

CHAPTER 4-1

RATIOS

1. 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] $\frac{4}{n-4}$ [B] $\frac{n}{4}$ [C] $\frac{n-4}{4}$ [D] $\frac{4}{n}$

2. 060223a, P.I. A.A.26
If the instructions for cooking a turkey state "Roast turkey at 325° for 20 minutes per pound," how many hours will it take to roast a 20-pound turkey at 325° ?

3. 010117a, P.I. A.A.26
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] 14 [B] 56 [C] 29 [D] 42

4. 060505a, P.I. A.A.26
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] 2.25 [B] 2.5 [C] 1.75 [D] 2

5. 069913a, P.I. A.A.26
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] \$200 [B] \$250
[C] \$100 [D] \$150

6. 069915a, P.I. A.A.26
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] 90 [B] 490 [C] 280 [D] 147

7. 010014a, P.I. A.A.26
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] 450 g [B] 555 g
[C] 48.65 g [D] 200 g

8. 010210a, P.I. A.A.26
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] 107 [B] 117 [C] 210 [D] 147

9. 089931a, P.I. A.A.26
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.

10. 010331a, P.I. A.A.26
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?

SPEED

11. 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] $220h$ [C] $\frac{h}{220}$ [D] $55h$

12. 080415a, P.I. A.A.26
A rocket car on the Bonneville Salt Flats is traveling at a rate of 640 miles per hour. How much time would it take for the car to travel 384 miles at this rate?

[A] 36 minutes [B] 256 minutes
[C] 245 minutes [D] 1.7 hours

13. 080632a, P.I. A.A.26
Running at a constant speed, Andrea covers 15 miles in $2\frac{1}{2}$ hours. At this speed, how many *minutes* will it take her to run 2 miles?

14. 010027a, P.I. A.A.6
A truck traveling at a constant rate of 45 miles per hour leaves Albany. One hour later a car traveling at a constant rate of 60 miles per hour also leaves Albany traveling in the same direction on the same highway. How long will it take for the car to catch up to the truck, if both vehicles continue in the same direction on the highway?

15. 080518a, P.I. A.A.6
A bicyclist leaves Bay Shore traveling at an average speed of 12 miles per hour. Three hours later, a car leaves Bay Shore, on the same route, traveling at an average speed of 30 miles per hour. How many hours after the car leaves Bay Shore will the car catch up to the cyclist?

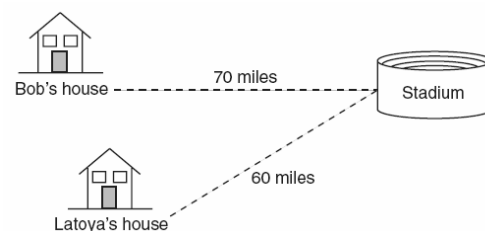
[A] 4 [B] 2 [C] 5 [D] 8

16. 060010a, P.I. A.A.6
A truck travels 40 miles from point *A* to point *B* in exactly 1 hour. When the truck is halfway between point *A* and point *B*, a car starts from point *A* and travels at 50 miles per hour. How many miles has the car traveled when the truck reaches point *B*?

[A] 60 [B] 25 [C] 40 [D] 50

17. 010125a, P.I. A.A.6
Two trains leave the same station at the same time and travel in opposite directions. One train travels at 80 kilometers per hour and the other at 100 kilometers per hour. In how many hours will they be 900 kilometers apart?

18. 010433a, P.I. A.A.6
Bob and Latoya both drove to a baseball game at a college stadium. Bob lives 70 miles from the stadium and Latoya lives 60 miles from it, as shown in the accompanying diagram. Bob drove at a rate of 50 miles per hour, and Latoya drove at a rate of 40 miles per hour. If they both left home at the same time, who got to the stadium first?

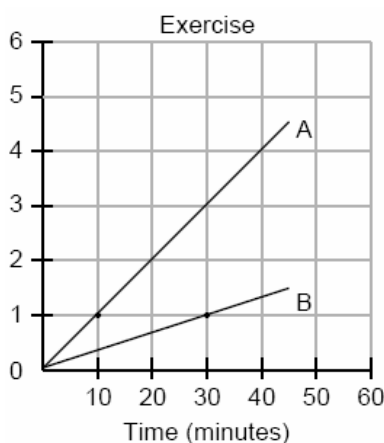


19. 080019a, P.I. A.A.6
A girl can ski down a hill five times as fast as she can climb up the same hill. If she can climb up the hill and ski down in a total of 9 minutes, how many minutes does it take her to climb up the hill?

[A] 4.5 [B] 7.2 [C] 1.8 [D] 7.5

20. 069926a, P.I. 8.G.13

During a 45-minute lunch period, Albert (A) went running and Bill (B) walked for exercise. Their times and distances are shown in the accompanying graph. How much faster was Albert running than Bill was walking, in miles per hour?



21. 080736a, P.I. A.M.1

The trip from Manhattan to Montauk Point is 120 miles by train or by car. A train makes the trip in 2 hours, while a car makes the trip in $2\frac{1}{2}$ hours. How much faster, in miles per hour, is the average speed of the train than the average speed of the car?

22. 060029a, P.I. A.N.4

The distance from Earth to the imaginary planet Med is 1.7×10^7 miles. If a spaceship is capable of traveling 1,420 miles per hour, how many days will it take the spaceship to reach the planet Med? Round your answer to the nearest day.

23. 060308b, P.I. A.N.4

Two objects are 2.4×10^{20} centimeters apart. A message from one object travels to the other at a rate of 1.2×10^5 centimeters per second. How many seconds does it take the message to travel from one object to the other?

- [A] 2.88×10^{25} [B] 2.0×10^{15}
[C] 1.2×10^{15} [D] 2.0×10^4

24. 060116b, P.I. A.M.1

On her first trip, Sari biked 24 miles in T hours. The following week Sari biked 32 miles in T hours. Determine the ratio of her average speed on her second trip to her average speed on her first trip.

- [A] $\frac{3}{2}$ [B] $\frac{4}{3}$ [C] $\frac{3}{4}$ [D] $\frac{2}{3}$

25. 080111b, P.I. A.M.1

On a trip, a student drove 40 miles per hour for 2 hours and then drove 30 miles per hour for 3 hours. What is the student's average rate of speed, in miles per hour, for the whole trip?

- [A] 36 [B] 37 [C] 35 [D] 34

26. 080119b, P.I. A.M.1

If Jamar can run $\frac{3}{5}$ of a mile in 2 minutes 30 seconds, what is his rate in miles per minute?

- [A] $\frac{4}{5}$ [B] $3\frac{1}{10}$ [C] $\frac{6}{25}$ [D] $4\frac{1}{6}$

27. fall0734ia, P.I. A.M.1
Hannah took a trip to visit her cousin. She drove 120 miles to reach her cousin's house and the same distance back home. It took her 1.2 hours to get halfway to her cousin's house. What was her average speed, in miles per hour, for the first 1.2 hours of the trip? Hannah's average speed for the remainder of the trip to her cousin's house was 40 miles per hour. How long, in hours, did it take her to drive the remaining distance? Traveling home along the same route, Hannah drove at an average rate of 55 miles per hour. After 2 hours her car broke down. How many miles was she from home?

SCALE

28. 080201a, P.I. A.A.26
On a map, 1 centimeter represents 40 kilometers. How many kilometers are represented by 8 centimeters?
[A] 320 [B] 280 [C] 5 [D] 48
29. 010818a, P.I. A.A.26
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] $7\frac{1}{2}$ [B] $\frac{1}{2}$ [C] $5\frac{1}{2}$ [D] $6\frac{1}{2}$
30. 080223a, P.I. A.A.26
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?
31. 080603a, P.I. A.A.26
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 6 in
[C] 5 ft [D] 38 in
32. 060124a, P.I. A.A.26
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?
33. 010222a, P.I. A.A.26
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?

CHAPTER 4-2

COMBINING LIKE TERMS

34. 010705a, P.I. A.A.22
What is the value of n in the equation $3n - 8 = 32 - n$?
[A] -6 [B] 10 [C] -10 [D] 6
35. 010807a, P.I. A.A.22
What is the value of p in the equation $8p + 2 = 4p - 10$?
[A] 3 [B] -1 [C] 1 [D] -3
36. fall0732ia, P.I. A.A.22
Solve for g : $3 + 2g = 5g - 9$
37. 060323a, P.I. A.A.22
Solve for m : $0.6m + 3 = 2m + 0.2$
38. 089921a, P.I. A.A.22
Solve for x : $2(x - 3) = 1.2 - x$

39. 060404a, P.I. A.A.22
If $3(x - 2) = 2x + 6$, the value of x is
[A] 20 [B] 12 [C] 0 [D] 5
40. 010401a, P.I. A.A.22
If $2(x + 3) = x + 10$, then x equals
[A] 7 [B] 5 [C] 14 [D] 4
41. 060602a, P.I. A.A.22
What is the value of x in the equation
 $13x - 2(x + 4) = 8x + 1$?
[A] 2 [B] 3 [C] 1 [D] 4
42. 060634a, P.I. A.A.22
Solve for x : $3.3 - x = 3(x - 1.7)$
43. 010601a, P.I. A.A.22
What is the value of x in the equation
 $5(2x - 7) = 15x - 10$?
[A] 1 [B] -5 [C] -9 [D] 0.6
44. 060702a, P.I. A.A.22
What is the value of x in the equation
 $6(x - 2) = 36 - 10x$?
[A] 6 [B] -6 [C] 1.5 [D] 3
45. 080731a, P.I. A.A.22
Solve for x : $5(x - 2) = 2(10 + x)$
46. 060704a, P.I. A.A.22
What is the value of w in the equation
 $\frac{1}{2}w + 7 = 2w - 2$?
[A] 6 [B] 3.6 [C] 2 [D] $3\frac{1}{3}$
47. 080620a, P.I. A.A.22
What is the value of w in the equation
 $\frac{3}{4}w + 8 = \frac{1}{3}w - 7$?
[A] -0.2 [B] -13.846 [C] 2.4 [D] -36
48. 010204a, P.I. A.A.22
What is the value of x in the equation
 $\frac{3}{4}x + 2 = \frac{5}{4}x - 6$?
[A] -16 [B] -4 [C] 4 [D] 16
49. 060310a, P.I. A.A.22
If $x + y = 9x + y$, then x is equal to
[A] 0 [B] y [C] 8 [D] $\frac{1}{5}y$
50. 010011a, P.I. A.A.22
If $9x + 2a = 3a - 4x$, then x equals
[A] $\frac{5a}{12}$ [B] $\frac{a}{13}$ [C] a [D] $-a$
51. 060513a, P.I. A.A.22
If $7x + 2a = 3x + 5a$, then x is equivalent to
[A] $\frac{3a}{10}$ [B] $\frac{7a}{4}$ [C] $\frac{7a}{10}$ [D] $\frac{3a}{4}$
52. 060111a, P.I. A.A.6
If one-half of a number is 8 less than two-thirds of the number, what is the number?
[A] 54 [B] 24 [C] 32 [D] 48
53. 060418a, P.I. A.A.6
The number of people on the school board is represented by x . Two subcommittees with an equal number of members are formed, one with $\frac{2}{3}x - 5$ members and the other with $\frac{x}{4}$ members. How many people are on the school board?
[A] 12 [B] 8 [C] 4 [D] 20

CHAPTER 4-4

TRANSFORMING FORMULAS

54. 080218a, P.I. A.A.23

If $2m + 2p = 16$, p equals

- [A] $16 - m$ [B] $8 - m$
[C] $9m$ [D] $16 + 2m$

55. 010116a, P.I. A.A.23

If $bx - 2 = K$, then x equals

- [A] $\frac{2-K}{b}$ [B] $\frac{K}{b} + 2$
[C] $\frac{K+2}{b}$ [D] $\frac{K-2}{b}$

56. 060719a, P.I. A.A.23

If $c = 2m + d$, then m is equal to

- [A] $\frac{c-d}{2}$ [B] $d - 2c$
[C] $c - \frac{d}{2}$ [D] $\frac{c}{2} - d$

57. 060219a, P.I. A.A.23

If $x = 2a - b^2$, then a equals

- [A] $\frac{x-b^2}{2}$ [B] $\frac{b^2-x}{2}$
[C] $\frac{x+b^2}{2}$ [D] $x + b^2$

58. 010421a, P.I. A.A.23

If $2ax - 5x = 2$, then x is equivalent to

- [A] $\frac{2}{2a-5}$ [B] $7 - 2a$
[C] $\frac{2+5a}{2a}$ [D] $\frac{1}{a-5}$

59. 080530a, P.I. A.A.23

If $\frac{x}{4} - \frac{a}{b} = 0$, $b \neq 0$, then x is equal to

- [A] $-\frac{a}{4b}$ [B] $-\frac{4a}{b}$ [C] $\frac{4a}{b}$ [D] $\frac{a}{4b}$

60. 080722a, P.I. A.A.23

Which equation is equivalent to $3x + 4y = 15$?

- [A] $y = 15 - 3x$ [B] $y = 3x - 15$
[C] $y = \frac{15-3x}{4}$ [D] $y = \frac{3x-15}{4}$

61. 010310a, P.I. A.A.23

The equation $P = 2L + 2W$ is equivalent to

- [A] $2L = \frac{P}{2W}$ [B] $L = \frac{P-2W}{2}$
[C] $L = \frac{P+2W}{2}$ [D] $L = P - W$

62. 010620a, P.I. A.A.23

In the equation $A = p + prt$, t is equivalent to

- [A] $\frac{A}{pr} - p$ [B] $\frac{A}{p} - pr$
[C] $\frac{A-p}{pr}$ [D] $\frac{A-pr}{p}$

63. 060617a, P.I. A.A.23

The formula for the volume of a right circular cylinder is $V = \pi r^2 h$. The value of h can be expressed as

- [A] $\frac{V}{\pi r^2}$ [B] $V - \pi r^2$
[C] $\frac{\pi r^2}{V}$ [D] $\frac{V}{\pi r^2}$

64. 010710a, P.I. A.A.23

The formula for potential energy is $P = mgh$, where P is potential energy, m is mass, g is gravity, and h is height. Which expression can be used to represent g ?

- [A] $P - m - h$ [B] $\frac{P}{mh}$
[C] $\frac{P}{m} - h$ [D] $P - mh$

65. 069922a, P.I. A.A.23

Shoe sizes and foot length are related by the formula $S = 3F - 24$, where S represents the shoe size and F represents the length of the foot, in inches.

a Solve the formula for F .

b To the *nearest tenth of an inch*, how long is the foot of a person who wears a size $10\frac{1}{2}$ shoe?

66. 010703b, P.I. A.A.23

If $\sqrt{x-a} = b$, $x > a$, which expression is equivalent to x ?

- [A] $b^2 + a$ [B] $b - a$
[C] $b + a$ [D] $b^2 - a$

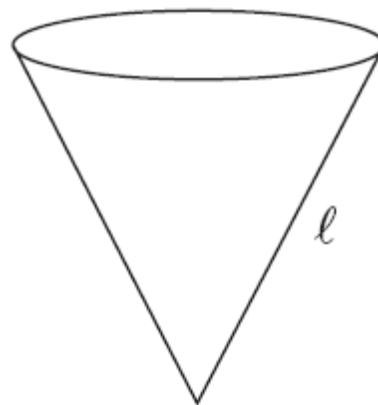
67. 080622b, P.I. A.A.23

The volume of any spherical balloon can be found by using the formula $V = \frac{4}{3}\pi r^3$. Write an equation for r in terms of V and π .

68. 080725b, P.I. A.A.23

The slant height, ℓ , of the conical water tank shown in the accompanying diagram is

$\ell = \sqrt[3]{\frac{8v}{\pi}}$. Solve for v , in terms of ℓ and π .



CHAPTER 4-7

SOLVING INEQUALITIES

69. 010425a, P.I. A.A.24

The inequality $\frac{1}{2}x + 3 < 2x - 6$ is equivalent to

- [A] $x < -\frac{5}{6}$ [B] $x > 6$
[C] $x > -\frac{5}{6}$ [D] $x < 6$

70. 060616a, P.I. 8.G.19

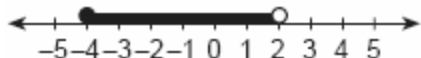
Which graph best represents the solution set for the inequality $x > \sqrt{2}$?

- [A]
[B]
[C]
[D]

CHAPTER 4-8

71. 060001a, P.I. 8.G.19

Which inequality is represented in the graph below?



- [A] $-4 < x < 2$ [B] $-4 \leq x < 2$
[C] $-4 \leq x \leq 2$ [D] $-4 < x \leq 2$

72. 080411a, P.I. 8.G.19

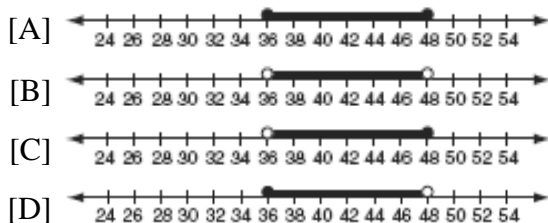
Which inequality is represented in the accompanying graph?



- [A] $-3 \leq x \leq 4$ [B] $-3 < x \leq 4$
[C] $-3 \leq x < 4$ [D] $-3 < x < 4$

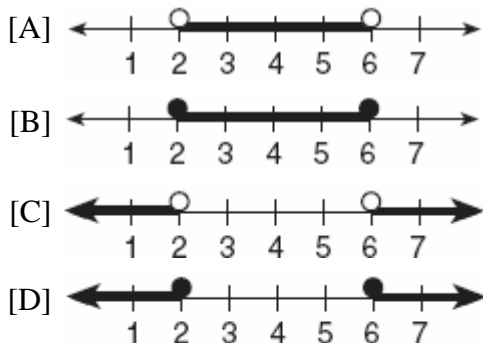
73. 010610a, P.I. 8.G.19

In order to be admitted for a certain ride at an amusement park, a child must be greater than or equal to 36 inches tall and less than 48 inches tall. Which graph represents these conditions?



74. 010312a, P.I. 8.A.13

Which graph represents the solution set for $2x - 4 \leq 8$ and $x + 5 \geq 7$?



75. 060532a, P.I. 8.G.19

The manufacturer of Ron's car recommends that the tire pressure be at least 26 pounds per square inch and less than 35 pounds per square inch. On the accompanying number line, graph the inequality that represents the recommended tire pressure.



76. 089910a

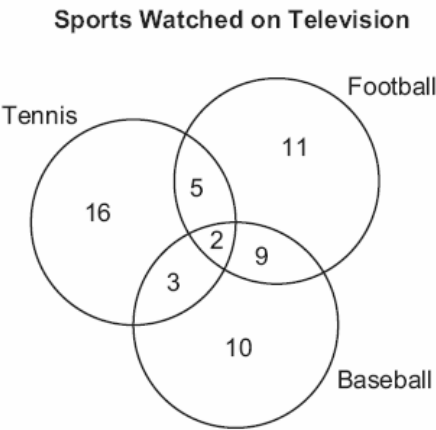
On June 17, the temperature in New York City ranged from 90° to 99° , while the temperature in Niagara Falls ranged from 60° to 69° . The difference in the temperatures in these two cities must be between

- [A] 20° and 30° [B] 20° and 40°
[C] 25° and 35° [D] 30° and 40°

MATH TOOLBOX P. 201

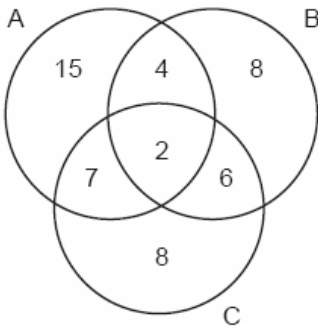
VENN DIAGRAMS

77. 060203a, P.I. A.RP.11
 The accompanying diagram shows the results of a survey asking which sports the members of the Key Club watch on television.

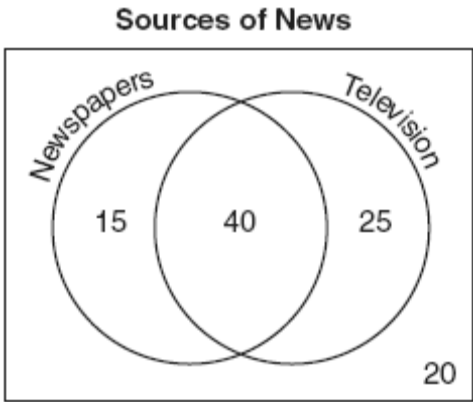


- Which statement or statements are true?
- I The most watched sport is tennis.
 - II The least watched sport is baseball.
 - III More Key Club members watch tennis than football.
- [A] II and III, only [B] I, only
 [C] I and II, only [D] II, only

78. 060026a, P.I. A.RP.11
 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?



79. 010621a, P.I. A.RP.11
 The accompanying Venn diagram shows the results of a survey asking 100 people if they get news by reading newspapers or by watching television.



- What is the probability that a person selected at random from this survey does *not* claim television as a source of getting the news?
- [A] $\frac{55}{100}$ [B] $\frac{15}{100}$ [C] $\frac{35}{100}$ [D] $\frac{75}{100}$

80. 080117a, P.I. A.RP.11
In a class of 450 students, 300 are taking a mathematics course and 260 are taking a science course. If 140 of these students are taking both courses, how many students are not taking either of these courses?
[A] 110 [B] 30 [C] 140 [D] 40
81. 069919a, P.I. A.RP.11
In a class of 50 students, 18 take music, 26 take art, and 2 take both art and music. How many students in the class are not enrolled in either music or art?
[A] 8 [B] 16 [C] 6 [D] 24
82. 060436a, P.I. A.RP.11
The senior class at South High School consists of 250 students. Of these students, 130 have brown hair, 160 have brown eyes, and 90 have both brown hair and brown eyes. How many members of the senior class have *neither* brown hair *nor* brown eyes?
83. 080226a, P.I. A.RP.11
In a telephone survey of 100 households, 32 households purchased Brand A cereal and 45 purchased Brand B cereal. If 10 households purchased both items, how many of the households surveyed did *not* purchase either Brand A or Brand B cereal?
84. 060533a, P.I. A.RP.11
In a survey of 400 teenage shoppers at a large mall, 240 said they shopped at Abernathy's, 210 said they shopped at Bongo Republic, and 90 said they shopped at both stores. How many of the teenage shoppers surveyed did not shop at either store?
85. 080631a, P.I. A.RP.11
In Clark Middle School, there are 60 students in seventh grade. If 25 of these students take art only, 18 take music only, and 9 do not take either art or music, how many take both art and music?
86. 010815a, P.I. A.RP.11
A school newspaper took a survey of 100 students. The results of the survey showed that 43 students are fans of the Buffalo Bills, 27 students are fans of the New York Jets, and 48 students do not like either team. How many of the students surveyed are fans of *both* the Buffalo Bills and the New York Jets?
[A] 52 [B] 18 [C] 16 [D] 70
87. 010434a, P.I. A.RP.11
A car dealer has 22 vehicles on his lot. If 8 of the vehicles are vans and 6 of the vehicles are red, and 10 vehicles are neither vans nor red, how many red vans does he have on his lot?
88. 060121a, P.I. A.RP.11
A school district offers hockey and basketball. The result of a survey of 300 students showed:
120 students play hockey, only
90 students play basketball, only
30 students do not participate in either sport
Of those surveyed, how many students play both hockey and basketball?
89. 080419a, P.I. A.RP.11
Seventy-eight students participate in one or more of three sports: baseball, tennis, and golf. Four students participate in all three sports; five play both baseball and golf, only; two play both tennis and golf, only; and three play both baseball and tennis, only. If seven students play only tennis and one plays only golf, what is the total number of students who play only baseball?
[A] 44 [B] 56 [C] 60 [D] 12

90. 080532a, P.I. A.RP.11
There are 30 students on a school bus. Of these students, 24 either play in the school band or sing in the chorus. Six of the students play in the school band but do not sing in the chorus. Fourteen of the students sing in the chorus and also play in the school band. How many students on the school bus sing in the chorus but do not play in the band?
91. 060732a, P.I. A.RP.11
Jose surveyed 20 of his friends to find out what equipment they use to play recorded movies. He found that 12 of his friends have only DVD players, 5 have both DVD players and VCRs, and 2 have neither type of player. The rest of his friends have only VCRs. What is the total number of his friends that have VCRs?
92. 010519a, P.I. A.RP.11
In Ms. Wright's English class, 16 students are in band, 7 students play sports, 3 students participate in both activities, and 9 students are not in band and do not play sports. How many students are in Ms. Wright's English class?
- [A] 10 [B] 26 [C] 29 [D] 7
95. fall0724ia, P.I. A.A.21
Which value of x is in the solution set of the inequality $-2x + 5 > 17$?
- [A] 12 [B] -4 [C] -6 [D] -8
96. 010536a, P.I. A.A.21
Find all negative odd integers that satisfy the following inequality: $-3x + 1 \leq 17$
97. 010737a, P.I. A.A.6
The Eye Surgery Institute just purchased a new laser machine for \$500,000 to use during eye surgery. The Institute must pay the inventor \$550 each time the machine is used. If the Institute charges \$2,000 for each laser surgery, what is the *minimum* number of surgeries that must be performed in order for the Institute to make a profit?
98. 080732a, P.I. A.A.6
Thelma and Laura start a lawn-mowing business and buy a lawnmower for \$225. They plan to charge \$15 to mow one lawn. What is the *minimum* number of lawns they need to mow if they wish to earn a profit of *at least* \$750?
99. fall0735ia, P.I. A.A.6
A prom ticket at Smith High School is \$120. Tom is going to save money for the ticket by walking his neighbor's dog for \$15 per week. If Tom already has saved \$22, what is the minimum number of weeks Tom must walk the dog to earn enough to pay for the prom ticket?
100. 010101a, P.I. A.A.6
There are 461 students and 20 teachers taking buses on a trip to a museum. Each bus can seat a maximum of 52. What is the *least* number of buses needed for the trip?
- [A] 9 [B] 10 [C] 11 [D] 8

CHAPTER 4-9

INTERPRETING SOLUTIONS

93. 060118a, P.I. A.A.21
In the set of positive integers, what is the solution set of the inequality $2x - 3 < 5$?
- [A] {1, 2, 3, 4} [B] {1, 2, 3}
[C] {0, 1, 2, 3, 4} [D] {0, 1, 2, 3}
94. 060311a, P.I. A.A.21
Which number is in the solution set of the inequality $5x + 3 > 38$?
- [A] 6 [B] 8 [C] 5 [D] 7

101. 089914a, P.I. A.A.6

In a hockey league, 87 players play on seven different teams. Each team has at least 12 players. What is the largest possible number of players on any one team?

[A] 14 [B] 15 [C] 13 [D] 21

102. 080224a, P.I. A.A.6

A doughnut shop charges \$0.70 for each doughnut and \$0.30 for a carryout box. Shirley has \$5.00 to spend. At most, how many doughnuts can she buy if she also wants them in one carryout box?

103. 069928a, P.I. A.A.6

A swimmer plans to swim at least 100 laps during a 6-day period. During this period, the swimmer will increase the number of laps completed each day by one lap. What is the *least* number of laps the swimmer must complete on the first day?

[1] C

[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 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

[2] incorrect procedure.

[3] B

[4] B

[5] D

[6] B

[7] B

[8] D

[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

[9] incorrect procedure.

[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

[10] obviously incorrect procedure.

[11] D

[12] A

[2] 20, and appropriate work is shown, such as $\frac{15}{150} = \frac{2}{x}$.

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

or [1] Appropriate work is shown, but one conceptual error is made, such as expressing the answer as $\frac{1}{3}$ hour.

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 incorrect procedure.

[13]

[3] 3 hours and an appropriate method or equation is shown, such as $45(x + 1) = 60x$.

[2] An appropriate method is shown, but an incorrect answer is found, such as 4 hours (the truck's time) or 180 miles traveled.

[1] An appropriate equation or method is shown, but no answer is found, such as showing an equation that reflects a one-hour difference in time but it is not solved.

or [1] 3 hours 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

[14] incorrect procedure.

[15] B

[16] B

[2] 5, and appropriate work is shown, such as solving the linear equation $80x + 100x = 900$, using a diagram or proportion or trial and error.

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

or [1] 5, 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

[17] incorrect procedure.

[2] Bob, and appropriate work is shown, such as using the distance formula to calculate the two travel times or setting up a proportion.

[1] Appropriate work is shown, but one computational or conceptual error is made, but an appropriate answer is found.

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

[0] Bob, but no work or inappropriate work is shown.

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

[18] obviously incorrect procedure.

[19] D

[3] 4 and an appropriate method is shown, such as calculating A at 6 mph and B at 2 mph through arithmetic, formula, or extending the graph to 60 minutes.

[2] The speeds of 6 and 2 are found but not their difference.

or [2] Their difference is found but not in miles per hour.

[1] Only distances of 4.5 miles and 1.5 miles are found.

or [1] The speeds found are incorrect but then are subtracted appropriately.

or [1] 3 times as fast and no appropriate explanation is given.

or [1] 4 and no appropriate explanation is given.

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

[20] incorrect procedure.

[3] 12, and appropriate work is shown, such as finding the rates of both vehicles and then subtracting 48 from 60.

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

or [2] The rates of both vehicles are found correctly, and appropriate work is shown, but they are not subtracted.

or [2] The rates of both vehicles are found correctly, and the correct difference is found, but no work is 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] The rates of both vehicles are found correctly, but no work is shown, and the difference is not found.

or [1] 12, 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.

[3] 499 days and appropriate work is shown, such as $\frac{17,000,000 \text{ miles}}{1420 \frac{\text{miles}}{\text{hour}}} \times 24 \frac{\text{hours}}{\text{day}}$.

[2] Appropriate work is shown, but one computational error is made or the student incorrectly calculates 1.7×10^7 by one decimal place.

or [2] Appropriate work is shown, but the answer is rounded incorrectly or is not rounded.

[1] $1.7 \times 10^7 = 17,000,000$ is shown.

or [1] $\frac{1.7 \times 10^7}{1420} = 11,971.831$ hours is shown.

or [1] 34,080 miles in 1 day is shown.

or [1] 499 but no work is shown.

[0] The student does not understand scientific notation.

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

[22] obviously incorrect procedure.

[23] B

[24] B

[25] D

[26] C

[3] 50, 1.5, and 10, and appropriate work is shown.

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

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

or [1] Appropriate work is shown, but two or more computational errors are made.

or [1] 50, and appropriate work is shown, but no further correct work is shown.

or [1] 1.5, and appropriate work is shown, but no further correct work is shown.

or [1] 10, and appropriate work is shown, but no further correct work is shown.

or [1] 50, 1.5, and 10, but no work is shown.

[0] 50 or 1.5 or 10, 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

[27] obviously incorrect procedure.

[28] A

[29] A

[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

[30] incorrect procedure.

[31] C

[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

[32] 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

[33] incorrect procedure.

[34] B _____

[35] D _____

[2] 4, and appropriate work is shown.

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

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

or [1] 4, 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

[36] incorrect procedure.

[2] 2, and appropriate work is shown.

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

or [1] 2, 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

[37] incorrect procedure.

[2] 2.4 and appropriate work is shown.

[1] The student shows correct use of the distributive property to obtain $2x - 6$ or other appropriate algebraic technique.

or [1] 2.4 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

[38] incorrect procedure.

[39] B _____

[40] D _____

[41] B _____

[2] 2.1, and appropriate work is shown.

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

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

or [1] 2.1, 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

[42] incorrect procedure.

[43] B _____

[44] D _____

[2] 10, and appropriate work is shown, such as solving the equation 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] Appropriate work is shown, but one conceptual error is made.

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] 10, but no work or fewer than three trials and 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

[45] incorrect procedure.

[46] A

[47] D

[48] D

[49] A

[50] B

[51] D

[52] D

[53] A

[54] B

[55] C

[56] A

[57] C

[58] A

[59] C

[60] C

[61] B

[62] C

[63] D

[64] B

a [1] $\frac{S+24}{3}$ or $\frac{S}{3}+8$

b [1] 11.5

or [1] Correct substitution into an incorrect part a is shown, and the answer is given to the nearest tenth of an inch.

a and b

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

[65] incorrect procedure.

[66] A

[2] $r = \sqrt[3]{\frac{3V}{4\pi}}$ or $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$ or an equivalent

answer, and appropriate work is shown.

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

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

or [1] $\sqrt[3]{\frac{3V}{4\pi}}$ or $\left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$ or an equivalent answer

is found, and appropriate work is shown, but an equation is not written.

or [1] $r = \sqrt[3]{\frac{3V}{4\pi}}$ or $r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}$ 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

[67] incorrect procedure.

[2] $v = \frac{\pi l^3}{8}$, and appropriate work is shown.

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

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

[1] $v = \frac{\pi l^3}{8}$, 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

[68] incorrect procedure.

[69] B

[70] C

[71] B

[72] B

[73] D

[74] B

[2] A correct graph is drawn on the number line, with a closed circle at the left end and an open circle at the right end.

[1] Appropriate work is shown, but one graphing error is made, such as writing an incorrect scale on the number line.

or [1] Appropriate work is shown, but one conceptual error is made, such as using a closed circle instead of an open circle.

or [1] A correct inequality is written, but the graph is not drawn.

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

[75] incorrect procedure.

[76] B

[77] D

[3] 84% and appropriate work is shown, such as mathematics or technology = 42, the total = 50, and the percentage = 84%.

[2] The correct numbers of students are shown, but the percentage is incorrect.

or [2] One error in computing the numbers of students is made, but the percentage is appropriate for those numbers.

[1] Only one number is correct, such as 28 taking mathematics.

or [1] An appropriate percentage is shown for two incorrect values.

or [1] 84% 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

[78] incorrect procedure.

[79] C

[80] B

[81] A

[3] 50, and appropriate work is shown, such as a Venn diagram.

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

or [2] 200, and appropriate work is shown to find the number of students that have brown hair and/or brown eyes.

[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] The numbers of students who have brown hair only (40) and brown eyes only (70) are found, but no further correct work is shown.

or [1] 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

[82] incorrect procedure.

- [3] 33, and appropriate work is shown, such as a Venn diagram.
[2] Appropriate work is shown, but the number of households that purchased only Brand A and only Brand B is found, $22 + 35 = 57$.
or [2] Appropriate work is shown, but one computational error is made.
[1] A conceptual error is made, such as subtracting 87 from 100.
or [1] 33, 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.
-
- [83] [2] 40, and appropriate work is shown, such as a Venn diagram or $(240 + 210) - 90 = 360$ and $400 - 360 = 40$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual 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 incorrect procedure.
-
- [84] [2] 8, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 8, 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.
-
- [85] [2] 8, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 8, 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.
-
- [86] B

- [2] 2, and appropriate work is shown, such as a Venn diagram, a listing, or an explanation.
[1] Appropriate work is shown, but one computational or conceptual error is made.
or [1] 2, 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.
-
- [87] [2] 60, and appropriate work is shown, such as $300 - 120 - 90 - 30 = 60$.
or [2] 60, and an appropriate Venn diagram to illustrate the answer is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] An appropriate Venn diagram is drawn, and 240 is determined to be the total number of students given, but no further work is shown.
or [1] 60, but no work is shown.
[0] 240 is not subtracted from 300 and is given as the solution.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [88] [2] 60, and appropriate work is shown, such as $300 - 120 - 90 - 30 = 60$.
or [2] 60, and an appropriate Venn diagram to illustrate the answer is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] An appropriate Venn diagram is drawn, and 240 is determined to be the total number of students given, but no further work is shown.
or [1] 60, but no work is shown.
[0] 240 is not subtracted from 300 and is given as the solution.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [89] B
- [2] 4, and appropriate work is shown, such as a Venn diagram.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 4, 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.
-
- [90] [2] 4, and appropriate work is shown, such as a Venn diagram.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 4, 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] 6, and appropriate work is shown, such as a Venn diagram.

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

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

or [1] 1, the number of friends with only a VCR player, is found, and appropriate work is shown.

or [1] 6, 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

[91] incorrect procedure.

[92] C

[93] B

[94] B

[95] D

[3] -5, -3, -1, and appropriate work is shown, such as solving the inequality 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] Appropriate work is shown, and the inequality $x \geq -5\frac{1}{3}$ is written, but no further

correct work is shown.

or [2] The trial-and-error method is used to find the correct solutions, 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] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but the solutions are not found.

or [1] -5, -3, -1, 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

[96] incorrect procedure.

[3] 345, and appropriate work is shown, such as solving the inequality $1450x > 500,000$, solving an equation, or trial and error with at least three trials and appropriate checks.

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

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but two or more computational or rounding errors are made.

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

or [1] A correct inequality or equation is written, but no further correct work is shown.

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] 345, 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

[97] incorrect procedure.

[2] 65, and appropriate work is shown, such as solving the inequality $15x \geq 225 + 750$ 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] Appropriate work is shown, but one conceptual error is made.

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] 65, but no work or fewer than three trials and 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

[98] incorrect procedure.

[3] 7, and appropriate work is shown, such as solving the inequality $15x + 22 \geq 120$, solving an equation, or trial and error with at least three trials and appropriate checks.

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

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but two or more computational or rounding errors are made.

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

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

or [1] A correct inequality or equation is written, but no further correct work is shown.

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] 7, 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

[99] incorrect procedure.

[100] B

[101] B

[2] 6, and appropriate work is shown, such as $0.70x + 0.30 \leq 5.00$ or trial and error with three trials and appropriate checks.

[1] The inequality is solved correctly, but the number of doughnuts is not found.

or [1] The trial-and-error method is used to find a correct solution, but fewer than three trials are shown.

or [1] 6, 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

[102] incorrect procedure.

[3] 15 and an appropriate method or explanation is shown, such as trial and error or the inequality $6x + 15 \geq 100$.

[2] An appropriate method is shown, but it stops at 14.

[1] An appropriate method is shown, but no answer is found.

or [1] 15 and no explanation is given.

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

[103] incorrect procedure.