

EXAM
CODE **360**

CATALOG
NUMBER **GEOx101**

TAKE ADVANTAGE OF ONLINE
**PRACTICE
EXAMS**
SEE PAGE 5 FOR DETAILS

Earth Science

CREDIT
HOURS

3

LEVEL

LOWER

PUBLISHED FEBRUARY 2021

The most current content guides are available at:

www.excelsior.edu/contentguides

U **EXCEL**[®]
STUDY.LEARN.SUCCEED.

CONTENTS

Preparing for the Exam	1
Before You Choose This UExcel Exam	1
Uses for the Examination.....	1
Examination Length and Scoring.....	1
Score Reporting.....	2
Letter Grade Description.....	2
Excelsior College Bookstore.....	2
Excelsior College Library.....	2
Take Charge of Your Own Learning	2
How Long Will It Take Me to Study?.....	2
How Can I Create an Effective Long-Term Study Plan?.....	3
What Learning Strategy Should I Use?.....	4
Study Tips.....	4
Using UExcel Practice Exams.....	5
About Test Preparation Services.....	6
Exam Preparation Strategies	6
Content Guides.....	6
Using the Content Outline.....	6
Using the Sample Questions and Rationales.....	6
Recommended Resources for the UExcel Exam in Earth Science	7
Textbook Editions.....	7
Strongly Recommended.....	7
Optional Resources.....	7
Reducing Textbook Costs.....	7
Open Educational Resources.....	7
Content Outline	9
General Description of the Examination.....	9
Learning Outcomes.....	9
General Education Career Competencies Addressed in this Exam.....	9
Content Outline.....	10
Sample Questions	20
Rationales	23
Taking the Exam	27
Registering for Your Exam	27
Register Online.....	27
Examination Administration.....	27
Accessibility Services.....	27
Computer-Delivered Testing.....	27
Breaks.....	27
Online Proctoring.....	27
On the Day of Your Exam	28
Important Reminders.....	28
Academic Integrity Nondisclosure Statement.....	28
UExcel Grade Report.....	28
Grade Appeals.....	28
What If I Miss My Appointment?.....	28
Late Arrivals.....	28
Earth Science Exam Development Committee	28
Sample Grade Report	29



SECTION ONE

Preparing for the Exam

Before You Choose This UExcel Exam

Uses for the Examination

- Excelsior College, the test developer, recommends granting three (3) semester hours of Lower-level undergraduate credit to students who receive a letter grade of C or higher on this examination.
- Other colleges and universities also recognize this exam as a basis for granting credit or advanced standing.
- Individual institutions set their own policies for the amount of credit awarded and the minimum acceptable score.

Examinees who have applied to Excelsior College should ask their academic advisor where this exam fits within their degree program.

Examinees **not enrolled** in an Excelsior College degree program should check with the institution from which they wish to receive credit to determine whether credit will be granted and/or to find out the minimum grade required for credit. Those who intend to enroll at Excelsior College should ask an admissions counselor where this exam fits within their intended degree program.

For more information on exam availability and actual testing information, see the [Exam Registration and Information Guide](#).

Examination Length and Scoring

This examination consists of 120 multiple choice and other type questions. You will have two (2) hours to complete the exam. Your score will be reported as a letter grade. Questions are scored either correct (1) or incorrect (0). There is no partial credit. Each credit-bearing exam contains pretest questions, which are embedded throughout the exam. They are indistinguishable from the scored questions. It is to your advantage to do your best on all the questions. Pretest questions are being tried out for use in future versions of the exam.

The UExcel exams do **not** have a fixed grading scale such as A = 90–100%, B = 80–90%, and so forth, as you might have seen on some exams in college courses. Each UExcel test has a scale that is set by a faculty committee and is different for each exam. The process, called standard setting, is described in more detail in the [Technical Handbook](#). Excelsior puts each exam through a standard setting because different test questions have different levels of difficulty. To explain further, getting 70% of the questions right on the exam when the questions are easy does not show the same level of proficiency as getting 70% of questions correct when the questions are hard. Every form of a test (a form contains the test questions) has its own specific grading scale tailored to the particular questions on each exam form.

Please also note that on each form, some of the questions (referred to as pretest questions) count toward the score and some do not; the grading scale applies only to those questions that count toward the score. The area with percentage ratings on the second page of your score report is intended to help identify relative strengths and weaknesses and which content areas to emphasize, should you decide to take the examination again. Your grade

is **based on only the scored questions**. Therefore, the percentage ratings do not necessarily reflect the total percentage that counted toward your grade.

For the best view of the types of questions on this exam, see the sample questions in the back of this guide. Practice, practice, practice!

Score Reporting

For most of our examinations, based on performance, an examinee is awarded a letter grade of A, B, C, or F. A letter grade of D can be given, but credit is awarded for A, B, and C letter grades only. The letter grades reported to examinees indicate that their performance was equivalent to the performance of students who received the same letter grade in a comparable, on-campus course.

More specifically, the letter grade indicates the examinee's proficiency relative to the learning outcomes specified in the exam content guide. Following are general descriptions of examinee performance at each level:

Letter Grade Description

- A Highly Competent: Examinee's performance demonstrates an advanced level of knowledge and skill relative to the learning outcomes.
- B Competent: Examinee's performance demonstrates a good level of knowledge and skill relative to the learning outcomes.
- C Marginally Competent: Examinee's performance demonstrates a satisfactory level of knowledge and skill relative to the learning outcomes.
- D Not Competent (no credit recommended): Examinee's performance demonstrates weak knowledge of the content and minimal skill relative to the learning outcomes.^①
- F Fail (no credit recommended): Examinee's performance demonstrates no knowledge of the content and no skill in the subject relative to the learning outcomes.

Credit is transcribed by Excelsior College for examinees who achieve letter grades of C or higher.

We encourage colleges and universities to use the Excelsior College letter grades of A, B, and C as acceptable standards for awarding credit.

^① In general, two-hour exams do not award a D letter grade.

See page 29, at the back of this content guide, for a sample UExcel Grade Report for Examinations.

Excelsior College Bookstore

The Excelsior College Bookstore offers recommended textbooks and other resources to help you prepare for UExcel exams.

The bookstore is available online at (login required): www.excelsior.edu/bookstore

Excelsior College Library

Library services are available to students enrolled in a degree program at Excelsior College. Created through our partnership with the Sheridan Libraries of The Johns Hopkins University, the library provides access to journal articles, books, websites, databases, reference services, and many other resources. To access the Excelsior College Library, visit www.excelsior.edu/library (login is required). Access to the library is available 24/7.

Take Charge of Your Own Learning

At Excelsior College, independent, self-directed study supported by resources we help you find is not a new concept. We have always stressed to students who take exams that they are acting as their own teacher, and that they should spend as much time studying for an exam as they would spend in a classroom and on homework for a corresponding college course in the same subject area.

Begin by studying the content outline contained in this content guide, at its most detailed level. You will see exactly which topics are covered, and where chapters on those topics can be found in the Recommended Resources. You will see exactly where you might need to augment your knowledge or change your approach.

The content outline, along with the learning outcomes for this exam and recommended textbooks, will serve as your primary resources.

How Long Will It Take Me to Study?

Study for a UExcel exam is comparable to an equivalent college-level course. As an independent

learner, you should study and review as much as you would for the same subject in a campus-based college course. If you already have a background in the subject, you may be able to pass the exam successfully with fewer hours of study. It depends upon the learner as well as the subject, the number of credits (for example, a 6- or 8-credit exam will require more hours of study than a 3-credit exam), and the length of the exam. We strongly encourage you to create a long-term action or study plan, so that you have a systematic approach to prepare for the exam. We've included guidelines for creating such a plan.

How Can I Create an Effective Long-Term Study Plan?

1. Determine the time you will require to complete your preparation for this exam. If you have not studied the subject before, you should plan to budget approximately 45 hours of study time for every credit: 135 hours for 3 credits, 180 hours for 4 credits, 270 hours for 6 credits, and 360 hours for 8 credits. These hours are rules of thumb based on expectations for a student taking a course in the subject; it may take you more or less time, depending on how familiar you are with the material and how easily you absorb the information studying on your own. Aside from the content review, you should then factor in time to search for and use other resources, and to complete any projects and assignments in the study materials that will clarify your understanding of the topics in the content outline (that part in the content guide where the specific areas of study are spelled out). Spend more time on concepts and areas in which you feel you are weak. Totaled, this is approximately the amount of time you should expect to devote to a three-credit, campus-based course. The actual amount of time you require depends on many factors, and will be approximate. If your background is weak, you may need to set aside substantially more than 135–150 hours. If your background is strong, you may budget less time.

Take a few minutes to review the content outline to assess your familiarity with the content. Then, in the space below, write the number of hours you will allocate to complete preparing for the exam.

Hours Required =

2. Determine the time you will have available for study.

In self-study, you need structure, as well as motivation and persistence, and a methodical approach to preparation. There is no set class to keep you on task. You have to do that yourself. Construct a time-use chart to record your daily activities over a one-week period. The most accurate way to do this is to complete the chart on a daily basis to record the actual amount of time you spend eating, sleeping, commuting, working, watching television, caring for others and yourself, reading, and everything else in an adult's life. However, if your schedule is regular, you might prefer to complete the chart in one sitting and, perhaps, by consulting your appointment book or planner.

After you have recorded your activities, you will be ready to schedule study periods around these activities or, perhaps, instead of some of them. In the space below, write the number of hours you will be able to set aside for study each week.

Hours Required =

3. Divide the first number by the second number.

This will give you the number of weeks you will need to set aside for independent study. For example, if you think you will require 170 hours of study and you have 10 hours available to study each week, divide 170 hours by 10 hours and you will get 17. This means that you will need about 17 weeks to complete this course of study. However, you will also need to allow about a week for review and self-testing. Moreover, to be on the safe side, you should also add two weeks to allow for unforeseen obstacles and times when you know you will not be able to study (e.g., during family illnesses or holidays). So, in this case, you should allot a total of 18 to 19 weeks to complete your study.

4. Schedule your examination to coincide with the end of your study period.

For example, if you plan to allow 18 weeks for study, identify a suitable examination date and begin study at least 18 weeks before that date. (The date you begin study assumes that you will have received all of your study materials, particularly textbooks, by that time.)

5. Format a long-term study plan.

You will need to use a calendar, planner, or some other tool to format and track your long-term study plan. Choose a method that is convenient and one that keeps you aware of your study habits on a daily basis. Identify the days and exact hours of each day that you will reserve for study throughout your whole independent study period. Check to see that the total number of hours you designate for study on your long-term study plan adds up to the number of hours you have determined you will need to complete this course of study (Step 1).

6. Record in your long-term study plan the content you plan to cover during each study period.

Enter the session numbers, review, and examination preparation activities you will complete during each study period. While it is suggested that approximately 160–170 hours of study is required for this exam, each and every student may require different timelines based on their comfort with, and comprehension of, the material.

You now have a tentative personal long-term study plan. Keep in mind that you will have to adjust your study plan, perhaps several times, as you study. It is only by actually beginning to work systematically through the material, using the content outline, that you will be able to determine accurately how long you should allow for each unit.

What Learning Strategy Should I Use?

The following guidelines are intended to help you acquire the grounding in the knowledge and skills required for successful completion of this examination.

1. Approach learning with a positive attitude.

Most students are capable of learning subject content if they devote enough time and effort to the task. This devotion will give you a positive edge and a feeling of control.

2. Diligently complete the exact work you specified in your study plan.

Your study plan is being designed for the specific purpose of helping you achieve the learning outcomes for this exam.

3. Be an active learner.

You should actively engage in the learning process. Read critically, take notes, and continuously monitor your comprehension. Keep a written record of your progress, highlight content you find difficult to grasp, and seek assistance from someone in your learning community who can help you if you have difficulty understanding a concept.

4. Be patient: you may not understand everything immediately.

When encountering difficulty with new material, be patient with yourself and don't give up. Understanding will come with time and further study. Sometimes you may need to take a break and come back to difficult material. This is especially true for any primary source material (original letters, documents, and so forth) that you may be asked to read. The content outline will guide you through the material and help you focus on key points. You will find that many concepts introduced in earlier sessions will be explained in more detail in later sessions.

5. Apply your learning to your daily life.

Use insights you gain from your study to better understand the world in which you live. Apply the learning whenever you can. Look for instances that support or contradict your reading on the subject.

6. Accommodate your preferred way of learning.

How do you learn best? Common ways to learn are reading, taking notes and making diagrams, and by listening to someone (on video or live). Others learn by doing. Do any of these descriptions apply to you? Or does your learning style vary with the learning situation? Decide what works for you and try to create a learning environment to accommodate your preferences.

Study Tips

Become an active user of the resource materials. Aim for understanding rather than memorization. The more active you are when you study, the more likely you will be to retain, understand, and apply the information.

The following techniques are generally considered to be active learning:

- **preview or survey** each chapter

- **highlight or underline text** you believe is important
- **write questions or comments** in the margins
- **practice re-stating content** in your own words
- **relate what you are reading** to the chapter title, section headings, and other organizing elements of the textbook
- **find ways to engage** your eyes, your ears, and your muscles, as well as your brain, in your studies
- **study with a partner or a small group**
- **prepare your review notes** as flashcards or create recordings that you can use while commuting or exercising

When you feel confident that you understand a content area, review what you have learned. Take a second look at the material to evaluate your understanding. If you have a study partner, the two of you can review by explaining the content to each other or writing test questions for each other to answer. Review questions from textbook chapters may be helpful for partner or individual study, as well.

Study smart for your UExcel exam! Success starts with establishing a relationship with your advisor.

Using UExcel Practice Exams

The official UExcel practice exams are highly recommended as part of your study plan. They can be taken using any computer with a supported web browser such as Google Chrome.

The practice exam package comes with two sets of questions. Please be aware that there will be fewer questions on the practice exams than there will be on the exam you take for credit. Generally, the practice questions will not be the same as the ones you will see when you take the actual exam for credit. They are intended to expose you to the types of questions you'll encounter in the actual exam. Practice questions are a tool, and do not provide a full exam experience. For example, the practice question sets do not have time limitations. Begin with the Content Guide, especially the detailed content outline. Memorizing specific questions and answers on the practice sets is not as effective as using the questions to practice, along with the content outline, to see which concepts you may need to study further. To register for the practice exam, visit www.excelsior.edu and log into your MyExcelsior

account. **Please note: You must be registered for the corresponding credit-bearing exam before you can register for the practice exam.**

Practice exams are not graded. Rather, they are intended to help you make sure you understand the subject and give you a sense of what the questions will be like on the exam for credit. Ideally, you would check any questions you got wrong, look at the explanations, and go back to the textbook to reinforce your understanding. After taking both forms of the practice exam, you should feel confident in your answers and confident that you know the material listed in the content outline.

Practice exams are one of the most popular study resources. Practice exams are typically shorter than the credit-bearing exam. Since the questions are drawn from the same pool of questions that appear on the credit-bearing exam, what you will see when you sit for the graded exam will be roughly the same. Used as intended, these practice exams will enable you to:

- Review the types of questions you may encounter on the actual exam.
- Practice testing on a computer in a timed environment.
- Practice whenever and wherever it is convenient for you.

Take two different forms of a practice exam within a 180-day period. (We highly recommend that you take the first form of the practice exam as a pretest, early in the study period. Use the results to identify areas to further study and carry out a plan. Then take the second form as a post-test and see how much you have improved.)

Although there is no guarantee, our research suggests that exam takers who do well on the practice exams are more likely to pass the actual exam than those who do not take advantage of the opportunity. Note that since the practice exams are not graded (calibrated) the same way as the scores on the credit-bearing exam, it will be hard for you to use the practice exams as a way to predict your score on the credit-bearing exam. The main purpose of the practice exams is for you to check your knowledge and to become comfortable with the types of questions you are likely to see in the actual, credit-bearing exam.

About Test Preparation Services

Preparation for UExcel® exams and Excelsior College® Examinations, though based on independent study, is supported by Excelsior College with a comprehensive set of exam learning resources and services designed to help you succeed. These learning resources are prepared by Excelsior College so you can be assured that they are current and cover the content you are expected to master for the exams. These resources, and your desire to learn, are usually all that you will need to succeed.

There are test-preparation companies that will offer to help you study for our examinations. Some may imply a relationship with Excelsior College and/or make claims that their products and services are all that you need to prepare for our examinations.

Excelsior College does not endorse the products and services of any tutorial or test preparation firm. We do not review the materials provided by these firms for the content or compatibility of their material and resources with UExcel® exams or Excelsior College Examinations®. No test preparation vendor is authorized to provide admissions counseling or academic advising services, or to collect any payments, on behalf of Excelsior College. Excelsior College does not send authorized representatives to a student's home nor does it review the materials provided by test preparation companies for content or compatibility with Excelsior College examinations.

To help you become a well-informed consumer, we suggest that before you make any purchase decision regarding study materials provided by organizations other than Excelsior College, you consider the points outlined on our website at www.excelsior.edu/testprep.

Exam Preparation Strategies

Each learner is different. However, all learners should read the content outline in the exam's Content Guide and ensure that they have mastered the concepts. For someone with no prior knowledge of the subject, a rule of thumb is 135 hours of study for a 3-credit exam—this number is just to give you an idea of the level of effort you will need, more or less.

Content Guides

This content guide is the most important resource. It lists the outcomes, a detailed content outline of what is covered, and textbooks and other study resources. It also has sample questions and suggestions for how to study. Content guides are updated periodically to correspond with changes in particular examinations and in textbook editions. Examinees can download any of the latest free UExcel content guides by visiting the individual exam page or from the list at www.excelsior.edu/contentguides.

Using the Content Outline

Each content area in the content outline includes the most important sections of the recommended resources for that area. These annotations are not intended to be comprehensive. You may need to refer to other chapters in the recommended textbooks. Chapter numbers and titles may differ among textbook editions.

This content outline contains examples of the types of information you should study. Although these examples are many, do not assume that everything on the exam will come from these examples. Conversely, do not expect that every detail you study will appear on the exam. Any exam is only a broad sample of all the questions that could be asked about the subject matter.

Using the Sample Questions and Rationales

Each content guide provides sample questions to illustrate those typically found on the exam. These questions are intended to give you an idea of the level of knowledge expected and the way questions are typically phrased. The sample questions do not sample the entire content of the exam and are not intended to serve as an entire practice test.

Recommended Resources for the UExcel Exam in Earth Science

The resources listed below were selected by the faculty members on the examination committee for use in developing this exam.

Resources listed under “Strongly Recommended” were used by the committee to verify all the questions on the exam. Please refer to the Content Outline to see which parts of the exam are cross-referenced to these resources.

Resources listed under “Optional” provide additional material that may deepen or broaden your understanding of the subject, or that may provide an additional perspective on the exam content. Textbook resources, both Strongly Recommended and Optional, may be purchased from the Excelsior College bookstore at www.excelsior.edu/bookstore.

You should allow ample time to obtain the necessary resources and to study sufficiently before taking the exam, so plan appropriately, with an eye towards your own personal learning needs. See the sections in this guide on the Excelsior College Bookstore and the Excelsior College Library, and under Reducing Textbook Costs, to help you secure the Strongly Recommended resources successfully.

Textbook Editions

Textbook editions listed in the UExcel content guides may not be the same as those listed in the bookstore. Textbook editions may not exactly match up in terms of table of contents and organization, depending upon the edition. However, our team of exam developers checks exam content against every new textbook edition to verify that all subject areas tested in the exam are still adequately available in the study materials. If needed, exam developers will list additional Strongly Recommended resources to ensure that all topics in the exam are still sufficiently covered. Public libraries may have the textbooks you need, or may be able to obtain them for you through interlibrary loan to reduce textbook costs. You may also consider financial aid, if you qualify, to further help defray the steep cost of textbooks. A section on open educational

resources (OER) has been included in this guide to help you locate additional, possibly free resources to augment your study.

Strongly Recommended

Tarback, E.J. (2015). *Earth science* (15th ed.). Upper Saddle River, NJ: Prentice Hall.

The study materials may be purchased from the [Excelsior College Bookstore](#).

Optional Resources

These textbooks were identified by the examination development committee as a resource to help you gain a deeper understanding of the subject.

Marshak, S. (2015). *Earth: Portrait of a planet* (6th ed.). New York: W.W. Norton.

Grotzinger, J., Jordan, T., Press, F., & Siever, R. (2014). *Understanding earth* (7th ed.). New York: W.H. Freeman.

Reducing Textbook Costs

Many students know it is less expensive to buy a used textbook, and buying a previous edition is also an option. The Excelsior College bookstore includes a buyback feature and a used book marketplace, as well as the ability to rent digital versions of textbooks for as long as students need them. Students are encouraged to explore these and the many other opportunities available online to help defray textbook costs.

Open Educational Resources

There are many resources available online free of charge that may further enhance your study for the exam. Known as Open Educational Resources (OER), these may be textbooks, courses, tutorials, or encyclopedias. Any additional OER that you find independently should be used to augment study—not as replacements for the Strongly Recommended resources.

Most sites for university-based OER can be searched through www.ocwconsortium.org and/or www.oercommons.org.

Sites that specialize in web courses designed by college professors under contract with the website sponsor, rather than in web versions of existing college courses, include:

www.education-portal.com

www.opencourselibrary.org (abbreviated as OCL)

We have included specific courses that cover material for one or more UExcel® exams from the sites in the listings above. It's worth checking these sites frequently to see if new courses have been added that may be more appropriate or may cover an exam topic not currently listed.

Sites like Khan Academy (www.khanacademy.com) and iTunes U feature relatively brief lessons on very specific topics rather than full courses. Full courses are also available on iTunes U (<http://www.apple.com/education/ipad/itunes-u/>). We have chosen a few courses and collections for this listing.

Open Online Textbooks

BookBoon

<http://bookboon.com/en/textbooks-ebooks>

Flatworld Knowledge

<http://catalog.flatworldknowledge.com/#our-catalog>

College Readiness

Khan Academy

<http://www.khanacademy.org/>

Hippocampus

<http://www.hippocampus.org/>

Open Course Library

<http://opencourselibrary.org/collg-110-college-success-course/>

Study Aids

Education Portal

<http://education-portal.com/>

Khan Academy

<http://www.khanacademy.org/>

Annenberg Learner

<http://www.learner.org/>

OpenCourseWare

<http://ocwconsortium.org/en/courses/search>

OER Commons

<http://www.oercommons.org/>

Open Course Library

<http://www.opencourselibrary.org/>

To achieve academic success, rate yourself at Excelsior College's Self-Regulated Learning Lab. Visit the Diagnostic Assessment & Achievement of College Skills site at <https://srl.daacs.net/>

It's free!

SECTION TWO

Content Outline

General Description of the Examination

The UExcel Earth Science examination is based on material typically taught in a one-semester, three-credit, lower-level course in geology, meteorology, and oceanography. The content of the examination corresponds to introductory course offerings such as Earth Science, Physical Geology, Geoscience, Environmental Geoscience, and Earth-System Science.

The examination measures knowledge of facts and terminology of earth science, understanding of plate tectonics, the rock cycle, the hydrologic cycle, earth history, geologic hazards, and energy resources, and the ability to apply this knowledge and understanding in an analysis of earth's processes.

No prior knowledge of earth science is required before beginning study for this exam.

Learning Outcomes

After you have successfully worked your way through the recommended study materials, you should be able to demonstrate the following learning outcomes:

1. Summarize the concepts and theories involved in the study of our planet. (Aligns to GECC 2.1)
2. Summarize the basic concepts of earth science and their historical development. (Aligns to GECC 2.1)
3. Examine the evolution of the earth. (Aligns to GECC 2.1)
4. Recognize the different types of Earth's physical, climatic, and tectonic environments. (Aligns to GECC 2.1)
5. Examine the fundamentals of volcanology, plate tectonics, paleontology, hydrology, petrology, and meteorology. (Aligns to GECC 2.1)
6. Recognize and evaluate the risks and consequences of natural disasters. (Aligns to GECC 2.1)
7. Demonstrate an understanding of how and why natural disasters occur. (Aligns to GECC 2.1)

General Education Career Competencies Addressed in this Exam

GECC-2: Mathematical and Scientific Problem Solving: Apply scientific knowledge and reasoning to make evidence-based decisions.

Content Outline

The content outline describes the various areas of the test, similar to the way a syllabus outlines a course. To fully prepare requires self-direction and discipline. Study involves careful reading, reflection, and systematic review.

The major content areas on the Earth Science examination, the percent of the examination devoted, and the hours to devote to each content area are listed below.

Content Area	Percent of the Examination	Hours of Study*
I. Introduction	5%	7
II. Plate Tectonics	10%	14
III. The Rock Cycle	25%	34
IV. The Hydrologic Cycle	25%	34
V. Geologic Hazards	20%	27
VI. Earth History	10%	14
VII. Earth and Energy Resources	5%	7
Total	100%	

*Approximate: For those examinees who know the topic well, less time may be needed to learn the subject matter. For those who are new to the subject matter, more time may be required for study.

NOTE: Occasionally, examples will be listed for a content topic to help clarify that topic. However, the content of the examination is not limited to the specific examples given.

I. Introduction

5 PERCENT OF EXAM

Tarbuck (2015)

Ch. 1, Introduction to Earth Science

Ch. 11, Geologic Time

A. What is earth science?

1. Geology

- a. Physical geology
 - b. Historical geology
2. Meteorology
 3. Oceanography
- B. Uniformitarianism and catastrophism**
- C. Scientific method**
1. Hypothesis
 2. Theory
- D. Earth systems**
1. Geosphere
 2. Hydrosphere
 3. Biosphere
 4. Atmosphere
- E. Internal structure of the earth**
1. Layers by composition

- a. Crust
 - 1) Continental
 - 2) Oceanic
- b. Mantle
- c. Core
- 2. Layers by physical properties
 - a. Lithosphere
 - b. Asthenosphere
 - c. Lower mantle (does not include thickness of mantle)
 - d. Outer core (does not include thickness of core)
 - e. Inner core (does not include thickness of core)

- d. Continental-continental convergence
- 3. Transform fault
 - a. Fracture zones
 - b. Conservative plate boundary
- D. Support for plate tectonics**
 - 1. Ocean drilling: age of the sea floor
 - 2. Hot spots
 - 3. Paleomagnetism
 - a. Magnetic reversals
 - b. Polar wander
 - 4. Geographic distribution of earthquakes and volcanoes
 - 5. Plate motion
 - a. Plate velocity
 - 1) Hot spots
 - 2) Global Positioning System (GPS)
 - b. Driving forces
 - 1) Mantle convection
 - 2) Slab pull
 - 3) Ridge push
 - 4) Slab suction

II. Plate Tectonics

10 PERCENT OF EXAM

Tarbuck

Ch. 7, Plate Tectonics: A Scientific Revolution Unfolds

- A. Wegener's continental drift hypothesis**
 - 1. Pangaea
 - 2. Evidence for continental drift
 - a. Continental fit
 - b. Fossil match
 - c. Rock types and structures
 - d. Ancient (paleo) climates
- B. Major lithospheric plates**
- C. Plate boundaries**
 - 1. Divergent
 - a. Mid-ocean ridges
 - b. Sea floor spreading
 - c. Continental rifts
 - 2. Convergent
 - a. Deep ocean trenches and subduction zones
 - b. Oceanic-continental convergence
 - c. Oceanic-oceanic convergence

III. The Rock Cycle

25 PERCENT OF EXAM

Tarbuck

Ch. 2, Matter and Minerals

Ch. 3, Rocks: Materials of the Solid Earth

Ch. 4, Weathering, Soil, and Mass Wasting

Ch. 9, Volcanoes and Other Igneous Activity

Ch. 10, Crustal Deformation and Mountain Building

- A. Elements and the periodic table**
 - 1. Atomic structure
 - a. Electrons
 - b. Protons
 - c. Neutrons

- d. Atomic number
- d. Atomic mass number
- e. Isotopes
- 2. Bonding and compounds
 - a. Ionic
 - b. Covalent

B. Minerals

- 1. Definition
- 2. Physical properties
 - a. Crystal form
 - b. Luster
 - c. Color
 - d. Streak
 - e. Hardness (Mohs scale)
 - f. Cleavage
 - g. Fracture
 - h. Specific gravity
 - i. Additional properties
 - 1) Magnetic
 - 2) Acid test
- 3. Chemical classification
 - a. Silicates
 - 1) Silicon-oxygen tetrahedron
 - 2) Common rock-forming silicates
 - a) Quartz
 - b) Feldspar
 - c) Mica
 - d) Amphibole
 - e) Pyroxene
 - f) Olivine
 - b. Nonsilicates
 - 1) Carbonates
 - 2) Halides
 - 3) Oxides
 - 4) Sulfides
 - 5) Sulfates

- 6) Native minerals (single elements)

C. Rocks

- 1. Definition
- 2. Types of rocks and the rock cycle

D. Igneous rocks and processes

- 1. Magma and lava
 - a. Origin of magmas: partial melting
 - 1) Heat and geothermal gradient
 - 2) Pressure
 - 3) Composition of partially melted rock
 - 4) Volatiles
 - b. Composition
 - 1) Mafic (basaltic)
 - 2) Intermediates
 - 3) Felsic (granitic)
 - c. Viscosity
 - d. Temperature
 - e. Gases
- 2. Crystallization
 - a. Intrusive (plutonic)
 - b. Extrusive (volcanic)
 - c. Bowen's reaction series
 - d. Magmatic differentiation
 - 1) Crystal settling
 - 2) Assimilation
 - 3) Magma mixing
- 3. Classification
 - a. Textures
 - 1) Fine grained (aphanitic)
 - 2) Coarse grained (phaneritic)
 - 3) Porphyritic
 - 4) Glassy
 - b. Composition
 - 1) Ultramafic (ultrabasic)
 - 2) Mafic (basaltic)
 - 3) Intermediate (andesitic)

- 4) Felsic (granitic)
 - 4. Plutonic structures
 - a. Plutons and batholiths
 - b. Dikes
 - c. Sills
 - 5. Volcanism
 - a. Lava flows
 - 1) Pahoehoe
 - 2) Aa
 - b. Pyroclastic material
 - c. Types of volcanoes
 - 1) Shield
 - 2) Composite
 - 3) Cinder cone
 - d. Volcanic landforms
 - 1) Fissure eruptions and lava plateaus
 - 2) Calderas and craters
 - 3) Volcanic pipes (conduits) and necks
 - e. Volcanic hazards (see also VD)
 - 6. Igneous rocks and plate tectonics
- E. Weathering and erosion**
- 1. Mechanical weathering
 - 2. Chemical weathering (for example: acid rain)
 - 3. Rates of and factors affecting weathering
 - 4. Soil formation
 - 5. Soil erosion
 - 6. Mass wasting
 - a. Controls and triggers
 - b. Types of materials
 - c. Rate and type of movement
 - 1) Fall
 - 2) Flow
 - 3) Slide

F. Sedimentary rocks and processes

- 1. Sediment
 - 2. Transport and deposition
 - 3. Lithification
 - a. Compaction
 - b. Cementation
 - 4. Classification
 - a. Detrital
 - b. Chemical
 - 5. Sedimentary features
 - a. Fossils
 - b. Layering (strata)
- G. Metamorphic rocks and processes**
- 1. Metamorphism
 - 2. Factors influencing metamorphism
 - a. Heat
 - b. Pressure
 - 1) Uniform stress (confining pressure)
 - 2) Differential stress
 - c. Fluids
 - d. Time
 - e. Parent rock composition
 - 3. Classification
 - a. Texture
 - 1) Foliated
 - 2) Nonfoliated
 - b. Parent rock
 - 4. Types of metamorphism
 - a. Contact (thermal)
 - b. Regional

H. Rock deformation and mountain building

- 1. Rock deformation
 - a. Elastic
 - b. Ductile
 - c. Brittle
- 2. Folds
 - a. Anticlines

- b. Synclines
- c. Domes
- d. Basins
- 3. Faults
 - a. Normal (tensional)
 - b. Reverse and thrust (compressional)
 - c. Strike-slip and transform (shear)
- 4. Mountain building
 - a. Island arcs
 - b. Volcanic arcs
 - c. Accreted terranes
 - d. Continental collisions
 - e. Fault-block mountains
 - f. Isostasy

- b. Gradient
- 3. River processes
 - a. Erosion
 - b. Transportation
 - 1) Types of load
 - a) Dissolved
 - b) Suspended
 - c) Bed load
 - 2) Competence
 - 3) Capacity
 - c. Deposition
- 4. Base level
- 5. Channel patterns
 - a. Meandering streams
 - 1) Point bars
 - 2) Cut banks
 - 3) Oxbow lakes
 - b. Braided streams
 - c. Floodplains
 - d. Natural levees
 - e. Deltas
- 6. Floods (see also VC)

IV. The Hydrologic Cycle

25 PERCENT OF EXAM

Tarbuck

Ch. 5, Running Water and Groundwater

Ch. 6, Glaciers, Deserts, and Wind

Unit 5, The Global Ocean (Ch. 13–15)

Unit 6, Earth's Dynamic Atmosphere (Ch. 16–20)

- A. Distribution of water**
- B. Driving mechanism (solar energy)**
- C. Components (water balance)**
 - 1. Evaporation
 - 2. Condensation
 - 3. Precipitation
 - 4. Evaporation and transpiration (evapotranspiration)
 - 5. Runoff
 - 6. Infiltration
- D. Running water**
 - 1. Drainage basins and divides
 - 2. Flow
 - a. Discharge

E. Groundwater

- 1. Groundwater system
 - a. Unsaturated zone (zone of aeration)
 - b. Saturated zone
 - c. Water table
- 2. Storage and movement
 - a. Porosity
 - b. Permeability
 - c. Aquifer
 - d. Aquitard
 - e. Darcy's Law
 - 1) Hydraulic gradient
 - 2) Hydraulic conductivity
- 3. Springs

- a. Hot springs
 - b. Geysers
 - 4. Wells
 - a. Drawdown
 - b. Cone of depression
 - c. Artesian
 - 1) Pressure surface
 - 2) Nonflowing
 - 3) Flowing
 - 5. Groundwater problems
 - a. Depletion
 - b. Subsidence
 - c. Contamination
 - 6. Karst features
 - a. Caverns
 - 1) Stalagmites
 - 2) Stalactites
 - b. Sinkholes
- F. Glaciers**
- 1. Definition
 - 2. Types
 - a. Valley (alpine)
 - b. Ice sheets and ice caps
 - 3. Glacial budget
 - a. Zone of accumulation
 - b. Zone of wastage (ablation)
 - c. Snowline
 - 4. Erosional features
 - a. Cirques
 - b. *Arêtes* and horns
 - c. U-shaped valley (glacial trough)
 - d. Hanging valley
 - e. Fjords
 - 5. Depositional features
 - a. Glacial drift
 - b. Glacial erratics
 - c. Moraine

- d. Drumlin
 - e. Kettle
 - 6. Glaciation
 - a. Ice ages
 - b. Causes
 - 1) Greenhouse gases
 - 2) Plate movements
 - 3) Earth's orbital variations (Milankovitch's model)
- G. Oceans**
- 1. Features of the oceans
 - a. Continental margins
 - 1) Passive
 - a) Continental shelf
 - b) Continental slope
 - i. Submarine canyon
 - ii. Turbidity currents
 - c) Continental rise
 - 2) Active
 - a) Trenches
 - b) Accretionary wedge
 - b. Ocean basins
 - 1) Abyssal plain
 - 2) Seamounts
 - 3) Oceanic plateau
 - c. Mid-Oceanic ridges
 - 1) Formation of rift valleys
 - 2) Spreading centers
2. Properties of ocean water
 - a. Temperature
 - b. Salinity
 - c. Density
3. Marine organisms
 - a. Plankton
 - b. Nekton
 - c. Benthos
 - d. Food chain

4. Ocean circulation
 - a. Surface
 - 1) Coriolis effect
 - 2) Upwelling
 - b. Deep
 5. Shorelines
 - a. Longshore currents
 - b. Wave refraction
 - c. Erosional features
 - 1) Wave-cut cliffs and platforms
 - 2) Sea arches and stacks
 - d. Depositional features
 - 1) Barrier islands
 - 2) Spits and bars
 - e. Coastal erosion and stabilization
 - 1) Beach nourishment
 - 2) Artificial structures (for example: sea walls, groins, breakwaters)
 - f. Estuaries
 6. Tides
 - a. Diurnal pattern
 - b. Causes of tides
- H. Atmosphere and climate**
1. Differences between weather and climate
 2. Composition of the atmospheres
 3. Structure of the atmosphere
 - a. Troposphere
 - b. Stratosphere
 - c. Mesosphere
 - d. Thermosphere
 4. Solar radiation
 - a. Reflection
 - b. Scattering
 - c. Absorption
 5. Global distribution of temperature
 6. Global air circulation
 - a. Trade winds
 - b. Westerlies
 - c. Polar winds
 7. Water in the atmosphere
 - a. Humidity
 - b. Relative humidity
 - c. Cloud formation
 - d. Precipitation mechanisms
 8. Weather patterns and severe storms
 - a. Fronts
 - 1) Cold
 - 2) Warm
 - 3) Stationary
 - b. Tornadoes
 - c. Thunderstorms
 - d. Cyclones and hurricanes
 9. Climate
 - a. Climate system
 - b. Classification
 - 1) Humid
 - 2) Dry
 - a) Arid
 - b) Semi-arid
 - 3) Polar
 - c. Global climate distribution
 - d. Climate change and its consequences
 - 1) Feedback mechanisms
 - 2) Increasing carbon dioxide levels
 - 3) Global warming
 - 4) Effect of aerosols
 10. Problems
 - a. Ozone depletion
 - b. Greenhouse effect
 - c. *El Niño* and *La Niña*
 - d. Air pollution

V. Geologic Hazards

20 PERCENT OF EXAM

Tarbuck

Ch. 5, Running Water and Groundwater

Ch. 8, Earthquakes and Earth's Interior

Ch. 9, Volcanoes and Other Igneous Activity

Ch. 19, Weather Patterns and Severe Storms

A. Earthquakes

1. Definition
2. Elastic rebound
3. Types of seismic waves
 - a. P wave
 - b. S wave
 - c. Surface wave
4. Earthquake location
 - a. Focus
 - b. Epicenter
5. Foreshocks and aftershocks
6. Measurement scales
 - a. Intensity
 - b. Magnitude
 - 1) Richter scale
 - 2) Moment magnitude scale
7. Global distribution
8. Earthquake hazards
 - a. Ground shaking
 - b. Amplification
 - c. Liquefaction
 - d. Tsunami
9. Prediction
 - a. Short term
 - b. Long term
 - 1) Probability
 - 2) Uniform building code

B. Mass wasting (see IIIE6)

C. Floods

1. Definition
2. Causes
3. Flash floods
4. Flood mitigation
 - a. Artificial levees
 - b. Dams
 - c. Channelization
 - d. Land-use planning
 - e. 100-year flood

D. Volcanic hazards

1. Lahar (mudflow)
2. Nuée ardente (pyroclastic flow)
3. Lava flow (see IIID5a)
4. Volcanoes and climate change

E. Coastal hazards

1. Hurricanes (see also IVH8d)
 - a. Storm surge
 - b. High winds
 - c. Flooding
2. Tsunami (see also VA8d)
3. Shoreline erosion (see also IVG5e)

VI. Earth History

10 PERCENT OF EXAM

Tarbuck

Ch. 1, Introduction to Earth Science

Ch. 11, Geologic Time

Ch. 12, Earth's Evolution Through Geologic Time

A. Origins of the earth and solar system

1. Nebular hypothesis
2. Age of the earth

B. Geologic time

1. Principles of relative dating
 - a. Law of superposition
 - b. Original horizontality
 - c. Cross-cutting relations

- d. Inclusions
- e. Unconformities
- 2. Radiometric dating
 - a. Isotopes (see also IIIA1f)
 - b. Radioactive decay
 - 1) Parent atoms
 - 2) Daughter atoms
 - c. Half-life
- 3. Fossils
 - a. Means of preservation
 - b. Principle of fossil succession
 - c. Index fossils
- 4. Methods of correlation
 - a. Fossil assemblages
 - b. Numerical ages
 - c. Layer sequence (strata)
- 5. Geologic time scale
 - a. Precambrian
 - 1) Early atmosphere (outgassing)
 - 2) Stromatolites
 - 3) Shields
 - b. Paleozoic
 - 1) Age of invertebrates
 - 2) Age of fishes
 - 3) Age of amphibians
 - 4) First appearance of reptiles
 - 5) Assembly of Pangaea
 - 6) Mass extinction
 - c. Mesozoic
 - 1) Breakup of Pangaea
 - a) Gondwana
 - b) Laurasia
 - 2) Age of reptiles
 - 3) First birds
 - 4) First flowering plants
 - 5) First mammals
 - 6) Dinosaur extinction

- d. Cenozoic
 - 1) Age of mammals
 - 2) Age of flowering plants
 - 3) Ice ages
 - 4) Extinction of large mammals
 - 5) First humans

VII. Earth and Energy Resources

5 PERCENT OF EXAM

Tarbuck

Ch. 2, Matter and Minerals

Ch. 3, Rocks: Materials of the Solid Earth

Ch. 13, The Ocean Floor

A. Resource versus reserve

B. Renewable and nonrenewable

C. Mineral resources

1. Formation of metallic and nonmetallic minerals
 - a. Igneous processes
 - b. Metamorphic processes
 - c. Weathering and sedimentary processes
 - d. Hydrothermal solutions
2. Rocks and aggregates
3. Resources from the ocean (for example: sulfide deposits)

D. Energy resources

1. Fossil fuels
 - a. Oil
 - b. Natural gas and gas hydrates
 - c. Coal
 - d. Oil shales
 - e. Oil sands
2. Alternative energy resources

NOTE: The rapid pace of development in this area makes textbook references unreliable. We recommend that you search the Web for "alternative energy" or the specific energy

source (for example, “geothermal energy”) and use good information literacy skills in selecting and filtering the search results to get reliable, up-to-date information about these resources.

- a. Solar
- b. Geothermal
- c. Wind
- d. Nuclear
- e. Hydroelectric
- f. Tidal

SECTION THREE

Sample Questions

The sample questions give you an idea of the level of knowledge expected in the exam and how questions are typically phrased. They are not representative of the entire content of the exam and are not intended to serve as a practice test.

Rationales for the questions can be found on pages 23–26 of this guide. In that section, the correct answer is identified and each answer is explained. The number in parentheses at the beginning of each rationale refers to the corresponding section of the content outline. For any questions you answer incorrectly, return to that section of the content outline for further study.

1. When can a theory be termed a paradigm?
After the theory has been
 - 1) tested then rejected as a scientific hypothesis
 - 2) accepted by the scientific community as a natural law
 - 3) successfully tested on a narrow range of natural phenomena
 - 4) successfully used to explain a wide range of natural phenomena
2. What is the largest layer by volume of the earth?
 - 1) crust
 - 2) mantle
 - 3) outer core
 - 4) inner core
3. What is the most probable appearance of the East African rift in 20 million years?
 - 1) Basin and Range Province
 - 2) long linear sea similar to the Red Sea
 - 3) long chain of volcanoes like the Andes
 - 4) wide ocean similar to the Atlantic Ocean
4. Which element is an essential constituent of pyroxenes?
 - 1) iron
 - 2) oxygen
 - 3) phosphorus
 - 4) zinc
5. Which structure forms when (1) silica-rich magma rises to the earth's surface, (2) an eruption ejects huge volumes of lava and ash, and (3) the roof of the magma chamber collapses over a broad area?
 - 1) a caldera
 - 2) a laccolith
 - 3) a pluton
 - 4) a volcanic neck
6. What is the most common product of chemical weathering of feldspar?
 - 1) quartz
 - 2) calcite
 - 3) iron oxides
 - 4) clay minerals

7. Why are mafic lavas more abundant at island arcs than at arcs developed on the continents?
 - 1) The mantle underneath island arcs is more mafic.
 - 2) Assimilation of silica-rich crust by island arc magmas is less.
 - 3) Island arc lavas form predominantly through decompression melting.
 - 4) Island arc magmas are formed solely by melting of mafic oceanic crust.

8. An accreted terrane must have which rock characteristic?
 - 1) rocks that are older than rocks in the surrounding areas
 - 2) rocks that are younger than rocks in the surrounding areas
 - 3) rocks that have a different geological history than the rocks in the surrounding areas
 - 4) rocks that are comprised of different rock types than the rocks in the surrounding areas

9. What best explains why the elevations of the ocean basins are lower than the elevations of the continents?
 - 1) The mantle is thinner under the oceans.
 - 2) The oceanic crust is thinner than the continental crust.
 - 3) The weight of the oceans forces the oceanic crust downward.
 - 4) The greater buoyancy of the continents results from their higher temperature.

10. What is a consequence of isostatic adjustment accompanying erosion?
 - 1) exposure of the earth's mantle at the surface of the earth
 - 2) increase of erosion rates as material is removed from mountains
 - 3) exposure of high-grade metamorphic rocks on mountain summits
 - 4) rebound of continental slopes in response to sediment deposition

11. Where is the second most plentiful source of the world's fresh water?
 - 1) in lakes
 - 2) in the ground

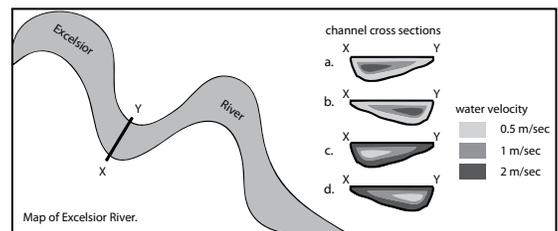
- 3) in the atmosphere
- 4) in streams and rivers

12. Which energy source drives the hydrologic cycle?
 - 1) gravity
 - 2) the sun
 - 3) the moon
 - 4) radioactive decay

13. Which process contributes least to the hydrologic cycle?
 - 1) condensation
 - 2) evaporation
 - 3) precipitation
 - 4) sublimation

14. Why do ice crystals consume water droplets in water-saturated air at temperatures below 0° C (32° F)?
 - 1) Supercooled water is more stable under these conditions.
 - 2) Supercooled ice crystals will melt under these conditions.
 - 3) The degree of supersaturation is less for ice than for liquid water.
 - 4) The degree of supersaturation is greater for ice than for liquid water.

15. If a house is built on location Y, what will happen over time to the edge of the river that is nearest the house?
 - 1) move toward the house and eventually destroy it.
 - 2) transform into a braided stream and form an island.
 - 3) remain in the same place, so things remain the same.
 - 4) move away from the house, so the yard will get larger.



The river's edge will

- 1) move toward the house and eventually destroy it.
- 2) transform into a braided stream and form an island.
- 3) remain in the same place, so things remain the same.
- 4) move away from the house, so the yard will get larger.

16. Which statement describes porosity and permeability of rock/sediment?
- 1) Porosity and permeability of rock or sediment have identical meanings.
 - 2) Rock or sediment may be very porous yet still prevent water from moving through it.
 - 3) A poorly sorted cemented sandstone has greater porosity than a well sorted uncemented sandstone.
 - 4) The quantity of groundwater that can be stored depends on the permeability of the rock or sediment.
17. Which force forms oceanic ridges?
- 1) contractional
 - 2) compressional
 - 3) tangential
 - 4) tensional
18. Which differences in global cooling effects followed the most recent eruptions of Mount St. Helens and Mount Pinatubo? Select the two that apply.
- 1) the differing sizes of the two volcanoes
 - 2) the differing amounts of gas injected into the stratosphere
 - 3) the differing amounts of volcanic ash released into the atmosphere
 - 4) the differing compositions of the volcanic gases injected into the atmosphere
19. Which hazard associated with hurricanes can occur hundreds of kilometers from the location of landfall?
- 1) storm surge
 - 2) warm fronts
 - 3) inland flooding
 - 4) inland snowfall
20. During radioactive decay of uranium-238, what is the unstable daughter nucleus produced directly by the alpha decay of thorium-230?
- 1) lead-214
 - 2) radium-226
 - 3) thorium-234
 - 4) uranium-234
21. Where are the best locations to find chromium?
- 1) shield areas
 - 2) ocean floors
 - 3) stable platforms
 - 4) young mountain belts

SECTION FOUR

Rationales

1. (IC2)

- 1) Although testing and rejection of hypotheses and theories is vital, it does not conform to the definition of a paradigm.
- 2) A law explains a narrow range of phenomena and does not meet the definition of a paradigm.
- 3) This statement applies to a theory; a paradigm applies to a wide range of phenomena.
- *4) A paradigm is a theory that explains a wide range of natural phenomena.

2. (IE1b)

- 1) The crust is the relatively thin outer skin of the earth.
- *2) The mantle is over 82% of the earth's volume.
- 3) The inner and outer cores are 18% of the earth's volume.
- 4) The inner and outer cores are 18% of the earth's volume.

3. (IC1c)

- 1) The Basin and Range Province represents a different type of continental extension, distributed instead of localized, not an advanced stage of continental rifting.
- *2) Assuming an average rate of divergence of 5 cm/yr., the East African rift region will be 1,000 km wider with a long linear sea parallel to the Great Lakes region.
- 3) Volcanic activity will form new oceanic lithosphere.
- 4) The spreading rate required to form a 5,000 km ocean like the Atlantic Ocean is approximately 25 cm/yr., which is unrealistic.

4. (IIIB3a1)

- 1) Iron is present in many, but not all, pyroxenes.
- *2) Being silicates, pyroxenes are composed of silicate tetrahedra that contain silicon atoms surrounded by oxygen.
- 3) Phosphorus is not present in pyroxenes.
- 4) Zinc is not an essential component of pyroxenes.

5. (IIID5d2)

- *1) This is how a caldera is formed.
- 2) A laccolith is a type of intrusive igneous feature.
- 3) A pluton is a type of intrusive igneous feature.
- 4) Although they are a volcanic feature, necks do not form from collapse.

6. (IIIE2)

- 1) Quartz is resistant to chemical weathering and not a by-product of it.
- 2) Calcite is not a by-product of chemical weathering.
- 3) Iron oxides are not a product of chemical weathering.
- *4) Clay minerals are the most common product of weathering of feldspars.

*correct answer

7. (IIIH4a)

- 1) Mantle compositions are essentially the same beneath oceanic and continental crust.
- *2) The abundant intermediate and felsic lavas of continental arcs result from assimilation of felsic continental crust, which is far less abundant in the environment of island arcs.
- 3) Magmas giving rise to lavas at continental and island arcs are formed by melting of the mantle, not of the crust. Melting mafic crust forms intermediate lavas.
- 4) Melting at arcs does not result from decompression melting.

8. (IIIH4c)

- 1) Accreted terranes can be younger or older than surrounding rocks.
- 2) Accreted terranes can be younger or older than surrounding rocks.
- *3) Accreted terranes are identified by the presence of rocks indicating a different geologic history, for example, rocks of oceanic origin juxtaposed next to continental rocks.
- 4) Rock types vary dramatically within individual terranes and on the continents, so this is an insufficient criterion to identify a region as an accreted terrane.

9. (IIIH4f)

- 1) The mantle is somewhat thinner under the continents.
- *2) The greater thickness of continental crust elevates these areas relative to oceanic crust.
- 3) The mass of the oceans is too small to cause the relatively dramatic elevation difference between the continents and the oceans.
- 4) Heat flow is higher in oceanic crust and any effect on buoyancy is offset by the greater density of the oceanic crust. These effects are minor compared to the effect of crustal thickness.

10. (IIIH4f)

- 1) The decrease in erosion potential and increase in sedimentary deposition as elevation decreases prevents direct exposure of the mantle at the surface.
- 2) Erosion rates are proportional to the energy gradients. Gradients on mountains decrease as mountain elevation is lost through erosion.
- *3) The coupling of erosion and uplift as a consequence of isostasy frequently leads to the exposure of high grade metamorphic rocks (formed deep in the crust) at Earth's surface on the tops of mountains.
- 4) The continental slopes undergo subsidence in response to sediment loading as a consequence of isostasy.

11. (IVA)

- 1) Lakes contain a very minor amount of the world's fresh water.
- *2) Groundwater accounts for almost all of the world's non-frozen fresh water.
- 3) The atmosphere contains a minor amount of the world's fresh water.
- 4) Streams and rivers contain a minor amount of the world's fresh water.

12. (IVB)

- 1) Gravity plays a role in part of the hydrologic cycle by pulling water down hill, but gravitational potential energy does not drive the hydrologic cycle.
- *2) The sun causes evaporation to occur.
- 3) The moon plays no role in the hydrologic cycle.
- 4) The amount of energy that radioactive decay contributes to the total earth budget is miniscule.

13. (IVC)

- 1) Condensation is important in cloud formation and the resulting precipitation.
- 2) Evaporation drives the hydrologic cycle.
- 3) Precipitation is critical to the hydrologic cycle.
- *4) Sublimation can occur in high latitudes, but it is a very minor contributor to the hydrologic cycle as a whole.

*correct answer

14. (IVC3)

- 1) Supercooled water is unstable with respect to ice in these conditions.
- 2) Ice crystals grow, not melt, under these conditions.
- 3) The degree of supersaturation is greater for ice in these conditions.
- *4) Ice crystals grow at the expense of water droplets, which evaporate as the ice crystals grow.

15. (IVD5a)

- 1) Erosion occurs at the cut bank, moving the river bank toward the outer edge of the bend in the river channel. A house at location X would be destroyed.
- 2) A meandering stream occurs on a shallow gradient; a braided stream forms on very steep gradients. A braided stream would not form.
- 3) The patterns of water velocity in meandering rivers produce dynamic landscapes where river bands migrate significantly over time.
- *4) Point bars migrate toward the existing river channel, increasing the amount of land between location Y and the river's bank.

16. (IVE2a)

- 1) Porosity is the percentage of the total volume of rock/sediment that consists of pore spaces. Permeability is the ease/ability of material to transmit fluid.
- *2) Some sediments, such as clay, are quite porous, but water cannot move because the pore spaces between particles are too small.
- 3) Cementation or the presence or mixture of small particles (poorly sorted) can reduce the open pore spaces (and thus the porosity) of sandstone.
- 4) The quantity of groundwater that can be stored depends on the porosity of the rock or sediment.

17. (IVG1c)

- 1) Contractional is not a term used to describe force, but it has the same general meaning as compressional.
- 2) Compressional force forms mountain ranges on land and subduction zones but does not produce rifting and so, does not form oceanic ridges.
- 3) Tangential force acts at a few plate tectonic boundaries but does not produce rifting and so, does not produce oceanic ridges.
- *4) Tensional forces at divergent plate boundaries form rift valleys on land and rifting in ocean crust that leads to extensive volcanism and formation of oceanic ridges.

18. (VD4)

- 1) Mount St. Helens and Mt. Pinatubo are about the same size. Size does not matter, but the amount and nature of the material erupted does.
- *2) Mount St. Helens (1980) injected mainly ash, not gas, and it affected primarily the atmosphere level. Mount Pinatubo (1991) injected mainly sulfur dioxide gas into the stratosphere. The gas content is the major difference.
- *3) Mount Pinatubo did release some ash, but not nearly as much as Mount St. Helen's did.
- 4) Both volcanoes produced primarily sulfur dioxide gas (same composition), but only Mount Pinatubo was powerful enough to inject significant amounts of gas into the stratosphere.

19. (VE1c)

- 1) A storm surge only occurs in the coastal region near the location of hurricane landfall.
- 2) Warm fronts are not related to hurricanes.
- *3) Inland flooding can occur hundreds of kilometers from the location of landfall of a hurricane.
- 4) Inland snowfall is not related to hurricanes.

*correct answer

20. (VIB2b2)

- 1) Lead-214 is an unstable daughter atom produced after thorium-230 has formed in the decay series as indicated by mass loss of 16 units (not a direct step in the series).
- *2) Radium-226 is an unstable daughter atom produced directly by alpha decay of thorium-230 as indicated by the mass loss of 4 units due to alpha decay.
- 3) Thorium-234 is an unstable daughter atom produced before thorium-230 is formed within the uranium-238 decay series. So, it cannot be produced directly by decay of thorium-230.
- 4) Uranium-234 is an unstable daughter atom produced before thorium-230 is formed within the uranium-238 decay series. So, it cannot be produced directly by decay of thorium-230.

21. (VIIC1)

- *1) Economic reserves of chromium are found only in Precambrian rocks that make up the shields of the continents.
- 2) Economic reserves of chromium are not found on the ocean floor.
- 3) Economic reserves of chromium are not found in stable platforms.
- 4) Economic reserves of chromium are not found in young mountain belts.

*correct answer

SECTION FIVE

Taking the Exam

Registering for Your Exam

Register Online

www.excelsior.edu/examregistration

Follow the instructions and pay by Visa, MasterCard, American Express, or Discover Card.

Examination Administration

Pearson Testing Centers serve as the administrator for all Excelsior College computer-delivered exams.

Accessibility Services

Excelsior College is committed to the principle that every individual should have an equal opportunity to enroll in an Excelsior College degree program, to register for courses or examinations in order to demonstrate their knowledge and skills under appropriate conditions, and to complete a degree.

The Accessibility Services Office at Excelsior College is responsible for considering requests for reasonable accommodations for individuals with verifiable, documented disabilities. If you are requesting an accommodation due to a disability/condition, complete a [Request for Accommodation form](#).

Computer-Delivered Testing

The UExcel exams are delivered by computer. You can take this exam either in a [Pearson VUE testing center](#) or at your home or office with an online proctor. If you are interested in remote proctoring, visit [PearsonVUE OnVUE online proctoring](#).

The system is designed to be as user-friendly as possible, even for those with little or no computer experience. On-screen instructions are similar to those you would see in a paper examination booklet. You will use either the keyboard or the mouse to submit your answers, depending upon the type of question.

Before taking your exam, we strongly encourage you to go on a virtual tour of the testing center. To access this tour, click the What to Expect in a Pearson VUE test center at the following link: home.pearsonvue.com/test-taker/security.aspx

You also will receive a small, erasable whiteboard if you need one.

Breaks

Breaks are only permitted for exams taken at Pearson VUE Testing Centers, and are not permitted during exams delivered via online proctoring.

Online Proctoring

As of spring 2021, Excelsior is offering an [online delivery option](#) for UExcel exams, using OnVUE, Pearson VUE's online delivery and proctoring service.

You must use a personal (vs. an employer's) computer if you want to take the exam online and not in a testing center, so the exam can be effectively delivered to you.

Breaks are not allowed during an exam taken online from home. You may not leave your seat during an online-proctored exam, so be prepared to sit for two or three hours. If you need extra time, the exam will have to be taken at a PearsonVUE Testing Center, and an accommodation formally requested.

NOTE: English Composition, Spanish, Music, and College Writing will NOT be available for online proctoring.

On the Day of Your Exam

Important Reminders

On the day of your exam, remember to:

- dress comfortably: the computer will not mind that you're wearing your favorite relaxation outfit
- arrive at the test site rested and prepared to concentrate for an extended period
- allow sufficient time to travel, park, and locate the test center
- be prepared for possible variations in temperature at the test center due to weather changes or energy conservation measures
- bring your ID, but otherwise, don't weigh yourself down with belongings that will have to be kept in a locker during the test.

Academic Integrity Nondisclosure Statement

- All examinees must agree to the terms of the Excelsior College Academic Integrity Policy before taking an examination. The agreement will be presented on screen at the Pearson VUE Testing Center before the start of your exam.
- Once the examinee agrees to the terms of the Academic Integrity Nondisclosure Agreement (NDA), the exam will begin.

If you choose not to accept the terms of the agreement

- your exam will be terminated
- you will be required to leave the testing center
- you will not be eligible for a refund. For more information, review the Student Policy Handbook at www.excelsior.edu/studentpolicyhandbook.

Student behavior is monitored during and after the exam. Electronic measures are used to monitor the security of test items and scan for illegal use of intellectual property. This monitoring includes surveillance of Internet chat rooms, websites, and other public forums.

UExcel Grade Report

After you complete the exam, you will be issued a UExcel Grade Report for Examinations. See the [sample UExcel Grade Report](#) in this content guide.

Grade Appeals

If you believe that your score grade is incorrect, you may appeal your grade to examcredit@excelsior.edu. Details about the appeals process are in the [Student Handbook](#).

What If I Miss My Appointment?

If you don't cancel or reschedule your testing appointment 24 hours before your test appointment, you will have to pay the full fee of the exam, even if you don't show up.

Late Arrivals

You will also forfeit the exam fee if you arrive to the test center more than 15 minutes late.

Earth Science Exam Development Committee

Aley El-Shazly, PhD
(Stanford University, 1991)
Associate Professor, Marshal University

John D. Skalbeck, PhD
(University of Nevada, Reno, 2001)
Assistant Professor, University of Wisconsin – Parkside

Allan M. Thompson, PhD
(Brown University, 1968)
Associate Professor Emeritus, University of Delaware

Lorraine W. Wolf, PhD
(University of Alaska, Fairbanks, 1989)
Professor, Auburn University

Sample Grade Report

Excelsior College
GRADE REPORT FOR EXAMINATIONS

Contact ID:

Test Date: 11/21/2020

Letter Grade: C

Examination Code and Title: 210 Statistics

Recommended Credit:
3 Lower Level

Your examination results are expressed as a Letter Grade of A, B, C, or F. Your results are automatically verified when they are received at Excelsior College. If an error is detected, you will be notified immediately.

Recommended Credit is the number of semester hours credit that Excelsior College awards and recommends for your grade. Excelsior College awards and recommends credit for letter grades of C or better.

If you plan to take another examination, you may download free content guides and the User's Guide by visiting our website at www.excelsior.edu/exams/content-guides/.

If you need an Excelsior College Official Examinations Transcript to document the credit you have earned for this examination for another institution, the request can be made online by accessing the Excelsior College website (www.excelsior.edu), logging into your MyExcelsior account, and scrolling down to the For Exams Takers box and clicking on the Request transcripts link. If you do not already have a MyExcelsior username and password, you can obtain one at no cost by accessing the Excelsior College website, clicking the Log In to MyExcelsior button, and then clicking the link "Create a MyExcelsior User Account."



7 Columbia Circle, Albany, New York 12203-5159

Phone | toll free 888-647-2388 or 518-464-8500

TDD | 518-464-8501

Fax | 518-464-8777

excelsior.edu/exams