

Estimate Quotients and Check Division with Multiplication

Facts to Know

Estimating Quotients

You can determine if an answer in division is reasonable by learning to estimate the answers.

Sample

1. Round the divisor to the nearest 10 or 100, depending on how many digits are in the divisor. In the sample problem, the divisor 27 rounds to 30.
2. Round the dividend to the nearest 10, 100, or 1,000 so that all of the digits, except the first one are zeros. In the sample problem, the dividend 630 rounds to 600.
3. Divide 600 by 30. The answer is 20.
4. Compare your estimate to the exact answer to determine if the exact answer is reasonable.

$$\begin{array}{r}
 27 \overline{)630} \\
 \downarrow \quad \downarrow \\
 \quad \underline{20} \\
 30 \overline{)600} \\
 \\
 \begin{array}{r}
 \text{x23 R9} \\
 27 \overline{)630} \\
 - 54 \downarrow \\
 \underline{90} \\
 - 81 \\
 \underline{9}
 \end{array}
 \end{array}$$

The estimate of 20 and the exact answer of 23 R9 are close so the estimated answer is reasonably close to the actual answer.

Helpful Hint: The estimate and the exact answer will usually have the same number of digits.

Check Division with Multiplication

Division and multiplication are inverse or opposite operations. You can use multiplication to check your division answer this way.

Sample

$$\begin{array}{r}
 \text{quotient} \\
 \downarrow \\
 \text{x23 R9} \\
 \begin{array}{r}
 27 \overline{)630} \leftarrow \text{dividend} \\
 - 54 \\
 \underline{90} \\
 - 81 \\
 \underline{9} \leftarrow \text{remainder}
 \end{array} \\
 \text{divisor}
 \end{array}
 \qquad
 \begin{array}{r}
 23 \text{ quotient} \\
 \times 27 \text{ divisor} \\
 \underline{161} \\
 + 460 \\
 \underline{621} \\
 + 9 \text{ remainder} \\
 \underline{630} \text{ dividend}
 \end{array}$$

1. Do the division problem.
2. Multiply the quotient times the divisor.
3. If there is a remainder, add it to the multiplication product.
4. Compare this answer to the dividend. They should be the same number ($630 = 630$).

You can estimate a quotient to see if your answer is reasonable by following these steps:

Sample

- Round off the divisor and the dividend.
- Divide the rounded-off numbers in your mind.
- Compare your estimate to the actual answer.

$$\begin{array}{r}
 \text{Actual} \\
 \text{x } 223 \text{ R}5 \\
 38 \overline{)8,479} \\
 \underline{-76} \downarrow \\
 87 \downarrow \\
 \underline{-76} \downarrow \\
 119 \\
 \underline{-114} \\
 5
 \end{array}$$

$$\begin{array}{r}
 \text{Estimate} \\
 \text{x } 200 \\
 40 \overline{)8,000} \\
 \underline{-80} \\
 0
 \end{array}$$

Directions: Estimate a quotient for each problem below. Then do the division to get the exact answer. Use the information above and on page 25 to help you solve these problems. The first one is done for you.

Actual**Estimate****Actual****Estimate**

1.

$$\begin{array}{r}
 \text{x}19 \text{ R}9 \\
 23 \overline{)446} \\
 \underline{-23} \\
 216 \\
 \underline{-207} \\
 9
 \end{array}$$

$$\begin{array}{r}
 \text{x}20 \\
 20 \overline{)400} \\
 \underline{-40} \\
 0
 \end{array}$$

4.

$$\begin{array}{r}
 \text{x} \quad \text{R} \\
 27 \overline{)939}
 \end{array}$$

2.

$$\begin{array}{r}
 \text{x} \quad \text{R} \\
 39 \overline{)841}
 \end{array}$$

5.

$$\begin{array}{r}
 \text{x} \quad \text{R} \\
 41 \overline{)841}
 \end{array}$$

3.

$$\begin{array}{r}
 \text{x} \quad \text{R} \\
 28 \overline{)625}
 \end{array}$$

6.

$$\begin{array}{r}
 \text{x} \quad \text{R} \\
 29 \overline{)6459}
 \end{array}$$

..... Checking Division Problems with Multiplication

You can use multiplication to check division this way:

$ \begin{array}{r} \text{quotient} \\ \downarrow \\ \mathbf{x\ 302\ R3} \\ \text{divisor } \rightarrow \mathbf{25} \overline{)7,553} \leftarrow \text{dividend} \\ \underline{-75} \downarrow\downarrow \\ \mathbf{53} \\ \underline{-50} \\ \mathbf{3} \leftarrow \text{remainder} \end{array} $	$ \begin{array}{r} \mathbf{302} \text{ quotient} \\ \mathbf{x\ 25} \text{ divisor} \\ \hline \mathbf{1,510} \\ \mathbf{+ 6,040} \\ \hline \mathbf{7,550} \\ \mathbf{+ 3} \text{ remainder} \\ \hline \mathbf{7,553} \text{ dividend} \end{array} $
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Check your division by multiplying the quotient and divisor ($302 \times 25 = 7,550$) and then adding the remainder to the product ($7,550 + 3$).

Directions: Use the information on page 25 and in the sample above to help you solve these problems and check the answers. The first one is started for you.

Check

Check

1.

$$\begin{array}{r}
 \mathbf{x19\ R9} \\
 23 \overline{)446} \\
 \underline{23} \\
 216 \\
 \underline{207} \\
 9
 \end{array}$$

4.

$$\begin{array}{r}
 \mathbf{x} \quad \mathbf{R} \\
 29 \overline{)913}
 \end{array}$$

2.

$$\begin{array}{r}
 \mathbf{x} \quad \mathbf{R} \\
 39 \overline{)887}
 \end{array}$$

5.

$$\begin{array}{r}
 \mathbf{x} \quad \mathbf{R} \\
 33 \overline{)784}
 \end{array}$$

3.

$$\begin{array}{r}
 \mathbf{x} \quad \mathbf{R} \\
 21 \overline{)765}
 \end{array}$$

6.

$$\begin{array}{r}
 \mathbf{x} \quad \mathbf{R} \\
 31 \overline{)4816}
 \end{array}$$

••••• Checking More Division Problems
with Multiplication

Directions: Solve the long division problems below. Use the information on page 25 to help you solve each problem. Check your division by using multiplication for each problem.

1.

$$26 \overline{) 7915}$$

2.

$$33 \overline{) 6934}$$

3.

$$16 \overline{) 4965}$$

4.

$$92 \overline{) 9536}$$

5.

$$17 \overline{) 1428}$$

6.

$$53 \overline{) 9352}$$

7.

$$88 \overline{) 9734}$$

8.

$$43 \overline{) 9887}$$

9.

$$26 \overline{) 5644}$$

10.

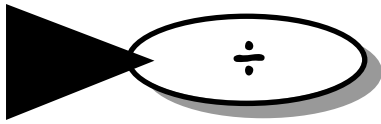
$$76 \overline{) 86,734}$$

11.

$$65 \overline{) 13,120}$$

12.

$$14 \overline{) 13,962}$$



Answer Key

Page 6

1. 11 R1
2. 16 R4
3. 13
4. 11 R1
5. 28 R2
6. 24 R3
7. 9
8. 34
9. 13
10. 10 R6
11. 11 R1
12. 14 R1
13. 16 R1
14. 18 R2
15. 11 R2
16. 16 R3
17. 23
18. 6 R4
19. 8 R4
20. 9 R2
21. 10
22. 5
23. 12 R2
24. 21 R3
25. 23 R1

Page 7

1. 91
2. 71 R1
3. 62
4. 62 R3
5. 53 R1
6. 52
7. 54 R1
8. 79 R6
9. 62 R5
10. 75 R3
11. 99 R2
12. 57

Page 8

1. 612 R1
2. 691 R1
3. 374 R4
4. 417 R3
5. 887 R4
6. 489 R1
7. 1125 R4
8. 1455 R1
9. 1090 R3

Page 10

1. 381
2. 93
3. 124
4. 41
5. 143
6. 135
7. 224
8. 88
9. 174
10. 225
11. 2967
12. 1420
13. 3956
14. 1046
15. 3269
16. 1184

Page 11

1. 91
2. 54
3. 85
4. 79
5. 62
6. 56
7. 45
8. 107
9. 31
10. 67
11. 743
12. 577
13. 1091
14. 561
15. 369
16. 1404

Page 12

1. 238
2. 704
3. 999
4. 1604
5. 2312
6. 479
7. 212
8. 1741
9. 703
10. 1714
11. 1981
12. 191

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1. 37
2. 57
3. 66
4. 456
5. 743
6. 76
7. 67
8. 54
9. 77
10. 23
11. 998
12. 447
13. 168
14. 345
15. 678

Page 15

1. 23
2. 22
3. 21
4. 32 R6
5. 12 R9
6. 34 R7
7. 42 R9
8. 47 R16
9. 24 R9
10. 150
11. 211
12. 443
13. 232
14. 321
15. 233
16. 161 R7

Page 16

1. 173
2. 903
3. 69
4. 200
5. 150
6. 486
7. 51
8. 134
9. 83
10. 81
11. 75
12. 62

Page 18

1. 21 R17
2. 31 R14
3. 32 R12
4. 31 R10
5. 15 R2
6. 11 R2

7. 42 R5
8. 21 R22
9. 23 R13
10. 13 R25
11. 22 R6
12. 32 R17

Page 19

1. 23 R10
2. 26 R26
3. 21 R9
4. 11 R36
5. 34 R16
6. 23 R13
7. 24 R12
8. 23 R15
9. 22 R13
10. 31 R10
11. 15 R36
12. 22 R9
13. 21 R22
14. 23 R14
15. 34 R15
16. 33 R14

Page 20

1. 185 R14
2. 215 R21
3. 244 R29
4. 224 R3
5. 358 R13
6. 182 R27
7. 213 R10
8. 256 R5
9. 251 R13

Page 22

1. 90 R2
2. 203 R2
3. 1002 R1
4. 1003 R4
5. 800 R3
6. 700 R6
7. 10 R15
8. 103 R11
9. 200 R4
10. 202 R22
11. 305 R5
12. 204 R5

Page 23

1. 205 R12
2. 209 R25
3. 105 R19
4. 209 R24
5. 309 R11
6. 109 R4
7. 207 R20
8. 209
9. 308 R9

10. 209 R13
11. 208 R28
12. 297 R13

Page 24

1. 205 R21
2. 100 R22
3. 204 R35
4. 208 R31
5. 209 R33
6. 209 R22
7. 309 R15
8. 109 R65
9. 209 R18
10. 309 R16
11. 209 R34
12. 100 R35

Page 26

Actual	Estimate
1. 19 R9	20
2. 21 R22	20
3. 22 R9	20
4. 34 R21	30
5. 20 R21	20
6. 222 R21	200

Page 27

1. 19 R9
2. 22 R29
3. 36 R9
4. 31 R14
5. 23 R25
6. 155 R11

Page 28

1. 304 R11
2. 210 R4
3. 310 R5
4. 103 R60
5. 84
6. 176 R24
7. 110 R54
8. 229 R40
9. 217 R2
10. 1141 R18
11. 201 R55
12. 997 R4

Page 30

1. 26 R151
2. 22 R278
3. 11 R184
4. 11 R52
5. 10 R601
6. 30 R269
7. 11 R1
8. 40 R125