Extended Problems Answer Key

Big Ideas: Extended Problems

Use or adapt the feedback in this Answer Key as you grade each student paper. Answers will vary. Therefore, you must examine each answer based upon its own merits. Representative examples are shown here.

Total Score: 25 points

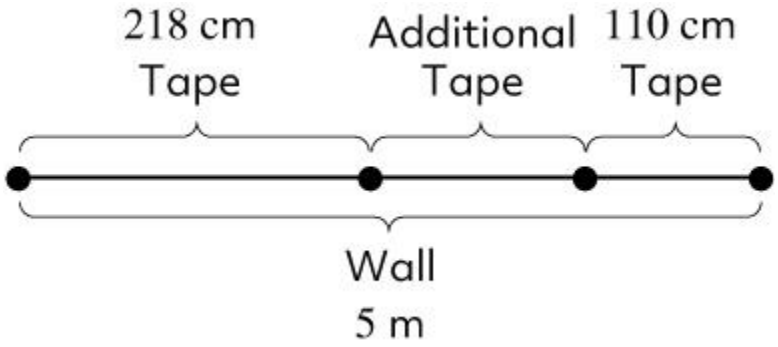
Several friends and families work on home improvement projects.

1. Matthew helps to paint another wall. He puts painter's tape on the floor along this wall as well. The wall is 5 meters long. Beginning at the left end of the wall, he puts down 218 centimeters of tape. Beginning at the right end of the wall, he puts down 110 centimeters of tape. The two pieces of tape are too short to connect. He needs to place a third piece of tape between the two other pieces so that tape is along the entire wall.

(a) Draw a diagram to model how to find the length of additional tape Matthew needs.

(b) Solve for the length of the third piece of tape, in centimeters. Show your work.

Sample response for Part (a)



Note: *Students' models may look different that the sample response shown here. Accept any model that accurately models how to find the length of additional tape Matthew needs.*

Sample response for Part (b)

5 meters = 500 centimeters

218 + 110 = 328

Matthew has 328 centimeters of tape.

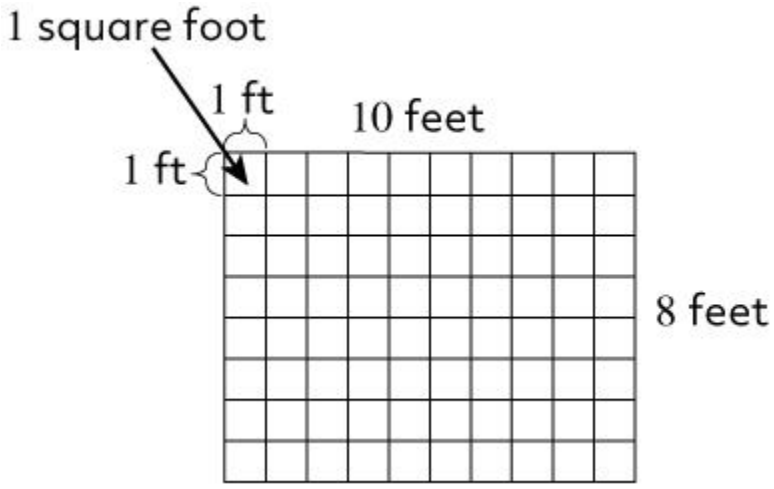
$500-328=172$

The third piece of tape must be 172 centimeters long.

2. Eric paints another wall that is 10 feet long and 8 feet high.

(a) Use this model to find the area of the wall without using the area formula. Explain your answer.

(b) Explain how your solution in part (a) can be used to determine the formula to find the area of a rectangle.



Sample response for Part (a)

Each square in the model has an area of 1 square foot. There are 80 squares in all. Therefore, the area is 80 square feet.

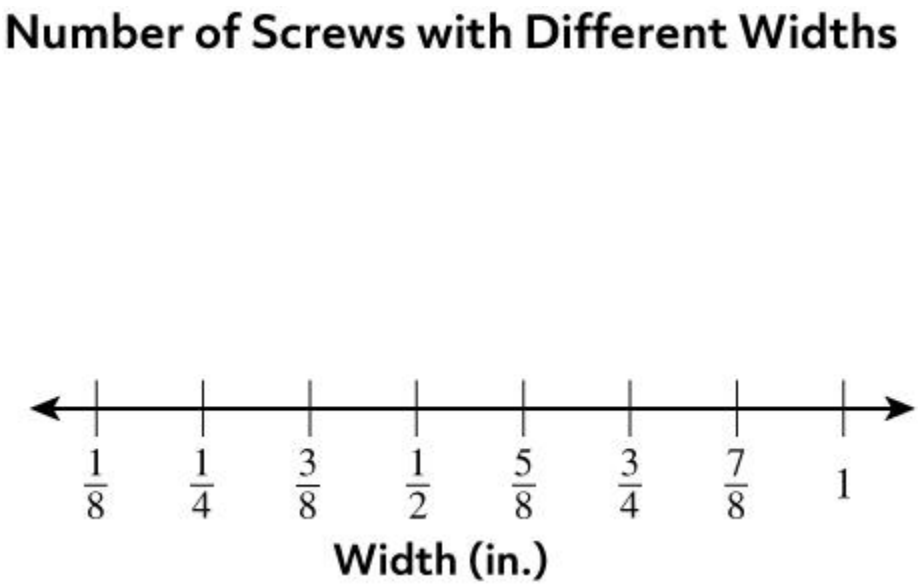
Sample response for Part (b)

The length of the rectangle is 10 feet. The width is 8 feet. The area is 80 square feet. Since $8 \times 10 = 80$, this model shows that I can multiply the length and the width to find the area of a rectangle. The formula to find the area of a rectangle is $A = l \times w$ where *A* is area, *l* is length, and *w* is width.

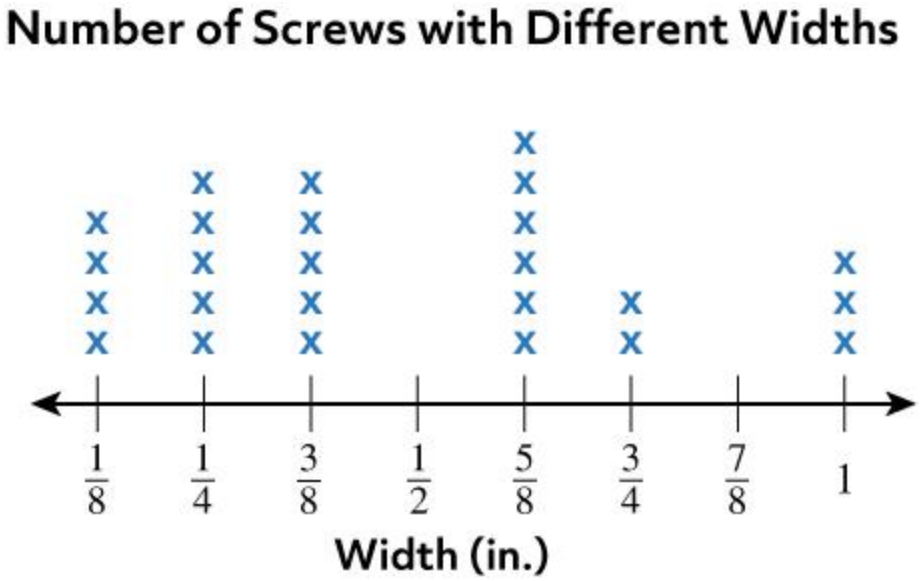
3. Natalie goes in the tool shed to look for screws. She finds some in a jar. The screws are all different widths. This frequency table shows how many of each width of screw is in the jar.

Screw Width (inches)	Number of Screws
$\frac{1}{8}$	4
$\frac{1}{4}$	3
$\frac{3}{8}$	5
$\frac{5}{8}$	6
$\frac{3}{4}$	2
1	3

Complete this line plot using the information in the table.



Sample response for Problem 3



4. Rami's and Jessica's parents decide to re-carpet their homes.

(a) Rami's parents have three rooms to carpet. This table lists the dimensions of these rooms.

Dimensions	Length (feet)	Width (feet)
Room 1	28	26
Room 2	18	12
Room 3	32	28

Find the number of square feet of carpet Rami's parents need to purchase. Show your work.

(b) Jessica's parents have two rooms to carpet. This table shows the dimensions of these rooms.

Dimensions	Length (feet)	Width (feet)
Room 1	20	15
Room 2	34	26

Find the number of square feet Jessica's parents need to purchase. Show your work.

(c) Both sets of parents choose the same carpet so they decided to purchase it together. Find the number of square feet they need to purchase all together. Show your work.

(d) Determine whether your solution to part (c) is reasonable.

(e) The carpet costs $2 per square foot. Find the total cost of the carpet. Show your work.

Sample response for Part (a)

Area of room 1: $A = 28 \times 26 = 728$ square feet

Area of room 2: $A = 18 \times 12 = 216$ square feet

Area of room 3: $A = 32 \times 28 = 896$ square feet

Total area = 728 + 216 + 896 = 1,840 square feet

Rami's parents need to purchase 1,840 square feet of carpet.

Sample response for Part (b)

Area of room 1: $A = 20 \times 15 = 300$ square feet

Area of room 2: $A = 34 \times 26 = 884$ square feet

Total area = 300 + 884 = 1,184 square feet

Jessica's parents need to purchase 1,184 square feet of carpet.

Sample response for Part (c)

1,840 + 1,184 = 3,024

Rami's and Jessica's parents need to purchase 3,024 square feet of carpet all together.

Sample response for Part (d)

$1{,}840 + 1{,}184 \approx 2{,}000 + 1{,}000 \approx 3{,}000$

Rami's and Jessica's parents need to purchase about 3,000 square feet of carpet. The solution 3,024 is close to 3,000, so the solution is reasonable.

Note: *Students may take a different approach to show reasonability. Accept any valid mathematical approach.*

Sample response for Part (e)

$3{,}024 \times 2 = 6{,}048$

The total cost of the carpet for both families combined was $6,048.

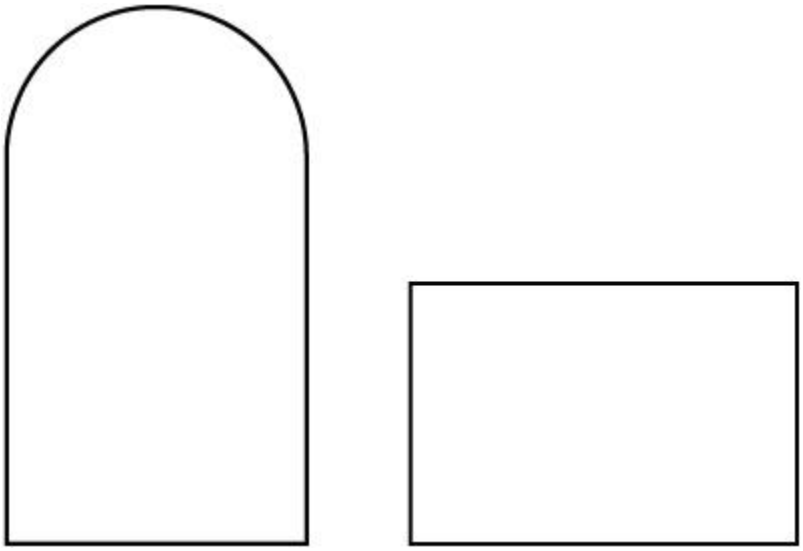
5. An architect draws designs for a new room. The sketches include parallel lines, perpendicular lines, and intersecting lines.

(a) Draw a pair of parallel lines. Explain why they are parallel.

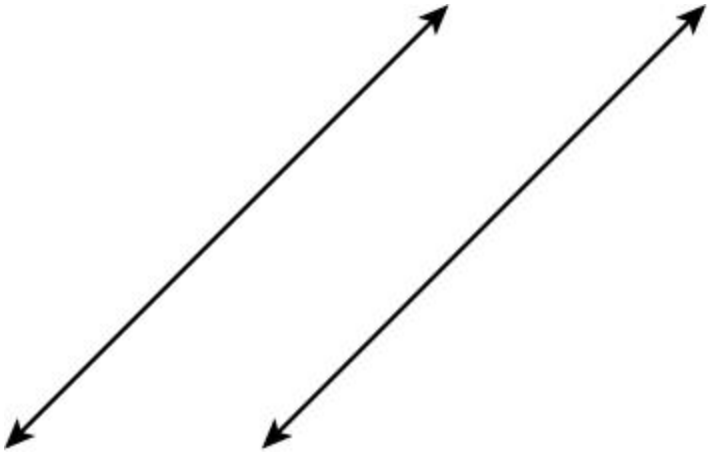
(b) Use a protractor to draw a pair of perpendicular lines. Explain why they are perpendicular.

(c) Draw a pair of intersecting lines that are not perpendicular.

(d) Below are sketches of two new windows for the new room. Draw all of the lines of symmetry in each figure.

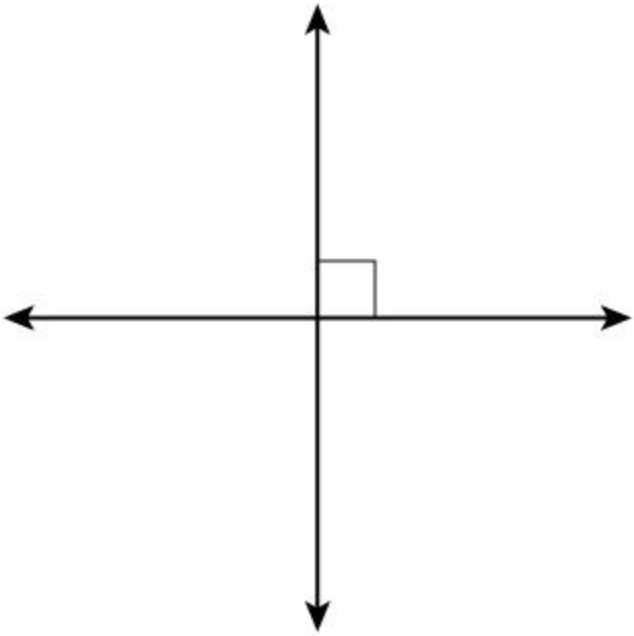


Sample response for Part (a)



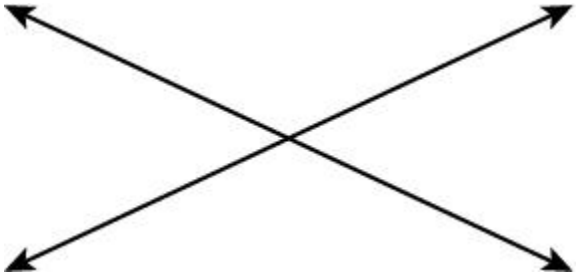
These lines are parallel because they will never meet, or intersect.

Sample response for Part (b)



The lines are perpendicular because they intersect at right angles.

Sample response for Part (c)



Sample response for Part (d)