**Grade 6 | Unit 8, Lesson 7**

**Intellectual Preparation Cover Sheet**

**Directions: Complete the IPP Cover Sheet for every lesson due for submission.**

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| **Step** | **Action:** |
| 1. Understand the concept and/or big ideas at play in the lesson and be able to articulate them clearly and crisply. | * Read the entire Lesson Plan and identify the key concepts/big ideas students need to understand. Create a **lesson summary** annotation that describes, in your own words, the purpose of the lesson (why), the key concepts students need to understand (big ideas/what), and how they will come to understand these within the lesson. |
| 1. Do the core tasks of the lesson to develop/refine exemplar work and clear CFS for anticipated strategies. | * Print the classwork and complete this step directly in the student packet for the TAI, INM/TTC problem (include exemplar annotations), and all GP/IP problems. |
| 1. Anticipate misconceptions and create questions/supports to address these misconceptions. | * For each core task, annotate to describe expected errors on the tasks and back pocket questions to respond to these errors * Identify the questions in the TAI debrief and INM/TTC that elicit the most important understandings and annotate with the following:   + The exemplar student responses   + 1-2 misconceptions or errors that could surface in response to these questions   + BPQs and/or the instructional strategy to address these misconceptions. |
| 1. Optional/As needed: Adjust the plan for any individualized AOTY or intellectual preparation goals. | * As determined with coach, you might:   + Script MVP directions into lesson plans   + Script in additional planned investment moves   + Create rapid & batched feedback forms to capture data   + Determine additional points for differentiation (especially for very high and very low performance during the lesson) * If you will meet in person to scrimmage this lesson, your coach may also ask you to submit a proposed practice objective and identify the lesson segment to practice. |
| **Submit annotated plans and any additional work as per IPP expectations in soft copy of LPs to your coach weekly (and at least 48 hours in advance of the IPP meeting). Implement any feedback from coach prior to the phase 2 meeting.** | |
| 1. Rehearse and Refine:    1. Meet with coach to further internalize and practice executing the plan. Refine plan as needed.    2. Refine plan as needed based on practice and/or student exit ticket data.    3. If possible, prior to teaching the day of, analyze student work from TAI administered at end of CR block; select S work to show call to drive TAI debrief discussion to land Fence Posts and key point. | |

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| **Lesson Type: Exercise Based Lesson** |
| **Aim** |
| * SWBAT apply the area formulas for rectangles, squares, triangles, parallelograms and trapezoids in the context of solving real-world problems |
| **Key Point** |
| * Real world situations involving covering a shape require us to use area |
| **Standard** |
| **Solve real-world and mathematical problems involving area, surface area, and volume.**  6.G.1 – Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. |
| **State Test Alignment** |
| *From 2014 NYSE*  Noah wants to make the kite shown below out of cloth.    He wants to determine how much cloth he needs. What is the area, rounded to the nearest square centimeter, of Noah’s Kite?   1. 531 2. 1,063 3. 1,430 4. 2,126 |
| **Assessment** |
| **Exit Ticket:**   1. The Andersons are going on a long sailing trip during the summer. However, one of the sails on their sailboat ripped and they have to replace it. The sail is pictured below. If the sailboat sails are on sale for $2 per square foot, how much will the new sail cost?     2. The New England Patriots are putting down new turf on their football field. Turf costs $10.99 every square yard. If the length of the rectangular football field is 100 yards and the width is half of the length, how much will it cost to put turf on the entire field?  **Student Work:**   * + - 1. The new sail will cost $96   A = ½bh Cost - $2 per sq. ft.  A = ½(8)(12) 2 x 48 = 96  A = 4(12)  A = 48 sq. ft.   * + - 1. It will cost $54,950   *Model is drawn with dimensions labeled*  A = l x w width= ½(100) = 50 yd Cost - $10.99 per sq. yd  A = 100 x 50 5,000 x 10.99 = $54,950  A = 5,000 sq yd |
| **Connection to Learning and Conceptual Understanding** |
| * How does this lesson connect to previous lessons?   + In the previous six lessons, students derived the area formulas for parallelograms, triangles, and trapezoids. In this lesson, students apply those formulas to solve real world problems involving area. * What do we want every student to take away or do as a result of this lesson? How will a teacher know if students have met this goal?   + Understand: As a result of this lesson, every student understands that they should apply area formulas to solve real world problems involving covering. When students are confronted with problems requiring them to cover a wall with paint, a lawn with sod, or present with wrapping paper, they understand that they have to apply the appropriate area formula to solve the problem.   + Do: As a result of this lesson, every student is able to solve real world problems involving measuring the area of trapezoids, triangles, parallelograms, and rectangles using the appropriate area formula. |
| **How** |
| * Key Strategy/ies   + Annotate the problem with margin notes   + Model is drawn (as needed) and labeled with dimensions   + Create a plan   + Write the appropriate formula and calculate the area   + Complete any additional steps   + Write an answer statement * CFS for top quality work   + Problem is annotated with margin notes to provide additional meaning   + Model is drawn accurately and labeled   + Plan is created   + Formula is written   + All calculations are shown, neatly organized, and labeled   + Answer statement is provided |
| **Anticipated Misconceptions and Errors** |
| * Ss may misidentify the bases and/or height * Ss may confuse area and perimeter problems * Ss may not determine all necessary steps to solve problem |
| **Key Vocabulary** |
| * **Area:** Measures the number of square units that cover the inside space of a 2-dimensional figure. * **Perimeter:** Measures the distance around a shape in units. * **Dimension**: Measurement in length, width and thickness (i.e. length, width, base, height) |
| **Materials** |
| * Handout * Calculators (optional) |

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| **Opening – Prompt for work time, Circulate, Debrief, Synthesis, & Frame – 12-15 min** |
| **THINK ABOUT IT!**  For each scenario below, identify the correct application (area, perimeter, or volume).   1. Fran is putting a fence around her garden and needs to figure out how many feet of fencing she needs 2. Alonso is painting his wall and needs to figure out how many square feet he will be painting 3. Shannon is filling her fish tank with water and needs to figure out the capacity of the tank 4. Chris is putting mulch over his entire yard and needs to know how many square feet of mulch he needs 5. Ayanna is putting a rug over her entire living room floor and needs to know the number of square feet she is covering   For all of the scenarios that you labeled with area, explain why you chose area. |
| **Prompt for Work Time (<30 sec)**  You will have 5 minutes to work on this Think About It. Please use the entire 5 minutes. Please show and explain all of your thinking clearly.  **Circulate (≤ 5 min)**  While circulating, collect data on the following:   |  |  | | --- | --- | | **Scholar thinking (correct and erroneous)** | **Scholar Initials - Work to show call** | | S correctly labels a-e with P, A, and V |  | | S incorrectly labels some of the scenarios |  | | S explains that s/he applied area when the problem involved ‘covering’ a space |  |   **Debrief (≤ 8-12 min)**  **Key Point:** *Real world situations involving covering a shape require us to use area*  For each scenario, have Ss show a 1 (area), 2(perimeter), or 3(volume)  **For scenario A, how did you label it? Vote. Why? CC.** SMS: I labeled it perimeter because the fence is going around the garden which represents the distance around the shape, or the perimeter.  **For scenario B, how did you label it? Vote. Why? CC.** SMS: I labeled it area because he is covering the entire surface with paint so you would need to know the amount of space inside the shape of the wall, or the area.  **For scenario C, how did you label it? Vote. Why? CC.** SMS: I labeled it volume because finding the capacity of a 3D figure (or the number of cubic units needed to fill it) is the same as its volume.  **For scenario D, how did you label it? Vote. Why? CC.** SMS: I labeled it area because he is covering his entire yard so we need to know the amount of space inside of the yard, or the area.  **For scenario E, how did you label it? Vote. Why? CC.** SMS: I labeled it area because she is covering the entire floor so she needs to know the amount of space inside of the floor, or the area.  **For B, D and E, why do they all require area to solve? TT. Discuss. CC**. SMS: All three scenarios require area to solve because you are looking for the number of square units needed to cover a shape.  **BPQ: What is similar about these scenarios?**  **BPQ: What different about these scenarios from the others?**  **Key Learning Synthesis (≤ 2 min)**  **Key Point**: *Real world situations involving covering a shape require us to use area*  **Let’s form our key point for the day. With your partner, come up with a key point about when we apply area to solve real world problems. TT. CC.**  **Frame (≤ 30 sec)**  You all just came up with today’s key point. Real world situations involving covering a shape require us to use area. Let’s apply our key point to a more rigorous problem! |

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| **Interaction with New Material – 10 min** |
| **Post the Key Point in visible place for student reference:** Real world situations involving covering a shape require us to use area.  50 ft.  30 ft.  25 ft.  27 ft.  27 ft.  Let’s use our key point from the TAI and apply it to solve an advanced problem!  **Ex. 1)** Bob the builder is constructing a lot with the shape and dimensions below.  Part A: Before starting to build, he ropes off the entire lot to ensure no one walks on it during construction. How many feet of rope does he need?  Part B: After roping off the lot, he covers the entire lot with a layer of cement. Cement costs $4 per bag and each bag covers 20 sq. ft. How much does he need to spend on cement?  **Understand**  T directs all Ss to read the prompt without making annotations.  **Without using numbers, what is happening in this problem? CC.** SMS: A builder is constructing a lot and roping it off as well as covering it with cement.  T directs all Ss to read the prompt a second time and annotate for meaning.  **What is our goal? CC**. SMS: Our goal is to find out how many feet of rope he needs as well as how much money he will spend on cement.  **What information is known? CC.** SMS: We know Bob is putting a rope around the lot and that he is covering the lot with cement. The bags of cement each cover 20 sq. ft. and cost $4 per bag.  **What are we trying to figure out? CC.** SMS: We are trying to find the perimeter of the shape to know how much rope he needs to surround the lot. And, we are trying to find the area of the lot to figure out how many bags of cement he will need as well as the cost.  **Why do we have to apply two different concepts for parts A and B? CC.** SMS: We have to apply perimeter because we are measuring the distance around the lot to put the rope up. Then, we have to apply area for part B because the lot is being covered with cement, so we have to measure the amount of space inside the figure.  **Plan**  **Based on our understanding of the problem, what is our plan for solving this problem? TT. CC.** SMS: Measure the perimeter. Find the area. Find the number of cement bags. Find the cost of the cement.  **Estimate/Predict**  **N/A**    **Solve**  **Let’s start using our plan. What should we do first? CC.** SMS: We should find the perimeter of the figure to determine the amount of rope he needs.  **On your own, do that.***T circulates and looks for common error. Ss may include 25 feet in the perimeter. If this occurs, show call and debrief. Otherwise, quickly debrief an exemplar.*  **What should we do next? CC.** SMS: We should find the area of the trapezoid by using the area formula. **On your own, take 1 minute to find the area of the trapezoid.**  *If a common error arises, show call two pieces of work – correct and common error. Otherwise, just show the exemplar work.* **Is this work correct? Why?**  **Now that we have the area of the trapezoid, what should we do? CC.** SMS: We should divide the area by 20 to figure out how many bags of cement we need. We have to divide because we know the total and group size, but we need to figure out the number of groups. The area represents the total, the 20 represents the group size, and the number of bags is the number of groups. **On your own, take 30 seconds to do that.**  *If a common error arises, show call two pieces of work – correct and common error. Otherwise, just show the exemplar work.* **Is this work correct? Why?**  **What next? CC.** SMS: Now that we know the number of bags, we need to determine the total cost. We can do that by multiplying 50 bags by $4 per bag. **What do we get? Call it.** SMS: $200!  **What is our answer statement?Everyone write. CC.** SMS: Bob needs to spend $200 on cement.  **Check**  **N/A**  **Key Learning Synthesis**  **How did we apply our key point for today to solve this example problem?** TT. CC. SMS: We applied our key point by using the context to determine whether or not we were coving a shape and therefore whether we needed to find area or not.  **Frame for PP/IP**  You will have 5 minutes to work with a partner on PP. Today during PP and IP, make sure your work meets each of the following criteria:   * + Problem is annotated with margin notes to provide additional meaning   + Model is drawn accurately and labeled   + Plan is created   + Formula is written   + All calculations are shown, neatly organized, and labeled   + Answer statement is provided |

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

UNIT 8 LESSON 7

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| AIM: | SWBAT solve area problems in real world contexts |

**THINK ABOUT IT!**

For each scenario below, identify the correct application (area, perimeter, or volume).

1. Fran is putting a fence around her garden and needs to figure out how many feet of fencing she needs
2. Alonso is painting his wall and needs to figure out how many square feet he will be painting
3. Shannon is filling her fish tank with water and needs to figure out the capacity of the tank
4. Chris is putting mulch over his entire yard and needs to know how many square feet of mulch he needs
5. Ayanna is putting a rug over her entire living room floor and needs to know the number of square feet she is covering

For all of the scenarios that you labeled with area, explain why you chose area.

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Key Point

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| Real world situations involving \_\_\_\_\_\_\_\_\_\_\_\_\_\_ a shape require us to use area. |

**Interaction with New Material**

*Ex. 1)* Bob the builder is constructing a lot with the shape and dimensions below.

50 ft.

30 ft.

25 ft.

27 ft.

27 ft.

Part A: Before starting to build, he ropes off the entire lot to ensure no one walks on it during construction. How many feet of rope does he need?

Part B: After roping off the lot, he covers the entire lot with a layer of cement. Cement costs $4 per bag and each bag covers 20 sq. ft. How much does he need to spend on cement?

**PARTNER PRACTICE**

* **CFS for top quality work**
  + Problem is annotated
  + Model is drawn accurately and labeled
  + Plan is created
  + Formula is written
  + All calculations are shown /Answer statement is provided

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| *Bachelor Level* |

1. A living room is getting new carpet and is in the shape of a parallelogram, pictured below.

20’

15’

12’

How much will it cost for new carpet if the entire floor is covered and each square foot of carpet costs $2?

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| *Master Level* |

1. Find the area of the deck around this pool. The deck is the white area in the diagram.



**INDEPENDENT PRACTICE**

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| *Bachelor Level* |

1. Teissia is painting ¼ of the wall in her bedroom blue. The wall is shaped like a triangle with a base of 10 feet and a height of 12 feet. How many square feet of the entire wall will she paint blue?

* **CFS for top quality work**
  + Problem is annotated
  + Model is drawn accurately and labeled
  + Plan is created
  + Formula is written
  + All calculations are shown /Answer statement is provided

What concept did you apply to solve problem 1? Why?

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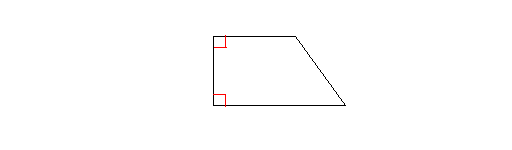
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| *Master Level* |

1. A student is working over the weekend painting fences to earn money. Each fence post is shaped like the one below and they all have the same dimensions.



10 feet

16 feet

12 feet

12 feet

4 ft.

3.5 ft.

2 ft.

On Saturday, he is painting the front of a fence with 20 identical fence posts. He needs to buy paint at the hardware store that charges $5.99 per gallon. If each gallon can be used to paint 25 square feet, how much will he spend on paint to paint the entire fence?

1. Mr. Jones is retiling his floor that is shaped like a trapezoid. The distance between the parallel bases is 10 m. The shorter base is half the length of the longer side, which is 12 m. If each tile is 1 meter by 1 meter in area, how many tiles will Mr. Jones need to retile his floor?

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| *PhD Level* |

4. Below is a drawing of a wall that is to be covered with either wallpaper or paint. It is 8 ft. high and 16 ft. long. The window, mirror, and fireplace will not be painted or papered. The window measures 18 in. by 14 ft. The fireplace is 5 ft. wide and 3 ft. high, while the mirror above the fireplace is 4 ft. by 2 ft. 

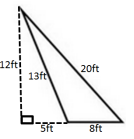
The wallpaper is sold in rolls that are 2 ft. wide and 21 ft. long, and cost $11.99 per roll. A gallon of paint covers $50 sq. ft. and is on sale for $5.99 per gallon. Paint needs to be applied on the wall twice so that there are two coats of paint. Is it more expensive to cover the wall with wall paper or paint? By how much?

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**EXIT TICKET**

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| Self-assessment | I mastered the learning objective today. | I am almost there. | Need more practice and feedback. |
| Teacher feedback | You mastered the learning objective today. | You are almost there. | You need more practice and feedback. |

1. The Andersons are going on a long sailing trip during the summer. However, one of the sails on their sailboat ripped and they have to replace it. The sail is pictured below. If the sailboat sails are on sale for $2 per square foot, how much will the new sail cost?



* **CFS for top quality work**
  + Problem is annotated
  + Model is drawn accurately and labeled
  + Plan is created
  + Formula is written
  + All calculations are shown /Answer statement is provided

1. The New England Patriots are putting down new turf on their football field. Turf costs $10.99 every square yard. If the length of the rectangular football field is 100 yards and the width is half of the length, how much will it cost to put turf on the entire field?

* **CFS for top quality work**
  + Problem is annotated
  + Model is drawn accurately and labeled
  + Plan is created
  + Formula is written
  + All calculations are shown /Answer statement is provided