

## MAT.07.PT.4.REMOD.A.414

Sample Item ID:	MAT.07.PT.4.REMOD.A.414
Title:	Bedroom Remodeling
Grade:	07
Primary Claim:	<p><b>Claim 4: Modeling and Data Analysis</b> Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.</p>
Secondary Claim(s):	<p>Claim 2: Problem Solving Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.</p> <p>Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.</p> <p>Claim 3: Communicating Reasoning Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.</p>
Primary Content Domain:	<b>Geometry</b>
Secondary Content Domain(s):	Ratios and Proportional Relationships Measurement and Data
Assessment Target(s):	<p>4 A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.</p> <p>4 B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.</p> <p>1 E: Draw, construct, and describe geometrical figures and describe the relationships between them.</p> <p>1 F: Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</p> <p>1 A: Analyze proportional relationships and use them to solve real-world and mathematical problems.</p> <p>1 H (grade 6): Solve real-world and mathematical problems involving area, surface area, and volume.</p> <p>1 A (grade 6): Understand ratio concepts and use ratio reasoning to solve problems.</p> <p>1 G (grade 5): Convert like measurement units within a given measurement system.</p> <p>1 E (grade 4): Use place value understanding and properties of operations to perform multi-digit arithmetic.</p>

## Grade 7 Mathematics Sample PT Form



	<p>3 F: Base arguments on concrete referents such as objects, drawings, diagrams, and actions.</p> <p>2 A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.</p> <p>2 C: Interpret results in the context of a situation.</p>
Standard(s):	7.G.1, 7.G.4, 7.G.6, 7.RP.3, 6.G.1, 6.RP.2, 5.MD.1, 4.NBT.4
Mathematical Practice(s):	1, 2, 3, 4, 6, 7, 8
DOK:	3
Item Type:	PT
Score Points:	15
Difficulty:	H
How this task addresses the "sufficient evidence" for this claim:	The student will use the content for the domains of geometry, ratios and proportional relationships, and measurement and data to explore methods for remodeling a bedroom. The student will use the content for the domains of geometry, ratios and proportional relationships, and measurement and data to make a scale drawing.
Target-Specific Attributes (e.g., accessibility issues):	
Stimulus/Source:	<p><a href="http://wiki.answers.com/Q/What_is_the_average_cost_to_install_hardwood_flooring">http://wiki.answers.com/Q/What is the average cost to install hardwood flooring</a></p> <p><a href="http://wiki.answers.com/Q/What_is_the_average_cost_to_paint_the_interior_of_a_home">http://wiki.answers.com/Q/What is the average cost to paint the interior of a home</a></p> <p><a href="http://www.askmehelpdesk.com/construction/interior-painting-labor-cost-210550.html">http://www.askmehelpdesk.com/construction/interior-painting-labor-cost-210550.html</a></p>
Notes:	Multi-part task
Task Overview:	<p>Students will use geometry and proportional reasoning to remodel a bedroom.</p> <p>Calculators may be used throughout the task.</p>
Teacher Preparation/Resource Requirements:	Students will need scannable 8.5-inch by 11-inch graph paper, a ruler, and a compass.
Teacher Responsibilities During Administration:	Monitor individual student work; provide resources as necessary.
Time Requirements:	Two scored sections of the task totaling no more than 100 minutes.

Prework: (Prior to the start of Session 1)

In preparation for this task, the teacher will guide a brief class discussion about the considerations that need to be made when remodeling a bedroom. The teacher will explain that “wood flooring” is any product manufactured from timber that is designed as a permanent covering for a floor. The teacher will explain that a “coat of paint” is a thin layer of paint covering a surface. The teacher will explain that for some types of paint, more than one coat of paint may be applied to the surface that is being painted. The teacher will explain that the budget for a remodeling project must account for the cost of all materials used as well as the cost of labor.

Prework: (Prior to the start of Session 2)

The teacher will explain that a “floor plan” for a room is a scale diagram showing the view from above of the relationship between the pieces of furniture in the room. The teacher will explain that an “heirloom” is a valued possession passed down through the generations of a family.

## **Remodeling a Bedroom**

### **Session 1**

You are remodeling a bedroom for a client. Your job will include installing new flooring, painting the walls, buying new furniture, and then arranging the new furniture in the bedroom. Your client has set a total budget of \$4500 for this project.

#### ***Part A***

#### **New Flooring**

The bedroom floor is in the shape of a rectangle. It is 15 feet long and 12 feet wide.

Your client has requested that you install either oak flooring or maple flooring.

The oak flooring costs \$6.75 per square foot for materials.

The maple flooring costs \$8.00 per square foot for materials.

The cost you charge for labor will be the same for either flooring option.

How much money will your client save if you install oak flooring instead of maple flooring? Explain or show your reasoning. You may use diagrams, drawings, or equations as well as words.

**Part B****Paint the Walls**

The height of the bedroom is 9 feet. There are 4 rectangular windows in the room that are each 30 inches wide and 36 inches high. You will **not** paint the windows, the floor, or the ceiling. You will paint the rest of the room, including the door. Your client likes two colors, *Light-at-Dawn* and *Cloudy Sunrise*. Both colors are only available in 1-gallon cans.

*Light-at-Dawn*: The regular price of a 1-gallon can is \$24, but it is on sale for 25% off the regular price. This type of paint requires 2 coats.

*Cloudy Sunrise*: The price of a 1-gallon can is \$28. This type of paint only requires 1 coat.

Each gallon of paint will cover an area of about 350 square feet.

Your client has stated that if the cost for using *Cloudy Sunrise* is no more than 5% greater than the cost for using *Light-at-Dawn*, then you should use *Cloudy Sunrise*.

Which paint color should you use? Explain or show your reasoning. You may use diagrams, drawings, or equations as well as words.

**Part C****Estimate the Total Cost for  
Materials and Installation**

Your client has requested an estimate of the total cost of installing new flooring and painting the walls.

Make a detailed estimate of the total cost of installing new oak flooring and painting the walls. The total cost is the sum of the costs for materials and labor. You must decide how much you will charge the client for your labor.

- A reasonable labor charge for installing flooring is between \$2.50 and \$5.00 per square foot.
- A reasonable labor charge for painting the walls is between \$0.75 and \$1.50 per square foot.

How much money will remain from your client's original budget of \$4500 after the total cost of installing new oak flooring and painting the walls has been subtracted?

\$

**End of Session 1**

**[You will not be allowed to return to Session 1 after clicking "Submit."]**

## Session 2

New Furniture Catalog

### **Part D**

### **Buy New Furniture**

After you installed new flooring and painted the walls, your client states that there is \$2347 remaining in the budget to buy new furniture.

Your client would like you to spend as much of the remaining budget as possible.

Click on the "New Furniture Catalog" link above to shop for new furniture. You must buy the following:

- 1 bed set
- 1 mattress set
- 1 dresser
- 1 nightstand
- 1 desk

The bed set and the mattress set must be the same size.

List the pieces of furniture you will buy from the catalog.

How much money will remain in your client's budget after you purchase the furniture? Explain how you know you will spend as much of the remaining budget as possible.

**Part E**

**Floor Plan**

Make a scale drawing of the bedroom floor on the graph paper that was provided to you. Include the dimensions in your drawing. You may use any scale you like, but the entire scale drawing must fit on one piece of graph paper. Be sure to indicate the scale you use.

**Part F**

**Arrange the Furniture**

Decide how you will arrange the new furniture, leaving room for an heirloom rug in the shape of a circle with a diameter of 6 feet. There can be no furniture arranged on top of the rug.

Make a floor plan by representing the new furniture on your scale drawing of the bedroom. Label each piece of furniture and include the dimensions in your drawing.

Explain how you know that there will be room for the heirloom rug.

**End of Session 2**

*Sample Top-Score Response:*

**Session 1**

**Part A:** The total area of the floor is  $15 \times 12 = 180$  square feet.

The cost of the oak flooring will be  $180 \times 6.75 = \$1215$

The cost of the maple flooring will be  $180 \times 8 = \$1440$

The client will save  $\$1440 - \$1215 = \$225$  if I install oak flooring.

**Part B:** The total wall area to be painted is  
 $(2 \times 15 \times 9 + 2 \times 12 \times 9) - (4 \times 2.5 \times 3) = 456$  square feet.

Light-at-Dawn: The interior decorator will need to buy 3 gallons of paint for a total cost of  
 $3 \times 0.75 \times 24 = \$54$ .

Cloudy Sunrise: The interior decorator will need to buy 2 gallons of paint for a total cost of  
\$56.

I can use Cloudy Sunrise.  $\frac{56 - 54}{54} \approx 0.037$ , so Cloudy Sunrise will only cost about 3.7% more than Light-at-Dawn.

**Part C:**

I will charge the client \$3.00 per square foot to install the flooring and \$0.75 per square foot to paint the walls.

The total cost to install oak flooring and paint the walls will be \$2153.00.

The cost to install the oak flooring will be  $1215 + 180 \times 3 = \$1755$

The cost to paint the walls will be  $56 + 0.75 \times 456 = \$398$

$1755 + 398 = \$2153$

The client will have \$2347.00 left in the budget.

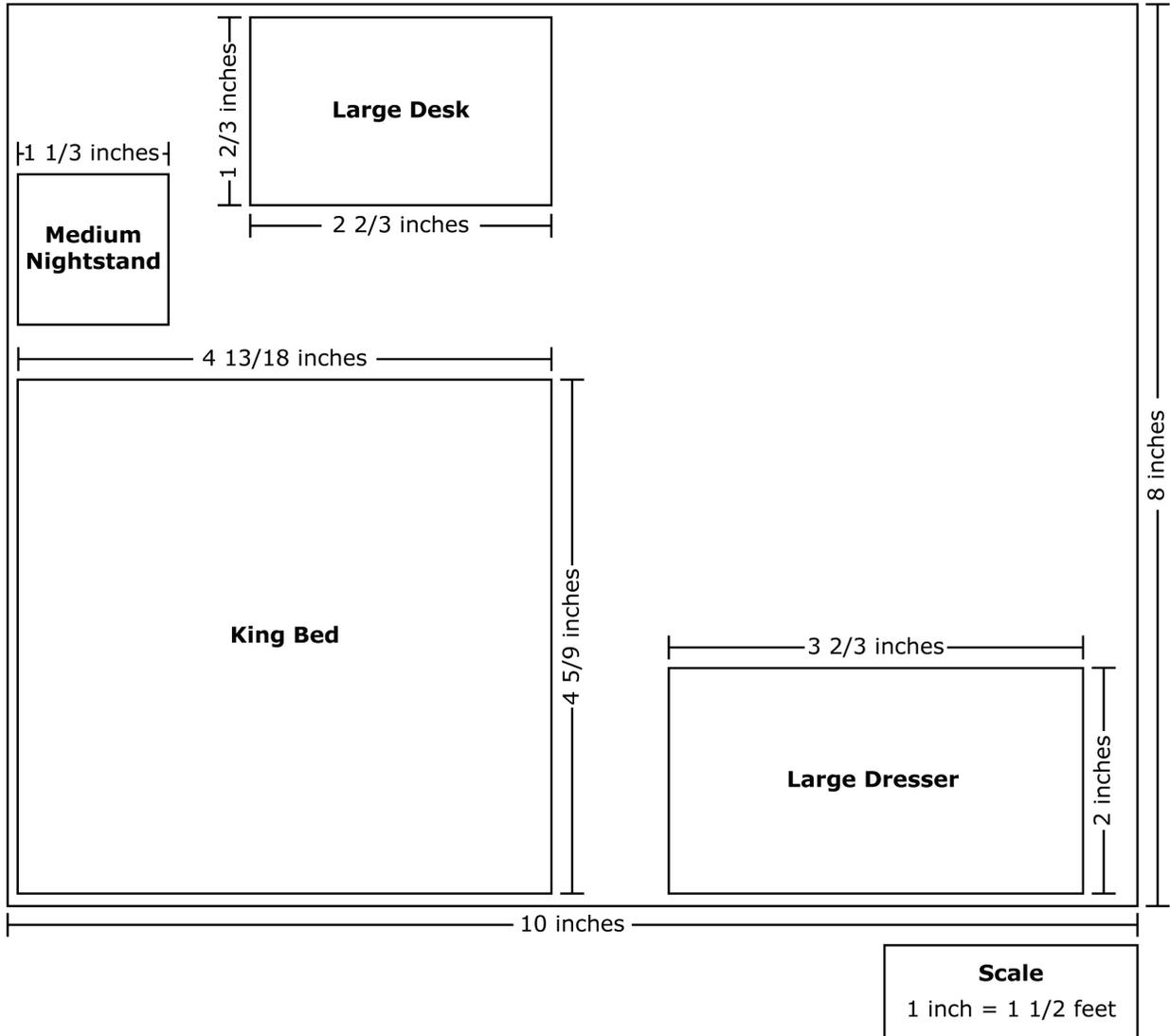
**Session 2:**

**Part D:**

I will purchase a king-size bed set, a king-size mattress set, a large dresser, a medium nightstand, and a large desk.

There will be \$47.00 left in the client's budget. There is not enough money remaining in the budget to upgrade to a large nightstand, and there is no other combination of furniture that is closer to \$2347 without going over.

**Part E:**



**Part F:** I know the rug will fit because I made sure that I would be able to draw a circle with a diameter of 4 inches in the middle of the open floor space.

**Scoring Notes:**

Any correct work based on previous incorrect work should be given full credit.

Accept decimal approximations for the dimensions listed in the scale drawing.

*Scoring Rubric:*

**Part A:** Responses to this part will receive 0–3 points, based on the following:

**3 points:** The student shows thorough understanding of solving real-world problems involving area and unit rates. The student correctly determines the total cost for both flooring options and correctly determines the amount saved by using oak flooring.

**2 points:** The student shows strong understanding of solving real-world problems involving area and unit rates. The student determines the total cost for both flooring options and determines the amount saved by using oak flooring but makes a computational error in his or her work.

**1 point:** The student shows partial understanding of solving real-world problems involving area and unit rates. The student determines the total cost for both flooring options and determines the amount saved by using oak flooring but makes multiple computational errors in his or her work. **OR** The student correctly determines the total cost for one flooring option.

**0 points:** The student shows inconsistent or no understanding of solving real-world problems involving area and unit rates.

**Part B:** Responses to this part will receive 0–4 points, based on the following:

**4 points:** The student shows thorough understanding of solving real-world problems involving surface area and percent increase. The student correctly determines the total cost for both paint options and correctly determines the percent increase between them.

**3 points:** The student shows strong understanding of solving real-world problems involving surface area and percent increase. The student determines the total cost for both paint options and determines the percent increase between them but makes a computational error in his or her work.

**2 points:** The student shows partial understanding of solving real-world problems involving surface area and percent increase. The student determines the total cost for both paint options and determines the percent increase between them but makes multiple computational errors in his or her work. **OR** The student correctly determines the total cost for one paint option.

**1 point:** The student shows limited understanding of solving real-world problems involving surface area and percent increase. The student determines the total area of the wall that will be painted.

**0 points:** The student shows inconsistent or no understanding of solving real-world problems involving surface area and percent increase.

**Part C:** Responses to this part will receive 0–2 points, based on the following:

**2 points:** The student shows thorough understanding of solving real-world problems involving unit rates. The student makes a reasonable estimate of the total cost to install oak flooring and paint the walls and correctly determines the amount of money that remains from the original budget.

**1 point:** The student shows partial understanding of solving real-world problems involving unit rates. The student makes a reasonable estimate of the total cost to install oak flooring and paint the walls but makes a computational error in his or her work.

**0 points:** The student shows inconsistent or no understanding of solving real-world problems involving unit rates.

**Part D:** Responses to this part will receive 0–2 points, based on the following:

**2 points:** The student shows thorough understanding of adding and subtracting multi-digit numbers. The student provides a complete list of furniture that uses the maximum amount of the remaining budget without exceeding the remaining budget and correctly determines the amount of money that remains.

**1 point:** The student shows partial understanding of adding and subtracting multi-digit numbers. The student provides a complete list of furniture that does not use the maximum amount of the remaining budget. **OR** The student provides a complete list of furniture that exceeds the remaining budget. **OR** The student does not correctly determine the amount of money that remains.

**0 points:** The student shows inconsistent or no understanding of adding and subtracting multi-digit numbers.

**Parts E and F:** Responses to these parts will receive 0–4 points, based on the following:

**4 points:** The student shows thorough understanding of making scale drawings. The student makes a correctly scaled drawing of the room and furniture. The student's drawing includes correct labels and dimensions, as well as the scale. The student correctly explains why the rug will be able to fit in the room based on his or her drawing.

**3 points:** The student shows strong understanding of making scale drawings. The student makes a scaled drawing of the room and furniture that is mostly correct but includes one incorrectly scaled piece of furniture. The student's drawing includes correct labels and dimensions as well as the scale. The student correctly explains why the rug will be able to fit in the room based on his or her drawing. **OR** The student makes a correctly scaled drawing of the room and furniture. The student's drawing is missing one or two labels or dimensions but includes the scale. The student correctly explains why the rug will be able to fit in the room based on his or her drawing.

**2 points:** The student shows partial understanding of making scale drawings. The student makes a scaled drawing of the room and furniture that is generally correct but includes two incorrectly scaled pieces of furniture. The student's drawing of the furniture may be missing labels and dimensions but includes the scale. The student correctly explains why the rug will be able to fit in the room based on his or her drawing. **OR** The student makes a scaled drawing of the room and furniture that is mostly correct and that includes the scale;

however, the drawing includes one incorrectly scaled piece of furniture and is missing one or two labels or dimensions. The student does not explain why the rug will be able to fit in the room based on his or her drawing.

**1 point:** The student shows limited understanding of making scale drawings. The student makes a correctly scaled drawing of the room and at least one piece of furniture. **OR** The student correctly explains why the rug will be able to fit in the room based on his or her drawing.

**0 points:** The student shows inconsistent or no understanding of making scale drawings. Merely stating that the rug will fit is not enough to earn the student any credit.

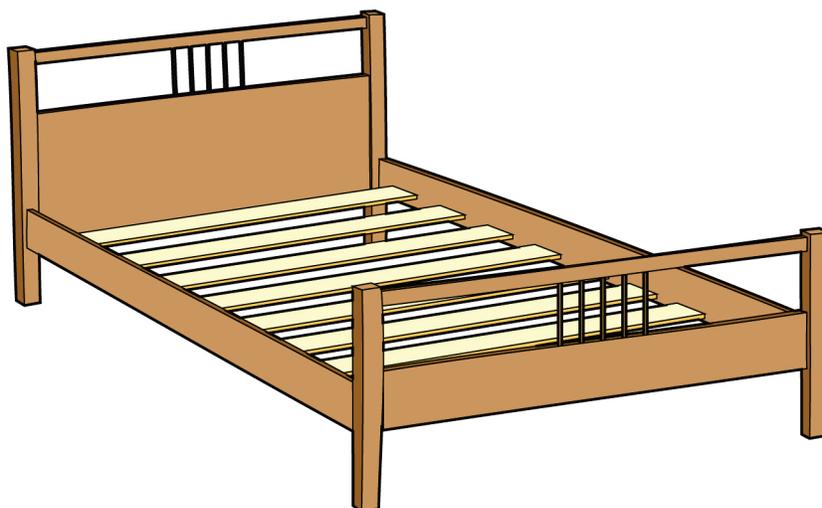
[Note – Any student who clicks on the “New Furniture Catalog” link in Session 2 will be redirected to this mock online furniture catalog. The catalog will appear on one page and should include a scroll bar.]

## Furniture Catalog

***All prices include tax!***

### Bed Sets

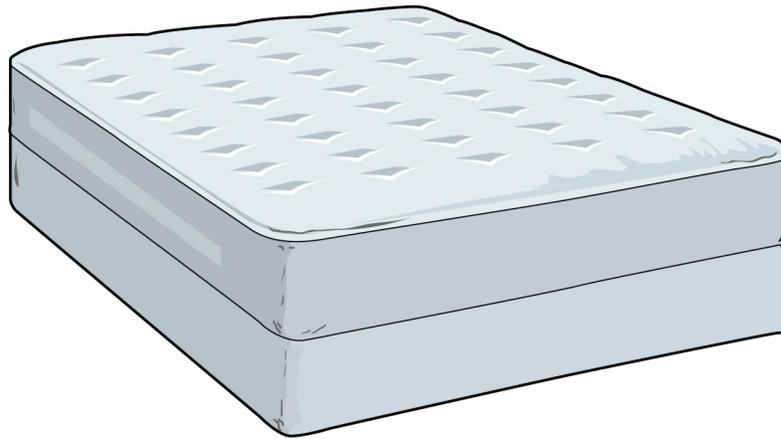
Each bed set includes footboard, headboard, and rails.



- Full Size \$350  
Length: 66 inches; Width: 80 inches; Height: 50 inches
- Queen Size \$400  
Length: 66 inches; Width: 85 inches; Height: 50 inches
- King Size \$450  
Length: 82 inches; Width: 85 inches; Height: 50 inches

### Mattress Sets

Each mattress set includes a mattress and foundation.



- Full Size \$600
- Queen Size \$700
- King Size \$800

Dressers



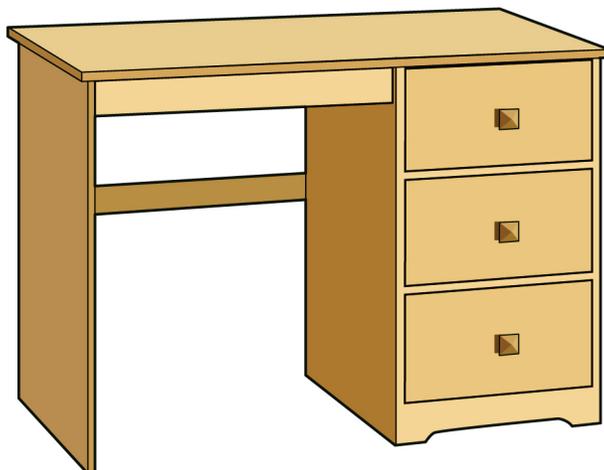
- Small \$250  
Length: 48 inches; Width: 18 inches; Height: 36 inches
- Medium \$400  
Length: 60 inches; Width: 24 inches; Height: 48 inches
- Large \$500  
Length: 66 inches; Width: 36 inches; Height: 54 inches

Nightstands



- Small \$150  
Length: 18 inches; Width: 18 inches; Height: 36 inches
- Medium \$200  
Length: 24 inches; Width: 24 inches; Height: 48 inches
- Large \$300  
Length: 30 inches; Width: 30 inches; Height: 48 inches

Desks



- Small \$250  
Length: 36 inches; Width: 18 inches; Height: 40 inches
- Medium \$300  
Length: 42 inches; Width: 24 inches; Height: 40 inches
- Large \$350  
Length: 48 inches; Width: 30 inches; Height: 42 inches