

Force & Motion (Part 1) Study Guide

Goal 1 - Types of Motion

1. What are the six types of motion? Write down a simple definition for each.
 1. Linear Motion - moving in a straight line
 2. Circular Motion - moving along a continually curved path
 3. Vibrational Motion - moving backwards and forwards in a straight line
 4. Projectile Motion - the force of gravity acting on an object to make it move
 5. Oscillating Motion - moving from side to side
 6. Deformation - motion inside an object, such as, tension, buckling, twisting, compression, bending, expansion, or stretching
2. Describe two types of motion that occur during a baseball game. Clearly describe each type of motion and explain how the objects or people involved are behaving.
 1. Projectile - batter hitting the ball, gravity brings the ball down
 2. linear - batter hits a line drive
 3. deformation - batter twists body in swinging motion
 4. oscillating - batter swings the bat back and forth
3. Describe two types of motion that occur during a during the Batman ride at Six Flags. Clearly describe each type of motion and why it is considered that type of motion.
 1. projectile - gravity causes the roller coaster to move down the hill
 2. deformation - the roller coaster car twists, contracts, and expands depending on the track
 3. circular - when the coaster goes around the upside curve; it goes along a curved motion

Goal 2 - Speed

4. What is the definition for speed?
The rate at which an object moves
5. What is the definition for velocity?
the speed and direction of a moving object
6. Give an example of two objects that have the same speed but different velocities.
Sally and Regina are both walking 2 mph to Dairy Queen. Sally is walking North and Regina is walking West.
Sally = 2 mph North
Regina = 2 mph West

7. What is the equation you use to calculate for speed? time? distance? (write all three)

$$s = d/t$$

$$d = st$$

$$t = d/s$$

Word Problems: Directions for #8-11. For the following, (1) write the equation out that you are using, (2) plug in the numbers into the equation, (3) write your answer with the correct units/label, and (4) circle your final answer.

8. A train is traveling west to California. It takes 10 hours to go 950 miles. Find the train's speed. Include proper units.

$$s=d/t$$

$$s= 950 \text{ mi}/10 \text{ hr}$$

$$s= 95 \text{ mph}$$

9. What is the distance a train will travel if it is going a speed of 40 mph if it travels for 2.4 hours?

$$d=st$$

$$d=(40 \text{ mph})(2.4 \text{ hr})$$

$$d=96 \text{ miles}$$

10. What is the time it takes a gorilla to move 100 meters if he is moving at a speed of 3.5 m/s?

$$t=d/s$$

$$t= 100 \text{ m} / 3.5 \text{ m/s}$$

$$t=28.6 \text{ seconds}$$

11. What is the speed of a bunny hopping south along the highway when it travels 3 miles in 20 minutes?

$$s=d/t$$

$$s= 3 \text{ mi} / 20 \text{ min}$$

$$s= 0.15 \text{ mi/min}$$

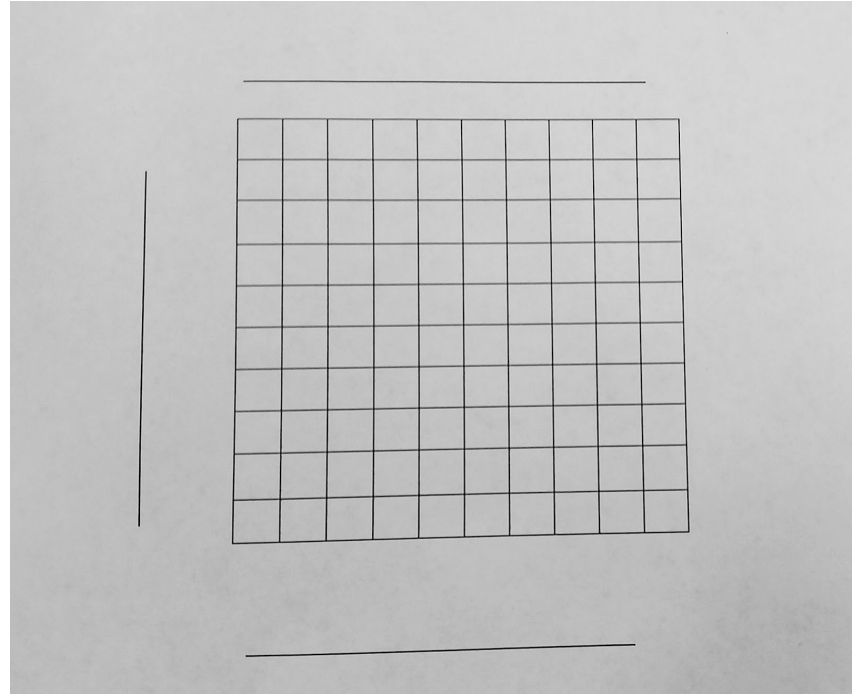
Goal 3 - Interpreting/Graphing Speed & Motion Events

12. Graph the average speed of the following boats on the blank graph to the right of the data table. Include an accurate title, labels with units, and a key.

Average Speed of Water-Motor Vehicles

Boats	Distance (m)	Time (s)
Paddle Boat	5	5
Speed Boat	45	1
Jet Ski	60	4
Pontoon Boat	80	4

Directions: Answer questions 13-15 using the average speed graph of different boats you just completed.



13. Which boat went the fastest on average? How do you know?

The speed boat has the fastest average speed because the line on the graph has the steepest slope.

14. Which boat went the slowest on average?

The paddle boat

15. Calculate the speed for each boat. Include correct units.

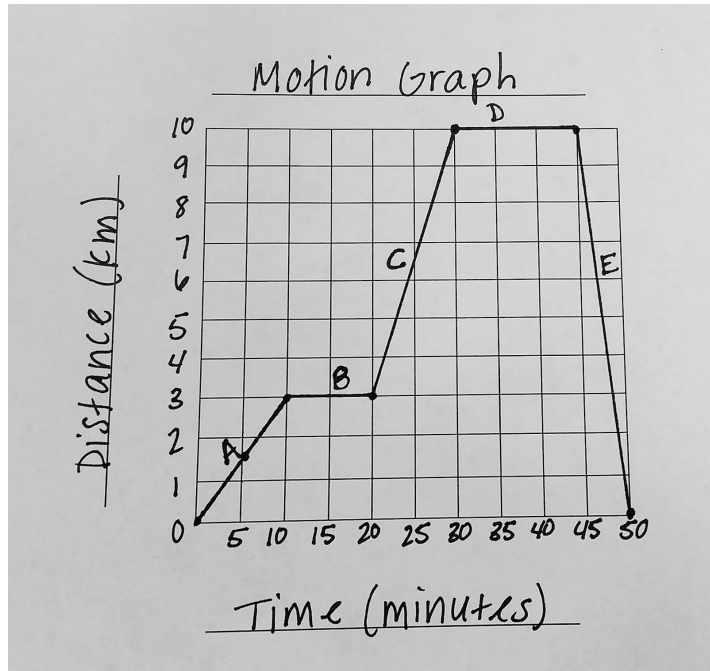
Paddle Boat _____ 1 m/s _____

Speed Boat _____ 45 m/s _____

Jet Ski _____ 15 m/s _____

Pontoon Boat _____ 20 m/s _____

Directions: Use the graph below to answer questions 16-20.



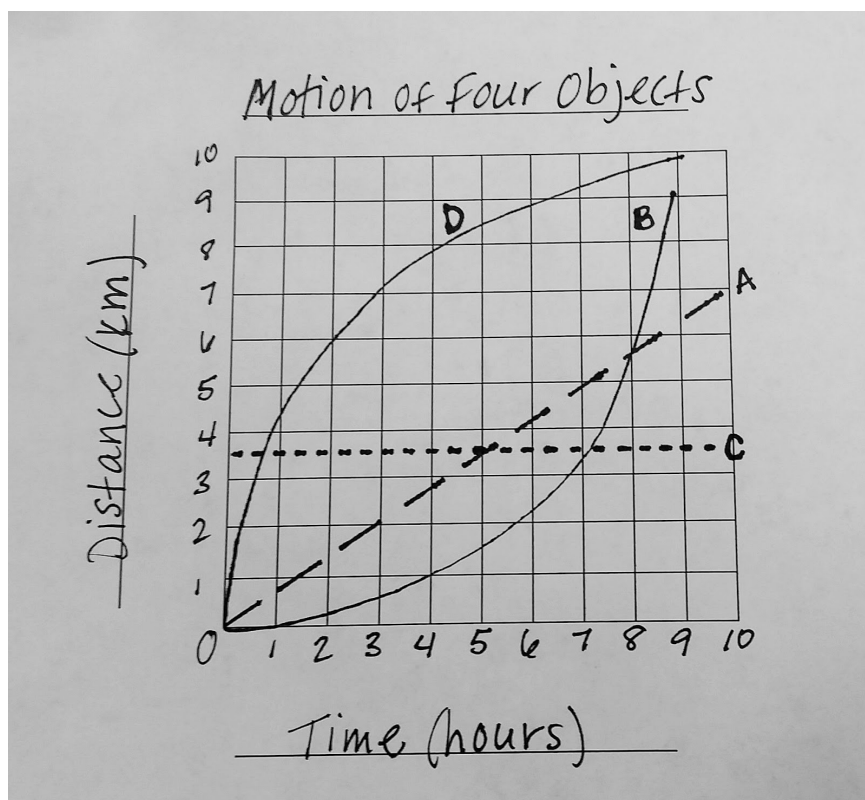
16. Which of the following best describes the motion graph above?
- Billy leaves his house to go to the gas station. He turns right onto Big Bend. After traveling for 10 minutes he gradually begins traveling uphill. He stops to enjoy the beauty at the top then speeds back down the hill towards home.
 - Billy leaves his house to go to the gas station, stops to get gas, then drives 7 km to the library where he returns a book and looks for a few new ones, and then he returns home.
 - Billy drives his car at a constant 0.3 km/min for 10 min. He gets hungry so he decides to stop for a burger. After he gets done eating he drives past Grant's Farm to see the animals. A stray buffalo catches his eye so he stops his car. He helps walk the buffalo back to Grant's farm which takes Billy further away from his starting location.
 - Billy jogs 10 km in 3 min, then stops to rest for 10 min. Then he runs 10 km in 7 min. He needs to rest for 15 min. Once he is rested up he travels the 10 km back to his home.
17. Which line(s) represents no movement at all? D
18. Which line represents the fastest speed? E
19. Which lines represents the slowest speed? A
20. Which line represents an object go backwards towards it's starting location? E

Goal 4 - Acceleration

21. What is acceleration? How do you know if an object accelerated?

Acceleration is the change in speed or direction of an object. The object will be changing it's speed or direction.

22. Look at the graph below, write what each line represents on the lines below, A-D.



- A - Object moving at a constant speed
- B - Object showing positive acceleration (speed increasing)
- C - Object stopped, no movement
- D - Object showing negative acceleration (speed decreasing)

Goal 5 - Forces

23. What is a force?

Push or pull on an object

24. What are the units for force?

Newton's

25. What instrument did we use in class to measure force?

Spring scale

Goal 6 - Types of Forces

26. What are contact forces? What are the five types of contact forces?

Contact forces - a force that is applied when two objects touch

1. Push
2. Pull
3. Friction
4. Air resistance
5. Buoyancy

27. What are non-contact forces? What are the three types of non-contact forces?

Non-contact forces - a force that one object applies to another object without touching

1. Gravitational force
2. Electrical force
3. Magnetic force

28. How does friction affect the force required to move an object?

Friction creates resistance and makes it harder for a force to move an object. The greater the friction the greater the force required to move the object.

Goal 7 - Gravity Basics

29. Explain the gravitational force of attraction that exists between objects.

Gravitational force is present between all objects that have mass. The greater the mass, the greater the gravitational force. The greater the distance between the objects the weaker the gravitational force becomes.

30. An object's weight is a measure of the gravitational force of a planet/moon acting on that object.

31. If it were possible for you to stand on all the planets in our solar system, which planet would you weigh the most on? WHY?

Jupiter, because this planet has the greatest mass of all the planets in our solar system. The greater the mass the greater the gravitational pull on an object.

32. Which set of pictures below would have the strongest gravitational pull between them? WHY?

D. The two objects are closest together, the closer the objects the greater the gravitational pull is between the objects.

