

To multiply a fraction by a fraction:

Take an example in which no cancelling can be done

e. g. $\frac{1}{2} \times \frac{1}{3}$.

Q. If any number be multiplied by one what will the product be? A. The product will be the same as the multiplicand. Thus (a) $\frac{1}{2} \times 1 = \frac{1}{2}$.

Q. Next multiply $\frac{1}{2}$ by $\frac{1}{3}$, thus (b) $\frac{1}{2} \times \frac{1}{3}$.

Q. How does the multiplier in (b) compare with the multiplier in (a). A. It is seven times as small.

Q. Since the multiplicands in (a) and (b) are the same how will the product in (b) compare with the product in (a)? A. The product in (b) will be seven times as small as the product in (a), that is, the product in (a) should be divided by 7 to get the product in (b).

Q. How can the product in (a) which is $\frac{1}{2}$ be divided by 7? A. By multiplying the denominator by 7, thus $\frac{1}{2} \div 7 = \frac{1}{14}$ therefore (b) $\frac{1}{2} \times \frac{1}{3} = \frac{1}{14}$.

(c) $\frac{1}{2} \times \frac{1}{3}$. Q. How does the multiplier in (c) compare with the multiplier in (b)? A. It is five times as great.

Q. Since the multiplicands in (b) and (c) are the same how will the product in (c) compare with the product in (b)? A. The product in (c) will be five times as great as the product in (b), that is, the product in (b) should be multiplied by 5 to get the product in (c).

Q. How can the product in (b), which is $\frac{1}{14}$ be multiplied by 5? A. By multiplying the numerator by 5, thus $\frac{1}{14} \times 5 = \frac{5}{14}$.

Thus we see that when $\frac{1}{2}$ is multiplied by $\frac{1}{3}$ the result is $\frac{1}{6}$. Express thus $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$. Work several examples in the same way, then by examining the work in detail, in each case, it will be found that the numerator in the product, is the product of the numerators of the fractions to be multiplied, and that the denominator in the product is the product of the denominators of the fractions to be multiplied. Briefly stated the rule for multiplying a fraction by a fraction is: Multiply the numerators for a numerator and the denominators for a denominator.

To divide a fraction by a fraction:

Take an example in which no cancelling can be done: e. g., $\frac{1}{2} \div \frac{1}{3}$.

Q. If any number be divided by one to what will the quotient be equal? A. The quotient will be equal to the dividend e. g. $9 \div 1 = 9$, therefore

(a) $\frac{1}{2} \div 1 = \frac{1}{2}$.

(b) $\frac{1}{2} \div \frac{1}{3}$

Q. How does the divisor in (b) compare with the divisor in (a)? A. It is eight times as small.

Q. When the dividend remains the same, as it does in (a) and (b) what change will there be in the quotient if the divisor be made eight times as small? A. The quotient will be eight times as large, that is the quotient

in (a) should be multiplied by 8 to get the quotient in (b) thus (b) $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times 8 = 4$. (c) $\frac{1}{2} \div \frac{1}{3}$.

Q. How does the divisor in (c) compare with the divisor in (b)? A. It is five times as large.

Q. When the dividend remains the same as it does in (b) and (c) how will the quotient be changed by making the divisor five times as large? A. The quotient will be made five times as small, that is, the quotient in (b) should be divided by five to get the quotient in (c) thus $\frac{1}{2} \div \frac{1}{3} = 4 \div 5 = \frac{4}{5}$, therefore $\frac{1}{2} \div \frac{1}{3} = \frac{4}{5}$.

After several such quotations are worked examine the work in each case and it will be found that to divide one fraction by another fraction, the numerator of the dividend is multiplied by the denominator of the divisor to get the numerator in the quotient and that the denominator of the dividend is multiplied by the numerator of the divisor to get the denominator in the quotient. By a few questions the class may be led to see that if the terms of the divisor are inverted the rule for multiplying a fraction by a fraction will give the correct quotient; thus $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times \frac{3}{1} = \frac{3}{2}$.

To multiply a whole number by a fraction e. g. $24 \times \frac{1}{3}$. Express the 24 as a fraction thus $\frac{24}{1}$ and apply the rule for multiplying two fractions; thus $24 \times \frac{1}{3} = \frac{24}{1} \times \frac{1}{3} = \frac{24}{3} = 8$.

By questioning the following rule may be deduced: Multiply the whole number by the numerator of the fraction and divide the result by the denominator of the fraction, or when the denominator of the fraction is a factor of the whole number divide the whole number by the denominator of the fraction and multiply the result by the numerator of the fraction.

If you have a task worth doing,
Do it now!
In delay there's danger brewing,
Do it now!
Do not be a "by-and-byer,"
And a sluggish patience-trier!
If there's aught you would acquire,
Do it now!

QUEEN'S
UNIVERSITY
KINGSTON - ONT.
HOME STUDY
AND
Summer School
Work for Degree in Arts Faculty.
Register before May 1st
Summer School, July 7—August 15
Languages, Mathematics, History
and Science.
Write for Information to
GEO. Y. CHOWN, Registrar.