Matter in Motion

Sci #

Chapter 5

Draw or tiny downloads: showing the following examples

Force	Unbalanced force
Balanced force	Net force
Weight vs mass	Projectile motion
4 Different types of friction:	

Name: _____ Sci Number: ___ period:__

Parent Sig_____

Vocabulary: Section 1 & 2

Word	Match the Definition with the word:
1. motion ____	A. the rate at which an object moves; speed depends on the distance traveled and the time taken to travel that distance
2. speed ____	B. the SI unit of forcethe SI unit of force
3. velocity ____	C. an object's change in position over time when compared with a reference point
4. acceleration ____	D. the force that results from combining all the forces exerted on an object
5. force ____	E. the rate at which velocity changes; an object accelerates if its speed changes, if its direction changes, or if both its speed and its direction change
6. Newton(N) ____	F. the speed of an object in a particular direction
7. Net force ____	G. a push or a pull; all forces have both size and direction

1. On pg 106. Why is lacrosse a good example of physics in action?

_____

_____

_____

	Definition	Does this produce a change in motion?	Example
Balanced Forces			
Unbalanced Forces			

Section 1: Measuring Motion (pages 108-114)

1. Name something in motion that you can't see moving. _____

2. Why do we generally calculate average speed? _____
_____

3. How is velocity different from speed? _____
_____

4. What is the equation for acceleration?

5. Match the word with the correct definition by drawing a line to connect the two.

Acceleration	Speed in a given direction
Deceleration	Rate at which velocity changes
Speed	Rate at which an object moves
Velocity	Rate at which velocity decreases

6. . Copy the graphs found on page 114 into the box below.

Graph Showing Acceleration	***Graph Showing Deceleration***

Section 2: What is a force? (pages 115-118)

7. A _____ is a push or pull and is measured with a unit called a _____.
8. What are 3 examples of different forces? _____
_____

9. Copy figure 8 & figure 9 in the two boxes below – as best you can. Label the forces.

Fig 8: Forces in the Same Direction	Fig 9: Forces in Different Directions

Vocabulary: Section 3&4

Word	Definition:
1. friction _____	A. a force of attraction between objects that is due to their masses
2. gravity _____	B. the amount of matter that something is made of; its value does not change with the object's location
3. Weight: ____	C. a force that opposes motion between two surfaces that are touching
4. Mass: ____	D. a measure of the gravitational force exerted on an object, usually by the Earth

Friction: Chapter 5, Section 3 – pages 119-124

1. Read the top two paragraphs on page 119. "The painful difference between sliding on grass & sliding on pavement has to do with _____.
2. Friction is a _____ that opposes _____ between two _____ that are touching."
3. What causes friction (figure 11)? _____
_____
_____
4. Name two ways in which friction can be increased._____
_____
5. Name two ways that **friction is harmful** and two ways that **friction is helpful** when riding a bicycle. _____
_____
_____

Give an example /define the types of friction:	Draw an example
Sliding: _____ _____ _____	
Rolling: _____ _____ _____	
Fluid: _____ _____ _____	
Static: _____ _____ _____	

Gravity Chapter 5, Section 4 Questions – pages 125-129

1. How does gravity affect motion on the moon? _____
_____
_____

2. True or False: All matter experiences gravity, so all objects experience an attraction towards all other objects. Explain: _____
_____
_____

3. If all objects are being pulled toward you and each other because of gravity on Earth, why don't you notice objects moving towards one another?
_____
_____
_____

4. Newton generalized his observations on gravity in a law known as the law of _____. The law describes the relationships between gravitational _____, _____, and _____. It is called universal because it applies to all objects in the universe, from the tiniest speck of _____ to the largest _____.

5. Copy figure 20 of the chapter below & include the labels a-c.

6. How does the mass of an object relate to the gravitational force the object exerts on other objects?_____
_____
_____

7. How does the distance between objects affect the gravity between them?
_____
_____
_____

8. What is the difference between mass and weight?
_____
_____
_____

Speed, Distance, Time Worksheet. SHOW THE FORMULA & YOUR WORK!

1. Nick rides his bike for 3 hrs at a speed of 40 km/h. What distance did he travel?

2. The Surf- Rider Train travels at a speed of 30 mph and travel a distance of 240 miles. How long did it take the train to complete it's journey?

3. Mrs. Gillum, in her mini, travels a distance of 540 km in 6 hours. What speed did she travel at?

4. Sam is a runner. He runs the 100 m sprint in 10.6 s. What speed did he travel at? (in m/s)

5. Mr.Lulay travels on his Harley 20 km in 4 hrs. What speed did the Mr.Lulay travel at?

6. The distance between two cities is 144 km, it takes Mr. Power 3 hours to travel between these cities. What speed did I travel at?

7. A train travels from the downtown San Diego to Long Beach, a distance of 576 km away in 6 hrs. The coach is only allowed to travel at a maximum speed of 90km/h. Did the coach break the speed limit?

8. At the equator, the earth spins a distance of 25,992miles every day. What speed does the Earth spin at in mph? (a hint… how many hours in a day?)

9. Lauren walks 100 m in half a minute. What must her speed have been to travel this distance?

10. A mouse runs a distance of 2 meters in 15 seconds. What is it's speed?

11. Jim travelled at a speed of 18km/h for 2 hours. What was the distance covered?

12. Mr. Bill was told his dinner would be ready at 6:00pm. He left the job site at (noon) 12:00pm and traveled in his car at an average speed of 45 mph to his house 300 miles away. Did Mr. Bill make it home in time for the dinner Mrs G had waiting for him?

13. A whale swims at a constant speed of 8m/s for 17s. What distance did it travel?

14. Sebastian writes down his jog times for each day.
Mon – 15 min Tue – 10 min Wed – 12 min Thu – 5 min Fri – No jog.
He jogs at a constant speed of 9km/h. Work out the distance he jogs each day.
On which day did he jog the furthest?

15. How long does it take to drive a distance of 260 miles at a speed of 65mph?

16. How long does it take to travel a distance of 672km at a speed of 96km/h?

17. Scripps Ranch is a distance of 135 miles away from Joshua Tree National Park. If I travelled at a constant speed of 45mph. How long would it take me to get there?

18. A beetle travels at a speed of 9cm/s., it travels a distance of 108 cm before it is caught in a jar. How long did the beetle run for?

Motion Math

Solve the following problems. Show all your work and attach additional paper if necessary. Write the formulas in the provided boxes to help. Remember to include the correct units.

Speed & Average Speed **Speed Formula:**

1. Nascar driver, Jeff Gordon, has a car that is one of the fastest on the circuit. If it travels 600 miles in 4 hours, what is his cruising speed?	2. The fastest car on Earth, a German-made Thrust SSC, would win every Nascar race in America. If it takes 0.5 hours (30 minutes) to travel 380 miles, what is its speed?
3. The fastest train on Earth, the TGV from France, can travel at faster speeds than trains in the United States. During a speed test, the train traveled 800 miles in 2.5 hours. What is its speed?	4. How fast was a plane flying if it traveled 400 km in 30 min? 5. A Hummer travels at a speed of 50 mi/hr for 4 hrs. How far did the car travel?
6. The fastest plane ever made, the Lockhead SR71, was able to travel 2200 miles per hour. Based on this speed, how far could it travel in: a. 2 hours? b. 3 hours? c. 5 hours?	

Velocity **Velocity Formula:**

7. A car traveled 1025 km from El Paso to Dallas in 13.5 hr. What was its average velocity? 9. A cheetah runs at a velocity of 88 ft/sec for 40 seconds. How far does this cheetah run?	8. A student walks 10 blocks to a computer store (Assume all the blocks are equal length.) a. How long will it take him to reach the computer store if he walks 3 blocks in 2 min? b. What is his average velocity?

Acceleration **Acceleration Formula:**

10. Twenty seconds after a soccer ball is kicked (initial velocity = 0), its velocity is 32 m/s. What is its acceleration?	11. A driver starts his parked car and within 1 minute reaches a velocity of 30 mph as he travels east. What is his acceleration?
Random-Find the missing variable 12. V = 40 mi/hr t= 3 hrs. D=?	13 A = 9.8 m/s^2 t= 3 hr V=?
14. t = 5 hr d= 100 m. V=?	15. V = 100 mi/hr d= 400 mi t= ?

Additional reference notes! ☺

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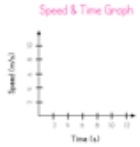
Speed Time Graphs

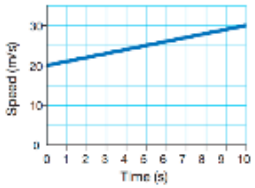


- Show an object's speed or **acceleration** over time
- **Speed** or **velocity** on **Y**-axis
- **Time** on **X**-axis

Label the Graphs

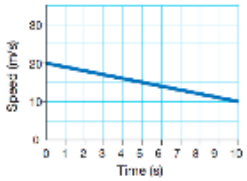
- **Positive Acceleration**

This object is getting faster & faster.



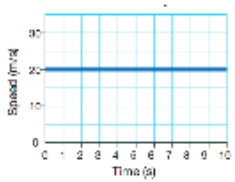
- **Negative Acceleration**

This object is getting slower & slower, or **decelerating**.



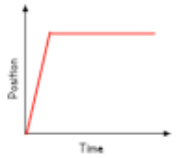
- **No Acceleration**

This object is maintaining a **constant** speed.

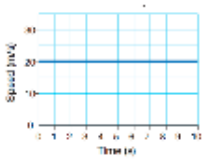


Flat Lines

A flat line on a **position-time** graph means **the object's stopped moving.**

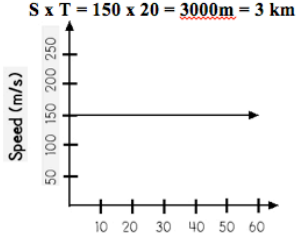


A flat line on a **speed-time** graph means **the object's stopped accelerating.**

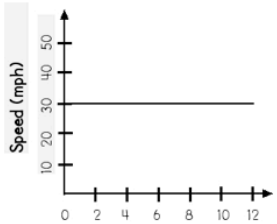


Distance = Speed x Time

How far did this object travel during the first 20 seconds? **S x T = 150 x 20 = 3000m = 3 km**

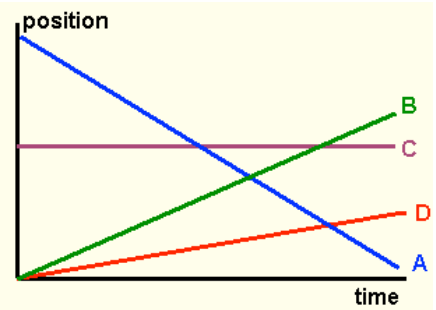


How far did this object travel during the first 8 hours? **S x T = 30 x 8 = 240 miles**



http://dev.physicslab.org/DocumentPrint.aspx?doctype=5&filename=Kinematics_ConstantVelocityPositionTimeGraphs1.xml

Position - Time Graph Virtual Lab:

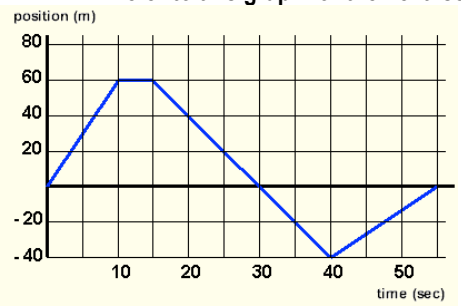


Match the description provided about the behavior of a cart along a linear track to its best graphical representation. Remember that **velocity** is determined by examining the slope of a position-time graph:

- **positive** slopes represent motion in a positive direction
- **negative** slopes represent motion in a negative direction
- **zero** slopes represent an object remaining in one position, that is, at rest

Answer these: Which line shows: 1. at rest ___ 2. traveling slowly in a positive direction___ 3. traveling quickly in a negative direction___ 4. traveling fast in a positive direction___

Refer to this graph for the next set of questions



1. During which time interval did it first travel in a positive direction?
2. During which second time interval did it later, once again, travel in a positive direction?
3. During which time interval did it first travel in a negative direction?
4. During which second time interval did it continue traveling in a negative direction?

Refer to the following information for the next six questions.

Using the same position-graph above, answer these questions regarding how far the cart traveled, its average speeds during each interval, and its displacement. Remember that while

- **velocity** is determined by calculating the slope of a position-time graph,
- **distance** is found by calculating comparing the cart's position (the graph's y-axis coordinate) at two times (the graph's x-axis coordinate). Distance is a scalar quantity that does not depend on the direction of travel, and its
- **average speed** during a time interval is defined as the total distance it traveled divided by the total time taken.

1. How far did the cart travel in the first 10 seconds? How fast was it moving during this time interval? _____
2. Briefly describe its behavior between 10 and 15 seconds? _____
3. How far did it travel between 15 and 30 seconds? How fast was it moving during this time interval? _____
4. How far did it travel between 30 and 40 seconds? How fast was it moving during this time interval? _____
5. How far did it travel between 40 and 55 seconds? How fast was it moving during this time interval? _____
6. What was the total distance it traveled? What was its final displacement? _____

BE SURE TO CLICK ON THE BOTTOM BUTTON: **VIEW CORRECT ANSWERS** TO SEE HOW YOU DID AND TO CORRECT ANY MISTAKES!

Bernoulli's Principle

Using the videos on my YouTube site, and various articles discuss the following:

1. What IS Bernoulli's Principal
2. How DOES a plane fly
3. What forces are involved with flight. Explain those forces
4. How does this also involve Newton's Laws?
5. Use some drawings to help you this explain too!
6. How will this help you in designing your Flying Car?