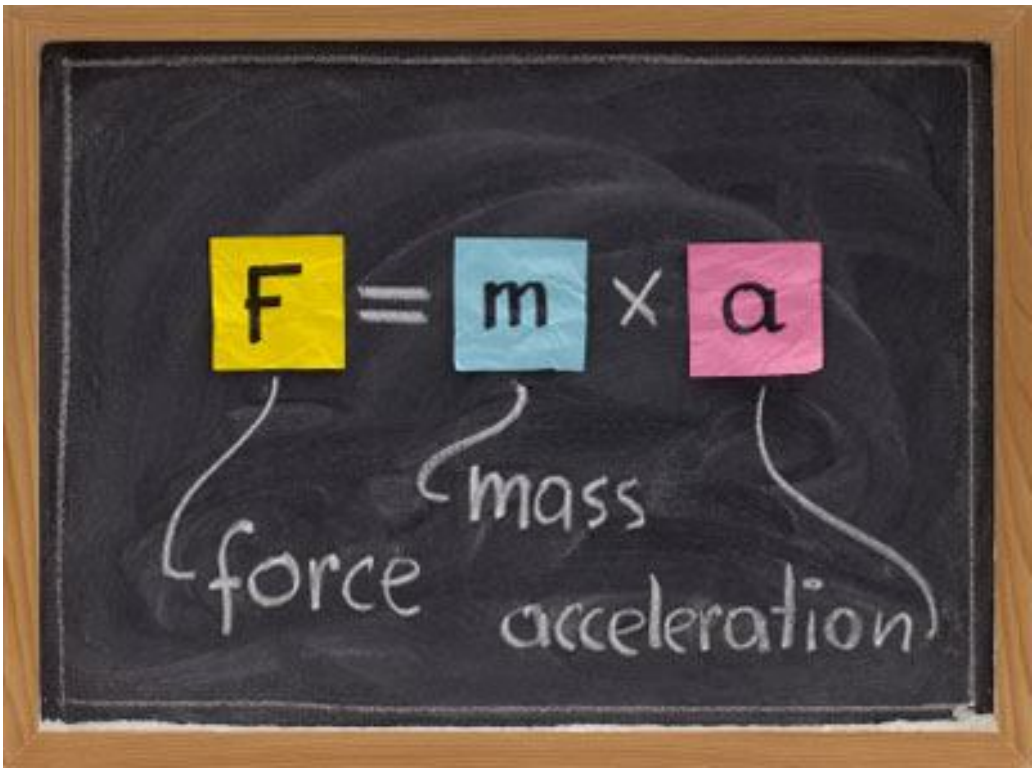
The Ministry of Higher and Secondary Special Education of Republic of Uzbekistan

Nukus State Pedagogical Institute named after Ajiniyaz

Kenjebaeva G.M., Borasheva A.T

ENGLISH MODULE FOR PHYSICS STUDENTS



NUKUS – 2015

Методическое пособие предназначена для студентов-физиков. Цель пособия обучение английскому языку студентов с помощью текстов по специальности, терминов по физике, даны задания по развитию чтения и устной речи.

This Module is designed for physics students. The aim of the module is teaching English to the students through the texts on the specialty, terms of physics. There is given tasks improving reading and speaking skill of students.

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English Module for physics students

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Preface

This module is designed for the first year students of Physics faculty. The work's aim is to broaden students' knowledge on professional topics and develop their skills. It will be a good addition not only for students but also for teachers.

The textbook consists of 10 units. Each unit has a vocabularywith the task to consolidate them, which helps to introduce a new topic, it makes easier to understand the professional text. Then tasks to revise grammar material and post reading activities.

The textbook looks inside the Physics of motion. The readers will learn more about motion and its laws and energy, vectors, velocity, momentum and of course about an outstanding physicist Isaak Newton.The readers will develop and improve their speaking, reading and writing skills on specialty. Moreover it has a test at the end of the textbook to check how much of material the students gained.

As professional topics are very difficult we tried to simplify it for the students with the given tasks. We hope it will be a great contribution in learning a foreign language. We believe that the students will enjoy studying English with this textbook.

We are also very grateful to Tajieva A. and Seytjanov J. for useful comments and suggestions.

Kenjebaeva Gulnur Maratovna

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Unit 1
Theme: Mechanics and motion

Vocabulary

Motion (*noun*)	mō-shən	Haraket
Universe (*noum*)	ˈyü-nə-ˌvərs	Bolmis
Mechanics (*noun plural but singular or plural in construction*)	mi-ˈka-niks	Mexanika
Law (*noun*)	ˈlȯ	Nizam
Galaxy (*noun*)	ˈga-lək-sē	Galaktika
Force (*noun*)	ˈfȯrs	Kush

Task 1
Find out the word to the definition

	an act or process of moving
	all of space and everything in it including stars, planets, galaxies, etc.
	any one of the very large groups of stars that make up the universe
	physical strength, power, or effect
	a science that deals with physical energy and forces and their effect on objects
	the whole system or set of rules made by the government of a town, state, country, etc.

Task 2
Pair work.
Make up sentences with these words in the box using Present Continuous Tense.

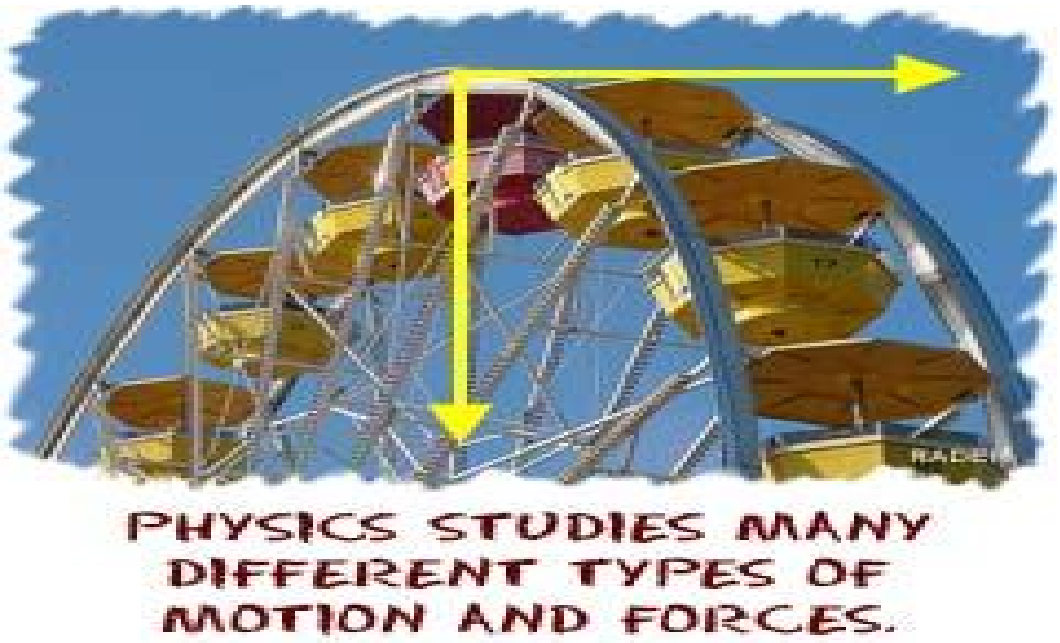
Happen Stand Change Reach Look at Move Reach Appear Stop

II Reading.

Read and take the main idea of the text.

Mechanics and Motion

Motion is one of the key topics in physics. Everything in the universe moves. It might only be a small amount of movement and very slow, but movement does happen. Don't forget that even if you appear to be standing still, the Earth is moving around the Sun, and the Sun is moving around our galaxy. The movement never stops. Motion is one part of what physicists call mechanics. Over the years, scientists have discovered several rules or laws that explain motion and the causes of changes in motion. There are also special laws when you reach the speed of light or when physicists look at very small things like atoms.



Task 3

Answer the questions according to the text

1. What is motion?
2. What is moving around the Sun?
3. Does the movement stop?
4. What have scientists discovered over the years?
5. What is moving around our galaxy?

Task 4

Put sentences in order according to the text.

Everything in the universe moves.

There are also special laws when you reach the **speed of light** or when physicists look at very small things like atoms.

Motion is one part of what physicists call **mechanics**.

Motion is one of the key topics in physics.

It might only be a small amount of movement and very slow, but movement does happen.

The movement never stops.

Don't forget that even if you appear to be standing still, the Earth is moving around the Sun, and the Sun is moving around our galaxy.

Over the years, scientists have discovered several rules or **laws** that explain motion and the causes of changes in motion.

III Post-reading.

Speaking. Group work.

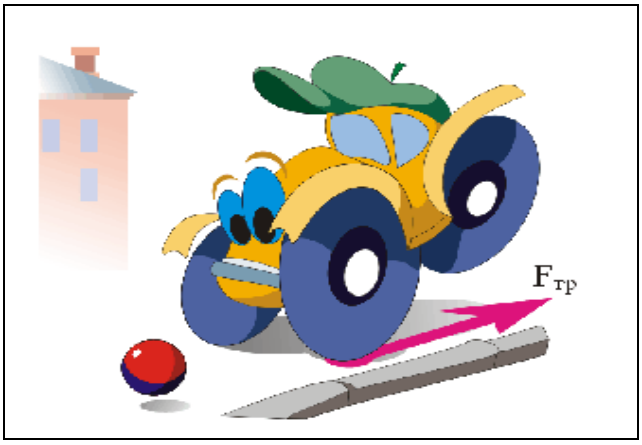
To design a poster which shows motion. Presenting posters.

Unit 2

Theme: Speed it up, slow it down

Warm up

1. What can you see in this picture?
2. What does F mean?
3. What do you think what topic of our new unit is?



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Vocabulary

Solid (*adjective)*	'sä-ləd	Qatti
Speed (*noun*)	Spēd	Tezlik
Increase (*verb)*	in-'krēs	O'siw
Twist (*verb)*	'twist	Buraw, tawlaw
Acceleration (*noun)*	ik-ˌse-lə-'rā-shən	Tezleniw
Influence (*noun)*	'in-ˌflü-ən(t)s	Tasir etiw
Velocity (*noun)*	və-'lä-sə-tē, -'läs-tē	Tezlik
Measure (*noun)*	'me-zhər, 'mā-	O'lshem

Task 1

Match the words with the definitions.

physics : the rate at which the speed of a moving object changes over time	Influence
a unit used in measuring something the act or process of moving faster or happening more quickly : the act or process of accelerating	Speed
the power to change or affect someone or something : the power to cause changes without directly forcing them to happen	Velocity
to bend or turn (something) in order to change its shape	Solid
to become larger or greater in size, amount, number, etc.	Acceleration
firm or hard : not having the form of a gas or liquid	Twist
the quality of being quick	Increase
quickness of motion	Measure

II. Reading.

Read and look for a particular piece of information.

Speed it Up, Slow it Down

The physics of **motion** is all about forces. **Forces** need to act upon an object to get it moving, or to change its motion. Changes in motion won't just happen on their own. So how is all of this motion measured? Physicists use some basic terms when they look at motion. How fast an object moves, its speed or **Velocity**, can be influenced by forces. (Note: Even though the terms 'speed' and 'velocity' are often used at the same time, they actually have different meanings.) **Acceleration** is a twist on the idea of velocity. Acceleration is a measure of how much the velocity of an object changes in a certain time (usually in one second). Velocities could either increase or decrease over time. **Mass** is another big idea in motion. Mass is the amount of something there is, and is measured in grams (or kilograms). A car has a greater mass than a baseball.

Task 2

Write a number (1-7) to put these sentences in order

_____ Physicists use some basic terms when they look at motion

_____ How fast an object moves, its speed or **Velocity**, can be influenced by forces..

_____ Changes in motion won't just happen on their own.

_____ So how is all of this motion measured?

_____ The physics of **motion** is all about forces

_____ **Forces** need to act upon an object to get it moving, or to change its motion

Task 3

Circle the best word to complete these sentences

1. The physics of motion is all about ***forces/vector***.
2. ***Acceleration/ velocity*** is a twist on the idea of velocity.
3. ***Mass/ force*** is another big idea in motion.
4. ***Mass / length*** is the amount of something there is, and is measured in grams (or kilograms).
5. Physicists use some basic terms when they look at ***motion/light***

III. Post-reading

Put together the pieces of puzzle

Acceleration is a twist on the idea of velocity

Mass is another big idea in motion

Mass is the amount of something there is, and is measured in grams (or kilograms).

Acceleration is a measure of how much the velocity of an object changes in a certain time (usually in one second).

A car has a greater mass than a baseball.

Velocities could either increase or decrease over time.

Unit 3
Theme: Force of Nature

Vocabulary

De·vote (*verb*)	di-ˈvōt, dē-	Bag'shlaw
Pull (*verb*)	ˈpu̇l ***also*** ˈpəl	Tartiw
Nu·cle·us (*noun*)	ˈnü-klē-əs	Yadro
Re·volve (*verb*)	ri-ˈvälv, -ˈvȯlv	Aylaniw
Oc·cur (*verb*)	ə-ˈkər	Boliw
Equal (*adjective*)	ˈē-kwəl	Ten'
Ex·ert (*verb*)	ig-ˈzərt	Payda etiw, orinlaw
Ap·ply (*verb*)	ə-ˈplī	
Blow (*verb*)	ˈblō	Esiw
Wind (*noun*)	ˈwind	samal

Task 1

Guess to which word the definition belongs

1. to give over or direct (as time, money, or effort) to a cause, enterprise, or activity to hold onto and move (someone or something) in a particular direction and especially toward yourself. _____

2. the central part of an atom that is made up of protons and neutrons _____

3. to turn around a center point or line_____

4. to happen _____

5. to put or spread (something) on a surface, a part of the body, etc. _____

6. the same in number, amount, degree, rank, or quality _____

7. to cause (force, effort, etc.) to have an effect or to be felt *of air* (1) **:** to be in motion (a breeze *blew* gently) (2) **:** to move with speed or force (the wind was *blowing*)

_____

8. a natural movement of air of any velocity; *especially* **:** the earth's air or the gas

_____

9. surrounding a planet in natural motion horizontally _____

Task 2

Find the words in the puzzle:

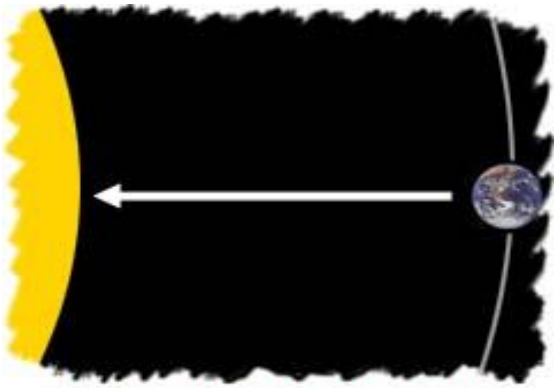
Wind, blow, exert, equal, apply , occur, nucleus, pull, devote.

P	A	L	A	U	Q	E	O
U	B	T	R	E	X	E	C
L	C	E	D	C	B	A	C
L	D	A	P	P	L	Y	U
N	U	C	L	E	U	S	R
A	E	W	O	L	B	E	G
D	E	V	O	T	E	F	H
B	F	C	D	W	I	N	D

II. Reading.

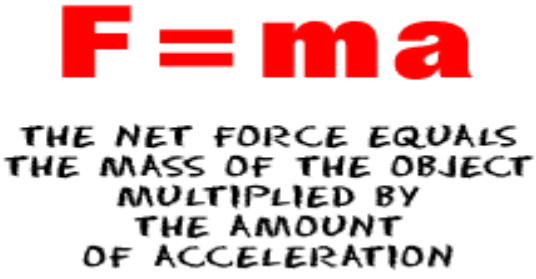
Identify main points in the text.

Forces of Nature



Forces are a big part of physics. Physicists devote a lot of time to the study of **forces** that are found everywhere in the universe. The forces could be big, such as the pull of a star on a planet. The forces could also be very small, such as the pull of a nucleus on an electron. Forces are acting everywhere in the universe at all times.

A Formula of Force



There is one totally important formula when it comes to forces, **F = ma**. That's all there is, but everything revolves around that formula. "F" is the total (net) **force**, "m" is the object's **mass**, and "a" is the **acceleration** that occurs. As a sentence, "The

net force applied to the object equals the mass of the object multiplied by the amount of its acceleration." The net force acting on the soccer ball is equal to the mass of the soccer ball multiplied by its change in velocity each second (its **acceleration**). Do you remember the wind gently blowing on the soccer ball? The force acting on the ball was very small because the mass of air was very small. Small masses generally exert small forces, which generally result in small accelerations (changes in motion).

Task 3

Answer the question.

1. What do small masses do?
2. What is a big part of physics?
3. What is the net force acting on the soccer ball equal?
4. Where are forces acting?
5. What is the formula of force?

Task 4

Complete the sentences with the suitable words.

- Small masses generally _____ small forces, which generally _____ in small accelerations.
- The net force acting on the soccer ball is _____ to the mass of the soccer ball multiplied by its change in _____ each second
- The forces could also be very small, such as the pull of a _____ on an electron.
- _____ are a big part of physics
- The force acting on the _____ was very small because the _____of air was very small.
- _____ are acting everywhere in the _____ at all times.

Unit 4

Theme: Vector Basics

Vocabulary

Hold (*verb*)	ˈhōld	Uslap turiw
Vector (*noun)*	ˈvek-tər	Vector
Direction (*noun)*	də-ˈrek-shən, dī-	Bag'dar
Scalar (*adjective*)	ˈskā-lər-, -ˌlär	Skalyar
Value (*noun)*	ˈval-(ˌ)yü	A'himiyet
Magnitude (*noun)*	ˈmag-nə-ˌtüd, -ˌtyüd	Ko'lem
Arrow (*noun*)	ˈa-(ˌ)rō	Strelka
Depend (*verb)*	di-ˈpend	Tiyisli, baylanisli
Energy (*noun*)	ˈe-nər-jē	Energiya

Task 1.

Find the meaning of these words in karakalpak.

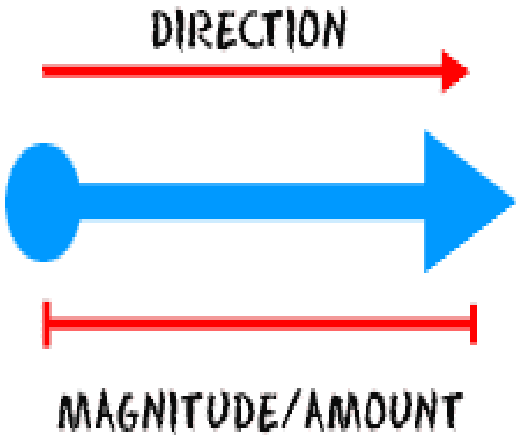
1.to have or keep (something) in your hand, arms, etc *2. mathematics* : a quantity (such as velocity) that has size and direction 3. the course or direction of an airplane 4. the course or path on which something is moving or pointing (of a quantity) having only magnitude, not direction. 5. the amount of money that something is worth : the price or cost of something 6. the great size or extent of something. 7. a mark (such as →) that is shaped like an arrow and that is used to show direction 8. be controlled or determined by. 9. usable power that comes from heat, electricity, etc.	

Task 2
ABC order game
Put the words from the text in alphabetical order in the right hand column below.

FORCE	
MAGNITUDE	
DIRECTION	
VECTOR	
ENERGY	
THING	
LENGTH	
VALUE	
ARROW	
EXAMPLE	
MASS	
SCALAR	
TEMPERATURE	
RESULT	

II. Jigsaw reading.

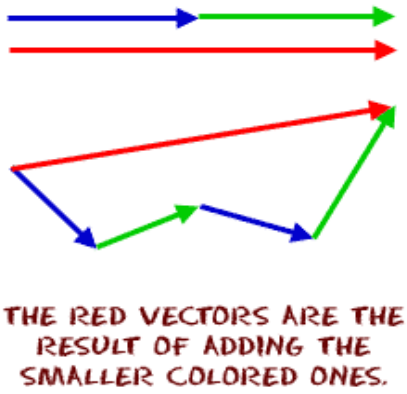
Vector Basics



Force is one of many things that are vectors. A **vector** is a numerical **value** in a specific **direction**, and is used in both math and physics. The force vector describes a specific amount of **force** and its direction. You need both value and direction to have a vector. Both. Very important. Scientists refer to the two values as direction and **magnitude** (size). The alternative to a vector is a scalar. **Scalars** have values, but no direction is needed. Temperature, mass, and **energy** are examples of scalars.

When you see vectors drawn in physics, they are drawn as arrows. The direction of the arrow is the direction of the vector, and the length of the arrow depends on the magnitude (size) of the vector.

Real World Vectors



Imagine a situation where you're in a boat or a plane, and you need to plot a course. There aren't streets or signs along the way. You will need to plan your navigation on a map.

You know where you're starting and where you want to be. The problem is how to get there. Now it's time to use a couple of vectors.

Draw the vector between the two points and start on your way. As you move along your course, you will probably swerve a bit off course because of wind or water currents. Just go back to the map, find your current location, and plot a new vector that will take you to your destination. Captains use vectors (they know the speed and direction) to plot their courses.

Task 2
Open the brackets in the sentences using Present Continuous

1. The wind ____**(blow)**_____.
2. The children ____**(draw)**____ pictures now.
3. The teacher ____**(start)**___ the lesson now.
4. Students ____**(describe)**____ the situation.
5. The car ____**(move)**____ very fast.

III. Post-reading.

Retell this text in 4 sentences.

Unit 5
Theme: Isaac Newton

Vocabulary

Receive (*verb)*	ri-ˈsēv	Aliw
Plague (*noun)*	ˈplāg	Chuma
Calculus (*noun)*	-ləs	Ten'leme
Attention (*noun)*	ə-ˈten(t)-shən	Itibar
Rainbow (*noun)*	-ˌbō	Ayqulak
Perpendicular (*adjective*)	ˌpər-pən-ˈdi-kyə-lər	Perpendikulyar
Draw (*verb)*	\ˈdrȯ\	Aliw, sheshimge keliw
Sideward (*adverb)*ˈ	\sīd-wərd\	Qaptalg'a bag'darlang'an
Upward (*adverb*)	\ˈəp-wərd\	To'meng bag'darlang'an
Bury (*verb)*	\ˈber-ē, ˈbe-rē\	Jerlew

Task 1.

Match column A with column B

A	B
to get or be given (something)	**Perpendicular**
a disease that causes death and that spreads quickly to a large number of people	**Draw**
an advanced branch of mathematics that deals mostly with rates of change and with finding lengths, areas, and volumes	**Plague**
notice, interest, or awareness	**Sideward**
a curved line of different colors that sometimes appears in the sky when the sun shines through rain	**Rainbow**
going straight up or to the side at a 90 degree angle from another line or surface	**Receive**
to cause (attention) to be given *to* someone or something	**Bury**
toward a side	**Upward**
toward the ceiling, sky, etc.	**Calculus**
to put (a dead person or animal) in a grave	**Attention**

Task 2

Make up sentences with these words using Past Simple

Show Answer Close Die Love

Study Ask Discover Receive

II. Reading

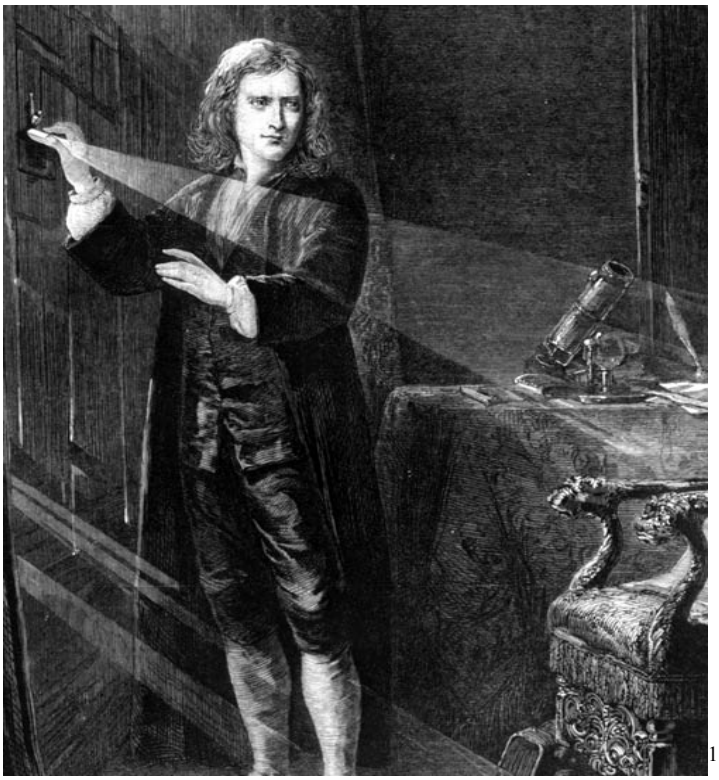
Read for specific information.

Task 3

Answer the questions

1. How old is Newton in this picture?
2. What is he doing?
3. What is on the table?

Isaac Newton



[1]

[1] Picture is taken from the www.veselajashkola.ru

Newton, one of the greatest scientists of all times was born in 1642 in the little village in Lincolnshire, England. His father was a farmer and died before Newton was born. His mother was a clever woman whom he always loved.

After the school, Newton studied mathematics at Cambridge university and received his degree in 1665. Then the university was closed because of the danger of plague and Newton went home for eighteen months. It was most important period in his life when he made his three great discoveries — the discoveries of the differential calculuses, of the nature of white light, and of the law of gravitation.

These discoveries are still important for the modern science. Newton had always been interested in the problems of light. Many people saw colours of a rainbow but only Newton showed, by his experiments, that white light consists of these colours.

It is interesting how he discovered the law gravitation. Once, as he sat at the garden, his attention was drawn by the fall of an apple. Many people saw such an usual thing before.

But it was Newton who asked himself a question: "Why does that apple fall perpendicularly to the ground? Why doesn't it go sidewards or upwards?" The answer to this question was the theory of gravitation, discovered by Newton.

Newton died at the age of 84, and was buried in Westminster Abbey, where his monument stands today.

Task 4

Answer the question

1.When and where was Newton born?

2. What three major discoveries did Newton make?

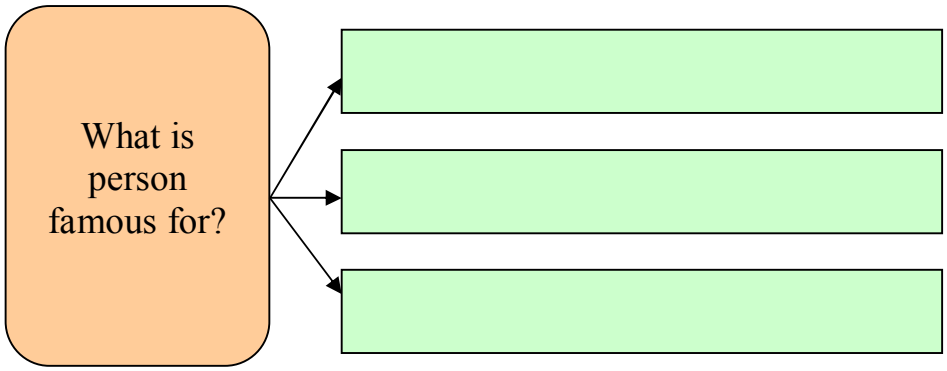
3. When did Newton make these discoveries?

4. How did the idea which led to the discovery of the law of gravitation first come to him?

5. When did Newton die and where is he buried?

III. Post-reading

Write 3 facts about Newton. Group work



Unit 6
Theme: Law's of motion

Vocabulary

Action (*noun)*	ak-shən	Is-ha'reket
Gravitation (*noun)*	ˌgra-və-ˈtā-shən	Gravitatsiya
Discovery (*noun)*	dis-ˈkə-v(ə-)rē	Ashiw, oylap tabiw
Differential calculus	di-fə-ˈren(t)-shəl	Differentsial ten'leme
Tend (*verb*)	ˈtend	Saqlap turiw
Verify (*verb)*	ˈver-ə-ˌfī	Tekseriw
Danger (*noun)*	ˈdān-jər	Qa'wip
Ram (*verb*)	ˈram	Soqlig'iw
Inverse (*adverb)*	ˈin-ˌvərs	Qarama-qarsi

Task 1

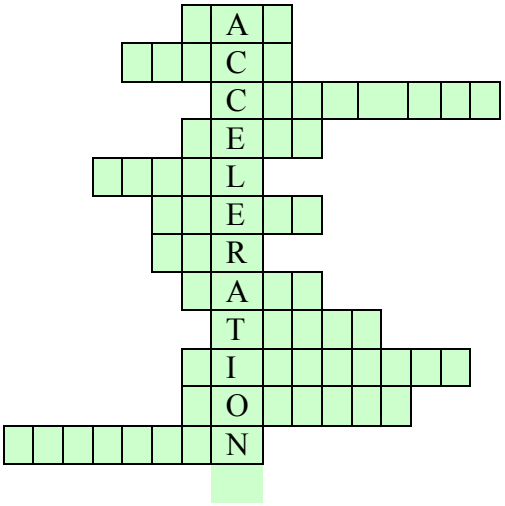
Find out the definitions to the given words

Equal	
Gravitation	
Differential calculus	
Action	
Mass	
Force	
Discovery	

Task 2

Put these words into suitable places:

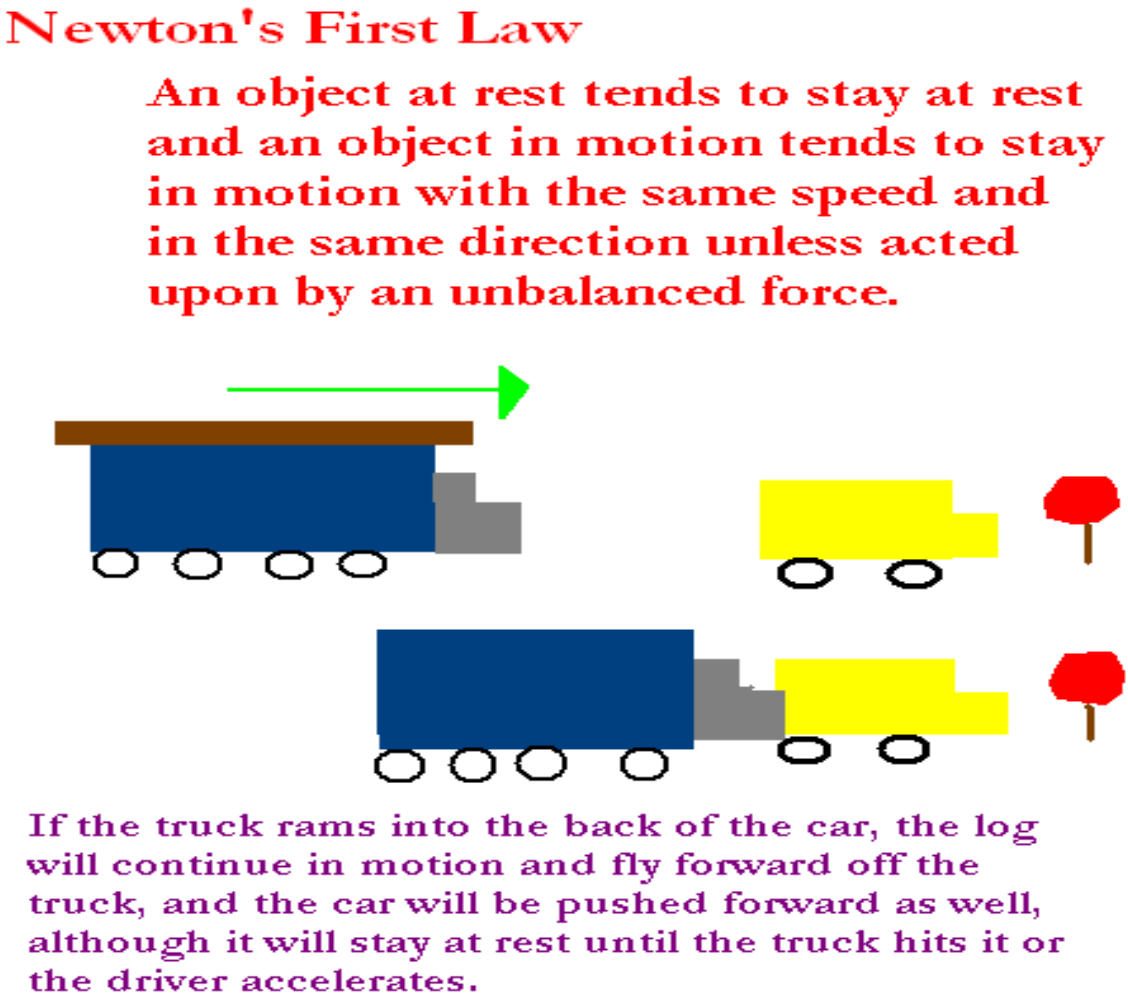
Speed, mass, direction, tent, law, car, force, calculus, object, reaction. Equal, truck



II. Reading. Read and identify main points.

Newton's Laws of Motion

There was this fellow in England named **Sir Isaac Newton**. A little bit stuffy, bad hair, but quite an intelligent guy. He worked on developing **calculus** and **physics** at the same time. During his work, he came up with the three basic ideas that are applied to the physics of most **motion** (NOT**modern physics**). The ideas have been tested and verified so many times over the years, that scientists now call them **Newton's Three Laws of Motion.**



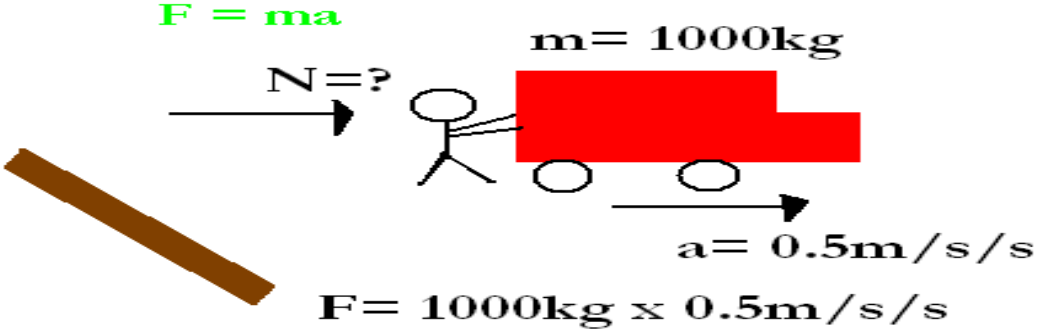
[2]

[2] Picture is taken from www.pinterest.com

Newton's Second Law

The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.

$F = ma$



F= 1000kg x 0.5m/s/s
F= 500N

[3]

Newton's Third Law

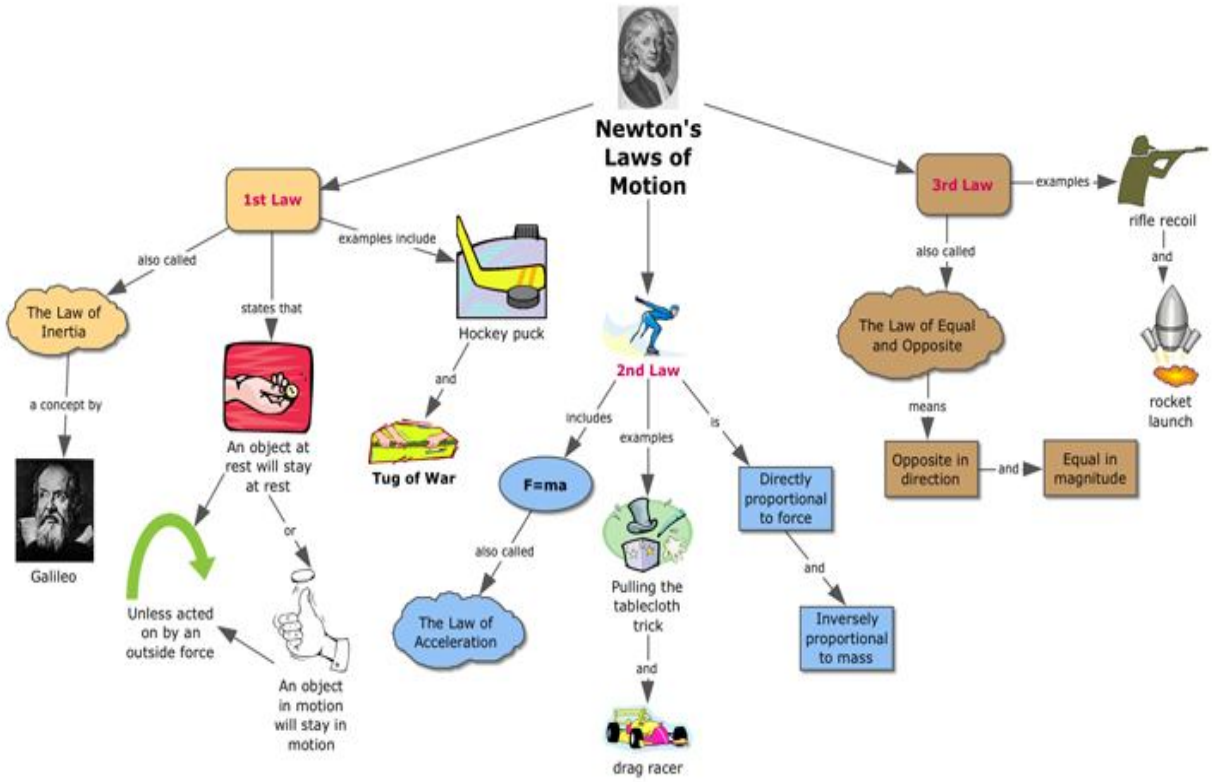
For every action, there is an equal and opposite reaction.

[4]

[3] Picture is taken from www.pinterest.com
[4] Picture is taken from www.pinterest.com

III. Post-reading

The importance of Newton's laws



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Name of the law	Where we can use it in our life

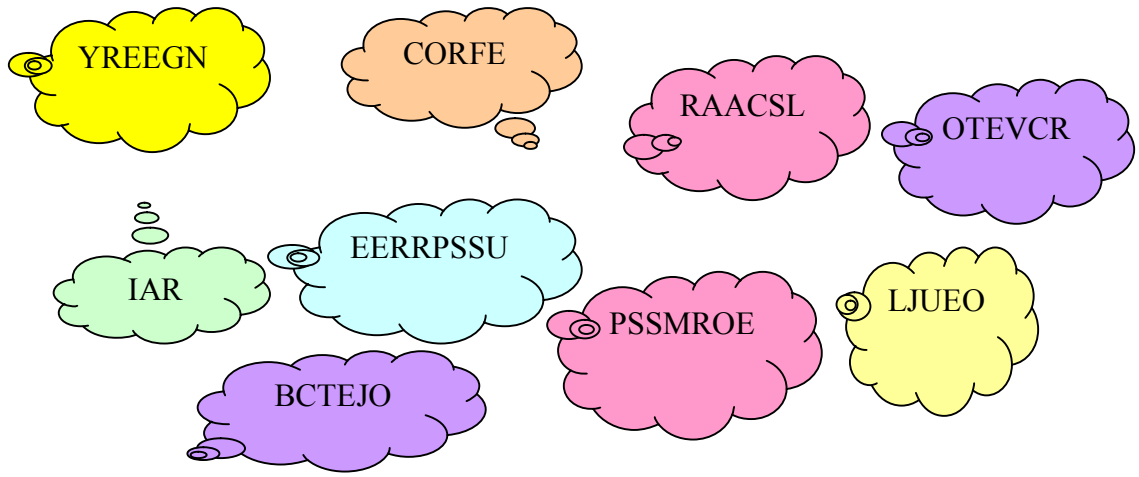
[5] Picture is taken from www.inspiration.com

Unit 7
Theme: Energy of motion

Vocabulary

Nuclear *(adjective)*	ˈnü-klē-ər, ˈnyü-, ÷-kyə-lər	Yadroliq
Behave *(verb)*	bi-ˈhāv, bē-	O'zin tuta biliw
Solar *(adjective)*	sō-lər, -ˌlär	Quyash (sistemasi)
Kinetic *(adjective)*	kə-ˈne-tik *also* kī-	Kinetikaliq
Spring *(verb)*	ˈspriŋ	Ko'teriliw
Arrangement *(noun)*	ə-ˈrānj-mənt	Tayarliq, ta'rtipke keltiriw
Joule *(noun)*	ˈjül *also* ÷ˈjau̇(-ə)l	Joul
Store *(transitive verb)*	ˈstȯr	Saqlaw
Elastic *(adjective)*	i-ˈlas-tik	Iyiliwshen'
Pressure *(noun)*	ˈpre-shər	Basim
Expand *(verb)*	ik-ˈspand	Ken'eytiriw

Task 1
Unscramble the given words from the text



Task 2

Write words to the definitions

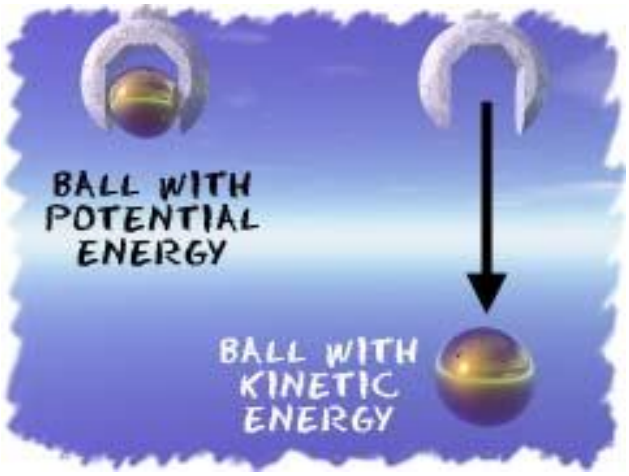
a unit of work or energy	
com·press	
keep or accumulate (something) for future use.	
to act in an acceptable way : to act properly	
something that is done to prepare or plan for something in the future	
of or relating to the movement of physical objects	

a resilient device, typically a helical metal coil, that can be pressed or pulled but returns to its former shape when released, used chiefly to exert constant tension or absorb movement.	
of, relating to, producing, or using energy that is created when the nuclei of atoms are split apart or joined together	
able to return to an original shape or size after being stretched, squeezed, etc.	
to increase in size, range, or amount : to become bigger	
of or relating to the sun	
the action of pressing or pushing against something	
to press or squeeze (something) so that it is smaller or fills less space	

II. Reading. Scan the text

Energy Around Us

We use the concept of energy to help us describe how and why things behave the way they do. We talk about solar energy, nuclear energy, electrical energy, chemical energy, etc. If you apply a **force** to an object, you may change its energy. That energy must be used to do work, or accelerate, an object. Energy is called a **scalar**; there is no direction to energy (as opposed to **vectors**). We also speak of kinetic energy, potential energy, and energy in springs. Energy is not something you can hold or touch. It is just another means of helping us to understand the world around us. Scientists measure energy in units called **joules**.



Active Energy vs. Stored Energy

Kinetic and potential energies are found in all objects. If an object is moving, it is said to have **kinetic energy** (KE).**Potential energy** (PE) is energy that is "stored" because of the position and/or arrangement of the object

Gases Storing Energy

Gases? What can they do? Gases are great because they can **compress** and **expand**. They act as if they were elastic. If the pressure increases and compresses gas molecules, the amount of stored energy increases. It's similar to a spring, but slightly different. Eventually that energy in the compressed gas can be let out to do something (work).

Task 1

Read the following statements and decide if these statements are True or False by writing 'T' or 'F' in the right hand column below.

Statements	True or False?
a. Gases are great because they can compress and expand.	
b. Kinetic energy is energy that is "stored" because of the position and/or arrangement of the object.	
c. The amount of stored energy increases, if the pressure increases and compresses gas molecules.	
d. Kinetic and potential energies are found in all objects.	
e. If you do not apply a force to an object, you may change its energy.	
f. Energy is something you can hold or touch.	
g.Scientists do not measure energy in units called joules.	

Task 2

Open the brackets in the sentences using Past Simple

1. We **(talk)** about solar energy at the conference yesterday
2. They **(speak)** of kinetic energy at the meeting last week.
3. Air pressure **(increase)** extremely last month.
4. The students **(understand)** him very well last night.
5. Scientists measure energy in units **(call)** joules.

Unit 8
Theme: Velocity

Vocabulary

Rate *(verb)*	'rāt	Bahalaw
Average *(noun)*	'a-v(ə-)rij	Ortasha san
Divide *(verb)*	də-'vīd	Bo'liw
Constant *(adjective)*	'kän(t)-stənt	Turaqli
Instantaneous *(adjective)*	ˌin(t)-stən-'tā-nē-əs, -nyəs	Birzamatliq
Limit *(noun)*	'li-mət	Shegara
Tiny *(adjective)*	'tī-nē	Kishkentay
Measurement *(noun)*	'me-zhər-mənt, 'mā-	O'lshem birlik

Task 1

Match the words with the definitions

.

1) instantaneous	**a)** happening very quickly : happening in an instant
2) average	**b)** to separate (something) into two or more parts or pieces
3) constant	**c)** an amount or number that is the highest or lowest allowed
4) **divide**	**d)** very small
5) tiny	**e)** happening all the time or very often over a period of time
6) **Rate**	**f)** the act or process of measuring something
7) measurement	**g)** assign a standard or value to (something) according to a particular scale
8) limit	**h)** a level that is typical of a group, class, or series : a middle point between extremes

Task 2

Find the words from the text in the puzzle

D	I	R	E	C	T	I	O	N	A	B	C	D	E	F
A	I	N	S	T	A	N	T	A	N	E	O	U	S	A
B	A	T	B	T	D	E	F	M	O	T	I	O	N	B
C	K	I	S	J	I	H	G	F	E	D	C	B	A	C
D	A	N	P	B	C	D	V	E	L	O	C	I	T	Y
E	A	Y	E	D	E	F	G	H	I	G	K	T	L	D
F	M	N	E	L	I	M	I	T	O	P	Q	I	R	E
G	S	T	D	U	V	W	X	Y	Z	A	B	M	C	F
H	M	E	A	S	U	R	E	M	E	N	T	E	D	G

II. Reading. Read and understand the text.

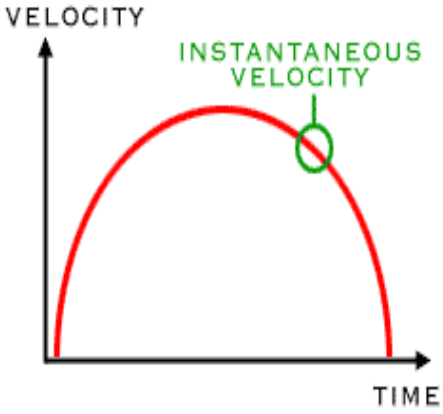
Velocity, Speed, and Motion...

Velocity and speed are very similar ideas, but velocity is a **vector**, and speed is not.

Velocity is the rate of motion in a specific direction. I'm going that-a-way at 30 kilometers per hour. My velocity is 30 kilometers per hour that-a-way. Average speed is described as a measure of distance divided by time. Velocity can be constant, or it can change (acceleration). Speed with a direction is velocity.

One Moment in Time

There is a special thing called instantaneous velocity. That's the velocity at a split second in time. The term "instantaneous" refers to something physicists call a limit. Scientists "limit" the amount of time they do the measurement. When the "limit" moves to zero, that limit is one tiny moment in time. A physicist would measure your velocity as the "limit for a period of time", zero, to get the instantaneous velocity.



Task 3

Complete these sentences with 2 words.

1. A physicist would measure your velocity as the "limit for a period of time", zero, to get the _____ _____.
2. Average speed is described as a measure of _____ _____ by time.
3. There is a special _____ _____ instantaneous velocity.
4. . Velocity is the rate of motion in a _____ _____.
5. The term "instantaneous" refers to something physicists _____ _____.

III. Post-reading.

Work in groups of two or three. Talk about velocity, motion and speed. Write down the sentences and compare your opinions with other groups.

Unit 9

Theme : Momentum

Vocabulary

Calculate *verb*	'kal-kyə-ˌlāt	Esaplaw
Multiply *verb*	'məl-tə-ˌplī	Ko'beytiw
Remain *(verb)*	ri-'mān	Qaliw, saqlap qaliw
Hit *(verb)*	'hit	Uriw, sog'iw
Through *(preposition)*	'thrü	Arqali
Momentum *(noun)*	mō-'men-təm, mə-	Moment
Conserve *(verb)*	kən-'sərv	Saqlaw
Hurt *(verb)*	'hərt	Ziyan keltiriw
Linear *(adjective)*	'li-nē-ər	Siziqli
Indicate *(verb)*	'in-də-ˌkāt	Ko'rsetiw
Within *(adverb)*	wi-'thin, -'thin	Ishinde

Task 1

Write the meaning of the words in karakalpak.

to move your hand, a bat, etc., quickly so that it touches someone or something in a forceful or violent way	
to show (something) : to show that (something) exists or is true	
to cause pain or injury to (yourself, someone else, or a part of your body)	
the property that a moving object has due to its mass and its motion	
to keep (something) safe from being damaged or destroyed	
to increase greatly in number or amount : to become much more numerous	

formed by lines : made up of lines	
to stay in the same place or with the same person or group : to stay after others have gone from one side or end to another side or end of (something)—used to describe movement within a place or an area of land, air, etc.	
inside something	
to find (a number, answer, etc.) by using mathematical processes	

Task 2

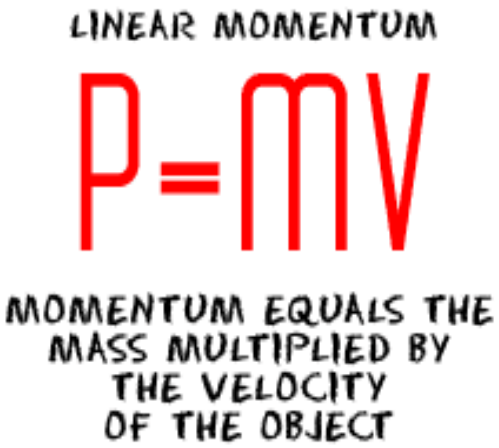
Make up the sentences in Future Simple with the given words.

Visit	***Hurt***	***Stop***	***Say***	***Calculate***
Throw	***Multiply***	***Come***	***Hit***	***Remain***

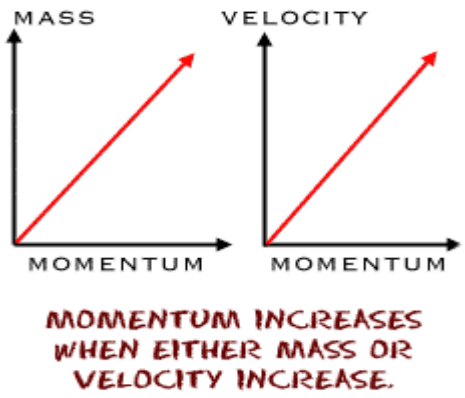
II. Reading.

Extract specific information.

Momentum Basics



Momentum is another vector measurement. **Momentum** is in the same direction as velocity. Scientists calculate momentum by multiplying the **mass** of the object by the **velocity** of the object. It is an indication of how hard it would be to stop the object.



The momentum of an object, or set of objects (system), remains the same if it is left alone. Within such a system, momentum is said to be **conserved**. Here's the momentum idea in simpler terms. When you throw a ball at someone and it hits him hard, it

hurts because it was difficult to stop (had momentum).Think about it. If you throw a small ball and a large ball at the same speeds, the large ball will hit a person with a greater momentum, be harder to stop, and hurt more. When the mass is greater (at the same speeds), the momentum is greater.

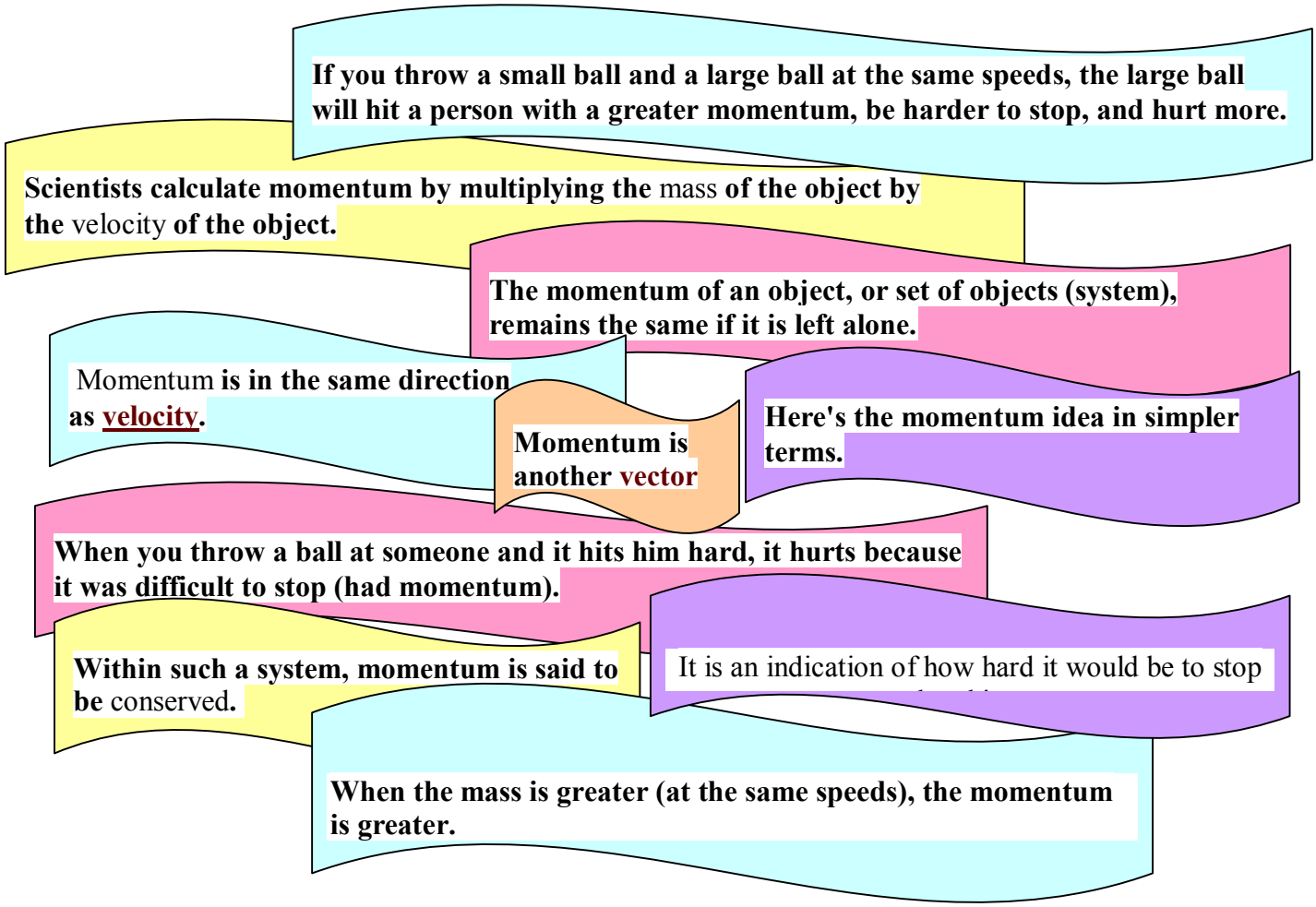
Task 3

Read the following statements and decide if these statements are True or False by writing 'T' or 'F' in the right hand column below.

Statements about reading	True or False?
Momentum is another force measurement.	
The momentum of an object, or set of objects (system), changes the same if it is left alone.	
The momentum is greater, when the mass is greater (at the same speeds).	
Momentum is not said to be conserved, within such a system.	
Scientists calculate momentum by multiplying the mass of the object by the velocity of the object.	

Task 4

Put the sentences in right order according to the text.



III. Post-reading.

Work in groups of two and three. Make up questions based on the text and find answers from other students.

Unit 10

Theme: Gravity

Vocabulary

Gravity (*noun*)	ˈgra-və-tē	Tartilis
Swell (*verb*)	ˈswel	Isiniw
Tide (*noun)*	ˈtīd	Ag'im
Rotate (*adjective)*	ˈrō-ˌtāt	Aylaniw, gezeklesiw
Speed (*noun)*	ˈspēd	Tezlik
Gain (*noun*)	ˈgān	Jetisiw, aliw
Feather (*noun)*	ˈfe-thər	Pa'r

Task 1

Match the definitions in a column A with the words in a column B

A	B
any one of the light growths that make up the outer covering of the body of a bird	**Swell**
the quality of being quick	**Rotate**
to increase in size or number	**Gravity**
something wanted or valued that is gotten : something that is gained; *especially* : money gotten through some activity or process	**Feather**
the flow of the ocean's water as the tide rises or falls	**Acorn**
: the rate at which the speed of a moving object changes over time having the parts flat and spreading or radiating like the spokes of a wheel <*rotate* blue flowers>	**Tide**
the natural force that tends to cause physical things to move towards each other : the force that causes things to fall towards the Earth	**Gain**

Task 2

Make up sentences with the given words using Present Simple

Keep	Exert	Pull	Fall	Rotate
Gain	Bring	Produce	Pass	Drop

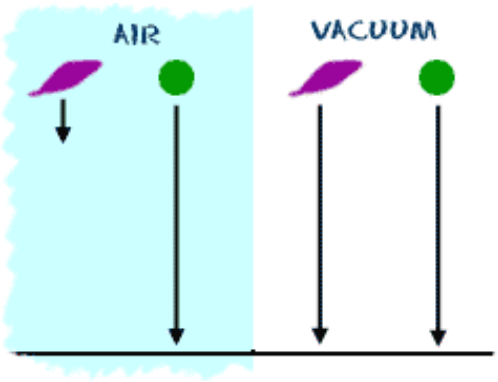
II. Reading.

Reading for details.

Planetary Gravity

Obviously, gravity is very important on Earth. The Sun's gravitational pull keeps our planet **orbiting** the Sun. The motion of the Moon is affected by the gravity of the Sun AND the Earth. The Moon's gravity pulls on the Earth and makes the tides rise and fall every day. As the Moon passes over the ocean, there is a **swell** in the sea level. As the Earth rotates, the Moon passes over new parts of the Earth, causing the swell to move also. The tides are independent of the phase of the moon. The moon has the same amount of pull whether there is a full or new moon. It would still be in the same basic place.

We have to bring up an important idea now. The Earth always produces the same **acceleration** on every object. If you drop an acorn or a piano, they will gain velocity at the same rate. Although the gravitational force the Earth exerts on the objects is different, their masses are just as different, so the effect we observe (acceleration) is the same for each. The Earth's gravitational force **accelerates** objects when they fall. It constantly pulls, and the objects constantly speed up.



BOTH THE FEATHER AND BALL FALL AT THE SAME SPEED IN A VACUUM.

Task 3

Answer the questions

1. Is the gravity important on Earth?
2. By what is the motion of Moon affected?
3. What does Sun's gravitational pull do?
4. What is there as the Moon passes over the ocean?
5. When does Earth's gravitational force accelerate objects?

Task 4

Find out missing words

1. The Moon's ____ pulls on the Earth and makes the ____ rise and fall every day
2. The tides are _____ of the phase of the moon.
3. The ____ always produces the same _____ on every object.
4. Although the _____ force the Earth exerts on the objects is different, their masses are just as _____, so the effect we observe (acceleration) is the same for each.
5. The Sun's gravitational pull _____ our planet **orbiting** the ____.

III. Post-reading.

Group work.
Write summary to the text.

TEST YOURSELF

Question 1:

Classical mechanics focuses on studying…

a) Electricity
b) Motion of Objects
c) Living Systems
d) Atomic Structure

Question 2:

An object with a changing velocity is...

a) Accelerating
b) Decelerating
c) Could Be Either Choice
d) Doing Both at the Same Time

Question 3:

If you were to measure the velocity of an object at one moment, you measured the...

a) Instantaneous Velocity
b) Average Velocity
c) Average Acceleration
d) Instantaneous Acceleartion

Question 4:

A vector needs...

a) Distance and Magnitude
b) Only Magnitude
c) Kinetic and Potential Energy
d) Direction and Magnitude

Question 5:

Gravity is a…
a) Scalar
b) Vector
c) Direction
d) Acceleration

Question 6

Who mathematically defined the classic laws of motion?

a) Einstein
b) Newton
c) Darwin
d) Mendeleev

Question 7:

If you do NOT apply a force to a moving object, it will stay in motion forever.

a) True
b) False

Question 8:

F = ?

a) dV
b) ma
c) mc
d) F

Question 9:

Friction can be eliminated with modern materials.

True
False*

Question 10:

Gravity increases when you increase...

a) Volume
b) Mass
c) Distance
d) All of the Above

Scanword quiz

Find as many words as possible. How many words can you find?

E	*A*	*B*	*C*	*G*	*E*	*F*	*M*	*G*	*H*	*I*	*J*	*O*	*U*	*L*	*E*	*K*	*L*	*N*	*O*
N	*P*	*Q*	*R*	*A*	*T*	*U*	*O*	*V*	*W*	*X*	*Y*	*Z*	*A*	*B*	*C*	*D*	*E*	*F*	*G*
E	*H*	*A*	*I*	*L*	*K*	*L*	*T*	*N*	*O*	*P*	*V*	*E*	*L*	*O*	*C*	*I*	*T*	*Y*	*Q*
R	*R*	*C*	*S*	*A*	*U*	*V*	*I*	*W*	*X*	*Y*	*Z*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
G	*I*	*C*	*J*	*X*	*L*	*M*	*O*	*N*	*V*	*E*	*C*	*T*	*O*	*R*	*U*	*V*	*W*	*X*	*M*
Y	*Y*	*E*	*Z*	*Y*	*B*	*C*	*N*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*U*
O	*P*	*L*	*Q*	*R*	*S*	*T*	*U*	*V*	*W*	*X*	*S*	*P*	*E*	*E*	*D*	*Y*	*Z*	*P*	*L*
A	*B*	*E*	*M*	*E*	*A*	*S*	*U*	*R*	*E*	*M*	*E*	*N*	*T*	*C*	*D*	*E*	*F*	*E*	*T*
G	*H*	*R*	*I*	*J*	*K*	*L*	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*T*	*U*	*V*	*W*	*R*	*I*
X	*Y*	*A*	*Z*	*M*	*A*	*G*	*N*	*I*	*T*	*U*	*D*	*E*	*A*	*B*	*C*	*D*	*E*	*P*	*P*
F	*G*	*T*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*T*	*U*	*V*	*E*	*L*
W	*X*	*I*	*Y*	*Z*	*N*	*U*	*C*	*L*	*E*	*A*	*R*	*A*	*B*	*C*	*D*	*E*	*F*	*N*	*Y*
A	*I*	*O*	*E*	*P*	*Y*	*A*	*B*	*C*	*M*	*E*	*C*	*H*	*A*	*N*	*I*	*C*	*S*	*D*	*D*
B	*J*	*N*	*F*	*Q*	*Z*	*B*	*H*	*O*	*V*	*E*	*N*	*Y*	*Z*	*A*	*B*	*C*	*D*	*I*	*E*
C	*K*	*V*	*C*	*O*	*N*	*S*	*T*	*A*	*N*	*T*	*O*	*F*	*G*	*H*	*F*	*I*	*J*	*C*	*K*
D	*L*	*W*	*G*	*R*	*A*	*C*	*I*	*P*	*W*	*F*	*P*	*L*	*M*	*N*	*O*	*P*	*Q*	*U*	*R*
E	*C*	*A*	*L*	*C*	*U*	*L*	*U*	*S*	*X*	*G*	*Q*	*S*	*T*	*U*	*R*	*V*	*S*	*L*	*L*
F	*M*	*X*	*H*	*S*	*B*	*D*	*J*	*Q*	*Y*	*H*	*R*	*X*	*Y*	*Z*	*C*	*A*	*O*	*A*	*I*
G	*N*	*N*	*U*	*C*	*L*	*E*	*U*	*S*	*Z*	*I*	*S*	*C*	*D*	*E*	*E*	*F*	*L*	*R*	*N*
H	*O*	*Y*	*I*	*T*	*M*	*O*	*M*	*E*	*N*	*T*	*U*	*M*	*I*	*J*	*K*	*L*	*A*	*M*	*E*
M	*P*	*Z*	*J*	*U*	*D*	*F*	*L*	*S*	*B*	*K*	*U*	*O*	*P*	*Q*	*R*	*S*	*R*	*T*	*A*
A	*Q*	*A*	*K*	*V*	*E*	*G*	*R*	*A*	*V*	*I*	*T*	*A*	*T*	*I*	*O*	*N*	*A*	*B*	*R*
S	*R*	*B*	*L*	*W*	*F*	*G*	*M*	*T*	*C*	*L*	*V*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
S	*S*	*C*	*P*	*R*	*E*	*S*	*S*	*U*	*R*	*E*	*W*	*L*	*M*	*N*	*O*	*P*	*Q*	*R*	*S*
U	*T*	*D*	*M*	*X*	*G*	*H*	*N*	*U*	*D*	*M*	*X*	*T*	*S*	*C*	*A*	*L*	*A*	*R*	*A*

Answer keys

Answers to the test.

1. Classical mechanics focuses on the study of objects as they react to external forces and changes in position. You might look at the linear, circular, or harmonic motion of objects.

2. An object with a changing velocity could be either accelerating or decelerating. Acceleration is about moving at a faster velocity over a specific amount of time. Deceleration is about slowing down over a specific amount of time. You can't go faster and slow down at the same time.

3. Any measurement in physics that is taken at one moment is an instantaneous measurement. Since you were measuring an object's velocity at one precise moment, you were measuring the instantaneous velocity. Average velocity would have been a measurement over a longer period of time. It is the difference between measuring the velocity of a truck as it passes on the road or its velocity over the past twenty-four hours.

4. A vector is a measurement that has two values. When you apply a force to an object in a specific direction, you have created a vector. A scalar only has one value. Gravity would be a vector while mass is a scalar value. Gravity has a direction and a magnitude.

5. We just gave you the answer to that one. Gravity is a vector measurement because it has an amount/magnitude and a direction. Earth's gravity always pulls an object towards the surface. On Earth (at sea level), gravity has a specific strength. As you move out into space, the strength of Earth's gravity weakens.

6. Isaac Newton was one of the major forces in developing the physics of mechanics. He came up with three general laws of motion. Einstein dealt with atomic physics and relativity. Darwin was a naturalist who worked with natural selection. Mendeleev helped to develop the modern periodic table.

7. If you do not apply a force to an object in motion, it will stay in motion. That's the concept of the first law of motion. A baseball doesn't keep flying forever, because the gravity of Earth pulls it down. If you were to throw a baseball in a place where there was no gravity or air resistance, the ball would keep flying forever.

8. The big formula in the second law of motion is F=ma. When explained, it means net force (F) is equal to the mass (m) multiplied by the amount of acceleration (a) for an object. For example, the net force of a 10kg object with an acceleration of 2m/s^2 is 20 Newtons.

F=ma=10kg * 2m/s^2 = 20kgm/s^2 = 20N

9:While chemists have done a great job at developing materials to reduce friction, there is no way to eliminate it completely. Materials such as Teflon and motor oil decrease a lot of friction, but can't completely eliminate it. Even a plane flying through the air is still colliding with air molecules as it flies through the gases of the atmosphere.

10. Gravity is increased when you increase the mass of an object. If you increase your distance, gravity will decrease. Changing your volume does not always increase your mass. You could just be the same mass occupying a larger amount of space. For example a glass of water has the same mass as the same water in the form of steam (which takes up a much greater volume).

Answer to the quiz 2.

Total number of words 25

E				**G**			**M**				**J**	**O**	**U**	**L**	**E**				
N				**A**			**O**												
E		**A**		**L**			**T**				**V**	**E**	**L**	**O**	**C**	**I**	**T**	**Y**	
R		**C**		**A**			**I**												
G		**C**		**X**			**O**		**V**	**E**	**C**	**T**	**O**	**R**					**M**
Y		**E**		**Y**			**N**												**U**
		L									**S**	**P**	**E**	**E**	**D**			**P**	**L**
		E	**M**	**E**	**A**	**S**	**U**	**R**	**E**	**M**	**E**	**N**	**T**					**E**	**T**
		R																**R**	**I**
		A		**M**	**A**	**G**	**N**	**I**	**T**	**U**	**D**	**E**						**P**	**P**
		T																**E**	**L**
		I			**N**	**U**	**C**	**L**	**E**	**A**	**R**							**N**	**Y**
		O							**M**	**E**	**C**	**H**	**A**	**N**	**I**	**C**	**S**	**D**	
		N																**I**	
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	C	**A**	**L**	**C**	**U**	**L**	**U**	**S**							**R**		**S**	**L**	**L**
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													S	**C**	**A**	**L**	**A**	**R**	

CONTENT

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