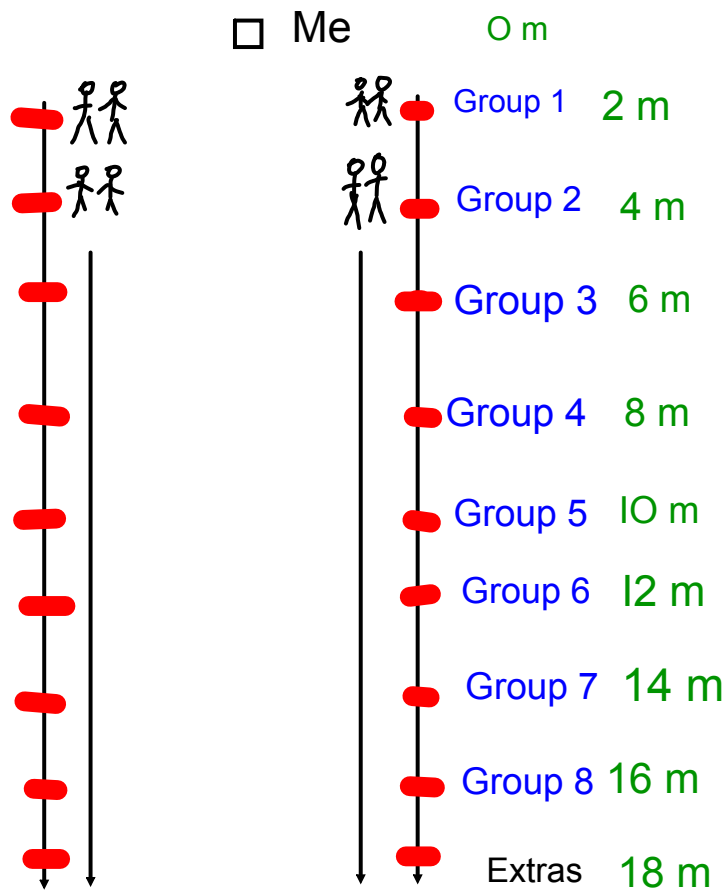




# Marble Labs



Name \_\_\_\_\_ Per. \_\_\_\_\_  
 Date \_\_\_\_\_

**Marble Lab # 1**

You can measure the time required for an object to travel a certain distance. In this lab you will calculate the average time it takes for a marble to roll a certain distance on a low and high ramp.

What is a reference point?  
 \_\_\_\_\_  
 \_\_\_\_\_

Question # 1: What is the relationship between height of the ramp and the average time the marble travels?

Hypothesis # 1: If the height of the ramp increases, then the average time the marble travels will

Collect data of a marble rolling down a low and high ramp.  
 Calculate the average time to the nearest hundredth.

Distance (m)	Low Ramp			High Ramp		
	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Trial 1	Trial 2	Average Time (s)
2						
4						
6						
8						
10						
12						
14						
16						
18						

Per. 1

* Distance (m)	<u>Low Ramp</u> *			<u>High Ramp</u> *		
	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Trial 1 (s)	Trial 2 (s)	Average Time (s)
2			1.5			1.3
4			2.5			2.1
6			3.5			3.0
8			4.1			3.7
10			5.4			4.6
12			6.6			5.8
14			7.6			6.6
16			8.8			7.9
18			10			8.8

## Per. 2

	Low Ramp			High Ramp		
Distance (m)	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Trial 1 (s)	Trial 2 (s)	Average Time (s)
2			0.7			0.6
4			2.2			2.1
6			3.4			3.0
8			4.3			4.0
10			5.1			4.4
12			6.3			5.7
14			7.7			6.7
16			8.9			7.9
18			9.8			8.8

## Per. 3

	Low Ramp			High Ramp		
Distance (m)	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Trial 1 (s)	Trial 2 (s)	Average Time (s)
2			2.0			1.2
4			2.3			1.8
6			3.5			2.9
8			4.7			4.1
10			5.4			4.8
12			6.6			5.8
14			7.8			6.8
16			9.0			8.1
18			10.2			9.0

## Per. 4

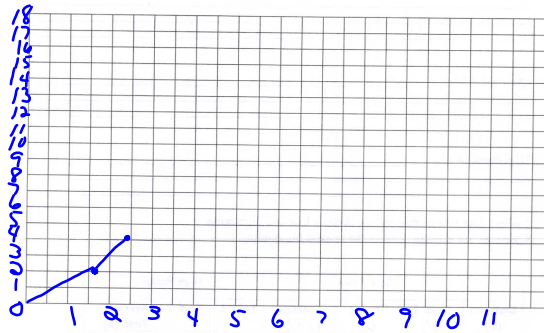
	Low Ramp			High Ramp		
Distance (m)	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Trial 1 (s)	Trial 2 (s)	Average Time (s)
2			1.5			1.2
4			2.3			1.9
6			3.4			3.0
8			4.1			3.9
10			5.3			4.7
12			6.6			5.8
14			7.6			7.5
16			9.3			8.2
18			10.4			8.9

## Per. 7

	Low Ramp			High Ramp		
Distance (m)	Trial 1 (s)	Trial 2 (s)	Average Time (s)	Trial 1 (s)	Trial 2 (s)	Average Time (s)
2			1.6			1.2
4			2.4			2.4
6			3.4			2.9
8			4.6			4.1
10			5.3			4.8
12			6.5			5.6
14			7.6			6.9
16			8.9			7.9
18			10.1			9.1

*Graphing Time and Distance*

Graph # 1 - Create a double line time and distance graph.  
Title - Average Time and Distance of a Marble on a Low and High Ramp  
X axis - Average Time (remember units)  
Y axis - Distance (remember units)  
Make a Key for the Low and High Ramps  
Scale correctly, plot your points and connect the dots.



What was the reference point used in this lab?

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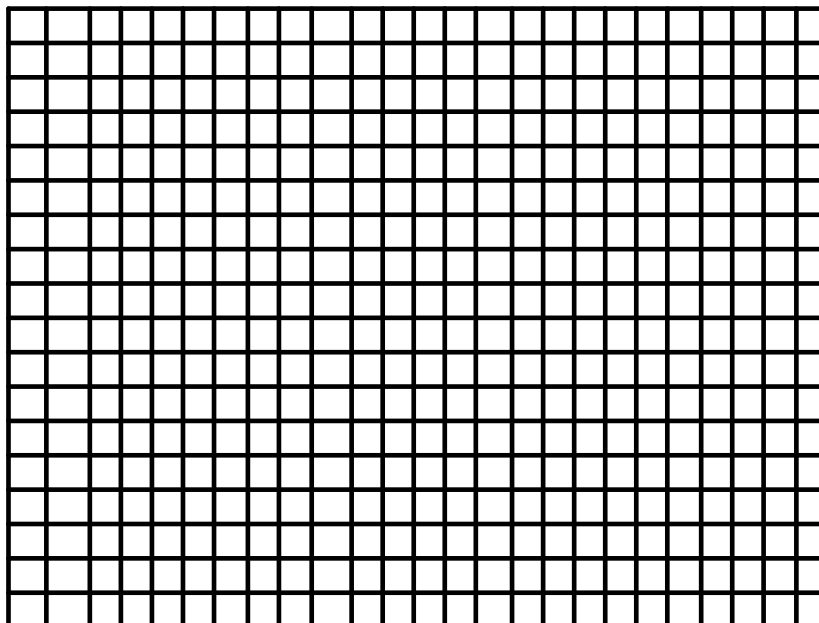
What is the relationship between the height of a ramp and the average time a marble travels? (Question # 1 and Graph # 1) Answer the question and use quantitative data to support your answer.

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Name \_\_\_\_\_ Per. \_\_\_\_\_  
 Date \_\_\_\_\_

**Marble Lab # 2**

With the measurements of distance and time, you can determine the average speed of an object by using the following formula:

$$\text{Average speed} = \text{distance}/\text{time}$$

Question # 2: What is the relationship between the height of the ramp and the average speed of the marble?

Hypothesis # 2: If the height of the ramp increases, then the average speed of the marble will increase.

Enter the Average Times for the low and high ramp from the Marble Lab # 1 data table. Calculate the average speed to the nearest tenth.

Distance (m)	Low Ramp		High Ramp	
	Average Time (s)	Average Speed (m/s)	Average Time (s)	Average Speed (m/s)
2				
4				
6				
8				
10				
12				
14				
16				
18				

Per. 1

Distance (m)	Low Ramp		High Ramp	
	Average Time (s)	Average Speed(m/s)	Average Time (s)	Average Speed(m/s)
2	1.5		1.3	
4	2.5		2.1	
6	3.5		3.0	
8	4.1		3.7	
10	5.4		4.6	
12	6.6		5.8	
14	7.6		6.6	
16	8.8		7.9	
18	10.0		8.8	

Per. 2

$$s = \frac{d}{t}$$

	Low Ramp		High Ramp	
	*	*	*	*
Distance (m)	Average Time (s)	Average Speed(m/s)	Average Time (s)	Average Speed(m/s)
2	0.7	2.9	0.6	3.3
4	2.2		2.1	
6	3.4		3.0	
8	4.3		4.0	
10	5.1		4.4	
12	6.3		5.7	
14	7.7		6.7	
16	8.9		7.9	
18	9.8		8.8	

Per. 3

$$s = \frac{d}{t}$$

	Low Ramp		High Ramp	
Distance (m)	Average Time (s)	Average Speed(m/s)	Average Time (s)	Average Speed(m/s)
2	2.0	1.0	1.2	1.7
4	2.3		1.8	
6	3.5		2.9	
8	4.7		4.1	
10	5.4		4.8	
12	6.6		5.8	
14	7.8		6.8	
16	9.0		8.1	
18	10.2		9.0	

Per. 4

$$s = \frac{d}{t}$$

	Low Ramp		High Ramp	
Distance (m)	Average Time (s)	Average Speed(m/s)	Average Time (s)	Average Speed(m/s)
2	1.5	1.3	1.2	1.7
4	2.3		1.9	
6	3.4		3.0	
8	4.1		3.9	
10	5.3		4.7	
12	6.6		5.8	
14	7.6		7.5	
16	9.3		8.2	
18	10.4		8.9	

Per. 7

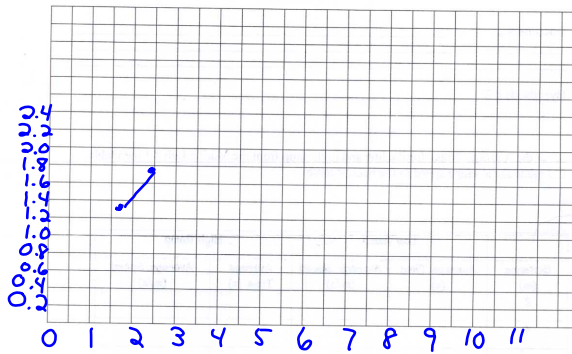
$$s = \frac{d}{t}$$

	Low Ramp		High Ramp	
Distance (m)	Average Time (s)	Average Speed(m/s)	Average Time (s)	Average Speed(m/s)
2	1.6	1.3	1.2	1.7
4	2.4		2.4	
6	3.4		2.9	
8	4.6		4.1	
10	5.3		4.8	
12	6.5		5.6	
14	7.6		6.9	
16	8.9		7.9	
18	10.1		9.1	



*Graphing Time and Speed*

Graph # 2 – Create a double line time and speed graph.  
 Title - Average Time and Speed of a Marble on a Low and High Ramp  
 X axis - Average Time (remember units)  
 Y axis – Average Speed (remember units)  
 Make a Key for the Low and High Ramps  
 Scale correctly, plot your points and connect the dots.



What is the relationship between the height of a ramp and the average speed a marble travels? (Question # 2 and Graph # 2) Answer the question and use quantitative data to support your answer.

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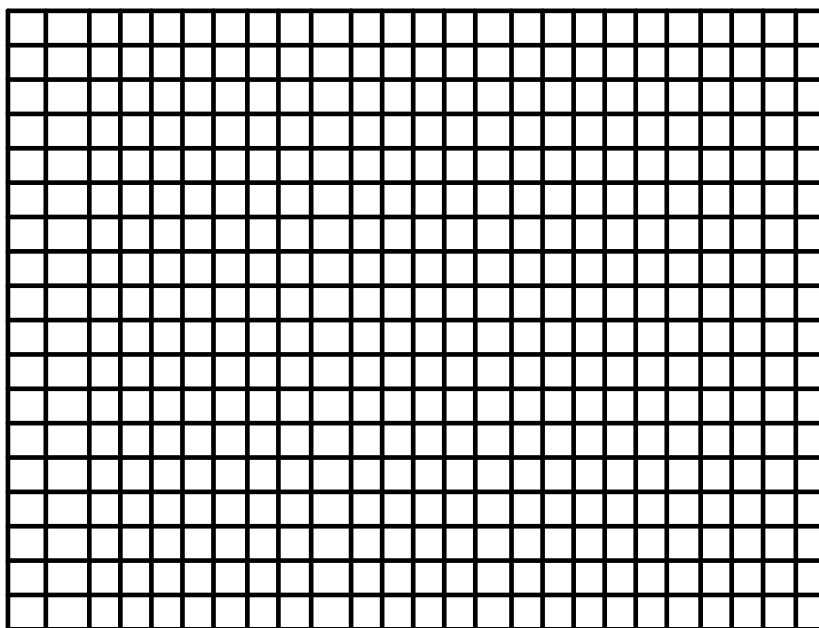
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Is the marble traveling at a constant speed during this lab? Explain your answer.

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Name \_\_\_\_\_  
Date \_\_\_\_\_ Per. \_\_\_\_\_

**Marble Lab # 3**

Would you get the same speed at 18 m if you dropped a larger sized marble on a low and high ramp?

Speed = distance/time

Question # 3: What is the relationship between the size of the marble and the speed of the marble?

Hypothesis # 3: If the size of the marble increases, then the speed of the marble will...

Distance (18m)	Low Ramp		High Ramp	
	Time (s)	Speed (m/s)	Time (s)	Speed (m/s)
Small				
Large				

Analyze the data. What is the relationship between the size of the marble and the speed the marble travels? (Question # 3 and Data Table # 3) Answer the question and use quantitative data to support your answer.

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<https://www.youtube.com/watch?v=OzUyc7wPgTA>

