ACADEMIC UPGRADING

Sample Questions

1. Reading Review

Multiple Choice and Short Answers

2. Writing Review

300-600 Word Essay
Timed for 1 hour

3. Math Review

Basic Numeracy Review
Timed for 1 hour

ACADEMIC UPGRADING: Reading Review

There will be 4 reading tasks during the actual review which will increase in difficulty. This article is similar in difficulty to only the most difficult one. Read the article then answer the questions that follow. The correct answers are given at the end. During the actual skills review, some short (written) answer questions will also be asked for each reading.

Mines in the Sky

William K. Hartmann

Sometime in the next few decades, astronomers will discover a small asteroid, only 500 meters across, approaching the Earth. It will not hit Earth, of course; asteroids this large hit Earth only about once every 100,000 years. The orbit of this asteroid will take it past Earth's orbit at perhaps ten times the moon's distance. Planetary astronomers, who have been using spectroscopy to determine the composition of the thousands of already catalogued asteroids, turn their equipment on this new object. It is stony iron, composed mostly of the pure nickel-iron alloy that composes many meteorites. Meteorites are fragments of such asteroids.

This little asteroid, five football fields across, contains 400 million tons of pure nickel-iron, as well as 50 million tons of rocky material. About 95 percent of the metal is iron and four percent is nickel. At the current price of about $7.00 a pound, the market value of the refined nickel alone would be $240 billion! The market value of the iron would be similar. The market value of the refined metals from the entire asteroid counting additional minerals of economic interest could be a good deal more than $600 billion.

Man has awaited this opportunity for some years. An interplanetary reconnaissance ship departs from a space station in orbit around earth. If the asteroid has an orbit around the sun reasonably close to the Earth's, the trip is easy. The total change in velocity that the ship's engines must produce could be less than the change in velocity required in the Apollo program to send astronauts from the surface of the Earth to the surface of the moon and back. In other words, the voyage to match orbits with this asteroid is no harder than the voyage to the moon, even though it takes longer. It is made still easier by the fact that no atmospheric passage is required.

The ship takes some weeks to reach the asteroid. It matches orbits, then "parks" close alongside. In this position, the asteroid's gravity will pull the ship toward its surface. The ship will be falling, but it is quite safe. The gravity is so weak that the ship will take about half an hour to fall 250 meters toward the asteroid, even without rocket braking. It can turn its landing legs toward the surface and "hit" with about the impact speed of a pencil dropped from half an inch above a table. The ship lands by falling gently onto the surface.

While the ship is maneuvering to land, the astronauts descend to the asteroid surface. Once the landing has been completed, more astronauts leap from the ship's hatch, undergoing a slow fall, or glide, of several minutes.

Like the moon, the asteroid is covered with a thin layer of powdery dry soil, created during millions of years as micrometeorites pulverized its surface rocks and metal. The soil contains fragments of stone and nickel-iron alloy. Below the soil layer are more coherent rock and metal, shielded by the soil itself, but possibly heavily fractured by ancient collisions between the asteroid and moderate-size meteorites. The astronauts first sample the surface material, drill to test the depth of the soil, and conduct seismic tests to probe the deep structure of the asteroid.

Now the astronauts begin a strange task. At a selected site, they start assembling a long, spidery tower – part of an assembly called a "mass driver." The mass driver is a magnetic device something like a giant conveyor belt. It accelerates packets of soil along the tower to extreme speed and flings them off into space. The mass driver turns the asteroid into a giant rocket. Instead of expelling flaming fuel, it expels native asteroid dirt, driving the asteroid slowly forward in the other direction. Although the speed is slow, there is a large supply of "fuel" (soil) and a lot of time. The procedure is adequate to change the orbit of the asteroid over a period of many months. Eventually the asteroid can be brought toward the Earth's orbit, can match speed with Earth, and then can be maneuvered into orbit around it.

Bringing the asteroid back to Earth could raise political questions. Concerned scientists have pointed out that well before we could put an asteroid into Earth's orbit, we would be able to divert one to make it strike the earth. A half kilometer asteroid would hit with the explosive force of thousands of megatons, making it a weapon equal to all the nuclear bombs on Earth. Mining asteroids where they are and shipping the metal back to Earth presents no such problems.

As the asteroid mining operation swings into gear, two historically important breakthroughs will have occurred. First, the population of Earth will have acquired a new source of raw materials to replace the supplies that have dwindled during our rapacious mining of the Earth's crust. Even as small an asteroid I have described here would contain most of a year's global consumption of iron and enough nickel to supply the world's demand for 24 years.

Secondly, and just as important, the industrial processing of economic resources will have begun outside Earth's ecosphere. This means that instead of ravaging the Earth to obtain materials, and instead of dumping our industrial wastes into the atmosphere, streams and oceans, we can begin to let the Earth relax back to its original, less polluted more natural state. We will be on our way from being a global society with finite limits to being and interplanetary society with vastly wider horizons.

And there are many more, larger asteroids available for future exploration. Even a modest asteroid, three kilometers across, of which dozens exist in the near-Earth part of the solar system, would supply 36 times as much material as our example. In the asteroid belt, just beyond Mars, there are thousands of still larger asteroids. Some are mostly rock, and others are believed to contain large volumes of metals. Clearly, objects of economic interest exist in space closer to Earth than the nearest planets.

Multiple choice questions.

Answer the following questions based on the information provided (or inferred) in the article.

1) An advantage of pursuing asteroid mining is that it will
    a. provide jobs for many people
    b. help maintain world peace by increasing available resources
    c. provide raw materials to replace the Earth's dwindling supply
    d. prevent dangerous asteroids from colliding with the Earth

2) Successfully mining an asteroid would be
    a. economically beneficial
    b. an exciting occupation
    c. very dangerous
    d. excellent training opportunities for astronauts

3) Another name for this article could be
    a. Mining Meteors
    b. Asteroid Resources
    c. Colonizing Space
    d. New Careers for Astronauts

4) The raw materials available in space relatively close to Earth are
    a. limited in quantity
    b. enormous in quantity
    c. difficult to process
    d. nearly exhausted

5) Mining and processing ore outside the Earth's atmosphere will be
    a. very costly
    b. an international project
    c. beneficial for earth's ecology
    d. performed by robots

6) the mass driver acts like a
    a. meteorite
    b. a propulsion system
    c. weapon
    d. asteroid

7) Landing on an asteroid can be accomplished through
    a. tractor beam
    b. a mass driver
    c. rocket braking
    d. gravity

8) The companies or countries that participate in asteroid mining will be motivated by
    a. the opportunity for space exploration
    b. the tremendous economic potential
    c. the ability to create an interplanetary society
    d. the desire to develop new technologies

Answers to Multiple choice questions:

1)	c	5)	c
2)	a	6)	b
3)	b	7)	d
4)	b	8)	b

ACADEMIC UPGRADING: WRITING REVIEW

WritePlacer®

This test measures your ability to write effectively, which is critical to academic success.

Your writing sample will be scored on the basis of how effectively it communicates a whole message to the readers for the stated purpose. Your score will be based on your ability to express, organize and support your opinions and ideas, not the position you take on the essay topic. The following five characteristics of writing will be considered:

- Focus — The clarity with which you maintain your main idea or point of view
- Organization — The clarity with which you structure your response and present a logical sequence of ideas
- Development and Support — The extent to which you elaborate on your ideas and the extent to which you present supporting details
- Sentence Structure — The effectiveness of your sentence structure
- Mechanical Conventions — The extent to which your writing is free of errors in usage and mechanics

WritePlacer Sample Topic

Prepare a multiple-paragraph writing sample of about 300–600 words on the topic below. You should use the time available to plan, write, review and edit what you have written. Read the assignment carefully before you begin to write.

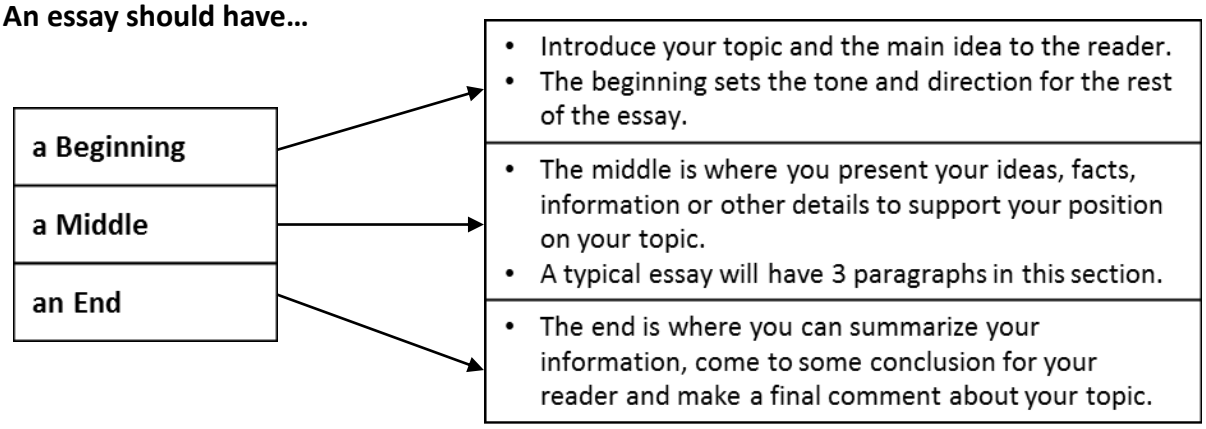
Some schools require each student to participate in an organized school sport chosen by the student. People at these schools argue that athletics is an important part of the educational experience and that there should be a rule requiring participation. Others argue that students should be free to decide whether or not they wish to participate in organized school sports. Write an essay for a classroom instructor in which you take a position on whether participation in organized school athletics should be required. Be sure to defend your position with logical arguments and appropriate examples. Your essay must be 300–600 words in length.

Essay Outline

The following information is intended to help those who may not have written an essay for a long time (or ever!) or for those who have forgotten how to structure one.

Ideally, we are looking for a 5 paragraph essay (about 300 words) to see how well you can present your ideas in writing. Please don't worry if you never learned to write this way or if you haven't practiced writing essays in recent years. Just do the best you can.

An essay should have…



About Paragraphs

A paragraph is a group of sentences that develop a single idea. An effective paragraph begins with a main idea (topic sentence) and has one or more sentences that support the main idea of that paragraph. While you may have several paragraphs to support the topic of your essay, each paragraph should only present or develop a single idea.

A typical one page essay contains 5 paragraphs: one for the beginning, one for the end and three for the middle, where you develop your ideas or present your arguments. You can review the "Mines in the Sky" document to see how the paragraphs have been laid out, and how they each present one idea.

During the assessment, you will be typing your essay into a computer which will also score your essay. This process is at the experimental stage only, and ***every essay will also be scored manually***. We just want to see if this program can be useful to us. The computer, however, cannot score the essay properly unless your ideas are presented in paragraph form, with each paragraph separated by a blank line. You will receive more instructions about this during the assessment.

Other things we are looking for:

Spelling	• If you are not a good speller, that's fine. Sound out the words and write them as best you can.

Grammar	• Please do your best to use complete sentences in your essay . If you remember the rules of grammar, please use them. If you don't, just write as best you can.
Organization	• Organization is about the structure and flow of your essay. Is the beginning at the beginning, the middle in the middle and the end at the end? Stay on topic and present your ideas in an organized way.
Punctuation	• The rules for formal writing are different than the conventions for texting. • Sentences begin with a capital letter. They can end with a . ! or ? • When referring to yourself, such as "I went to the store" the I is capitalized and not "i". • Don't use texting abbreviations such as LOL, OMG, etc.
Vocabulary	• Use the best words you can to get your ideas across. Unfortunately, more complex words are often more difficult to spell. In this situation we would prefer you to "risk" using the best word you can and not worry about the spelling.

ACADEMIC UPGRADING: Basic Numeracy Review

The following are basic math problems ***similar to*** ones on the actual review.

During the actual skills review, ***calculators will not be permitted*** so please be sure you understand how to complete these types of problems without one**.** You will have paper available to work out the problems.

If you will be upgrading in math, it is very important that you have the multiplication tables (from 1 x 1 through to 10 x 10) memorized.

Section 1. Addition

a) 458 + 63

b) 2,374 + 587

c) 34,706 + 8,129

d) 68,025 + 52,986

e) 4,321 + 7,894 + 7,676

f) 92,718 + 53,846 + 21,789

Section 2. Subtraction

a) 59 - 44

b) 765 - 38

c) 6,090 - 587

d) 8,017 - 5,098

Section 3. Multiplication / Division

Fill in the missing number in each of the following equations:

a) 3 x ____ = 27

b) 4 x ____ = 32

c) 8 x ____ = 64

d) 6 x ____ = 54

e) 42 ÷ 7 = ____

f) 56 ÷ 8 = ____

g) 12 ÷ ____ = 1

h) ____ ÷ 9 = 0

Section 4. Large Multiplication

a) $\begin{array}{r} 37 \\ \times\ 56 \\ \hline \end{array}$

b) $\begin{array}{r} 458 \\ \times\ 72 \\ \hline \end{array}$

c) $\begin{array}{r} 306 \\ \times\ 58 \\ \hline \end{array}$

d) $\begin{array}{r} 2007 \\ \times\ 804 \\ \hline \end{array}$

Section 6. Long Division

a) $8\overline{)472}$

b) $12\overline{)306}$

c) $34\overline{)2108}$

d) $64\overline{)5432}$

Section 7. Word Problems.

1) Ben has taken four tests and received grades of 82%, 77%, 75%, and 84%. What is the average score of Ben's 4 tests?

2) Kelli runs 5 kilometers several times a week and keeps track of her weekly performance. On Monday she ran the distance in 24 minutes and 25 seconds. On Wednesday her time was 24 minutes and 11 seconds. On Thursday it was 23 minutes and 46 seconds. Her best day was Saturday, with a time of 23 minutes and 38 seconds. What was Kelli's average run time that week?

3) Heather's bill for lunch at a restaurant was $27.50. She left an 18% tip. How much did she leave for the tip?

4) A cook puts a roast in the oven. It needs to bake for 2 hours and 45 minutes. She put it in the oven at 2:40 p.m. At what time should she take it out of the oven?

Answers:

Section 1. Addition

a) 521 b) 2,961 c) 42,835 d) 121,011

e) 19,891 f) 168,353

Section 2. Subtraction

a) 15 b) 727 c) 5,503 d) 2,919

Section 3. Multiplication / Division

a) 9 e) 6

b) 8 f) 7

c) 8 g) 12

d) 9 h) 0

Section 4. Large Multiplication

a) 2,072 b) 32,976 c) 17,748 d) 1,613,628

Section 6. Long Division

a) 59 b) 25.5 or 25 R 6 or 25 ½

c) 62 d) 84.875 or 84 R 56 or $84\ ^{7}/_{8}$

Section 7. Word Problems.

1) 79.5%
2) 24 minutes 00 seconds
3) $4.95
4) 5:25 p.m.