

Math  
Released Item 2019

Geometry

Fish Tank  
2875-M42383

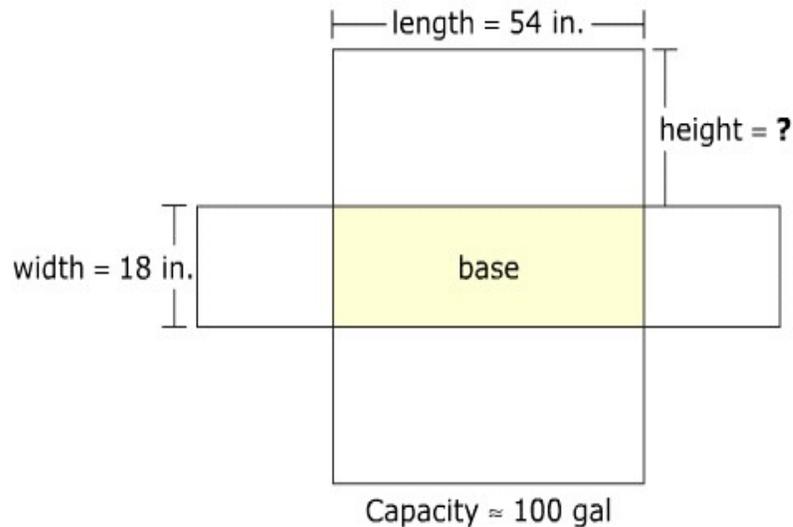
Anchor Set  
A1–A10

With Annotations

# Prompt

## Part A

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

## Part B

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

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# Rubric

## #12 2875-M42383 Rubric Part A

Score	Description
4	<p>Student response includes each of the following 4 elements:</p> <ul style="list-style-type: none"><li>• Correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet.</li><li>• Correct recognition that units must be converted in order to make them consistent throughout calculations, and correct conversions to achieve that goal.</li><li>• Correct application of the volume formula for a rectangular prism.</li><li>• Correct calculations that lead to the correct height for the fish tank, which is 23.772 inches.</li></ul> <p>Sample Student Response:</p> <p>Since the desired capacity of the fish tank is 100 gallons, and 7.48 gallons of water are equivalent to 1 cubic foot, the desired volume of the fish tank is <math>(100 / 7.48)</math> cubic feet, or approximately 13.369 cubic feet.</p> <p>The desired volume is stated as a number of cubic feet so the known dimensions of the fish tank must be converted from inches to feet.</p> <p style="text-align: center;">length = 54 inches = 4.5 feet width = 18 inches = 1.5 feet</p> <p>The formula for the volume <math>V</math> of a rectangular prism with length <math>l</math>, width <math>w</math>, and height <math>h</math> is <math>V = lwh</math>. Substitute the known dimensions into the formula and solve for <math>h</math>.</p> <p style="text-align: center;"><math>V = lwh</math> <math>13.369 \approx 4.5 \times 1.5 \times h</math> <math>13.369 \approx 6.75h</math> <math>h \approx 1.981</math></p> <p>So the height of the fish tank should be approximately 1.981 feet. This is equivalent to 23.772 inches.</p> <p>Note: Correct variations of the answers may result due to rounding during calculations. In Part A, Element 1 has an acceptable range of 13.36 – 13.4 and Element 4 has an acceptable range of 23.767 – 23.822.</p>

# Rubric

<b>3</b>	Student response includes 3 of the 4 elements.
<b>2</b>	Student response includes 2 of the 4 elements.
<b>1</b>	Student response includes 1 of the 4 elements.
<b>0</b>	The response is incorrect or irrelevant.

# Rubric

## #12 2875-M42383 Rubric Part B

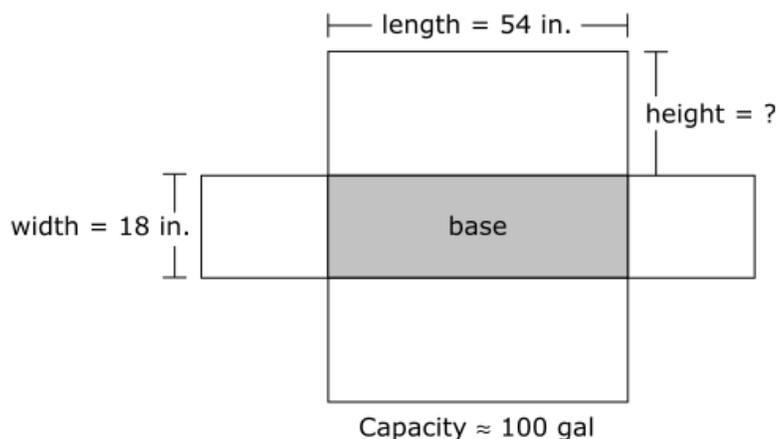
Score	Description
2	<p>Student response includes each of the following 2 elements: Correct weight of the fish tank when empty, which is 265.774 pounds. Correct cost to ship the fish tank, which is \$66.44.</p> <p>Sample Student Response:</p> <p>Find the volume of the completed fish tank using <math>V = lwh</math>, which is the formula for the volume <math>V</math> of a rectangular prism with length <math>l</math>, width <math>w</math>, and height <math>h</math>. Substitute the known dimensions of the fish tank into the formula and solve for <math>V</math>.</p> $V = lwh$ $V = 4.5 \times 1.5 \times 1.981$ $V = 13.369$ <p>So the volume of the fish tank is 13.369 cubic feet, and this will be the volume of the water when the fish tank is filled to capacity. Use the fact that one cubic foot of water weighs 62.4 pounds to find the weight of the water.</p> $\text{Weight of water} = 13.369 \text{ cubic feet} \times 62.4 \text{ pounds} / 1 \text{ cubic foot} = 834.226 \text{ pounds}$ <p>Subtract the weight of the water alone from the combined weight of the water and fish tank to find the weight of the fish tank alone.</p> $1,100 \text{ pounds} - 834.226 \text{ pounds} = 265.774 \text{ pounds}$ <p>Multiply the weight of the fish tank alone by the per-pound shipping cost to find the total cost of shipping.</p> $265.774 \text{ pounds} \times \$0.25 / 1 \text{ pound} = \$66.44$ <p>Therefore, the total cost to ship the fish tank when it is empty will be \$66.44.</p> <p>Note: Correct variations of the answers may result due to rounding during calculations. In Part B, Element 1 has an acceptable range of 263.84 – 265.78 and Element 2 has an acceptable range of \$65.96 - \$66.45.</p>

# Rubric

<b>1</b>	Student response includes 1 of the 2 elements.
<b>0</b>	The response is incorrect or irrelevant.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$\frac{100}{7.48} = 13.369$$

$$4.5 \times 1.5 \times h = 13.369$$

$$h = 1.98059259 \times 12 = 23.767in.$$

$$h = 23.767in$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$62.4 \times 13.369 = 834.2256$$

$$1100 - 834.2256 = 265.7744$$

$$265.7744 \times .25 = 66.4436$$

$$\$66.45$$

## Annotation

### Anchor Paper 1

#### Part A: Score Point 4

This response receives full credit. The student includes each of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.369). Units are not required.
- The student correctly recognizes that units must be converted in order to make them consistent throughout calculations, and provides correct conversions to achieve that goal ( $4.5 \times 1.5 \times h = 13.369$ ). The student converts the length and width from inches to feet. By using 4.5 and 1.5 [feet] instead of the 54 and 18 inches provided in the item, the student proves that the correct conversion is made. It is not necessary to show division of the values in inches by 12 because it is straightforward and can be done mentally.
- The student correctly applies the volume formula for a rectangular prism ( $4.5 \times 1.5 \times h = 13.369$ ). The student substitutes in appropriate values for the length, width, and volume.
- The student provides the correct calculations that lead to the correct height for the fish tank, which is 23.772 inches ( $100/7.48 = 13.369$ ,  $4.5 \times 1.5 \times h = 13.369$ ,  $h = 1.98059259 \times 12 = 23.767\text{in.}$ ,  $h = 23.767\text{in.}$ ). The student shows calculations for converting gallons to cubic feet, solving for the height in feet, and converting the height from feet to inches. The answer is correctly rounded to the nearest thousandth.

Note that the calculation for converting the height from feet to inches is not a run-on equation because, although there are two equal signs, each section does in fact equal every other individual section [ $h = 1.98059259 \times 12$ ,  $1.98059259 \times 12 = 23.767$ , and  $h = 23.767$ ]. A run-on equation exists when all of the sections do not equal each other.

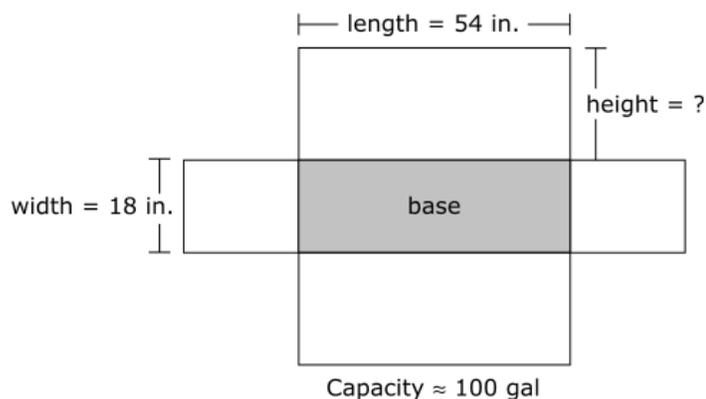
#### Part B: Score Point 2

This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (265.7744). Units are not required.
- The student provides the correct cost to ship the fish tank, which is \$66.44 (\$66.45). This cost is within the acceptable range of \$65.96 - \$66.45.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$\begin{aligned}
 54 \times 18 &= 972 \\
 \frac{100}{7.48} &= 13.369 \\
 13.369 \times 12^3 &= 23101.604 \\
 972 \times x &= 23101.604 \\
 x &= 23.767
 \end{aligned}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$\begin{aligned}
 23.767 \times 54 \times 18 &= 23101.604 \\
 \frac{23101.604}{12^3} &= 13.369 \\
 62.4 \times 13.369 &= 834.225 \\
 1100 - 834.225 &= 265.775 \\
 265.775 \times .25 &= 66.444 \\
 \$66.44
 \end{aligned}$$

## Annotation

### Anchor Paper 2

#### Part A: Score Point 4

This response receives full credit. The student includes each of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.369). Units are not required.
- The student correctly recognizes that units must be converted in order to make them consistent throughout calculations, and provides correct conversions to achieve that goal ( $13.369 \times 12^3 = 23101.604$ ). The student converts the total volume in cubic feet to cubic inches. By using  $12^3$  [inches] instead of the 1 cubic foot provided in the item, the student proves that the correct conversion is made.
- The student correctly applies the volume formula for a rectangular prism ( $54 \times 18 = 972$ ,  $13.369 \times 12^3 = 23101.604$ ,  $972 \times x = 23101.604$ ). The student multiplies the length and width in inches, and then substitutes that value into the volume formula. The student also substitutes in an appropriate volume.
- The student provides the correct calculations that lead to the correct height for the fish tank, which is 23.772 inches ( $54 \times 18 = 972$ ,  $100/7.48 = 13.369$ ,  $13.369 \times 12^3 = 23101.604$ ,  $972 \times x = 23101.604$ ,  $x = 23.767$ ). The student shows calculations for multiplying the length and width in inches, converting gallons to cubic feet, converting cubic feet to cubic inches, and solving for the height in inches. The answer is correctly rounded to the nearest thousandth.

Note that units are not required for Element 4 because they are specified in the item (Round your answer to the nearest thousandth of an inch). A scoring decision was made that if the item specifies the unit for the answer, the student does not have to label the answer.

Also note that, although  $x$  is used instead of  $h$  for the height, it does not need to be defined because it is only used for one value in Part A. It can therefore be inferred that  $x$  represents height.

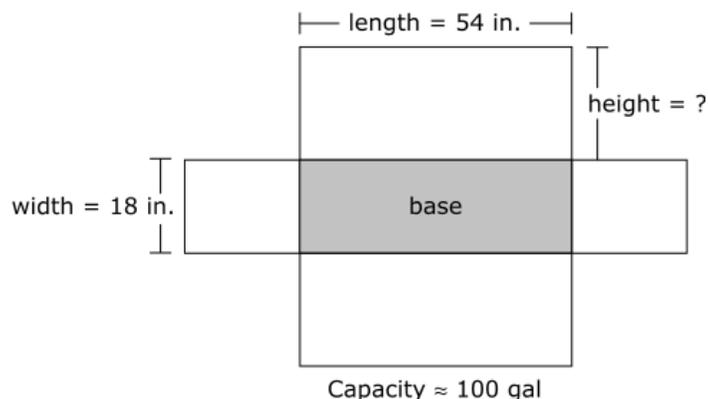
#### Part B: Score Point 2

This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (265.775). Units are not required. This weight is within the acceptable range of 263.84 – 265.78.
- The student provides the correct cost to ship the fish tank, which is \$66.44 (\$66.44).

**Part A**

The *Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$\frac{1}{7.48} = \frac{x}{100}$$

$$x = 13.37$$

$$13.37 \times 12 = 160.42$$

$$18 \times 54 \times x = 160.42$$

$$1.5 \times 4.5 \times x = 13.37$$

$$x = 1.981$$

$$1.981 \times 12 = 23.769$$

$$23.769 = \textit{Height}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$13.37 \times 62.4 = 834.288$$

$$1100 - 834.288 = 265.712$$

$$265.712 \times .25 = 66.428$$

$$\textit{Cost} = \$66.43$$



## Annotation

### Anchor Paper 3

#### Part A: Score Point 3

This response receives partial credit. Although the student includes all of the elements, a precision point is deducted because the variable  $x$  is used to represent two different values in Part A [volume in cubic feet and height in inches] and it is not defined in either case. Thus, the paper cannot receive a perfect score of 4 in Part A and 2 in Part B. The point is deducted from the part where the error occurs [Part A]. Contrast this with Anchor Paper 2, where  $x$  was only used to represent one value in Part A and therefore did not need to be defined. The student includes each of the four required elements:

- The student provides the correct volume for the fish tank, which is approximately 13.369 cubic feet (13.37). The work demonstrates that 13.37 is the volume ( $1/7.48 = x/100$ ,  $x = 13.37$ ). The student uses a correct proportion to compute the volume. The volume is within the acceptable range of 13.36 – 13.4.
- The student correctly recognizes that units must be converted in order to make them consistent throughout calculations, and provides correct conversions ( $1.5 \times 4.5 \times x = 13.37$ ). By using 4.5 and 1.5 [feet] instead of the 54 and 18 inches provided in the item, the student proves that the correct conversion is made.
- The student correctly applies the volume formula for a rectangular prism ( $1.5 \times 4.5 \times x = 13.37$ ). The student substitutes in appropriate values for the length, width, and volume. Although the variable  $x$  is used for two different values, it only appears once in each step.
- The student provides the correct calculations that lead to the correct height for the fish tank, which is 23.772 inches ( $1/7.48 = x/100$ ,  $x = 13.37$ ,  $1.5 \times 4.5 \times x = 13.37$ ,  $x = 1.981$ ,  $1.981 \times 12 = 23.769$ ). The student shows calculations for converting gallons to cubic feet [by using a correct proportion], solving for the height in feet, and converting the height from feet to inches. The answer, which is the result of multiplying the unrounded version of  $x$  by 12, is correctly rounded to the nearest thousandth.

Note that abandoned work ( $13.37 \times 12 = 160.42$ ,  $18 \times 54 \times x = 160.42$ ) can be disregarded. This work is considered abandoned because the student did not use these values beyond this point.

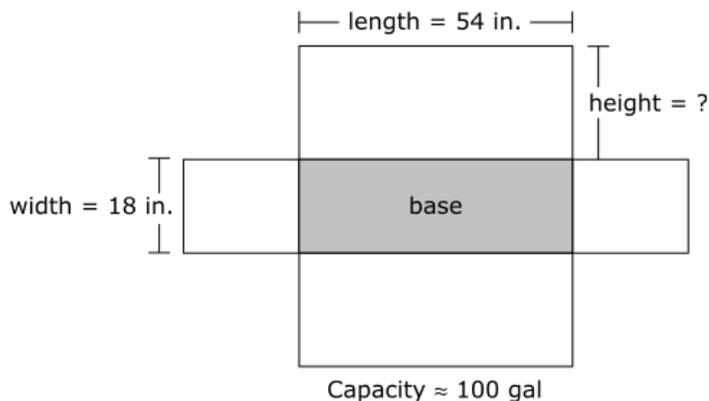
#### Part B: Score Point 2

This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (265.712). Units are not required. This weight is within the acceptable range of 263.84 – 265.78.
- The student provides the correct cost to ship the fish tank, which is \$66.44 (\$66.43). This cost is within the acceptable range of \$65.96 - \$66.45.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$100 \div 7.48 \approx 13.36$$

$$54 \div 12 = 4.5$$

$$18 \div 12 = 1.5$$

$$4.5 \times 1.5 = 6.75$$

$$13.36 \div 6.75 \approx 1.98$$

$$1.98 \times 12 \approx 23.75$$

$$23.75 \text{ inches}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$4.5 \times 1.5 \times 1.98 \approx 13.36$$

$$13.36 \times 62.4 = 833.66$$

$$1100 - 833.66 = 266.34$$

$$266.34 \times .25 \approx 66.58\$$$



## Annotation

### Anchor Paper 4

#### Part A: Score Point 3

This response receives partial credit. The student includes three of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.36). Units are not required. The volume is within the acceptable range of 13.36 – 13.4.
- The student correctly recognizes that units must be converted in order to make them consistent throughout calculations, and provides correct conversions to achieve that goal ( $4.5 \times 1.5 = 6.75$ ). The student converts the length and width from inches to feet. By using 4.5 and 1.5 [feet] instead of the 54 and 18 inches provided in the item, the student proves that the correct conversion is made.
- The student correctly applies the volume formula for a rectangular prism ( $4.5 \times 1.5 = 6.75$ ,  $13.36 \div 6.75 \approx 1.98$ ). The student multiplies the length and width in feet, and then substitutes that value into the volume formula. The formula is in the form of an equivalent equation ( $13.36 \div 6.75 \approx 1.98$ ). The student also substitutes in an appropriate volume.

Although the student provides correct calculations for the height of the fish tank ( $100 \div 7.48 \approx 13.36$ ,  $4.5 \times 1.5 = 6.75$ ,  $13.36 \div 6.75 \approx 1.98$ ,  $1.98 \times 12 \approx 23.75$ ), the answer is incorrect because it is rounded to the nearest hundredth (23.75) rather than the nearest thousandth as specified in the item.

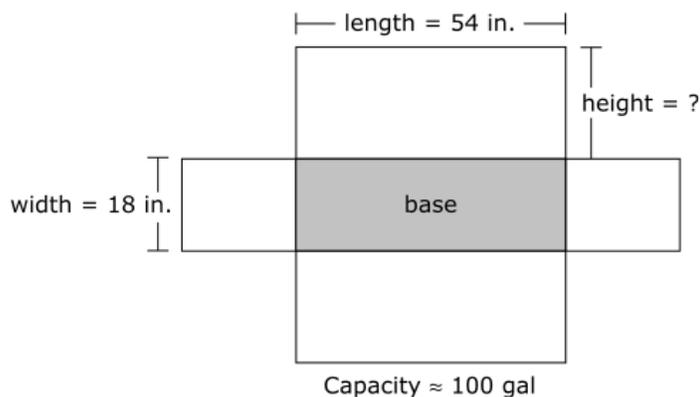
#### Part B: Score Point 2

This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (266.34). Units are not required. Although this weight is not within the acceptable range of 263.84 – 265.78, it is acceptable because the work shows that it is slightly off as a result of rounding ( $4.5 \times 1.5 \times 1.98 \approx 13.36$ ,  $13.36 \times 62.4 = 833.66$ ,  $1100 - 833.66 = 266.34$ ). The rubric notes that correct variations of the answers may result due to rounding during calculations.
- The student provides the correct cost to ship the fish tank, which is \$66.44 (66.58\$). Although this cost is not within the acceptable range of \$65.96 - \$66.45, it is acceptable because the work shows that it is slightly off as a result of rounding ( $266.34 \times .25 \approx 66.58$ ). The rubric notes that correct variations of the answers may result due to rounding during calculations. Also note that, although the dollar sign is placed after the cost value rather than before it, this was not otherwise a top-score response so no additional point is deducted because of this.

**Part A**

The *Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$7.48 \text{ gallons} = 1 \text{ cubic foot}$$

$$100 \div 7.48 = 13.369 \text{ ft}$$

$$54 \div 12 = 4.5$$

$$18 \div 12 = 1.5$$

$$4.5 \times 1.5 \times y = 13.369$$

$$y \times 6.75 = 13.369$$

$$y = 1.981$$

$$1.981 \times 12 = 23.767 \text{ inches}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$\text{one cubic foot is equal to } 62.4 \text{ pounds}$$

$$62.4 \times 13.369 = 834.23 \text{ pounds}$$

$$0.25 \times 834.23 = \$208.56$$

## Annotation

### Anchor Paper 5

#### Part A: Score Point 4

This response receives full credit. The student includes each of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.369). Although the units provided are incorrect [ft rather than cubic feet], no additional point is deducted because the entire response was not otherwise the top score of 4 for Part A and 2 for Part B. Also, the student clearly did not mistake 13.369 for length rather than volume because the previous line indicates conversion of one unit of volume to another ( $7.48 \text{ gallons} = 1 \text{ cubic foot}$ ), and  $100 \div 7.48$  is the application of that conversion.
- The student correctly recognizes that units must be converted in order to make them consistent throughout calculations, and provides correct conversions to achieve that goal ( $54 \div 12 = 4.5$ ,  $18 \div 12 = 1.5$ ). The student converts the length and width from inches to feet.
- The student correctly applies the volume formula for a rectangular prism ( $4.5 \times 1.5 \times y = 13.369$ ). The student substitutes in appropriate values for the length, width, and volume.
- The student provides the correct calculations that lead to the correct height for the fish tank, which is 23.772 inches ( $100 \div 7.48 = 13.369$ ,  $4.5 \times 1.5 \times y = 13.369$ ,  $y = 1.981$ ,  $1.981 \times 12 = 23.767$ ). The student shows calculations for converting gallons to cubic feet, solving for the height in feet, and converting the height from feet to inches. The answer, which is the result of multiplying the unrounded version of  $y$  by 12, is correctly rounded to the nearest thousandth.

Note that, although  $y$  is used instead of  $h$  for the height, it does not need to be defined because it is only used for one value in Part A. It can therefore be inferred that  $y$  represents height. This is similar to Anchor Paper 2.

#### Part B: Score Point 0

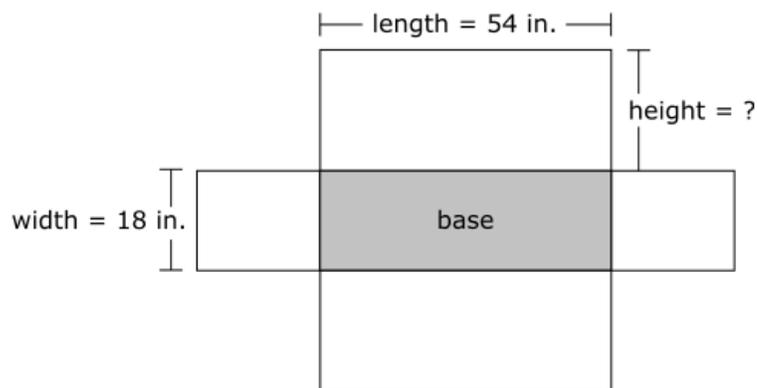
This response receives no credit. The student includes none of the two required elements.

The response does not contain the weight of the empty fish tank. Only the weight of the water in the full tank is determined ( $62.4 \times 13.369 = 834.23$ ).

The response does not provide the correct cost to ship the fish tank. The cost shown is what the cost would be to ship only the water ( $0.25 \times 834.23 = \$208.56$ ).

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



Capacity  $\approx$  100 gal

One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$100 \div 7.48 = 13.4cu.$$

$$13.4 \times 144 = 1930$$

$$54 \times 18 \times x = 1930$$

$$972 \times x = 1930$$

$$x = 2ft.100$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$100 \div 7.48 = 13.4$$

$$13.4 \times 62.4 = 836.16$$

$$1100 - 836.16 = 263.84lb.$$

$$263.84 \times 0.25 = \$65.96 \text{ to ship.}$$

## Annotation

### **Anchor Paper 6**

#### **Part A: Score Point 2**

This response receives partial credit. The student includes two of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.4). Although the units are incomplete (cu.), units are not required. The volume is within the acceptable range of 13.36 – 13.4.
- The student correctly applies the volume formula for a rectangular prism ( $13.4 \times 144 = 1930$ ,  $54 \times 18 \times x = 1930$ ). The student substitutes in appropriate values for the length, width, and volume. Note that although the previously-calculated volume is incorrect, this does not detract from the fact that it is used appropriately in the volume formula. The incorrect value is not inappropriately labeled, so it can be inferred that the student intends it to be a volume.

The response contains an incorrect conversion ( $13.4 \times 144 = 1930$ ). The volume in cubic feet is multiplied by square inches [ $12 \times 12$ ] rather than by cubic inches [ $12 \times 12 \times 12$ ], so the conversion to cubic inches is incorrect.

The final height for the fish tank is incorrect (2ft.100). It is incorrectly labeled as feet and not correctly rounded to the nearest thousandth [ $1930 \div 972 = 1.985596708$ , which would be 1.986 inches if rounded to the nearest thousandth].

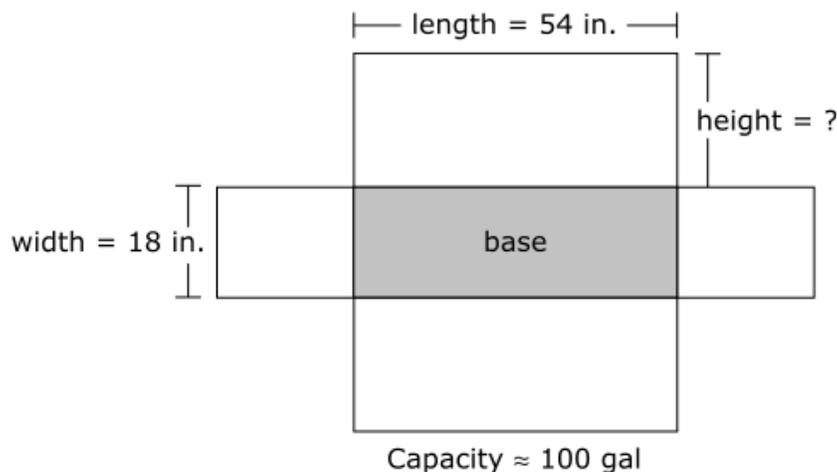
#### **Part B: Score Point 2**

This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (263.84lb). This weight is within the acceptable range of 263.84 – 265.78.
- The student provides the correct cost to ship the fish tank, which is \$66.44 (\$65.96). This cost is within the acceptable range of \$65.96 - \$66.45.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$\frac{100}{7.48} = 13.369 \text{ ft}^3 = 160.428 \text{ in}^3$$

$$54 \times 18 \times h = 160.428$$

$$972 \times h = 160.428$$

$$h = .165 \text{ in.}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$13.369 \times 62.4 = 834.226$$

$$1100 - 834.226 = 265.774 \text{ pounds}$$

## Annotation

### **Anchor Paper 7**

#### **Part A: Score Point 3**

This response receives partial credit. The student includes three of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.369).
- The student correctly applies the volume formula for a rectangular prism ( $100/7.48 = 13.369\text{ft}^3 = 160.428\text{in}^3$ ,  $54 \times 18 \times h = 160.428$ ). The student substitutes in appropriate values for the length, width, and volume. Note that although the previously-calculated volume is incorrect, this does not detract from the fact that it is used appropriately in the volume formula. The label of cubic inches indicates that it is intended to be the volume.
- Although the final height for the fish tank (.165 inches) is not 23.772, it is the appropriate height for the correct calculations provided by the student. A scoring decision was made that bullets in the rubric [elements] are independent of each other. If a student makes an error in a previous part [Element 2 in this response], and uses the incorrect answer in the next part, the response can receive credit. In this response, the student correctly converts gallons to cubic feet, correctly applies the volume formula, and solves for the height appropriately.

The response contains an incorrect conversion ( $13.369\text{ft}^3 = 160.428\text{in}^3$ ). The response does not provide any work to show how the conversion is determined.

#### **Part B: Score Point 1**

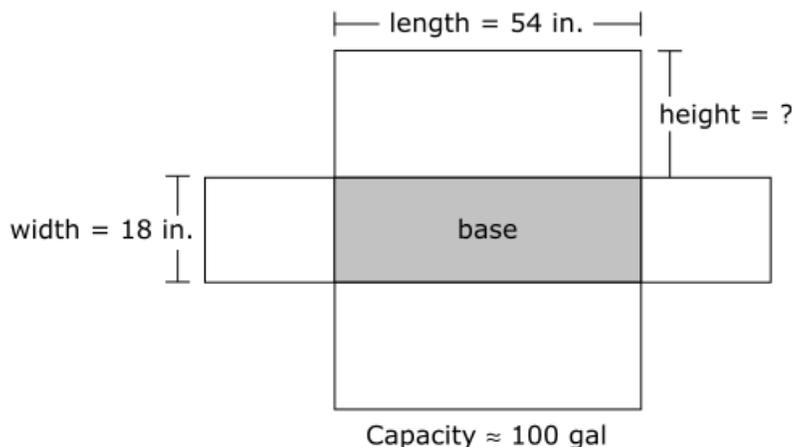
This response receives partial credit. The student includes one of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (265.774 pounds).

The response does not provide the correct cost to ship the fish tank. No work for calculating the cost is provided.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$100 \div 7.48 = 13.36898396 \times 12 = 160.4278075$$

Inches.

$$160.4278075 = 54 \times 18 \times h = .1650491847$$

*Height* = .165 inches

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$13.37 \times 62.4 = 834.288 \text{ pounds of water}$$

$$1100 - 834.288 = 265.712 \text{ pounds without water.}$$

$$265.712 \times .25 = 66.428 \text{ dollars to ship the tank.}$$

## Annotation

### **Anchor Paper 8**

#### **Part A: Score Point 1**

This response receives partial credit. The student includes one of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.36898396).

The response contains an incorrect conversion ( $13.36898396 \times 12 = 160.4278075$  inches). The volume in cubic feet is multiplied by inches (12) rather than by cubic inches [ $12 \times 12 \times 12$ ], so the conversion to cubic inches is incorrect. The product, which is labeled inches, is misinterpreted as a length. Contrast this against Anchor Paper 5, where the statement that 7.48 gallons = 1 cubic foot clarified that the label of ft did not indicate length. Also contrast it against Anchor Paper 7, which uses a label of ft<sup>3</sup> to clarify that an incorrect value was interpreted as volume. This response has no indication that it is anything other than the measure of length indicated by its units of inches.

The response does not correctly apply the volume formula for a rectangular prism. The work presented shows an incorrect application of the volume formula ( $160.4278075 = 54 \times 18 \times h$ ). To be a correct application, a volume must be substituted in for V. This response substitutes in a length for where the volume should go; therefore, it is incorrectly applied.

The final height for the fish tank is incorrect (.165). Unlike the same value in Anchor Paper 7, this response's answer is not an appropriate follow-through because it is the result of an incorrectly-applied volume formula. To receive credit for Element 4, the height must be the result of correct calculations.

#### **Part B: Score Point 2**

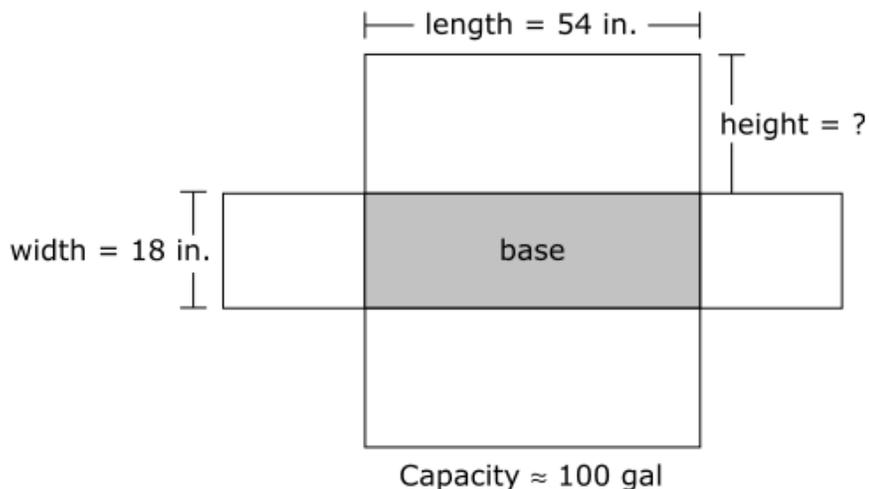
This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (265.712 pounds). This weight is within the acceptable range of 263.84 – 265.78.

The student provides the correct cost to ship the fish tank, which is \$66.44 (66.428 dollars). This cost is within the acceptable range of \$65.96 - \$66.45. Note that, although the cost is not rounded appropriately for money [money should always be rounded to the hundredths place for cents], this was not otherwise a top-score response so no additional point is deducted because of this.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$1.5 \times 4.5 \times x = 13.37$$

$$x = 2(12)$$

The height can be about 24 inches

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

2

## Annotation

### **Anchor Paper 9**

#### **Part A: Score Point 3**

This response receives partial credit. The student includes three of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.37). Units are not required. The volume is within the acceptable range of 13.36 – 13.4.
- The student correctly recognizes that units must be converted in order to make them consistent throughout calculations, and provides correct conversions to achieve that goal ( $4.5 \times 1.5 \times x = 13.37$ ). The student converts the length and width from inches to feet.
- The student correctly applies the volume formula for a rectangular prism ( $4.5 \times 1.5 \times x = 13.37$ ). Although there are no calculations to show the derivation of the volume, it is the correct value and therefore its substitution into the formula is appropriate and, along with the substitution of appropriate values for the length and width, validates that the formula is correctly applied.

The final height for the fish tank is incorrect (about 24 inches) and the calculations that lead to the height are incomplete. The answer is not rounded to the nearest thousandth of an inch as specified in the item. Also, calculations are not shown for computing the volume of the tank. To receive credit for Element 4, a response must have a correct height rounded to the nearest thousandth and adequate calculations that lead to that height.

#### **Part B: Score Point 0**

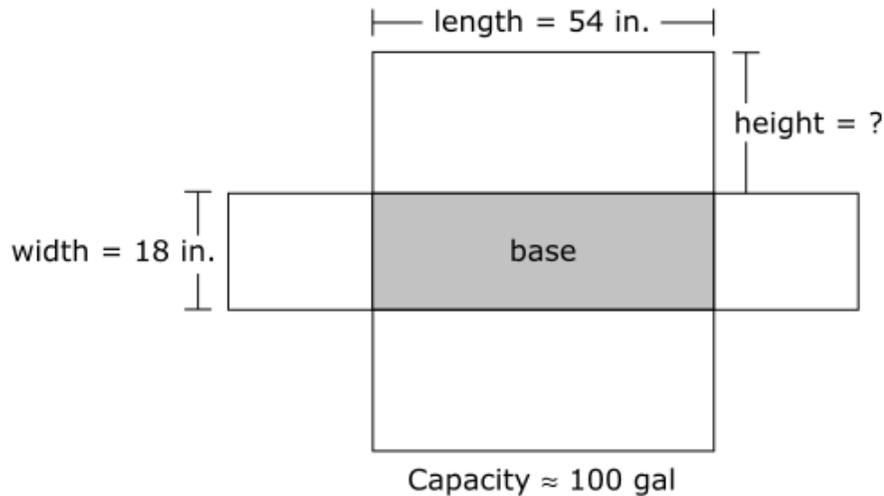
This response receives no credit. The student includes none of the two required elements.

The response does not contain the correct weight of the fish tank when empty.

The response does not provide the correct cost to ship the fish tank.

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$100 \div 7.48 = 13.37$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$13.37 \times 62.4 = 834.288$$

$$1100 - 834.288 = 265.712$$

$$265.712 \times .25 = 66.43$$

## Annotation

### **Anchor Paper 10**

#### **Part A: Score Point 1**

This response receives partial credit. The student includes one of the four required elements:

- The student provides the correct determination of the desired volume for the fish tank, which is approximately 13.369 cubic feet (13.37). Units are not required. The volume is within the acceptable range of 13.36 – 13.4. Although 13.37 is the only “answer” presented, the work ( $100 \div 7.48 = 13.37$ ) proves that it is the volume in cubic feet rather than the height of fish tank, for which the student was asked.

The response does not show the conversion of inches to feet or cubic feet to cubic inches.

The response does not apply the volume formula for a rectangular prism.

The response does not provide a height for the fish tank.

#### **Part B: Score Point 2**

This response receives full credit. The student includes each of the two required elements:

- The student provides the correct weight of the fish tank when empty, which is 265.774 pounds (265.712). Units are not required. This weight is within the acceptable range of 263.84 – 265.78.
- The student provides the correct cost to ship the fish tank, which is \$66.44 (66.43). Note that units are not required for Element 2 because they are specified in the item [calculate the total cost indicates using dollars]. A scoring decision was made that if the item specifies the unit for the answer, the student does not have to label the answer. This cost is within the acceptable range of \$65.96 - \$66.45.

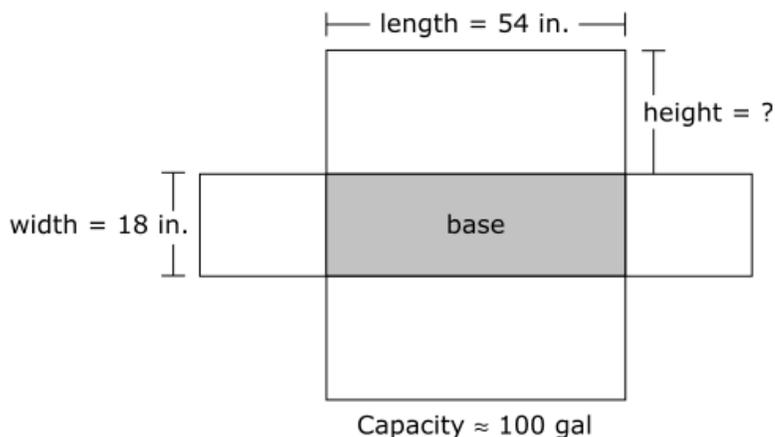
Practice Set

P1–P10

No Annotations Included

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$\begin{aligned}
 12^3 &= 1728 \\
 1728 \times (100 \div 7.48) &\approx 23101.60428 \\
 23101.60428 \div 54 &\approx 427.8074866 \\
 427.8074866 \div 18 &\approx 23.76708259 \\
 h &\approx 23.767 \text{ inches}
 \end{aligned}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

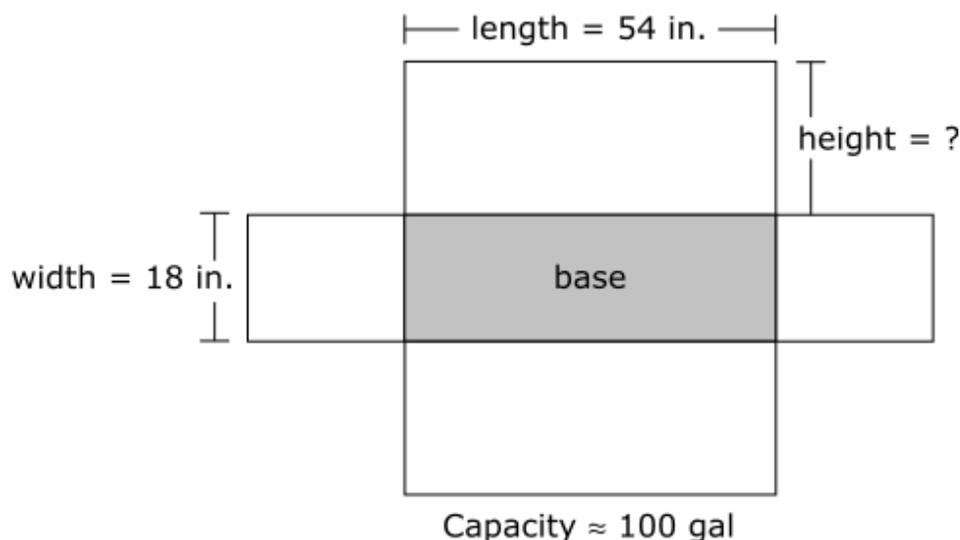
Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$\begin{aligned}
 100 \div 7.48 &\approx 13.36898396 \\
 13.36898396 \times 62.4 &\approx 834.2245989 \\
 1100 - 834.2245989 &\approx 265.7754011 \\
 265.7754011 \times .25 &\approx 66.44385027 \\
 &\$66.44
 \end{aligned}$$

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

it would have to be 22.222 inches tall

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

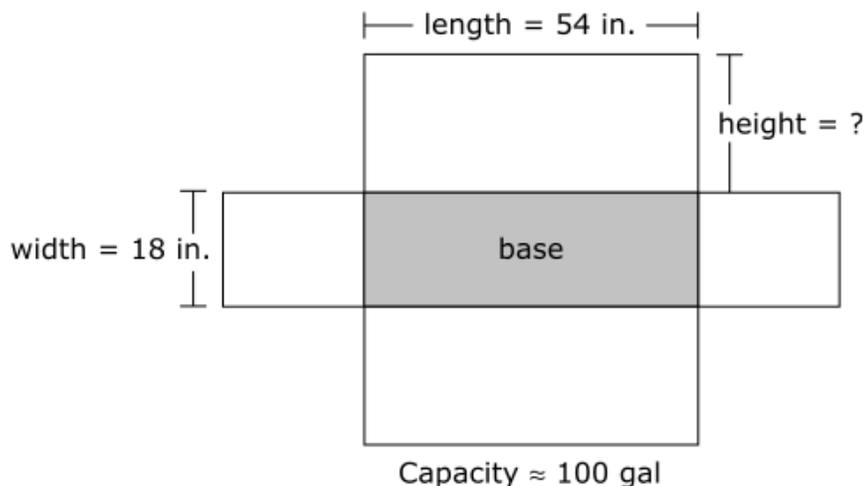
Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

it would cost 233.445

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$54 \div 12 = 4.5$$

$$18 \div 12 = 1.5$$

$$4.5 \times 1.5 = 6.75$$

$$13.36 \div 6.75 = 1.97$$

$$1.979$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

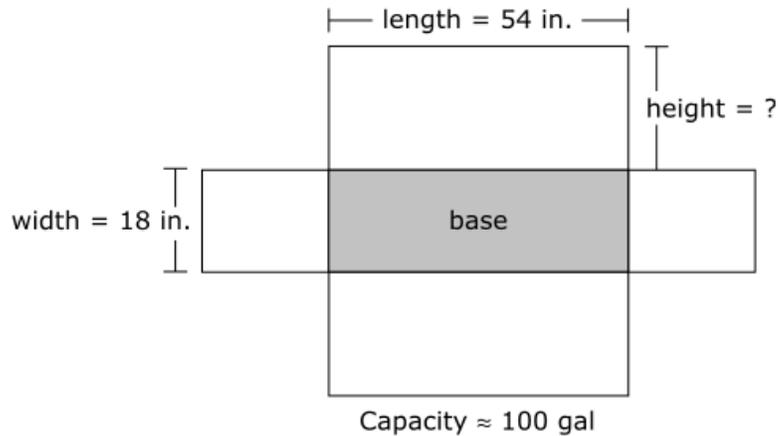
Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$62.4 \div 13.5$$

$$4.6 \text{ (lbs)} \times 0.25 = 1.15$$

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$\text{Height} = 23.767$$



$$1.5\text{ft.} \times 4.5\text{ft.} \times h = 160.4278075$$



$$h = \text{height}$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$265.775 \text{ pounds.}$$



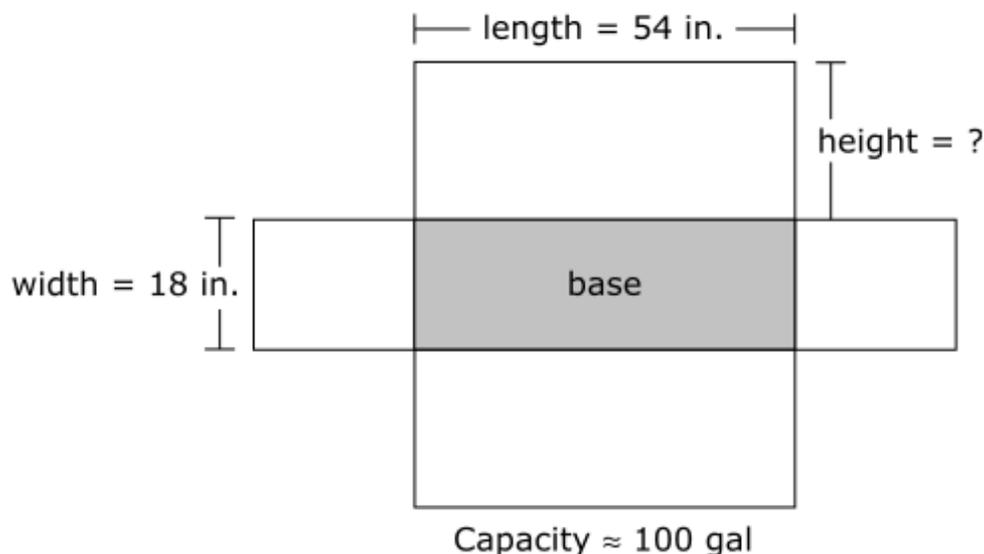
$$13.36898396 \times 62.4 = 834.2245991$$



$$1,100 - 834.2245991 = 265.775$$

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

13.369

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

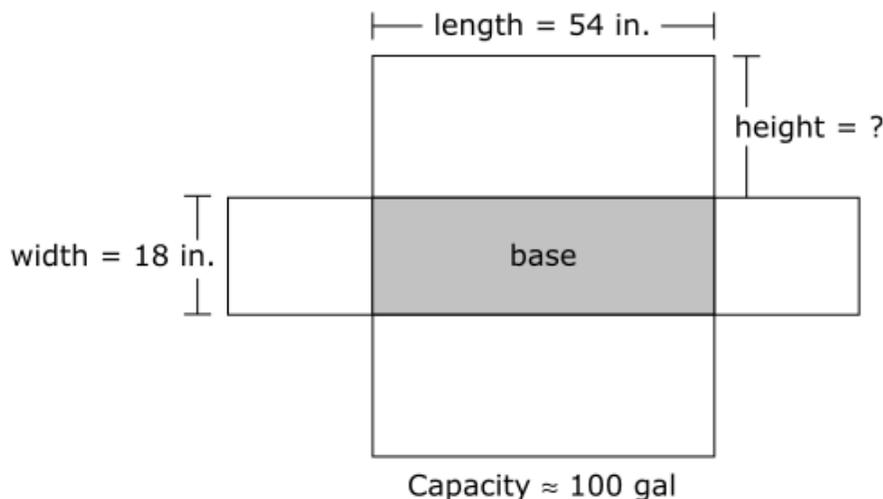
Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

The total cost would be \$70.52

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$\frac{100}{7.48}$  equals 13.369 cubic feet.  $\frac{54}{12}$  equals 4.5 ft.  $\frac{18}{12}$  equals 1.5 feet,  $4.5(1.5)x$  equals 13.369. the height therefore equals 1.9 ft or 23.7 inches.

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

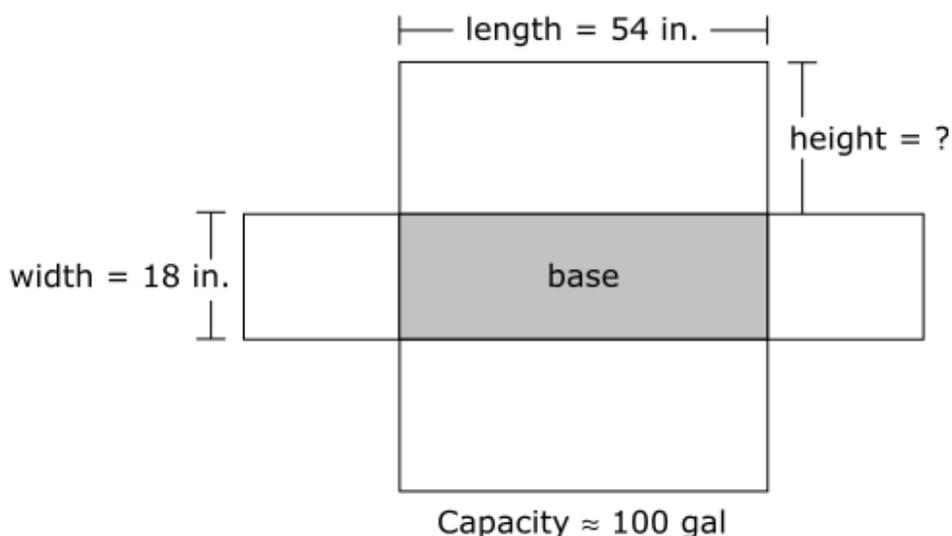
Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

13.369 times 62.4 equals 834.226 pounds.  
 $1,100 - 834.226 = 265.774$  pounds times  
 $0.25 = 66.44$  dollars

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$100 - 7.48 = 13.3$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

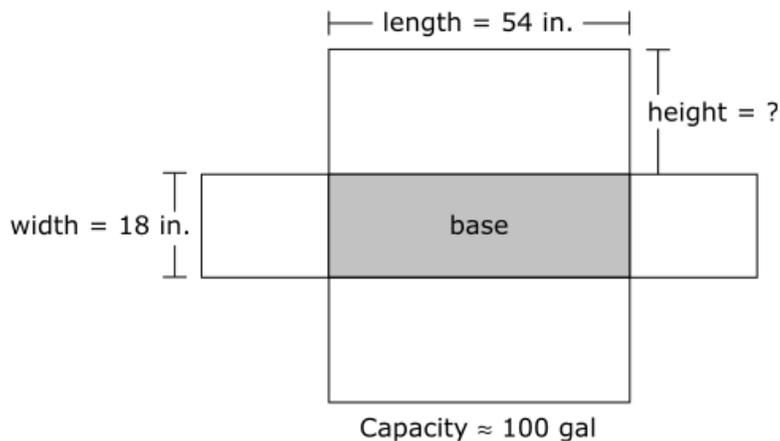
Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$.25 \times 1100 = 275$$

$$.25 \times 62.4 = 15.6, \text{ final answer}$$

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$v = l \times w \times h$$

$$100 \div 7.48 = 13.369 \text{ ft}^3$$

$$13.369 \text{ ft} = 407.48712$$

$$54 \text{ in} = 137.16 \text{ cm}$$

$$18 \text{ in} = 45.72 \text{ cm}$$



$$407.48712 = 137.16 \times 45.72 \times x$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

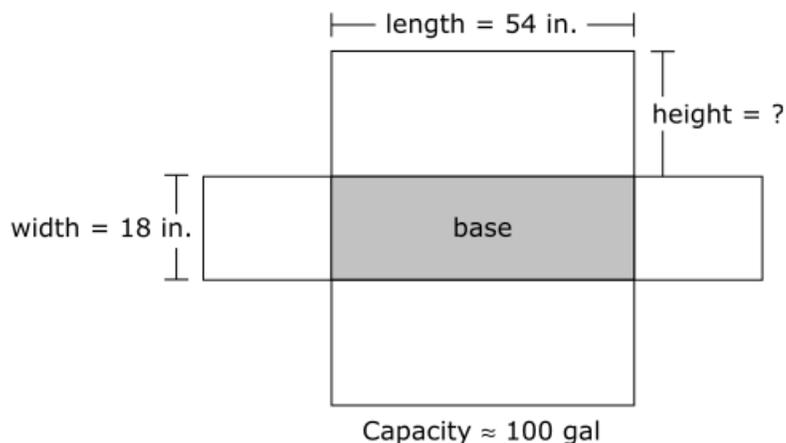
$$1100 \div 62.4 = 17.6 \text{ cubic ft}$$

$$17.6 \times .25 = 4.4$$

$$\text{shipping } \square = \$4.40$$

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

23.767

work:

$$(54in) \div 12 = 4.5 \text{ feet.}$$

$$(18in) \div 12 = 1.5 \text{ feet}$$

$$1.5 \times (4.5) = 6.75$$

$$100gallons \div 7.48gallons = 13.369cubicfeet$$

$$13.369 \div 6.75 = 1.981 \text{ feet}$$

$$((1.981 \text{ feet}) \times 12)inches = 23.767$$

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

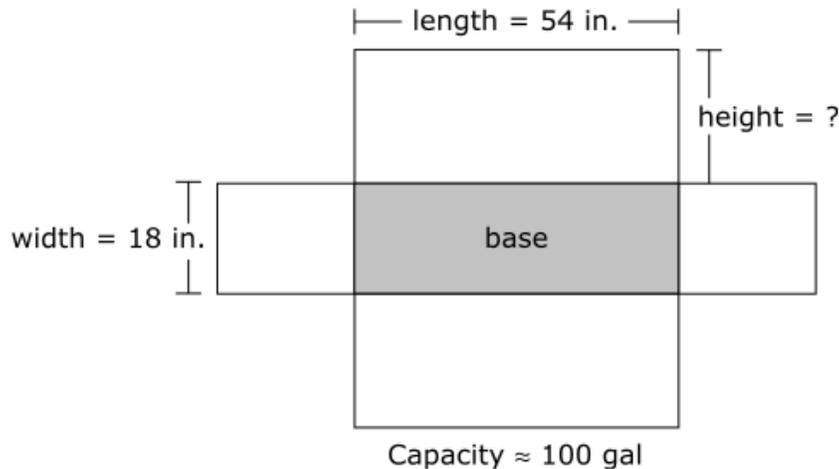
Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

81.98

**Part A**

*The Pisces Place* is a company that makes fish tanks. Corey has sent the company a special order for a fish tank that is a rectangular prism with an open top. He provides a sketch with the dimensions as shown.



One cubic foot of water is equivalent to 7.48 gallons. If the capacity of the fish tank is 100 gallons, find the maximum possible height for the fish tank. Round your answer to the nearest thousandth of an inch. Show your work.

$$(54in) \times (18in) \times x = 160.427in.$$

$$972 \times x = 160.427in$$

$$x = 0.165$$



The maximum height of the fish tank is 0.165 inches.

**Part B**

Corey plans to have the completed fish tank sent to his home. A shipping company offers to ship it at a cost of \$0.25 per pound.

Corey knows that his fish tank would weigh a total of 1,100 pounds if it were filled to capacity. One cubic foot of water weighs 62.4 pounds.

Use this information to calculate the total cost to ship the fish tank when it is empty. Show your work.

$$(1100pounds) \times 0.25 = 275\$$$



# Practice Set

<b>Paper</b>	<b>Score</b>
<b>P1</b>	<b>4,2</b>
<b>P2</b>	<b>0,0</b>
<b>P3</b>	<b>2,0</b>
<b>P4</b>	<b>2,1</b>
<b>P5</b>	<b>0,0</b>
<b>P6</b>	<b>3,2</b>
<b>P7</b>	<b>0,0</b>
<b>P8</b>	<b>2,0</b>
<b>P9</b>	<b>4,0</b>
<b>P10</b>	<b>0,0</b>