

Day 3

Number Sense – Proportions and Percents

Proportions

Fraction = Fraction example: $\frac{3}{4} = \frac{12}{16}$

To solve a proportion, multiply the two numbers across from each other.

Then divide the answer by the number you have not used from the proportion.

Example – Solve the following:

$$\frac{1}{4} = \frac{5}{x} \quad \frac{x}{3} = \frac{20}{5}$$

Proportions

Your Turn – Solve the following:

$$\frac{3}{7} = \frac{15}{x} \quad \frac{1}{3} = \frac{x}{21}$$

Percent

- Percent must add to 100, as a decimal they must add to 1
- Create a proportion using the trick

is over of = % over 100

Example: what percent of 60 is 15?

$$\frac{15}{60} = \frac{x}{100} \quad x =$$

25%

Example: what is 40% of 90?

$$\frac{x}{90} = \frac{40}{100} \quad x = 36$$

Your Turn:

- What percent of 40 is 15?
- What percent of 88 is 64?
- What is 20% of 200?
- What is 8% of 44?

Examples

- Parts of a Whole add to 100%
- Consider the following parts of a whole
 $\frac{1}{4}$, 24%, .2, x

Describe x as a decimal

Describe x as a percent

Your Turn

- Consider the following parts of a whole
 $\frac{1}{5}$, 41%, .13, x

Describe x as a decimal

Describe x as a percent

OGT Preparation #3**NS02 –Fractions(Ratios), Decimals, and Percents**

Name _____

1. Three-fifths of a city's population is registered to vote. In the last election, 75% of the registered voters cast a ballot. What fractional part of the city's population voted in the last election?

- A. $\frac{9}{20}$ B. $\frac{3}{4}$ C. $\frac{4}{5}$ D. $\frac{27}{20}$

2. A dance committee surveyed some students about suggestions for the next school dance. When they analyzed the results, 45% of those surveyed were seniors, $\frac{1}{4}$ of those surveyed were juniors, 0.1 of those surveyed were sophomores, and the remainder were freshmen. What fraction of the students surveyed were freshmen?

- A. $\frac{1}{20}$ B. $\frac{1}{5}$ C. $\frac{3}{10}$ D. $\frac{2}{5}$

3. A DVD player is on sale for 15% off the regular price of \$135. After the price reduction, a 5% sales tax is added. How much will a customer pay?

- A. \$141.75 B. \$120.49 C. \$114.75 D. \$109.01

4. A state game warden has been observing deer during a particularly severe winter. She recorded that 14 of the 96 deer she observed throughout the state appeared to be suffering from malnutrition. The state has an estimated deer population of 600,000. Based on her observations, approximately how many deer would she predict are suffering from malnutrition?

- A. 14,000 B. 72,000 C. 88,000 D. 96,000

5. Tina plays on the Lakewood High softball team. During her first season, she went to bat 27 times and got 6 hits. If she continues to hit at about the same rate, how many total hits will she have if she bats 40 times?

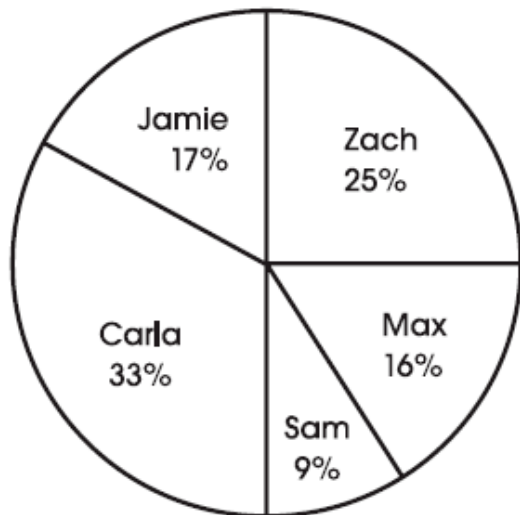
- A. 4 B. 9 C. 15 D. 19

6. Carmella has a coupon that allows her to buy one pair of shorts at the regular price and get a second pair at half the regular price. The shorts cost \$25.50 per pair. When Carmella arrives at the store, she finds that the shorts are on sale for 30% off the regular price. This sale does not allow coupons to be used on the discounted items.

In your **Answer Document**, explain whether two pairs of shorts would cost less by using the coupon or by buying two pairs of shorts at the sale price. Provide mathematical calculations and/or reasoning to support your answer.

7. Six hundred sixty students cast their votes for Junior Class President at Hillmark High School. The results are shown in the graph below.

Votes for Junior Class President



If one-third of those who voted for Zach were girls, how many girls voted for Zach?

- A. 220 B. 165 C. 110 D. 55

8. [SA] Two years ago Monique paid \$5.50 for the rookie baseball card of her favorite New York Yankees player. The card is now worth \$17.00. Sean, her brother, paid \$12.00 for his favorite card, and it has a current value of \$27.00.

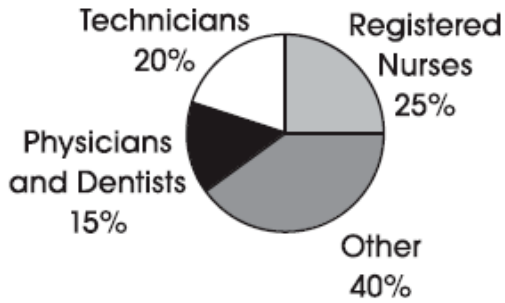
Sean says that his card has increased more in value than Monique's card.
Monique says that her card has increased more in value than Sean's card.

In your Answer Document, show how both Monique and Sean can be correct. Support your answer by showing work or providing an explanation.

9. [SA] The population density of a state, in people per square mile, is found by dividing the population of the state by its area in square miles. Florida has an area of 53,936 square miles. In 1998, Florida had a population of 14,915,980 and a population density of 276.5 people per square mile. In your **Answer Document**, describe the conditions under which a different state could have a smaller population than Florida but have a greater population density.

10. Light travels at a speed of 1.86×10^5 miles per second. A light-year is defined to be the distance that light travels in one year. In your **Answer Document**, determine the number of miles in one light-year. Write your answer in correct scientific notation. Show all of your work or provide an explanation for your answer.

11. Central Health Center employs 360 individuals. The graph shows the different types of positions at Central Health Center.



Approximately 48% of the physicians and dentists employed by Central Health Center are women. How many of the physicians and dentists are women?

- A. 26 B. 28 C. 36 D. 37

12. [SA] Three different opinion polls show different results for the proportion of voters expected to vote for Candidate A in an election for mayor.

Poll 1: Nine of every 20 voters are expected to vote for Candidate A.

Poll 2: The percentage of voters expected to vote for Candidate A is 52%.

Poll 3: There are 130,000 people expected to vote, and of these, 55,000 are expected to vote for Candidate A.

In your **Answer Document**, determine which of these polls shows the greatest favorable result for Candidate A. Show your work or provide an explanation for your answer.

13. [SA] An organization distributes money to various groups in the Toledo area. This organization expects to receive a gift of 15% of a \$5.8 million grant. Sixty-seven percent of this gift will be distributed to the Toledo Arts Festival. In your **Answer Document**, compute the amount that the Toledo Arts Festival will receive. Show or explain all steps used in finding the answer.

14. [SA] Adam was going to buy a new lawn mower from Lawn Care Depot for \$169, less a 10% discount. He saw the same mower on sale at Tractors-R-Us. Their mower originally cost \$210 and was on sale for 13 off. In your **Answer Document**, determine the sale price of the mower at each store. Show your work or provide an explanation to support your answer.

Identify which store would be the most economical place to purchase the mower.

1. Three-fifths of a city's population is registered to vote. In the last election, 75% of the registered voters cast a ballot. What fractional part of the city's population voted in the last election?

- (A) $9/20$ B. $3/4$ C. $4/5$ D. $27/20$

$$\frac{3}{5} \left(\frac{3}{4} \right) = \frac{9}{20}$$

2. A dance committee surveyed some students about suggestions for the next school dance. When they analyzed the results, 45% of those surveyed were seniors, $1/4$ of those surveyed were juniors, 0.1 of those surveyed were sophomores, and the remainder were freshmen. What fraction of the students surveyed were freshmen?

- A. $1/20$ (B) $1/5$ C. $3/10$ D. $2/5$

$$\begin{array}{r} .45 \\ .25 \\ .1 \\ \hline .8 \end{array} \quad .2 = \frac{1}{5}$$

3. A DVD player is on sale for 15% off the regular price of $\$135$. After the price reduction, a 5% sales tax is added. How much will a customer pay?

- A. $\$141.75$ (B) $\$120.49$ C. $\$114.75$ D. $\$109.01$

4. A state game warden has been observing deer during a particularly severe winter. She recorded that 14 of the 96 deer she observed throughout the state appeared to be suffering from malnutrition. The state has an estimated deer population of 600,000. Based on her observations, approximately how many deer would she predict are suffering from malnutrition?

- A. 14,000 B. 72,000 (C) 88,000 D. 96,000

$$\frac{14}{96} = \frac{x}{600000} \quad x = 87500$$

5. Tina plays on the Lakewood High softball team. During her first season, she went to bat 27 times and got 6 hits. If she continues to hit at about the same rate, how many total hits will she have if she bats 40 times?

- A. 4 (B) 9 C. 15 D. 19

6. Carmella has a coupon that allows her to buy one pair of shorts at the regular price and get a second pair at half the regular price. The shorts cost $\$25.50$ per pair. When Carmella arrives at the store, she finds that the shorts are on sale for 30% off the regular price. This sale does not allow coupons to be used on the discounted items.

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coupon

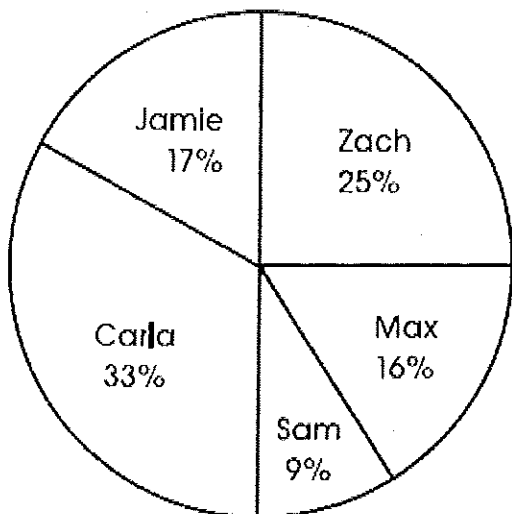
$$25.50 + \frac{25.50}{2} = 38.25$$

$$\begin{aligned} 30\% \\ 25.50 \cdot 2 &= 51 \\ 51(.30) &= 15.3 \\ 51 - 15.3 &= 35.70 \end{aligned}$$

660

7. Six hundred sixty students cast their votes for Junior Class President at Hillmark High School. The results are shown in the graph below.

Votes for Junior Class President



$$\frac{660}{.25} = 165 \text{ students voted for Zach}$$

$$\frac{1}{3}(165) = 55$$

- If one-third of those who voted for Zach were girls, how many girls voted for Zach?

A. 220 B. 165 C. 110 **D. 55**

8. [SA] Two years ago Monique paid \$5.50 for the rookie baseball card of her favorite New York Yankees player. The card is now worth \$17.00. Sean, her brother, paid \$12.00 for his favorite card, and it has a current value of \$27.00.

Sean says that his card has increased more in value than Monique's card. Monique says that her card has increased more in value than Sean's card.

In your Answer Document, show how both Monique and Sean can be correct. Support your answer by showing work or providing an explanation.

$$\text{Sean: } 27 - 12 = 15 \quad \frac{15}{12} = 125\%$$

$$\text{Mon.: } 17 - 5.50 = 11.50 \quad \frac{11.50}{5.50} = 209\%$$

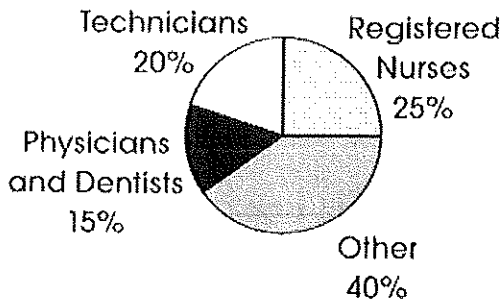
9. [SA] The population density of a state, in people per square mile, is found by dividing the population of the state by its area in square miles. Florida has an area of 53,936 square miles. In 1998, Florida had a population of 14,915,980 and a population density of 276.5 people per square mile. In your Answer Document, describe the conditions under which a different state could have a smaller population than Florida but have a greater population density.

If they are more tightly packed in $\frac{\text{Pop} = 10,000,000}{\text{Area} = 20,000} = 500$

10. Light travels at a speed of 1.86×10^5 miles per second. A light-year is defined to be the distance that light travels in one year. In your Answer Document, determine the number of miles in one light-year. Write your answer in correct scientific notation. Show all of your work or provide an explanation for your answer.

$$\frac{1.86 \times 10^5 \text{ mi}}{\text{sec}} \cdot \frac{60 \text{ sec}}{\text{min}} \cdot \frac{60 \text{ min}}{\text{hr}} \cdot \frac{24 \text{ hrs}}{\text{day}} \cdot \frac{365 \text{ days}}{\text{yr}} = 5.87 \times 10^{12}$$

11. Central Health Center employs 360 individuals. The graph shows the different types of positions at Central Health Center.



$$360 (.15) = 54 \text{ people}$$

$$54 (.48) = 26 \text{ women}$$

Approximately 48% of the physicians and dentists employed by Central Health Center are women. How many of the physicians and dentists are women?

- (A) 26 B. 28 C. 36 D. 37

12. [SA] Three different opinion polls show different results for the proportion of voters expected to vote for Candidate A in an election for mayor.

Poll 1: Nine of every 20 voters are expected to vote for Candidate A.

$$\frac{9}{20} = .45 = 45\%$$

Poll 2: The percentage of voters expected to vote for Candidate A is 52%.

Poll 3: There are 130,000 people expected to vote, and of these, 55,000 are expected to vote for Candidate A.

$$\frac{55000}{130000} = .42 = 42\%$$

In your **Answer Document**, determine which of these polls shows the greatest favorable result for Candidate A. Show your work or provide an explanation for your answer.

Poll 2

13. [SA] An organization distributes money to various groups in the Toledo area. This organization expects to receive a gift of 15% of a \$5.8 million grant. Sixty-seven percent of this gift will be distributed to the Toledo Arts Festival. In your **Answer Document**, compute the amount that the Toledo Arts Festival will receive. Show or explain all steps used in finding the answer.

$$(5.8)(.15) = .87 \text{ million} \cdot .67 = .5829 \text{ million}$$

$$\$582,900$$

14. [SA] Adam was going to buy a new lawn mower from Lawn Care Depot for \$169, less a 10% discount. He saw the same mower on sale at Tractors-R-U's. Their mower originally cost \$210 and was on sale for $\frac{1}{3}$ off. In your **Answer Document**, determine the sale price of the mower at each store. Show your work or provide an explanation to support your answer.

Identify which store would be the most economical place to purchase the mower.

Depot

$$169(.10) = 16.9 \text{ off}$$

$$169 - 16.9 = 152.1$$

R-U's

$$210\left(\frac{1}{3}\right) = 70 \text{ off}$$

$$210 - 70 = 140$$

↑
Cheaper