

## Section 6-2: Using a Ratio to Express a Rate

1. 060101a, P.I. A.A.1  
A car travels 110 miles in 2 hours. At the same rate of speed, how far will the car travel in  $h$  hours?
- [A]  $\frac{h}{55}$  [B]  $55h$  [C]  $\frac{h}{220}$  [D]  $220h$
2. 080002a, P.I. A.A.1  
A hockey team played  $n$  games, losing four of them and winning the rest. The ratio of games won to games lost is
- [A]  $\frac{n}{4}$  [B]  $\frac{n-4}{4}$  [C]  $\frac{4}{n}$  [D]  $\frac{4}{n-4}$

## Section 6-3: Verbal Problems Involving Ratio

3. 069913a, P.I. A.N.5  
A total of \$450 is divided into equal shares. If Kate receives four shares, Kevin receives three shares, and Anna receives the remaining two shares, how much money did Kevin receive?
- [A] \$150 [B] \$100  
[C] \$200 [D] \$250
4. 069915a, P.I. A.N.5  
During a recent winter, the ratio of deer to foxes was 7 to 3 in one county of New York State. If there were 210 foxes in the county, what was the number of deer in the county?
- [A] 280 [B] 147 [C] 490 [D] 90
5. 089931a, P.I. A.N.5  
The profits in a business are to be shared by the three partners in the ratio of 3 to 2 to 5. The profit for the year was \$176,500. Determine the number of dollars each partner is to receive.

6. 010014a, P.I. A.N.5  
Sterling silver is made of an alloy of silver and copper in the ratio of 37:3. If the mass of a sterling silver ingot is 600 grams, how much silver does it contain?
- [A] 200 g [B] 48.65 g  
[C] 450 g [D] 555 g
7. 010210a, P.I. A.N.5  
There are 357 seniors in Harris High School. The ratio of boys to girls is 7:10. How many boys are in the senior class?
- [A] 210 [B] 117 [C] 107 [D] 147
8. 010331a, P.I. A.N.5  
At the Phoenix Surfboard Company, \$306,000 in profits was made last year. This profit was shared by the four partners in the ratio 3:3:5:7. How much *more* money did the partner with the largest share make than one of the partners with the smallest share?

## Section 6-4: Proportion

9. 060505a, P.I. A.N.5  
A cake recipe calls for 1.5 cups of milk and 3 cups of flour. Seth made a mistake and used 5 cups of flour. How many cups of milk should he use to keep the proportions correct?
- [A] 1.75 [B] 2 [C] 2.25 [D] 2.5

## Section 6-5: Direct Variation

10. 080005a, A.N.5

Which table does *not* show an example of direct variation?

[A]

$x$	$y$
1	4
2	8
3	12
4	16

[B]

$x$	$y$
2	24
4	12
6	8
8	6

[C]

$x$	$y$
1	$\frac{1}{2}$
2	1
3	$\frac{3}{2}$
4	2

[D]

$x$	$y$
-4	-20
-3	-15
-2	-10
-1	-5

11. 010708a, P.I. A.N.5

Which equation represents the direct variation relationship of the equation  $\frac{x}{y} = \frac{1}{2}$ ?

[A]  $x = 2y$                       [B]  $y = 2x$

[C]  $y = x + \frac{1}{2}$                       [D]  $y = 3x$

12. 010806a, P.I. A.N.5

If  $x$  varies directly as  $y$ , and  $x = 8$  when  $y = 24$ , what is the value of  $x$  when  $y = 6$ ?

[A] 3                      [B] 4                      [C] 1                      [D] 2

13. 010431a, P.I. A.N.5

Julio's wages vary directly as the number of hours that he works. If his wages for 5 hours are \$29.75, how much will he earn for 30 hours?

14. 060223a, P.I. A.M.1

If the instructions for cooking a turkey state "Roast turkey at  $325^\circ$  for 20 minutes per pound," how many hours will it take to roast a 20-pound turkey at  $325^\circ$ ?

15. 010117a, P.I. A.M.1

In a molecule of water, there are two atoms of hydrogen and one atom of oxygen. How many atoms of hydrogen are in 28 molecules of water?

[A] 29                      [B] 56                      [C] 14                      [D] 42

16. 080201a, P.I. A.M.2

On a map, 1 centimeter represents 40 kilometers. How many kilometers are represented by 8 centimeters?

[A] 280                      [B] 48                      [C] 320                      [D] 5

17. 010818a, P.I. A.M.2

On a map, 1 inch represents 3 miles. How many miles long is a road that is  $2\frac{1}{2}$  inches long on the map?

[A]  $\frac{1}{2}$                       [B]  $7\frac{1}{2}$                       [C]  $5\frac{1}{2}$                       [D]  $6\frac{1}{2}$

18. 080223a, P.I. A.N.5

An image of a building in a photograph is 6 centimeters wide and 11 centimeters tall. If the image is similar to the actual building and the actual building is 174 meters wide, how tall is the actual building, in meters?

19. 080603a, P.I. A.N.5

Jordan and Missy are standing together in the schoolyard. Jordan, who is 6 feet tall, casts a shadow that is 54 inches long. At the same time, Missy casts a shadow that is 45 inches long. How tall is Missy?

[A] 86.4 in                      [B] 5 ft  
[C] 5 ft 6 in                      [D] 38 in

20. 060124a, P.I. A.N.5  
If a girl 1.2 meters tall casts a shadow 2 meters long, how many meters tall is a tree that casts a shadow 75 meters long at the same time?
21. 010222a, P.I. A.N.5  
A 12-foot tree casts a 16-foot shadow. How many feet tall is a nearby tree that casts a 20-foot shadow at the same time?

## Section 6-6: Percent and Percentage Problems

### Base, Rate, and Percent

22. 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?
23. 010009a, P.I. A.N.5  
Twenty-five percent of 88 is the same as what percent of 22?
- [A]  $12\frac{1}{2}\%$                       [B] 50%
- [C] 40%                              [D] 100%
24. 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?
25. 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] \$72    [D] \$60
26. 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?
27. 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?
28. 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?
29. 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"?
30. 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?

31. 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] 10,000 [D] 1,000

### Percent of Error

32. fall0723ia, P.I. A.M.3

The groundskeeper is replacing the turf on a football field. His measurements of the field are 130 yards by 60 yards. The actual measurements are 120 yards by 54 yards. Which expression represents the relative error in the measurement?

- [A]  $\frac{(130)(60) - (120)(54)}{(130)(60)}$   
[B]  $\frac{(130)(60)}{(130)(60) - (120)(54)}$   
[C]  $\frac{(130)(60) - (120)(54)}{(120)(54)}$   
[D]  $\frac{(120)(54)}{(130)(60) - (120)(54)}$

33. 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?

### Percent of Increase or Decrease

34. 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.

35. 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] 5% [B] 3% [C] 2% [D] 8%

### Section 6-7: Changing Units of Measure

36. 010427a, P.I. A.A.1

Which expression represents the number of yards in  $x$  feet?

- [A]  $\frac{x}{3}$  [B]  $3x$  [C]  $12x$  [D]  $\frac{x}{12}$

37. 060014a, P.I. A.A.1

If rain is falling at the rate of 2 inches per hour, how many inches of rain will fall in  $x$  minutes?

- [A]  $\frac{x}{30}$  [B]  $\frac{30}{x}$  [C]  $2x$  [D]  $\frac{60}{x}$

38. 060709a, P.I. A.M.2

Andy is 6 feet tall. If 1 inch equals 2.54 centimeters, how tall is Andy, to the *nearest centimeter*?

- [A] 15 [B] 213 [C] 183 [D] 30

39. 060731a, P.I. A.M.2

If a United States dollar is worth \$1.41 in Canadian money, how much is \$100 in Canadian money worth in United States money, to the *nearest cent*?

[1] B

[2] B

[3] A

[4] C

[4] \$52,950, \$35,300, and \$88,250 and an appropriate method is shown, such as  $3x + 2x + 5x = \$176,500$ .

[3] A correct equation is set up or multiplied by correct fractional values  $\frac{3}{10}$ ,  $\frac{2}{10}$ , and  $\frac{5}{10}$ ,

but a computational mistake is made, and three appropriate values are found.

or [3] An appropriate method is shown, but not all three values are found.

[2] The equation is set up correctly, but numerous computational mistakes are made, and three appropriate values are found.

or [2] An incorrect equation is shown, but three appropriate values are found.

or [2] An appropriate equation is shown but is solved only for  $x$  (17,650).

[1] The equation is set up correctly, but no appropriate values are found.

or [1] Three correct answers are found, and 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

[5] incorrect procedure.

[6] D

[7] D

[4] \$68,000, and appropriate work is shown.

[3] \$119,000 and \$51,000, and appropriate work is shown, but the answers are not subtracted to find the difference.

or [3] Appropriate work is shown, but one computational error is made.

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

[1] The value for one share (\$17,000) is found, but no further correct work is shown.

or [1] \$68,000, but no work is shown.

[0] \$17,000 or \$119,000 or \$51,000, and 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

[8] obviously incorrect procedure.

[9] D

[10] B

[11] B

[12] D

[2] \$178.50, and appropriate work is shown, such as solving a proportion, using a table, or trial and error with at least three trials and appropriate checks.

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

or [1] An appropriate proportion is set up, but no solution or an incorrect solution is found.

or [1] An incorrect proportion is set up, but an appropriate solution is found.

or [1] \$178.50, but no work is shown or fewer than three trials with appropriate checks are shown.

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

[13] incorrect procedure.

[2]  $6\frac{2}{3}$  or 6 hr 40 min or  $6.\overline{66}$  or an

equivalent answer, and appropriate work is shown.

[1] 400 min, but the answer is not converted into hours.

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

or [1] Appropriate work is shown, but the answer is rounded to the nearest hour.

or [1]  $6\frac{2}{3}$  or 6 hr 40 min or  $6.\overline{66}$  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

[14] incorrect procedure.

[15] B

[16] C

[17] B

[2] 319, and appropriate work is shown.

[1] A correct proportion is shown, but no solution or an incorrect solution is found.

or [1] An incorrect proportion of equal difficulty is solved appropriately.

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

or [1] 319, 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.

[19] B

[2] 45, and appropriate work is shown, such

as a diagram or  $\frac{1.2}{2} = \frac{x}{75}$ .

[1] Appropriate work is shown, but no answer or an incorrect answer is found.

or [1] 45, 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

[20] incorrect procedure.

[2] 15, and any equivalent proportion, equation, or fraction conversion is shown,

such as  $\frac{12}{16} = \frac{x}{20}$ .

[1] An appropriate proportion, equation, or fraction conversion is shown, but one computational or conceptual error is made.

or [1] An incorrect proportion, equation, or fraction conversion is shown, but an appropriate answer is found for the incorrect proportion.

or [1] 15, 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

[21] incorrect procedure.

[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

[22] procedure.

[23] 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  $180 \times 0.9$  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

[24] incorrect procedure.

[25] A

[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

[26] obviously incorrect procedure.

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[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

[27] incorrect procedure.

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[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

[28] incorrect procedure.

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[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

[29] incorrect procedure.

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[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

[30] incorrect procedure.

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[31] C

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[32] C

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[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

[33] incorrect procedure.

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[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

[34] incorrect procedure.

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[35] D

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[36] A

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[37] A

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[38] C

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[2] 70.92, and appropriate work is shown, such as a proportion.

[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] 70.92, 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

[39] incorrect procedure.

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