

**Title:** Multiplying dividing fractions**Materials:**

Teacher notes and script. (*This page and next.*)

Student note sheet. (*Make a copy for each student.*)

Student activity (Fraction Puzzle). (*Make a copy for each student. If doing in class, students will need scissors and glue sticks.*)

Overheads (*Make transparencies*)

**Previous Knowledge Needed:** Reducing fractions**Important Concepts/Methods:**

To multiply fractions- Multiply numerators together, then multiply denominators together. Reduce answer down.

OR

Cross cancel if possible, then multiply numerators together and denominators together.

To divide fractions – Take the reciprocal of the second fraction (flip it over), change the problem to multiplication, then follow multiplication rules.

**Script**

Remember when you multiply that you can either reduce before you multiply or after. Let's look at the first problem. (*Put overhead up and read the problem.*)

$$\frac{7}{8} \cdot \frac{4}{14}$$

a)  $\frac{1}{2}$

b)  $\frac{1}{4}$

c)  $\frac{16}{49}$

d)  $\frac{7}{16}$

$$\frac{7}{8} \cdot \frac{4}{14} = \frac{\cancel{7}^1}{2\cancel{8}_2} \cdot \frac{\cancel{4}^1}{\cancel{14}_2} = \frac{1 \cdot 1}{2 \cdot 2} = \frac{1}{4}$$

OR

$$\frac{7}{8} \cdot \frac{4}{14} = \frac{7 \cdot 4}{8 \cdot 14} = \frac{28}{112} = \frac{28 \div 2}{112 \div 2} = \frac{14}{56} = \frac{14 \div 2}{56 \div 2} = \frac{7}{28} = \frac{7 \div 7}{28 \div 7} = \frac{1}{4}$$

We can reduce this down before we multiply by cross canceling. That means that if there is a number that divides into a numerator and denominator of the same fraction or of different fractions, we can cancel it out. So we know 7 goes into 7 once, and 7 goes into 14 twice. (*As you explain cancel out and rewrite numbers in the correct places on the overhead. Make students do the same on their papers.*) We also know that 4 goes into 4 once, and 4 goes into 8 twice. (*As you explain cancel out and rewrite numbers in the correct places on the overhead. Make students do the same on their papers.*) So our problem is now  $\frac{1}{2}$  times  $\frac{1}{2}$ . Multiplying the numerators gives us one, and multiplying the denominators gives us 4, so our answer is  $\frac{1}{4}$ . (*Write the correct answer down and have students do the same.*) Any questions? (*Answer any question that the students have.*)

We could have done this problem another way. We could have multiplied it the way it was. Seven times four is 28, and 8 times 14 is 112. (*Write 28/112 on the overhead and have students do the same.*) Now we need to reduce 28/112 down. What goes into both 28 and 112? (*If students say 28, reduce fraction down all the way. If they say another number, for example 2, reduce the fraction down with the number they gave you, then tell them it's not reduced all the way. Ask for another number and keep going until it's reduced all the way.*) Any questions? (*Answer any questions the students have.*)

Now let's try a division problem. (*Put overhead up and read.*)

$$\frac{4}{5} \div \frac{8}{15}$$

a)  $1\frac{1}{2}$

b)  $\frac{2}{3}$

c)  $\frac{32}{75}$

d)  $\frac{3}{5}$

$$\frac{4}{5} \div \frac{8}{15} = \frac{4}{5} \cdot \frac{15}{8} = \frac{\cancel{4}^1}{5} \cdot \frac{15^3}{\cancel{8}_2} = \frac{1 \cdot 3}{1 \cdot 2} = \frac{3}{2} = 1\frac{1}{2}$$

OR

$$\frac{4}{5} \div \frac{8}{15} = \frac{4}{5} \cdot \frac{15}{8} = \frac{4 \cdot 15}{5 \cdot 8} = \frac{60}{40} = \frac{60 \div 10}{40 \div 10} = \frac{6}{4} = \frac{6 \div 2}{4 \div 2} = \frac{3}{2} = 1\frac{1}{2}$$

The first thing we need to do is take the reciprocal of the second fraction and change the problem to multiplication, so we need to rewrite our equation to say  $\frac{4}{5} \cdot \frac{15}{8}$ . (*Rewrite the new problem on the board and have students do the same on their papers.*) Now it's the same type of problem that we just did. Let's cross cancel to reduce it down. Four goes into four once and it goes into 8 twice. (*As you explain cancel out and rewrite numbers in the correct places on the overhead. Make students do the same on their papers.*) Also five goes into five once and into 15 three times. (*As you explain cancel out and rewrite numbers in the correct places on the overhead. Make students do the same on their papers.*) So our new problem is 1/1 times 3/2. One times 3 is three, and 1 times two is two, So we get 3/2. (*Write down the answer and be sure students do also.*) Is this reduced all the way? (*Get students to say no. It has to be a mixed number.*) If we change it into a mixed number our answer is 1 1/2. (*Write answer down. If students do not remember how to change to a mixed number, review with them.*) Any questions? (*Answer any questions they have.*)

### Common Mistakes:

Let's look at the wrong answers. In the first question they got answer a by adding both the numerator and denominator 11/22 and reducing it down. To get answer c they took the reciprocal of the first fraction. They made it 8/7 then multiplied. Answer d is just a mess. They didn't cancel all the way.

In the second problem. They got b by taking the reciprocal of the first fraction. Answer c was because they didn't take the reciprocal, but just multiplied it out the way it was. Answer d is just a guess.

### Student Problems:

Try the next two problems on your own. (*Give students time to try problems.*) (*Put overhead up and either work out problem or give students the opportunity to come up and explain it. Make sure they do all steps.*)

### Assignment:

(*Hand out Fraction Puzzle. Either give students time to do and then discuss their problems, or give as homework and collect the next day. Instruct students to cut squares apart and find the problem on one piece that matches the answer on another piece. Once all matches are made correctly, pieces should make a 3 x4 rectangle. Have students glue to an 11x8 piece of paper AFTER all matches are made.*)

$$\frac{7}{8} \bullet \frac{4}{14}$$

a)  $\frac{1}{2}$

b)  $\frac{1}{4}$

c)  $\frac{16}{49}$

d)  $\frac{7}{16}$

$$\frac{4}{5} \div \frac{8}{15}$$

a)  $1\frac{1}{2}$

b)  $\frac{2}{3}$

c)  $\frac{32}{75}$

d)  $\frac{3}{5}$

$$\frac{18}{28} \bullet \frac{4}{27}$$

a)  $\frac{1}{5}$

b)  $\frac{16}{35}$

c)  $\frac{56}{243}$

d)  $\frac{2}{21}$

---

$$\frac{15}{16} \div \frac{5}{24}$$

a)  $4\frac{1}{2}$

b)  $\frac{2}{9}$

c)  $\frac{25}{128}$

d)  $\frac{1}{2}$

# Fraction Puzzle

$$\frac{3}{8}$$
$$\frac{3}{16}$$

A

$$\frac{4}{15} \div \frac{18}{25}$$
$$\frac{5}{9} \div \frac{35}{54}$$
$$\frac{4}{7} \div \frac{20}{21}$$
$$\frac{3}{4}$$

N

$$\frac{6}{7}$$
$$\frac{2}{3} \times \frac{15}{16}$$
$$\frac{9}{14} \times \frac{7}{33}$$
$$\frac{10}{27}$$

T

$$\frac{7}{18} \div \frac{14}{45}$$
$$\frac{7}{24}$$
$$\frac{5}{8}$$
$$\frac{3}{10} \div \frac{15}{6}$$

M

$$\frac{3}{8} \div \frac{9}{32}$$
$$\frac{7}{18}$$
$$\frac{4}{7}$$
$$\frac{3}{5} \times \frac{2}{15}$$

D

$$\frac{3}{10}$$
$$\frac{7}{10} \times \frac{15}{28}$$
$$\frac{5}{12} \times \frac{14}{15}$$
$$1\frac{1}{4}$$

H

$$1\frac{3}{4} \div \frac{3}{4}$$
$$\frac{11}{30}$$
$$\frac{5}{12}$$
$$\frac{2}{5} \times \frac{3}{8}$$

H

$$1\frac{1}{2}$$
$$\frac{4}{9} \times \frac{3}{8}$$
$$\frac{1}{3} \div \frac{5}{8}$$
$$\frac{5}{6} \div \frac{5}{9}$$

O

$$\frac{1}{3}$$
$$\frac{3}{5}$$
$$\frac{9}{14}$$
$$\frac{1}{2} \div \frac{3}{4}$$

W

$$\frac{3}{20}$$
$$1\frac{3}{4} \div \frac{3}{4}$$
$$\frac{1}{4} \times \frac{8}{11}$$
$$\frac{5}{6} \times \frac{9}{25}$$

O

$$\frac{3}{25}$$
$$\frac{3}{22}$$
$$\frac{2}{3}$$
$$\frac{4}{5}$$

C

$$\frac{3}{7} \times \frac{14}{27}$$
$$\frac{2}{3} \div \frac{7}{6}$$
$$\frac{1}{6}$$
$$\frac{2}{9}$$

A

$$\frac{8}{9} \times \frac{27}{32}$$
$$\frac{2}{11}$$

# Fraction Puzzle

$$\frac{9}{14}$$

$$\frac{1}{2} \div \frac{3}{4}$$

W

$$\frac{3}{20}$$

$$\frac{1}{2} \div \frac{3}{4}$$

$$\frac{5}{12}$$

$$\frac{2}{5} \times \frac{3}{8}$$

H

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

$$\frac{4}{9} \times \frac{3}{8}$$

$$\frac{1}{3} \div \frac{5}{8}$$

$$\frac{5}{6} \div \frac{5}{9}$$

O

$$\frac{1}{3}$$

$$\frac{3}{5}$$

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

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

C

$$\frac{3}{7} \times \frac{14}{27}$$

$$\frac{2}{3} \div \frac{7}{6}$$

$$\frac{1}{6}$$

$$\frac{2}{9}$$

A

$$\frac{8}{9} \times \frac{27}{32}$$

$$\frac{2}{11}$$

$$\frac{4}{7} \div \frac{20}{21}$$

$$\frac{3}{4}$$

N

$$\frac{6}{7}$$

$$\frac{2}{3} \times \frac{15}{16}$$

$$\frac{4}{7}$$

$$\frac{3}{5} \times \frac{2}{15}$$

D

$$\frac{3}{10}$$

$$\frac{7}{10} \times \frac{15}{28}$$

$$\frac{1}{4} \times \frac{8}{11}$$

$$\frac{5}{6} \times \frac{9}{25}$$

O

$$\frac{3}{25}$$

$$\frac{3}{22}$$

$$\frac{5}{8}$$

$$\frac{3}{10} \div \frac{15}{6}$$

M

$$\frac{3}{8} \div \frac{9}{32}$$

$$\frac{7}{18}$$

$$\frac{3}{8}$$

$$\frac{3}{16}$$

A

$$\frac{4}{15} \div \frac{18}{25}$$

$$\frac{5}{9} \div \frac{35}{54}$$

$$\frac{9}{14} \times \frac{7}{33}$$

$$\frac{10}{27}$$

T

$$\frac{7}{18} \div \frac{14}{45}$$

$$\frac{7}{24}$$

$$\frac{5}{12} \times \frac{14}{15}$$

$$1\frac{1}{4}$$

H

$$\frac{1}{2} \div \frac{3}{4}$$

$$\frac{11}{30}$$

Fraction Puzzle Answer Key

# Ideas that I'm going to study and learn.

To multiply fractions- Multiply numerators together, then multiply denominators together. Reduce answer down.

OR

Cross cancel if possible, then multiply numerators together and denominators together.

To divide fractions – Take the reciprocal of the second fraction (flip it over), change the problem to multiplication, then follow multiplication rules.

$$\frac{7}{8} \cdot \frac{4}{14}$$

- a)  $\frac{1}{2}$
- b)  $\frac{1}{4}$
- c)  $\frac{16}{49}$
- d)  $\frac{7}{16}$

$$\frac{4}{5} \div \frac{8}{15}$$

- a)  $1\frac{1}{2}$
- b)  $\frac{2}{3}$
- c)  $\frac{32}{75}$
- d)  $\frac{3}{5}$

$$\frac{18}{28} \cdot \frac{4}{27}$$

- a)  $\frac{1}{5}$
- b)  $\frac{16}{35}$
- c)  $\frac{56}{243}$
- d)  $\frac{2}{21}$

$$\frac{15}{16} \div \frac{5}{24}$$

- a)  $4\frac{1}{2}$
- b)  $\frac{2}{9}$
- c)  $\frac{25}{128}$
- d)  $\frac{1}{2}$

## Solution Key

$$\frac{7}{8} \cdot \frac{4}{14}$$

a)  $\frac{1}{2}$

b)  $\frac{1}{4}$

c)  $\frac{16}{49}$

d)  $\frac{7}{16}$

$$\frac{7}{8} \cdot \frac{4}{14} = \frac{\cancel{7}^1}{\cancel{2}^1 \cancel{8}_2} \cdot \frac{\cancel{4}^1}{\cancel{14}_2} = \frac{1 \cdot 1}{2 \cdot 2} = \frac{1}{4}$$

OR

$$\begin{aligned} \frac{7}{8} \cdot \frac{4}{14} &= \frac{7 \cdot 4}{8 \cdot 14} = \frac{28}{112} = \frac{28 \div 2}{112 \div 2} = \frac{14}{56} \\ &= \frac{14 \div 2}{56 \div 2} = \frac{7}{28} = \frac{7 \div 7}{28 \div 7} = \frac{1}{4} \end{aligned}$$

$$\frac{4}{5} \div \frac{8}{15}$$

a)  $1\frac{1}{2}$

b)  $\frac{2}{3}$

c)  $\frac{32}{75}$

d)  $\frac{3}{5}$

$$\frac{4}{5} \div \frac{8}{15} = \frac{4}{5} \cdot \frac{15}{8} = \frac{\cancel{4}^1}{\cancel{1}^1 \cancel{5}_5} \cdot \frac{\cancel{15}^3}{\cancel{8}_2} = \frac{1 \cdot 3}{1 \cdot 2} = \frac{3}{2} = 1\frac{1}{2}$$

OR

$$\begin{aligned} \frac{4}{5} \div \frac{8}{15} &= \frac{4}{5} \cdot \frac{15}{8} = \frac{4 \cdot 15}{5 \cdot 8} = \frac{60}{40} = \frac{60 \div 10}{40 \div 10} \\ &= \frac{6}{4} = \frac{6 \div 2}{4 \div 2} = \frac{3}{2} = 1\frac{1}{2} \end{aligned}$$

$$\frac{18}{28} \cdot \frac{4}{27}$$

a)  $\frac{1}{5}$

b)  $\frac{16}{35}$

c)  $\frac{56}{243}$

d)  $\frac{2}{21}$

$$\frac{18}{28} \cdot \frac{4}{27} = \frac{\cancel{2}^1 \cancel{18}^3}{\cancel{7}^1 \cancel{28}_4} \cdot \frac{\cancel{4}^1}{\cancel{27}_3} = \frac{2 \cdot 1}{7 \cdot 3} = \frac{2}{21}$$

OR

$$\begin{aligned} \frac{18}{28} \cdot \frac{4}{27} &= \frac{18 \cdot 4}{28 \cdot 27} = \frac{72}{756} = \frac{72 \div 2}{756 \div 2} = \frac{36}{378} \\ &= \frac{36 \div 2}{378 \div 2} = \frac{18}{189} = \frac{18 \div 9}{189 \div 9} = \frac{2}{21} \end{aligned}$$

$$\frac{15}{16} \div \frac{5}{24}$$

a)  $4\frac{1}{2}$

b)  $\frac{2}{9}$

c)  $\frac{25}{128}$

d)  $\frac{1}{2}$

$$\frac{15}{16} \div \frac{5}{24} = \frac{15}{16} \cdot \frac{24}{5} = \frac{\cancel{3}^1 \cancel{15}^2}{\cancel{2}^1 \cancel{16}_8} \cdot \frac{\cancel{24}^3}{\cancel{1}^1} = \frac{3 \cdot 3}{2 \cdot 1} = \frac{9}{2} = 4\frac{1}{2}$$

OR

$$\begin{aligned} \frac{15}{16} \div \frac{5}{24} &= \frac{15}{16} \cdot \frac{24}{5} = \frac{15 \cdot 24}{16 \cdot 5} = \frac{360}{80} = \frac{360 \div 10}{80 \div 10} \\ &= \frac{36}{8} = \frac{36 \div 4}{8 \div 4} = \frac{9}{2} = 4\frac{1}{2} \end{aligned}$$