PETERSON MEANING PHRASES

SCIENCE E

Exploration of Earth many sciences

Geology study of earth's processes

Meteorology atmospheric study

Oceanography study of oceans

Astronomy study of space

Systems undergo constant change

Geology locates valuable materials

Meteorology allows weather predictions

seismographs measure earthquakes

Oceans studied in submersibles

Scientists study tornadoes

wind speeds assigned a scale

Astronomers study comets

Learn composition of comets

Scientific method answers questions solves problems

Louis Agassiz looked at glaciers

Agassiz hypothesized great ice sheet

Theories are generalizations explain phenomena

Accurate measurements International System for measurements

basic units

multiples of ten easy to use

measure length use meters or kilometers

measure volume use liters or milliliters

measure mass
use grams
or kilograms

Temperature
degrees Celsius

Zero degrees
freezing water

Density equals
mass divided
by volume

grams per
milliliter

or grams per
cubic centimeter

Many tools are
very simple

geologists use
rock hammers
in the field

Use radar
to find rain
or snow

use microscopes
to examine
composition of materials

aerial photographs
identify features
on the ground

Stereoscope gives
3 dimensional view

Telescopes
gather light

distant objects
can be seen

Computers
analyze data

Satellites used
remote sensing

computers filter
satellite images

identify
specific features
models used
make predictions

Four types
of models
Physical models
like globes

mental models
show things
that cannot be seen

Mathematical models
explain with equations
like $E=mc^2$

Image models
graphic representation
like maps

maps are plan views
seen from above

maps can show
great detail

use symbols
explained in
the legend

a map scale
compares length
on map
to length
on earth

latitude
and longitude
pinpoint locations
on earth

equator
runs east-west
zero degrees
latitude
prime meridian
runs north-south
zero degrees
longitude

North pole
is 90 degrees
north latitude

South Pole
is 90 degrees
south latitude

International
Date line
180 degrees
east longitude
same as
180 degrees
west longitude

time zones
15 degrees
of longitude

takes earth
one hour
to rotate
15 degrees

gets earlier
east to west

later
west to east

day changes
at International
Date Line
next day
traveling west

previous day
traveling east

Topographic maps
show changes in
elevation

change shown
contour lines

equal change
between each line

distance between
each line
contour interval

contour interval
for the map
determined by
the elevation change

Contour shapes
denote particular
land features

peaks valleys
depressions

topographic map
is a quadrangle
Thematic maps
colors represent
population
geologic formations
precipitation
types of plants

Elements
consist of atoms

cannot be
chemically changed
or separated

atoms consist
of electrons
protons neutrons

protons
and neutrons
in the nucleus
electrons orbit
around nucleus
cause chemical
reactions
electrons
negative charge
almost no weight

Protons
positive charge

one atomic
mass unit

Neutrons
no charge
one a.m.u.

Anything with mass
called matter
Matter on earth
has three phases

solid
definite shape
and volume

liquid
no shape
definite volume

gas
no definite
shape
or volume

all matter
can change
from one phase
to another
Depends on
Temperature
and pressure

Elements defined by
number of protons

Same as
atomic number

can have more
or fewer neutrons
called Isotopes

Can have
more or fewer
electrons
called Ions

Ninety elements
occur naturally
Each has
characteristic
chemical properties
physical properties
Chemical properties
describe how
element reacts
with other elements

Physical properties
can be measured
do not change
the element

Examples include
density
boiling point
freezing point
malleability
electrical
heat conduction
Listed in
the Periodic Table

Columns called Groups
have similar
physical and chemical
properties

Rows called Periods
increasing electrons
increasing protons
left to right

displays much other
information

allows prediction
likely reactions
likely properties

Two or more
elements together
a compound

different properties
from individual
elements

**Held together
by different bonds**

**Covalent bond
atoms share
electrons**

**Ionic bond
One atom takes
an electron
from another**

**Can only be separated
with added energy**

**Mixtures may
look like compounds
can be
physically separated**

**Solutions are
mixtures where
one component
is dissolved in
another**

**Separated by
boiling
other methods**

**Energy is ability
to move
to change matter
Two main types
Kinetic Energy
energy of motion**

**Potential energy
stored energy
rock on a cliff**

**easily switch
back and forth**

**Heat an example
Kinetic energy
Thermal energy**

**Food an example
Potential energy
Chemical energy**

**Nuclear energy
loss of particle
reduces mass
kinetic energy
released**

**Man's progress
measured by
manipulation
of elements**

**First were
stones on stones
to change shape
"Stone Age"**

**low temperature metals
combined and shaped
"Bronze Age"**

**High temperature metals
much stronger
combined and shaped
"Iron Age"**

**Today we can
manipulate atoms
"Atomic Age"**

Metal mixtures
called alloys
not chemically combined
share some
physical properties
more useful

Minerals are
naturally occurring
elements or compounds
rocks and soil
Minerals are solids

Minerals form naturally

Minerals are inorganic

definite composition

Atoms are arranged
in regular patterns

crystals sign
of inner pattern

Different arrangements
of same atoms
different minerals
diamond versus graphite

Three-dimensional
carbon versus
two-dimensional
carbon

Crystal size
based on
speed of cooling

slow cooling
gives big crystals

fast cooling
gives small crystals

Grow by adding
groups of atoms
known as
crystallization

Largest group
is Silicates
contain Silicon
and Oxygen

abundant elements
Earth's crust

One group
of Silicates

Iron and Magnesium
ferromagnesian
usually dark
and dense

Other group
little or no
Iron or Magnesium
non-ferromagnesian
like Quartz
or Feldspar
Feldspar decays
makes clay

Quartz has
many uses
melted for glass
used in watches
sometimes gems

Other mineral groups
based on consistent
elemental components

Oxides
elements combined
with oxygen
Magnetite

Sulfides
elements with sulfur
Pyrite

Halides
elements with Halogens
Fluorite

Carbonates
included
Carbon and
three Oxygens
Calcite

Sulfates
Sulfur with
Four Oxygens
Barite

Basic tests
identify minerals
Crystal shape
is characteristic
can't always see

Hardness
measured with
Mohs scale

Diamond hardest
Talc softest

Color
only works with some

Streak
rub mineral
on piece of
rough porcelain

Cleavage
and Fracture
Cleavage gives
regular faces
when mineral broken

Mica gives
flat sheets

Fracture leaves
rough surface

Magnetism
only applies to
a few

Density
and Specific Gravity
weigh specimen
in water
to be accurate
Acids react
with some minerals
like Calcite
or marble

Luster
how the mineral
reflects light

Fluorescence
and double image
are other properties

Minerals are
extremely important

Metals and glass
refined from ores

Ores are
any mineral
extracted at
a profit

Ores result
from a concentration
of specific elements
or minerals

Many from magmas
specific heats
and pressures
correspond to
specific minerals

Hot water carries
dissolved minerals
or elements
drop out
when water cools
Evaporation
leaves behind
dissolved minerals

Heavy minerals
concentrate
in low spots

Rainwater dissolves
some minerals

Leaves others
behind

Mining used
to collect ores
separate ores
from surrounding rock

close to surface
open pits used
narrow or deep
shafts and tunnels
are dug

Salts can be
dissolved
and pumped out

Ore mined
needs processing

extract metals

precious gems

Cost of mining
and processing