Name _____ per____ mail box_____

EXAM REVIEW PACKET - FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

4-1 What is speed and velocity?
Tech terms
Motion:

Speed:

Velocity:

4-2 What is acceleration?
Tech Terms
Acceleration:

4-3 What are balanced and unbalanced forces?
Tech Terms
Balanced forces:

Unbalanced forces:

Force:

4-4 What is Newton's first law of motion?
Tech terms
Inertia:

4-5 What is Newton's second law of motion?
Tech terms
Newton:

4-6 What is Newton's third law of motion?
Tech terms
Action force:

Reaction force:

other mathematics problem types also to review:

Momentum

And

Force – F =M(A)

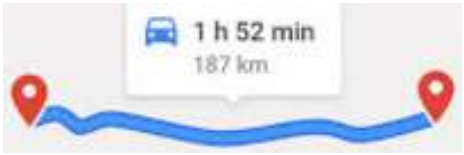
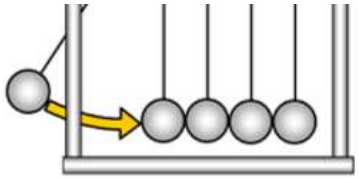
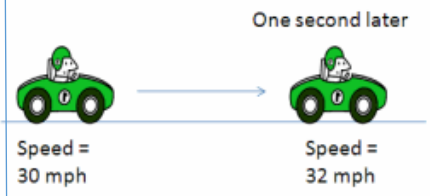
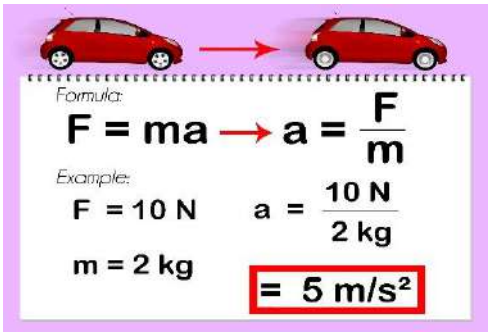
TO EARN EVIDENCE OF STUDY CREDIT MUST BE IN YOUR HAND DAY OF EXAM OR BEFORE - NOT AFTER, NOT IN LOCKER, NOT ½ DONE.

QUIZLET CAN BE FOUND MY WEB PAGE – VOCAB REVIEW CAN BE FOUND THERE AS WELL

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Mental Map of -> **Force = mass x acceleration**

Where does the SI Unit of Force (N) for newton named after Sir Isaac Newton come from and how is it built?

Equation	**units**	**units combined**
		
		
		
		

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Speed, Velocity, Acceleration and Momentum Notes

SPEED

Speed is the distance an object travels in a given amount of time.

The formula for Speed is =

Directions: Try this practice problem to calculate speed:
A man walked 25 meters in 500 seconds. What is his speed?

VELOCITY

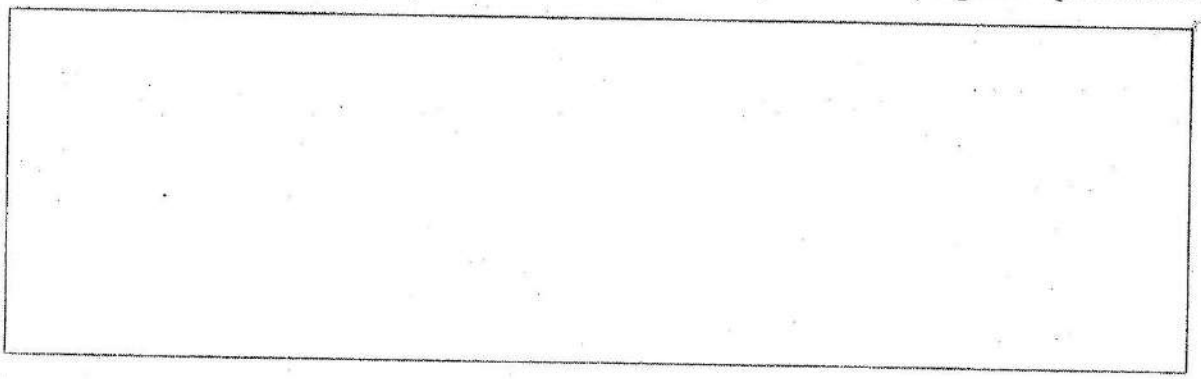
Velocity is the speed in a given direction.

- The formula to determine velocity is the same as speed, but you must add the direction of the movement at the end of your answer.

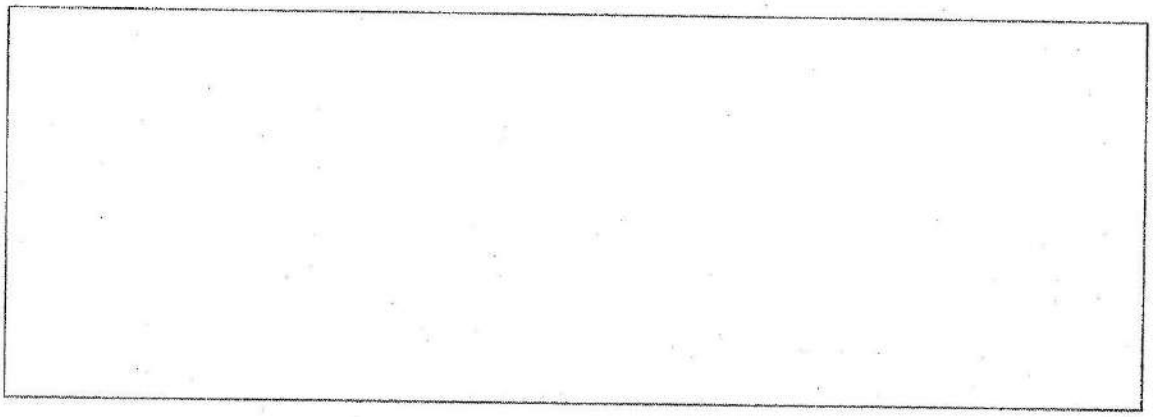
Directions: Complete the following practice problem.
Joe is traveling 300km North to see his friend. He makes the trip in 60 minutes. What is his velocity?

ACCELERATION

Acceleration is the change in speed over time. It can be positive or negative (deceleration)



Directions: Complete the practice problem below.
Leah was biking 12m/s. After 10seconds, and a big hill, she was biking at 15m/s. What is her acceleration?



MOMENTUM

Momentum property an object has due to it's mass and velocity

Calculate the momentum of a 2.5kg puppy that is running with a velocity of 4.8m/s south.

Speed, Velocity and Acceleration Practice

Directions: Solve the following problems using either the acceleration, speed or velocity formula. Remember to **show all your work** and to include your **units.**

1. Billy drove his dirt bike over 120 km in 3 hours. What is his speed?

2. A car is approaching a stop light. It is going a 55m/s and comes to a complete stop in 10 seconds. What is the cars acceleration?

3. Jessica ran straight for 10seconds in gym class at a speed of 7 meters per second. What distance did she cover?

7. Mikey walks 100 meters from the bus to his locker in 4 minutes. What was his speed?

8. What is the velocity of a plane that traveled 3,000miles from New Year City to California in 5.0 hours?

9. How from will a ball roll in a westerly direction at a rate of 0.5m/s for 15 seconds?

_____ 2. The rate of change in speed or velocity can be calculated by velocity final (V_f), minus velocity initial (V_i) and then dividing by change in time.

A. True
B. False

_____ 3. Which of the following is true?

A. Acceleration cannot be a negative number.
B. **The rate at which momentum changes with time is speed.**
C. Speed cannot be determined for relative rates of bubble gum chewing.
D. Average speed equals the total distance divided by the total time.

_____ 4. Matt hikes at a speed of 1km/h starting out but, then gradually speeds up to 5km/h over the course of 2 hours. Find acceleration:

A. - 2 km/h^2
B. 5 km/h^2
C. 1 km/h
D. 2 km/h^2

show work

_____ 5. Passengers fly on an airplane which, went from 350km/hr to 650 km/hr in 30minutes time.
Find acceleration: **30min = 0.5hr**

A. 600 km/h^2
B. 600 km/h
C. 300 km/h
D. -300 km/h^2

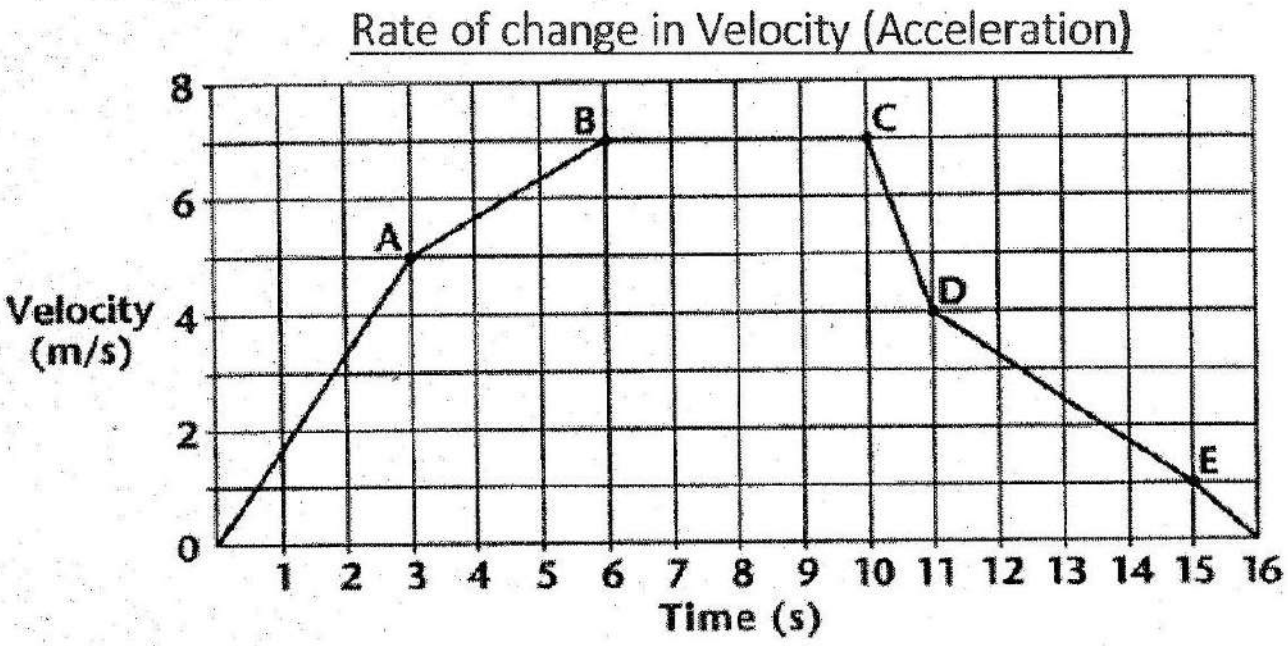
show work

_____ 6. A car speeds along at 80**km/h**. It must brake and slow down because of heavy traffic. The car slows to 20**km/h** in 9 seconds. 9 sec. equals **0.0025 hours.** Give the answer with these units **km/h^2**

1.write equation 2.show work 3.box answer

3pts

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK



Answer the following based on the graph above.

_____ 6. What is occurring between points B and C?

- **A.** Deceleration
- **B.** The car is stopped
- **C.** Constant speed
- **D.** Changing velocity

_____ 7. What is the vehicle's speed at 11 seconds?

- **A.** 4 m/s
- **B.** 4 m/s^2
- **C.** - 4 m/s
- **D.** Cannot be determined

_____ 8. The car's initial deceleration is -3m/s^2, but it then slows again at a rate of -0.75m/s^2 immediately afterward. Consider the graph and data to select the best response.

- **A.** This car's deceleration rate was constant
- **B.** This car applied the brakes rapidly then eased up.
- **C.** This car stopped multiple times
- **D.** Cannot be determined

_____ 9. Which rate of deceleration was greater, meaning slowed more rapidly?

- **A.** A-B
- **B.** B-C
- **C.** C-D
- **D.** D-E

Gravity

Quick –Review What is Gravity?

Weight

- measure of the _____ on an object
- measured in Newtons
- measured with a _____
- can change depending on gravitational field object is in.

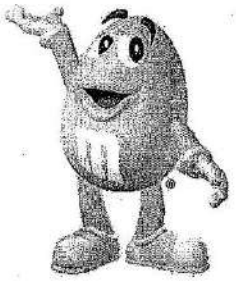
Quick Review -What is weight?

Mass

- measure of the amount of matter in an object
- measured in _____
- measured with a triple beam balance
- _____ in different gravitational fields
  - If my mass 110kg on Earth – I am still 110kg on Jupiter

ass the M&M in front of you...

M &M = _____g

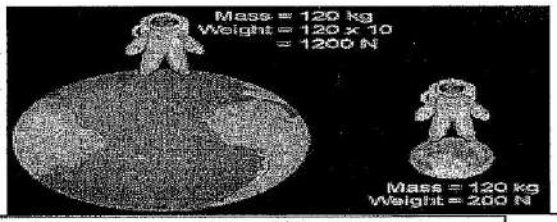


What else do you think is 1gram?

Planets and Gravity

Mass – _____ on the planets and Earth

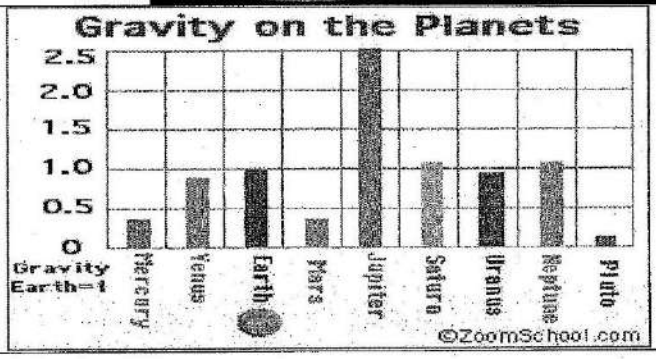
Weight –_____ because of the gravitational force of the planets (how far are they from the Sun)



King Henry Died Un-expectantly Drinking Chocolate Milk

- How much is a kilo? _____
  How much is a gram?_____

Kilo Hecta Deca U(grams,meters, liters) Deci Centi Milli



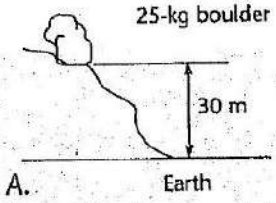
EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

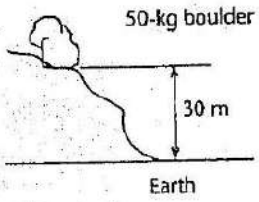
4. If an object weighs 40 N on Earth, would it weigh more than 40 N on the moon? Explain your answer. _____

5. If an object has a mass of 26 g on Earth, would its mass be less than 26 g on the moon? Explain your answer. _____

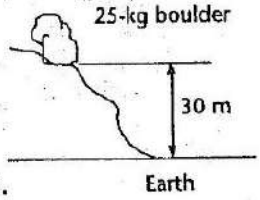
Circle the picture in each set below that shows the greater gravitational force between the two objects.

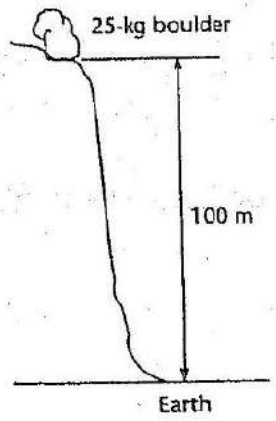
A.



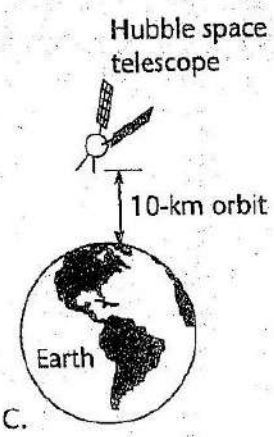


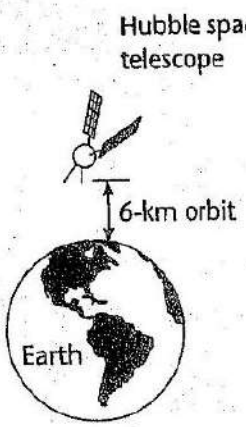
B.



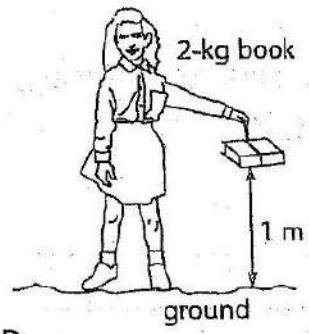


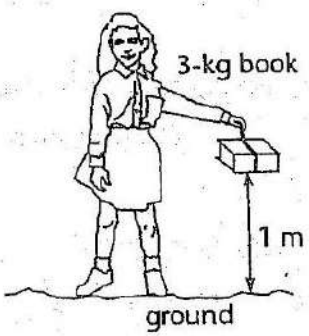
C.





D.



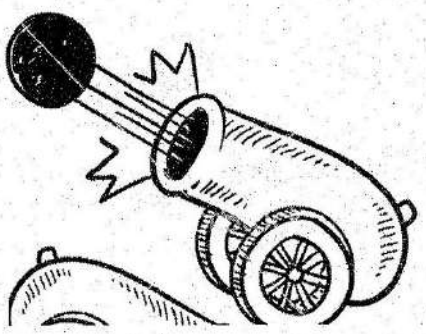


EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Science 8
Unit: Forces

Name_____
Period_____

Newton's Third Law



1. Draw an arrow on the image to the right, to show the direction the cannon will move when the cannonball is fired.

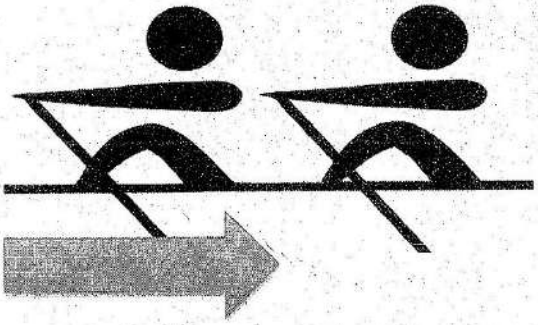
   a. Does the arrow you draw for the cannon represent the action or reaction force? _____

   b. If the force that propels the cannonball forward is 500N, how much force will move the cannon backwards? Explain.

   _____

   _____

   _____



2. Draw an arrow on the image to the left to show the direction the oars must move to propel the boat forward.

   a. Does the arrow you draw for the cannon represent the action or reaction force? _____

3. Do you agree or disagree with this statement "As you sit in your seat, the force of gravity on Earth pulls you downwards. This is equal to the amount of force the chair is pushing upwards on your body." Explain using Newton's third law.

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

_____ 5. You intend to compete in a 5 kilometer fun run this spring. You are a little worried about how much time it will take though. You know you can run 3.1 miles in about 21 minutes and you want to predict your time for the 5 kilometer race. Your running coach tells you your speed is about 14.29km/hr. What will your **time** likely be?

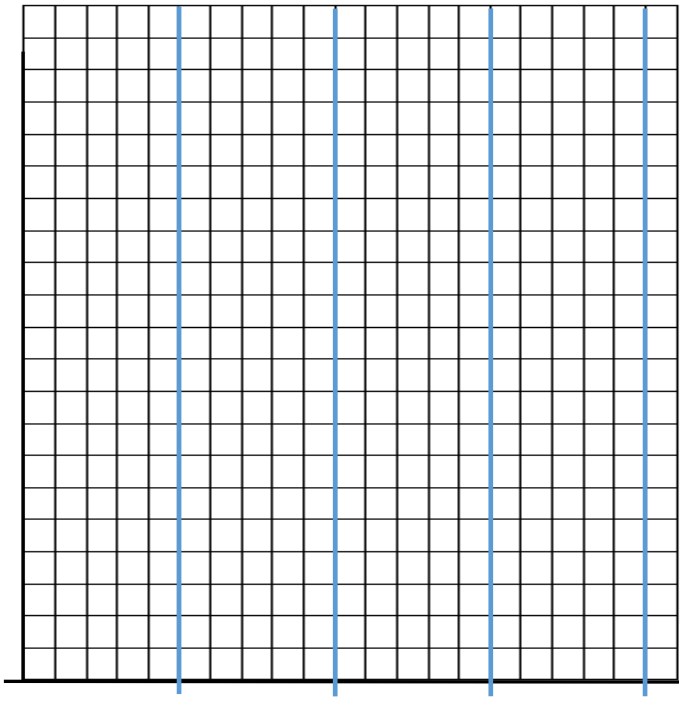
1mile = 1.609km	**Conversion factors**
1km= 0.621mile	

A. 11 minutes
B. 7 hr
C. 21 m per min
D. 30.32 min
E.
E. 21 minutes
F. 14 mph
G. 15 km/hr
H. 11 miles/km

6. A constant speed vehicle has traveled **20 feet** across the classroom floor in **4 seconds**. Assume the speed truly was **constant**. **Complete the graph below.**

Include the following for full credit:

- **Title**
- **labels for x & y axis**
- **Units**
- **include numbers**
- **draw sloped line**



Place ANSWERS on the line provided.

_____ 7. What's the distance traveled 2 seconds into the roll across the floor? Refer to graph above. (answer w/ units)

_____ 9. Preparatory Question: When scientists discuss the velocity of object's motion, they will also include the speed as well as direction of motion. We refer to things like velocity that include two quantities of measurement as:

A. vectors
B. imperial units
C. scalars
D. metric system

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Bonus: What branch of mathematics did Sir Isaac Newton invent? _____

SPEED = DISTANCE / TIME S=d/t
DISTANCE = SPEED X TIME d=s(t)
TIME = DISTANCE / SPEED t=d/s

VELOCITY = DISTANCE / TIME with (direction)

UNITS
Standard International (SI):
kilometers per hour – **km/h**
meters per second – m/sec – **m/s**

US Standard:
miles per hour - **mph** - mi/h
feet per second – ft/sec – **ft/s**

ACCELERATION

A = Velocity Final – Velocity Initial / Time

$$a = \frac{\Delta v}{\Delta t}$$

UNITS

Standard International (SI):
km/h/h – **km/h²**
m/sec/sec – **m/s²**

US Standard:
mi/h/h - **mi/h²**
ft/s/s - **ft/s²**

MOMENTUM = MASS X VELOCITY

p = m (v)

UNITS
(SI):
kilograms x kilometers per hour – **kg(km/h)**
grams x meters per second – **g(m/s)**

US Standard:
pounds x (feet per sec) – **lbs. (ft./s)**
tons x miles per hour – **tons(mph)**

FORCE = MASS X ACCELERATION

F = m (a)

UNITS
(SI):
1 newton equals 1kg times 1m/s²

kilograms x (meters per second) – **kg (m/s²)**
kg (m/s²) = N

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Name Key 2019 per____ mail box_____

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Mental Map of -> **Force = mass x acceleration**

Where does the SI Unit of Force (N) for newton named after Sir Isaac Newton come from and how is it built?

Equation | **units** | **units combined**

SI

Speed = $\frac{\text{distance}}{\text{time}}$ or

Vel = $\frac{\text{dist}}{\text{time}}$ & direction

dist = meters

time = seconds

m/s → meters per second

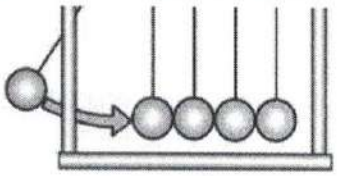
Momentum = mass x velocity

$P = m(v)$

mass = kilograms

velocity = m/s

$P = kg(m/s)$

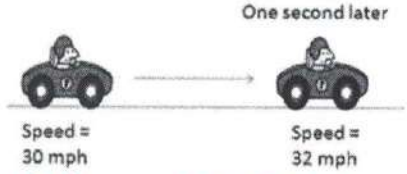


Acceleration = $\frac{V_F - V_I}{\text{time}}$

vel. = m/s

time = sec.

$A = \frac{V_F - V_I}{\text{time}}$



Meters per sec. squared m/s/s

where do accel. units come from.

$\frac{1}{2} \div \frac{1}{2} \rightarrow \frac{1}{2} \times \frac{2}{1} = \frac{2}{2}$

$m/s \div s/1 = m/s \times 1/s = m/s^2$

Force = mass x acceleration

$F = m(A)$

mass = Kilograms

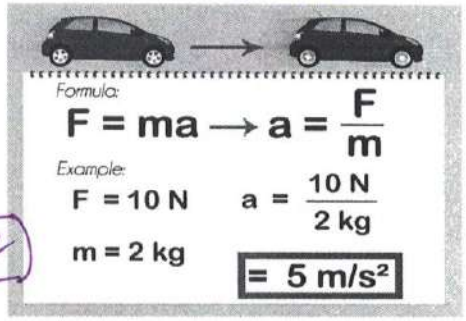
accel = m/s^2

$kg(m/s^2) = N$

1 newton

Force = $kg(m/s^2)$

(1 N-newton of force is needed to accelerate 1 Kilogram at a rate of 1 m/s^2)



Speed, Velocity, Acceleration and Momentum Notes

SPEED

Speed is the distance an object travels in a given amount of time.

The formula for Speed is = $S = d/t$ $d = S(t)$ $t = d/S$

$\frac{+}{1} S = \frac{d}{+}\left(\frac{t}{1}\right)$ $\frac{d}{S} = \frac{St}{S}$

Directions: Try this practice problem to calculate speed:
A man walked 25 meters in 500 seconds. What is his speed?

$S = d/t$ $S = \frac{25\,m}{500\,sec}$ $S = 0.05\,m/sec$

VELOCITY

Velocity is the speed in a given direction.

- The formula to determine velocity is the same as speed, but you must add the direction of the movement at the end of your answer.

$V = d/t$ + direction

Directions: Complete the following practice problem.
Joe is traveling 300km North to see his friend. He makes the trip in 60 minutes. What is his velocity?

$V = d/t$ $V = \frac{300\,km}{60\,min}$ $V = 5\,km/min$ North

ACCELERATION

Acceleration is the change in speed over time. It can be positive or negative (deceleration)

$$A = \frac{V_F - V_I}{T} = \frac{\text{Vel. final} - \text{Vel Initial}}{\text{Time}}$$

Directions: Complete the practice problem below.
Leah was biking 12m/s. After 10seconds, and a big hill, she was biking at 15m/s. What is her acceleration?

$$A = \frac{V_F - V_I}{T} \qquad A = \frac{15\,m/s - 12\,m/s}{10\,sec}$$

$$A = 1.3\,m/s^2$$

MOMENTUM = P

Momentum property an object has due to it's mass and velocity

$$P = m(v) \text{ or } V = \frac{P}{m} \text{ or } m = \frac{P}{V}$$

Calculate the momentum of a 2.5kg puppy that is running with a velocity of 4.8m/s south.

$$P = m(v) \qquad P = 2.5kg\,(4.8\,m/s) \qquad P = 12\,kg(m/s)$$

Speed, Velocity and Acceleration Practice

Directions: Solve the following problems using either the acceleration, speed or velocity formula. Remember to **show all your work** and to include your **units.**

1. Billy drove his dirt bike over 120 km in 3 hours. What is his speed?

$S = d/t$ $\quad S = \frac{120\,km}{3\,hr}$ $\quad S = 40\,km/hr$ or kilometers per hour

2. A car is approaching a stop light. It is going a 55m/s and comes to a complete stop in 10 seconds. What is the cars acceleration?

deceleration! V_I V_F 0m/s

$A = \frac{V_F - V_I}{T}$ $\quad A = \frac{0\,m/s - 55\,m/s}{10\,sec}$ $\quad A = -5.5\,m/s^2$

note negative

3. Jessica ran straight for 10seconds in gym class at a speed of 7 meters per second. What distance did she cover?

$d = S(t)$ $\quad d = 7\,m/s\,(10\,sec)$ $\quad d = 70\,m$

$d = 7\frac{m}{s}(10\frac{s}{1})$ seconds cancel left w/ meters

7. Mikey walks 100 meters from the bus to his locker in 4 minutes. What was his speed?

$S = d/t$ $\quad S = \frac{100\,m}{4\,min}$ $\quad S = 25$ meters per minute

$25\,m/min$

8. What is the velocity of a plane that traveled 3,000miles from New Year City to California in 5.0 hours?

West

$V = d/t$ $\quad V = \frac{3000\,miles}{5.0\,hrs}$ $\quad V = 600\,miles/hr$ or 600 mph

9. How ~~from~~ far will a ball roll in a westerly direction at a rate of 0.5m/s for 15 seconds?

$d = S(t)$ $\quad d = 0.5\,m/s\,(15\,sec)$

$d = 7.5$ meters

A 2. The rate of change in speed or velocity can be calculated by velocity final (V_f), minus velocity initial (V_i) and then dividing by change in time.

A. True
B. False

D 3. Which of the following is true?

A. Acceleration cannot be a negative number.
B. The rate at which momentum changes with time is speed.
C. Speed cannot be determined for relative rates of bubble gum chewing.
D. Average speed equals the total distance divided by the total time.

D 4. Matt hikes at a speed of 1km/h starting out but, then gradually speeds up to 5km/h over the course of 2 hours. Find acceleration:

A. - 2 km/h²
B. 5 km/h²
C. 1 km/h
D. 2 km/h²

show work

$A = \frac{V_F - V_I}{T}$ $A = \frac{5\,km/h - 1\,km/h}{2\,h}$ $A = 2\,km/h^2$

A 5. Passengers fly on an airplane which, went from 350km/hr to 650 km/hr in 30minutes time. Find acceleration:

30min = 0.5hr

A. 600 km/h²
B. 600 km/h
C. 300 km/h
D. -300 km/h²

show work

$A = \frac{V_F - V_I}{T}$ $A = \frac{650\,km/hr - 350\,km/hr}{0.5\,hr}$

$A = 600\,km/hr^2$

_____ 6. A car speeds along at 80**km/h**. It must brake and slow down because of heavy traffic. The car slows to 20**km/h** in 9 seconds. 9 sec. equals **0.0025 hours.** Give the answer with these units **km/h²**

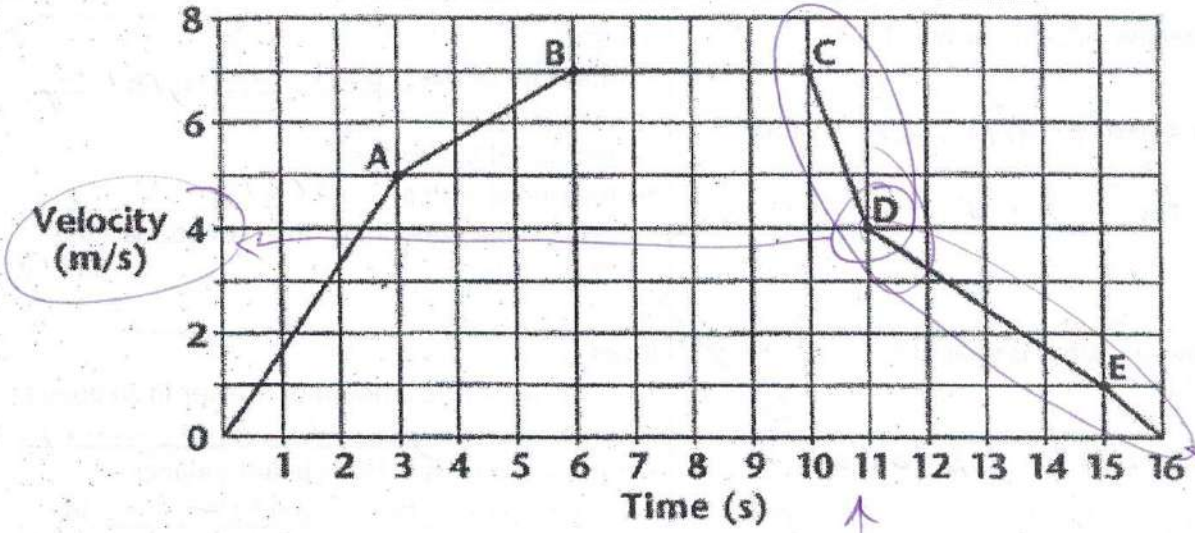
1.write equation V_F 2.show work 3.box answer

$A = \frac{V_F - V_I}{Time}$ $A = \frac{20\,km/hr - 80\,km/hr}{0.0025\,hr}$ $A = 24000\,km/hr^2$

3pts

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Rate of change in Velocity (Acceleration)



Answer the following based on the graph above.

C 6. What is occurring between points B and C?
- A. Deceleration
- B. The car is stopped
- C. Constant speed
- D. Changing velocity

A 7. What is the vehicle's speed at 11 seconds?
- A. 4 m/s
- B. 4 m/s^2
- C. - 4 m/s
- D. Cannot be determined

B 8. The car's initial deceleration is -3m/s^2, but it then slows again at a rate of -0.75m/s^2 immediately afterward. Consider the graph and data to select the best response.
- A. This car's deceleration rate was constant
- B. This car applied the brakes rapidly then eased up.
- C. This car stopped multiple times
- D. Cannot be determined

C 9. Which rate of deceleration was greater, meaning slowed more rapidly?
- A. A-B
- B. B-C
- C. C-D
- D. D-E

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Gravity ← Know basics of Mass, weight, gravity

Quick –Review What is Gravity?

Force at a distance due to the mass of an object.

Weight

- measure of the pull of gravity on an object
- measured in Newtons
- measured with a scale
- can change depending on gravitational field object is in.

Quick Review -What is weight?

a mass of 1 kilogram equals a weight of 9.8 newtons

Mass

- measure of the amount of matter in an object
- measured in grams, kilograms, etc.
- measured with a triple beam balance
- Stays the same in different gravitational fields
  - If my mass 110kg on Earth – I am still 110kg on Jupiter

ass the M&M in front of you...

M &M = 1 g

One M&M = about 1g

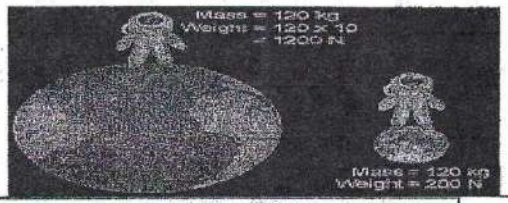
What else do you think is 1gram?

large paperclip

Planets and Gravity

Mass – does not change on the planets and Earth

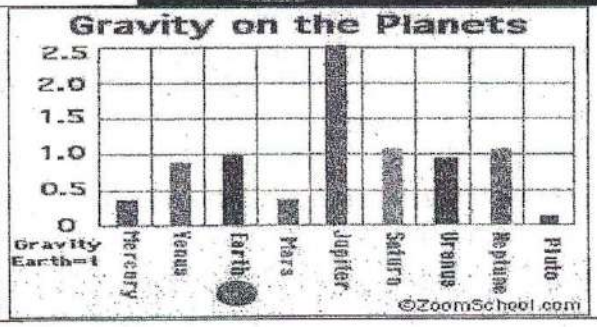
Weight – changes because of the gravitational force of the planets (how far are they from the Sun)



King Henry Died Un-expectantly Drinking Chocolate Milk

- How much is a kilo? 1000 grams
  How much is a gram? 1000 milligrams

Kilo Hecta Deca U(grams,meters, liters) Deci Centi Milli



EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

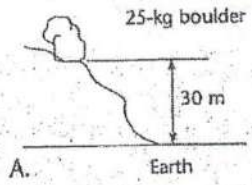
If an object weighs 40 N on Earth, would it weigh more than 40 N on the moon? Explain your answer. No, force of gravity is less on the moon. The gravity on the moon is about 1/6 the force here on Earth. $9.807 m/s^2$ (Earth) / $1.62 m/s^2$ (moon)

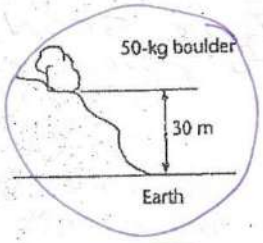
5. If an object has a mass of 26 g on Earth, would its mass be less than 26 g on the moon? Explain your answer. No, the same

Circle the picture in each set below that shows the greater gravitational force between the two objects.

Fact - gravity decreases as distances increase between surfaces.

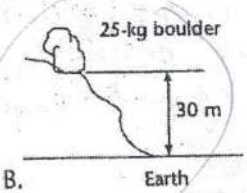
A.

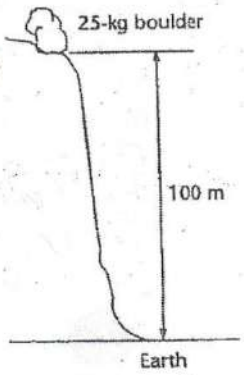




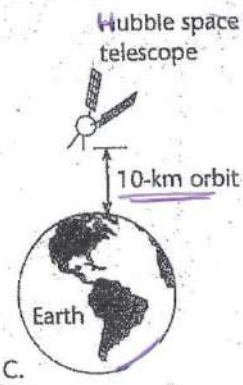
arguably

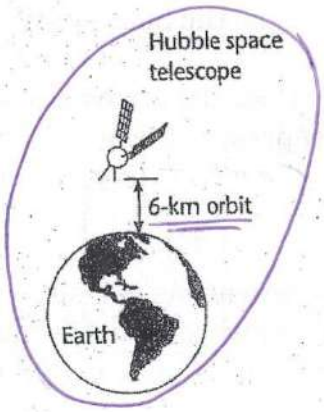
B.



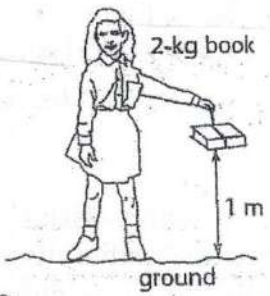


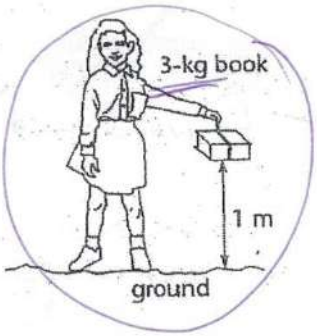
C.





D.





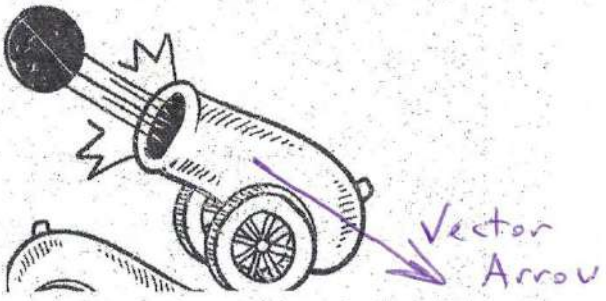
EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

Science 8
Unit: Forces

Name_____
Period_____

Newton's Third Law

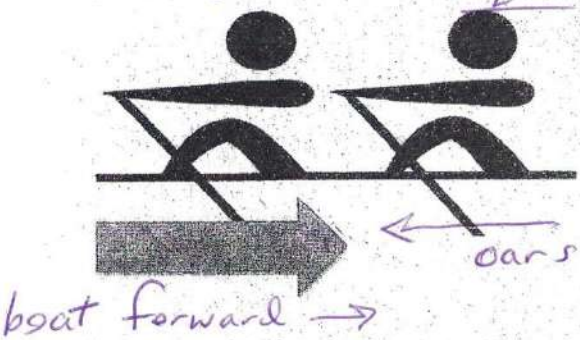
1. Draw an arrow on the image to the right, to show the direction the cannon will move when the cannonball is fired.



a. Does the arrow you draw for the cannon represent the action or reaction force? _____

b. If the force that propels the cannonball forward is 500N, how much force will move the cannon backwards? Explain.

Force firing forward (action) will push the cannon backward with equal force 500N (reaction). It doesn't the cannon gets pushed equally as far just with equal force.



2. Draw an arrow on the image to the left to show the direction the oars must move to propel the boat forward.

a. Does the arrow you draw for the oars ~~cannon~~ represent the action or reaction force? reaction.

3. Do you agree or disagree with this statement "As you sit in your seat, the force of gravity on Earth pulls you downwards. This is equal to the amount of force the chair is pushing upwards on your body." Explain using Newton's third law.

For every action there is an equal and opposite reaction. If seated applying a force of 10N then the chair must be applying an equal force back.

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK

There are a dozen ways to solve this.

_____ 5. You intend to compete in a 5 kilometer fun run this spring. You are a little worried about how much time it will take though. You know you can run 3.1 miles in about 21 minutes and you want to predict your time for the 5 kilometer race. Your running coach tells you your speed is about 14.29km/hr. What will your **time** likely be?

Answer right here

1mile = 1.609km	**Conversion factors**
1km= 0.621mile	

Find time: rounded up to 5km?

$\frac{3.1 \text{ miles}}{1 \text{ mile}} = \frac{x}{1.609 \text{ km}} = 4.98 \text{ km}$

A.	11 minutes	**E.**	21 minutes
B.	7 hr	**F.**	14 mph
C.	21 m per min	**G.**	15 km/hr
D.	30.32 min	**H.**	11 miles/km

$t = d/s$ $t = \frac{3.1 \text{ miles}}{s}$ ←?

$\frac{4.98 \text{ km}}{0.35 \text{ hr}} = 14.2 \text{ km/hr}$

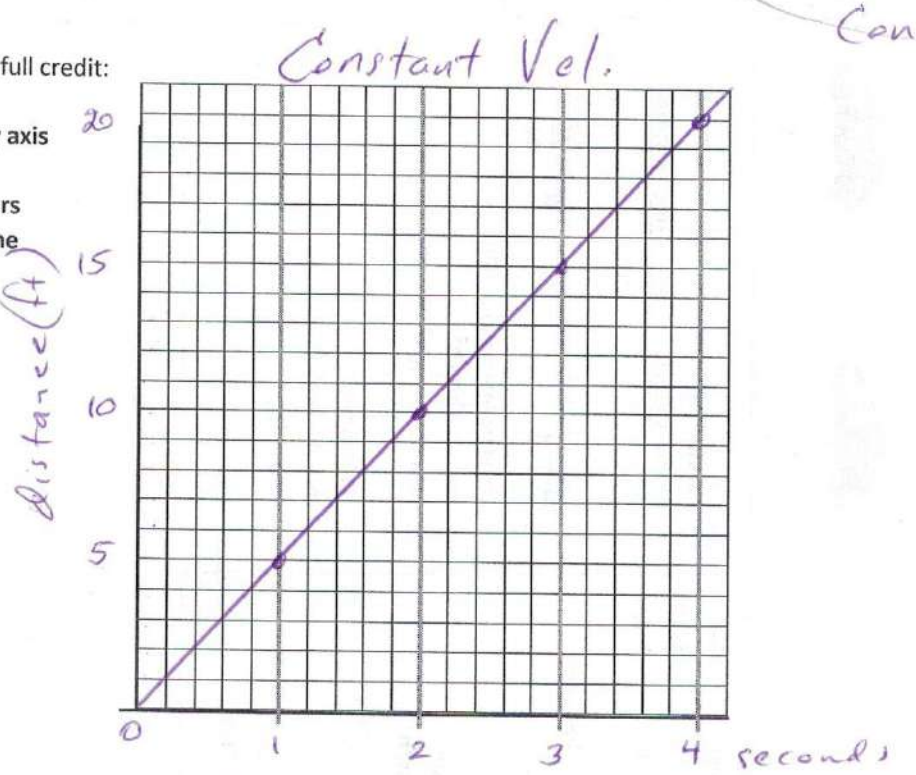
0.35 hr = 21 min!

Convert

6. A constant speed vehicle has traveled **20 feet** across the classroom floor in **4 seconds**. Assume the speed truly was **constant**. **Complete the graph below.**

Include the following for full credit:

- **Title**
- **labels for x & y axis**
- **Units**
- **include numbers**
- **draw sloped line**



Place ANSWERS on the line provided.

10 ft 7. What's the distance traveled 2 seconds into the roll across the floor? Refer to graph above. (answer w/ units)

A 9. Preparatory Question: When scientists discuss the velocity of object's motion, they will also include the speed as well as direction of motion. We refer to things like velocity that include two quantities of measurement as:

- **A.** vectors
- **B.** imperial units
- **C.** scalars
- **D.** metric system

Bonus: What branch of mathematics did Sir Isaac Newton invent? Calculus

EXAM REVIEW PACKET FIND ANSWER KEY ONLINE TO CHECK YOUR WORK