What Is Cubing??

- Cubing is an instructional strategy that asks students to consider a concept from a variety of different perspectives.
- The cubes are six-sided figures that have a different activity on each side of the cube.
- A student rolls the cube and does the activity that comes up.
- Cubes can also be used for group tasks as well as individual tasks.
How Cubing Works

• Students can work alone, in pairs, or in small groups with the appropriate cube.
• In pairs or small groups, each student takes a turn rolling the cube and doing the activity that comes up. Students have the choice to roll again once if they don’t like the activity that turns up.
• Students each roll the cube 2 – 4 times, depending on the magnitude of the assignments.
• When working in groups, an option is to have the student who rolls lead the discussion and/or activity rolled. Have another student serve as the scribe to take notes on the group discussion. After the group reaches consensus that the task is complete, the roller and scribe change.

How Cubing is Differentiated

• Not all students receive the same cube.
• You can differentiate the tasks in cubes according to readiness, interest or learning profile (See examples).
• One cubing activity might group gifted learners for more challenging, higher-level activities; another cubing activity might group students with different readiness levels according to their interests; another might group students according to one of the learning profile categories.
Creating a Cubing Exercise

- Start by deciding which part of your unit lends itself to optional activities. Decide which concepts in this unit can you create a cube for. Is it possible for you to make 3 cubes for 3 different interests, levels, or topics?
- **First Step:** (use one of the cubes)
  - Write 6 questions that ask for information on the selected unit.
  - Use your 6 levels of Bloom, intelligence levels, or any of the cubing statements to design questions.
  - Make questions that use these levels that probe the specifics of your unit.
  - Keep one question opinion based – no right or wrong.
- **Second Step:** (use other cubes)
  - Use the first cube as your “average” cube, create 2 more using one as a lower level and one as a higher level.
  - Remember all cubes need to cover the same type of questions, just geared to the level, don’t water down or make too busy!
  - Label your cubes so you know which level of readiness you are addressing.
  - Hand your partner the cubes and ask if they can tell high, medium, or low. If they can’t tell, adjust slightly.
- **Third Step:**
  - Always remember to have an easy problem on each cube and a hard one regardless the levels.
  - Color code the cubes for easy identification and also if students change cubes for questions.
  - Decide on the rules: Will the students be asked to do all 6 sides? Roll and do any 4 sides? Do any two questions on each of the 3 cubes?

**Places to get questions:**
- Old quizzes, worksheets, textbook-study problems, students generated.

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**CUBING**

1. **Describe it:** Look at the subject closely (perhaps with your senses as well as your mind)
2. **Compare it:** What is it similar to? What is it different from?
3. **Associate it:** What does it make you think of? What comes to your mind when you think of it? Perhaps people? Places? Things? Feelings? Let your mind go and see what feelings you have for the subject.
4. **Analyze it:** Tell how it is made? What are its traits and attributes?
5. **Apply it:** Tell what you can do with it. How can it be used?
6. **Argue for it or against it:** Take a stand. Use any kind of reasoning you want – logical, silly, anywhere in between.

Or you can . . . .
- Rearrange it
- Illustrate it
- Question it
- Satirize it
- Evaluate it
- Connect it
- Cartoon it
- Change it
- Solve it
Ideas for Cubing

- **Arrange** ________ into a 3-D collage to show ________
- **Make** a body sculpture to show ________
- **Create** a dance to show ________
- **Do** a mime to help us understand ________
- **Present** an interior monologue with dramatic movement that ________
- **Build/construct** a representation of ________
- **Make** a living mobile that shows and balances the elements of ________
- **Create** authentic sound effects to accompany a reading of ________
- **Show** the principle of ________ with a rhythm pattern you create. Explain to us how that works.

Ideas for Cubing in Math

- **Describe** how you would solve ________
- **Analyze** how this problem helps us use mathematical thinking and problem solving ________
- **Compare and contrast** this problem to one on page ________
- **Demonstrate** how a professional (or just a regular person) could apply this kind or problem to their work or life ________
- **Change** one or more numbers, elements, or signs in the problem. Give a rule for what that change does ________
- **Create** an interesting and challenging word problem from the number problem. (Show us how to solve it too.) ________
- **Diagram or illustrate** the solution to the problem. Interpret the visual so we understand it ________

What is the Point?

- Cubing gives students who like to use their hands and move around a chance to feel like they are “playing” while learning ________
- Cubing gives students a chance to look at a concept from a series of different perspectives ________
- Cubing is very flexible and encourages depth and complexity ________
- Cubing allows the teacher to differentiate for readiness in a very un-obvious way. Since all students are working with cubes, students are not aware that their neighbors might be doing something a little different ________
General Cube Template

- Critique
- Describe
- Pretend
- Compare
- Create
- Dance
<table>
<thead>
<tr>
<th>Red Cube</th>
<th>Describe</th>
<th>Big Idea:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Your favorite picture in the story <em>Family Pictures</em> to tell why you picked that one.</td>
<td>To understand basic connections that all people have regardless of their culture in order to function in the real world</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compare</th>
<th>List</th>
<th>Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your favorite picture in the story <em>Family Pictures</em> to a similar activity in your life. You may use words and/or pictures.</td>
<td>Words that describe your feelings about the Mexican culture as you look at each picture in the story.</td>
<td>Using a Venn diagram, show your favorite things and compare to the favorite things you found in the story. Find common areas that you and the story share.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Grade Southwest Unit Cubing Example</th>
<th>Analyze</th>
<th>Justify</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Family Pictures</em> by Carmen Lomas Garza</td>
<td>The favorite things in the story by understanding why these might be traditions in the culture. If you were a researcher asked about the important things in the Mexican culture, what would you say.</td>
<td>The story describes a family that speaks a different language and come from a different culture. Justify thy it is important to meet people who speak a different language and have a different culture.</td>
</tr>
</tbody>
</table>

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<tr>
<th>Orange Cube</th>
<th>Describe</th>
<th>Big Idea:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Mexican culture using at least three sentences with three describing words in each sentence.</td>
<td>To understand basic connections that all people have regardless of their culture in order to function in the real world</td>
</tr>
</tbody>
</table>

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<tr>
<th>Compare</th>
<th>Pretend</th>
<th>Critique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the Compare/Contrast graphic organizer and look at areas of food, shelter, traditions, family life, fun.</td>
<td>That you are a child from Mexico. Tell me about your day. What would your chores be? What would you eat? How would you spend your free time? Would you take naps? Tell me why.</td>
<td>Find another story to read at the reading center. Compare it to <em>Family Pictures</em> and discuss elements you liked and did not like of either.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Third Grade Southwest Unit Cubing Example</th>
<th>Create</th>
<th>Dance</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Family Pictures</em> by Carmen Lomas Garza</td>
<td>Make your own family album by drawing at least five special activities your family shares</td>
<td>Choreograph a dance or mime to represent three main ideas that you learned about the Mexican culture.</td>
</tr>
</tbody>
</table>

Adapted from a lesson by Joy Peters, Nebraska
1. Define the following terms:
a. tornado
b. "tornado watch"
c. funnel
d. spin
e. counter-clockwise
f. twister
g. swallowing

2. Make a three-part drawing that shows a torn before, during, and after a tornado. Use labels to explain what is happening.

3. Tornadoes are one of the most powerful forces in nature. Nature's power can also be seen in waterfalls, ocean waves, thunderstorms, and even tornadoes. Write a paragraph describing some force you have observed in nature. Use vivid adjectives to best describe the power of nature in your example.

4. Compare a tornado with a hurricane. 
   Use these categories to report what you found:
   - Where is each usually found?
   - How strong are the winds?
   - What kind of damage does each one cause?
   - Report results on a chart.

5. Working with the powerful forces of nature can be dangerous. Which of the following should you take the least danger? Why?
   - Forest firefighter
   - Park Ranger
   - Tornado Watcher
   - 'On-the-case' weather reporter

6. Write an adventure story about a tornado. You may make it appear to be very real with people doing things that would appear to be normal. Or you could create a story where the characters are different than life — like a talking cat or a character like Superman.

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1. Answer the following questions:
a. What are the signs that a tornado is coming?
b. What causes tornadoes?
c. What dangerous effects can a tornado have?
d. What should you do if a tornado is coming?

2. Create a web, diagram, or drawing that shows the basic structure of a tornado, include how it is formed, its make-up, speed, path, and lifespan.

3. Your school is located in a potential tornado area. Develop a set of directions for what your class should do in case of a tornado warning.

4. Create five to six questions a reporter could ask observers to describe a tornado. The questions must get people to talk about what happened or answer questions in "what, why, how" or "who, where, when" expressions. Fill out the interview with a friend.

5. Design a scale for evaluating tornadoes. Describe how you scale would work.

6. You are a tornado. Write a story (or poem) about your life, feelings, and thoughts.
# Cubing with Charlotte’s Web

## Basic Cube
1. Draw Charlotte as you think she looks.
2. Use a Venn diagram and compare Charlotte and Fern.
3. Use a comic strip to tell what happened in this chapter.
4. Shut your eyes and describe the barn. Jot down your ideas.
5. Predict what will happen in the next chapter using symbols.
6. In your opinion, why is Charlotte a good friend?

## Abstract Cube
1. Use a graphics program on the computer and create a character web for Wilbur.
2. Use symbols on a Venn diagram to compare Wilbur and Charlotte.
3. Draw the farm and label the items, people, and buildings.
4. Use a storyboard to show the progress of the plot to this point.
5. What is the message that you think the writer wants people to remember? Draw a symbol that illustrates your ideas.
6. When you think of the title, do you agree or disagree that it is a good choice? Why or why not?
Theme
Describe the theme of your poem in a paragraph. Check for topic sentence, supporting details and conclusion.

Figurative Language
Using a graphic organizer, list all the similes and metaphors in your poem. If you need help finding metaphors, consult with your group members.

Line
Describe the way the lines are arranged.

Rhyme
Figure out the rhyme scheme of the poem. Be prepared to teach it to the class.

Setting
Illustrate the setting of your poem. Use color (markers, pencils) and give your picture a title that is connected to the poem but not the title of the poem.

Speaker
Describe the speaker of this poem. Be prepared to share orally.

Compare the theme of your poem to the theme of a story or novel you have read. Use a Venn diagram to show your comparison.

Tell how the similes and metaphors in your poem enhance the imagery. Be prepared to share orally.

What does the rhyme scheme have to do with the meaning of the poem? Why do you think the poet chose this pattern?

Describe the impact the line arrangement has on the poem. Argue convincingly in a short paragraph.

Beth Atkins & Kay Brimijoin
(1999) Amherst, VA
8th Grade Poetry

Theme
Write a short poem to express the theme of the poem you have chosen. Choose your own style.

Figurative Language
Write 2 more similes and metaphors that could be added to the poem.

Rhyme
Provide other examples of rhyme or rhythm besides end rhyme used in your poem. How does this add to the sound of the poem? Be prepared to share orally.

Line
How would the poet arrange the next lines of this poem if he/she were extending the meaning and theme?

Setting
If your poet were an artist, how would he/she express this poem as a picture? Use markers, pencils, etc. to illustrate your answer.

Speaker
Create another line for this poem that the speaker may have written.

Beth Atkins & Kay Brimijoin (1999) Amherst, VA

Poetry Level I

Setting
Illustrate the setting of your poem. Use color (markers, pencils) and give your picture a title that is connected to the poem but not the title of the poem.

Theme
Describe the theme of your poem in a paragraph. Check for topic sentence, supporting details and conclusion.

Figurative Language
Using a graphic organizer, list all the similes and metaphors in your poem. If you need help finding metaphors, consult with your group members.

Line
Describe the way the lines are arranged.

Rhyme
Figure out the rhyme scheme of the poem. Be prepared to teach it to the class.

Speaker
Describe the speaker of this poem. Be prepared to share orally.
Poetry – Level II

**Theme**
Compare the theme of your poem to the theme of a story or novel you have read. Use a Venn diagram to show your comparison.

**Figurative Language**
Tell how the similes and metaphors in your poem enhance the imagery. Be prepared to share orally.

**Rhyme**
What does the rhyme scheme have to do with the meaning of the poem? Why do you think the poet chose this pattern?

**Line**
Describe the impact the line arrangement has on the poem. Argue convincingly in a short paragraph.

**Setting**
Illustrate the setting of your poem. Use color (markers, pencils) and give your picture a title that is connected to the poem but not the title of the poem.

**Speaker**
How does the speaker feel? Find at least 2 feelings and be prepared to explain orally.

Biology – A Differentiated Lesson Using Cubing by Readiness, and Jigsaw

**Understand:** Functions of cell organelles relatedness of each organelle’s function with others’

**Know:** Key Vocabulary (nucleus, mitochondria, endoplasmic reticulum, ribosome, nucleolus, vacuole, golgi body, lysome, cell membrane)

**Do:** Analyze and explain a facet of cell function and interrelationship of parts

**First:** Class reading and discussion of cell, parts, and interrelationships – followed by a diagnostic quiz

**Next:** The teacher assigns students to Jigsaw groups of 6 – and a task numbered 1-6 within the Jigsaw groups.

Tasks escalate in difficulty and may also interest or learning profiles.

1. **Describe** cell parts (structure) and function
2. **Illustrate** a cell with organelles and functions
3. **Analyze** how each cell part is related to others
4. **Compare** location of the organelle with its functions and relationships
5. **Connect** how interrelationships among organelle functions are like other interrelationships among organelle functions are like other interrelationships in life
6. **Apply** what you’ve learned to predict how organism functions are like cell functions.

Within “specialty” groups (all the 4’s, for example) students devise a way of sharing their tasks and understandings with the Jigsaw “home base” groups. Once back in Jigsaw home base groups, each individual is responsible for
   a) presenting and answering questions about one facet of the cube, and
   b) taking notes, asking questions, achieving understanding about the other facets of the cube.

Students have an opportunity to pose questions and ask for clarification from the whole class. They then select either a quiz or a journal entry on the topic to demonstrate their understanding.
Concerns?

Here is one – you may have more!

• Cubes can turn into glorified worksheets – but not if all activities are purposeful and focused on getting students to understand a concept in a multitude of ways!

© ThinkDOTS

• After a conceptual unit has been presented and students are familiar with the ideas and associated skills, “Think DOTS” is an excellent activity for students to construct meaning for themselves about the concept they are studying. The instructor first defines readiness levels, interests or learning styles in the class, using on-going assessment.

• Each student is given a set of activity cards on a ring, a die, and an activity sheet. Each student rolls the die and completes the activity on the card that corresponds to the dots thrown on the die. Each student then completes the activity on the activity sheet.

Materials:
1. 8 ½ x 11 inch paper
2. Hole punch
3. Metal or plastic rings
4. Dice
5. Scissors
6. Markers or dots
7. Laminating materials
© ThinkDOTS

Construction:

1. For each readiness level, six activities should be created.
2. On an 8 ½ x 11 inch page divided into six sections (this can be done easily on the computer by creating a 2 x 3 cell table and saving it as a template), the activities should be written or typed in each section.
3. On the back of each page, dots corresponding to the dots on the faces of a die should be either drawn or affixed (you can use Avery adhesive dots) on each of the six sections of the page.
4. The pages should be laminated for durability.
5. Then each page should be cut into the six sections.
6. Use a hole punch to make holes in one corner or in the top of each activity card.
7. Use a metal or plastic ring to hold each set of six cards together (you can get 100 metal rings from Office Suppliers in Roanoke for $9.00)
8. Create an Activity Sheet to correspond to the lesson for easy recording and management.

Suggestions:

1. Use colored paper and/or colored dots to indicate different readiness levels, interests or learning styles.
2. Have students work in pairs.
3. Let students choose which activities – for example: roll the die and choose any three; create complex activities and have students choose just one to work on over a number of days.
4. After students have worked on activity cards individually, have them come together in groups by levels, interest or learning style to synthesize
Application:
1. Use “ThinkDOTS” to lead students into deeper exploration of a concept.
2. Use “ThinkDOTS” for review before assessment.
3. Use “ThinkDOTS” as an assessment.
THINK DOTS

Describe…  Apply…  Question…

Argue for or against…  Satirize…

Space ThinkDOTS  3rd - 4th Multiage  Judy Rex, Scottsdale, AZ

KNOW:
• Key vocabulary – astronomer, atmosphere, axis, constellation, gravity, moon, orbit, phase, planet, revolution, rotation, solar system, star (X Factor: crater, eclipse, flare, galaxy, meteorite, nebula, sunspot)
• Components of solar system
• Physical characteristics of the Sun, moon, and Earth
• Four seasons and their characteristics
• Objects that move in the sky

UNDERSTAND:
• The parts of the solar system influence one another and appear to be a unified whole.
• The Sun, Moon and Earth have different physical characteristics and regular movements that result in daily, monthly, and yearly patterns.
• Scientific investigation of the solar system has an impact on human activity and the environment and is a result of the contributions of many people.
Space ThinkDOTS

3rd - 4th Multiage

DO:

• Identify the solar system and the planets in relationship to the sun
• Describe and compare the physical characteristics of the Sun, Moon, and Earth
• Identify objects that move in the sky
• Describe patterns of change visible in the sky over time
• Observe and record phases of the moon, position of constellations
• Identify the seasons and their characteristics
• Distinguish between revolution and rotation and demonstrate the difference
• Use a variety of resources, including the internet, to complete research
• Work cooperatively in a group
• Plan, design, conduct, and report on the conclusions of basic experiments

Judy Rex, Scottsdale, AZ

SPACE THINKDOTS I

Build a model of the solar system and label its parts. Show why it is a system. Illustrate the key vocabulary for our space study. Write the word under each picture. Be sure to check your spelling.

Create a mobile to show the 4 major phases of the moon. Be sure to put them in the order in which they occur. Plan a skit that will show you understand the characteristics of the four seasons and when they happen. Be ready to answer questions from the audience.

Judy Rex, Scottsdale, AZ

Use words, pictures, and color to complete attribute webs for the Sun, the Moon, and the Earth. List the similarities and differences you find. You are an astronomer and have discovered another planet in our solar system. Describe the planet’s location and attributes. Draw a picture and name your planet.
<table>
<thead>
<tr>
<th>SPACE THINK DOTS 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Draw and label a map of our solar system to scale. Describe why it is considered a system.</td>
<td>Create an illustrated glossary for a book about how the objects in our solar system move in space and are related to one another. Use the key vocabulary from our space study. Be sure to check your spelling!</td>
<td></td>
</tr>
<tr>
<td>Demonstrate that you know all the phases of the moon and why they occur.</td>
<td>Prove why we have seasons. Create a way to show us what would happen without the rotation and revolution of the Earth.</td>
<td></td>
</tr>
</tbody>
</table>

Judy Rex, Scottsdale, AZ

You are from another galaxy going to explore the solar system's Sun, Earth, and Moon. What will you take with you? What will you find there? What useful information will you take back to your galaxy? Share your findings with the earthlings in our class.

You are an astronomer and have discovered another space system. Find a way to tell us all about it and what makes it a system.

<table>
<thead>
<tr>
<th>SPACE THINK DOTS 3</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Develop a way to categorize the planets in our solar system and their relationship to the sun. Why is it considered to be a system?</td>
<td>If you were going to teach a unit on space, what key vocabulary would you want your students to understand? List the words, their meanings, and how you would teach each one.</td>
<td></td>
</tr>
<tr>
<td>Demonstrate that you know all the phases of the moon and why they occur. How does the Earth's moon compare to the moons of other planets?</td>
<td>Compare and contrast the movement in space that causes day and night to the movement that creates the seasons.</td>
<td></td>
</tr>
</tbody>
</table>

Judy Rex, Scottsdale, AZ

You are an intergalatic travel agent. Create a travel brochure for our solar system's Sun, Moon, and Earth. Be sure to include all important information about these destinations.

If you were an astronomer, predict what your job would be like during the next 10 years. What might you discover?
Create an ad for a good that Ancient Greece and Rome did NOT trade with Egypt. Make your ad convincing enough that an Egyptian will want to buy your good.

<table>
<thead>
<tr>
<th>Illustrate, explain, video or record these definitions (in your own words):</th>
<th>Could you live without goods, service or money? Defend your position.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdependence</td>
<td></td>
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<tr>
<td>Economic Specialization</td>
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</tr>
<tr>
<td>Government Services</td>
<td></td>
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<tr>
<td>Taxation or Taxes</td>
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<tr>
<td>Savings</td>
<td></td>
</tr>
<tr>
<td>Investments</td>
<td></td>
</tr>
</tbody>
</table>

Research goods and services in Greece, Rome, or Jamestown today. Compare and contrast with goods and services in those places long ago.

<table>
<thead>
<tr>
<th>Create a map of Europe and Jamestown that illustrates the concept of interdependence between the two. Be sure to include a key of any symbols used.</th>
<th>Pretend you are running for office. Defend raising taxes for a government service of your choice.</th>
</tr>
</thead>
</table>

Research what goods are traded between Greece and Rome and Egypt today. Compare and contrast with goods that were traded long ago.

<table>
<thead>
<tr>
<th>Illustrate, explain, video or record these definitions (in your own words):</th>
<th>What kinds of choices do you and your family make based on goods, services, and savings? Why?</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Investments</td>
<td></td>
</tr>
</tbody>
</table>

Using a Venn diagram, compare and contrast goods and services produced in Greece, Rome, or Jamestown. Choose two places to compare.

<table>
<thead>
<tr>
<th>Use a storyboard to create a story about what happens to a bale of tobacco and a barrel of peanuts when they leave the farmlands of Jamestown and head for Europe. Explain what happens and why.</th>
<th>Create 3 fib game cards listing government services paid for by taxes. Add a question on each card asking why the fib is a fib and why taxes wouldn't be used to pay for it.</th>
</tr>
</thead>
</table>
What goods did Ancient Greece and Rome trade with Egypt? Illustrate and label and explain why they traded each good.

Record or write a story about a French cloth maker and a Jamestown farmer. Tell how they depend on each other. How do you get them?

Name two goods and services that you depend on today.

On a chart, list the goods and services produced in Greece, Rome, and Jamestown long ago.

Illustrate, explain, video or record these definitions (in your own words):
- Interdependence
- Economic Specializations
- Government Services
- Taxation or Taxes
- Opportunity Cost
- Scarcity
- Price
- Savings
- Investments

Using pictures from magazines, create a collage of government services that you would be willing to pay taxes for.

Multiplication Think Dots

- Struggling to Basic Level

It’s easy to remember how to multiply by 0 or 1! Tell how to remember.

Jamie says that multiplying by 10 just adds a 0 to the number. Bryan doesn’t understand this, because any number plus 0 is the same number. Explain what Jamie means, and why her trick can work.

Explain how multiplying by 2 can help with multiplying by 4 and 8. Give at least 3 examples.

We never studied the 7 multiplication facts. Explain why we didn’t need to.

Jorge and his _____ friends each have _____ trading cards. How many trading cards do they have all together? Show the answer to your problem by drawing an array or another picture. Roll a number cube to determine the numbers for each blank.

What is _____ X _____? Find as many ways to show your answer as possible.
Multiplication Think Dots
• Middle to High Level

There are many ways to remember multiplication facts. Start with 0 and go through 10 and tell how to remember how to multiply by each number. For example, how do you remember how to multiply by 0? By 1? By 2? Etc.

There are many patterns in the multiplication chart. One of the patterns deals with pairs of numbers, for example, multiplying by 3 and multiplying by 6 or multiplying by 5 and multiplying by 10. What other pairs of numbers have this same pattern? What is the pattern?

Russell says that 7 X 6 is 42. Kadi says that he can’t know that because we didn’t study the 7 multiplication facts. Russell says he didn’t need to, and he is right. How might Russell know his answer is correct? Give 2 different explanations.

Max says that he can find the answer to a number times 16 simply by knowing how to multiply by 2. Explain how Max can figure it out, and give at least two examples.

Alicia and her ____ friends each have ____ necklaces. How many necklaces do they have all together? Show the answer to your problem by drawing an array or another picture. Roll a number cube to determine the numbers for each blank.

What is _____ X _____? Find as many ways to show your answer as possible.
Susan has ___ of a pizza and Jayni has ___ of a pizza. How much pizza do they have together? Is this less, equal to or more than a whole pizza? Roll the fraction die to determine the fractional amounts Susan and Jayni have.

Explain why you need a common denominator when adding fractions.

Model the fraction ___ in three different ways. Roll the fraction die to determine the fraction to be modeled.

Which fraction is larger: ____ or ____? Use a model to prove you are correct. Roll the fraction die to determine which fractions to use.

Explain the difference between a numerator and a denominator.

Demonstrate how to find a common denominator for the fractions ____ and ____. Roll the fraction die to determine which fractions to use.

Describe how you would solve 2/13 + 2/17 + 7/13. Roll the die to determine your own fractions.

Compare and contrast these two problems: 1/3 + 1/2 and 3/7 + 1/2.

A carpet-layer has 2 yards of carpet. He needs 4 feet of carpet. What fraction of his carpet will he use? How do you know you are correct?

Create an interesting and challenging word problem that can be solved by ____ + ____ - ____.

Roll the fraction die to determine your fractions.

Diagram and explain the solution to ____ + ____ + ____.

Roll the fraction die to determine your fractions.
Level 1:
1. a, b, c and d each represent a different value. If a = 2, find b, c, and d.
   \[ a + b = c \]
   \[ a - c = d \]
   \[ a + b = 5 \]
2. Explain the mathematical reasoning involved in solving card 1.
3. Explain in words what the equation 2x + 4 = 10 means. Solve the problem.
4. Create an interesting word problem that is modeled by 8x - 2 = 7x.
5. Diagram how to solve 2x = 8.
6. Explain what changing the “3” in 3x = 9 to a “2” does to the value of x. Why is this true?

Level 2:
1. a, b, c and d each represent a different value. If a = -1, find b, c, and d.
   \[ a + b = c \]
   \[ b + b = d \]
   \[ c - a = -a \]
2. Explain the mathematical reasoning involved in solving card 1.
3. Explain how a variable is used to solve word problems.
4. Create an interesting word problem that is modeled by 2x + 4 = 4x - 10. Solve the problem.
5. Diagram how to solve 3x + 1 = 10.
6. Explain why x = 4 in 2x = 8, but x = 16 in \( \frac{1}{2} x = 8 \). Why does this make sense?
Level 3:
1. a, b, c and d each represent a different value. If \( a = 4 \), find b, c, and d.
   \[
   \begin{align*}
   a + c &= b \\
   b - a &= c \\
   cd &= -d \\
   d + d &= a
   \end{align*}
   \]
2. Explain the mathematical reasoning involved in solving card 1.
3. Explain the role of a variable in mathematics. Give examples.
4. Create an interesting word problem that is modeled by \( 3x - 1 \leq 5x + 7 \). Solve the problem.
5. Diagram how to solve \( 3x + 4 = x + 12 \).
6. Given \( ax = 15 \), explain how \( x \) is changed if \( a \) is large or \( a \) is small in value.

ThinkDOTS Activities for Science Lesson
Concept: STRUCTURE

<table>
<thead>
<tr>
<th>Why do you think scientists used the term “cloud” to describe the position of electrons in an atom?</th>
<th>How do the atomic numbers in the periodic table change from the top to the bottom? From left to right across the table?</th>
<th>Share two ways that scientists study atoms. Suggest any new ways you might think of.</th>
<th>What is the correct symbol for the element helium? Research the history of this element and create a timeline showing what elements were discovered just before and after helium.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppose you were given some sugar cubes, a grinder, some water, a pan, and a hot plate. What physical and chemical changes could you make in the sugar?</td>
<td>Predict as many properties for potassium as you can. To make your predictions, look at the information in the box for this element and consider its location on the periodic table.</td>
<td>How are physical and chemical properties different? Why?</td>
<td>Name three types of physical changes. Create a list with at least two examples of each that are different from the examples in the book.</td>
</tr>
<tr>
<td>There are 3 jars in the front of the room. Each has a substance with a strong odor. One is a solid, one is a liquid and one is a gas. Which odor would students in the back of the room smell first? Why?</td>
<td>Carbon is atomic number 6. How are 2 carbon atoms with mass numbers of 12 and 14 different? Why are these atoms called isotopes?</td>
<td>What does the periodic table tell us about calcium? How can this help us in our everyday lives?</td>
<td>Which is higher, an element’s atomic number or its mass number? Why?</td>
</tr>
</tbody>
</table>
### ThinkDOTS 5th Grade Poetry

Visit: [www.emule.com/poetry](http://www.emule.com/poetry) and click on the link for the top ten poems. Read several poems and select one that you really like. Print out the poem and write a short explanation on why you enjoyed this poem. Look up unfamiliar words. Explain what you believe the poem to mean.

### ThinkDOTS 5th Grade Poetry (advanced)

Make a great big list (30 or more) of possible topics you could write a poem about. Choose one topic to write a poem using any style of poetry you wish.

Alliteration is a fun and creative style of writing. Remember that alliteration is the repetition of the first consonant or vowel sound. Example: Franky’s family is frantic about frogs. Your task is to write a short story using alliteration. Try to see how long you can write using alliteration. Work hard to make your story make sense.

### Poetry is a lot of fun! One of the craziest and funniest forms of poetry is a limerick. Edward Lear is credited for popularizing this form of poetry. Now let’s see how you can do. Remember that lines 1, 2, and 5 rhyme and lines 3 and 4 rhyme. Go to it!

A couplet is made up of two lines that rhyme. A complete idea may be expressed in a couplet or a long poem may be made up of many couplets. Your task is to find 2 examples of good couplets and then to write an original couplet. You may use reference materials in the classroom or search the Internet. The emphasis is on meaning not humor.

### A skill of some of the best writers is to use metaphor to add description to a story. Remember that metaphor is used to compare two dissimilar objects that are alike in some way. Example: Music is the honey of the human spirit. Find several examples of metaphor using classroom books and write three examples of your own.

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### Now it is time to play free style poetry. Use this opportunity to write a poem about a topic of your choice using free style poetry. Here are some topic ideas: Emotions School Friendship

Ask your teacher for a copy of the poem “Alone” by Walter de la Mare. Read the poem carefully and write a reflection based on your feelings about the poem. Do you think this poem is sad? Why or why not?

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### Prejudice

Discuss how prejudice and discrimination are not only harmful to the victim, but also to those who practice them.

### Scapegoating

Imagine a group of people that could be scapegoats. List and describe stereotypes of this group and the treatment they received because of them.

### Articles

Read the article: What could be reasons for the persecution? How can you justify the minds of those responsible?

### Genetics

Certain characteristics are blamed on genetics. Do genetics impact the characteristics of your group? Explain the reasoning behind your answer. Use your science knowledge.

### Stereotypes

Your group was persecuted. Identify a group who has been persecuted in more recent years. Compare the two and give reasons why.

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### Prejudice

Is it possible to grow to adulthood without harboring some prejudice? Why or why not?

### Scapegoating

What is scapegoating? Explore the word’s etymology and hypothesize about its present day meaning. How was your group scapegoated?

### Articles

Read the article: What is genocide? Did the people in your article face genocide? Why?

### Genetics

Identify stereotypes your group faced. Pick a clique in the school and discuss the traits of that group. Are they stereotyped?

### Stereotypes

Name a group you stereotype and discuss those traits that you stereotype. What were the stereotypes your group had?

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### Prejudice

Is it possible to grow to adulthood without harboring some prejudice? Why or why not?

### Scapegoating

Identify and discuss the scapegoating that took place in your group. Compare the scapegoating of your group to that of a present day group.

### Genetics

Did genetics have an impact on the Aryan race? Why? Does it in the group you are studying? Why?

### Stereotypes

Name a group you stereotype and discuss those traits that you stereotype. What were the stereotypes your group had?