



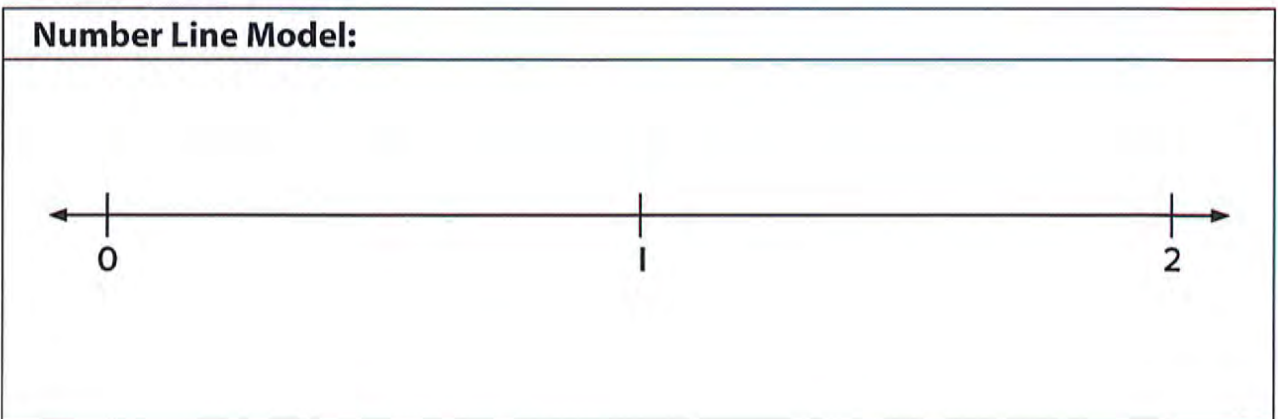
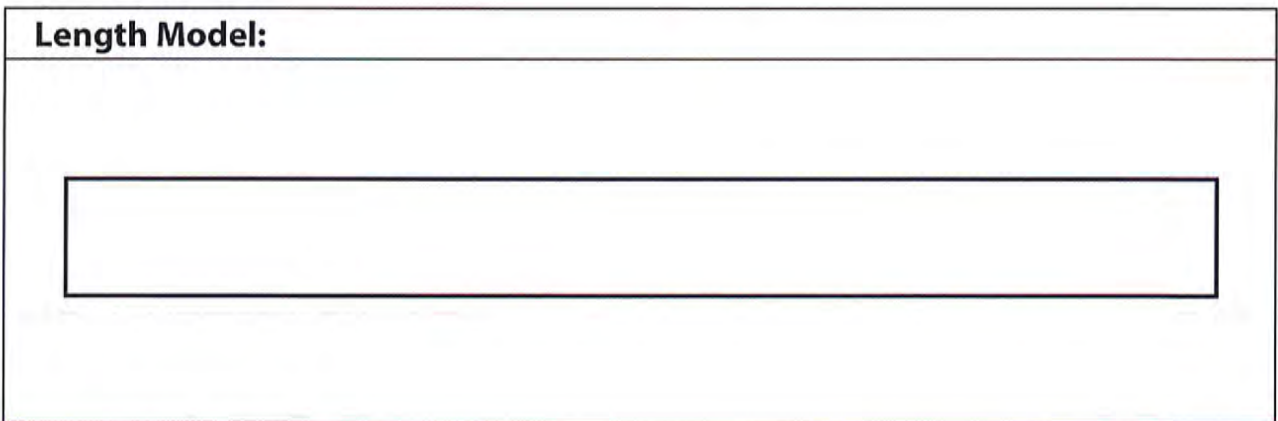
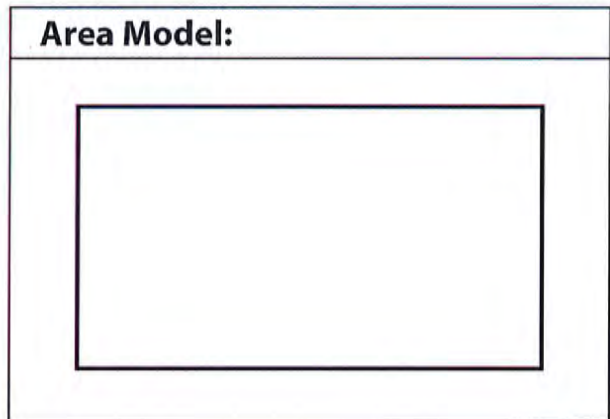
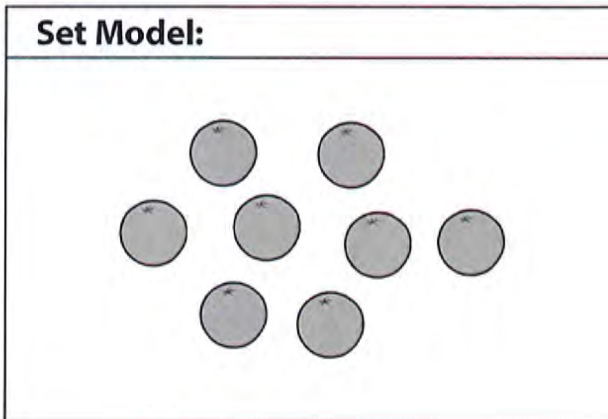
Fractions: From Misunderstanding to Deep Understanding

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Show $\frac{1}{4}$ in each of these models.

For each model, consider the following questions:

- What is the whole?
- What does equal-sized mean?
- What does the fraction indicate?
- What attribute is the focus?



Representing Fractions

Teachers and students need to consider the following:

- The type of quantity (continuous or discrete?) that the model is intended to represent.
- How the whole is defined.
- What equal-sized means in the model.
- What the fraction indicates.



Representing Fractions

Set Model



The number – a discrete (countable) quantity

The whole is determined by a defined **count** of a collection or set.

The **same number** of items represents equal-sized parts.

The fraction indicates the count of objects in the subset compared to the defined set of objects.



Representing Fractions

Area Model



The area – a continuous (measurable) quantity

The whole is determined by the defined **area** or region.

The **same area** represents equal-sized parts.

The fraction indicates the area of the part compared to the area of the whole.



Representing Fractions

Length Model



The length – a continuous (measurable) quantity

The whole is determined by a defined **length**.

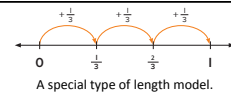
The **same length** represents equal-sized parts.

The fraction indicates the length of the part compared to the length of the whole.



Representing Fractions

Number Line Model



The distance – a continuous (measurable) quantity

The whole is determined by a unit of **distance** from 0 to 1.

The **same distance** represents equal-sized parts.

The fraction indicates the location of a point in relation to the distance from 0 with regard to the defined unit.



Representing Fractions

Type of Model	Type of Quantity	Whole	Meaning of Equal-Sized Parts	What the Fraction Indicates
Set model	discrete	determined by a defined count of a collection or set	same number of items	the count of objects in the subset compared to the defined set of objects
Area model	continuous	determined by a defined area or region	same area	the area of the indicated part compared to the area of the indicated whole
Length model	continuous	determined by a defined length	same length	the length of the indicated part compared to the length of the indicated whole
Number line model	continuous	unit of distance from 0 to 1	same distance	the location of a point in relation to the distance from 0 with regard to the defined unit