Shapes Within Shapes

Model how stars, galaxies, and galaxy clusters fit together.

E.6.8.2 "Use graphical displays or models to explain the hierarchical structure (stars, galaxies, galactic clusters) of the universe."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB In paragraph 1, underline the sentence starting "A star is" and the sentence starting "A galaxy is." In paragraph 2, number only the three bold terms from smallest level (1) to largest (3).

Looking Toward the Coma Cluster

1. Imagine aiming a telescope toward the Coma Cluster, a gathering of galaxies far beyond the Milky Way. One member is a galaxy called NGC 4889. Its light comes from countless stars, too distant for a classroom telescope to show one by one. A star is a huge ball of hot gas that gives off its own light. A galaxy is a vast system of stars, gas, dust, and other matter held together by gravity. The galaxy's bright patch may look like one object, but it contains many stars.

2. In a size model, one **star** is a single dot. A **galaxy** is a larger shape filled with many dots, and a **galaxy cluster** is an even larger shape holding many galaxies. This is a model of what belongs inside what, not a map of true sizes or distances. In the Coma Cluster, NGC 4889 is one of the galaxies. A dot inside NGC 4889 could stand for one of its stars. Drawn shapes help you follow the levels without seeing every star.

3. A cluster contains multiple galaxies, not just one enormous galaxy. In a nested sketch, put tiny dots inside several galaxy outlines, then place those outlines inside one cluster outline. If a dot sits outside all the galaxy outlines, the sketch fails to show which galaxy contains that star. The outlines do not mean galaxies have hard walls. They simply mark groups for the reader. A label beside each level can make the order clear even when a drawing is small.

2 ANSWER WITH EVIDENCE

Use the passage

1. In a nested model of the Coma Cluster, where would you place a dot for a star in NGC 4889?

2. A model shows several galaxy outlines inside one larger outline. What should the larger outline be labeled? Explain your choice.

3. A dot is inside the cluster outline but outside every galaxy outline. Why does this model fail to show that the dot is a star in NGC 4889?

4. Why can't you use the sizes of the shapes in this nested model to find the real distances between stars and galaxies?

3 YOUR TURN

Your own words

In the box, draw a labeled nested model of a made-up Lantern Cluster containing two galaxies, Reef Galaxy and Pebble Galaxy. Show at least three stars in each galaxy, then write one sentence explaining what your model shows and one sentence explaining what it cannot show accurately.

ANSWER KEY

Shapes Within Shapes

GRADE 6 · E.6.8.2

PART 1 · READ AND MARK

In paragraph 1, underline the sentence starting "A star is" and the sentence starting "A galaxy is." In paragraph 2, number only the three bold terms from smallest level (1) to largest (3). Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In a nested model of the Coma Cluster, where would you place a dot for a star in NGC 4889?	**Inside the outline for NGC 4889, which is inside the outline for the Coma Cluster.**
2	A model shows several galaxy outlines inside one larger outline. What should the larger outline be labeled? Explain your choice.	**Galaxy cluster, because a galaxy cluster contains multiple galaxies.**
3	A dot is inside the cluster outline but outside every galaxy outline. Why does this model fail to show that the dot is a star in NGC 4889?	**The dot must be inside the NGC 4889 outline to show that the star belongs to that galaxy.**
4	Why can't you use the sizes of the shapes in this nested model to find the real distances between stars and galaxies?	**The shapes show what belongs inside what, not true sizes or distances.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Sketch: One outline labeled Lantern Cluster encloses two separate outlines labeled Reef Galaxy and Pebble Galaxy. Each galaxy outline contains three dots labeled stars.
Written explanation: The dots show stars inside each galaxy, and both galaxies are inside Lantern Cluster. The outlines do not show the true distances between these objects.

Accept any clearly labeled nested model with both galaxies inside the cluster and at least three stars inside each galaxy. The explanation should identify the levels shown and a limit of the model, such as inaccurate sizes or distances.