

**Estimating Solutions to Word Problems**  
**4<sup>th</sup> Grade – Calhoun**  
**Higher-Order Thinking Lesson #5**

**Topic:** Estimating Solutions to Word Problems

**Approx Duration of Lesson:** 45 min

**Lesson Date:** Wednesday, November 28, 2007

**Lesson Start Time:** ~10:45AM

**Learning Objectives:**

*The student will be able to –*

1. Round whole numbers to estimate solutions to problems.
2. Use estimation skills to solve short word problems in small groups.
3. Give mathematical explanations that describe how the solutions were obtained.
4. Compare and contrast solutions.
5. Determine if estimates seem reasonable.
6. Justify why one answer is preferable to the others.

**Language Objectives:**

*The student will be able to –*

1. Define “best,” “estimate,” “about,” “sum” and “difference.”
2. Use the word “about” as an alternative clue to estimate.
3. Provide verbal and written explanations that describe the process of estimating.
4. Include sequencing words in explanations.

**Materials:**

1. estimating sheet – Lesson A
2. estimating sheet – Lesson B
3. pencil
4. think cards
5. reflection

**Initiation:**

Whole-class discussion: introduction of objectives, discuss vocabulary.

**Procedures:**

Split class into two groups. Within those groups, students are split into groups of 4. Each teacher spends 15 minutes with each half of the class. Facilitate cooperative learning by encouraging discourse (talking about methods/strategies, explaining how to get answers, comparing/contrasting ideas). Discuss why some answers are wrong.-justify reasoning. Push for further discussion of problem. As students provide reasoning and answers, we will ask appropriate questions so students build off of each others’ ideas.

See Lesson A Plan (Leslie) and Lesson B Plan (Paige). Distribute think cards if students finish early or find the material easy.

**Closure:**

Comparison of solutions from different teams – mini presentations. How are the solutions similar? How are they different? How did teams solve these problems? What strategies were involved?

**Assessment:**

1. completed worksheet from Lesson A
  2. completed worksheet from Lesson B
  3. reflection
  4. whole-class discussion
  5. small-group discussion
  6. observations
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## Lesson Plan A (Leslie)

### Procedures:

1. Students work in cooperative groups of 4 to solve the problems on sheet A.
2. Facilitate learning. Questions to push for accountable talk:
  - What is rounding?
  - Why is it important to round before you choose the best choice?
  - What are some strategies to help you round?
  - How do your ideas compare to your group members' ideas?
  - Why is it important to explain how you got your answer?
  - How did you know that an answer wasn't the 'best' choice? How could you **justify** this?
  - What makes a good explanation?
  - What are some strategies for estimating?
3. Students should spend about 5 minutes on each question.
4. At the end of the 15 minutes, ask students to reflect on the cooperative learning experience.
  - Was this helpful to do in groups? Why or why not?
  - Can you think of a real-life situation where you would need to estimate?

## Lesson Plan B (Paige)

### Procedures:

1. Students work in cooperative groups of 4 to solve the problems on sheet B.
2. Facilitate learning. Questions to push for accountable talk:
  - a. Why do we sometimes not have exact numbers to use?
  - b. How would you find a reasonable number to help you estimate?
  - c. How do your ideas compare to your group members' ideas?
  - d. Why is it important to explain how you got your answer?
  - e. How did you know that an answer wasn't the 'best' choice? How could you **justify** this?
  - f. What makes a good explanation?
3. Students should spend about 7 minutes on each question, then switch to next.
4. At the end of the 15 minutes, ask students to reflect on the cooperative learning experience.
  - a. Was this helpful to do in groups? Why or why not?
  - b. Can you think of a real-life situation where you would need to estimate?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Estimating Solutions to Problems – A

Directions: Discuss the following problems with your group members. Round first, then choose the best answer.

1a. Joe saw 34 animals at the zoo. Tom saw only 23 animals. Which of the following would be BEST to estimate how many more animals Joe saw than Tom?

- Round:
- Choose the best answer:

- a.  $30 + 20$
- b.  $30 - 20$
- c.  $40 - 20$
- d.  $20 - 30$

1b. Explain in words how you estimated the solution to question 1a. Use “time” words in your explanation (ex. first, second, then, finally, etc.)

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2a. At the beginning of the year, there were 456 books in our class library. 125 of those books are now signed out to students. Which of the following number sentences would be BEST to ESTIMATE how many books are still in our library?

- Round:
- Choose the best answer:

- a.  $400 - 100$
- b.  $500 + 100$
- c.  $500 - 100$
- d.  $400 - 200$

2b. **Justify** why one of the choices above was not the BEST answer.

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3a. Justin has 323 coins and Stephanie has 566 coins. Which of the following would be BEST for Jose and Maryann to ESTIMATE the sum of their coins?

- a.  $300 + 600$
- b.  $400 + 500$
- c.  $600 - 300$
- d.  $400 + 600$

3b. Write in words how you solved question 3a.

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3c. **Justify** why one of the choices above was not the BEST answer.

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<p style="text-align: center;"><b>Think Card #1</b></p> <p>Holly spent \$38.98 on a present for a friend. She then spent another \$48.59. ESTIMATE how much Holly spent in total.</p>	<p style="text-align: center;"><b>Think Card #2</b></p> <p>Of 645 students in the ninth grade, 85 are left-handed. ABOUT how many students are right-handed?</p>														
<p style="text-align: center;"><b>Think Card #3</b></p> <p>At a music store, DVDs cost \$11.99 each. Melissa buys 4 DVDs. ABOUT how much money does Melissa spend on DVDs?</p>	<p style="text-align: center;"><b>Think Card #4</b></p> <p>The manager of the Medina Paint store kept track of the number of gallons of paint sold in the first six weeks of the year.</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;"><u>Week Number</u></th> <th style="text-align: center;"><u>Gallons of Paint Sold</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">104</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">183</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">216</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">172</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">206</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">159</td> </tr> </tbody> </table> <p>ABOUT how many gallons were sold in all?</p>	<u>Week Number</u>	<u>Gallons of Paint Sold</u>	1	104	2	183	3	216	4	172	5	206	6	159
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Name: \_\_\_\_\_

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### Estimating Solutions to Problems – B

Directions: Discuss the following problems with your group members.

- 1a.** Bruce made between 10 and 14 donuts to sell at the donut shop each day. He worked at the donut shop 6 days this week.. ABOUT how many donuts did he make in all?

- a** 24
- b** 60
- c** 70
- d** 80

- 1b.** Explain in words how you estimated the solution to question 1a. Use “time” words in your explanation (ex. first, second, then, finally, etc.)

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- 2a.** Albert works at his job between 8 and 12 hours each day. He works 5 days a week. ABOUT how many hours does he work each week?

- a** 25
- b** 60
- c** 40
- d** 50

- 2b.** Justify why one of the choices above was not the BEST answer.

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- 2c.** Write sentences to explain why you think your answer is **REASONABLE**.

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<p style="text-align: center;"><b>Think Card #1</b></p> <p>If Josh works between 10 and 15 hours per week and makes \$5.00 per hour, ABOUT how much money does he earn each week?</p>	<p style="text-align: center;"><b>Think Card #2</b></p> <p>Sam rakes leaves after school in the Fall for 2 weeks. He rakes between 2 and 4 yards per day. ABOUT how many yards does he rake in the Fall? _____</p> <p>If he earns \$20.00 per yard, ESTIMATE the amount of money he will earn raking leaves.</p>
<p style="text-align: center;"><b>Think Card #3</b></p> <p>Brittany needs to earn \$50.00 to pay for her class trip. She can make \$3.00 for each magazine she sells. One week she sold 10 magazines. ABOUT how many more magazines does she need to sell?</p>	<p style="text-align: center;"><b>Think Card #4</b></p> <p>If Miss Calhoun gives between <math>\frac{1}{2}</math> hour and 1 hour of homework each school night, ABOUT how much time do her students spend on homework each week?</p> <ul style="list-style-type: none"><li>a. 5 hours</li><li>b. 2 hours</li><li>c. 4 hours</li><li>d. <math>1 \frac{1}{2}</math> hours</li></ul>

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Reflection**

Directions: Write sentences in response to the questions.

1. Write down one thing you and your group members discussed. Why was this important to discuss?

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2. Were there any confusing or difficult words from this activity? If so, what made them difficult words? If not, why don't you think so?

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3. Do you think estimation is important in the real world? Why or why not?

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