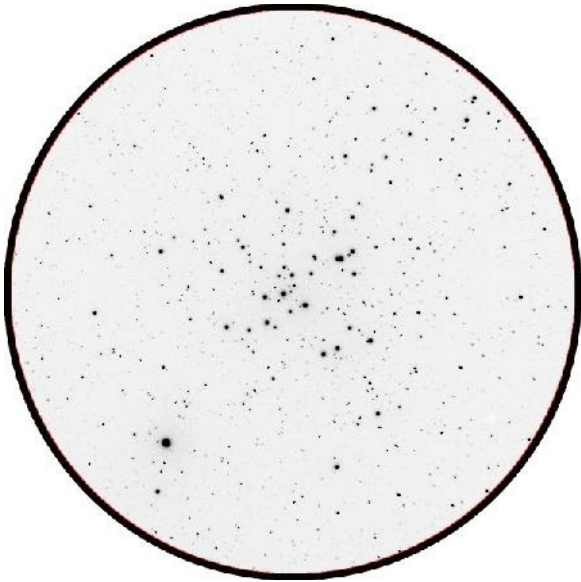
- Adhara (Epsilon Canis Majoris), Mu Canis Majoris, 145 Canis Majoris

Notable Stars:

- Sirius (Alpha Canis Majoris)

Open Clusters:

- M41, NGC 2354, NGC 2362, Collinder 121



M41

Canis Minor

Notable Stars:

- Procyon (Alpha Canis Minoris)

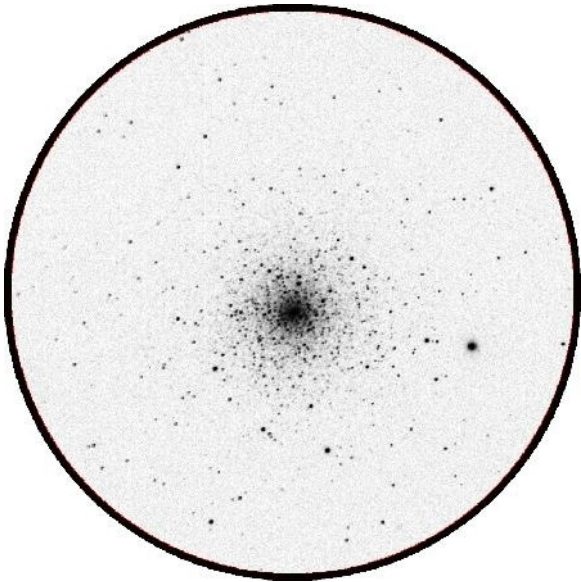
Capricornus

Globular Clusters:

- M30

Multiple Stars:

- Algiedi (Alpha Capricorni), Beta Capricorni, Omicron Capricorni, Rho Capricorni, Sigma Capricorni



M30

Carina

Globular Clusters:

- NGC 2808

Multiple Stars:

- Upsilon Carinae

Nebulae:

- NGC 3372 (Keyhole Nebula)

Open Clusters:

- Southern Pleiades, NGC 2516 (Southern Beehive), NGC 3114, NGC 3293 (Gem Cluster), NGC 3532 (Football Cluster), NGC 3766 (Pearl Cluster)

Variable Stars:

- ZZ Carinae
- 

Cassiopeia

Multiple Stars:

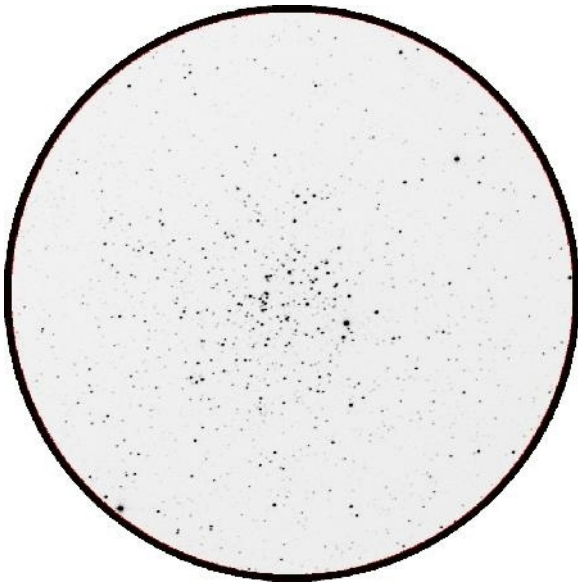
- Achird (Eta Cassiopeiae), Iota Cassiopeiae, Sigma Cassiopeiae, Upsilon<sup>1</sup> and Upsilon<sup>2</sup> Cassiopeiae, Struve 163, Struve 3053

Nebulae:

- NGC 281, NGC 896, NGC 7635, IC 1805, IC 1848

Open Clusters:

- M52, M103, NGC 129, NGC 133, NGC 146, NGC 225 (Sailboat Cluster), NGC 281, NGC 436, NGC 457 (The E.T. Cluster), NGC 654, NGC 659, NGC 663, NGC 744, NGC 1027, NGC 7788, NGC 7789, NGC 7790, IC 1805, IC 1848, Collinder 34



M30

Centaurus

Galaxies:

- NGC 4945, NGC 5128 (Hamburger Galaxy)

Globular Clusters:

- NGC 5139 (Omega Centauri), NGC 5286

Multiple Stars:

- Alpha Centauri, m Centauri, N Centauri, Q Centauri

Notable Stars:

- Alpha Centauri

Planetary Nebulae:

- NGC 5189 (Spiral Planetary)

Cetus

Galaxies:

- M77, NGC 247, NGC 1055

Variable Stars:

- Mira (Omicron Ceti)

Cepheus

Galaxies:

- NGC 6946

Multiple Stars:

- Struve 2816, Struve 2819

Notable Stars:

- Garnet Star (Mu Cephei)

Open Cluster:

- NGC 188, NGC 6939, NGC 7160, NGC 7235, NGC 7380, NGC 7510

Variable Stars:

- Delta Cephei

Circinus

Multiple Stars:

- Alpha Circini

Coma Berenices

Galaxies:

- M64 (Blackeye Galaxy), M85, M88, M91, M98, M99, M100, NGC 4394, NGC 4459, NGC 4473, NGC 4477, NGC 4479, NGC 4559, NGC 4565 (Needle Galaxy)

Globular Clusters:

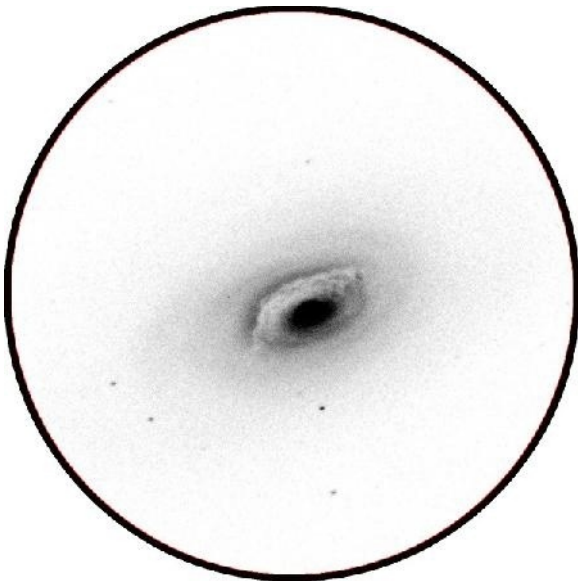
- M53, NGC 5053

Multiple Stars:

- 17 Comae Berenices, 24 Comae Berenices, 35 Comae Berenices

Open Clusters:

- Melotte 111



M64

Corona Borealis

Multiple Stars:

- Nu Coronae Borealis, Sigma Coronae Borealis, Zeta Coronae Borealis

Crux

Multiple Stars:

- Acrux (Alpha Crucis), Gacrux (Gamma Crucis), Mu Crucis

Nebulae:

- Coal Sack

Open Clusters:

- NGC 4755 (Jewelr Box)

Variable Stars:

- BZ Crucis

Cygnus

Multiple Stars:

- Albireo (Beta Cygni), Omicron<sup>1</sup> Cygni, 16 Cygni, 17 Cygni, 59 Cygni, 61 Cygni, Struve 2525

Nebulae:

- NGC 7000 (North American Nebula)

Notable Stars:

- Deneb (Alpha Cygni)

Open Clusters:

- M29, M39, NGC 6811, NGC 6834, NGC 6866, NGC 6910, NGC 7039, NGC 7048, IC 1369, IC 4996

Planetary Nebulae:

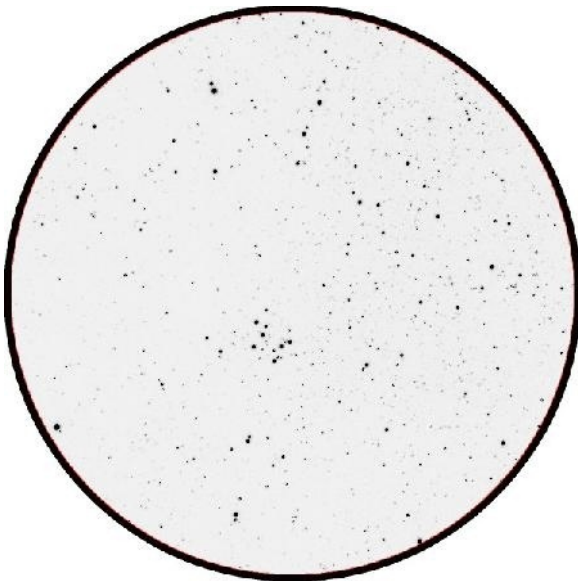
- NGC 6826 (Blinking Planetary), NGC 7026, NGC 7048

Supernova Remnants:

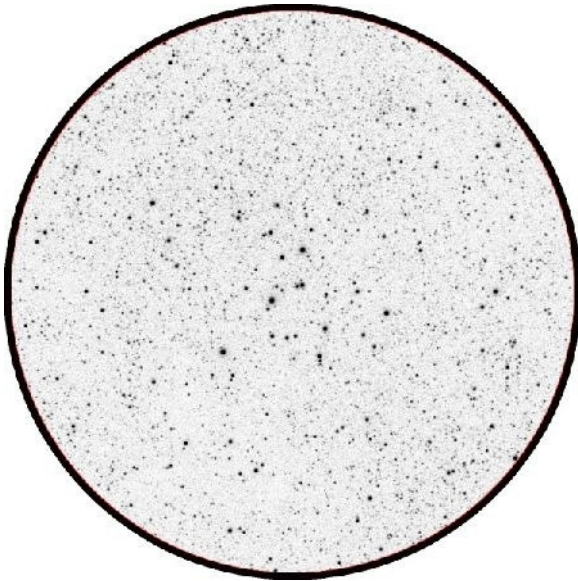
- Veil Nebula (NGC 6960, NGC 6992, NGC 6995)

Variable Stars:

- Chi Cygni, P Cygni, R Cygni, RS Cygni



M29



M39 (Original Image: Ole Nielsen)

Delphinus

Globular Clusters:

- NGC 7006

Multiple Stars:

- Gamma Delphinus, Struve 2703, Struve 2725



Delphinus (cont.)

*Planetary Nebulae:*

- NGC 6891, NGC 6905

Dorado

*Galaxies:*

- Large Magellanic Cloud

*Globular Clusters:*

- NGC 1786, NGC 1835

*Nebulae:*

- NGC 1727, NGC 1743, NGC 1837, NGC 1858, NGC 1872, NGC 1874, NGC 1934, NGC 1962, NGC 1974, NGC 2001, NGC 2014, NGC 2015, NGC 2032, NGC 2033, NGC 2042, NGC 2044, NGC 2048, NGC 2055, NGC 2070 (Tarantula Nebula), NGC 2074, NGC 2077, NGC 2079, NGC 2080, NGC 2081, NGC 2086, NGC 2098, NGC 2103, NGC 2122

*Open Clusters:*

- NGC 1711, NGC 1727, NGC 1743, NGC 1755, NGC 1837, NGC 1845, NGC 1847, NGC 1850, NGC 1854, NGC 1856, NGC 1858, NGC 1872, NGC 1874, NGC 1901, NGC 1910, NGC 1934, NGC 1962, NGC 1967, NGC 1974, NGC 1983, NGC 1986, NGC 1994, NGC 2001, NGC 2009, NGC 2014, NGC 2015, NGC 2031, NGC 2032, NGC 2033, NGC 2042, NGC 2044, NGC 2055, NGC 2060, NGC 2070, NGC 2074, NGC 2077, NGC 2079, NGC 2080, NGC 2081, NGC 2086, NGC 2098, NGC 2100, NGC 2103, NGC 2122

*Supernova Remnant:*

- NGC 2060

*Variable Stars:*

- S Doradus

Draco

*Galaxies:*

M102 (Spindle Galaxy, NGC 5866), NGC 6503, NGC 6543

*Multiple Stars:*

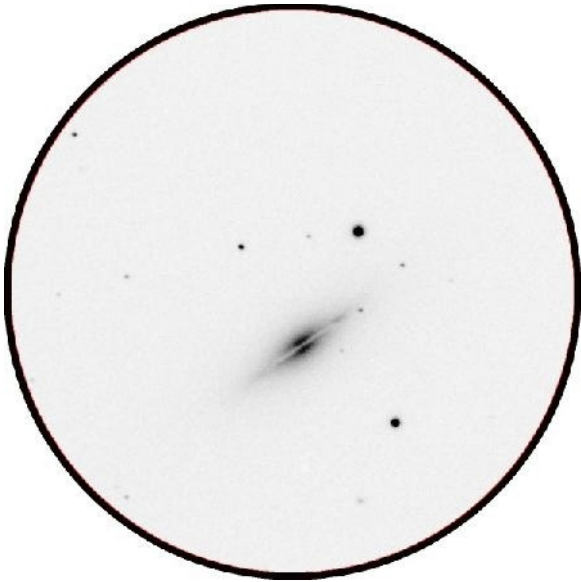
- Nu Draconis, Omicron Draconis, Psi Draconis, 39 Draconis

*Planetary Nebulae:*

- NGC 6543 (Cat’s Eye Nebula)

*Variable Stars:*

- UX Draconis



*M102, the Spindle Galaxy*

Eridanus

*Multiple Stars:*

- Acamar (Theta Eridani), Keid (Omicron<sup>2</sup> Eridani), 32 Eridani

*Planetary Nebulae:*

- NGC 1535

Gemini

Multiple Stars:

- Castor (Alpha Geminorum), Propus (Eta Geminorum), Wasat (Delta Geminorum), Kappa Geminorum, Lambda Geminorum, 15 Geminorum, Struve 1083, Struve 1124

Open Clusters:

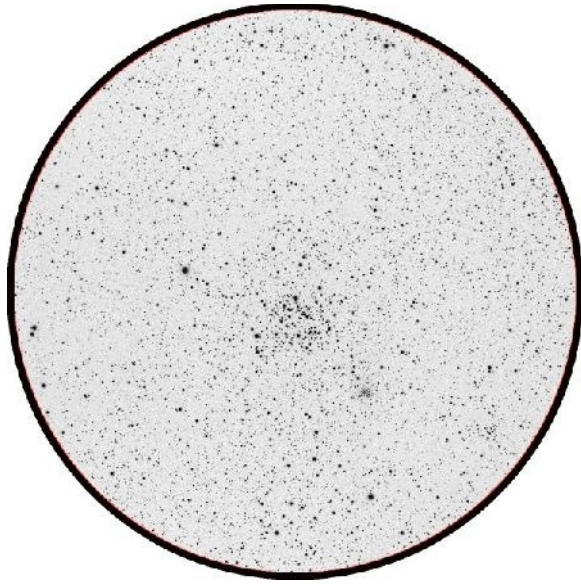
- M35, NGC 2129, NGC 2158, NGC 2266, NGC 2420

Planetary Nebulae:

- NGC 2371-72, NGC 2392 (Eskimo Nebula)

Variable Stars:

- YY Geminorum



M35 (Original Image: Oliver Stein)

Hercules

Galaxies:

- NGC 6207

Globular Clusters:

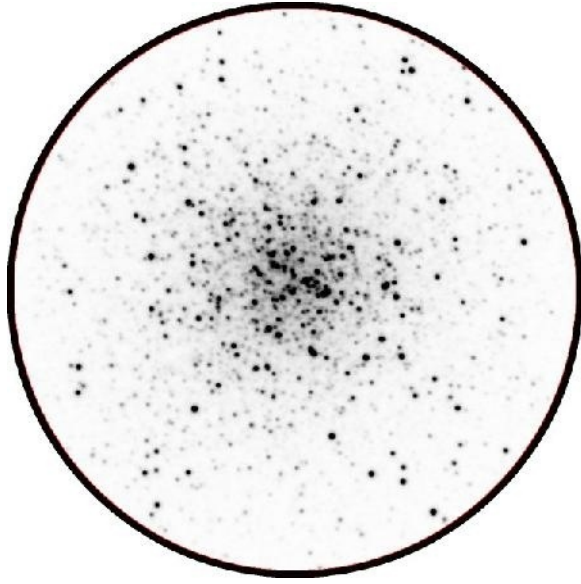
- M13 (Great Hercules Cluster), M92

Multiple Stars:

- Rasalgethi (Alpha Herculis), Delta Herculis, Mu Herculis, Rho Herculis, 95 Herculis

Planetary Nebulae:

- NGC 6210



M13, the Great Hercules Cluster

Hydra

Galaxies:

- M83

Globular Clusters:

- M48, M68

Multiple Stars:

- Epsilon Hydrae

Planetary Nebulae:

- NGC 3242 (Ghost of Jupiter)

Variable Stars:

- V Hydrae

Leo

Galaxies:

- M65, M66, M95, M96, M105, NGC 2903, NGC 2905, NGC 3377, NGC 3384, NGC 3389, NGC 3412, NGC 3489, NGC 3607, NGC 3608, NGC 3628, NGC 3632

Multiple Stars:

- Algieba (Gamma Leonis), Kappa Leonis, 54 Leonis

Variable Stars:

- R Leonis

Lacerta

Multiple Stars:

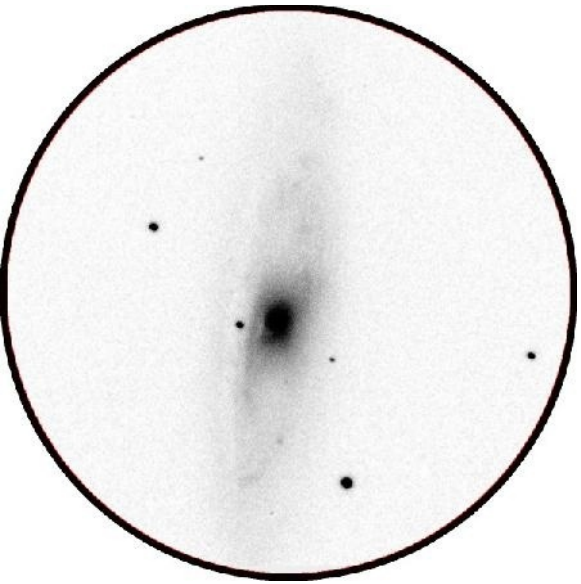
- Struve 2890

Open Clusters:

- NGC 7243, NGC 7209, IC 1434

Variable Stars:

- SS Lacertae



M65

Lepus

*Globular Clusters:*

- M79

*Multiple Stars:*

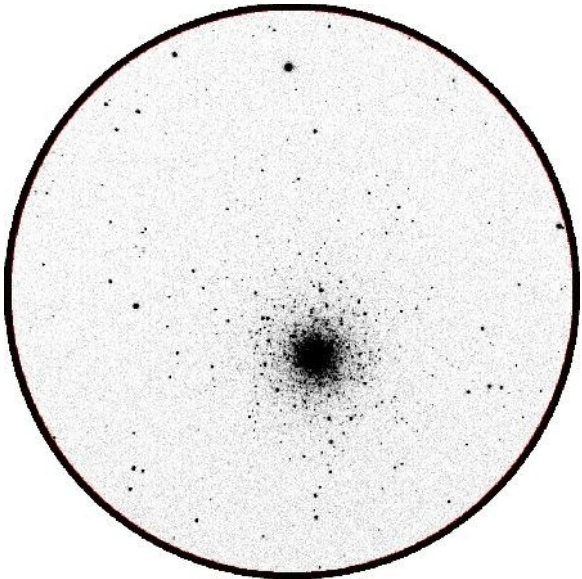
- Gamma Leporis

*Planetary Nebulae:*

- IC 418

*Variable Stars:*

- R Leporis



M79

Lupus

*Multiple Stars:*

- Eta Lupi, Xi Lupi

Lyra

*Globular Clusters:*

- M56

*Multiple Stars:*

- Delta Lyrae, Epsilon Lyrae (Double Double), Zeta Lyrae, Struve 525, Struve 2338, Struve 2392, Struve 2470, Struve 2474

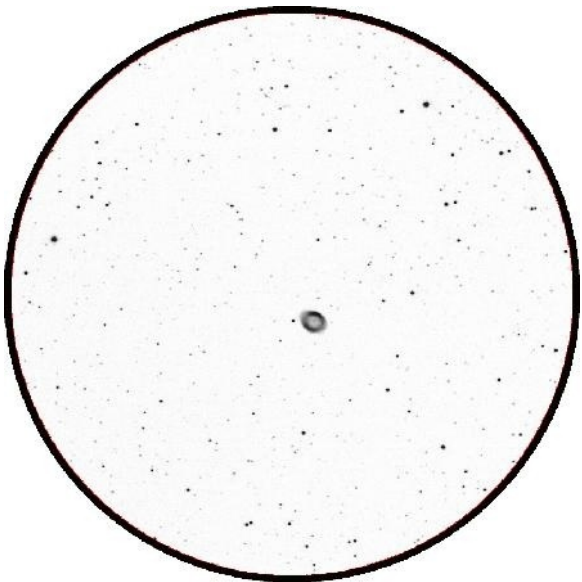
*Notable Stars:*

- Vega (Alpha Lyrae)

Lynx

*Multiple Stars:*

- 12 Lyncis



M57, the Ring Nebula

Lyra (cont.)

*Planetary Nebulae:*

- M57 (Ring Nebula)

*Variable Stars:*

- Sheliak (Beta Lyrae), T Lyrae, XY Lyrae

Monoceros

*Multiple Stars:*

- Beta Monocerotis, Epsilon Monocerotis, 14 Monocerotis, Struve 939, Struve 953

*Nebulae:*

- NGC 2236, NGC 2244 (Rosette Nebula), NGC 2251, NGC 2252, NGC 2254, NGC 2261 (Hubble’s Variable Nebula)

*Notable Stars:*

- S Monocerotis

*Open Clusters:*

- M50, NGC 2232, NGC 2244, NGC 2259, NGC 2264 (Christmas Tree Cluster), Collinder 106

Musca

*Globular Clusters:*

- NGC 4372, NGC 4833

*Multiple Stars:*

- Beta Muscae



Ophiuchus

*Galaxies:*

- NGC 6384

*Globular Clusters:*

- M9, M10, M12, M14, M19, M62, M107, NGC 6293, NGC 6342, NGC 6356, NGC 6366

*Multiple Stars:*

- Omicron Ophiuchi, 24 Ophiuchi, 36 Ophiuchi, 53 Ophiuchi, 61 Ophiuchii, 67 Ophiuchii, 70 Ophiuchii, Struve 2216

*Nebulae:*

- NGC 6572

*Notable Stars:*

- Barnard’s Star

*Open Clusters:*

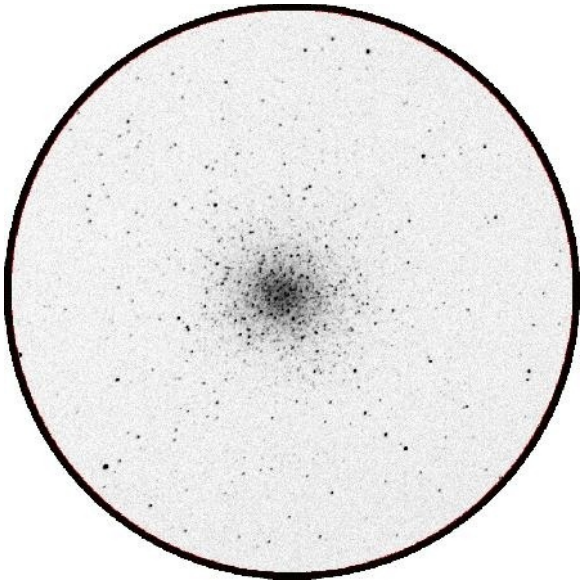
- NGC 6633, IC 4665, Collinder 350

*Planetary Nebulae:*

- NGC 6572

*Variable Stars:*

- V Ophiuchii



M14

Orion

*Multiple Stars:*

- Alnitak (Zeta Orionis), Meissa (Lambda Orionis), Mintaka (Delta Orionis), Rigel (Beta Orionis), Eta Orionis, Iota Orionis, Sigma Orionis, Theta<sup>1</sup> Orionis (Trapezium), Theta<sup>2</sup> Orionis, 32 Orionis, 42 Orionis, 52 Orionis, Struve 745, Struve 747, Struve 761

*Nebulae:*

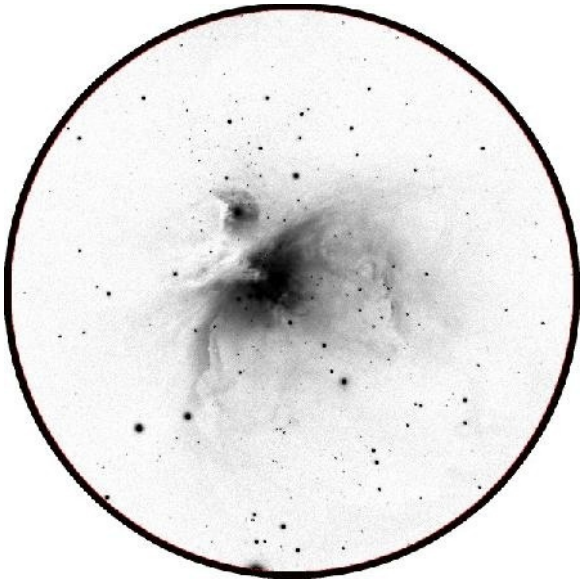
- M42 (Orion Nebula), M43, M78, NGC 1977, NGC 1981, NGC 2024, NGC 2071, NGC 2175, Barnard 33 (Horsehead Nebula)

*Open Clusters:*

- NGC 1977, NGC 2112, NGC 2169, NGC 2194

*Variable Stars:*

- Betelgeuse (Alpha Orionis), FU Orionis



M42, the Orion Nebula

Pavo

*Galaxies:*

- NGC 6744

*Globular Clusters:*

- NGC 6752

*Multiple Stars:*

- Peacock Star (Alpha Pavonis), Xi Pavonis

Pegasus

*Galaxies:*

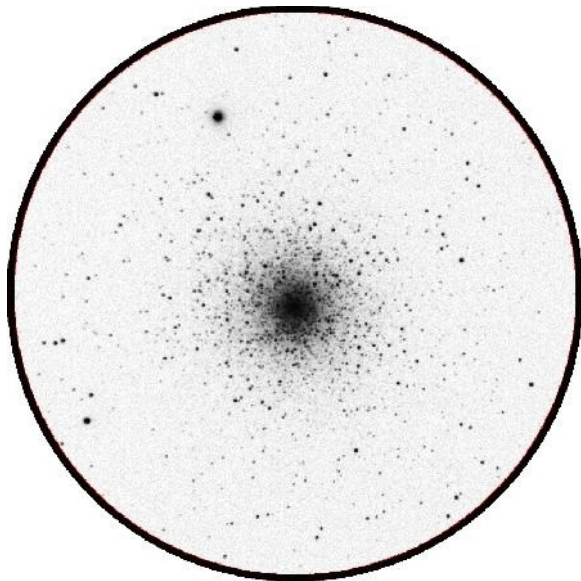
- NGC 7331

*Globular Clusters:*

- M15

*Notable Stars:*

- 51 Pegasi



*M15*

Perseus

*Multiple Stars:*

- Eta Persei

*Nebulae:*

- NGC 1491, NGC 1499, NGC 1624

*Open Clusters:*

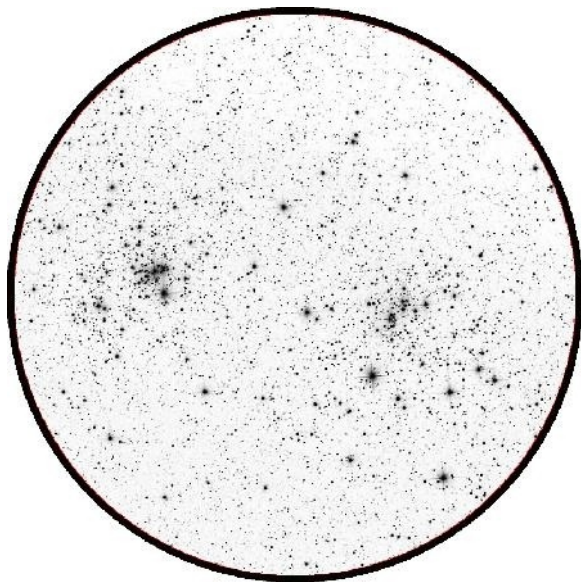
- M34, NGC 869/884 (Double Cluster), NGC 1513, NGC 1528, NGC 1545, Melotte 20 (Alpha Persei Association)

*Planetary Nebulae:*

- M76

*Variable Stars:*

- Algol (Beta Persei), Rho Persei



*NGC 869/884, the Double Cluster  
(Original Image: Rawastrodata)*

Pisces

*Galaxies:*

M74

Puppis

*Multiple Stars:*

- Markab (k Puppis), Struve 1120, Struve 1121

*Open Clusters:*

- M46, M47, M93, NGC 2423, Melotte 71

*Planetary Nebulae:*

- NGC 2438, NGC 2440

Sagittarius

*Galaxies:*

- NGC 6822

*Globular Clusters:*

- M22, M28, M54, M55, M69, M70, M75, NGC 6624

*Multiple Stars:*

- Ascella (Zeta Sagittarii)

*Nebulae:*

- M8 (Lagoon Nebula), M17 (Swan Nebula), M20 (Trifid Nebula)

*Open Clusters:*

- M18, M21, M23, M25, NGC 6530, NGC 6774

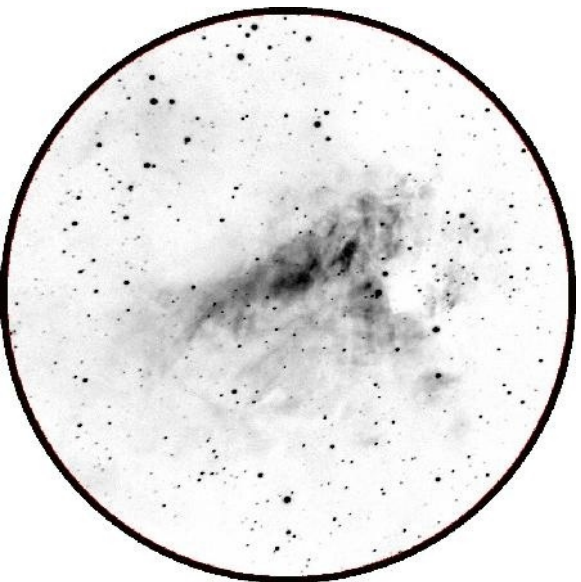
Sagitta

*Globular Clusters:*

- M71

*Multiple Stars:*

- Epsilon Sagittae, Theta Sagittae, Zeta Sagittae



*M17, the Swan Nebula*



Sagittarius (cont.)

*Planetary Nebulae:*

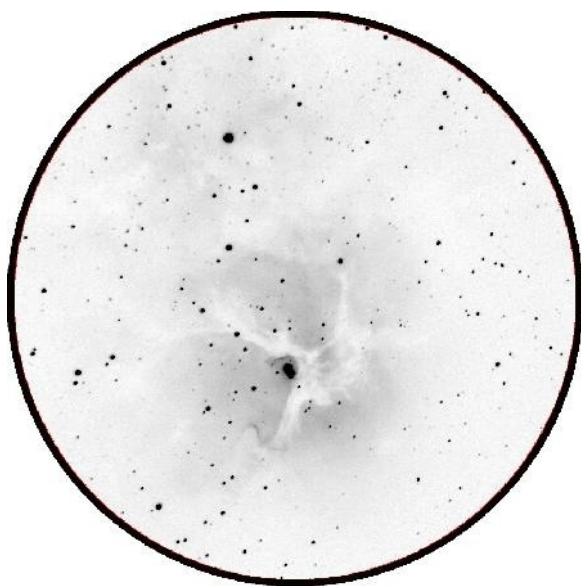
- NGC 6818

*Star Cloud:*

- M24 (Sagittarius Star Cloud)

*Variable Stars:*

- U Sagittarii



*M20, the Trifid Nebula*

Scorpius

*Globular Clusters:*

- M4, M80, NGC 6144

*Multiple Stars:*

- Antares (Alpha Scorpii), Graffias (Beta Scorpii), Nu<sup>1</sup> and Nu<sup>2</sup> Scorpii, Omega<sup>1</sup> and Omega<sup>2</sup> Scorpii, Sigma Scorpii, Xi Scorpii, Zeta Scorpii, Struve 1999

*Notable Stars:*

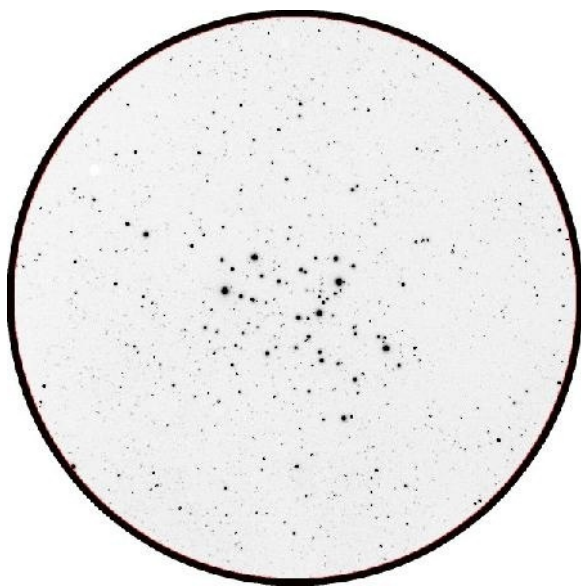
- Antares (Alpha Scorpii)

*Open Clusters:*

- M6 (Butterfly Cluster), M7 (Ptolemy’s Cluster), NGC 6231

*Variable Stars:*

- RR Scorpii



*M6, the Butterfly Cluster*

Sculptor

*Galaxies:*

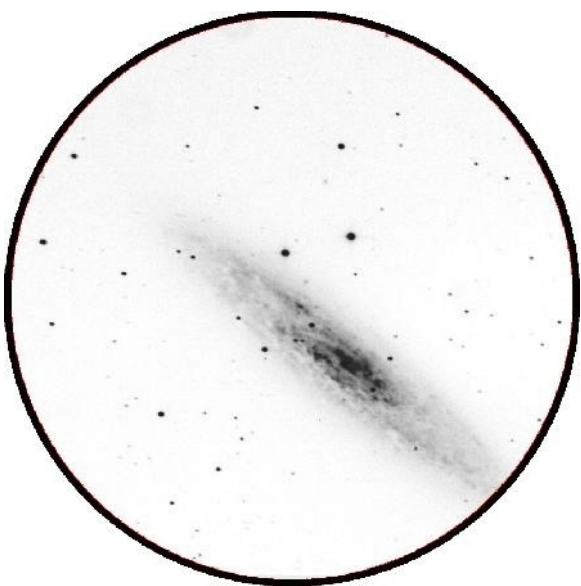
- NGC 253, NGC 7793

*Globular Clusters:*

- NGC 288

*Multiple Stars:*

- Delta Sculptoris



*NGC 253*

Scutum

*Globular Clusters:*

- NGC 6712

*Multiple Stars:*

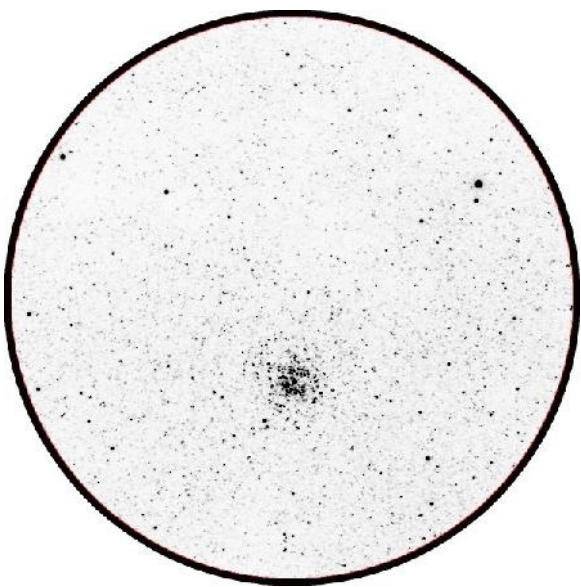
- Struve 2391

*Open Clusters:*

- M11 (Wild Duck), M26, NGC 6664

*Variable Stars:*

- R Scuti, EV Scuti



*M11, the Wild Duck Cluster*

Serpens

*Globular Clusters:*

- M5

Serpens (cont.)

Multiple Stars:

- Theta Serpentis, Struve 1985, Struve 2031, Struve 2375

Nebulae:

- M16 (Eagle Nebula)

Open Clusters:

- M16, IC 4756

Taurus

Multiple Stars:

- 75 Tauri, Struve 110, Struve 118, Struve 742

Notable Stars:

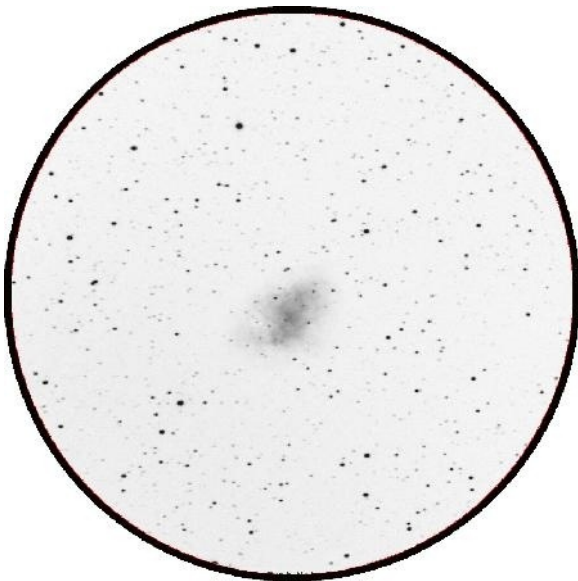
- Aldebaran (Alpha Tauri)

Open Clusters:

- Melotte 25 (Hyades), M45 (Pleiades), NGC 1647, NGC 1746, NGC 1750, NGC 1758

Supernova Remnants:

- M1 (Crab Nebula)



M1, the Crab Nebula

Triangulum

Galaxies:

- M33 (Triangulum Galaxy)

Multiple Stars:

- Iota Trianguli

Tucana

Galaxies:

- Small Magellanic Cloud

Globular Clusters:

- 47 Tucanae, NGC 362, NGC 419

Multiple Stars:

- Kappa Tucanae

Nebulae:

- NGC 249, NGC 261, NGC 346

Open Clusters:

- NGC 220, NGC 222, NGC 231, NGC 265, NGC 330, NGC 346, NGC 371, NGC 376, NGC 395, NGC 456, NGC 458, NGC 460, NGC 465

Ursa Major

Galaxies:

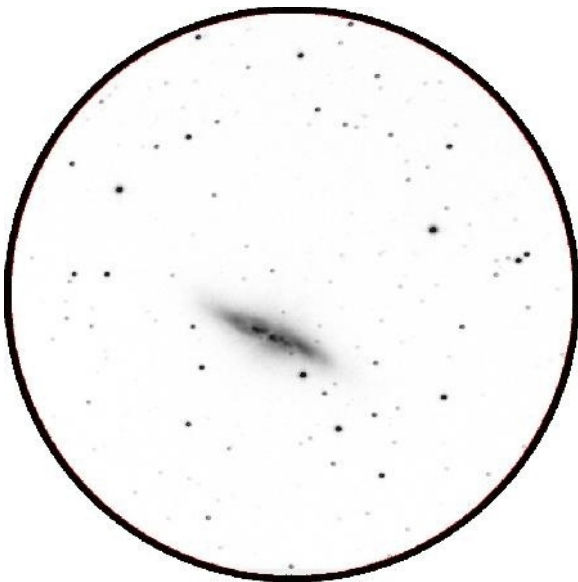
- M81 (Bode’s Galaxy), M82 (Cigar Galaxy), M101 (Pinwheel Galaxy), M108, M109, NGC 3738, NGC 3756, NGC 3898, NGC 3953, NGC 3982, NGC 3990, NGC 3998, NGC 5447

Multiple Stars:

- Dubhe (Alpha Ursae Majoris), Mizar & Alcor (Zeta and 80 Ursae Majoris, respectively), Xi Ursae Majoris, M40 (Winecke 4), Struve 1603, Struve 1795

Planetary Nebulae:

- M97 (Owl Nebula)



M82, the Cigar Galaxy

Ursa Minor

*Multiple Stars:*

- Polaris (Alpha Ursae Minoris)

Virgo

*Galaxies:*

- M49, M58, M59, M60, M61, M84, M86, M87 (Virgo A), M89, M90, M104 (Sombrero Galaxy), NGC 4387, NGC 4388, NGC 4402, NGC 4413, NGC 4425, NGC 4435, NGC 4438, NGC 4458, NGC 4461, NGC 4478, NGC 4638, NGC 4647, NGC 4754, NGC 4762

*Multiple Stars:*

- Porrima (Gamma Virginis), Struve 1689

*Notable Stars:*

- Spica (Alpha Virginis)

Volans

*Multiple Stars:*

- Epsilon Volantis, Gamma Volantis, Zeta Volantis

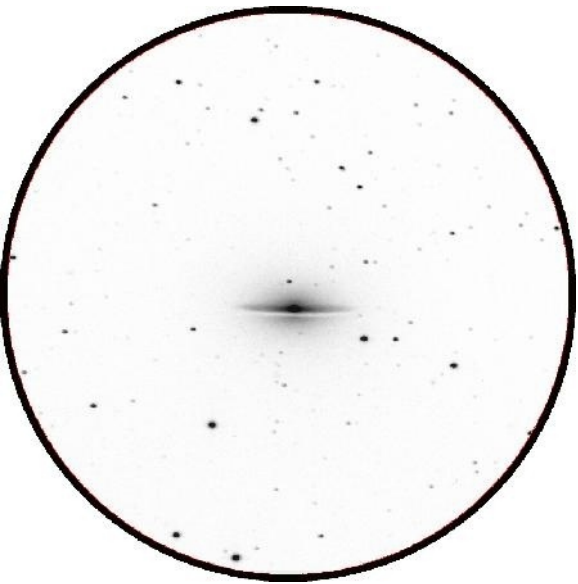
Vela

*Multiple Stars:*

- J Velorum

*Open Clusters:*

- NGC 2547



*M104, the Sombrero Galaxy*

Vulpecula

*Multiple Stars:*

- Struve 2521

*Open Clusters:*

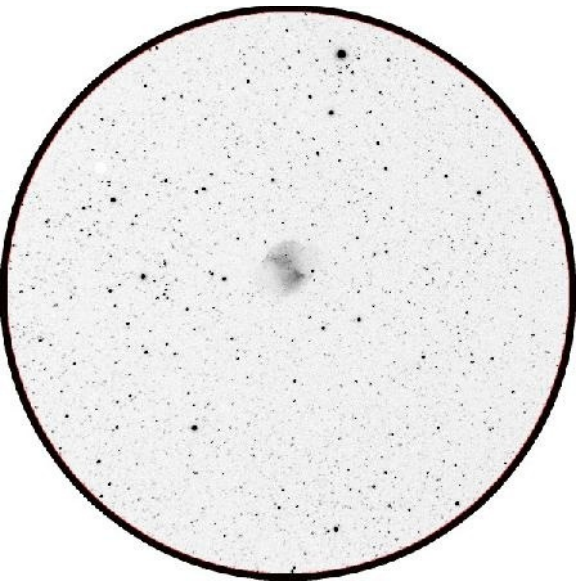
- NGC 6800, NGC 6940, Collinder 399 (The Coathanger)

*Planetary Nebulae:*

- M27 (Dumbbell Nebula)

*Variable Stars:*

- Z Vulpeculae



*M27, the Dumbbell Nebula*



	<div data-bbox="1762 248 2972 300"><div>Recommended Resources</div><hr/></div> <div data-bbox="1762 1759 2972 1785"><hr/><div>337</div></div>
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Books

Guy Consolmagno and Dan M. Davis, *Turn Left at Orion: Hundreds of Night Sky Objects to See in a Home Telescope – and How to Find Them* (Cambridge University Press, ISBN 978-0-521-153973)

Sue French, *Celestial Sampler: 60 Small-Scope Tours for Starlit Nights* (Sky Publishing, ISBN 1-931559-28-7)

Sue French, *Deep Sky Wonders: A Tour of the Universe with Sky & Telescope’s Sue French* (Firefly, ISBN 978-1554077939)

Sissy Haas, *Double Stars for Small Telescopes: More Than 2,000 Stellar Gems for Backyard Observers* (Sky Publishing, ISBN 1-931559-32-5)

Jeff Kanipe, *A Skywatcher’s Year* (Cambridge University Press, ISBN 0-521-63405-9)

E. Karkoschka, *The Observer’s Sky Atlas with 50 Star Charts Covering the Entire Sky* (Springer, ISBN 978-0-387-48537)

Alan M. MacRobert, *Star-Hopping for Backyard Astronomers* (Sky Publishing, ISBN 0-933346-68-9)

Roger W. Sinnott, *Sky & Telescope’s Pocket Sky Atlas* (Sky Publishing, ISBN 978-1931559317)

Robert Bruce Thompson and Barbara Fritchman Thompson, *Astronomy Hacks: Tips and Tools for Observing the Night Sky* (O’Reilly Media, ISBN 978-0596100605)

Robert Bruce Thompson and Barbara Fritchman Thompson, *Illustrated Guide to Astronomical Wonders: From Novice to Master Observer* (Maker Media, ISBN 978-0596526856)

Facebook Groups

*Astronomy for Beginners* - <https://www.facebook.com/groups/astro4beginners/>

*Astrophotography/Amateur Astronomy Enthusiasts* - <https://www.facebook.com/groups/astrophotographers/>

*Online Astronomy Society* - <https://www.facebook.com/groups/OASoc/>

*Telescope Addicts* - <https://www.facebook.com/groups/telescopeaddicts/>

Societies Online

*American Association of Variable Star Observers* - <http://www.aavso.org/>

*American Astronomical Society* – <http://aas.org/>

*Astronomical Society of Australia* - <http://asa.astronomy.org.au/>

*British Astronomical Society* - <http://www.britastro.org/>

*Canadian Astronomical Society* - <http://casca.ca/>

*International Association of Double Star Observers* - <http://www.iadso.org/>

*Royal Astronomical Society* - <https://www.ras.org.uk/>

Software

*Distant Suns* - <http://www.distantstars.com/> (Android, iOS)

*Mobile Observatory* - <http://zima.co/> (Android)

*Sky Safari* - <http://www.southernstars.com/products/index.html> (Android, iOS, Mac)

*Sky Tools 3* - <http://www.skyhound.com/skytools.html> (Mac, Windows)

*Star Walk* - <http://vitotechnology.com/star-walk.html> (Android, iOS, Windows)

*Starry Night* - <http://astronomy.starrynight.com/> (Mac, Windows)

*Stellarium* - <http://www.stellarium.org/> (Android, iOS, Linux, Mac, Windows)



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