

PROFICIENCY CHALLENGE 13 ANSWER KEY

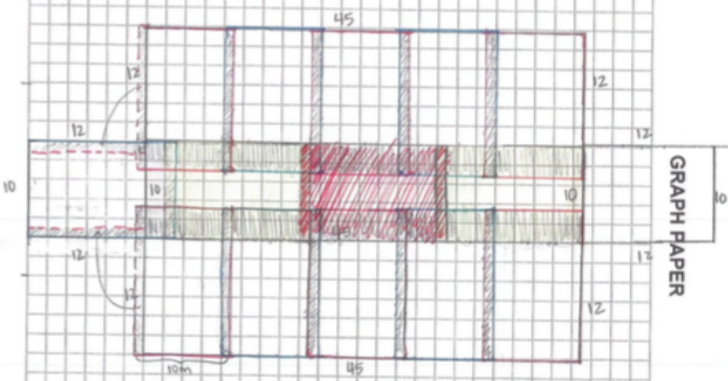
AMV = "Answers May Vary"

1	<p>The area of the original square is 9 cm^2. If we double the side length, the square is 36 cm^2. If we multiply the lengths by 10, the square is 900 cm^2.</p> <p>In general, if you multiply the length of a square's side by k the area will be k^2 as large.</p>
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2	468 treats fit in the pan. You can cut 26 half-inch "columns" and 18 half-inch "rows" from the pan.
a	$\frac{5}{8} \text{ in}^3$ since $\frac{1}{2} \cdot \frac{1}{2} \cdot 2\frac{1}{2} = \frac{5}{8}$
b	292.5 in^3

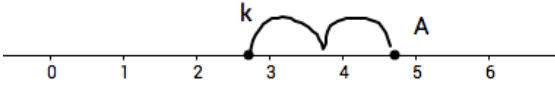
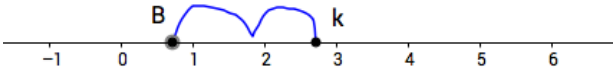
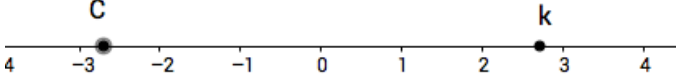
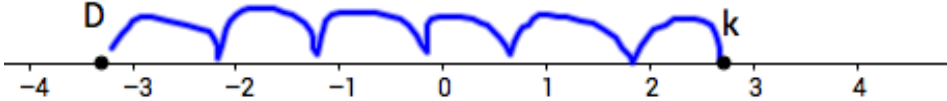
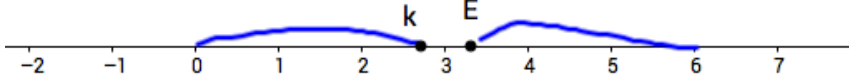
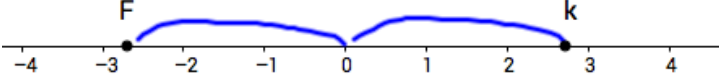
3	<p>a AMV; 16-18 tarps are needed depending on tarp placement.</p> <p>The solution may be difficult to visualize. We highly recommend either a model or a scaled drawing. Below you can see a scale drawing where each linear box represents 2 meters.</p> <div style="text-align: center;"> </div> <p>If we start with the shortest side of the building, and place one tarp, it will cover the side exactly with a bit covering the roof. That means when we tarp the adjacent side, we will need to wrap 1 meter around the shortest side as well. In the drawings below, pencil shading indicates where tarps overlap (remember 1 linear unit is 2 meters in the drawing). The alternating blue and red show different tarps.</p> <div style="text-align: center;"> </div>
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PROFICIENCY CHALLENGE 13 ANSWER KEY (Continued)

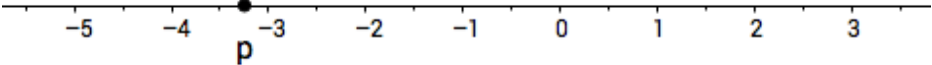
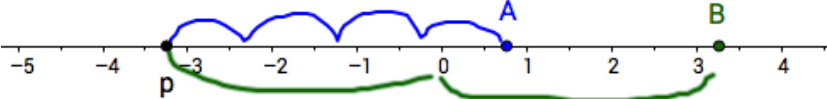
<p>3 (cont)</p>	<p>So far we are up to 11 tarps. Next, we can tarp the roof. On the left end we already have some tarp overlapping the roof. We need three additional tarps to get the roof covered, as shown below. We are now at 14 tarps.</p>  <p>The last thing to cover is the remaining short side of the building. Since we need to wrap around to both adjacent sides of the building, we will need 2 tarps to complete the job, bringing our total to 16 tarps.</p>
<p>b</p>	<p>108 liters</p> <p>The inside of the building holds 5400 m^3. This means we have 54 hundred cubic meters of volume, and since each hundred requires 2 L of chemicals, we need 108 L of chemicals.</p>
<p>4</p>	<p>AMV; For example: Mark should buy a large or extra large storage unit.</p> <p>One small storage unit will hold 16 of Mark's boxes (if they can be tightly packed). He would need to get 5 small storage units to adequately store his 72 boxes. This would cost him \$250 per month.</p> <p>One medium storage unit will hold 60 of Mark's boxes, and leaves a 1.5 foot wide walkway through the unit. Mark could get one small and one medium storage unit, but that would cost \$125 per month (the extra large is cheaper than that). One large storage unit will hold 72 boxes, while the extra large will hold 108 boxes.</p> <p>It does not seem cost effective to get two storage units, so Mark needs either a large or extra large storage unit. I would recommend Mark get the extra large unit so he has room for walking and does not have to stack all his boxes to the ceiling.</p>

PROFICIENCY CHALLENGE 14 ANSWER KEY

AMV = "Answers May Vary"

1	<p>Monday's change resulted in a loss of \$600. Tuesday's change resulted in a gain of \$900. Wednesday there was no change.</p> <p>Over the course of the three days, his net, or overall, change was a gain of \$300.</p>
2 a	<p>Below you can see Point A is 2 units to the right of k.</p>  <p>A number line from 0 to 6. A point labeled 'k' is at 3. A point labeled 'A' is at 5. Two curved arrows above the line show a distance of 2 units from k to A.</p>
b	<p>Point B is exactly 2 units to the left of k.</p>  <p>A number line from -1 to 6. A point labeled 'k' is at 3. A point labeled 'B' is at 1. Two curved arrows above the line show a distance of 2 units from k to B.</p>
c	<p>Note that C is on the opposite side of 0 and the same distance from 0 as k.</p>  <p>A number line from -4 to 4. Point 'C' is at -3 and point 'k' is at 3.</p>
d	<p>Point D is 6 units to the left of k.</p>  <p>A number line from -4 to 4. Point 'D' is at -3 and point 'k' is at 3. Six curved arrows above the line show a distance of 6 units from k to D.</p>
e	<p>Note that the distance from 0 to k is the same as the distance from 6 to Point E. Thus E is at 6-k.</p>  <p>A number line from -2 to 7. Point 'k' is at 3 and Point 'E' is at 6. A curved arrow above the line shows a distance of 3 units from 0 to k, and another curved arrow shows a distance of 3 units from 6 to E.</p>
f	<p>Notice that the distance from k to 0 is the same as 0 to F. Then F is at 0-k. Note that Point F is also in the same location as Point C (which was at -k).</p>  <p>A number line from -4 to 4. Point 'F' is at -3 and point 'k' is at 3. Two curved arrows above the line show a distance of 3 units from k to 0, and another curved arrow shows a distance of 3 units from 0 to F.</p>

PROFICIENCY CHALLENGE 14 ANSWER KEY (Continued)

3	<p>AMV; For example: $p = -3.25$</p>  <p>A horizontal number line with tick marks from -5 to 3. A point labeled 'p' is marked with a black dot at -3.25.</p>
ab	<p>Point A is 4 units to the right of P. That is A is at 0.25. Point B is at 3.25 which is the absolute value of p.</p>  <p>A horizontal number line with tick marks from -5 to 4. Point 'p' is at -3.25, point 'A' is at 0.25, and point 'B' is at 3.25. A blue wavy line connects p to A, and a green wavy line connects p to B.</p>
c	<p>The distance between p and 2 is 5.25. It is 3.25 units from p to 0 and 2 units from 0 to 2.</p>
d	<p>AMV; Richard's statement is true for all values of p that are negative. When p is positive then $p = p$, which means the distance between them is 0.</p>
4	<p>$-\frac{3}{4}$ is closer to 0 because it is 0.75 units from 0, while $\frac{4}{3}$ is $1\frac{1}{3}$ units from 0.</p>
5	<p>-0.5 is halfway between -4 and 3.</p>

PROFICIENCY CHALLENGE 15 ANSWER KEY

AMV = "Answers May Vary"

1	a	AMV; For example: (2,2), (-3,2), (-3,-3) and (2,-3)
	b	AMV; For example: (4,2), (-2,2), (-2,-2), and (4,-2)

2	a	AMV; For example: (0,0), (8,0) and (0,8)
	b	AMV; For example: (0,0), (9.5,0) and (0,1)

3	a	$\left(\frac{1}{6}, -\frac{4}{5}\right)$
	b	(-2.3, 2.4)

4	a	See Figure 1 below. The reflection of A is $\left(3, -4\frac{1}{2}\right)$, the reflection of B is $\left(-1\frac{3}{4}, \frac{12}{5}\right)$, and the reflection of C is (0, 7).
	b	See Figure 2 below. The reflection of A is $\left(-3, 4\frac{1}{2}\right)$, the reflection of B is $\left(\frac{7}{4}, -\frac{12}{5}\right)$, and the reflection of C is (0, -7).
	c	See Figure 3 below. The reflection of A is (-3, -4.5), the reflection of B is , and the reflection of C is (0, 7).

Figure 1

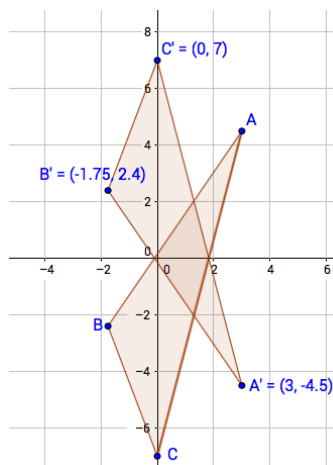


Figure 2

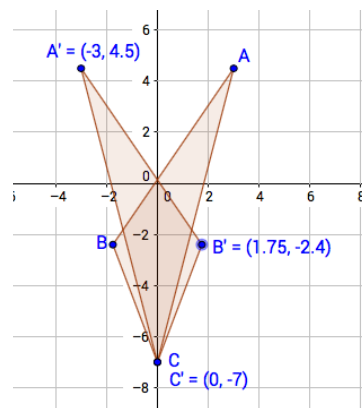
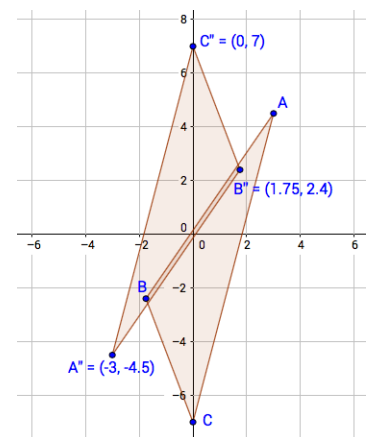
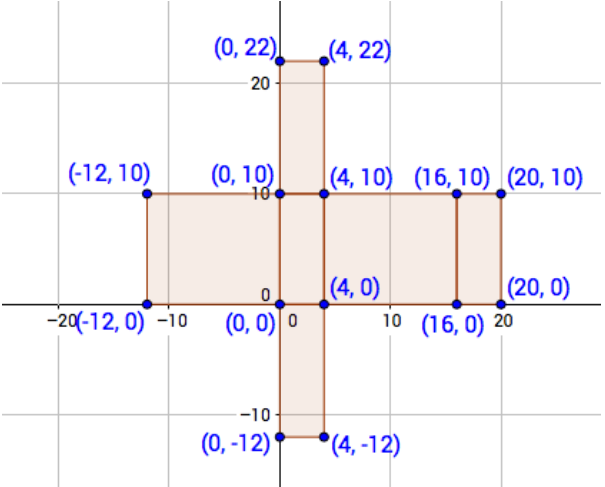


Figure 3



PROFICIENCY CHALLENGE 15 ANSWER KEY (Continued)

<p>5 a</p>	<p>We apologize, this problem leads to an answer beyond students' grade level learning.</p> <p>We recommend changing the problem to a surface area of 54 square units.</p>
<p>b</p>	<p>AMV; For example, using the dimensions 4 units by 12 units by 10 units:</p>  <p>The diagram shows a 3D shape on a coordinate plane. The vertices are labeled with their coordinates: $(-12, 10)$, $(0, 22)$, $(4, 22)$, $(4, 10)$, $(16, 10)$, $(20, 10)$, $(20, 0)$, $(16, 0)$, $(4, 0)$, $(0, 0)$, $(0, -12)$, and $(4, -12)$. The shape is shaded in light brown. The x-axis ranges from -20 to 20, and the y-axis ranges from -10 to 20.</p>

PROFICIENCY CHALLENGE 16 ANSWER KEY

AMV = "Answers May Vary"

1	AMV.
	One might assume or estimate that the average stride is 3 feet. Then to go one mile you would take 1,760 steps. To walk 1,000 miles, you would take 1,760,000 steps. 1,000 km is less than 1,000 miles, so it would be fewer steps. We could convert from 1,000 km into miles and follow the same calculations.
2	a $2 \div 4$ or 0.5 hours
	b $m \div 4$ hours
	c $\frac{m}{4} + \frac{m}{3}$ hours
3	There were at least 20 people who completed the survey.
	$45\% = \frac{45}{100} = \frac{9}{20}$. This means at a minimum, 9 of 20 people liked vanilla.