



# Divisibility

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## Overview

**Topic:** Divisibility Rules. This lesson introduces divisibility rules. Students use video, interactive websites with an interactive whiteboard, and PDAs to develop an understanding of divisibility rules and practice their application. The lesson would be good preparation for a unit on fractions.

## Time Allotment

One 50-minute class period

## Learning Objectives

On completion of this lesson students will be able to:

- Demonstrate knowledge and understanding of the rules of divisibility for the numbers 2, 3, 5, 9, and 10

- Apply divisibility rules

(This lesson addresses Va. SOLs Math 6.3, 6.8c)

## Media Components

- **Discovering Math: Number Theory** (Grades 6-8). Discovery Channel School (2006). Retrieved August 25, 2008, from Discovery Education: <http://www.wvpt.unitedstreaming.com>  
Segment Used:  
Segment 25: Example 2: Divisibility and Remainders – Eggs and Cake (1:23)
- Handheld computers (PDA), such as Palm – 1 per student
- Multimedia Projector
- Interactive White Board, such as SmartBoard
- SMART Notebook Software
- Computer
- Speakers

- Website: Divisibility Rules Game — Interactive game with divisibility rules.  
<http://www.oswego.org/ocsd-web/match/dragflip.asp?filename=slanedivrules>
- Website: Divisibility Rules — Interactive game with divisibility rules.  
<http://www.vectorkids.com/vkdivisible.htm>
- Divisibility Rules worksheet (Assessment)  
<http://www.edonyourown.com/math/mathworksheets/DivisibilityRulesWorksheet.pdf>

## Materials and Student Handouts

- Divisibility Rules (attached)
- Vocabulary worksheet (attached)
- Divisibility Rules and Eggs Worksheet (attached)
- Baggie with 12 pieces of candy – one per student
- Images of eggs (Download at [www.wvpt4learning.org/lessons/pdf09/divisibility/eggs](http://www.wvpt4learning.org/lessons/pdf09/divisibility/eggs)). Images of eggs are available; however, other images may be used. They need to be of items that can be divided into groups.

## Teacher Preparations

- Preview and download Discovery Education Streaming video.



## Divisibility

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- Make copies of “Divisibility Rules List,” “Divisibility Rules and Eggs” and “Vocabulary” worksheets. (1 of each worksheet per student)
- Download photos of eggs and load on PDA for students to use to practice divisibility rules.

### Introductory Activity

**1. Focus:** Say: I am going to hand you a bag of candy. Do not open this until I tell you. We are going to use this candy to do some math today.

**Activity:** Hand each student a bag of candy with 12 pieces. Say: Sort these pieces of candy into equal groups. Allow students time to sort their candy, approximately 5 minutes. Say: Get out a piece of scratch paper, write down how you sorted your candy and how many different groups you had.

**Follow-up:** Say: How did you sort your candy? (Answers will vary.) List the different ways students sorted their candy on the board. Say: How did you know you could sort the candies this way?

(Answers will vary.) Say: What we just did is called dividing.

#### Videostreaming

In order to use videostreaming interactively with students, teachers should use pre-segmented clips provided by the videostreaming company. If you wish to conduct a discussion before the clip is over and then resume after the discussion, use PAUSE, as this will cause the media player to remain at the current location in the stream. If the remainder of the video clip will not be used and the teacher wants to return to the beginning of the video clip, then use STOP so that the media player will revert to the beginning of the stream.

### Learning Activities

**1. Focus:** Say: Now we are going to watch a video. As you watch the video I want you to think about our introductory activity and find out what divisibility is.

**Play: Discovering Math: Number Theory,** “Example 2: Divisibility and Remainders – Eggs and Cake” video from 0:07 when you see and hear the chickens crowing.

**Pause:** :31 when you see ingredients and you hear “remainder.”

**Follow-up:** Say: What do you think divisibility is? Write student responses on board. (division with no remainder, responses may vary.) Replay the segment of the video if needed for students to come up with the meaning of divisibility.

**2. Focus:** Say: As we watch the next part of the video, listen for the math words you hear that are important.

**Resume** video.

**Pause:** at 0:38 when you hear “and the second is a factor of the first” and see no words on the screen.

**Follow-up:** Say: What math words did you hear? Open SMART Notebook and write vocabulary words as students list them. (integer, factor, divisible) Hand out a vocabulary definition sheet to each student. Say: Let’s come up with some workable definitions for our vocabulary words. Discuss words with students, moving toward workable definitions. (integer – a number; factor – a number you multiply to get another number; divisible – able to be broken into equal groups; divisibility – division with no remainder)

**3. Focus:** Say: Now that we know what divisibility is and have reviewed our vocabulary, how do you think the people in the video are going to use divisibility to make their cake?

**Resume:** from 0:38.

**Pause:** at 1:04 when you see pouring batter after “eggs.”

**Follow-up:** Say: How did they use divisibility when baking the cakes? (to know how many cakes they can make) Do we use divisibility for other things? (Answers will vary—how many buses are needed to take class on fieldtrip, how many teams we can form at PE.)

**4. Focus:** Say: How many cakes could you make if you only had 20 eggs? (6) Why couldn’t you make more cakes? (because you would need more eggs) What if you had 21 eggs, could you make more cakes? (yes) How many cakes could you make? (7) Why could you make 7 cakes? (because 21 is divisible by 3 and 20 is not) What is it called when you have a number left over when you divide? (remainder) Let’s find out more about what a remainder is.

**Resume** video.

**Stop:** at 1:23 when screen goes black and it is silent.

**Follow-up:** Say: What is a remainder? (the number that is left when you divide) Why do you think it would be important to know whether or not you would get a remainder? (Discuss)

**5. Focus:** Say: There are rules we can follow to make sure we divide correctly. Hand out the Divisibility Rules sheet to students. Say: We need to know the divisibility rules for 2, 3, 5, and 10. Have students read each rule to the class.

**Activity:** Project Divisibility Rules website ([www.vectorkids.com/vkdivisible.htm](http://www.vectorkids.com/vkdivisible.htm)) onto the SmartBoard and read each divisibility rule to the students. Work through the first number with the students, marking the checklist with the rules the students think will work on the SMARTBoard. Check the rules. Have one student at a time come up to the board and attempt to follow the rules. While one student is at the board have the other students check his work. When students appear comfortable with the rules, they are ready to try the divisibility rules game.

**Follow-up:** What rules do you think are easiest to follow? Which are harder? (Accept student responses.)

**6. Focus:** Say: Now we are going to play the divisibility rules game. You can use the rules that you have learned for this game.

**Activity:** Project the divisibility rules game ([www.oswego.org/ocsd-web/match/dragflip.asp?filename=slanedivrules](http://www.oswego.org/ocsd-web/match/dragflip.asp?filename=slanedivrules)) on the interactive whiteboard.

Say: You are going to place the list of numbers for the rules the above numbers follow next to the provided numbers. We will then check our work. If you disagree then we will review the rules using our list. If we are incorrect we will try again.

Practice the game a few times with the students.

**Follow-up:** Say: Let's review our divisibility rules. What is the divisibility rule for 2s? (even numbers ending in 0,2,4,6,8) What is our divisibility rule for 3s (add up the digits and see if they are multiples of 3) What is the divisibility rule for 5s? (end in 5 or 0) What is the divisibility rule for 10? (end in 0) How can knowing the divisibility rules be helpful to us as we do math? (Allow discussion.)

## Culminating Activities

**1. Focus:** It is time to practice on your own. You are going to use your divisibility rules to see how the eggs in each picture can be divided.

**Activity:** Hand out a PDA to each student (Make sure images of eggs have been loaded on the PDA.) Pictures can be printed or displayed with a projector if PDAs are not available. Students will open up each egg picture and use the divisibility rules to determine factors for each group of eggs. Hand out "Divisibility Rules and Eggs" worksheet. Students are to write down the rules that they think each picture will follow.

Say: Open each image file, look at the picture and decide what rules that picture will follow. When you have figured out what rules that picture follows write down the rules on the worksheet. You can check your answers using the "Draw on Photo" option to circle the groups.

**Follow-up:** Collect the students' worksheets. If there is time, project the images on the screen and go over with the students what rules the images followed.

**2. Focus:** Say: It looks like you really understand the divisibility rules, so let's take it one step further and let you create the problems. Each student will use the Notepad on their PDA to write a word problem that uses divisibility. (Provide example if needed.)

You will beam your problems to your partners to solve. Check the answer with your partner.

**Activity:** Have students open Notepad and write a short word problem that uses divisibility. Once both have finished their problems, have them beam to each other and then solve the problem from their partner. Once both have finished working the problems, they can check with their partner to see if they agree with the answers.

**Follow-up:** Have students share their word problems as time allows.

### Assessment

- Homework. Have students complete 10 problems identifying the divisibility rules using the Divisibility Rules worksheet from <http://www.edony-ourown.com/math/mathworksheets/DivisibilityRulesWorksheet.pdf>
- Student worksheets from the Palm activity
- Have student beam the word problem that they created to the teacher's PDA for assessment.
- Observation of the students during the interactive websites.

### Community Connections

- Invite a local baker to visit the class and discuss how they use divisibility.
- Invite a shipping manager from a local plant to discuss how they plan for shipping the items that they produce.

### Cross-Curricular Extensions

**Science:** Students will apply this concept when completing experiments that involve division.

**Math:**

- Students can research to find divisibility rules for numbers other than the ones used in the lesson.
- When students participate in activities throughout the year where they are expected to divide into groups or others are divided into groups, ask the students how many should be in each group or what they should be divided into.

### About the Author

**Amanda Dideum**

Amanda Dideum has been teaching Special Education for 6 years. She began her teaching career with in the Social Services and juvenile detention sector in Colorado. Amanda moved to North Carolina and began teaching in the public school system in 2006. She now resides in Rockbridge County, Virginia where she teaches 6th grade special education Mathematics and Science at Maury River Middle School.

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Name \_\_\_\_\_

## Vocabulary

Term	Definition
Integer	
Factor	
Divisible	
Divisibility	

## Divisibility Rules

2 last digit is divisible by 2

3 the digits sum adds up to a multiple of 3

5 the last digit of the number is a 5 or a 0

10 the last digit of the number is 0

## Divisibility Rules and Eggs

Write the rules you can use for each picture on your Palm.

Eggs 1.

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Eggs 2.

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Eggs 3.

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Eggs 4.

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Eggs 5.

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Eggs 6.

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Eggs 7.

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