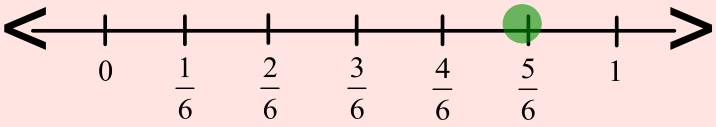
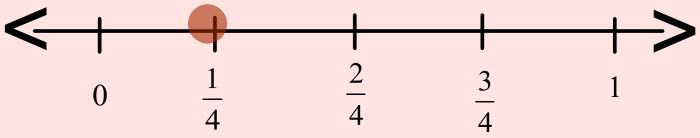
Section 3.6 - Dividing a Fraction by a Fraction

~~Number Lines~~

$\frac{5}{6} \div \frac{1}{4}$ How many one-fourths are in five-sixths?

Mark off five-sixths on a number line. Also mark off one-fourth on a number line.





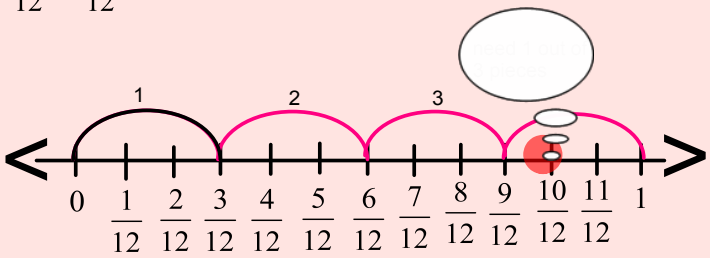
Convert fractions to common denominators first!

Common Denominator is 12

$$\frac{5}{6} = \frac{10}{12} \text{ and } \frac{1}{4} = \frac{3}{12}$$

$$\frac{5}{6} \div \frac{1}{4} \text{ is the same as } \frac{10}{12} \div \frac{3}{12}$$

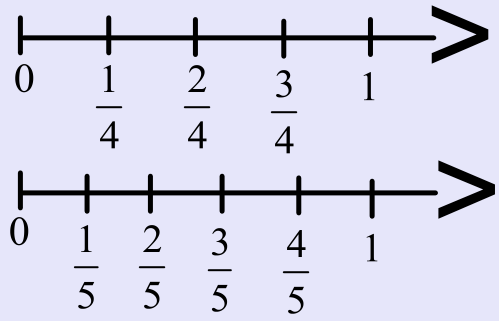
$\frac{10}{12} \div \frac{3}{12}$ How many three-twelfths are in ten-twelfths?



$$\frac{5}{6} \div \frac{1}{4} = 3\frac{1}{3}$$

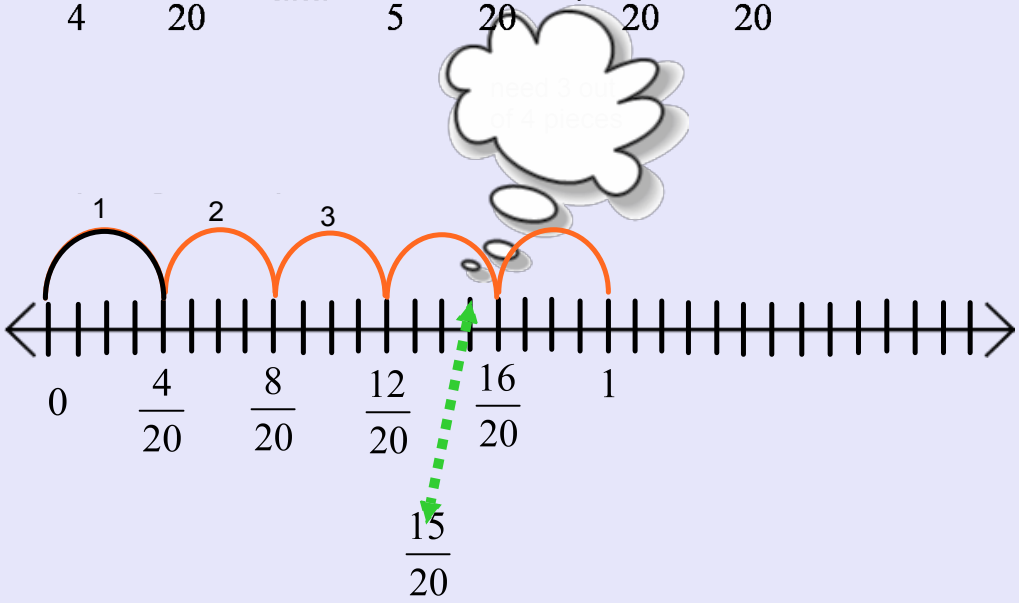
$\frac{3}{4} \div \frac{1}{5}$ How many three-fourths are in one-fifths?

Mark off three-fourths on a number line.
Mark off one-fifth on a number line.



Find a common denominator for 4 and 5 - 20

$\frac{3}{4} = \frac{15}{20}$ *and* $\frac{1}{5} = \frac{4}{20} \Rightarrow \frac{15}{20} \div \frac{4}{20}$



Answer: $\frac{3}{4} \div \frac{1}{5} = 3\frac{3}{4}$

2) Multiply by the reciprocal

Steps:

- ☆ Keep the first fraction the same
- ☆ Change division to multiplication
- ☆ Flip the second fraction (reciprocal)
- ☆ Use multiplication rules, reducing before you multiply

Rule for Dividing with Fractions...

1) $\frac{3}{4} \div \frac{1}{6}$

$\frac{3}{4} \times \frac{6}{1}$ ⟷ Multiply by the reciprocal (flip the second fraction)

$\frac{\cancel{3}^{\,2}}{\cancel{4}} \times \frac{\cancel{6}^{\,3}}{1}$ ⟷ Cross reduce, if possible

$= \frac{9}{2}$ ⟷ Multiply Numerators / Multiply Denominators

$= 4\frac{1}{2}$ ⟷ Reduce/Simplify!

2) $\frac{7}{8} \div \frac{2}{3}$

$\frac{7}{8} \times \frac{3}{2}$ ← Can't cross reduce, so we multiply the numerators and the denominators

$= \frac{21}{16}$ ← Can't reduce the fraction, so we simplify

$= 1\frac{5}{16}$