

2022 Telescope/Binocular Observer's Challenge:



If you came to the Table Mountain Star Party (TMSP) with your binoculars or have access to binoculars while at the TMSP this program is for you. This program will give you an opportunity to observe 50 or more showcase objects under the ideal conditions of the pristine Eden Valley skies. It's not super challenging this year but will get progressively harder each year. You will get a button for finding just one of the objects from each category on the list. All observations must be done during the TMSP.



You must find the objects yourself, without help

from anyone else. For at least three of the objects, you must sketch what you see through your binoculars or telescope. This year the Binocular and Telescope Observer's Challenge is concentrated on stellar evolution. "From Dust to Dust".

Everything that you see in the night sky is visible to you because of light from a star. The stars themselves, nebulae, planets, moons, are visible because of starlight. Even dark nebulae are visible because they block the illumination of stars or other objects lit up by stars. We exist because early generations of stars generated the elements that make up our planet and the chemical elements required for life. It is not an understatement to say that we exist because stars exist.

The purpose of this Observer's Challenge "Stellar Evolution" is to develop in the observer an appreciation for the most common objects that they see in the night sky – the stars. Stars, like us, are born, live their lives and end their lives. Understanding this 'stellar evolution' is important to understanding how the universe works.

Our hope is that in addition to performing the observations, you will have enough information to put each object into the context of stellar evolution. In the end, observing is something you do in your mind. It's not about simply seeing the object, it's about understanding what the object is, why it is important, why it is interesting and how it fits into the story. Once you do, you'll be able to say 'Oh, WOW' for objects that you may have overlooked or may have underappreciated in the past.

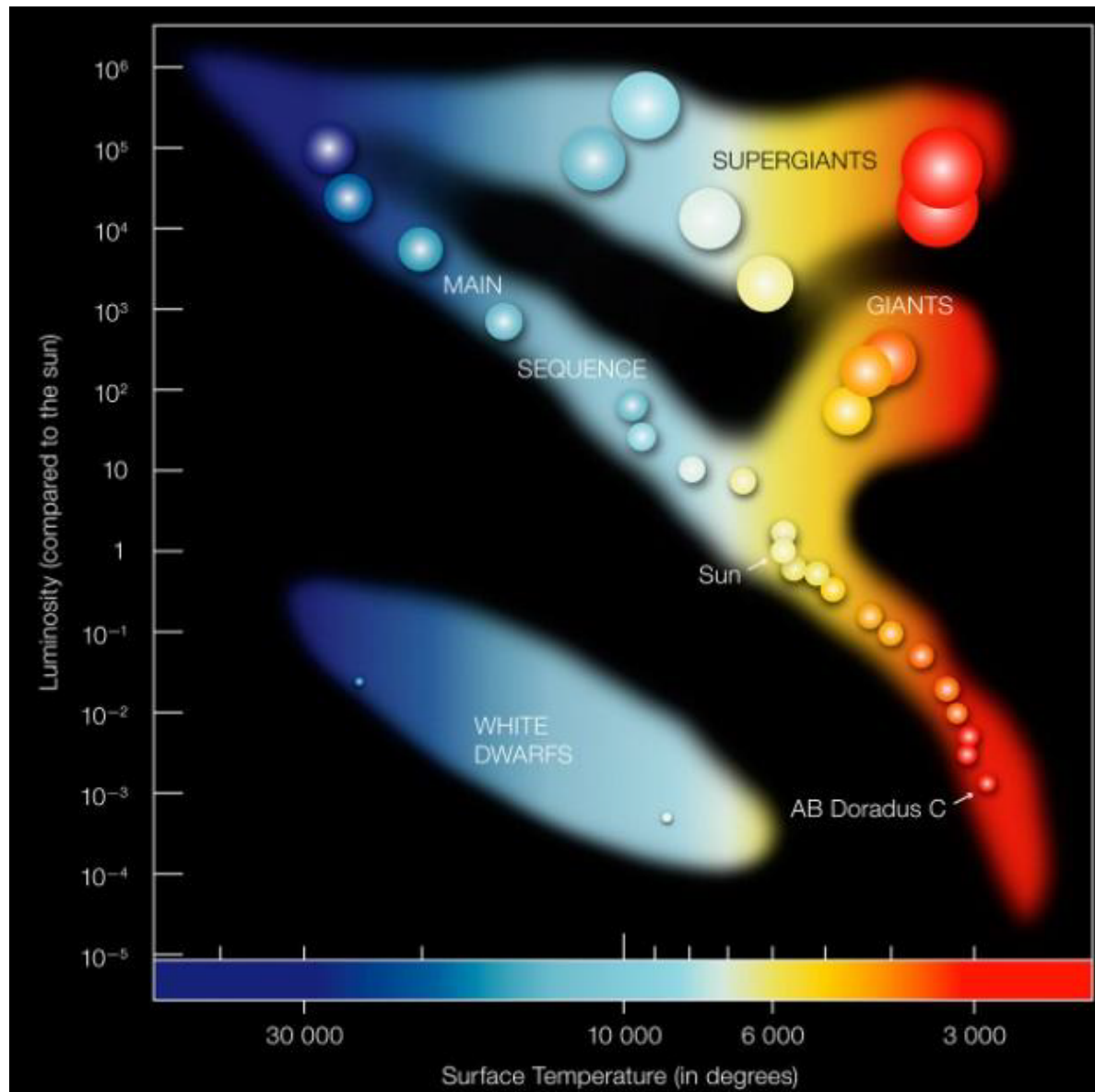
Any size binoculars or telescope can be used. All objects are within range of small to medium sized binoculars and are available for observation between 10:00PM and 4:00AM any time during the TMSP.

To receive your button, turn in your observations to **Mark Simonson or Ron Mosher (Observation Challenge Coordinators)** any time during the TMSP. If you finish the list the last night of TMSP, and we are not available to give you your button, just mail your observations to me at 1519 Ridge Dr., Camano Island, WA. 98282, or email your observations to me at

markniise@yahoo.com, and I will see that you get a button.

In the early 1900's there was quite a bit of data about stars. We had spectroscopic data for stars, and we had distances to some relatively nearby stars (developed by observing the parallax of the stars). The challenge was to organize this data in a way that helped us understand stars.

In about 1900 Ejnar Hertzsprung and Henry Norris Russell decided independently that plotting the intrinsic brightness of stars (the luminosity) on the Y axis and the temperature of the stars on the X axis might provide some interesting insight into how stars are categorized and how they work. When they did this, they found that most stars fell along a line that went from blue and hot (at the upper left) to red and cool (at the lower right). This line is called the 'main sequence'. The 'main sequence' is where a star stays for 90% or so of its lifetime. As a star ages, its location in the diagram changes. This is a function of its characteristics (color and temperature); this does not represent a change in the star's position in space.



THE LIST

OBSERVER'S NAME: _____

BINOCULARS/TELESCOPE _____

Stellar Nurseries

Type: E = Emission, R = Reflection, D = Dark

Name	Other Name	Con	RA	Dec	Mag	Type	Note
Rosette Nebula	NGC 2237	Mon	06h 30m 55s	+05° 02' 52"	8.0	E	Large and dim. Credit if you see the OC NGC2244 (Caldwell 50)
Cone Nebula	NGC2264	Mon	06h 40m 58s	+09° 53' 44"	4.1	ED	Cone is in southern part of object; the Christmas Tree cluster is at the north
Barnard 68		Sgr	17h 22m 38s	-23° 49' 34"		D	Requires dark skies
Trifid Nebula	M20	Sgr	18h 02m 28s	-22° 59' 11"	9.0	ERD	
Lagoon Nebula	M8	Sgr	18h 04m 08s	-24° 20' 15"	6.0	ED	
Eagle Nebula	M16	Ser	18h 18m 54s	-13° 51' 04"	5.6	E	Pillars of Creation
Swan Nebula	M17	Sgr	18h 20m 48s	-16° 11' 00"	9.0	E	Also called the Omega nebula
Pelican Nebula	IC5070	Cyg	20h 50m 48s	+44° 21' 00"	8.0	E	Associated with the North American Nebula, req's dark skies, diffuse
North America	NGC7000 / Caldwell 20	Cyg	20h 58m 50s	+44° 31' 00"	8.0	E	Visible unaided eye under dark skies
IC1396		Cep	21h 39m 06s	+57° 30' 00"	3.5	E	A cluster with associated nebulosity

Colorful Stars (O, B, A, F, G, K, M)

Name	Other Name	Type	Con	RA	Dec	Mag	Note
Mu And	SAO54281	A	And	00h 56m 45s	+38° 29' 58"	3.9	
HD14633	SAO37987	O	And	02h 22m 54s	+41° 28' 48"	7.5	Part of a multiple
Polaris	North Star	F	UMi	02h 31m 49s	+89° 15' 51"	2.0	Always visible to northerners
Algol	SAO45864	B	Per	03h 08m 10s	+40° 57' 20s	2.1	Eclipsing binary – drops to 3.4 every 2.867 days
Lalande 21185	SAO62377	M	UMa	11h 03m 20s	+35° 57' 21"	7.5	One of the brighter red dwarfs
Theta Boo	23 Boo	F	Boo	14h 25m 12s	+51° 51' 02"	4.1	
HD 139341	SAO64800	K	Boo	15h 36m 03s	+39° 48' 08"	6.5	A double star, both K
14 Her	SAO45933	K	Her	16h 10m 04s	+43° 49' 04"	6.6	
Zeta Oph	SAO160006	O	Oph	16h 37m 10s	-10° 34' 02"	2.6	
Rasalgethi	Alpha Her	M	Her	17h 14m 39s	+14° 23' 26"	2.8	
Rasalhague	Alpha Oph	A	Oph	17h 34m 56s	+12° 33' 34"	2.1	

Barnard's Star	HIP87937	M	Oph	17h 57m 48s	+04° 43' 26"	9.5	Red dwarf, quite dim
Vega	Alpha Lyr	A	Lyr	18h 36m 56s	+38° 47' 04"	0.0	
Ross 154	V1216 Sag	M	Sgr	18h 49m 50s	-23° 50' 12"	10.4	Flare star – hydrogen burning
Albireo A	Beta Cyg	K	Cyg	19h 30m 43s	+27° 57' 35"	3.1	Beautiful – the orange star
Albireo B	Beta Cyg	B	Cyg	19h 30m 43s	+27° 57' 35"	3.1	Beautiful – the blue star
Altair	Alpha Aql	A	Aql	19h 50m 47s	+08° 52' 10"	0.8	Altair, Vega, and Deneb form the summer triangle; all are 'A' stars
Alfirk	Beta Cep	B	Cep	21h 28m 51s	+70° 33' 39"	3.2	
Iota Peg	24 Peg	F	Peg	22h 07m 01s	+25° 20' 43"	3.8	
Matar	Eta Peg	G	Peg	22h 43m 00s	+30° 13' 17"	2.9	Binary yellow G and whiter F

Young Open Clusters

Name	Other Name	Age	Con	RA	Dec	Mag	Note
Double Cluster	NGC 884, NGC 869	~ 4 M years	Per	02h 20m 50s	+57° 07' 58"	5.3	Great sight in Binoculars!
M6	NGC6405	100 M years	Sco	17h 40m 17s	-32° 16' 17'	4.5	Butterfly Cluster
NGC6530	Col 362	2.3 M years	Sgr	18h 05m 11s	-24° 20' 54"	4.6	Imbedded in M8 (Lagoon Neb)
Wild Duck	M11	220 M years	Sct	18h 51m 06s	-06° 16' 00"	5.8	

Main Sequence Low Mass Stars

Name	Other Name	Color	Con	RA	Dec	Mag	Note
Gliese 67	HD 10307 HIP 7918	G	And	01h 41m 48s	+42° 36' 46"	5.0	.97 solar mass
Tau Cet	HIP 8102	G	Cet	01h 44m 03s	-15° 56' 06"	3.5	.81 solar mass
Eta Ari	SAO 75204	F	Ari	02h 12m 48s	+21° 12' 40"	5.2	1.3 solar mass
Beta Com	SAO 82706	G	Com	13h 11m 52s	+27° 52' 51"	4.2	1.1 solar mass
18 Sco	SAO 141066	G	Sco	16h 15m 37s	-08° 22' 15"	5.5	1.0 solar mass
Sigma Dra	SAO 18396	K	Dra	19h 32m 22s	+69° 39' 21"	4.7	.82 solar mass
61 Cyg A	HD201091 HIP104214 HR 8085	K	Cyg	21h 06m 54s	+38° 44' 58"	5.2	.63 solar mass. Brighter member of binary pair
51 Peg	SAO 90896	G	Peg	22h 57m 28s	+20° 46' 08"	5.5	1.1 solar mass (Hosts first extra-solar planet ever found)

Main Sequence Low Mass Stars (Red Giant Stars)

Name	Other Name	RA	Dec	Mag
Mirach	Beta Andromedae	01h 09m 44s	+35° 37' 13"	2.1
Arcturus	Alpha Boo	14h 15m 39s	+19° 10' 36"	-0.1
Scheat	Beta Peg	23h 03m 47s	+28° 05' 00"	2.4

Main Sequence Low Mass Stars (Carbon Stars)

Name	Other Name	RA	Dec	Mag
X Cnc	SAO 98230	08h 55m 23s	+17° 13' 53"	5.6-7.5
La Superba	Y CVn	12h 45m 08s	+45° 26' 25"	7.4-10
Herschel's Garnet Star	Mu Cep	21h 43m 30s	+58° 46' 48"	3.4-5.1

Main Sequence Low Mass Stars (Planetary Nebulae/White Dwarfs)

Name	Other Name	Con	RA	Dec	Mag	Note
Cat's Eye Nebula	NGC 6543	Dra	17h 58m 33s	+66° 38' 01"	8.1	Includes central white dwarf
Ring Nebula	M57	Lyr	18h 53m 35s	+33° 01' 47"	8.8	White dwarf in center requires large telescope
Blinking Planetary	NGC 6826	Cyg	19h 44m 48s	50° 31' 29"	8.8	
Dumbbell Nebula	M27	Vul	19h 59m 36s	+22° 43' 18"	6.7	
Saturn Nebula	NGC 7009	Aqr	21h 04m 11s	-11° 21' 47"	8.0	
Helix Nebula	NGC 7293	Aqr	22h 29m 38s	-20° 50' 11"	7.3	
Blue Snowball	NGC 7662	And	23h 25m 54s	42° 32' 06"	8.3	

Main Sequence High Mass Stars

Name	Other Name	Color	Con	RA	Dec	Mag	Note
Delta Cet	SAO 110665	B	Cet	02h 39m 29s	+00° 19' 43"	4.1	9.5 solar masses
10 Lacertae	SAO 72575	O	Lac	22h 39m 16s	+39° 03' 01"	4.9	16 solar masses

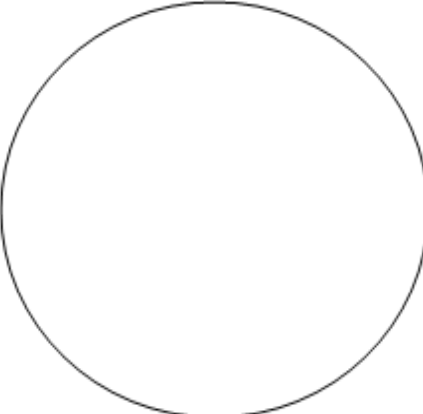
Main Sequence High Mass Stars (Red Supergiant)

Name	Other Name	RA	Dec	Mag	Note
Antares	Alpha Sco	16h 29m 24s	-26° 25' 55"	1.1	Small amplitude variable
VV Cep A	HD 208816	21h 56m 39s	+63° 37' 32"	4.8	Variable
RW Cep	SAO 34387	22h 23m 07s	+55° 57' 48"	6.0-7.3	Variable

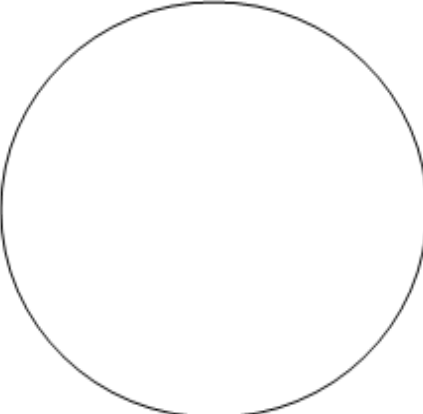
Supernova Remnant

Name	Other Name	Con	RA	Dec	Mag	Note
Veil Nebula	NGC 6960	Cyg	20h 45m 42s	+30° 43' 00"	10.6	Very Large

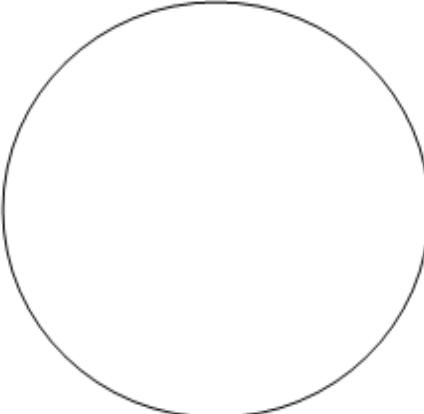
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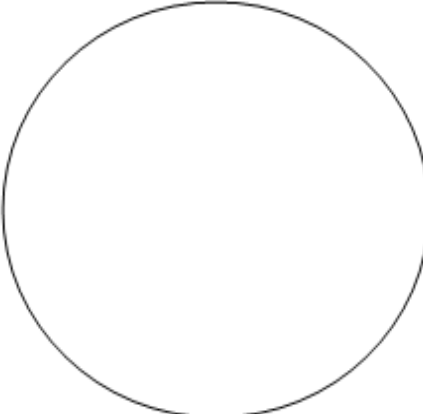
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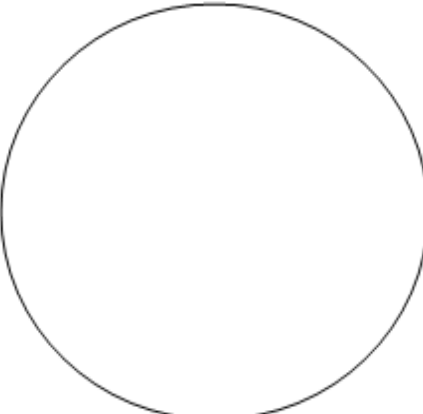
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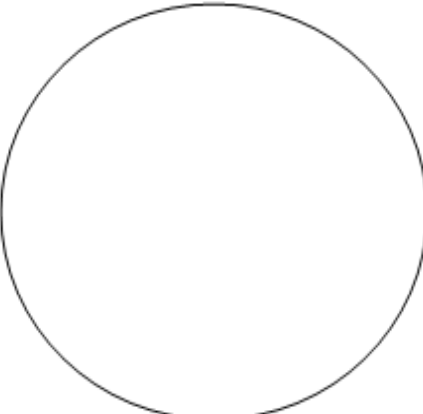
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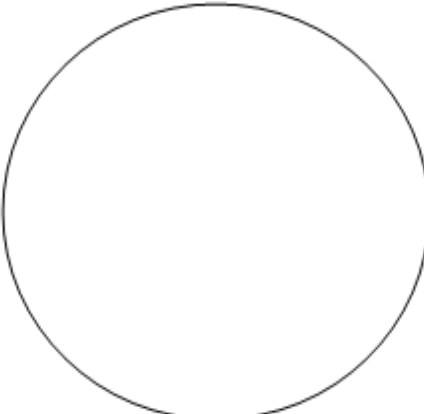
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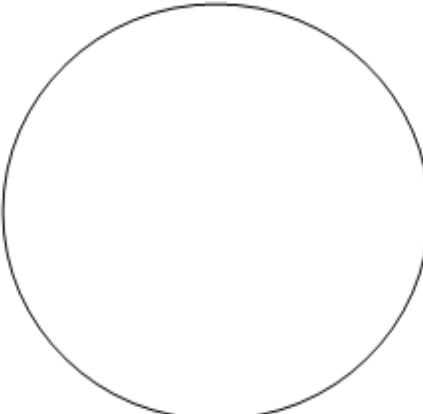
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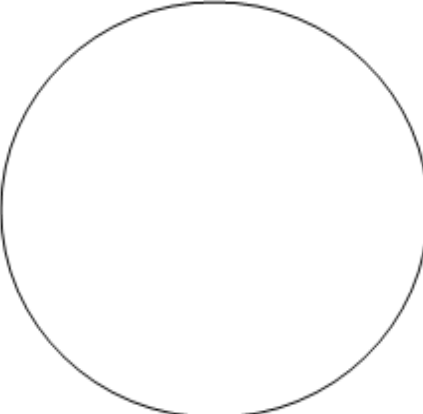
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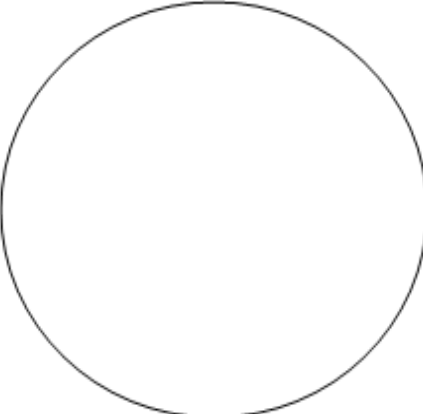
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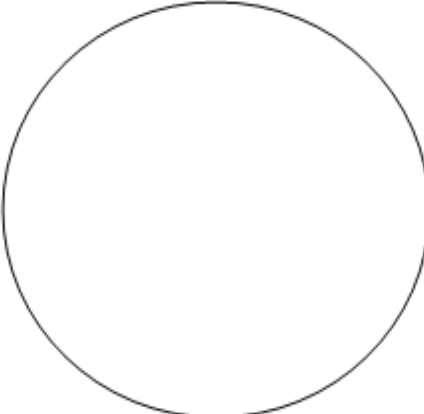
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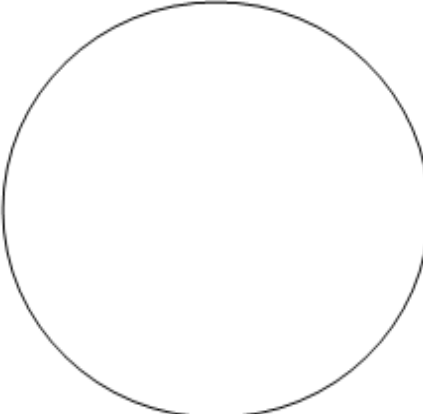
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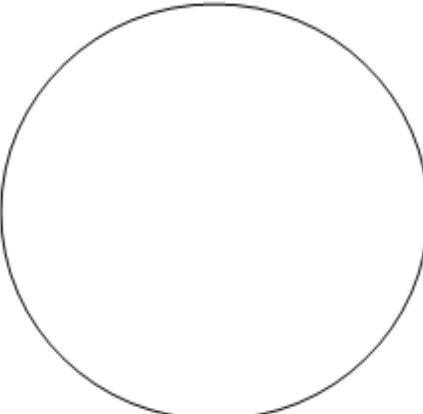
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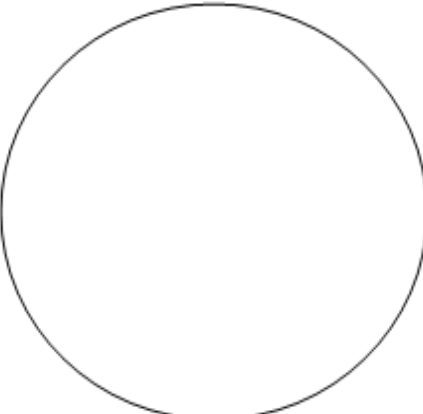
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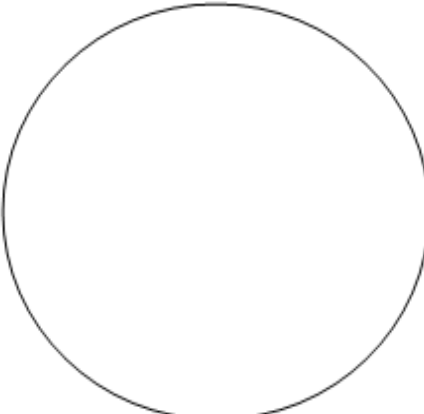
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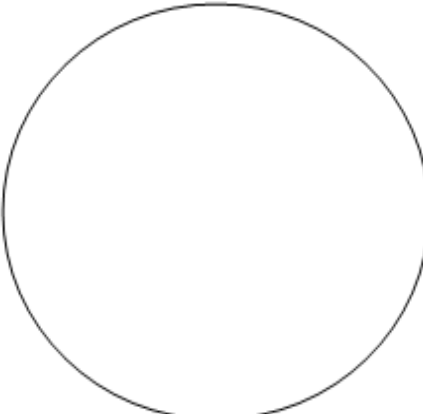
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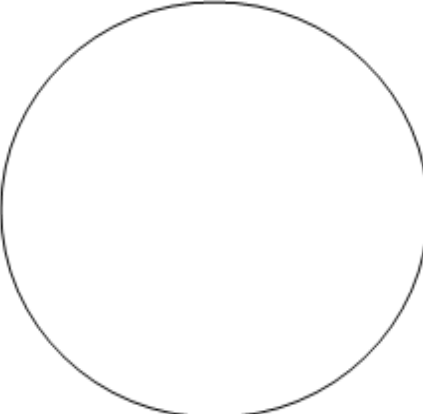
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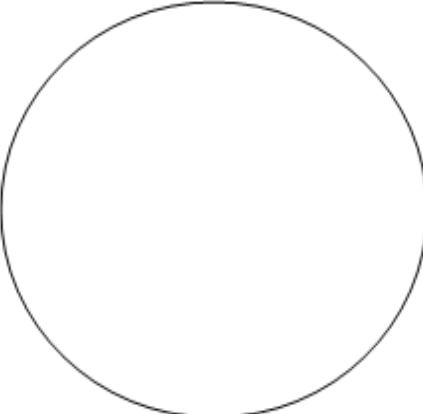
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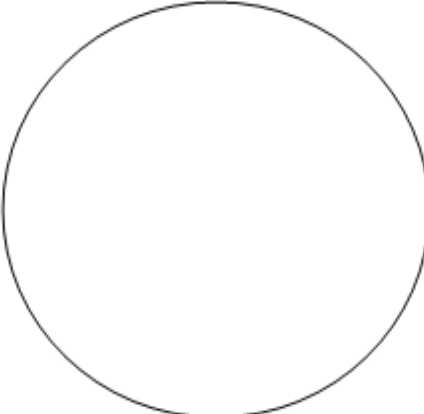
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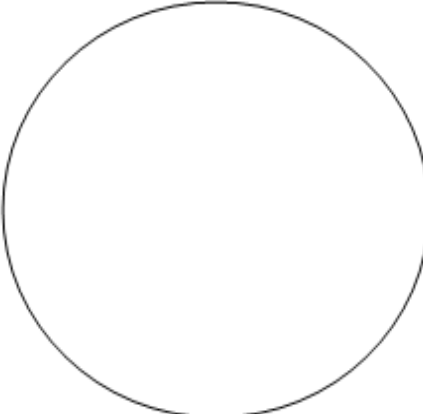
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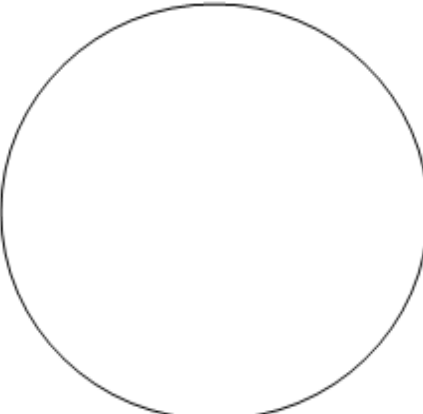
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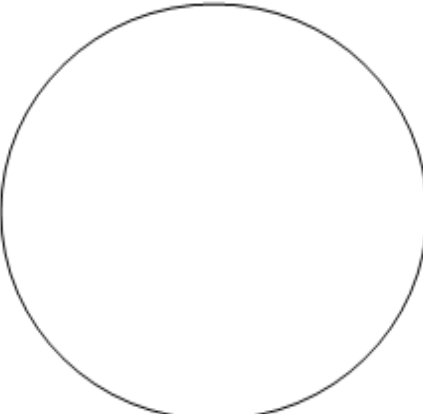
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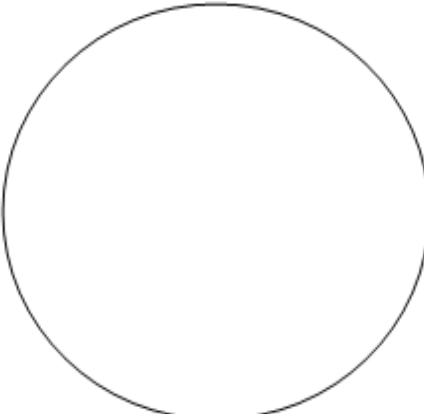
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