## 7.RP.A. 3 Solve Percent Problems

7.RP.A. 3 Use proportional relationships to solve multistep ratio and percent problems.

1 In a recent town election, 1,860 people voted for either candidate $A$ or candidate $B$ for the position of supervisor. If candidate $A$ received $55 \%$ of the votes, how many votes did candidate $B$ receive?

1) 186
2) 837
3) 1,023
4) 1,805

2 Twenty-five percent of 88 is the same as what percent of 22 ?

1) $12 \frac{1}{2} \%$
2) $40 \%$
3) $50 \%$
4) $100 \%$

3 The Edison Lightbulb Company tests 5\% of their daily production of lightbulbs. If 500 bulbs were tested on Tuesday, what was the total number of bulbs produced that day?

1) 25
2) 1,000
3) 10,000
4) 100,000

4 Linda paid $\$ 48$ for a jacket that was on sale for $25 \%$ of the original price. What was the original price of the jacket?

1) $\$ 60$
2) $\$ 72$
3) $\$ 96$
4) $\$ 192$

5 Rashawn bought a CD that cost \$18.99 and paid $\$ 20.51$, including sales tax. What was the rate of the sales tax?

1) $5 \%$
2) $2 \%$
3) $3 \%$
4) $8 \%$

6 Carla bought a dress at a sale for $20 \%$ off the original price. The sale price of the dress was $\$ 28.80$. Find the original price of the dress, in dollars.

7 The Hudson Record Store is having a going-out-of-business sale. CDs normally sell for $\$ 18.00$. During the first week of the sale, all CDs will sell for $\$ 15.00$. Written as a fraction, what is the rate of discount? What is this rate expressed as a percent? Round your answer to the nearest hundredth of a percent. During the second week of the sale, the same CDs will be on sale for $25 \%$ off the original price. What is the price of a CD during the second week of the sale?

8 A clothing store offers a $50 \%$ discount at the end of each week that an item remains unsold. Patrick wants to buy a shirt at the store and he says, "I've got a great idea! I'll wait two weeks, have $100 \%$ off, and get it for free!" Explain to your friend Patrick why he is incorrect and find the correct percent of discount on the original price of a shirt.

9 A painting that regularly sells for a price of $\$ 55$ is on sale for $20 \%$ off. The sales tax on the painting is $7 \%$. Will the final total cost of the painting differ depending on whether the salesperson deducts the discount before adding the sales tax or takes the discount after computing the sum of the original price and the sales tax on $\$ 55$ ?

10 Shana wants to buy a new bicycle that has a retail price of $\$ 259.99$. She knows that it will be on sale next week for $30 \%$ off the retail price. If the tax rate is $7 \%$, find the total amount, to the nearest cent, that she will save by waiting until next week.

11 Sue bought a picnic table on sale for $50 \%$ off the original price. The store charged her $10 \%$ tax and her final cost was $\$ 22.00$. What was the original price of the picnic table?

12 Miller's Department Store is having a sale with a $25 \%$ discount on mattresses. If the sales tax rate is $8 \%$, how much change will Frank receive from $\$ 800$ if he purchases a mattress regularly priced at $\$ 895$ during this sale?

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13 Mr. Perez owns a sneaker store. He bought 350 pairs of basketball sneakers and 150 pairs of soccer sneakers from the manufacturers for $\$ 62,500$. He sold all the sneakers and made a $25 \%$ profit. If he sold the soccer sneakers for $\$ 130$ per pair, how much did he charge for one pair of basketball sneakers?

14 Walter is a waiter at the Towne Diner. He earns a daily wage of $\$ 50$, plus tips that are equal to $15 \%$ of the total cost of the dinners he serves. What was the total cost of the dinners he served if he earned $\$ 170$ on Tuesday?

15 Max is paid a salary of \$225 a week plus $2.5 \%$ commission on his total sales. Write an equation for $P$, Max's pay for one week, in terms of $T$, his weekly total sales. Use this equation to determine his total pay for a week in which his total sales are $\$ 4,650$.

16 A factory packs CD cases into cartons for a music company. Each carton is designed to hold 1,152 CD cases. The Quality Control Unit in the factory expects an error of less than $5 \%$ over or under the desired packing number. What is the least number and the most number of CD cases that could be packed in a carton and still be acceptable to the Quality Control Unit?

17 Ninety percent of the ninth grade students at Richbartville High School take algebra. If 180 ninth grade students take algebra, how many ninth grade students do not take algebra?

18 In bowling leagues, some players are awarded extra points called their "handicap." The "handicap" in Anthony's league is $80 \%$ of the difference between 200 and the bowler's average. Anthony's average is 145 . What is Anthony's "handicap"?

19 A recent survey shows that the average man will spend 141,288 hours sleeping, 85,725 hours working, 81,681 hours watching television, 9,945 hours commuting, 1,662 hours kissing, and 363,447 hours on other tasks during his lifetime. What percent of his life, to the nearest tenth of a percent, does he spend sleeping?

20 A 14-gram serving of mayonnaise contains 11 grams of fat. What percent of the mayonnaise, to the nearest tenth of a percent, is fat?

21 The world population was 4.2 billion people in 1982. The population in 1999 reached 6 billion. Find the percent of change from 1982 to 1999.

22 At the end of week one, a stock had increased in value from $\$ 5.75$ a share to $\$ 7.50$ a share. Find the percent of increase at the end of week one to the nearest tenth of a percent. At the end of week two, the same stock had decreased in value from $\$ 7.50$ to $\$ 5.75$. Is the percent of decrease at the end of week two the same as the percent of increase at the end of week one? Justify your answer.

23 The accompanying Venn diagram shows the number of students who take various courses. All students in circle $A$ take mathematics. All in circle $B$ take science. All in circle $C$ take technology. What percentage of the students take mathematics or technology?


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## Answer Key

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1 ANS: 2
Candidate $B$ received $45 \% .45 \% \times 1860=837$

2 ANS: 4
$25 \% \times 88=22 x$
$22=22 x$ $x=1=100 \%$

3 ANS: 3

$$
\begin{aligned}
5 \%(x) & =500 \\
x & =10000
\end{aligned}
$$

4 ANS: 4

$$
\begin{aligned}
25 \%(x) & =48 \\
.25 x & =48 \\
x & =192
\end{aligned}
$$

5 ANS: 4
$18.99(x)=20.51$

$$
x \approx 1.08
$$

6 ANS:
$(1-0.20) p=28.80$

$$
p=36
$$

7 ANS:
$\frac{1}{6}, 16.67 \%, \$ 13.50 . \frac{18-15}{18}=\frac{1}{6} .18 \times 0.75=13.5$

8 ANS:
The $50 \%$ discount is applied to the net amount at the end of each week, not to the original price. After two weeks, the percent of discount is $75 \%(50 \%+(0.5)(50 \%))$.

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9 ANS:
No, because of the commutative property of multiplication.

$$
\begin{aligned}
55 \times 80 \% \times 107 \% & =55 \times 107 \% \times 80 \% \\
47.08 & =47.08
\end{aligned}
$$

10 ANS:
$259.99 \times 1.07-259.99(1-0.3) \times 1.07=83.46$

11 ANS:

$$
\begin{aligned}
& 50 \%(x) \times 110 \%=22 \\
& \$ 40 \text {. } \\
& .55 x=22 \\
& x=40
\end{aligned}
$$

12 ANS:
$800-(895)(0.75)(1.08)=75.05$

13 ANS:
\$167.50.

$$
\begin{aligned}
350 x+150(130) & =62500 \times 1.25 \\
350 x+19500 & =78125 \\
350 x & =58625 \\
x & =\$ 157.50
\end{aligned}
$$

14 ANS:

$$
\begin{aligned}
50+15 \%(x) & =170 \\
\$ 800 . \quad 15 x & =120 \\
x & =800
\end{aligned}
$$

15 ANS:
$P=225+0.025 T$ and 341.25. $P=225+.025(4650)=341.25$

16 ANS:
1,095 and $1,209 . \begin{aligned} & 1152 \times 95 \%=1095 \\ & 1152 \times 105 \%=1209\end{aligned}$

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17 ANS:
20. $\begin{aligned} 90 \%(x) & =180 \\ x & =200 \text { students total } .200-180=20 \text { students } \text { w/o algebra }\end{aligned}$

18 ANS:
44. $80 \% \times(200-145)=44$

19 ANS:
20.7. $\frac{141288}{(141288+85725+81681+9945+1662+363477)} \approx 20.7 \%$

20 ANS:
78.6. $\frac{11}{14} \approx .786 \approx 78.6 \%$

21 ANS:
42.85714286. $\frac{6-4.2}{4.2} \approx 43 \%$

22 ANS:
$30.4 \%$; no, $23.3 \% \cdot \frac{7.50-5.75}{5.75}=30.4 \% \cdot \frac{7.50-5.75}{7.50}=23.3 \%$

23 ANS:
$84 \% \cdot \frac{15+4+7+2+8+6}{15+4+7+2+8+6+8}=84 \%$

