

## New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

1. Bert has a part-time job making pizzas. He can make 3 different crusts: thin, medium, and extra thick. There are 10 vegetable toppings and 4 meat toppings to choose from as well.
  - a. How many different pizza combinations can Bert make if each pizza must come with only 1 meat and only 1 vegetable topping? Explain your answer.

**Solution:**

$$3 \text{ crusts} \times 10 \text{ vegetables} \times 4 \text{ meats} = 120 \text{ different pizzas}$$

- b. How many different pizza combinations can Bert make if each pizza must come with 2 meat toppings and 2 vegetable toppings? Explain your answer.

**Solution:**

$$3 \text{ crusts} \times (10 \times 9 \div 2) \text{ vegetables} \times (4 \times 3 \div 2) \text{ meats} = 810 \text{ different pizzas}$$

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

2. The costs for mailing packages of certain weights at a mail delivery service are listed in the table below.

Weight (lbs)	Cost
0.5	\$2.50
1	\$5.00
2	\$10.00
2.5	\$12.50

- a. Write an equation that expresses the cost  $c$  in terms of the weight  $w$ .

**Solution:**

$$c = 5w$$

- b. Using the formula from part a, what is the cost of mailing a package that weighs  $3\frac{1}{4}$  pounds?

**Solution:**

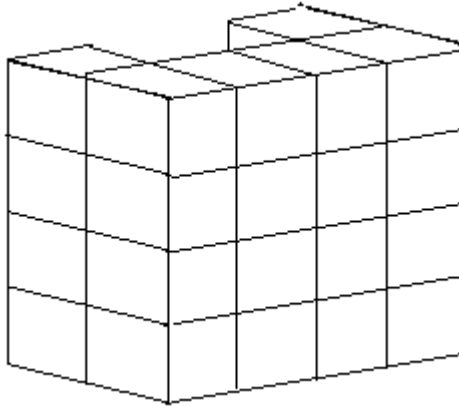
$$c = 5w$$

$$c = 5(3.25)$$

$$c = 16.25$$

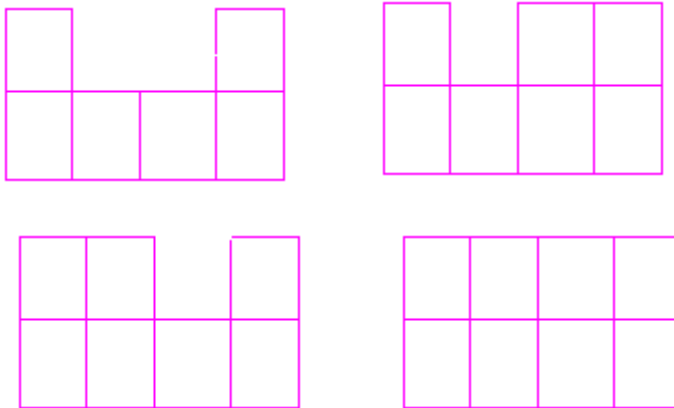
The package would cost \$16.25 to mail.

3. Part of the geometric solid is hidden from view.



- a. Draw all of the possible top views of the solid.

**Solution:**



- b. If each of the blocks is 1 cubic inch, determine the range of possible volumes of the solid.

**Solution:**

24 cubic inches to 32 cubic inches

- c. Determine the range of possible surface areas of the solid.

**Solution:**

64 square inches to 70 square inches

## New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

4. A camper can have a total weight of 7,400 pounds including cargo and passengers. Without water in its water tanks, the camper cargo weighs 7,155 pounds. If water weighs 8.3 pounds per gallon, how many gallons of water can be loaded into the tanks before the camper exceeds its total weight capacity?

**Solution:**

$$7400 - 7155 = 245 \text{ pounds available}$$

$$245 \div 8.3 \approx 29.5 \text{ gallons}$$

## New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

5. A machine produces a part for a certain automobile. The part needs to be produced to within 0.01 inch of the standard size to fit correctly. During a recent inspection, 3 out of 420 parts were found to not fit correctly. In the next production cycle, 700 parts will be produced. How many parts are expected not to fit correctly? Solve the problem by writing a proportion.

**Solution:**

$$\frac{3}{420} = \frac{x}{700}$$
$$x = 5$$

Five parts are expected to not fit correctly.

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

6. Sasha works at a greenhouse during the summer. She has to wrap mum plants with colored foil. There are 130 rows with 40 mums in each row. Each mum must be wrapped in one sheet of foil before it can leave the greenhouse. Colored foil comes in boxes of 250 sheets and costs \$34.25 per package. What is the total cost to wrap all the mums? Show your work.

**Solution:**

$$130 \times 40 = 5,200 \text{ plants}$$

$$\frac{5,200}{250} = 20.8 = 21 \text{ boxes}$$

$$21 \times \$34.25 = \$719.25$$

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

7. The temperature at 6:00 P.M. was  $13^{\circ}\text{F}$ . Between 6:00 P.M. and midnight, the temperature dropped  $2^{\circ}$  per hour. After midnight the temperature continued to drop. At 5:00 A.M. the temperature was  $4^{\circ}\text{F}$  below zero.

a. What was the temperature at midnight?

**Solution:**

$$13 - 6(2) = 1^{\circ}\text{F}$$

b. What was the drop in temperature from midnight to 5:00 A.M.?

**Solution:**

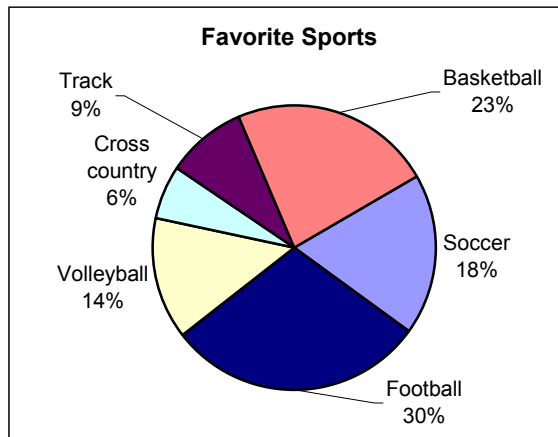
$$-4 - 1 = -5 = 5^{\circ}\text{F drop in temperature}$$

c. If the temperature then rose  $28^{\circ}\text{F}$  in 4 hours, what was the temperature at 9:00 A.M.?

**Solution:**

$$-4 + 28 = 24^{\circ}\text{F}$$

8. Martin surveyed his classmates and created the graph shown below.



If Martin surveyed and chose 65 classmates, how many students chose soccer as their favorite sport?

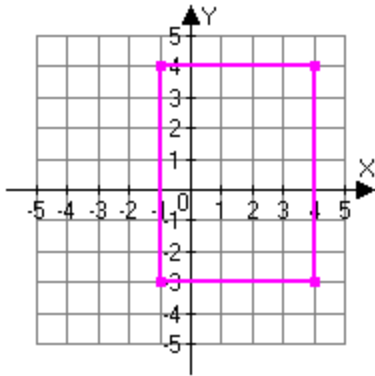
**Solution:**

$0.18 \times 65 = 11.7$ ; round up to 12 classmates so 12 students chose soccer as their favorite sport.

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

9. A rectangle has coordinates  $A(-1, 4)$ ,  $B(-1, -3)$ ,  $C(4, -3)$ , and  $D(4, 4)$ .
- a. Graph the points and draw the rectangle.

**Solution:**



- b. Determine the area of the rectangle.

**Solution:**

35 square units

- c. Move the coordinates as follows:

$A(-1, 4)$  to  $A'(-1, 5)$ ,  $C(4, -3)$  to  $C'(5, -3)$ , and  $D(4, 4)$  to  $D'(5, 5)$ .

Point  $B$  stays the same. Determine the area of the new rectangle.

**Solution:**

48 square units

- d. What is the percent increase in the area of the rectangle after changing the coordinates? Round to the nearest percent.

**Solution:**

$$\frac{13}{35} = 0.3714 = 37\% \text{ increase}$$

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

10. If you look at the side view of the picnic table, you can see a triangular shape made by the intersection of the two legs and the table top. If the perimeter of the triangle is 76 inches and the legs are 30 inches apart, how long are the legs from the point of intersection to the table top? Show your work.

**Solution:**

$$P = \text{side} + \text{side} + \text{side}$$

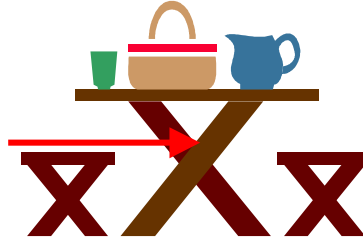
$$76 = 30 + x + x$$

$$76 = 30 + 2x$$

$$46 = 2x$$

$$23 = x$$

Each leg is 23 inches long from the point of intersection to the table top.



New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

11. The probabilities of winning certain games at a festival are given below.

Game	Probability of Winning
Ring toss	$\frac{1}{6}$
Cake walk	$\frac{5}{12}$
Pumpkin toss	$\frac{1}{2}$
Speedy cars	$\frac{2}{5}$

- a. What game are you most likely to win?

**Solution:**

Ring toss = 0.166  
Cake walk = 0.416  
Pumpkin toss = 0.50  
Speedy cars = 0.40

You are most likely to win the pumpkin toss since the probability is the greatest at 0.50.

- b. What is the probability of not winning the cake walk?

**Solution:**

$$1 - \frac{5}{12} = \frac{7}{12}$$

- c. What are the odds of winning the ring toss?

**Solution:**

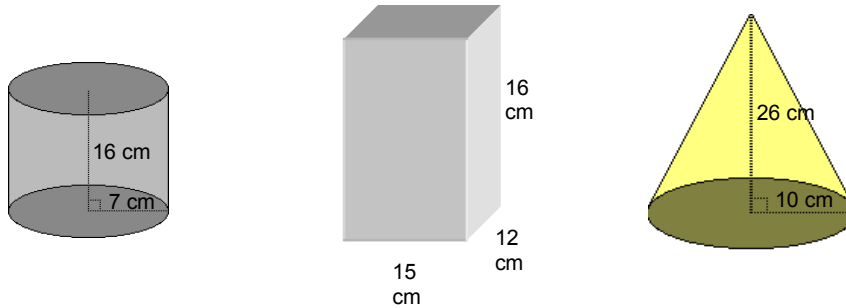
1:5

- d. What is the probability of winning the pumpkin toss two times in a row?

**Solution:**

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

12. You are the new manager of the concession stands at the circus. In order to increase profits you have decided to replace the current container in which popcorn is sold. The company that you purchase containers from has a choice of three different containers. You have decided to charge \$3.75 for a container of popcorn.



- a. Which container would you choose in order to make the most profit per container sold?

**Solution:**

Find the volume of each container:

Cylinder:  $V = 7^2 \cdot \pi \cdot 16$   
 $V = 2,461.8 \text{ cm}^3$

Prism:  $V = 15 \cdot 12 \cdot 16$   
 $V = 2,880 \text{ cm}^3$

Cone:  $V = \frac{1}{3} \pi \cdot 10^2 \cdot 26$   
 $V = 2,721.3 \text{ cm}^3$

The manager would most likely choose the cylinder since less popcorn would be required to fill it and a greater profit per container would be made.

- b. If the price of making a container is based on the amount of material needed to make each container, which container would be the cheapest to produce?

**Solution:**

Find the surface area of each container. Notice that the cylinder and prism each have only one base and that the cone has none, because there are no tops on the containers.

$$S = 2\pi rh + \pi r^2$$

Cylinder:  $S = 2(3.14)(7)(16) + 3.14(7^2)$   
 $S = 857.22 \text{ cm}^2$

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

$$\text{Prism: } S = (15 \times 12) + 2(15 \times 16) + 2(12 \times 16) = 1044 \text{ cm}^2$$

Cone: Find the slant height using the Pythagorean Theorem.

$$c^2 = 10^2 + 26^2$$

$$c^2 = 100 + 676$$

$$c = \sqrt{776} \approx 27.9$$

$$S = \pi r l$$

$$S = (3.14)(10)(27.9)$$

$$S = 876.06 \text{ cm}^2$$

The cylinder would be the cheapest to produce.

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

13. A cell phone service offers two rate plans, limited and unlimited.

Rate Plan	Flat Rate	Free Airtime	Overtime Charge
Limited	\$19.95	150 minutes	20 cents/minute
Unlimited	\$39.95	N/A	N/A

- a. Write two equations that show the cost for the limited and unlimited plans. Let cost =  $c$  and minutes =  $m$ .

**Solution:**

**Define the variables used.**

Let  $C$  be the cost of the phone plan.

Let  $m$  be the number of minutes of airtime.

**Write an equation for the limited plan.**

limited plan:  $C = 19.95 + 0.2(m - 150)$ ,  $m > 150$

**Write an equation for the unlimited plan.**

unlimited plan:  $C = 39.95$

- b. How much airtime would it take for the limited plan to cost the same as the unlimited plan? Show or explain how you found your answer.

**Solution:**

**Substitute  $C = 39.95$  for  $C$  in the limited plan's equation and solve for  $m$ .**

$$\begin{aligned}C &= 19.95 + 0.2(m - 150) \\39.95 &= 19.95 + 0.2m - 30 \\39.95 &= -10.05 + 0.2m \\39.95 + 10.05 &= -10.05 + 0.2m + 10.05 \\50 &= 0.2m \\50 & \quad 0.2m \\0.2 & \quad 0.2 \\250 &= m\end{aligned}$$

It would take 250 minutes for the limited plan to cost the same as the unlimited plan. Therefore, a person should consider purchasing the unlimited plan if he or she plans to use more than 250 minutes of airtime per month.

14. Doris created an input-output machine. Listed below are the results for five different numbers.

Input	Output
-1	9
0	7
3	1
5	-3
7	-7

- a. Write an algebraic equation to describe this pattern in terms of  $x$  and  $y$ .

**Solution:**

The equation for the ordered pairs in this table is  $y = -2x + 7$ .

- b. What is the slope and the  $y$ -intercept of the graph of this function? Explain your reasoning.

**Solution:**

To find the slope, choose two points and use the slope formula.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Use the points  $(-1, 9)$  and  $(0, 7)$ .

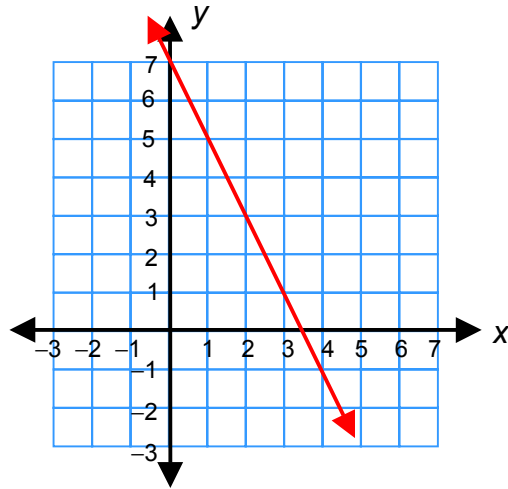
$$m = \frac{7 - 9}{0 - (-1)} = \frac{-2}{1}$$

The slope is  $-2$ . The  $y$ -intercept is  $7$ , because that is where the line crosses the  $y$ -axis.

- c. Graph this equation on a coordinate graph. How does this graph differ from a line that has a slope of  $2$ ?

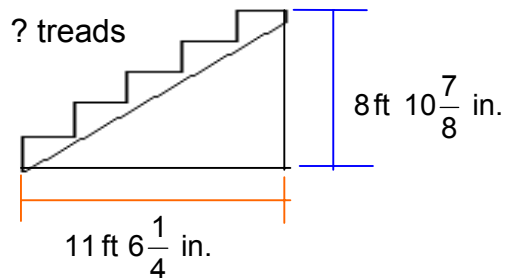
**Solution:**

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions



A line with a slope of 2 rises 2 units for every 1 unit it moves to the right. A line with a slope of  $-2$  falls 2 units for every 1 unit it moves to the right.

15. Your dad has just completed his new barn and needs to construct the staircase to the second floor. He determined that he would need 14 treads (what you step on) and 15 risers (the backs of the steps). While cleaning up, he accidentally threw out the plans for the staircase. Based on the two measurements below, determine the width of each tread.



**Solution:**

Determine the width in inches of the staircase.

Convert  $11 \text{ ft } 6 \frac{1}{4} \text{ in.}$

$$11 \text{ ft} \times \frac{12 \text{ in.}}{1 \text{ ft}} = 132 \text{ in.}$$

$$6 \frac{1}{4} \text{ in.} = 6.25 \text{ in.}$$

$$132 \text{ in.} + 6.25 \text{ in.} = 138.25 \text{ inches}$$

There are 14 treads. Divide the width by 14:  $138.25 \text{ in.} \div 14 = 9.875 \text{ in.}$

Each tread is  $9 \frac{7}{8}$  inches wide.

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

16. The following data shows the pulse rates for 24 eighth-graders, taken after three weeks of physical education.

92 84 77 82 88 84 76 62  
 76 84 88 85 90 76 82 84  
 64 76 83 85 82 78 90 76

- a. Determine the mean, median, and mode of the data.

**Solution:**

$$\text{Mean: } \frac{(\text{sum of the rates})}{24} = \frac{1,944}{24} = 81$$

Median: Place the scores in order from lowest to highest and find the middle score.  
 62 64 76 76 76 76 76 77 78 82 82 82 83 84 84 84 84 85 85 88 88 90 90 92

$$\frac{82 + 83}{2} = 82.5$$

Mode: 76

- b. Make a stem-and-leaf plot of the data.

**Solution:**

Stems	Leaves
6	2 4
7	6 6 6 6 6 7 8
8	2 2 2 3 4 4 4 4 5 5 8 8
9	0 0 2

- c. What percent of the eighth-graders have pulse rates between 76 and 88?

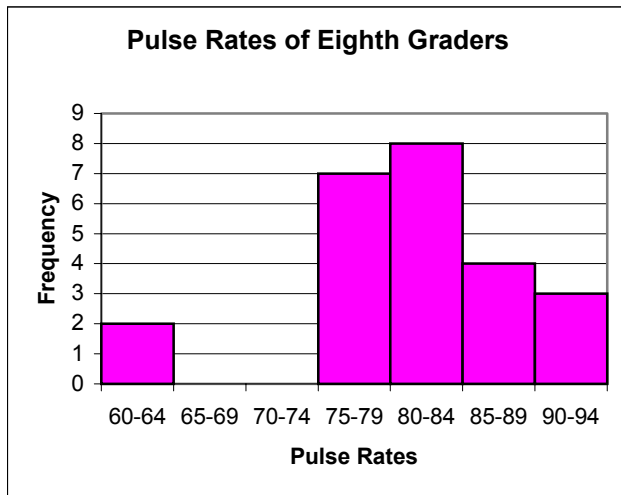
**Solution:**

$$\frac{19}{24} = 0.791666 = 79.1\bar{6}\%$$

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

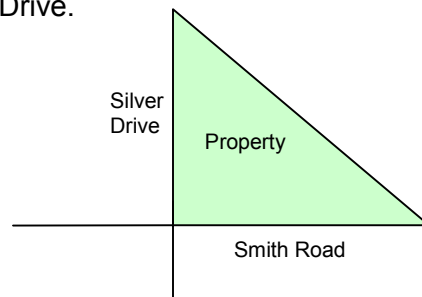
- d. Using 60–64, 65–69, etc. as intervals, make a histogram that represents the data.

**Solution:**



New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

17. A corner lot is shaped like a right triangle, as shown in the diagram. Silver Drive and Smith Road intersect at right angles. The property measures 1,440 feet along Smith Road and 920 feet along Silver Drive.



- a. What is the distance along the property edge that doesn't face Silver Drive or Smith Road, to the nearest foot?

**Solution:**

$$a^2 + b^2 = c^2$$

$$1,440^2 + 920^2 = c^2$$

$$2,073,600 + 846,400 = c^2$$

$$2,920,000 = c^2$$

$$2,920,000 = c^2$$

$$2,920,000 = c^2$$

$$\sqrt{2,920,000} = \sqrt{c^2}$$

$$1,708.8 = 1,709 \text{ ft}$$

The distance is 1,709 feet

- b. What is the area of the lot?

**Solution:**

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(1,440)(920)$$

$$A = 662,400 \text{ ft}^2$$

The lot is 662,400 square feet.

New York Sample 8<sup>th</sup> Grade Open Response Test: Sample Student Solutions

18. Your company is trying to decide which of three possible long-distance phone plans is the best deal. Use the table of information to answer each question.

Plan	Cost
Plan A	\$5.95 per month and \$0.10 per minute
Plan B	200 minutes for \$12.95 and \$0.07 per minute for all minutes over 200
Plan C	flat rate of \$22.75 per month

- a. What piece of information is most important in determining which plan is the least expensive?

**Solution:**

The number of minutes used per month.

- b. Which plan is the least expensive if 50 minutes of long distance are used per month?

**Solution:**

$$\text{Plan A} = 5.95 + 0.10(50) = \$10.95$$

$$\text{Plan B} = \$12.95$$

$$\text{Plan C} = \$22.75$$

Plan A is the least expensive.

- c. Which plan is the least expensive if 220 minutes of long distance are used per month?

**Solution:**

$$\text{Plan A} = 5.95 + 0.10(220) = \$27.95$$

$$\text{Plan B} = 12.95 + 0.07(20) = \$14.35$$

$$\text{Plan C} = \$22.75$$

Plan B is the least expensive.

- d. Write an equation for each plan.

**Solution:**

$$\text{Plan A: } y = 0.10x + 5.95$$

$$\text{Plan B: } y = 12.95 + 0.07(x - 200) \text{ for all minutes over 200}$$

$$\text{Plan C: } y = 22.75$$

- e. Your company is trying to decide between Plan B and Plan C. Plan C would be the least expensive plan if the company uses over how many minutes of long distance per month?

**Solution:**

$$22.75 = 12.95 + 0.07(x - 200)$$

$$9.80 = 0.07x - 14$$

$$23.80 = 0.07x$$

$$340 = x$$

The company would have to use over a total of 340 minutes in order for Plan C to be cheaper.