Estimating Products and Quotients

Estimating Products and Quotients: Find, Fix, and Work Backward

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Use rounded or compatible numbers that are easy to compute. $198 \times 31 \approx 200 \times 30 = 6000$; $1196 \div 29 \approx 1200 \div 30 = 40$. An estimate is not an exact answer. For a guaranteed capacity decision, check the original numbers.

Worked example

Find an estimate for 294×21 using 300×20. Say whether this estimate is above or below the exact value.

1. Replace the original numbers by the requested compatible pair: $294 \times 21 \approx 300 \times 20$.
2. Calculate the friendly expression: $300 \times 20 = 6000$.
3. The exact value is 6174; the absolute difference is 174.
Answer: About 6000. It is below the exact result; absolute error 174.

Practice Problems

Show your thinking.

1. A student claims 52×19 is about 10000. Test the claim using 50×20.

2. A compatible-number estimate replaces $619 \div 31$ by $\square \div 30 = 20$. Find the missing compatible dividend or factor.

3. Compute the estimate 200×40 for 198×42, then use the exact result to state its error.

4. A student claims $897 \div 29$ is about 300. Test the claim using $900 \div 30$.

5. Find an estimate for 306×18 using 300×20. Say whether this estimate is above or below the exact value.

6. A compatible-number estimate replaces $723 \div 24$ by $\square \div 24 = 30$. Find the missing compatible dividend or factor.

7. For planning, compare the estimate 70×30 for 71×28 with a limit of 2150. Is the estimate below the limit?

8. Compute the estimate $1200 \div 60$ for $1212 \div 61$, then use the exact result to state its error.

Answer Key

1. The claim is ten times the compatible estimate; use about 1000.
2. 600.
3. About 8000. It is below the exact result; absolute error 316.
4. The claim is ten times the compatible estimate; use about 30.
5. About 6000. It is above the exact result; absolute error 492.
6. 720.
7. Yes; the estimate is 50 below the limit.
8. About 20. It is above the exact result; absolute error $\frac{8}{61}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Replace the original numbers by the requested compatible pair: $52 \times 19 \approx 50 \times 20$.

2. Calculate the friendly expression: $50 \times 20 = 1000$.

3. $10000 \div 1000 = 10$, so the claimed scale is not reasonable.

Problem 2

1. Undo the known compatible number: $20 \times 30 = 600$.

2. Replace the original numbers by the requested compatible pair: $619 \div 31 \approx 600 \div 30$.

3. Calculate the friendly expression: $600 \div 30 = 20$.

Problem 3

1. Replace the original numbers by the requested compatible pair: $198 \times 42 \approx 200 \times 40$.

2. Calculate the friendly expression: $200 \times 40 = 8000$.

3. The exact value is 8316; the absolute difference is 316.

Problem 4

1. Replace the original numbers by the requested compatible pair: $897 \div 29 \approx 900 \div 30$.

2. Calculate the friendly expression: $900 \div 30 = 30$.

3. $300 \div 30 = 10$, so the claimed scale is not reasonable.

Problem 5

1. Replace the original numbers by the requested compatible pair: $306 \times 18 \approx 300 \times 20$.

2. Calculate the friendly expression: $300 \times 20 = 6000$.

3. The exact value is 5508; the absolute difference is 492.

Problem 6

1. Undo the known compatible number: $30 \times 24 = 720$.

2. Replace the original numbers by the requested compatible pair: $723 \div 24 \approx 720 \div 24$.

3. Calculate the friendly expression: $720 \div 24 = 30$.

Problem 7

1. Replace the original numbers by the requested compatible pair: $71 \times 28 \approx 70 \times 30$.

2. Calculate the friendly expression: $70 \times 30 = 2100$.

3. $2150 - 2100 = 50$.

Problem 8

1. Replace the original numbers by the requested compatible pair: $1212 \div 61 \approx 1200 \div 60$.

2. Calculate the friendly expression: $1200 \div 60 = 20$.

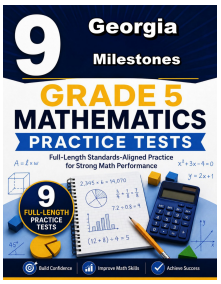
3. The exact value is $\frac{1212}{61}$; the absolute difference is $\frac{8}{61}$.

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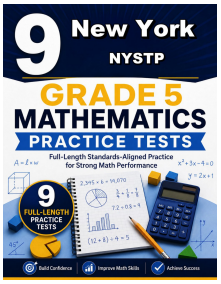
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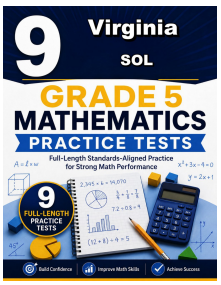
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