Example questions

Consider...

1. **Mechanics** (is it well-written? Clear?)

2. **Depth** (Is it trivial, or deep? What level of Bloom’s Taxonomy?)

3. **Goals** (What is this question trying to accomplish, pedagogically)

We use these questions in Powerpoints, in a Gallery Walk (where teachers visit questions and discuss), or we create groups of questions and ask participants to find a common theme. Visit [http://STEMclickers.colorado.edu](http://STEMclickers.colorado.edu) for our other workshop handouts.
Science Example Questions
Astronomy
Example question: Astronomy

You look to the eastern horizon as the Moon is rising and discover that it is in the new moon phase. Later that same day when the moon is setting, which of the moon phases shown below would the Moon have looked like?

Consider...
1. Mechanics
2. Depth
3. Goals

Center for Astronomy Education, Ed Prather
Geology
Example question: Geology

The graph below illustrates how the temperature changed with time for part of the rock cycle. Which of the following processes is best represented by the graph?

A. Sediment is lithified to form sedimentary rock
B. Sedimentary rocks are converted to metamorphic rocks
C. Metamorphic rocks are uplifted to Earth's surface
D. Magma cools to form plutonic igneous rock
E. Sedimentary rock is converted to magma

Consider...
1. Mechanics
2. Goals
3. Depth

Origin unknown
Physics
Superpowers

Which superpower would you rather have? The ability to...

A. Change the mass of things
B. Change the charge of things
C. Change the magnetization of things
D. Change the boiling point of things

This is an example of a “no one right answer” question. What is the goal? How “deep” is this question?
Example question: Physics

The pie graph shows the energy of the Skater, where could she be on the track?

A. PE
B. KE
C. A
D. B
E. C

Kathy Perkins, CU Boulder
Example question: Physics

You’re on a cart, initially at rest, throwing balls at a partition that is rigidly mounted on the front of the cart. If the balls bounce straight back, as in the figure, then is the cart put in motion?

A. Yes, left  
B. Yes, right  
C. No  
D. Don’t know

Consider…
1. Mechanics  
2. Depth  
3. Goals

Eric Mazur, “Peer Instruction”
Example question: Physics

About how close is a thunderstorm if you hear the thunder 6 seconds after hearing the lightening flash? (The speed of sound is 344 m/s)

A. 0 km
B. 1 km
C. 2 km
D. 6 km
E. None of these

Consider...
1. Mechanics
2. Depth
3. Goals

Steven Pollock, CU-Boulder
Boiling occurs when the vapor pressure of a liquid equals the atmospheric pressure.

In the high altitude city of Denver, is the boiling point of water

A. <100 °C
B. 100 °C
C. >100 °C

Consider...
1. Mechanics
2. Depth
3. Goals

Origin unknown
The sky appears to be blue during the day because

A. Air absorbs blue light less than other frequencies (i.e., acts like a blue filter).
B. Air molecules emit blue light after being struck by sunlight.
C. The sky reflects blue light from the oceans.
D. The temperature high in the Earth’s upper atmosphere is 1000 K.
E. None of the above.
Example Question: Physics

A block $m$ sits on a rough surface, with a spring attached and extended. **As the block moves up the incline a small distance, how many forces are exerted on the block?**

A. One force  
B. Two forces  
C. Three forces  
D. Four forces  
E. Five forces  
F. Six forces  
G. Seven forces  
H. More than seven forces  
I. Impossible to determine  
J. None of the above

Consider…
1. Mechanics  
2. Depth  
3. Goals

Bill Gerace, UMass Amherst
Example Question: Physics

In which of the following situations is the object accelerating? Choose ALL that apply; enter “0” for “none”.

A. A car slowing down at a stop sign
B. A ball being swung in a circle at constant speed
C. A vibrating string
D. The Moon orbiting the Earth
E. A skydiver falling at terminal speed
F. An astronaut in an orbiting space station
G. A ball rolling down a hill
H. A person driving down a straight section of highway at constant speed with her foot on the accelerator
I. A molecule in the floor of this room

Consider...
1. Mechanics
2. Depth
3. Goals

Bill Leonard, UMass Amherst
Example Question: Physics

Which of the following are ambiguous? Choose ALL that apply.

A. Origin
B. Function
C. Equilibrium
D. f(x)
E. x
F. M
G. sin-1(x)
H. Relationship
I. Power
J. None of these

Consider...
1. Mechanics
2. Depth
3. Goals
Example Question: Physics

A block and a beaker of water are placed side-by-side on a scale (case A). The block is then placed into the beaker of water, where it floats (case B). How do the two scale readings compare?

1. Scale A reads more than scale B.
2. Scale A reads the same as scale B.
3. Scale A reads less than scale B.
4. Not enough information.

Consider...
1. Mechanics
2. Depth
3. Goals

Bill Gerace, UMass Amherst
Example Question: Physics

b) A mass $m$ slides down a frictionless circular track of radius $R$. Which of the following would let you most efficiently find its angular velocity relative to the center of curvature when it reaches the bottom?

1) Kinematics only
2) $F = ma$ or Newton’s laws
3) Work-energy theorem
4) Impulse-momentum theorem
5) Angular impulse-angular momentum theorem
6) More than one of the above
7) None of the above

Consider...
1. Mechanics
2. Depth
3. Goals
Example Question: Physics

A child is standing at the rim of a disk holding a rock. The disk rotates freely without friction. At the instant shown, the child throws the rock radially outward. Which of the indicated paths most nearly represents the trajectory of the rock as seen from above?

6. None of the above
7. Cannot be determined

Consider...
1. Mechanics
2. Depth
3. Goals
Example Question: Physics

The diagrams below show two uniformly charged spheres. The charge on the right sphere is 3 times as large as the charge on the left sphere. Which force diagram best represents the magnitudes and directions of the electric forces on the two spheres?

A. [Diagram A]  
B. [Diagram B]  
C. [Diagram C]  
D. [Diagram D]  
E. [Diagram E]

Consider...
1. Mechanics
2. Depth
3. Goals

Bill Gerace, UMass Amherst
[Context: Students have been shown how to connect two forks to a quarter, and balance the assembly counterintuitively on the edge of a cup. After experimenting with this for a bit:] Make a drawing of the top view of the arrangement of 2 forks, 1 quarter, and 1 cup. [after drawing:] Which drawing below most closely resembles yours?

A.  

B.  

C.  

D. None of these

Consider...
1. Mechanics
2. Depth
3. Goals

Bill Leonard, UMass Amherst
Example Question: Physics

If you want to do as little work as possible while carrying a heavy box, should you be careful not to let it move up and down at all as you walk?

A. Yes
B. No
C. It depends

Consider...
1. Mechanics
2. Depth
3. Goals
Example Question: Physics

- Two identical steel balls are released from rest from the same height and travel along tracks as shown and labeled below. Which ball reaches the end of its track first?

A. The ball on track A.
B. The ball on track B.
C. Neither; it's a tie.
D. Not enough information.

Consider...
1. Mechanics
2. Depth
3. Goals

Bill Gerace, UMass Amherst
Example Question: Physics

To minimize the work you do getting a heavy bag of groceries from the first floor to the second floor of a building, should you

A. carry the bag up the stairs?
B. carry the bag up in an elevator?
C. put the bag on the floor of an elevator and then pick up the bag again?
D. carry the bag up a ramp?
E. put the bag in a cart and push it up a ramp?

Consider...
1. Mechanics
2. Depth
3. Goals

Bill Gerace, UMass Amherst
Example Question:  Physics

A battery and 5 bulbs are arranged as shown, and when the switch is closed 4 of the bulbs are lit. Which bulbs change when bulb B is unscrewed from its socket?

1. Bulb E goes out. (Bulbs A and D stay on; bulb C stays off.)

   2. Bulb E goes out; bulb C goes on. (Bulbs A and D stay on.)

   3. Bulb A goes out; bulb C goes on. (Bulbs D and E stay on.)

   4. Bulb C goes on. (Bulbs A, D, and E stay on.)

   5. Bulb C goes on; bulb D goes out. (Bulbs A and E stay on.)

   6. I have no idea!
Example Question: Physics

Which of the following are you least comfortable using to solve problems?

A. Kinematics
B. Newton’s Laws
C. Work-Energy Theorem
D. Momentum-Impulse Theorem
E. Angular Momentum-Angular Impulse Theorem

Consider...
1. Mechanics
2. Depth
3. Goals
A simple pendulum is released from rest with the string at an angle $A$. It swings back and forth with frequency $f$. The angle $\theta$ that the string makes with the vertical as a function of time can be described by the equation $\theta(t) = A\cos(2\pi ft)$. Which of the following equations might describe a real pendulum whose oscillations gradually die out as time passes? ("B" is some constant.)

A. $\theta(t) = A\cos(2\pi ft)$
B. $\theta(t) = A\cos(2\pi f\sqrt{t})$
C. $\theta(t) = A\cos^2(2\pi ft)$
D. $\theta(t) = Ae^{-Bt}\cos(2\pi ft)$
E. $\theta(t) = A\cos(2\pi fe^{-Bt}t)$
F. $\theta(t) = A\cos(2\pi ft) - Bt$
G. None of the above

Consider...
1. Mechanics
2. Depth
3. Goals

Ian Beatty, UMass Amherst
Environmental Science
Students watch section of *The Day After Tomorrow*. Then are asked:

Global warming could lead to the shutdown of the North Atlantic’s ocean circulation pattern causing global cooling.

A. Strongly agree
B. Moderately agree
C. Moderately disagree
D. Strongly disagree

Consider...
1. Mechanics
2. Depth
3. Goals
Example question: Environmental Science

When during the year is runoff in creeks in the Front Range of Colorado likely to be consistently the highest (over periods of weeks)?

A. In the winter after large snowfalls
B. In the spring when snow melts
C. In the summer after rainshowers
D. In the fall

Consider…
1. Mechanics
2. Depth
3. Goals

Origin unknown
Example question: Environmental Science

In this food chain, would you expect to have more owls or more frogs? Why?

1. More owls because they are good hunters and can catch more food than frogs can.
2. More frogs because they are lower on the food chain.
3. More owls because they are higher on the food chain.
4. More frogs because they have more food to eat.
5. More frogs because they are smaller and need less food.
6. More owls because no predators eat them.

Consider...
1. Mechanics
2. Depth
3. Goals

Cathy Wanat, Northampton High School
Example question: Environmental Science

Pick the 2 groups that would have the biggest effect on water quality in a watershed.

Enter up to two.

1. Homeowners
2. Factory owners
3. Pet owners
4. Vehicle owners
5. Boat owners
6. Farmers
7. Loggers
8. City wastewater treatment plant operators

Consider...

1. Mechanics
2. Depth
3. Goals
Consider…

1. Mechanics  
2. Depth  
3. Goals

Example question: Environmental Science

Observations of a particular ecosystem lead you to propose this food web. If a disease causes the population of frogs to decrease, what would you expect to happen to the population of rabbits?

A. Increase  
B. Decrease  
C. Stay the same

Ian Beatty, UMass Amherst
Example question: Environmental Science

Now, if you observe that the population of rabbits increases but the population of squirrels does not, which of these changes to the food web is most likely to explain this?

A. Decide frogs eat rabbits
B. Decide owls don’t eat frogs
C. Decide squirrels eat crickets
D. Decide owls eat rabbits
E. Decide foxes eat frogs
F. Decide snakes eat frogs
G. Decide we’re missing an important plant or animal (that fits where?)

Consider...
1. Mechanics
2. Depth
3. Goals
Math
If Leah is 6 years older than Sue, and John is 5 years older than Leah, and the total of their ages is 41, how old is Sue?

A. 8  
B. 10  
C. 14  
D. 19  
E. 21

Consider...
1. Mechanics
2. Depth
3. Goals
Example question: Math

Your sister in law calls to say that she’s having twins. Which of the following is the most likely? (Assume she’s having fraternal, not identical, twins)

A. Twin boys
B. Twin girls
C. One girl and one boy
D. All are equally likely

Consider…
1. Mechanics
2. Goals
3. Depth

Derek Bruff, Vanderbilt
Example question: Math

You flip a nickel and a penny. Which is the most likely?

A. Two heads
B. Two Tails
C. One head and one tail
D. All are equally likely

Consider...
1. Mechanics
2. Goals
3. Depth

Origin unknown
Example question: Math

Given the following equations:

\[3a = 24\]
\[a + b = 16\]

What is the value of b?

Enter a number or enter (0) for Impossible to determine

Consider...
1. Mechanics
2. Goals
3. Depth

Example question: Math

A coin has just been flipped 1000 times, and it landed heads 600 times and tails 400 times. **What is the probability that the next flip of the coin will land heads?**

A. 10%
B. 20%
C. 30%
D. 40%
E. 50%
F. 6%
G. 70%
H. 80%
I. Impossible to determine
J. None of the above

Consider…
1. Mechanics
2. Goals
3. Depth
Chemistry
Example Question: Chemistry

The most abundant element in the Earth is:
A. Hydrogen
B. Oxygen
C. Magnesium
D. Silicon
E. Iron

Consider...
1. Mechanics
2. Depth
3. Goals

Origin unknown
Demonstration predictions. For example, show that a light bulb lights up when it’s connected to a power source through a weak acid. What will happen if I use a 100% acid solution? (A) Brighter (B) Dimmer

The answer ends up being opposite of what you’d expect!

Consider...
1. Mechanics
2. Depth
3. Goals

Origin unknown
Example question: Chemistry

Show students a demonstration that a lightbulb will light when a current is run through a weak acid solution. If the acid solution is increased to 100% strength, what will happen to the brightness of the lightbulb?

A. Brighter
B. Dimmer
C. Completely dark
D. Don’t know

Consider...
1. Mechanics
2. Depth
3. Goals

Origin unknown
A volleyball (circumference=66cm) is inflated to a pressure of 4.5psi. The number of moles of gas inside the volleyball is CLOSEST to

A. 0.02
B. 0.06
C. 0.10
D. 0.14
E. 0.18
F. 0.22
G. 0.26
H. 0.30

Consider...
1. Mechanics
2. Depth
3. Goals
Which of the following has the largest radius?

A. $\text{Ca}^{2+}$
B. $\text{K}^+$
C. $\text{Ar}$
D. $\text{Cl}^-$
E. $\text{S}^{2-}$

Consider...
1. Mechanics
2. Goals
3. Depth

Origin unknown
Example question: Chemistry

In a beaker, a saturated salt solution is in equilibrium with undissolved salt lying on the bottom of the container. If some alcohol is now poured into the beaker, what will happen?

A. More salt will dissolve, leaving less on the bottom.
B. Some salt will crystallize out of solution, leaving more on the bottom.
C. All the salt will crystallize out of solution.
D. Something else will happen.
E. Nothing will change.

Consider...
1. Mechanics
2. Goals
3. Depth

Ian Beatty, UMass Amherst
Biology
Example question: Biology

A small acorn over time can grow into a huge oak tree. The tree can weigh many tons. Where does most of the mass come from as the tree grows?

A) Minerals in the soil
B) Organic matter in the soil
C) Gases in the air
D) Sunlight

Consider...
1. Mechanics
2. Depth
3. Goals

A Private Universe; Annenberg Media
Example question: Biology

When you lose 10 pounds, where does most of the weight go?

A. Out of the body in secretions (urine, feces, and/or sweat)
B. Out of the body in air you exhale
C. The body uses it up as energy
D. Half out of the body in secretions and half used up as energy

Consider…
1. Mechanics
2. Goals
3. Depth

Origin unknown
Skin: Wall as Mucus:_____

A. Welcome mat
B. Storm door
C. Moat
D. Room
E. Mailbox
F. Vaseline
G. None of the above
H. Other

Kate Dollard, Northampton High School
Which of the following are alive? (May be more than one)

A. Seed
B. Leaf on a tree
C. A leaf that has just fallen
D. A tree in spring (no leaves)
E. A tree in summer (lots of leaves)
F. A tree in fall (leaves not green)
G. A tree in winter

Consider...
1. Mechanics
2. Goals
3. Depth

Bill Leonard, UMass Amherst
Example question: Biology

Which kind of reproduction is best for species survival?
1. Asexual
2. Sexual
3. Neither

Consider...
1. Mechanics
2. Goals
3. Depth

Kate Dollard, Northampton High School
Example question: Biology

Hundreds of phospholipids are dropped in water and, under the water, form a sphere with water trapped inside. Draw a possible arrangement of the phospholipids to form this sphere.

Consider...
1. Mechanics
2. Goals
3. Depth

Kate Dollard, Northampton High School
Example question: Biology

Which drawing is closest to your idea of how the phospholipids could be arranged into a sphere in water with water trapped inside?

1. Mechanics
2. Goals
3. Depth

Kate Dollard, Northampton High School
Example question: Biology

If you want to have strong, athletic children, you should work out at the gym a lot.

Enter one response.

1. Agree
2. Disagree
3. It depends.

Consider...
1. Mechanics
2. Goals
3. Depth

Cathy Wanat, Northampton High School
Example question: Biology

How would a giraffe’s heart be different from a human’s? Choose all that apply.

A. It would be larger
B. It would be proportionally larger
C. It would have thicker walls
D. It would have proportionally thicker walls
E. It would beat faster
F. It would beat more slowly
G. It would have more chambers
H. It would have different valve mechanisms
I. It would be located somewhere else in the body

Consider...
1. Mechanics
2. Goals
3. Depth

Ian Beatty, UMass Amherst
Example question: Biology

Methotrexate is an antimetabolite drug that interferes with the formation of nucleotides. At what stage would it be most effective?

1. G₁
2. G₀
3. S
4. G₂
5. Prophase
6. Metaphase
7. Anaphase
8. Telophase
9. Cytokinesis

Consider...
1. Mechanics
2. Goals
3. Depth

Sue Lincoln, Northampton High School
Health Sciences
Example question: Health Sciences

RR is a 22 year old Mexican American with Type I Diabetes. He has no insurance and speaks limited English. Which is the best insulin regimen to start him on?

a. Gliargine 15 units at bedtime
b. NPH 30 units twice daily
c. Mixed insulin 70/30, 20 units in the morning and 10 units at bedtime
d. Gliargine 15 units at bedtime and lispro 5 units with meals

Consider...
1. Mechanics
2. Depth
3. Goals

Unknown origin
What do you think is the most effective intervention for the prevention of infection?

A. Prophylactic antibiotics
B. Contact precautions
C. Handwashing
D. Fewer invasive interventions

Consider...
1. Mechanics
2. Goals
3. Depth

Nursing program, CU–Denver, Gail Armstrong
You are caring for a 73 y.o. patient who is on high dose of steroids for an asthma exacerbation. He develops pneumonia on day 6 of his hospitalization. He has not experienced any changes in LOC. What kind of pneumonia does he have?

A. Community acquired
B. Iatrogenic
C. Aspiration
D. VAP

Consider…
1. Mechanics
2. Goals
3. Depth
Which patient has the poorest prognosis?

A. T2, N1, M2
B. Tis, N1, M1
C. T3, N4, M3
D. T0, N0, M0

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

A nurse needs to make rounds on four patients who are stable. Using the principle of medical sepsis, which patient should be seen first?

A. A postsurgical cardiac patient with pneumonia  
B. A patient with a draining wound  
C. A patient who is severely neutropenic  
D. A child with chickenpox

Consider…
1. Mechanics
2. Goals
3. Depth
Using the principles of standard precautions, the nurse decides to apply gloves when performing which of the following nursing interventions?

A. Providing a back massage
B. Feeding a client
C. Providing hair care
D. Providing oral hygiene

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

A patient has been identified as having a very virulent bacterial infection that is spread through close physical contact. To decrease the chance of spreading this organism, the nurse would implement which infection control precautions?

A. Airborne precautions
B. Droplet precautions
C. Contact precautions
D. Protective isolation

Consider…
1. Mechanics
2. Goals
3. Depth
A patient develops a bloodstream infection from a central venous access device that has been in place for several months. The culture reports indicate that the infection is endogenous. The nurse concludes that which of the following would be a potential source of the infectious organism?

A. Hands of a caregiver
B. The patient’s skin flora
C. Airborne bacteria from another patient
D. Bacteria from contaminated IV fluids
A patient is transferred to the unit 2 days after a total hip replacement. The nurse should place this patient with which of the following roommates?

A. A patient recovering from gastroenteritis with frequent diarrhea
B. A patient with chronic bronchitis
C. A patient with balanced suspended traction
D. A patient diagnosed with type 2 diabetes being treated for draining foot ulcers

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

Into which lung is a patient with altered LOC more likely to aspirate?

A. Left lung  
B. Both lungs equally  
C. Right lung  
D. It depends on his angle of Louis

Consider...
1. Mechanics  
2. Goals  
3. Depth

Nursing program, CU –Denver, Gail Armstrong
Example question: Health Sciences

You are caring for a patient who is experiencing increasing dyspnea and suspected to have pneumonia. Which diagnostics do you expect to run on this patient?

A. Only sputum culture
B. Sputum C&S, CBC
C. Sputum C&S, CBC, ABGs
D. Sputum C&S, CBC, ABGs, VS

Consider...
1. Mechanics
2. Goals
3. Depth
You are caring for a patient who is suspected to have TB. What kind of room must this patient be placed in?

A. Positive airflow room
B. Negative airflow room
C. Private room
D. Neutropenic precaution room

Consider…
1. Mechanics
2. Goals
3. Depth
You are caring for a patient post thoracentesis. Which potential complication is guiding your assessment?

A. Infection
B. Pain
C. Pneumothorax
D. Pleural effusion

Consider…
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

You are caring for a patient who has been admitted for an asthma exacerbation. She is becoming more anxious and more tachypnic. Assuming that her respiratory status is stable, which medication might you ask the physician to add to her regimen?

A. Aspirin  
B. Lorazepam  
C. A bronchodilator  
D. Ibuprofen

Consider…
1. Mechanics  
2. Goals  
3. Depth
Example question: Health Sciences

Why do we still get sick if we have this great immune system to take care of infection?

A. It takes time for the immune system to respond
B. Our immune system cannot recognize all foreign invaders
C. Invading microorganisms depress the immune system

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

How do you think the immune system knows not to attack its own cells?

A. Gets rid of immune system cells that would recognize non-self proteins
B. Gets rid of immune system cells that would recognize self proteins
C. c. Self cells are recognized by immune system, but not attacked

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

Determine the metabolic energy content in this serving of Dannon peach yogurt:
Total = 227 grams
Protein = 9g, Carbohydrates = 45g, Fat = 3g

A. 180 kcal
B. 243 kcal
C. 908 kcal
D. 228 kcal
E. None of the above

Consider...
1. Mechanics
2. Goals
3. Depth

Origin Unknown: Bill Something. Human Physiology II

Dr. Stephanie Chasteen. Science Education Initiative, CU-Boulder. http://STEMclickers.colorado.edu
Body temperature is maintained constant throughout the human body

A. True
B. False
Example question: Health Sciences

What type of treatment would be most effective for a patient who has a genetic disease that prevents formation of T cells?

A. White blood cell transfusion from close relative
B. Bone marrow transplant from close relative
C. Gene therapy using own stem cells that are engineered to have a good copy of gene

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

Please select the organ that is not considered part of the respiratory system

A. Nares
B. Trachea
C. Larynx
D. Left primary bronchi
E. None of the above

Consider…
1. Mechanics
2. Goals
3. Depth
The pulmonary arteries carry blood that is

A. High in oxygen
B. Low in oxygen
C. Unchanged in oxygen
D. Hb saturated

Consider...
1. Mechanics
2. Goals
3. Depth
Both bacteria and viruses can trigger immune system response. Which of the following is a FALSE statement about bacteria and viruses?

A. Viruses are cells.
B. Viruses replicate inside human cells.
C. Bacteria can replicate their own DNA.
D. Viruses can have RNA as genetic material.
The T wave of the ECG shows

A. Ventricular relaxation
B. Atrial repolarization
C. Atrial contraction
D. Ventricular depolarization
E. None of the above
Select the factor(s) that would result in a decrease in blood pressure

A. Increased arterial diameter
B. Decreased stroke volume
C. Decreased blood viscosity
D. Increased parasympathetic stimulation
E. All of the above

Consider...
1. Mechanics
2. Goals
3. Depth
What ultimately kills an individual who is infected with HIV?

A. The high number of viral particles
B. A low but particularly deadly number of viral particles
C. Infections which the immune system cannot fight

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

Why is metastasis bad?

A. Cancer cell can travel to new location
B. Cancer cell can interrupt function of more normal cells
C. Cancer is harder to remove when it is spread out
D. All of the above

Consider...
1. Mechanics
2. Goals
3. Depth

Integrative Physiology, Physics, Molecular, Cellular and Developmental Biology, CU-Boulder; Nursing program, CU –Denver
Example question: Health Sciences

Why is metastasis bad?

A. Cancer cell can travel to new location
B. Cancer cell can interrupt function of more normal cells
C. Cancer is harder to remove when it is spread out
D. All of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Mr. Q., a 38-year old male, states he is having trouble hearing in his left ear. Upon examination of his left ear, he is found to have a large impaction of cerumen, which must be manually removed with a curette. What would be the expected findings of the Weber test prior to the cerumen removal?

A. Bilaterally equal lateralization  
B. Lateralization to the (L) ear  
C. Lateralization to the (R) ear  
D. AC > BC

Consider...
1. Mechanics  
2. Goals  
3. Depth
When performing the Rinne test on Mr. Q., what would be the expected findings?

A. Bilateral equal lateralization
B. BC > AC
C. AC > BC
D. Able to hear whisper at 2 feet.

Consider...
1. Mechanics
2. Goals
3. Depth
After performing the Weber and Rinne tests, Mr. Q mentions he is having difficulty hearing. Which cranial nerve is associated with hearing?

A. CN V  
B. CN II  
C. CN VIII  
D. CN IX

Consider...
1. Mechanics
2. Goals
3. Depth
Mr. Q comes back to the clinic 1 week later with complaints of pain in his left ear. Upon exam, you note his left ear is exquisitely tender when you manipulate his pinna. Would you diagnose this as external or internal otitis media?

A. Internal
B. External

Consider…
1. Mechanics
2. Goals
3. Depth
Example question: Health Sciences

Based on Mr. Q’s diagnoses, what lymph nodes would you expect to be enlarged on Mr. Q’s exam?

A. Preauricular
B. Supraclavicular
C. Axillary
D. Submental

Consider...
1. Mechanics
2. Goals
3. Depth

Tammy Spencer, Nursing program, CU –Denver
Human Physiology
Example question: Human Physiology

How many primary forms of energy exist?

A. 2  
B. 4  
C. 6  
D. 8  
E. 10  

Consider...
1. Mechanics  
2. Goals  
3. Depth
Example question: Human Physiology

Biomolecules can be classified as all of the following except

A. Carbohydrates
B. Organic carbon compounds
C. Proteins
D. Inorganic carbon compounds
E. All of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Please indicate the equilibrium constant (Keq) that represents the chemical reaction with the greatest energy requirement

A. 0.05
B. 0.100
C. -0.05
D. 1.000
E. 10.000

Consider...
1. Mechanics
2. Goals
3. Depth
Please identify the energy source associated with the regeneration of ATP that represents the greatest storage of energy

A. Carbohydrate
B. Protein
C. Creatine Phosphate
D. Fat
E. None of the above

Consider...
1. Mechanics
2. Goals
3. Depth

Origin Unknown: Bill Something, Human Physiology II
Example question: Human Physiology

Indirect calorimetry measures what variable to determine energy output?

A. Carbon dioxide  
B. ATP  
C. Heat  
D. Oxygen  
E. Nitrogen

Consider...
1. Mechanics  
2. Goals  
3. Depth
Key centers for regulating energy balance and body temperature are located in the

A. Aortic arch  
B. Medulla  
C. Pineal gland  
D. Hypothalamus  
E. Stomach
During the absorptive (fed, catabolic) state in a person at rest

A. The liver forms glycogen
B. Adipocytes dump fatty acids into the plasma
C. Skeletal muscles have net glycogen catabolism
D. Gluconeogenesis takes place
E. Two of the above
The postabsorptive state in a person at rest must maintain

A. Plasma free fatty acid levels  
B. Plasma amino acid levels  
C. Plasma glucose levels  
D. Plasma glucagon levels  
E. None of the above
Example question: Human Physiology

Feeling cold when you first get out of a 75°F swimming pool on a warm, dry day is probably due to

A. Conductive heat loss
B. Convective heat loss
C. Evaporative heat loss
D. A & C
E. B & C

Consider...
1. Mechanics
2. Goals
3. Depth
The metabolic rate of the students consuming the energy bar will:

A. Be higher than the students who did not consume an energy bar
B. Be lower than the students who did not consume an energy bar
C. Be the same as the students who did not consume an energy bar
D. Be influenced by the sex of the subjects
The blood glucose levels of the students consuming the energy bar will

A. Be higher than the subjects who did not consume an energy bar
B. Be lower than the students who did not consume an energy bar
C. Be the same as the students who did not consume an energy bar
D. Be influenced by the sex of the subjects
The core temperature of the students consuming the energy bar will

A. Be higher than the subjects who did not consume an energy bar
B. Be lower than the students who did not consume an energy bar
C. Be the same as the students who did not consume an energy bar
D. Be influenced by the sex of the subjects
Example question: Human Physiology

The visceral pleura lines

A. The small intestine
B. The surface of the lungs
C. The thoracic wall
D. The diaphragm
E. All of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Cartilage provides support for all of these levels of the bronchial tree except

A. Secondary bronchus
B. Trachea
C. Main bronchus
D. Bronchioles

Consider…
1. Mechanics
2. Goals
3. Depth

Origin Unknown: Bill Something, Human Physiology II
Example question: Human Physiology

Alveoli contain

A. Type I cells
B. Type II cells
C. Dust cells (macrophage)
D. All of the above

Consider...
1. Mechanics
2. Goals
3. Depth

Origin Unknown: Bill Something, Human Physiology II
In the alveoli, surfactant, which is a mixture of phospholipids and lipoproteins, serves to

A. Lower the surface tension of alveolar fluid
B. Increase the surface tension of alveolar fluid
C. Provide a marker for bacterial destruction by alveolar macrophages
D. Act as the primary lubricant for the pleural cavity

Consider...
1. Mechanics
2. Goals
3. Depth
Which of the following would not be considered part of the respiratory membrane

A. Alveolar endothelial cells
B. Interstitial fluid
C. Respiratory type II cells
D. Capillary basement membrane
E. None of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Pulmonary ventilation is a combination of

A. Tidal volume
B. Residual volume
C. Ventilatory rate
D. A & C
E. B & C

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Relative to atmospheric pressure, please indicate what happens to alveolar pressure during inspiration

A. Alveolar pressure increases
B. Alveolar pressure decreases
C. Alveolar pressure remains the same

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Please determine the blood flow required to maintain a resting metabolic rate of 240 ml of oxygen per minute

A. 8 L/min
B. 80 L/min
C. 5 L/min
D. 740 L/min
E. None of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Blood flow in the cardiovascular system is controlled by

A. Osmotic gradients
B. Temperature gradients
C. Pressure gradients
D. Oxygen gradients
E. None of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Cardiac output is the product of

A. HR * SV
B. SV * dBP
C. SV * sBP
D. HR * dBP
E. sBP * TPR

Consider...
1. Mechanics
2. Goals
3. Depth
The ______________ receives oxygenated blood from the pulmonary veins.

A. Right atrium
B. Left atrium
C. Right ventricle
D. Left ventricle
E. None of the above
The ____________ sets the contractile rate for the entire heart.

A. SA node  
B. Internodal pathway  
C. AV node  
D. Bundle branches  
E. Purkinje fibers
Example question: Human Physiology

Please select the letter that corresponds to the pacemaker potential in a cardiac autorhythmic cell:

A. A
B. B
C. C

Consider...
1. Mechanics
2. Goals
3. Depth
Repolarization in cardiac autorhythmic and cardiac contractile cells is associated with

A. An efflux of K from the cell
B. An influx of K from the cell
C. An influx of Na from the cell
D. An efflux of Na from the cell
E. None of the above
The plateau in the action potential of a cardiac contractile cell is associated with

A. A decreased efflux of K from the cell
B. An increased influx of CA from the cell
C. An increased influx of NA from the cell
D. A & B
E. B & C

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Please select the statement that explains why systolic blood pressure in the major arteries of the systemic circulation does not fall to zero.

A. Blood flow through the tissue capillary beds is pulsatile
B. Major arteries expand and store pressure in elastic walls
C. Atria act as secondary pumps to maintain arterial diastolic blood pressure

Consider…
1. Mechanics
2. Goals
3. Depth
Arteries can be grouped into 3 types. The types of arteries associated with delivering blood to specific organs are

A. Elastic arteries  
B. Muscular arteries  
C. Arterioles  
D. None of the above

Consider…
1. Mechanics  
2. Goals  
3. Depth
_____ are unique structures associated with peripheral veins.

A. Tunica intimas  
B. Leaky junctions  
C. Embolisms  
D. Valves  
E. All of the above
Example question: Human Physiology

Please select the factor(s) that would result in a decrease in blood pressure.

A. Increased arterial diameter
B. Decreased stroke volume
C. Decreased blood viscosity
D. Increased parasympathetic stimulation
E. All of the above
Example question: Human Physiology

Please select the hormone released by the kidney in response to a decrease in blood pressure.

A. Renin
B. Angiotensinogen
C. Epinephrine
D. Acetylcholine
E. None of the above

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Human Physiology

Please indicate the system below that is arranged in parallel. (Use of diagram.)

A. Boxes in series
B. Boxes around center
C. Boxes in parallel

Consider...
1. Mechanics
2. Goals
3. Depth

Origin Unknown: Bill Something, Human Physiology II
Example question: Human Physiology

Which component(s) of the digestive system are most like the pictures below? Enter all that apply.

1. Mouth
2. Pharynx
3. Esophagus
4. Stomach
5. Small Intestine
6. Large Intestine
7. Rectum
8. Liver
9. Gall bladder
10. Pancreas

Consider...
1. Mechanics
2. Goals
3. Depth
You are hiking, and have run out of water. You are overheated and thirsty. How many of your body’s systems (digestive, excretory, endocrine, nervous, muscle, circulatory, etc.) are involved in restoring homeostasis? Enter a number from 0 to 8, or “9” to mean “more than 8”).

Consider…
1. Mechanics
2. Goals
3. Depth
If you could only have one system left, which would it be?

1. Circulatory  
2. Nervous  
3. Endocrine  
4. Immune  
5. Digestive  
6. Respiratory  
7. Excretory  
8. Muscle/Skeletal

Consider...
1. Mechanics  
2. Goals  
3. Depth

Kate Dollard, Northampton HS (based on a question by Chevy Seney of Frontier Regional School)
Example question: Human Physiology

What could A represent? [Students discussed Q in groups, responses were collected on board, class discussed, and then used the CRS to vote on their top 2 picks from the list.]

Consider...
1. Mechanics
2. Goals
3. Depth

Kate Dollard, Northampton High School
Example question: Human Physiology

What physiological problem might this electrocardiogram indicate? [imagine an appropriate list of possible health conditions]

Consider...
1. Mechanics
2. Goals
3. Depth

Idea by Ian Beatty, UMass Amherst, who doesn’t have the content knowledge to invent a good set of choices.
Example question: Human Physiology

You are a doctor, and a patient comes to you complaining that she's unusually short of breath after exercising. **What health problems might be responsible?** Choose all that apply.

A. Leaky heart valve(s)  
B. Damaged heart muscle  
C. Hardened arteries  
D. High blood pressure  
E. Low red blood cell count  
F. Obstructed veins in heart muscle  
G. Poor diet  
H. High cholesterol levels  
I. Heartbeat arrhythmia  
J. None of the above

Consider...  
1. Mechanics  
2. Goals  
3. Depth
Example question: Human Physiology

You are a dietician helping a teenager with his diet. Here is a typical day’s meal:

Breakfast: bagel and orange juice
Lunch: Pita with lettuce, tomato, peppers & olives and banana
Supper: pasta with tomato sauce, salad with low-fat dressing, Coke

What advice would you give this person?

Choose ALL that apply.

1. Keep up the good choices!
2. Add more fat to your diet.
3. Remove fat from your diet.
4. Add more carbohydrates to your diet.
5. Remove carbohydrates from your diet.
6. Add more calcium to your diet.
7. Reduce the calcium in your diet.
8. Add more protein to your diet.
9. Remove protein from your diet.

Consider...
1. Mechanics
2. Goals
3. Depth

Cathy Wanat, Northampton High School
Humanities Example Questions
Classics
Example question: Classics

What is at stake when Clytaemestra asks Agamemnon to walk on the carpet? What is at issue? Why is he reluctant to do so?

A) The carpet is too valuable to walk on. Agamemnon knows he will ruin it. Organic matter in the soil
B) The carpet is red. It symbolizes shed blood. To walk on it implies disrespect for human life. Sunlight
C) To walk on the carpet is sacrilegious. The gods might walk on such a carpet, but for a human to act so is an act of desecration.
D) Walking on the carpet makes Agamemnon analogous to the hybristic potentates of the East, in whose lands he has spent the previous 10 years.
E) The carpet symbolizes specifically the blood of Agamemnon's daughter Iphigeneia, whom he sacrificed to promote the expedition to Troy. Walking on the carpet re-enacts that murder.

Consider...
1. Mechanics
2. Depth
3. Goals

Jackie Elliott, CU-Boulder
Vocabulary
The child apprized her father's authority and behaved herself in church. **Apprized means**

A. Appreciated  
B. Compromised  
C. Defied  
D. Noted

**Consider...**
1. Mechanics  
2. Goals  
3. Depth
Economics
An example of economic independence is

A. South Africans mining their gold and diamond resources
B. The government of France issuing new currency
C. Japan selling technological goods to buy Middle Eastern oil
D. An Indian subsistence farmer waiting for the rains to water his crops
History
Example question: History

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble. This paragraph appears in which historic document?

A. The Declaration of Independence
B. The Freedom of Information Act
C. The Mayflower Compact
D. The Magna Carta
E. The U. S. Constitution

Origin unknown
Ethics
Example question: Ethics

If you were a judge, how would you assess the “responsibility” of the U.S. Government, for what happened in the world between 1933 and 1945?

A. Not responsible
B. Minimally responsible
C. Responsible
D. Very responsible

Consider…
1. Mechanics
2. Goals
3. Depth

Origin unknown
Psychology
Example question: Psychology

Play students the “Jaws” theme after a break. Is your reaction an example of operant or classical conditioning?

A. Yes
B. No
C. It depends

Consider...
1. Mechanics
2. Goals
3. Depth
Language
Example question: Language

The girl is wearing a:

A. A hat
B. Glasses
C. A cap
D. Jacket
E. More than one/ Something else

Consider...
1. Mechanics
2. Goals
3. Depth
Example question: Language

Is the following a run-on sentence? “The sly fox sometimes jumped over the lazy dog unless it was Thursday.”

A. Yes
B. No
C. Not sure

Consider...
1. Mechanics
2. Goals
3. Depth
Other Types
Example question: Experience Survey

Do you know someone who has cancer (or had it in the past)?

A. Yes, someone close to me
B. Yes, but I didn’t know them well
C. No
D. Not sure

Consider…
1. Mechanics
2. Goals
3. Depth

Origin unknown
If you were walking down a road and passed a piece of trash, would you pick it up?

A. Yes
B. No
C. It depends

Consider…
1. Mechanics
2. Goals
3. Depth

vaguely recollected from a question described by Kate Dollard, Northampton HS
A question idea: In-class experiment

One of you will be randomly selected to be a winner! Pick one:

A. You can receive $1.00 (cash) right now
B. You can receive $1.05 (cash) during the next meeting of this class

Results: 66% of class took $1 now (but 33% if $1 on next to last day of class instead of last day of class)

From DrJamesIII at http://www.youtube.com/watch?v=CnnP0uCqD4k
A question idea: Are you done?

During a group or individual task:

Click in with your progress:

A. Still working
B. Almost done
C. Finished
A question idea:
Real-time confusion meter

A. I’m bored – speed up
B. I’m with you
C. Slow down a little
D. I’m totally lost