Patterns in Education: An Examination of Gifted and Talented Instruction

An Honors Thesis (HONRS 499)

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Abstract

The study attempted to investigate the differences between instruction for gifted students in a regular classroom and gifted students in a self-contained classroom. Many obstacles were encountered throughout the study, including one which prohibited research before it could even begin. To complete this study, previous research was used to hypothesize what products the study may have yielded. It was determined that differentiation, in its many forms, is the best method to use to appropriately challenge gifted students in the regular classroom.
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Patterns in Education: An Examination of Gifted and Talented Instruction

Patterns are an integral part of the American educational system. Students daily look at patterns in variety of subjects in an attempt to analyze them. In this study the intent was to use patterns to further students understanding and to help identify ways in which curriculum could be modified to better meet the needs of gifted and talented students. Research indicates that one of the most efficient and effective ways to do this is through differentiation. This study will investigate reasons why this issue is so important and will focus on how teachers can use differentiation to improve instruction in their classrooms, insuring they are meeting the needs of students of all ability levels.

Preliminary Work

This study began in May of 2007. When searching for research topics, the main goal was to address an education related issue that received an inadequate amount of attention from education’s governing bodies. This led to the investigation of the education of gifted and talented students in the United States. A little research done primarily through printed text, showed that gifted and talented students across the United States were being inadequately served. In response to this situation, a study to examine ways that teachers in mixed-ability classrooms could work to meet the needs of the high ability students in their classrooms was proposed.

The first step was to find two different classrooms that could be compared to determine how to better meet the needs of gifted students and two third grade classrooms in the central Indiana area were chosen. The first classroom was located in Muncie, Indiana at a school in the Muncie Community School Corporation, Storer Elementary. The class from this school was an Enhanced Learning Program (ELP) class and was
comprised solely of high ability students from across the corporation. The second school was Sycamore Elementary in the Avon Community School Corporation in Avon, Indiana. At this school, an inclusive classroom was going to be observed and then compared to the ELP class from Storer.

After selecting the schools, the next step was to plan the study. In an attempt to make the two different settings as similar as possible, it was decided that both classes would be taught using a unit on patterns that consisted of ten lessons. Another possible difference was the experience level of the teachers teaching the lessons. To minimize that difference, it was determined that each of the ten lessons would be taught by a student teacher who had been placed in each of the classrooms during the fall semester of 2007. It was anticipated that this solution would alleviate differences presented by classroom familiarity and classroom discipline procedures. While this was not the most ideal situation, the precautions taken to eliminate variations were determined to be the best that could be achieved.

Since it would be very difficult to adequately note the differences between each of the classroom settings during the ten short lessons, the lessons were to be taped to allow repeated viewing and thus aid in evaluating the impact of the lessons. This evaluation was to include pacing of the lesson, questions from the teacher, student responses, and an overall progression of the lesson. By studying these aspects, the researcher could accurately compare the two classrooms. After comparing them, the recordings were to be used to make a short video illustrating the differences between the two environments. The video was also to include a set of approximately ten succinct recommendations that
could strengthen teaching pedagogy for gifted students in particular and all students in general.

Since this project dealt with human subjects, the next step was to receive permission for the study from the Institutional Review Board (IRB) at Ball State University. This is the governing body charged with approving all studies involving human subjects. Their objective is to ensure that all researchers respect the rights of individuals involved in the study. The process includes submission of an application explaining all aspects of the project (See Appendix A). After submitting the application to the IRB, the proposal was returned with recommendations for improvements. Some of these recommendations included adding more details, enhancing descriptions, and including letters of approval from the school corporations.

After approaching the administration at each district with the proposal, it was determined that Avon Community Schools were not interested in taking part in the study. This created a new set of obstacles. Another third grade class with a student teacher from Ball State University had to be found. This problem was solved much more easily than one would anticipate. It was determined that another classroom at Storer would participate. This second class from Storer was a mixed ability third grade class being taught by a student teacher. The next step was to obtain permission from the Muncie Community School Corporation.

In order to receive approval from Muncie Community Schools, a letter of approval from the IRB was required. The revised documentation was then resubmitted to the IRB accompanied by an explanation of the changes made to the original study and a description of the requirements established by the Muncie Community School
Corporation. This proposal was approved on January 30, 2008, but remained subject to approval from the school corporation.

Next began the process of completing the documents required by Muncie Community. These documents included a letter of intent, proof of approval from the institution, and a copy of the instrument that would be used to collect data. The documents submitted to the school corporation to satisfy these requirements can be found in Appendix B. About one week after submission, Muncie Community Schools determined that they were not interested in taking part in the study as stated in a letter received on February 21, 2008 (See Appendix C). The school corporation included the following response in their letter:

The Research Committee of Muncie Community Schools recently met and has voted to not recommend your study to the Superintendent of Schools for his approval. This decision was based on a number of factors, some of which may include but are not limited to:

- Purpose of the study.
- The extent to which students, teacher, parents, and/or administrators were asked to be involved in the study.
- The benefits of this study to Muncie Community Schools and/or the field of public education.

After nearly nine months of work to receive approval to complete this research, the school corporation brought the investigation to a screeching halt. Even though the study was not approved by all parties involved, it still had many important implications for education. For this reason, the project was converted to a research based endeavor.
Although this research does not satisfy the technology component that was an integral part of the previous study, it does address the needs of gifted and talented students and has suggestions to help teachers challenge all students in their classrooms appropriately.

**Resulting Research**

As mentioned earlier, this study resulted from the personal identification of a weakness in many education programs in schools across the state of Indiana. Based upon my own limited experience, the lack of programs for gifted students seemed to be an obvious deficit. Research showed that not only were gifted and talented programs not being developed, but the ones that were in existence were often being cut due to funding issues. Before the impact of these programs (and their elimination) is explored any further, it is essential to understand the term giftedness and the implications it has for the American education system.

Giftedness is a difficult term to define. "Common usage of the terms even by experts is ambiguous and inconsistent" (Davis & Rimm, 2004, p. 17). However to establish a definition of giftedness and in order to maintain consistency, one can look to the United States government. In the 1988 passage of Public Law 100-297, Section 4103, the U.S. government adapted their previous definition (from 1978) to read:

The term "gifted and talented students" means children and youth who give evidence of high performance capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities (Davis & Rimm, 2004, p.19).
This definition indicates that the term gifted is not restricted to only individuals who have demonstrated a high level of performance in the classroom; but it also applies to individuals who have the capability to perform at a high level. Another key element of this definition is that typical programs may not be effective for these students. While this definition does not mandate that schools make any adjustments for these students, it does strongly suggest that they should.

Despite the implications of this 1988 definition, many programs designed to enhance the experience of gifted and talented children have been eliminated from schools across the United States during the last 20 years. One of the biggest factors in this age of testing and yearly achievement is funding (Kelly, 1991, p. 18). The No Child Left Behind Act of 2001 places immense pressure on schools to have all students pass the state standardized test. If this does not occur, the state can withhold funding from the school or distribute it to other school corporations who performed better. This leads schools to focus all of their time and resources on those students who are close to passing opposed to those who are passing with ease (Sunderman, Kim, & Orfield, 2005).

Besides monetary concerns, these programs are being cut because they are not viewed as fair or equal. Personal discussions and classroom related studies have indicated that people, who oppose placing emphasis on gifted and talented education, argue that this is not fair to spend a significant amount of time working with students who already understand when there are so many children who do not understand. Opponents also seem to struggle to see how allowing gifted students to complete alternate assignments is equal. While many of their arguments may appear to make sense, their reasoning is only accurate if one believes that education should be equal as opposed to
being equitable. For the case of the arguments made in this paper, education will be viewed as an equitable enterprise where the goal is to help all students reach the highest level possible. This view correlates well with the Individualized Education Plan (IEP) developed for special education students. IEPs do not require students with learning disabilities to compete the exact same curriculum as other students but instead puts them on a level playing field with all other students. Equitability is achieved through modifications such as having a test read to the student or giving a student extra time on a test to help compensate for their learning disability. While this is not equal it is equitable and it helps these students reach their full potential.

In *Public policy on education* (Gallagher, 2005), Joseph Renzulli and Sally Reis also discuss the elimination of gifted and talented programs. They attribute this elimination to a phenomenon known as a quiet crisis. These experts define a quiet crisis as one that systematically eliminates its victims opposed to a crisis which allows its victims to mount a comeback because of its sensational nature. Renzulli and Reis feel that the quiet crisis currently confronting gifted and talented education is the direct result of the educational reform movement in America known as the No Child Left Behind Act of 2001. This act focuses on making administrative changes that effect the way schools are organized and managed. Renzulli and Reis argue that instead, reforms should focus on the heart of the learning process, which is the three-way interaction between teachers, students, and the curriculum. They argue that in order to rebuild public support for gifted and talented programs, it is necessary to show that they are indeed successful because they are designed around the heart of the learning process.
Even though gifted and talented programs have proven to be very helpful for students, they still continue to be eliminated. Despite the reason for elimination of programs for gifted and talented students, their absence is still having an immense impact on students. Gallagher (2004) cites Jeanne Purcell’s study which looked at the impact the elimination of a gifted and talented program had on students. Since few studies have been done regarding these effects, this study will stand as the lone example of the detrimental effects of the elimination of these programs. While this study cannot be generalized, it did yield some impressive results. In 1993, Jeanne Purcell completed a study using five different data points from a school corporation in a suburban New England community. The first of these points was a group of interviewed parents. Out of 60 parents initially contacted, 19 parents were interviewed. Twenty-seven of the 49 who preferred not to be interviewed completed an anonymous survey. The third point was gathered using nine newspaper articles and 33 letters written to the editor. The researcher also conducted interviews with two teachers who were previously teachers in the gifted and talented program. The final element that Purcell took into consideration was a video from a school board meeting which included 13 different citizens’ opinions on the proposed elimination of the program.

A prevalent result from both interviewed and surveyed parents was that their children were bored with the traditional curriculum. Other outcomes cited by parents included disappointment, increased frustration, withdrawal from participation, disruptive behavior, and decline in motivation for academic endeavors. Parents were also asked to speculate on the perceived long-term effects of the elimination of the program. Eighty-four percent of the 19 interviewed parents believed that this would have a long-term
impact on their child. One of parents’ biggest concerns was that their children’s potential would not be realized and achieved in a regular classroom.

While students from the aforementioned school were lucky enough to have a gifted program for several years, many students do not. These students often fall victim to the same problems described by parents in Purcell’s study. Many students have trouble in the classroom setting because they are bored, which in turn may cause them to act out. This boredom and frustration can then escalate into something larger creating a discipline problem or issue. This negative reaction often indicates that the students’ needs are not being met (Gallagher, 2005). If it is the goal of education, as set forth by the definition of “gifted and talented,” to meet students’ diverse needs, then it seems imperative to provide them with the programs indicated by the definition.

Since the No Child Left Behind Act places most of its emphasis on disadvantaged students, while hardly mentioning gifted students, programs like the ones suggested in the definition may not become a reality for quite some time. In the meantime, it is still important for classroom teachers to work to meet the needs of students of all ability levels. A 1994 publication by the Association for Supervision and Curriculum Development (ASCD) suggests one method that can help schools achieve this goal while not increasing expenditures is clustering. This strategy places a group of high ability students in the same classroom without creating an exclusive class for gifted and talented children. This strategy makes it much easier and more effective for teachers to spend time implementing instruction that will meet the needs of all children in a diverse group of learners.
A second method that has proven to be effective over the years is differentiating instruction. This model shifted the focus using enrichment activities to the investigation of real problems using a project oriented program (VanTassel-Baska, 2004). Today a differentiated curriculum provides teachers with a variety of ways to challenge students both as individuals and in groups. There are numerous strategies from the video that teachers can use to help meet the needs of these students. Seven distinct modifications of common teaching strategies from the video *Challenging gifted students in the regular classroom* will be discussed: the questioning technique, tiered lessons, flexible skills grouping, learning centers, compacting, independent projects, and interest groups (ASCD, 1994). From reading a short description of each of these methods, the teacher in a mixed-ability classroom should be able to recognize, and hopefully be interested in implementing, some of these strategies in their classrooms.

Before discussing each of the seven strategies, it is important to realize that there are different methods of grouping which can help facilitate the process of differentiating instruction. These methods include grouping based on student readiness, student interest, and the student’s learning profile (Tomlinson, 2001). Choosing the right grouping style depends on the topic being covered and the needs of the students in the classroom. One example of a differentiated lesson utilizing student interest levels is to allow students the option of choosing a book that interests them and then grouping the class based on the books the students chose. Literature circles are one example of a popular teaching strategy that can be differentiated using this method. Teachers can also differentiate lessons based on the three different components of the lesson: the content, the process, or the products. Differentiating based on content involves modifying what is being taught to
each group. The process involves how students use the content or make sense of the content. The third component, products, means that different groups will be expected to complete different assessments or projects. It is important to keep these grouping methods and three components in mind when trying to create activities to use in the regular classroom.

The questioning strategy includes but is not limited to adjusting the levels of questions asked to particular students. Questions posed to gifted students should be at a higher level of Bloom’s Taxonomy that requires abstract thinking. This may even require the student to pull information from three or more sources and then analyze the relationship between the different pieces of information (ASCD, 1994). This particular questioning strategy can be applied during whole group instruction, small group instruction, and individualized instruction. For this reason it is very versatile. It is also easy to implement because it is an oral strategy. By eliciting verbal responses to higher order thinking questions from gifted students in a whole class setting, the other students are in turn being exposed to the information; thereby, giving them an opportunity to see how others may work to reach conclusions.

A second strategy is the use of tiered lessons (ASCD, 1994). Teachers can tier lessons based on students’ readiness, interest level, or learning style. A tiered lesson has been defined as a, “...differentiation strategy that addresses a particular standard, key concept, and essential understanding, but allows several pathways for students to arrive at an understanding of these components, based on the students’ readiness, interests, or learning profiles” (Adams & Pierce, 2006). Tiered lessons may require the use of different groups or different evaluation materials. It is imperative that teachers who use
tiered lessons focus on using them to enhance the quality of the lesson, opposed to increasing the quantity of work required for completion of the lesson. An example of a way to accomplish this in a mathematics classroom, is to have all students work on the same content but at different levels. For example one group of students may work on adding only single-digit numbers, another may work on adding a single-digit number to a two-digit number, and yet another may work on adding more than one two-digit number. This lesson would be differentiated based on content. Creating tiered lesson plans can initially be time consuming, but once one becomes more comfortable with it, it becomes much easier to implement on a regular basis.

Yet another form of differentiation is flexible skills grouping. ASCD (1994) defines this as a method of grouping that is based on student readiness at a given time. An important aspect of this grouping strategy is that it is not stagnant. Instead it is a flexible system where students are frequently placed in different groups. Flexible grouping is especially useful because it allows teachers to place students in both mixed ability and single ability groups. Because teachers are always in control of grouping arrangements, it is quite easy for them to rearrange groups, thereby, giving students a chance to work with a variety of classmates. This system of grouping helps students become familiar with different members of the class while limiting the labeling of students. This strategy, like the ones previously discussed, helps meet the needs and interests of gifted students in the regular classroom which in turn makes learning more meaningful for them.

Learning centers, a staple in early primary classrooms, can also be used to aid in the process of differentiating instruction. A classroom can have numerous learning
centers. Some examples of general centers include computer programs, audio programs including books on tape or DVD, and a classroom library. Throughout the year, it will also be helpful to set-up centers that directly relate to the content being covered in the classroom. These centers could provide students with the opportunity to delve deeper into topics being discussed in class. Teachers can differentiate instruction by allowing students to visit centers that interest them or requiring students to complete the activities at a center that is suited for either their ability level or learning style. An appeal to students' wants and wishes will in turn motivate students to participate. This strategy benefits both the teacher and the students. The students can participate in hands-on activities in an attempt to make learning more meaningful, while the teacher can enhance certain skills related to the curriculum.

Another strategy of differentiated instruction is compacting the curriculum. Compacting the curriculum is exactly what it sounds like. It means taking the curriculum and pushing it together so as to reduce the amount of time it takes to cover a unit. Sometimes students are already familiar with the topic before the unit even begins. In this case, it is appropriate to pre-test the students to determine who has already mastered the material. If students are already proficient with the material, it will be more beneficial for them to spend their time working on an independent project or other activity. Compacting may also be useful with gifted and talented students in what Winebrenner (1992) refers to as "Boring B." This means that students may not have mastered the topic but are bored by it because they do not know enough about it in order to be interested. In this case, a pre-test would not be sufficient. Instead the teacher will still need to teach them the new material, but he or she may be able to accelerate it so that
the students remain focused throughout the unit. This often gives students the opportunity to finish ahead of their classmates and move on to an independent learning project.

The independent learning project mentioned above is another strategy that can be used to differentiate the curriculum. ASCD (1994) feels that these are especially important because they allow students to investigate a topic of interest in great depth. Smutny, Walker, and Meckstroth (1997) recommend several independent activities for use in the regular classroom including: point-of-view, resident expert, and learning contracts. Point-of-view can easily be connected to any literature activity being done in the classroom. Children can take a work, such as a short story or a novel, and tell that story from the point-of-view of a different character. This can be an extremely enjoyable activity for students and can help them develop their creative writing skills. This activity is especially appropriate for use with folk tales (Kasten, Kristo, McClure, & Garthwait, 2005).

Another form of independent learning is the resident expert. This task allows a student to thoroughly research a topic and then present his or her findings to the class. The topic that the student researches is usually one of great interest to the student. In order to select a topic, the student may even need to spend a few days examining a variety of materials to discover an area of interest. This form of independent project often requires the teacher to provide constant supervision at first, but once the student becomes accustomed to the procedure, it will require less supervision by the teacher. In conjunction with projects like this one, ASCD (1994) recommends that students be paired with professionals from the community. This will help students get a first hand account
of what they are studying and will also give them a role model to turn to who can efficiently answer their questions.

Another important component of independent student projects are learning contracts. These contracts hold students accountable and require them to complete projects on time. They also provide a structure for them to follow, so they can always refer back to it if they get stuck or do not know what the next step should be. These contracts not only help the students, but they also help the teacher keep track of the individual projects that are being completed by all students in the classroom. They also help children and teachers set realistic goals in a simple format. The added bonus of using a contract is that students will feel especially important and grown-up when they are told they have to sign on the line.

Interest grouping would be used by teachers to create groups that are comprised of students with similar interests. This technique can be implemented in connection with many of the other strategies including learning centers and independent learning projects. This strategy is one of the best ways to get students from a range of ability levels to work together on a group project. Because the topic appeals to all members of the group, it is much easier for students at different levels to work together. This is an essential component for opponents of gifted and talented instruction because it helps alleviate the negative connotation associated with labeling of students. This strategy like many of the others can be paired with other strategies to help all students develop their potential to its fullest.

The seven strategies focused on are only a small sample of the ways in which instruction can be modified or differentiated to meet different student's needs.
Incorporating them into the daily routine will not only help meet the needs of gifted and talented students, but it will also help meet the needs of students of all ability levels. By combining strategies and building the curriculum to meet the needs of individual students, our school systems will be assuring that all children’s rights, “…to learn new concepts in school everyday,” are being satisfied (Silverman, n.d.).

Conclusion

This research project, spurred by the inattention currently being paid to gifted children in American schools, did not turn out as planned; however, it did ultimately meet the goal set forth in the beginning which was to create a list of recommendations that would help teachers meet the needs of gifted students in their classrooms. This list comes in the form of seven different strategies that teachers can use to differentiate the curriculum. Developing activities that coincide with these strategies can initially be time consuming. However with a little extra effort, ordinary teachers can develop extraordinary methods of instruction that will ultimately help gifted and talented children achieve their full potential.
References


Patterns:

An Interdisciplinary Unit
Patterns Unit
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Patterns Unit Overview

This is a 10 lesson interdisciplinary unit on patterns that is designed to meet the needs of students in a third grade mixed ability classroom. It is intended to be completed in 10 days but may need to be extended due to time constraints in the classroom. It begins with a general introduction to patterns in the real world. Mathematical patterns addressed in this unit consist of arithmetic patterns, growing patterns, and geometric patterns. Through the use of poetry, one lesson in this unit addresses language arts and music standards. The remaining lessons focus on patterns that occur in the natural world. These include the earth, sun, and moon's patterns of movement.

These lessons are intended to be used with both regular third grade and gifted and talented third grade classes. It was determined that these should be geared towards the regular classroom instead of the gifted classroom because the sheer number of inclusive, mixed ability classrooms is much greater than the number of self-contained gifted and talented classrooms in the United States. To meet the needs of high ability students, recommendations were added at the end of each lesson to help teachers enhance the difficulty of certain components of the lesson.
**Goals and Intended Outcomes**

**Overall Goal:** Students will learn to recognize patterns in the world around them and they will be able to determine how those patterns impact their world.

1. When given a particular object, students will be able to work together to find a pattern.
2. Students will be able to define important terms such as pattern and core.
3. Students will be able to create multiple patterns from a given set of classroom objects.
4. Students will be able to extend arithmetic patterns.
5. Students will be able to find the rule for a given pattern.
6. Students will use mental math to help them find patterns.
7. Students will continuously participate throughout the lesson.
8. Students will use technology to help them solve complex mathematical problems.
9. Students will be able to apply technology to real life situations.
10. Students will create patterns using pattern blocks.
11. Students will label patterns to find patterns that are the same but may not look the same.
12. Students will find and label varying patterns in age appropriate poetry.
13. Students will write their own poetry.
14. Students will determine how many lines poetry must have based on rhyming patterns.
15. When given a picture, students will be able to identify the season and the time of day in their city.
16. After reading Lesson 1 + 2, the student will be able to identify the cause of day and night, the seasons, and the length of a year.
17. Students will be able to explain natural patterns that occur all around them.
Content Standards Addressed in Patterns Unit

Indiana State Standards

English/Language Arts

Standard 3: Reading (Comprehension and Analysis of Literary Text)
Students read and respond to a wide variety of significant works of children's literature. The selections in the Indiana Reading List (www.doe.state.in.us/standards/readinglist.html) illustrate the quality and complexity of the materials to be read by students. At Grade 3, students read a wide variety of fiction, such as classic and contemporary literature, historical fiction, fantasy, science fiction, folklore, mythology, poetry, songs, plays, and other genres.

Indicator: 3.3.1: Recognize different common genres (types) of literature, such as poetry, drama, fiction, and nonfiction. Example: Look at the same topic, such as cranes, and see how it is shown differently in various forms of literature, such as the poem "On the Run" by Douglas Florian, the play The Crane Wife by Sumiko Yagawa, Anne Laurin's fictional book Perfect Crane, and the nonfiction counting book Counting Cranes by Mary Beth Owens.

Standard 7: Listening and Speaking (Skills, Strategies, and Applications)
Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation (raising and lowering voice). Students deliver brief oral presentations about familiar experiences or interests that are organized around a coherent thesis statement (a statement of topic). Students use the same Standard English conventions for oral speech that they use in their writing.

Indicator: 3.7.9: Read prose and poetry aloud with fluency, rhythm, and timing, using appropriate changes in the tone of voice to emphasize important passages of the text being read.

Mathematics

Standard 4: Geometry
Students describe and compare the attributes of plane and solid geometric shapes and use their understanding to show relationships and solve problems.

Indicator: 3.4.1: Identify quadrilaterals as four-sided shapes. Example: Which of these are quadrilaterals: square, triangle, rectangle?

Indicator 3.4.10: Recognize geometric shapes and their properties in the environment and specify their locations. Example: Write the letters of the alphabet and draw all the lines of symmetry that you see.
Standard 6: Problem Solving
Students make decisions about how to approach problems and communicate their ideas.

Indicator: 3.6.1: Analyze problems by identifying relationships, telling relevant from irrelevant information, sequencing and prioritizing information, and observing patterns. Example: Solve the problem: "Start with any number. If it is even, halve it. If it is odd, add 1. Do the same with the result and keep doing that. Find what happens by trying different numbers." Try two or three numbers and look for patterns.

Science

Standard 3: The Physical Setting
Students observe changes of Earth and the sky. They continue to explore the concepts of energy and motion.

Indicator: 3.3.1: Observe and describe the apparent motion of the sun and moon over a time span of one day.

National Standards

Music (MENC)

Standard 1: Singing, alone and with others, a varied repertoire of music.

Standard 8: Understanding relationships between music, the other arts, and disciplines outside the arts.
Patterns Pre-Test
What Do You Know About Patterns?

Circle the best answer:

1. A ____________________ is a letter, number, word, or other object that is repeated in a particular order.
   A. Core
   B. Pattern
   C. Sequence
   D. Constant

2. This is the shortest string of elements that you see over and over again:
   A. Core
   B. Pattern
   C. Sequence
   D. Constant

Complete the problems below by filling in the blanks:

3. 7, 13, 19, __________, __________, __________

4. 31, 26, 21, __________, __________, __________

5. 1, 2, 4, 7, 11, __________, __________, __________

Numbers 6 & 7: Complete the problem by filling in the blanks. Then circle the core of each the pattern.

6. ⊙, ⊚, ⊛, ⊚, ⊛, __________, __________, __________

7. __________, __________, __________, ⊕, ⊗, ⊞
Find the rhyme scheme in the poem below:

8. *Three Stings*

George got stung by a bee and said, ________

“I wouldn’t have got stung if I’d stayed in bed.” ________

Fred got stung and we heard him roar, ________

“What am I being punished for?” ________

Lew got stung and we heard him say, ________

“I learned somethin’ about bees today.” ________

-From Shel Silverstein’s *Falling Up* – page 148

Circle the best answer for each question:

9. The imaginary line that the earth spins on is called a(n):

   A. Equator
   B. Longitude
   C. Axis
   D. Latitude

10. The earth makes one ____________________ every 24 hours.

    A. Cycle
    B. Revolution
    C. Rotation
    D. Spin
Circle the best answer for each question:

11. It takes 365 ¼ days for the Earth to make one ________________ around
the sun.
   A. Cycle
   B. Revolution
   C. Rotation
   D. Spin

12. The path the Earth follows around the sun is known as a(n):
   A. Orbit
   B. Oval
   C. Circle
   D. All of the Above

13. It takes about_____________________ for the moon to make one
revolution around the Earth.
   A. 1 week
   B. 24 hours
   C. 365 days
   D. 28 days
Name the phase of the moon shown in the pictures below:

14. [Image of a full moon]

15. [Image of a black moon]

16. [Image of a gibbous moon]

17. [Image of a first quarter moon]

18. [Image of a crescent moon]
What Do You Know About Patterns?

Circle the best answer:

1. A ________________________ is a letter, number, word, or other object that is repeated in a particular order.
   A. Core
   B. Pattern
   C. Sequence
   D. Constant

2. This is the shortest string of elements that you see over and over again:
   A. Core
   B. Pattern
   C. Sequence
   D. Constant

Complete the problems below by filling in the blanks:

3. 7, 13, 19, _____ _, _____ 31 ___, _____ 37 __

4. 31, 26, 21, _____ 16 ___, _____ 11 ___, _____ 5 __

5. 1, 2, 4, 7, 11, _____ 16 ___, _____ 22 ___, _____ 29 ___

Numbers 6 & 7: Complete the problem by filling in the blanks. Then circle the core of each the pattern.


7. __ + __, __ * __, __ ≡ __, + , * , ≡
Find the rhyme scheme in the poem below:

8. Three Stings

George got stung by a bee and said, ____A____
“I wouldn’t have got stung if I’d stayed in bed.” ____A____
Fred got stung and we heard him roar, ____B____
“What am I being punished for?” ____B____
Lew got stung and we heard him say, ____C____
“I learned somethin’ about bees today.” ____C____

-From Shel Silverstein’s Falling Up – page 148

Circle the best answer for each question:

9. The imaginary line that the earth spins on is called a(n):
   A. Equator
   B. Longitude
   C. Axis
   D. Latitude

10. The earth makes one ____________________ every 24 hours.
    A. Cycle
    B. Revolution
    C. Rotation
    D. Spin
Find the rhyme scheme in the poem below:

8. Three Stings

George got stung by a bee and said, ___A___
“I wouldn’t have got stung if I’d stayed in bed.” ___A___
Fred got stung and we heard him roar, ___B___
“What am I being punished for?” ___B___
Lew got stung and we heard him say, ___C___
“I learned somethin’ about bees today.” ___C___

-From Shel Silverstein’s Falling Up – page 148

Circle the best answer for each question:

9. The imaginary line that the earth spins on is called a(n):
   A. Equator
   B. Longitude
   C. Axis
   D. Latitude

10. The earth makes one __________________ every 24 hours.
    A. Cycle
    B. Revolution
    C. Rotation
    D. Spin
Name the phase of the moon shown in the pictures below:

14. [Image] Gibbous Moon

15. [Image] New Moon

16. [Image] Full Moon

17. [Image] First Quarter Moon

18. [Image] Crescent Moon
Lesson Plans
# Introduction to Patterns: What is a Pattern?

<table>
<thead>
<tr>
<th>Courtney Smith</th>
<th>3rd Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Patterns</td>
<td></td>
</tr>
<tr>
<td>Interdisciplinary - Focus: Mathematics (Geometric Patterns)</td>
<td></td>
</tr>
<tr>
<td>Standard 6: Problem Solving</td>
<td></td>
</tr>
<tr>
<td>Indicator: 3.6.1</td>
<td></td>
</tr>
</tbody>
</table>

## Materials
1. Computers with Internet Access
2. Sentence Strip Definitions: Pattern, Core
3. Judy Clock
4. Necklace
5. Basket
6. Deck of Playing Cards
7. Calendar
8. Wrapping Paper
9. Ruler
10. Striped Shirt
11. Animals
12. Notebook Paper
13. 10 Colored Paper Clips per student
14. SMART Board (if available)
15. Computer, Projector, and Screen (if SMART Board is not available)

## Objectives
1. When given a particular object, students will be able to work together to find a pattern.
2. Students will be able to define important terms such as pattern and core.
3. Students will be able to create multiple patterns from a given set of classroom objects.

## Motivation/Engagement
Have students Think-Pair-Share about the definition of the term pattern. Write the student's ideas/definitions on the board. These will be used later to help the class create a definition for the word pattern.

## Goal for Learner
After completing the activity today, you will be able to define the term pattern and find common patterns in the world around you.

## Content and Procedures
- Divide the class into groups of 2-4 students.
- Give each group an object from the list of materials above.
- Have each group find a pattern in the object they were given.
- Have students use the patterns to modify the original definition of a pattern.
- Students should share the patterns they found with the class.
- Use these patterns to help the class create a good definition for the word pattern.
- Introduce mathematics patterns by looking at the interactive video found at: http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/5_Patterns/index.html
- Have students complete activity as a class.
Practice
Students will practice what they know and learn about patterns when they complete the activities throughout the interactive video.

Application
Give each individual student a plastic bag containing 10 colored paper clips. Have students use the paper clips to create a pattern. Challenge students to think of other ways they can make patterns (for example using color, size, direction, and so on). In each pattern they create, the student should be able to identify the core. After they have created their own patterns, have students create the core of a pattern and then give it to a classmate to solve or continue.

Evaluation of Student Learning
The instructor will informally evaluate each student’s comprehension by observing students as they work together in groups. This observation will accompany the pre-assessment to help the teacher determine the scope and sequence of the following lessons.

Closure
Have students identify patterns that they can think of in their everyday lives. Talk about why patterns are important.

Gifted and Talented Students
This lesson can be tiered by varying the objects that students use. It would be tiered in content and student readiness. Students of higher ability levels should be given objects in which it is more difficult to discern the pattern or more patterns can be determined. These may include objects such as the clock, a ruler, or a deck of playing cards.
Extending Numerical Patterns

Courtney Smith
Mathematics
Standard 6: Problem Solving
Indicator: 3.6.1

Materials
1. Pattern Review Worksheets and Overhead (or SMART Board)
2. 3 Bases and Home Plate
3. Game Cards
4. Patterns Worksheet

Objectives
1. Students will be able to extend arithmetic patterns.
2. Students will be able to find the rule for a given pattern.
3. Students will use mental math to help them find patterns.
4. Students will continuously participate throughout the lesson.

Motivation/Engagement
Review the definition for the word pattern. In groups of five, have students create patterns using numbers. Allow students to share their group's pattern with the class.

Goal for Learner
After completing this activity, you will be able to extend patterns using addition, subtraction, and multiplication. You will also be able to find the rules for a pattern.

Content and Procedures
• Review patterns with students using an overhead or SMART Board. Place emphasis on patterns that involve multiplication.
• Students should fill out the same sheet as you work through the problems together.
• Show students how they can use the space beneath the set of numbers to write the difference.
• After review, split class into two teams for Batter Up!
• Explain rules. Give examples to help students better understand the rules.
• Have one student draw a card and complete the pattern on the card. While this is occurring, members of the team should also silently be working to solve the problem. An incorrect answer results in an out. Points will be awarded based on a pre-determined difficulty of the question.
• After three outs or after every student on the team scores, the next team with get a chance to bat.
• After 30 minutes, the team with the most runs will win.

Practice
Students will practice extending numerical patterns when they play the game Batter Up!

Application
Students will apply what they have learned about extending numerical patterns when they complete the follow-up worksheet after the game.
Evaluation of Student Learning
The follow-up worksheet will be graded to determine student achievement.

Closure
Share some examples of real life situations where students may come across numerical patterns. After sharing some examples, have students brainstorm and come up with their own examples.

Gifted and Talented Students
In an inclusive classroom, worksheets should be adjusted to reflect the knowledge base of the students. This could be done by placing an emphasis on multiplication patterns (for example: 3, 6, 9, ... where the rule must involve multiplication) or patterns that require multiple steps (for example: 2, 6, 3, 7, 4, ... Rule: +4, -3).

Note
Worksheets included with this activity are intended for a mixed-ability third grade class. Differentiation (based on content) may be necessary for higher and lower ability students.
Prepare sentence strips with examples like the following:

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Example:</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 5, 10, 15, 20, 25, _____, _____</td>
<td>+1, +2, -1, -2, etc.</td>
<td>single</td>
</tr>
<tr>
<td>2. 100, 95, 90, 85, 80, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
<tr>
<td>3. 80, 70, 60, 50, 40, _____, _____</td>
<td>rule: double</td>
<td></td>
</tr>
<tr>
<td>4. 0, 100, 200, 300, 400, _____, _____</td>
<td>rule: double</td>
<td></td>
</tr>
<tr>
<td>5. 1000, 900, 800, 700, 600, _____, _____</td>
<td>rule: triple</td>
<td></td>
</tr>
<tr>
<td>6. 60, 58, 56, 54, 52, _____, _____</td>
<td>rule: triple</td>
<td></td>
</tr>
<tr>
<td>7. 89, 88, 87, 86, 85, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>8. 150, 140, 130, 120, 110, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>9. 210, 200, 190, 180, 170, _____, _____</td>
<td>rule: double</td>
<td></td>
</tr>
<tr>
<td>10. 99, 97, 95, 93, 91, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
<tr>
<td>11. 11, 12, 13, 14, 15, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>12. 95, 92, 89, 86, 83, _____, _____</td>
<td>rule: double</td>
<td></td>
</tr>
<tr>
<td>13. 48, 42, 36, 30, 24, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>14. 60, 54, 48, 42, 36, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>15. 40, 36, 32, 28, 24, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>16. 4, 8, 10, 12, 14, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
<tr>
<td>17. 50, 55, 60, 65, 70, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
<tr>
<td>18. 49, 42, 35, 28, 21, _____, _____</td>
<td>rule: home run</td>
<td></td>
</tr>
<tr>
<td>19. 24, 20, 16, 12, 8, _____, _____</td>
<td>rule: double</td>
<td></td>
</tr>
<tr>
<td>20. 21, 18, 15, 12, 9, _____, _____</td>
<td>rule: double</td>
<td></td>
</tr>
<tr>
<td>21. 6, 8, 10, 12, 14, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
<tr>
<td>22. 12, 16, 20, 24, 28, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
<tr>
<td>23. 9, 12, 15, 18, 21, _____, _____</td>
<td>rule: single</td>
<td></td>
</tr>
</tbody>
</table>
24. 85, 80, 75, 70, 65, ____, ____  
rule: _______  single
**Student Worksheet – Batter Up!**

**Complete each pattern below and write the rule.**

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Example: +1, +2, -1, -2, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 900, 800, 700, 600, 500, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>2. 10, 12, 14, 16, 18, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>3. 97, 95, 93, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>4. 130, 120, 110, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>5. ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>6. 141, 140, 139, 138, 137, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>7. 119, 116, 113, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>8. 135, 140, 145, 150, 155, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>9. 170, 160, 150, ____</td>
<td>rule: ____</td>
</tr>
<tr>
<td>10. 157, 155, 153, 151, ____</td>
<td>rule: ____</td>
</tr>
</tbody>
</table>
Growing Patterns

<table>
<thead>
<tr>
<th>Courtney Smith</th>
<th>3rd Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing Patterns</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>Standard 6: Problem Solving</td>
<td></td>
</tr>
<tr>
<td>Indicator: 3.6.1</td>
<td></td>
</tr>
<tr>
<td>Music (from NSME)</td>
<td></td>
</tr>
<tr>
<td>Standards: 1 &amp; 8</td>
<td></td>
</tr>
</tbody>
</table>

Materials
1. One Grain of Rice
2. Calculators
3. Walk the Dog Overhead Transparency
4. “The Green Grass Grows All Around” Lyrics
5. Calculator Pattern Worksheet

Objectives
1. Students will use technological implements to help them solve complex mathematical problems.
2. Students will be able to apply technology to real life situations.

Motivation/Engagement
Read the book One Grain of Rice. This book deals with doubling and focuses on growing patterns.

Goal for Learner
After completing this activity, you will be able to tell the difference between a growing pattern and a repeating pattern. You will also be able to extend a growing pattern.

Content and Procedures
- Present dog walking dilemma to students.
  - Your wealthy neighbor wants you to walk her dog after school every day for a month. She has offered to pay you either one million dollars or one penny on the first day, and every day you walk the dog after that your pay doubles.
- Pose the question: Which is the best deal?
- Have students attempt to solve the problem.
- Use overhead to figure out together (check answers) to see which deal is really better.
- Sing the song “The Green Grass Grew All Around”
  Lyrics can be found at: http://www.songsforteaching.com/folk/greengrassgrowsallaround.htm
- Find growing patterns in the song.
- Next use constant button on calculators to make the process of determining growing patterns easier.
- Do another example together as a class.

Practice
Students will practice using the constant key on all subsequent examples.
Application
Students will apply what they have learned when they complete the follow-up activity.

Evaluation of Student Learning
The follow-up activity will be collected and graded.

Closure
Discuss what growing patterns students may see in real life. Have students acknowledge growing patterns they see in all disciplines (such as shown through the use of music in the lesson).

Gifted and Talented Students
Children with higher abilities may be able to complete these patterns without calculators. It is also important to adjust the worksheet so it includes numbers that are appropriate for high ability students. Another way to challenge them may be by including numbers that cannot be handled by a typical calculator used by students at this grade level (for example: numbers in the millions and above).
## Walk the Dog

<table>
<thead>
<tr>
<th>Day Number</th>
<th>Pay for That Day</th>
<th>Total Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$.01</td>
<td>$.01</td>
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<tr>
<td>2</td>
<td>$.02</td>
<td>$.03</td>
</tr>
<tr>
<td>3</td>
<td>$.04</td>
<td>$.07</td>
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<td>$.08</td>
<td>$.15</td>
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<td>29</td>
<td></td>
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<tr>
<td>30</td>
<td></td>
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</tr>
</tbody>
</table>
**Calculator Patterns**

**Directions**
Use the constant key on your calculator to make an addition pattern that increases. Find the first three numbers in the patterns, then trade with a partner to solve the rest of the patterns.

1. ______ ______ ______ ______ ______ ______
   What is the pattern? ______________________

2. ______ ______ ______ ______ ______ ______
   What is the pattern? ______________________

3. ______ ______ ______ ______ ______ ______
   What is the pattern? ______________________

4. ______ ______ ______ ______ ______ ______
   What is the pattern? ______________________

5. ______ ______ ______ ______ ______ ______
   What is the pattern? ______________________

6. ______ ______ ______ ______ ______ ______
   What is the pattern? ______________________
Geometric Patterns

Courtney Smith
Geometric Patterns
Mathematics
Standard 4: Geometry
Indicators: 3.4.1 and 3.4.10
Standard 6: Problem Solving
Indicator: 3.6.1

Materials
1. Pattern Blocks
2. Overhead Projector
3. Pattern Cards
4. Perfect Patterns Worksheet

Objectives
1. Students will create patterns using pattern blocks.
2. Students will label patterns to find patterns that are the same but may not look the same.

Motivation/Engagement
Give students a handful of pattern blocks. Have students create a pattern and share it with a classmate. Classmates should extend the pattern.

Goal for Learner
After completing the activity today, you will be able to create patterns that are the same even though it may not look like they are.

Content and Procedures
• Place pattern blocks on the overhead in a pattern. Have a student help you extend the pattern.
• Do three or four of these together as a class.
• Label the blocks using letters written on the overhead beneath the blocks.
• Do this for each example on the overhead.
• Next create a pattern that follows the ABAB pattern.
• Have two students share patterns they’ve created that follow the ABAB pattern.
• Discuss how they may not look the same but the pattern is the same.
• Repeat the previous steps for the ABC and ABBC patterns.

Practice
To practice labeling patterns, students will play the pattern card game. They will draw a card and use pattern blocks to create the pattern shown on the card. The other person then has to guess the pattern. If they guess correctly, then they get the card. If they guess incorrectly then the player who created the pattern gets to keep the card.

Application
Students will apply what they have learned about patterns when they complete the Perfect Patterns worksheet.
Evaluation of Student Learning
The instructor will continuously and informally evaluate each student's understanding. The Perfect Patterns worksheet will also be graded.

Closure
Talk about places where you may see geometric patterns in real life (wrapping paper, fabrics, and wallpaper). Have students brainstorm and come up with their own ideas.

Gifted and Talented Students
Since students are being required to create their own patterns, some students will challenge themselves by working at their own level. Another way to meet the needs of these students may be to create a more difficult pattern game that could be played with students who are in the same ability group. This game would include patterns that involve up to six letters and therefore require students to use all of the shapes.
Perfect Patterns

Look at the type of pattern called for in the problems below. Use your pattern blocks to show the problem on the paper. Trace around each pattern block and color the shape the appropriate color.

ABCCABCCABCC

ABBABBABB

ABCAABCAABCA
<table>
<thead>
<tr>
<th>ABAB</th>
<th>ABC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AABB</td>
<td>AABC</td>
</tr>
<tr>
<td>AAAB</td>
<td>ABBC</td>
</tr>
<tr>
<td>ABBB</td>
<td>ABCC</td>
</tr>
<tr>
<td>ABCA</td>
<td>ABCB</td>
</tr>
</tbody>
</table>
Patterns in Poetry

Courtney Smith 3rd Grade
Patterns in Poetry
English/Language Arts
Standard 3: Reading (Comprehension and Analysis of Literary Text)
Indicator: 3.3.1
Standard 7: Listening and Speaking (Skills, Strategies, and Applications)
Indicator: 3.7.9

Materials
1. Small Collection of Poems that Rhyme
2. Overhead Poems
3. List of Common Rhyming Words
4. SMART Board (if available)

Objectives
1. Students will find and label varying patterns in age appropriate poetry.
2. Students will write their own poetry.
3. Students will determine how many lines poetry must have based on rhyming patterns.

Motivation/Engagement
Hand out a different Shel Silverstein poem to each student. Give the student time to read his or her poem. Have them reread their poem and attempt to find patterns in their poem. Have a few volunteers share theirs with the class.

Goal for Learner
After looking at several poems, you will be able to determine the pattern found in each poem. You will even be able to write your own poem.

Content and Procedures
- Read a poem aloud to the class. (Jack Prelutsky's poems are an excellent source)
- Have students tell you what they think the poem means.
- Reread the poem and have students focus on what patterns they see in the poem.
- Place poem on the overhead (or SMART Board).
- Look at the words at the end of each line.
- Label the lines using the letters A, B, C, and so on for each different rhyme.
- Have students name the rhyme scheme for the poem.

Practice
Students will find the rhyme scheme for their poem in the motivation activity using letters.
**Application**

Students will write a short poem with an ABAB rhyme scheme. The poem must be at least four lines long. Have students try to figure out the fewest number of lines and the greatest number of lines the poem can have (4, 8, 12, and so on in increments of four). Allow students to share their poems with the class.

**Evaluation of Student Learning**

For homework students will write a rhyming poem that is 4 or more lines long. They will then find the rhyme scheme for their poem. The instructor will evaluate the student's ability to find the rhyme scheme when they write their own poems.

**Closure**

Share a favorite poem with the class and show students how they can quickly hear the pattern without writing it out.

**Gifted and Talented Students**

Teacher facilitation and questioning will be used to help students figure out how many lines a poem with a certain rhyme scheme must have. For example a poem with an ABAB rhyme scheme must have a total of 4, 8, 12, etc. lines. Only multiples of four would work for this rhyme scheme. This requires significant higher order thinking skills.
Revolving and Rotating: Earth's Movements - Day 1

Courtney Smith  
Revolving and Rotating: Earth's Movements  
Science  
Standard 3: The Physical Setting  
Indicator: 3.3.1

Materials
1. Science Textbook  
2. Science Worksheet for Lesson 1

Objectives
1. When given a picture, students will be able to identify the season and the time of day in their city.  
2. After reading Lesson 1 + 2, the student will be able to identify the cause of day and night, the seasons, and the length of a year.  
3. Students will be able to explain natural patterns that occur all around them.

Motivation/Engagement
Have students Think-Pair-Share about the following question:  
What causes night and day?

Goal for Learner
After completing this chapter, you will be able to explain why we have night and day, why the seasons change, and why a year is 365 days long.

Content and Procedures
- Preview title of Chapter 15: Patterns in the Sky  
- Preview Chapter 15 Vocabulary on page 418 and 419  
- Preview Lesson 1 title: What are some patterns that repeat everyday?  
- Have students identify some patterns that repeat everyday  
- Read Lesson 1  
- Answer Lesson 1 questions during reading

Practice
Students will practice the information that they learn as they answer the questions that accompany chapter 1.

Application
Students will apply what they've learned on day 2.

Evaluation of Student Learning
Questions from Lesson 1 will be graded.

Closure
Have students describe the position of the Earth at specific points during the day. It may even be helpful to have students model them.
Gifted and Talented Students

High ability students could work together to model the tilt of the Earth's axis. They should then explore the impact that the tilt has on the way in which the earth rotates and the seasons that we experience. This will help students explore the importance of the earth's tilt more in depth.
Science – Chapter 15 Lesson 1

1. A giant ball of hot, glowing gases is a _______________.

2. The sun is the main source of ______________________ and ______________________ for the Earth.

3. The imaginary line that runs through the center of the Earth is called a(n) _________________.

4. One complete spin on Earth’s axis is known as a __________________. It takes the Earth ____________ days to do this one time.

5. The sun rises in the ________________ and sets in the ________________.

Why does the sun appear to move across the sky?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
6. Objects standing in the sun stop the light and create a ___________ on a nearby surface.

7. A shadow cast by the sun is shortest at ________________.
Revolving and Rotating: Earth's Movements - Day 2

Courtney Smith
Revolving and Rotating: Earth's Movements
Science
3rd Grade
Standard 3: The Physical Setting
Indicator: 3.3.1

Materials
1. Science Textbook
2. When the Earth Moves Booklet
3. Styrofoam Balls
4. Pipe Cleaners

Objectives
1. When given a picture, students will be able to identify the season and the time of day in their city.
2. After reading Lesson 1 + 2, the student will be able to identify the cause of day and night, the seasons, and the length of a year.
3. Students will be able to explain natural patterns that occur all around them.

Motivation/Engagement
Have students Think-Pair-Share about the following questions:
• What causes night and day?
• Why does the sun rise and set?

Goal for Learner
After completing this chapter, you will be able to explain why we have night and day, why the seasons change, and why a year is 365 days long.

Content and Procedures
• Review what students read in Lesson 1
• Review vocabulary terms: star, axis, and rotation
• Have students create a model of the Earth using Styrofoam balls and pipe cleaners
• Demonstrate Earth's rotation and tilt on its axis
• Read and color pages in "When Earth Moves" booklet that correspond to the terms axis and rotation

Practice
Students will practice the information that they learn in Lessons 1 when they complete "When the Earth Moves" booklet.

Application
Students will apply what they've learned when they model the axis, rotation, and revolution of the Earth using Styrofoam balls and pipe cleaners.

Evaluation of Student Learning
The teacher will observe students at they model the rotation of the Earth and as they answer verbal questions.
**Closure**

*Have students describe the position of the Earth at this point in the year.*
*Review these repeating patterns and discuss how they relate to our everyday lives.*

**Gifted and Talented Students**

*To challenge the students further, they could create their own booklet detailing the movement of the moon. This booklet should be similar to the “When Earth Moves” booklet they completed in class.*
When the Earth Moves

The Earth is always turning. It never stops.

It makes one turn on its **axis** every 24 hours.

It **revolves** around the sun once every year.

Does the sun move across the sky?

The sun seems to move across the sky during the day. It is really the Earth's spinning that causes this to happen.
Do you know what makes day and night?

The sun shines on the Earth as it spins. But sunlight shines only on the half of the Earth facing the sun. That half has day. The other half is dark. That half has night.

As the Earth spins we move from day, to night, to day, to night over and over again.

Is there day and night on the moon?

If you were on the moon, you would also have day and night. But the moon spins very slowly, so days and nights are two weeks long.
The Earth is tilted on its **axis**. As the Earth moves around the sun, this tilt makes the poles point toward or away from the sun at different times of the year.

The tilt is why the amount of the sunlight a part of the Earth gets changes. The seasons change depending on the amount of sunlight.

The North and South Poles are not straight up and down.

When the North Pole is tilted away from the sun, the northern half of the Earth has winter. The days are short and the nights are long. The short days mean that the Earth is not getting much warmth from the sun.

The northern half of the Earth is facing away from the sun. It is winter there.
When the North Pole is tilted toward the sun, the northern half of the Earth has summer. The days are long and the nights are short. The long days mean that the Earth is getting a lot of warmth from the sun.

The northern half of the Earth is facing the sun. It is summer there.

Spring and autumn have days and nights that are about the same length. The days are not as hot as in the summer and not as cold as in the winter.

The equator is pointing toward the sun.
The **equator** is an imaginary line around the middle of our planet. It divides the Earth in half. The seasons are opposite north and south of the equator. When it is summer to the north of the equator, it is winter to the south. When it is autumn to the south of the equator, it is spring to the north.

Match:

**North of the Equator**

- When it is summer here,
- When it is autumn here,
- When it is winter here,
- When it is spring here,

**South of the Equator**

- it is summer here.
- it is autumn here.
- it is winter here.
- it is spring here.
Are the seasons the same everywhere?

When you think of winter do you picture snow in your mind? Or do you think of picnics at the beach?

Where you live determines what kind of spring, summer, autumn, and winter you have. If you live near the equator where the sun shines much of the time, winter and summer may not be very different. You would think of seasons as "rainy" and "dry" instead.

If you live farther north or south of the equator, the weather is very different during each of the four seasons.
Revolving and Rotating: Earth's Movements - Day 3

Courtney Smith 3rd Grade
Revolving and Rotating: Earth’s Movements
Science
Standard 3: The Physical Setting
Indicator: 3.3.1

Materials
1. Science Textbook
2. SMART Board or Computer, Screen, and Projector
3. Computer with Internet Access and Projector
4. Science Worksheets
5. When the Earth Moves Booklet

Objectives
1. When given a picture, students will be able to identify the season and the time of day in their city.
2. After reading Lesson 1 + 2, the student will be able to identify the cause of day and night, the seasons, and the length of a year.
3. Students will be able to explain natural patterns that occur all around them.

Motivation/Engagement
Have students Think-Pair-Share about the following questions:
• Why is a year 365 days?
• Why do the seasons change?

Goal for Learner
After completing this chapter, you will be able to explain why we have night and day, why the seasons change, and why a year is 365 days long.

Content and Procedures
• Read Lesson 2 title: What patterns repeat every year?
• Have students predict what patterns repeat every year
• Preview Vocabulary term for Lesson 2: revolution
• Read Lesson 2
• Answer questions about Lesson 2 during reading

Practice
Students will practice the information that they learn in Lesson 2 when they answer questions.

Application
Students will apply what they learn in lesson 4.

Evaluation of Student Learning
Questions from Lesson 2 will be graded.
Closure
Have students describe the position of the Earth at this point in the year.
Review these repeating patterns and discuss how they relate to our everyday lives.

Gifted and Talented Students
Instead of just discussing how the position of the Earth relates to our everyday lives,
gifted students should be required to verbally share a creative story which explains the
Earth's position and how it affects those on Earth. This would be an example of applying
the knowledge that the students learned throughout the lesson to demonstrate mastery
of the topic.
Science – Chapter 15 Lesson 2

Answer each of the questions below.

1. The part of the Earth that is pointed towards the Sun receives the most _________________.

2. Circle the correct answer from the choices in parentheses.

   During a 24 hour day the part of the Earth in direct sunlight spends ( more / less ) time in daylight than darkness in a 24 hour period.

3. The United States is located in the ________________ hemisphere (or half).

4. The northern hemisphere is tilted towards the sun in this month: ________________.

5. We see the sun at different places in the sky during different seasons because of _________________.

6. Why do the seasons change? ________________
Why The Seasons Change

1. Earth’s ____________ never changes direction. It is always tilted at a 23.5° angle and is always pointing in the same direction.

2. The hemisphere (or half of the Earth) that is tilted ________________ the sun gets the most sunlight and is experiencing summer time.

3. The ________________ is receiving the most sunlight during spring and fall.

4. What two vocabulary words cause the seasons to change?
   _______________________________ and _______________________________
Revolving and Rotating: Earth's Movements - Day 4

Materials
1. Science Textbook
2. SMART Board or Computer, Screen, and Projector
3. Computer with Internet Access and Projector
4. When the Earth Moves Booklet

Objectives
1. When given a picture, students will be able to identify the season and the time of day in their city.
2. After reading Lesson 1 and 2, the student will be able to identify the cause of day and night, the seasons, and the length of a year.
3. Students will be able to explain natural patterns that occur all around them.

Motivation/Engagement
Have students Think-Pair-Share about the following questions:
• Why is a year 365 days?
• Why do the seasons change?

Goal for Learner
After completing this chapter, you will be able to explain why we have night and day, why the seasons change, and why a year is 365 days long.

Content and Procedures
• Review what students learned in Lesson 2
• Model Earth's tilt on its axis, rotation, and revolution with Styrofoam models
• Model Earth's tilt on its axis, rotation, and revolution using simulations posted on the World Wide Web (below are some examples)
  • http://www.classzone.com/books/earth_science/terc/content/visualizations/es0404/es0404page01.cfm?chapter_no=visualization
  • http://www.onr.navy.mil/focus/spacesciences/observingsky/motion1.htm
• Read pages in When Earth Moves Booklet that correspond to revolution

Practice
Students will practice the information that they learn in Lesson 2 when they complete the "How the Earth Moves" booklet.

Application
Students will apply what they've learned when they answer verbal questions about the simulation.

Evaluation of Student Learning
Students will be given a sheet of pictures. They will have to decide what season it is and what time of day it is in the city that is pointed out in the picture.
**Closure**

*Have students describe the position of the Earth at this point in the year.*
*Review these repeating patterns and discuss how they relate to our everyday lives.*

**Gifted and Talented**

*Students could use this time to work on an independent project related to patterns in astronomy. One possible option is to study the orbits that each planet in our solar system follows around the sun.*