

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

1. 010732a, P.I. A.N.5

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?

2. 080635a, P.I. A.N.5

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?

3. 010009a, P.I. A.N.5

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

- [A] 40% [B] $12\frac{1}{2}\%$
[C] 50% [D] 100%

4. 060222a, P.I. A.N.5

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?

5. 069910a, P.I. A.N.5

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

- [A] \$192 [B] \$96 [C] \$60 [D] \$72

6. 010122a, P.I. A.N.5

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?

7. 060420a, P.I. A.N.5

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

- [A] 2% [B] 3% [C] 5% [D] 8%

8. 089930a, P.I. A.N.5

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?

9. spring9833a, P.I. A.N.5

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.

10. 080436a, P.I. A.N.5

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?

11. 060836a, P.I. A.N.5
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.
12. 080225a, P.I. A.N.5
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"?
13. 060835ia, P.I. A.N.5
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?
14. 080935ia, P.I. A.N.5
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.
15. 060233a, P.I. A.N.5
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?
16. 010322a, P.I. A.N.5
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.
17. 010626a, P.I. A.N.5
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?
[A] 100,000 [B] 25
[C] 1,000 [D] 10,000
18. 060127a, P.I. A.N.5
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?

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

[2] 78.6%, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 78.6%, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, incoherent or is a correct response that was obtained by an obviously incorrect

[1] procedure.

[2] 20.7, and appropriate work is shown, such

as $\frac{141288}{683748} = \frac{x}{100}$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 20.7, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[2] incorrect procedure.

[3] D

[2] 20, and appropriate work is shown, such as $(180 \div 0.9) - 180$.

[1] A partial answer is found, such as 200 students are enrolled, but 180 is not subtracted from the answer.

or [1] An appropriate equation is shown, but one computational error is made, but 180 is subtracted.

or [1] An answer of 18 is found by subtracting 180×0.9 from 180.

or [1] 20, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[5] A

[2] \$40, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] \$40, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[6] incorrect procedure.

[7] D

[3] No, it will not differ and the student shows that both methods lead to \$47.08, such as $\$55 \times .80 = \44 , $\$44 \times 1.07 = \47.08 , $\$55 \times 1.07 = \58.85 , and $\$58.85 \times .80 = \47.08 .

[2] Both ways are computed, one computational mistake is made, and an appropriate answer is found.

or [2] Both ways are computed correctly, but no comparison is found.

[1] At least one way is computed correctly, but no comparison is found.

or [1] Both ways are computed incorrectly, but an appropriate comparison is found.

[0] Both ways are computed incorrectly, and no comparison is found.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[8] obviously incorrect procedure.

- [4] Gives an appropriate explanation to show Patrick he is wrong such as showing that for a particular item costing say \$10, the first 50% discount would result in a \$5 price and the second 50% discount would result in a \$2.50 price, not \$0. The student then finds the correct 75% discount. (The student need not show a specific example if they show the 75% discount as their explanation.)
- [3] Gives an appropriate explanation to Patrick but only computes that the cost is 25% of the original cost or leaves the discount as a fraction ($\frac{3}{4}$) not as a percent.
- [2] Gives a specific correct example to show Patrick incorrect but does not correctly show the percent discount.
- [1] Explanation to Patrick is partially correct or just says 25%.
-
- [9] [3] \$800, and appropriate work is shown, such as $0.15x + 50 = 170$ or a table of values or trial and error with at least three trials and appropriate checks.
- [2] Appropriate work is shown, but one computational error is made.
- or [2] The trial-and-error method is used to find the correct solution, but only two trials and appropriate checks are shown.
- [1] Appropriate work is shown, but two or more computational errors are made.
- or [1] Appropriate work is shown, but one conceptual error is made.
- or [1] Appropriate work is shown, but the \$50 per day is not included in his pay, resulting in an answer of \$1,133.33.
- or [1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.
- or [1] \$800, but no work or only one trial with an appropriate check is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [10] [3] A correct equation is written, such as $P = 225 + 0.025T$, and 341.25, and appropriate work is shown.
- [2] A correct equation is written and appropriate work is shown, but one computational error is made.
- or [2] Appropriate work is shown to find the correct total pay, but no equation is written.
- [1] Appropriate work is shown, but two or more computational errors are made.
- or [1] Appropriate work is shown, but one conceptual error is made, such as using $P = 225 + 0.25T$.
- or [1] A correct equation is written, but no further correct work is shown.
- or [1] 341.25, but no work is shown and no equation is written.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [11] [2] 44, and appropriate work is shown, such as $0.8(200 - 145)$.
- [1] Appropriate work is shown, but one computational or conceptual error is made.
- or [1] 44, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [12] [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

- [3] $\frac{3}{18}$, 16.67% and \$13.50, and appropriate work is shown.
- [2] Appropriate work is shown, but one rounding error is made, such as 16.6%, 16.7%, or 17%.
- or [2] An incorrect fractional rate of discount is found, but an appropriate percent is stated, and \$13.50 is found.
- or [2] Appropriate work is shown, but only two correct answers are found.
- [1] Appropriate work is shown, but one conceptual error is made.
- or [1] Appropriate work is shown, but only one correct answer is found.
- or [1] $\frac{3}{18}$, 16.67% and \$13.50, but no work is shown.
- [0] $\frac{3}{18}$, 16.67% or \$13.50, but no work is shown.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

- [3] 30.4, and appropriate work is shown, and "no," and an appropriate justification is given.
- [2] Appropriate work is shown, but one computational or rounding error is made, but an appropriate answer and justification are given.
- or [2] 30.4, and appropriate work is shown, and "no," but no justification or an incorrect justification is given.
- [1] Appropriate work is shown, but two or more computational or rounding errors are made, but an appropriate answer and justification are given.
- or [1] Appropriate work is shown, but one conceptual error is made, but an appropriate answer and justification are given.
- or [1] 30.4 and "no," but no work is shown, and no justification or an incorrect justification is given.
- [0] "No," but no work is shown, and no justification or an incorrect justification is given.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [4] \$167.50, and appropriate work is shown, such as $350x + (150)(130) = 1.25(62,500)$ or trial and error with at least three trials with appropriate checks.
- [3] Appropriate work is shown, but one computational error is made.
- [2] Appropriate work is shown, but more than one computational error is made.
- or [2] \$167.50, but only one trial with an appropriate check is shown.
- [1] \$167.50, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-

[2] 42.85714286 or an equivalent answer, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] An answer of 30 is found by dividing 1.8 by 6.

or [1] An answer of 70 is found by dividing 4.2 by 6.

or [1] 42.85714286 or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[16] incorrect procedure.

[17] D

[3] 1,095 and 1,209, and appropriate work is shown.

[2] Appropriate work is shown, but one computational error is made.

or [2] Appropriate work is shown, but a whole-number solution is not found.

or [2] 5% of CD cases is rounded to 58, but 58 is added to or subtracted from 1,152 appropriately.

or [2] Appropriate work is shown, but only one correct solution is found.

[1] Appropriate work is shown, but more than one computational error is made.

or [1] 5% of CD cases is rounded to 58, but 58 is added to or subtracted from 1,152, but one computational error is made.

or [1] 5% of 1,152 is found, but no further work is shown.

or [1] 1,095 and 1,209, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[18] incorrect procedure.
