A.N.5: Percents: Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount), and proportionality/direct variation

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?

Name: _____

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?

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"?

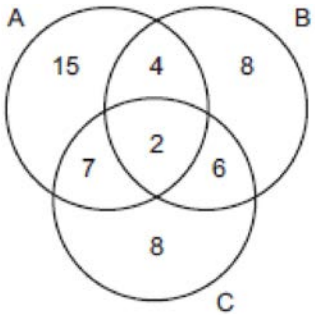
19 A recent survey shows that the average man will spend 141,288 hours sleeping, 85,725 hours working, 81,681 hours watching television, 9,945 hours commuting, 1,662 hours kissing, and 363,447 hours on other tasks during his lifetime. What percent of his life, to the *nearest tenth of a percent*, does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

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

REF: 081007ia

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

REF: 010009a

3 ANS: 3
$$5\%(x) = 500$$
$$x = 10000$$

REF: 010626a

4 ANS: 4
$$25\%(x) = 48$$
$$.25x = 48$$
$$x = 192$$

REF: 069910a

5 ANS: 4
$$18.99(x) = 20.51$$
$$x \approx 1.08$$

REF: 060420a

6 ANS:
$(1 - 0.20)p = 28.80$
$p = 36$

REF: 011532ia

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

REF: 060835ia

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%)).

REF: spring9833a

9 ANS:

No, because of the commutative property of multiplication. $55 \times 80\% \times 107\% = 55 \times 107\% \times 80\%$

$47.08 = 47.08$

REF: 089930a

10 ANS:

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

REF: 011239ia

11 ANS:

$50\%(x) \times 110\% = 22$

$.55x = 22$

$x = 40$

\$40.

REF: 010122a

12 ANS:

$800 - (895)(0.75)(1.08) = 75.05$

REF: 081334ia

13 ANS:

$350x + 150(130) = 62500 \times 1.25$

$350x + 19500 = 78125$

$350x = 58625$

$x = \$157.50$

\$167.50.

REF: 060233a

14 ANS:

$50 + 15\%(x) = 170$

$.15x = 120$

$x = 800$

\$800.

REF: 080436a

15 ANS:

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

REF: 060836a

16 ANS:

$1152 \times 95\% = 1095$

$1152 \times 105\% = 1209$

1,095 and 1,209.

REF: 060127a

17 ANS:

20. $\begin{array}{l} 90\%(x) = 180 \\ x = 200 \text{ students total} \end{array}$. $200 - 180 = 20$ students w/o algebra

REF: 060222a

18 ANS:

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

REF: 080225a

19 ANS:

20.7. $\dfrac{141288}{(141288 + 85725 + 81681 + 9945 + 1662 + 363477)} \approx 20.7\%$

REF: 080635a

20 ANS:

78.6. $\dfrac{11}{14} \approx .786 \approx 78.6\%$

REF: 010732a

21 ANS:

42.85714286. $\dfrac{6 - 4.2}{4.2} \approx 43\%$

REF: 010322a

22 ANS:

30.4%; no, 23.3%. $\dfrac{7.50 - 5.75}{5.75} = 30.4\%$. $\dfrac{7.50 - 5.75}{7.50} = 23.3\%$

REF: 080935ia

23 ANS:

84%. $\dfrac{15 + 4 + 7 + 2 + 8 + 6}{15 + 4 + 7 + 2 + 8 + 6 + 8} = 84\%$

REF: 060026a