Name _____

Class _____

1. After weighing all of the pennies, record the weights in the table below. Then subtract the weight of the cup (number of pennies = 0) from each value and record the actual weight of the pennies in the last column of the table.

Number of Pennies	Force (Newtons)	Force (pennies) – Force (cup)
0		
10		
20		
30		
40		
50		
60		
70		
80		
90		
100		

2. Sketch and label the graph showing the number of pennies and the force readings.

3. What does the point on the *y*-axis where the number of pennies = 0 represent?

_____

_____

4. As the number of pennies increases, what happens to the force of gravity or their weight on Earth?

_____

_____

5. What correlation does the graph show between force/weight in Newtons and the number of pennies?

_____

_____

6. What is the average rate of change in force for every 10 pennies added to the cup? How did you figure this out?

_____

_____

7. On Earth, how much would 1,000, 10,000, 100,000, and 1,000,000 pennies weigh in Newtons?

_____

_____

8. Use the gravity conversion factors to complete the table of how much the pennies would weigh on the moon, Mars, Saturn, and Jupiter. (Use your answers from Question 7 to complete the data for the Earth.)

Celestial Body	**Gravity Conversion Factor**	**Weight of Pennies in Newtons**				
		100 pennies	1,000 pennies	10,000 pennies	100,000 pennies	1,000,000 pennies
Earth	1.00					
Earth's moon	0.17					
Mars	0.38					
Saturn	0.92					
Jupiter	2.36					

For example, a treasure hunter could lift six times the weight on the moon as on Earth. This is because the moon has a smaller mass and diameter so the weight in Newtons of the treasure is only 1/6 as much as on Earth.

9. For every 10 pennies you lift on Earth, you can only lift about 4 pennies on Jupiter. Explain why this statement makes sense.

_____

_____

10. The mass of 100 pennies will be _____ at every location in the universe. The weight of 100 pennies is different. Since weight is a result of the pull of gravity on a mass, the weight of 100 pennies would _____ depending on its location. Weight on Earth is a measure of the _____ force between the Earth and the 100 pennies and the distance of the pennies from the center of the _____. Since the mass of Earth's moon is smaller, it exerts only 1/6 of the Earth's gravity on the pennies. Therefore, 100 pennies should weigh _____ on the moon.

11. The weight of 100 pennies will _____ in different locations. _____ is a measure of the gravitational force between the mass of Earth, the moon, Mars, Saturn, or Jupiter and the pennies. The different masses and diameters of these celestial bodies cause different amounts of _____ pull on the pennies. The pennies also pull back on the large bodies.

Conclusion

12. 100 pennies weigh the *least* on _____. This is because the _____ and diameter are _____ so the gravitational pull on the pennies is _____ .

13. 100 pennies weigh the *most* on _____. This is because the _____ and diameter are _____ so the gravitational pull on the pennies is _____ .

14. If you could lift 100 pounds of pennies on Earth, how many pennies could you lift on each of the other celestial bodies? How much money would that be in each case?

Celestial Body	Number of Pennies You Could Lift	Amount of Money You Could Lift
Earth's moon		
Mars		
Saturn		
Jupiter		

15. If I could keep all the treasure in pennies that I could lift, I would bury my treasure on

_____ .

Application

16. If a treasure hunter can lift 50 pounds of pennies on Earth, what is the maximum number of pounds this person can lift on each of the other celestial bodies? (Round to the nearest pound.)

50 pounds on Earth

_____ pounds on Earth's moon

_____ pounds on Mars

_____ pounds on Saturn

_____ pounds on Jupiter