

Multiply by a Three-Digit Number



Example:

Steps:

Multiply by the ones.

$$\begin{array}{r} 2,313 \\ \times 132 \\ \hline 4,626 \end{array}$$

Multiply by the tens. Put a zero in the ones place.

$$\begin{array}{r} 2,313 \\ \times 132 \\ \hline 4,626 \\ 69,390 \end{array}$$

Multiply by the hundreds. Put a zero in the ones and tens place.

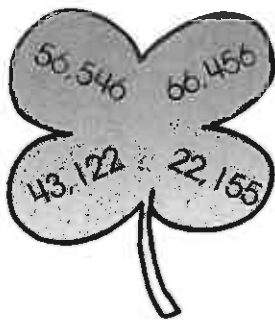
$$\begin{array}{r} 2,313 \\ \times 132 \\ \hline 4,626 \\ 69,390 \\ 231,300 \end{array}$$

Add.

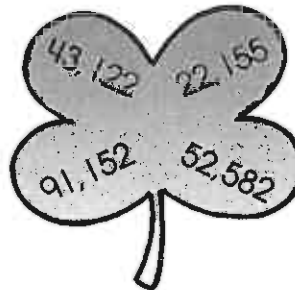
$$\begin{array}{r} 2,313 \\ \times 132 \\ \hline 4,626 \\ 69,390 \\ +231,300 \\ \hline 305,316 \end{array}$$

Directions: Multiply. Circle the correct answer in each clover.

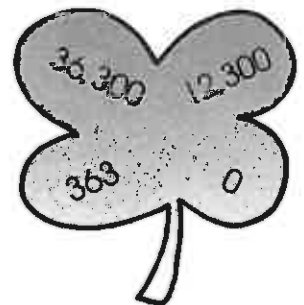
$$\begin{array}{r} 312 \\ \times 213 \end{array}$$



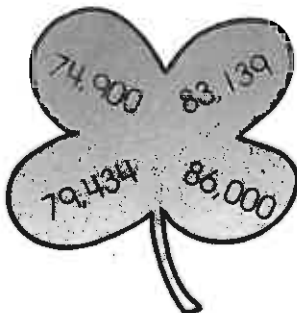
$$\begin{array}{r} 431 \\ \times 122 \end{array}$$



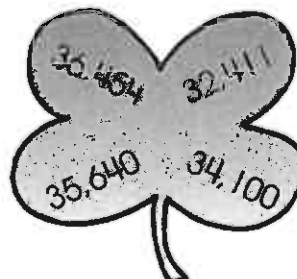
$$\begin{array}{r} 121 \\ \times 300 \end{array}$$



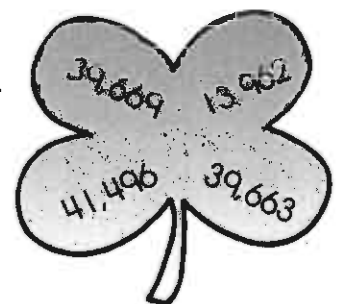
$$\begin{array}{r} 749 \\ \times 111 \end{array}$$



$$\begin{array}{r} 324 \\ \times 110 \end{array}$$



$$\begin{array}{r} 133 \\ \times 312 \end{array}$$



Division

Divide.

Place 2 in the
tens column to
represent 20.

$$3 \overline{)78}$$

Think: 3 times what
number is closest to, but is
less than or equal to, 78?

$$\begin{aligned} 3 \times 10 &= 30 \text{ Too small} \\ 3 \times 20 &= 60 \\ 3 \times 30 &= 90 \text{ Too big} \end{aligned}$$

$$\begin{array}{r} 2 \\ 3 \overline{)78} \\ \underline{-60} \\ 18 \end{array}$$

Think: 3 times what
number is closest to,
but is less than or
equal to, 18?

$$3 \times 6 = 18$$

$$\begin{array}{r} 26 \\ 3 \overline{)78} \\ \underline{-60} \\ 18 \\ \underline{-18} \\ 0 \end{array}$$

1. $1 \overline{)16}$

$8 \overline{)96}$

$4 \overline{)92}$

$5 \overline{)95}$

$3 \overline{)99}$

2. $3 \overline{)57}$

$1 \overline{)11}$

$2 \overline{)36}$

$6 \overline{)72}$

$6 \overline{)84}$

3. $7 \overline{)91}$

$9 \overline{)72}$

$3 \overline{)87}$

$2 \overline{)60}$

$4 \overline{)84}$

4. $6 \overline{)90}$

$9 \overline{)54}$

$3 \overline{)54}$

$8 \overline{)96}$

$5 \overline{)85}$

5. $3 \overline{)36}$

$6 \overline{)24}$


$1 \overline{)66}$

$6 \overline{)78}$

$6 \overline{)66}$

Division

Divide. Then check your answer.



↑
dividend

$$\begin{array}{r} 1 \\ 5 \overline{)7,631} \\ \underline{-5,000} \\ 2,631 \end{array}$$

$$\begin{array}{r} 1,5 \\ 5 \overline{)7,631} \\ \underline{-5,000} \\ 2,631 \\ \underline{-2,500} \\ 131 \end{array}$$

$$\begin{array}{r} 1,52 \\ 5 \overline{)7,631} \\ \underline{-5,000} \\ 2,631 \\ \underline{-2,500} \\ 131 \\ \underline{-100} \\ 31 \end{array}$$

divisor
quotient

$$\begin{array}{r} 1,526 \text{ R}1 \\ 5 \overline{)7,631} \\ \underline{-5,000} \\ 2,631 \\ \underline{-2,500} \\ 131 \\ \underline{-100} \\ 31 \\ \underline{-30} \\ 1 \end{array}$$

remainder

To Check: Multiply your quotient by the divisor. Add the remainder.

1,526 ← your quotient
 \times 5 ← your divisor
 7,630
 $+$ 1 ← your remainder
 → 7,631 ← your dividend

These two should be equal.

1. $7 \overline{)221}$

$5 \overline{)101}$

$4 \overline{)831}$

2. $9 \overline{)762}$

$2 \overline{)332}$

$8 \overline{)890}$

3. $5 \overline{)5,840}$

$2 \overline{)9,284}$

$6 \overline{)5,818}$

4. $6 \overline{)1,587}$

$9 \overline{)1,377}$

$3 \overline{)1,116}$

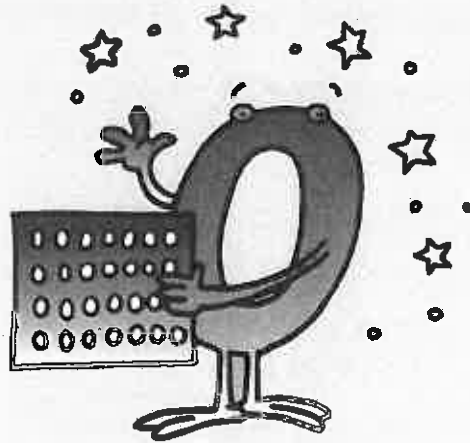


Zeros in the Quotient

Some problems will have a zero in the quotient.

$$\begin{array}{r}
 1,026R2 \\
 5 \overline{) 5,132} \\
 \underline{-5} \\
 01 \\
 \underline{-00} \\
 13 \\
 \underline{-10} \\
 32 \\
 \underline{-30} \\
 2
 \end{array}$$

5 does not divide into 1. Put a zero in the quotient as a placeholder.



Directions: Divide

$4 \overline{) 1,636}$

$7 \overline{) 1,680}$

$6 \overline{) 1,818}$

$5 \overline{) 5,285}$

$5 \overline{) 5,025}$

$9 \overline{) 21,654}$

$8 \overline{) 8,320}$

$6 \overline{) 24,300}$

Name _____

Date _____

Pre-Test: Division

Divide.

1. $3 \overline{)72}$

$8 \overline{)44}$

$6 \overline{)472}$

$5 \overline{)346}$

2. $4 \overline{)2,408}$

$2 \overline{)1,240}$

$16 \overline{)67}$

$17 \overline{)74}$

3. $31 \overline{)91}$

$26 \overline{)89}$

$34 \overline{)120}$

$82 \overline{)783}$

4. $24 \overline{)560}$

$45 \overline{)361}$

$92 \overline{)3,457}$

$57 \overline{)5,71}$

5. $15 \overline{)1,475}$

$81 \overline{)8,138}$

$21 \overline{)39,464}$

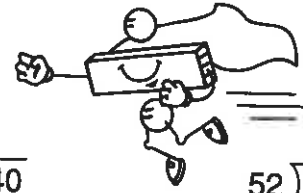
$49 \overline{)31,09}$

Name _____

Date _____

Division

Divide.



1. $37 \overline{) 4,072}$

$81 \overline{) 4,455}$

$69 \overline{) 4,740}$

$52 \overline{) 3,486}$

2. $46 \overline{) 2,408}$

$21 \overline{) 1,240}$

$56 \overline{) 6,721}$

$17 \overline{) 7,147}$

3. $24 \overline{) 1,200}$

$82 \overline{) 5,832}$

$14 \overline{) 5,604}$

$35 \overline{) 1,610}$

4. $90 \overline{) 1,445}$

$67 \overline{) 5,655}$

$25 \overline{) 1,275}$

$61 \overline{) 2,135}$

5. $31 \overline{) 3,936}$

$29 \overline{) 3,009}$

$71 \overline{) 2,310}$

$60 \overline{) 5,520}$

6. $13 \overline{) 1,725}$

$47 \overline{) 1,036}$

$39 \overline{) 2,535}$

$85 \overline{) 2,150}$

Drop It!

Example:

To divide dividends and divisors that end with zeros, use this quick trick to make it easier.

$$6,400,000 \div 80,000$$

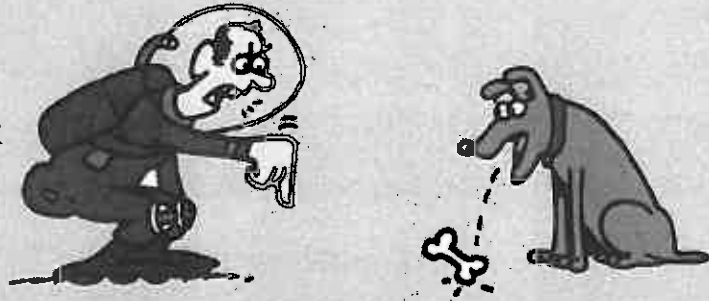
Steps:

1. Count the number of zeros in the divisor. Cross off that number of zeros in both the dividend and the divisor.
2. Divide the numbers.
3. The quotient of the new problem will be the quotient of the original.

$$4,800,000 \div 80,000 \text{ Cross off 4 zeros from each number.}$$

$$= 480 \div 8$$

$$= 60$$



Directions: Cross off the correct number of zeros in each number. Then, divide.

$$45,000 \div 90 = \underline{\hspace{2cm}}$$

$$280,000 \div 400 = \underline{\hspace{2cm}}$$

$$64,000 \div 8,000 = \underline{\hspace{2cm}}$$

$$300,000 \div 6,000 = \underline{\hspace{2cm}}$$

$$4,900,000 \div 7,000 = \underline{\hspace{2cm}}$$

$$3,300,000 \div 1,100 = \underline{\hspace{2cm}}$$

$$9,600,000 \div 120 = \underline{\hspace{2cm}}$$

$$56,000,000 \div 800,000 = \underline{\hspace{2cm}}$$

$$42,000,000 \div 60,000 = \underline{\hspace{2cm}}$$

$$200,000,000 \div 500,000 = \underline{\hspace{2cm}}$$

Name _____ Date _____

Exercise 2.12

Write the mathematical expression for each situation and solve these problems.

1. Divide 1,628 by 37.
2. Find the quotient of 2,660 and 28.
3. How many sets of 6 are there in 252?
4. Divide 1,005 by 15.
5. Find the quotient of 1,792 and 28.
6. How many equal groups of 7 are there in 343?
7. Find the quotient of 384 and 12.

Changing Improper Fractions to Mixed Numbers

Change the improper fractions to mixed or whole numbers.



$\frac{14}{3}$ can be rewritten as $14 \div 3$ or $3 \overline{)14}$

$\frac{14}{3}$ is an improper fraction.

$$\begin{array}{r} 4 \text{ R}2 \\ 3 \overline{)14} \\ \underline{-12} \\ 2 \end{array} \qquad \frac{14}{3} = 4 \frac{2}{3}$$

2 becomes the numerator; the denominator stays 3.

$4 \frac{2}{3}$ is a mixed number.

1.

$\frac{15}{2}$

$\frac{7}{4}$

$\frac{20}{7}$

2.

$\frac{43}{5}$

$\frac{23}{8}$

$\frac{21}{5}$

3.

$\frac{31}{12}$

$\frac{5}{2}$

$\frac{13}{8}$

4.

$\frac{11}{4}$

$\frac{49}{9}$

$\frac{41}{6}$

5.

$\frac{23}{3}$

$\frac{45}{4}$

$\frac{60}{5}$

6.

$\frac{23}{7}$

$\frac{72}{6}$

$\frac{16}{2}$

Changing Mixed Numbers to Improper Fractions



$$\begin{aligned} 3\frac{1}{3} &= \frac{(3 \times 3) + 1}{3} \\ &= \frac{9 + 1}{3} \\ &= \frac{10}{3} \end{aligned}$$

To change mixed numbers to improper fractions:

1. Multiply the denominator by the whole number.
2. Add the numerator.
3. Keep the denominator.

$$\begin{aligned} 4\frac{5}{8} &= \frac{(8 \times 4) + 5}{8} \\ &= \frac{32 + 5}{8} \\ &= \frac{37}{8} \end{aligned}$$

Change the mixed numbers to improper fractions.

1. $2\frac{1}{3}$

$6\frac{3}{4}$

$1\frac{1}{12}$

2. $3\frac{1}{8}$

$7\frac{3}{5}$

$1\frac{9}{10}$

3. $3\frac{2}{5}$

$9\frac{4}{11}$

$3\frac{6}{7}$

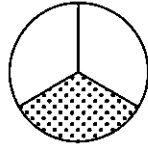
4. $5\frac{4}{5}$

$4\frac{5}{12}$

$6\frac{7}{11}$



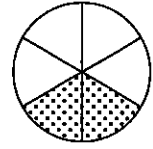
Renaming Fractions



$\frac{1}{3}$ of the circle is shaded.

To rename a fraction, multiply the numerator and denominator by the same number.

$$\frac{1}{3} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6}$$



$\frac{2}{6}$ of the circle is shaded.

$$\frac{4}{5} \Rightarrow \frac{8}{10}$$

Think: To get from 5 to 10, multiply by 2.

$$\text{So, } \frac{4}{5} = \frac{4 \times 2}{5 \times 2} = \frac{8}{10}$$

$$\frac{2}{3} \Rightarrow \frac{8}{12}$$

Think: To get from 3 to 12, multiply by 4.

$$\text{So, } \frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

Rename the following fractions using the denominator given.

1. $\frac{3}{4} = \frac{\quad}{12}$

$\frac{4}{5} = \frac{\quad}{15}$

$\frac{2}{3} = \frac{\quad}{6}$

2. $\frac{1}{4} = \frac{\quad}{16}$

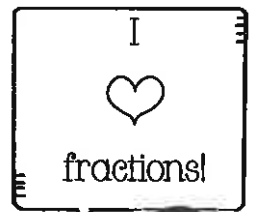
$\frac{5}{6} = \frac{\quad}{18}$

$\frac{3}{5} = \frac{\quad}{20}$

3. $\frac{5}{8} = \frac{\quad}{24}$

$\frac{2}{7} = \frac{\quad}{14}$

$\frac{5}{6} = \frac{\quad}{12}$



Simplifying Fractions

$$\frac{4}{8} = \frac{4 \div 4}{8 \div 4}$$

$$= \frac{1}{2}$$



A fraction is simplified when 1 is the only number that divides into both the numerator and the denominator.

To simplify, you must divide the numerator and denominator by the same number.

$$\frac{12}{18} = \frac{12 \div 2}{18 \div 2}$$

$$= \frac{6}{9}$$

$\frac{6}{9}$ is not simplified.

$$\frac{6}{9} = \frac{6 \div 3}{9 \div 3}$$

$$= \frac{2}{3}$$

Simplify.

1. $\frac{4}{8}$

$\frac{6}{15}$

$\frac{8}{24}$

2. $\frac{4}{6}$

$\frac{5}{15}$

$\frac{6}{10}$

3. $\frac{6}{8}$

$\frac{2}{24}$

$\frac{8}{12}$

4. $\frac{3}{9}$

$\frac{6}{24}$

$\frac{10}{12}$

5. $\frac{6}{12}$

$\frac{5}{20}$

$\frac{14}{14}$

Adding Fractions

Add. Simplify if possible.



$$\begin{array}{r} \frac{2}{5} \\ + \frac{1}{5} \\ \hline \frac{3}{5} \end{array}$$

When adding fractions with like denominators:

1. Add the numerators.
2. Keep the same denominator.
3. Simplify if possible.

$$\begin{array}{r} \frac{5}{12} \\ + \frac{5}{12} \\ \hline \frac{10}{12} = \frac{5}{6} \end{array}$$

1.
$$\begin{array}{r} \frac{3}{5} \\ + \frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{3} \\ + \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{6} \\ + \frac{3}{6} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{9} \\ + \frac{2}{9} \\ \hline \end{array}$$

2.
$$\begin{array}{r} \frac{1}{7} \\ + \frac{2}{7} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{4} \\ + \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{12} \\ + \frac{4}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{10} \\ + \frac{4}{10} \\ \hline \end{array}$$

3.
$$\begin{array}{r} \frac{3}{6} \\ + \frac{2}{6} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{11} \\ + \frac{3}{11} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{8} \\ + \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{4}{9} \\ + \frac{3}{9} \\ \hline \end{array}$$

4.
$$\begin{array}{r} \frac{2}{9} \\ + \frac{2}{9} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{12} \\ + \frac{5}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{11} \\ + \frac{2}{11} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{8} \\ + \frac{2}{8} \\ \hline \end{array}$$

Name _____

Date _____

Subtracting Fractions

Subtract. Simplify if possible.

To subtract fractions with like denominators:



$$\begin{array}{r} \frac{2}{5} \\ - \frac{1}{5} \\ \hline \frac{1}{5} \end{array}$$

1. Subtract the numerators.
2. Keep the same denominator.
3. Simplify if possible.

$$\begin{array}{r} \frac{7}{8} \\ - \frac{3}{8} \\ \hline \frac{4}{8} = \frac{1}{2} \end{array}$$

1.
$$\begin{array}{r} \frac{3}{8} \\ - \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{7}{12} \\ - \frac{5}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{6} \\ - \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{6}{7} \\ - \frac{3}{7} \\ \hline \end{array}$$

2.
$$\begin{array}{r} \frac{11}{12} \\ - \frac{1}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{9}{10} \\ - \frac{3}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{4}{5} \\ - \frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{2}{3} \\ - \frac{1}{3} \\ \hline \end{array}$$

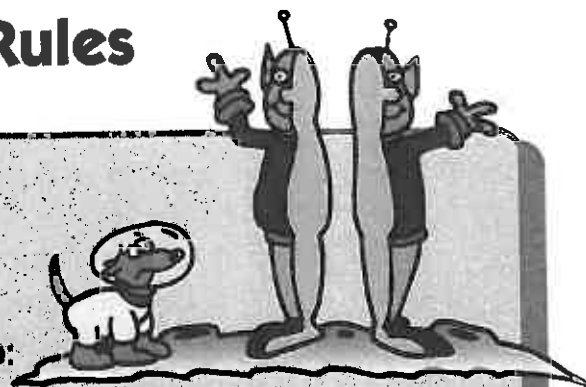
3.
$$\begin{array}{r} \frac{3}{4} \\ - \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{11}{12} \\ - \frac{5}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{10}{11} \\ - \frac{3}{11} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{13}{16} \\ - \frac{3}{16} \\ \hline \end{array}$$

Divisibility Rules



One number is divisible by another if it can be divided evenly without a remainder.

A number is divisible by:

Test:

- 2 If the number is even (ends in 0, 2, 4, 6, or 8)

Example:

7,598 is an even number, so it is divisible by 2

- 3 If the sum of the digits is divisible by 3

5,415 $\rightarrow 5 + 4 + 1 + 5 = 15$
 $15 \div 3 = 5$, so 5,415 is divisible by 3

- 4 If the last 2 digits form a number that is divisible by 4

85,724 $\rightarrow 24 \div 4 = 6$, so 85,724 is divisible by 4

- 5 If the number ends in 0 or 5

7,095 ends in 5, so it is divisible by 5

- 6 If the number is divisible by 2 and 3

7,944 is divisible by 2 and 3, so it is divisible by 6

- 9 If the sum of the digits is divisible by 9

8,775 $\rightarrow 8 + 7 + 7 + 5 = 27$
 $27 \div 9 = 3$, so 8,775 is divisible by 9

- 10 If the number ends in 0

5,090 ends in 0 so it is divisible by 10

Challenge: 6,520 is divisible by 2, 4, 5, and 10. Can you show why?

Directions: Look at each number below. Then, list the number or numbers by which it is divisible.

4,612

3,048

2,217

5,320

8,316

45,693

34,134

21,545

81,396

55,004

7,690

90,300

Multiply or Divide?

These key words will help you know when to multiply and when to divide.

Multiplication key words: **in all**, **altogether**, **times**, and **each**

Division key words: **per** and **each**



Directions: Circle the key words and solve the story problems.

1. There are 9 classrooms at the vocational school. The average number of students per classroom is 27 students. How many students altogether are there in the school?
- _____

2. Thirty-five students are studying auto mechanics. Three times that many are studying business. How many students are studying business?
- _____

3. The semester is 16 weeks long. Students attend class 5 days a week. How many days in all must a student attend class each semester?
- _____

4. In one class of 27 students, each student used \$30.00 worth of materials. Altogether, how much did materials cost this class?
- _____

5. Lunch cost each student \$11.50 for a 5-day week. How much does each lunch cost?
- _____

6. The average student drives a total of 8 miles per day to attend classes. How many miles in all does a student drive during the 80-day semester?
- _____