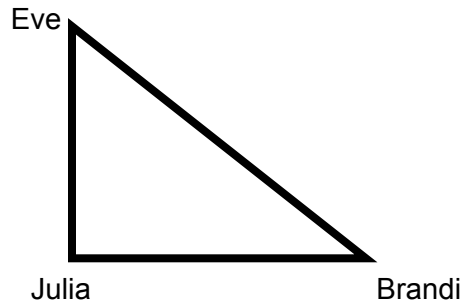


North Carolina Grade 8 Sample Open Response Test

1. Brandi lives due east of Julia. Julia lives due south of Eve. There is a bike path that connects all three houses to form a triangle.
 - a. Sketch a map of where these three friends live in relation to each other.
 - b. If Brandi lives 3 miles from Julia and Eve lives 5 miles from Brandi, how many miles is it from Julia's house to Eve's house? Explain your reasoning.
 - c. If the school is 8 miles due south of Eve, how many miles is the school from Brandi? Explain your reasoning.

SOLUTION

a.



- b. Use the Pythagorean theorem to find the distance from Julia's home to Eve's home, because the houses can be represented by the vertices of a right triangle.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ a^2 + 3^2 &= 5^2 \\ a^2 + 9 &= 25 \\ a^2 &= 16 \\ \sqrt{a^2} &= \sqrt{16} \\ a &= 4 \end{aligned}$$

It is 4 miles from Julia's home to Eve's home.

- c. Brandi is 5 miles from school because Julia is the midpoint between the school and Eve's home, so the right triangle formed by the school, Julia's home, and Brandi's home is congruent to the right triangle formed by the girl's houses. Therefore the distance from school to Brandi's house is congruent to the distance from Eve's house to Brandi's house.

North Carolina Grade 8 Sample Open Response Test

2. Coach Gray recorded his team's score and their opponent's score for each of the last 10 basketball games. The data is listed below.

Gray	55	72	66	95	55	63	54	58	61	51
Opponents	68	45	65	42	58	60	49	56	40	47

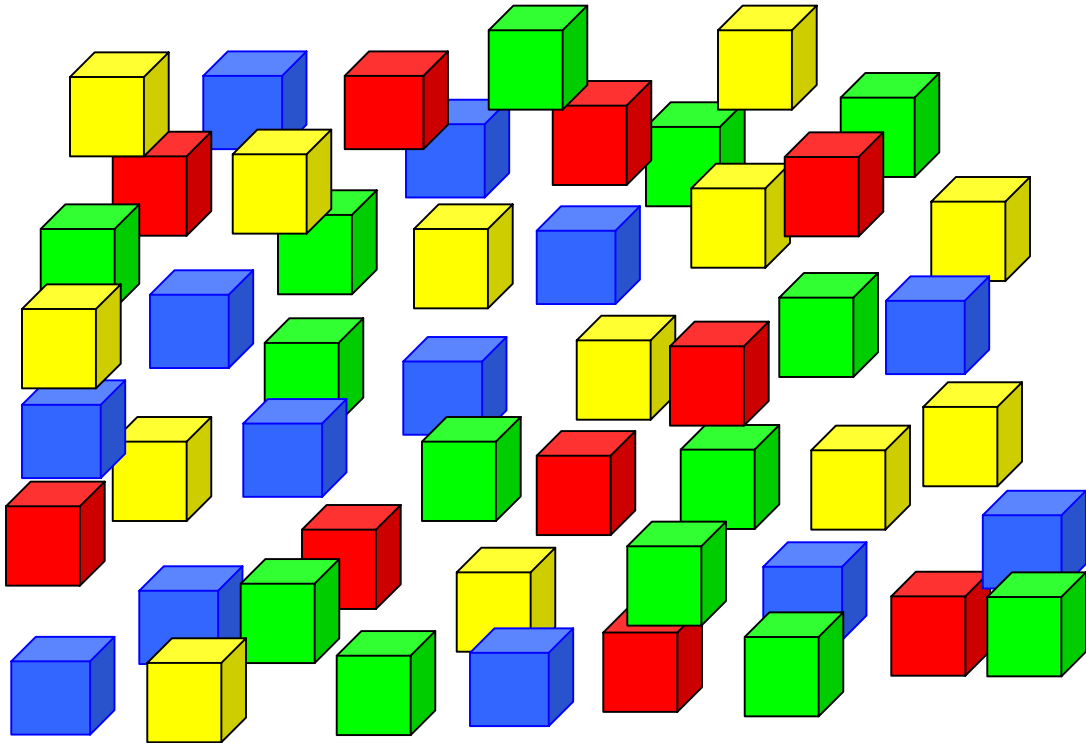
- Find the mean score for Coach Gray's team. Then find the mean score for the opponents. Identify any outliers in either set of data. How do these values affect the mean?
- Which value would be more representative of the scoring of Coach Gray's team: the mean, the median, or the mode? Explain your reasoning.
- Coach Gray's team won 8 out of 10 games. Can you say with certainty that next season the probability of winning a game will be 80%? Explain your answer.

SOLUTION

- The mean score for Gray's team is 63 points per game. The outlier is the value 95. Without this value the mean score is 59.4, or 59 points per game. The outlier increased the average by almost 4 points.

The mean score for the opponents is 53 points per game. There are no outliers in this set of data.
- The median, 59.5, would be most representative of the data. The value of the mode, 55, is too small. The value of the median is a better representation of the data because of the outlier.
- No; You cannot say with certainty that the percentage is correct because there are many factors involved that might change. For instance, they could have a tougher schedule, different players, injuries, etc.

3. Maria is performing an experiment in which a box is filled with the different colored blocks shown. If Maria randomly chooses one block from the box, which color or colors of blocks have the greatest probability of being chosen? Provide the work that shows how you arrived at your answer.



SOLUTION

The probability of choosing a red block is $\frac{10}{50}$, or $\frac{1}{5}$.

The probability of choosing a yellow block is $\frac{13}{50}$.

The probability of choosing a blue block is $\frac{13}{50}$.

The probability of choosing a green block is $\frac{14}{50}$, or $\frac{7}{25}$.

The green blocks have the greatest probability of being chosen.

Course 1, Lesson 11-1

North Carolina Grade 8 Sample Open Response Test

4. Jeff is working at an appliance store to earn money to buy a \$940 computer system. Jeff's base salary is \$40 per day, and he also earns \$75 for every major appliance that he sells.

Jeff's father gives him a challenge: If Jeff earns enough in one day to buy the computer, his father will buy him a DVD player to go with the new computer.

Write and solve an equation to find the number of appliances Jeff needs to sell in one day to have enough money for his computer system. Provide the work that shows how you arrived at your answer.

SOLUTION

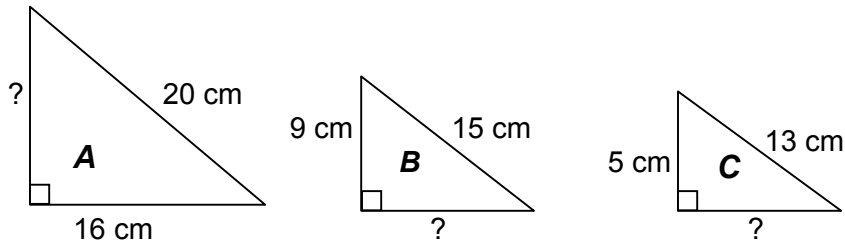
$$\begin{array}{r} 40 + 75x = 940 \\ -40 \quad \underline{\quad} \quad -40 \\ \hline 75x = 900 \\ 75 \quad \underline{\quad} \quad 75 \\ x = 12 \end{array}$$

Jeff needs to sell 12 major appliances in one day to have enough money for his computer system.

Course 3, Lessons 10-4

North Carolina Grade 8 Sample Open Response Test

5. Ken drew three right triangles. Two of the triangles are similar.



- A. Find the missing side lengths. Which two triangles are similar?
- B. Ken needs to draw another right triangle whose hypotenuse measures 30 cm and is similar to the other two similar triangles. Find the lengths of the two legs of this new triangle?

SOLUTION

- A. Use the Pythagorean Theorem to find the missing side lengths.

Triangle A

$$\begin{aligned}x^2 + 16^2 &= 20^2 \\x^2 + 256 &= 400 \\x^2 &= 144 \\x &= 12 \text{ cm}\end{aligned}$$

Triangle B

$$\begin{aligned}9^2 + x^2 &= 15^2 \\81 + x^2 &= 225 \\x^2 &= 144 \\x &= 12 \text{ cm}\end{aligned}$$

Triangle C

$$\begin{aligned}5^2 + x^2 &= 13^2 \\25 + x^2 &= 169 \\x^2 &= 144 \\x &= 12 \text{ cm}\end{aligned}$$

Triangles A and B are similar because their sides are proportional.

$$\frac{9}{12} = \frac{12}{16} = \frac{15}{20}$$

North Carolina Grade 8 Sample Open Response Test

B. Use proportions to find the missing side length.

Using triangle B:

$$\frac{\text{vertical leg } B}{\text{vertical leg } C} = \frac{\text{hypotenuse } B}{\text{hypotenuse } C}$$

$$\frac{9}{x} = \frac{15}{30}$$

$$15x = 270$$

$$x = 18 \text{ cm}$$

Using triangle B:

$$\frac{\text{horizontal leg } B}{\text{horizontal leg } C} = \frac{\text{hypotenuse } B}{\text{hypotenuse } C}$$

$$\frac{12}{x} = \frac{15}{30}$$

$$15x = 360$$

$$x = 24 \text{ cm}$$

To check your work, use the Pythagorean Theorem.

$$18^2 + 24^2 = 30^2$$

$$324 + 576 = 900$$

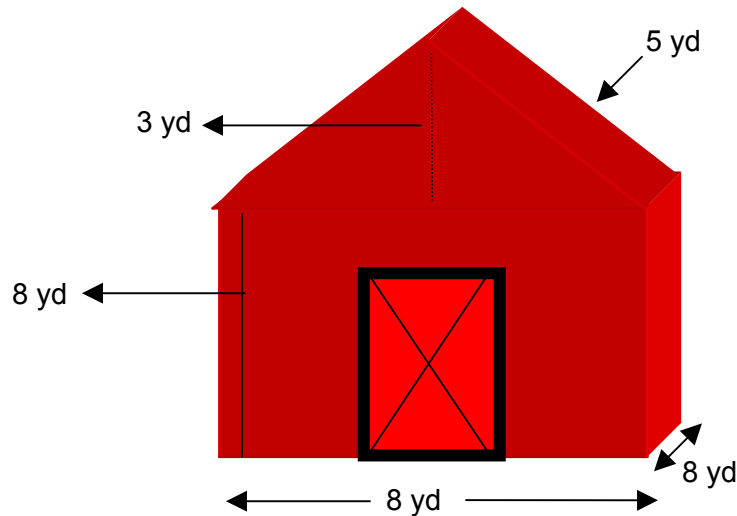
$$900 = 900$$

Course 3, Lessons 6-3 and 7-6

North Carolina Grade 8 Sample Open Response Test

6. Barry needs to paint the outside of his barn. Find the surface area of the outside of the barn to determine the number of gallons of paint needed to cover the barn's surface, and then find the approximate cost of the paint to be purchased. Use the diagram below to show how you found the surface area of the barn. Show all of your work.

- One gallon of paint will cover about 400 square feet.
- One gallon of paint costs \$22.99.



SOLUTION

To find the surface area of the barn, first find the areas of the 4 sides of the barn and the 4 sides of the roof. Then add those areas. There are 2 triangles that are part of the roof. The other faces of the structure are rectangles.

The formula for the area of a rectangle is $A = lw$.

The formula for the area of a triangle is $A = \frac{1}{2}bh$.

$$\begin{aligned} \text{surface area} &= 4(8 \cdot 8) + 2(5 \cdot 8) + \frac{1}{2}(8 \cdot 3) + \frac{1}{2}(8 \cdot 3) \\ &= 256 + 80 + 12 + 12 \\ &= 360 \end{aligned}$$

The surface area of the barn is 360 yd^2 .

Change the units from square yards to square feet.

$$360 \text{ yd}^2 \cdot \frac{3^2 \text{ ft}^2}{1 \text{ yd}^2} = 3,240 \text{ ft}^2$$

North Carolina Grade 8 Sample Open Response Test

To find the amount of paint needed, divide the surface area of the barn by the number of square feet that can be covered by a gallon.

$$3,240 \div 400 = 8.1$$

Barry will need to buy 9 gallons of paint. The cost will be 9×22.99 , or \$206.91.

Course 3, Lesson 6-1 and 6-2