SKILL 13: PROBLEM SOLVING: Overestimating and Underestimating

Sometimes you must overestimate or underestimate to find a useful solution to a problem. To overestimate a product, round the factors so the estimate is greater than the exact product. To underestimate a product, round the factors so the estimate is less than the exact product.

Example

Each student in Mr. Ruiz's class needs $3\frac{3}{8}$ pounds of clay for an art project. There are 12 students in his class. How much clay should he order for the project?

Read   Mr. Ruiz needs enough clay so each student has $3\frac{3}{8}$ pounds. There are 12 students.

Plan   Overestimate to make sure that Mr. Ruiz will have enough clay.

Solve   Overestimate the product of $3\frac{3}{8} \times 12$.

Round the mixed number, $3\frac{3}{8}$ to the next greater whole number, 4.

Estimate the product: $4 \times 12 = 48$. He needs about 48 pounds of clay.

Look Back   Why does overestimation make sense in this case? Overestimation means that he will have enough for all the students.

Guided Practice

Josh earns $12 per hour. He worked $8\frac{1}{2}$ hours last week. He was hoping to work enough hours to be able to buy new speakers that cost $105. Use an estimate to decide if he earned enough money.

1. Should you overestimate or underestimate? Why?

_____

2. Estimate the product. _____

3. Do you think that he earned enough money? _____

4. About how many hours should he have worked? Why? _____

_____

SKILL 13: Practice

Overestimate or underestimate to solve each problem.
Explain why you chose to overestimate or underestimate.

1. A carpenter needs $2\frac{7}{8}$ feet of wood for each shelf in a bookcase he is building. About how many feet of wood will he need to make 8 shelves?

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2. Sarah is training for a race. She wants to run at least 12 miles a week to prepare for the race. If she runs $3\frac{1}{4}$ miles each day for 5 days, will she meet her goal?

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3. A painter needs $15\frac{1}{3}$ feet of wire to hang each painting in an exhibit. She has 8 paintings to hang. Will 120 feet of wire be enough for her to hang all of the paintings?

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4. Alyssa earns $12 for each hour that she does yard work. She wants to earn enough money to buy a pair of concert tickets that cost a total of $75. She has already worked for $5\frac{3}{4}$ hours. Has she earned enough money to buy the tickets yet?

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5. Devin has 3 hours to finish his homework and his chores before he can go to the movies. If he spends $1\frac{3}{4}$ hours doing his homework and $\frac{5}{6}$ hours completing his chores, will he be finished in time to go to the movies?

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TEST PREP

6. Jack is making fruit punch for a party. He has invited 9 people and expects each person to drink $3\frac{1}{2}$ cups. How many cups should he make to be sure to have enough?

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A 36   C 27
B 30   D 45

7. Delia has 3 cups of milk. She uses $\frac{3}{4}$ cup milk in one recipe and $1\frac{2}{3}$ cups milk in another recipe. How much milk does she have left?

Skill 8

F $\frac{5}{12}$ c   H $1\frac{5}{12}$ c
G $\frac{7}{12}$ c   J $2\frac{5}{12}$ c