Standard 4.NF.1 Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

Please note: Denominators for fourth grade are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.

Key elements of the standard: Multiplying by one using visual representations such as number lines, bar models, and area models, will create equivalent fractions.

Area Model: Multiplying by one illustrates how the area is maintained yet, the size of the pieces are different.

The whole is the rectangle, measured by area. The red rectangle shows 2/3 of the area. The blue rectangle shows 4/4 of the area. When the red rectangle and the blue rectangle are multiplied (the vertical dimension x horizontal dimension), the resulting area is the purple rectangle. The purple area covers the same space as the red area, yet you can still see the multiplication because now there are 12 total pieces in the whole, and 8 pieces
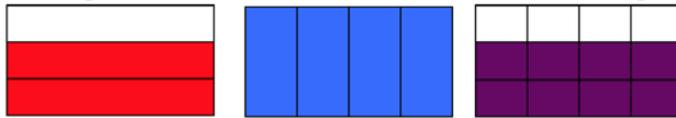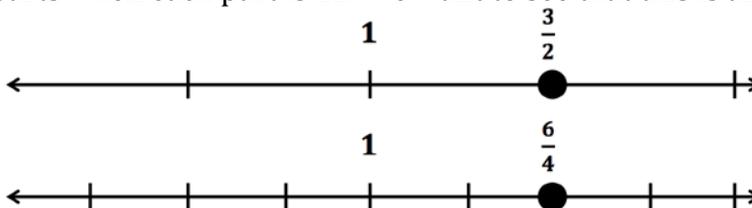

$$\frac{2}{3} = \frac{4}{4}\,x\,\frac{2}{3} = \frac{4\,x\,2}{4\,x\,3} = \frac{8}{12}$$

are purple.

Number Line: Multiplying by one illustrates how the location of the fraction does not change and shows that its relationship to the number does not change. For fractions larger than one number lines are helpful representations.

32 is 3 parts when each part is 12. We want to see that this is also 2 x 3 parts when each

$$\frac{3}{2} = \frac{2}{2}\,x\,\frac{3}{2} = \frac{2\,x\,3}{2\,x\,2} = \frac{6}{4}$$

part is
12 x 2 . Divide each of the intervals of length ½ into 2 parts of equal length. There are 2 x 2 parts of equal length in the unit interval, and 32 is 2 x 3 of these. Therefore 32 = 64

Bar model: Is a linear representation of the area model and combines aspects of both the number line and area model. The size of the overall fraction remains the same. The partitions increase in number, yet decrease in size as the numerator and denominator are multiplied.

The whole is represented with equal sized bars. In order to multiply the fraction, the number in the numerator and denominator partitions each unit fraction in the whole.

$\frac{1}{2}$	

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

12 = 33 x 36 = 3 x 13 x 2 = 36