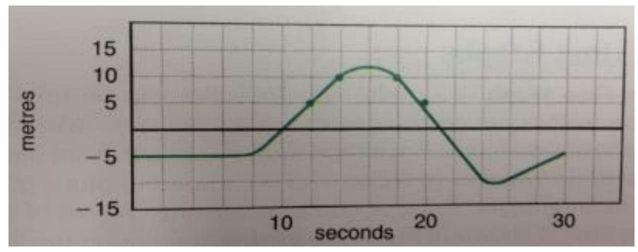
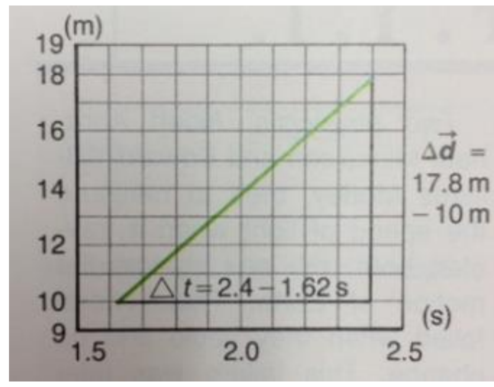
Graphing Uniform Motion

Graphing

1. Find the ***average velocities*** from the graph to the side of this question
   a. Between t = 10.0 and 12.0 s
   b. Between t = 14.0 and 18.0 s
   c. Between t = 20.0 and 24.0 s
   d. Between t = 26.0 and 30.0 s



2. Use the figure to the right to find the sprinter's ***velocity*** at 2.0 s.



3. Using the table of values below, plot a ***displacement-time*** graph representing the data.

Displacement (m) [E]	Time (s)
0.0	0.0
10	1.0
20	2.0
20	3.0
10	4.0
0	5.0

4. From your graph in question 3, calculate the value of the ***slope*** of each time interval. What does this tell you?

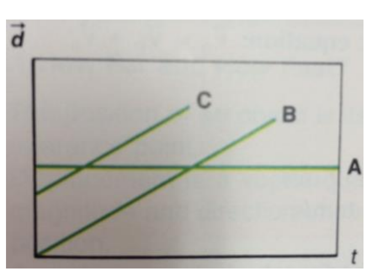
5. A car moves along a straight road at a constant velocity of +75 km/h for 4.0 h, stops for 2.0 h, and then drives in the reverse direction at the original speed for 3.0 h.
   a. Plot a ***velocity-time graph*** for the car.
   b. Find the ***area under the curve*** for the first 4.0 h. What does this represent?
   c. Explain how to use the graph to find the distance the car is from its starting point at the end of the 9.0 h.

Theory

1. Answer the following questions briefly for each situation.
   a. What variable goes on the y-axis in a displacement-time graph?
   b. What does the slope tell you in a displacement-time graph?
   c. What does the slope tell you in a velocity-time graph?
   d. How can we calculate distance from a velocity-time graph?

2. Sketch ***position-time graphs*** for these four motions:
   a. Starting at a positive position with a positive velocity.
   b. Starting at a negative position with a smaller positive velocity.
   c. Remaining at a negative position.
   d. Starting at a positive position with a negative velocity.

3. Sketch a ***velocity-time graphs*** for lines, A, B, and C from the graphs shown below.



Practice (Remember to be as accurate as possible)

Question: How does average speed change as a ramp incline changes? Is there an incline where the ramp will cause the average speed to decrease? If so, what degree do you think will happen?

Hypothesis:
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Materials: (Make a list of materials used in this experiment)

Procedure:

1. Get the necessary materials for the experiment.
2. Have one or more group members set up the ramp and measure the incline.
3. Record the degree of the incline on the data table.
4. Mark 1.00 meter from the bottom of the ramp to a 'finish line'
5. Place the ball at the top of the ramp and mark with a piece of tape where the ball is to be released.
6. Release the ball but only start recording the time when it touches the ground.
7. Record the time it takes the cart to travel the 1.00 meter.
8. Calculate the average speed of the ball.
9. Do 2 trial runs of each angle and take an average time. Record this answer in the chart.
10. Repeat steps 2-9 until you have 7 successful degree measurements. Each trial should be at least 5-10 degrees away from other degree measurements.

Data Table: (Note: place degrees in increasing order on the data table)

Trial	Degree (°)	Distance (m)	Time (s)	Speed (m/s)
1				
2				
3				
4				
5				
6				
7				

Graphing: On a separate sheet of graph paper, make a distance time graph. Draw and label the trial runs from the data table on your graph. In the end you will have 7 different lines on one graph. Staple it to the back of this sheet when it is ready to be handed in.

Conclusion: What can you analyze from your data table in regards to the speed of the ball based on the incline of the ramp? What your hypothesis correct? Explain.

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