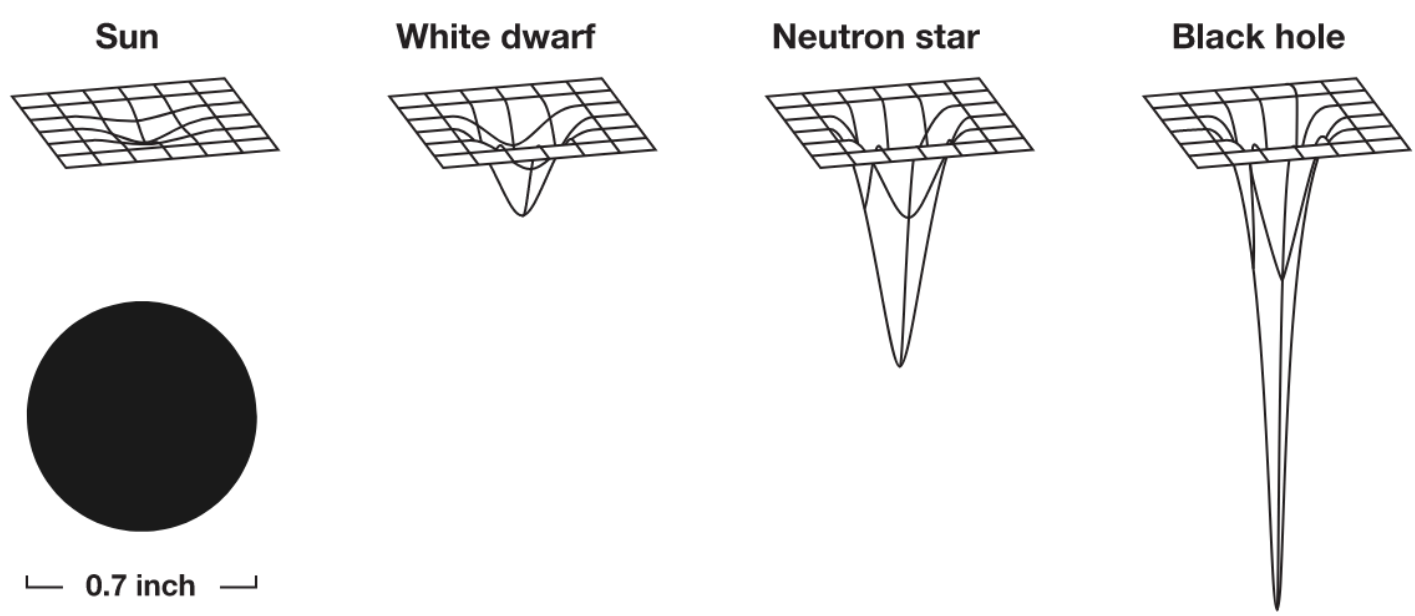
Black Hole Formation Lab- CLASS SET

PROCEDURE

1. Create a data table on the Student Sheet.
2. Blow up the balloon almost completely and tie off the end.
3. Cover the inflated balloon with the sheets of aluminum foil to make your Star.
4. DO NOT POP YOUR BALLOON!
5. Measure the circumference of the Star using the string and ruler.
6. Record this on the data table for Trial 1 circumference.
7. Place the your Star on the scale and record the mass in grams.
8. Record this on the data table for Trial 1 mass
9. Think about where the <u>center of gravity</u> is for your star.
10. Now, your star is going to die in a SUPERNOVA!
11. Pop your balloon and gently squeeze the aluminum foil into a smaller sphere **<u>about half</u>** the original size.
12. DO NOT COMPRESS IT AS TIGHTLY AS POSSIBLE (yet).
13. Repeat steps 5-8 and record your data in Trial 2 on your data table.
14. Squeeze the tinfoil (collapsed Star) and make it as small as possible
15. Repeat steps 5-8 and record your data in Trial 3 on your data table.
16. Complete the radius, volume, and density calculations for all three trials.
    a. $Radius = \frac{circumference}{6.3} \times 0.01$ (round to the nearest 0.001)
    b. $Volume = 1.33 \times 3.14 \times radius \times radius \times radius$
    c. $Density = \frac{mass}{volume}$



Name: _____

Date: _____ Period: _____

Black Hole Student Sheet

DATA TABLE

Create a data table below that includes the following information

Trials 1, 2, and 3	Radius (m)	Density (g/m^3)
Circumference (cm)	Volume (m^3)	Mass (g)

ANALYSIS QUESTIONS

1. Explain/diagram how each property of the 'Star' changes during the lab. Use evidence from the lab.
    a. Volume

    b. Mass

    c. Density

Name: _____

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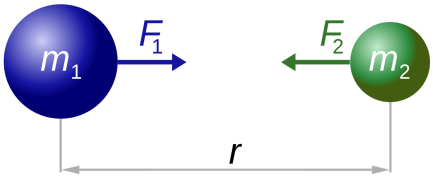
Black Hole Student Sheet

2. This lab models how black holes form from very large collapsing stars. If our sun became a black hole, what would happen to:
   a. the amount of gravity that affects the Earth and the other planets?

   b. the amount of gravity <u>at the surface</u> of the sun/black hole?



$$F_1 = F_2 = G\frac{m_1 \times m_2}{r^2}$$

4 Highly Proficient	**3** Proficient	**2** Close to Proficient	**1** Developing
❏ I can apply my knowledge of gravity to the change of a star to a black hole. ❏ My answers include detai and evidence.	❏ Data table is complete and correct ❏ The changes of volume, mass and density are well understood. ❏ I can show some understanding of the similarities and differences in gravity between a star and a black hole.	❏ Data table is incomplete or incorrect ❏ I misunderstand the changes in volume, mass and/or density. ❏ I misunderstand the effect of distance on gravity. ❏ My work is <u>incomplete</u>.	❏ Not attempted or mostly incomplete.