Date: _____

FORCE AND MOTION TEST REVIEW
TEST IS TUESDAY, March 6th

Finding SPEED, DISTANCE, TIME

1. What Three equations do you use to find SPEED, DISTANCE, and TIME?

D / T | R $D = T \cdot R$ $T = \frac{D}{R}$ $R = \frac{D}{T}$

2. A car travels 100 cm in 4 seconds. What **speed** is the car moving in cm/s?

$R = \frac{D}{T}$ $\frac{100\text{cm}}{4\text{s}} = 25\text{cm/s}$

3. Bill has a walking rate of 35cm/s. He can walk from science to English class in 8 seconds. **How far away** are his science and English classes?

$D = T \cdot R$ $35\text{cm/s} \cdot 8\text{s} = 280\text{cm}$

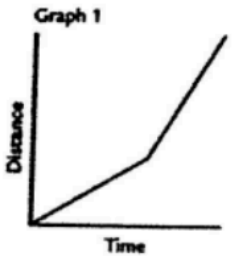
4. WORD BANK: SPEED, FORCE, DISTANCE, ACCELERATION, TIME

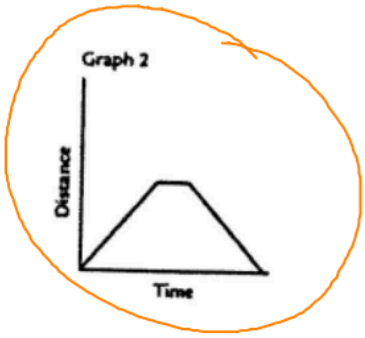
a. m/s is a unit for Speed
b. m/s^2 is a unit for Acceleration
c. N (Newtons) is a unit for Force
d. s (seconds) is a unit for Time
e. cm is a unit for Distance

MOTION GRAPHS

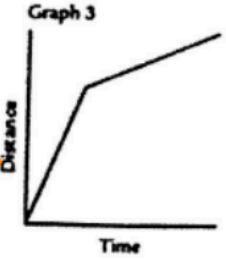
5. Which graph below shows a person walking at a steady pace, stops briefly, then returns back to the starting point at a steady pace?

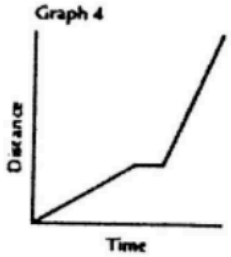
Slow then fast →





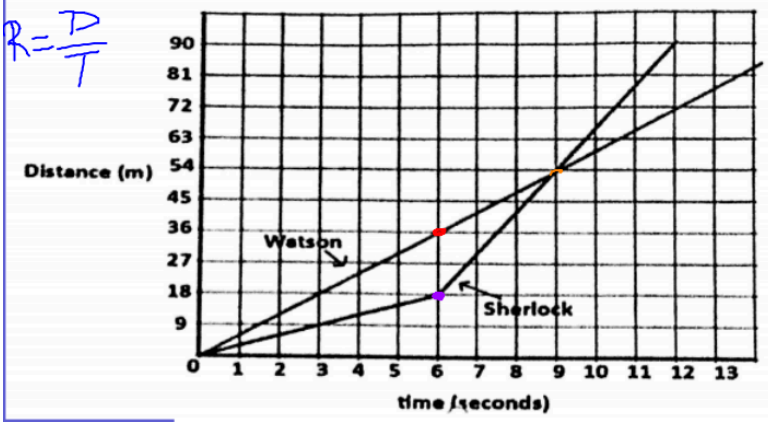
fast then slow →





← Slow, Stop, fast

$R = \frac{D}{T}$



1. Who starts out traveling at a faster speed? Watson
2. What is Watson's speed from 0 to 6 seconds? 36m/6s = 6m/s
3. What is Sherlock's speed from 0 to 6 seconds? 18m/6s = 3m/s
4. Which person would get to an object 54 m away faster? Explain. Both
5. What is Watson's speed from 6-12 seconds? 6 m/s
6. Tell a story or write a trip strip for both Sherlock and Watson.

sherlock and watson left baker street together. Watson started out jogging and sherlock was slower and walking. after 6 second sherlock started running and passed watson after 54 meters.

7. Design an experiment to see how release height affects speed. What would your variables be? How would you do this lab? What would need to remain constant? How can you measure speed in the classroom? (Think force and motion activity 74)
   1. drop the cart from notch A on the ramp then calculate speed
   2. drop the cart from a lower notch B and calculate speed
   3. repeat for notch C
   4. This data will prove if there is an affect on speed.

SHOW THE RELATIONSHIP:

- As speed of an object increases, what happens to the FORCE in a collision? ↑
- As mass increases, inertia ↑.
- As mass decreases, the force needed to move an object ↓.
- As speed increases, braking distance ↑.
- Low center of mass = ↑ stability.
- As surface area increases, friction ↑.

BALANCED AND UNBALANCED FORCES

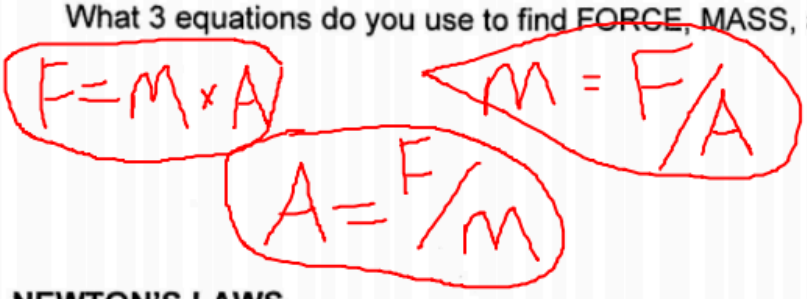
6. What is the definition of *acceleration*? A change in speed and/or direction

7. Fill in the table below:

Road friction	40 N	40 N	40 N
Car engine force	40 N	80 N	50 N
Balanced or **unbalanced** forces?	Balanced	Unbalanced	Unbalanced
Net force = ?	0 (zero)	40 N	10 N
Steady speed or **acceleration**?	Steady speed	Acceleration	Acceleration

FORCE, MASS, ACCELERATION

What 3 equations do you use to find FORCE, MASS, and ACCELERATION?



NEWTON'S LAWS

What are Newton's 3 Laws of Motion?

- 1. Law of Inertia - Objects resist a change in motion
- 2. Force = Mass * Acceleration
- 3. Law of Action / Reaction --- Every force has an equal and opposite force

Your friend says that when a car goes **twice as fast**, the braking distance **doubles**. Do you agree? Look at the data below.

Initial speed (m/s)	Braking distance (m)
4.5	3
9	14
18	54
27	123

I disagree. When speed doubles from 9 to 18 the braking distance increases by WAY more than double (14 to 54)

#1-6 -- True or False:

1. T The heavier the car, the more force is needed to make it speed up.
2. F A force is always needed to keep an object moving
3. T A force is always needed to slow down an object
4. F It takes more force to slow down a small car than a large truck because the truck is heavier
5. T When a falling object hits the ground, the ground applies and upward force to it
6. F Friction exists only when two solid objects rub against each other.

Matching:

B 17. Unit for force

H 18. Balanced forces

A 19. Unit for acceleration

E 20. Unbalanced forces

K 21. Stopping distance

C 22. Friction

I 23. Deceleration

J 24. Center of mass

G 25. Risk

F 26. Inertia

a. m/s^2
b. Newtons
c. a force between any 2 forms of matter that are touching; opposes the movement of an object
d. amount of matter an object has
e. Uneven forces; non zero net force; acceleration occurs
f. resistance to a change in motion
g. the chance that an event can be unfavorable
h. equal force on each side of a force diagram. Zero net force, steady speed, no acceleration
i. slowing down or stopping
j. the point where all mass is evenly distributed throughout an object
k. braking distance + reaction time

F=MA Practice Sheet

1. If a car is accelerating at 25 m/s and has a mass of 1000 kg, what is the force?

$1000kg \times 25m/s = 25,000\ N$

2. What is the mass of a bowling ball which requires 150N to accelerate $5m/s^2$?

$\frac{150N}{5m/s^2} = 30kg$

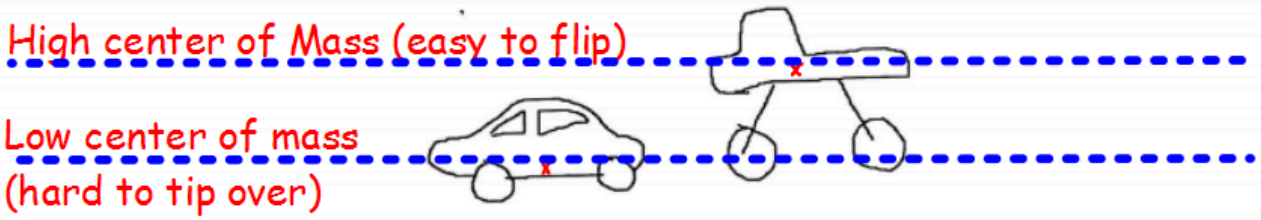
3. What is the acceleration of a golf ball with a mass of 1Kg that is hit with a force of 50N?

$\frac{50N}{1kg} = 50m/s^2$

4. What happens to a car which is acted upon by BALANCED forces?

Balanced forces do NOT change the motion of an object so the car would remain at the same speed and direction.

5. Which of the following is easier to tip over? Think in terms of Center of Mass.



6. Why are seatbelts and airbags helpful in saving lives? Think about how it "slows down the slowdown"

In a car crash, a person's inertia keeps them moving forward when the car stops. A seatbelt slows the person down over a long period of time than the steering wheel. This means the acceleration would be lower so the force would also be lower.