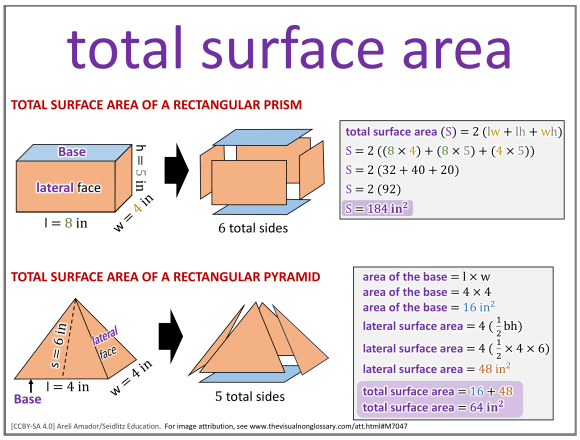
Teacher Guide for the Lesson on **total surface area**

Standard:
7.9(D)

Content Objective:
We can solve problems involving **total surface area** by finding the **areas** of all faces of three-dimensional figures.



Language Objective: Answer the following question in complete sentences using the sentence stem and the key vocabulary of the lesson:

> Why do you think manufacturers/designers consider the **total surface area** of gift boxes?
>
> *I think manufacturers/designers consider the **total surface area** of gift boxes because...*

Other key vocabulary: lateral surface area

By studying this visual, students might:

Notice	Wonder
• The rectangular prism has a Base and lateral faces	• Why do we multiply by 2 in the prism formula?
• The pyramid has a Base and triangular lateral faces	• Do all shapes have the same number of faces?
• The formulas show how to calculate total surface area	• How do you know which measurements to use for each face?
• Each face's area is calculated and then added together	• Why is the pyramid calculated differently than the prism?
• The final answer is written in square units	• When would I use total surface area in real life?

EXTENDING THE DISCUSSION

- After randomly calling on students, if there is anything from this list that was not mentioned, then ask the class, "Did anyone notice...?"
- After students have shared what they notice, ask the class, "Did anyone wonder...?" using the suggestions above or anything else you might think is interesting or relevant to the lesson.

Structured Conversation Prompts

OBSERVATIONAL	RELATIONAL	INFERENTIAL
What is **total surface area**? **Total surface area** is...	How is **total surface area** different from **lateral surface area**? **Total surface area** is different from **lateral surface area** because...	Why do you think manufacturers/designers consider the **total surface area** of gift boxes? I think manufacturers/designers consider the **total surface area** of gift boxes because...

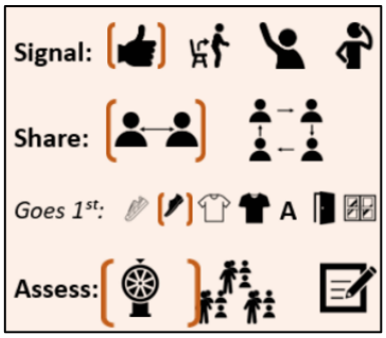
Example Student Responses to the Observational Question

Low-Level	High-Level
Total surface area is adding up all the sides of a shape.	**Total surface area** is the sum of the areas of all the faces of a three-dimensional figure, including the **base** and lateral faces.

RESPONDING TO RESPONSES

Emphasize and celebrate each student's use of the key vocabulary to support a culture of "no wrong answers."

STRUCTURING STUDENT CONVERSATIONS



Have students list observations from the visual as a warm-up, then use the Q-SSS-A process to guide small-group conversations. In the slide decks, brackets can be moved to prepare the structured conversation. In the example to the right, students will be instructed: Q-SSS-A.

- To put a thumb up, then lower their hand when they are ready to answer the question
- To share with their elbow/shoulder partner, and that the student with the darkest shoe will share first
- That they will be randomly called on after the conversation

Here is an example of structuring a conversation with Q-SSS-A.

Note: the inferential question is the same as the language objective. It is recommended that students answer the inferential question in a small-group discussion before answering it individually as the closure or exit ticket of the lesson.

Structured Reading

READING PURPOSE	PAT LIST	POST-READING DISCUSSION
The purpose for reading is to understand the steps for finding **total surface area** so you can determine how much material is needed to cover a new package.	• How each face of a shape is included in total surface area • The role of the Base and how it is calculated • How the lateral surface area contributes to the total • The steps used to combine all areas together • Why finding total surface area is important in real-world situations	How would you find the **total surface area** of the triangular prism package described in the passage? *To find the **total surface area** of the triangular prism, I would first…*

STRUCTURING THE READING

Communicate the purpose of reading to the students and instruct them to make a note every time they see something on the PAT ("Pay Attention To") list. How you have students note items on the PAT list is up to you. This could include:

- Putting an asterisk in the margin
- Underlining text that supports the PAT list
- Putting a comment in the margin

Follow the reading with the post-reading discussion. Structure this discussion using the Q-SSS-A process just like the structured conversations in this lesson.

Note: you might find the relational question is better discussed before or after the reading. This depends on whether the relational question is directly related to the reading or might make connections across units.

DIFFERENTIATING THE READING

You will notice that three different reading passages are provided with this lesson. Look at the shapes in the top-left of each passage to determine the grade level.

BELOW GRADE LEVEL	ON GRADE LEVEL	ABOVE GRADE LEVEL
		
Triangle is bottom-left	*Square is bottom-left*	*Circle is bottom-left*

In a class with students at diverse reading level proficiencies, you can give the appropriate reading passage to different students, while having all students follow the same PAT list and post-reading discussion.