

1. 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] 11 [C] 10 [D] 8

2. 010102a

In right triangle ABC , $m\angle C = 3y - 10$, $m\angle B = y + 40$, and $m\angle A = 90$. What type of right triangle is triangle ABC ?

- [A] isosceles [B] obtuse
[C] scalene [D] equilateral

3. 010103a, P.I. A2.A.13

If $x > 0$, the expression $(\sqrt{x})(\sqrt{2x})$ is equivalent to

- [A] $\sqrt{2x}$ [B] $x\sqrt{2}$
[C] $x^2\sqrt{2}$ [D] $2x$

4. 010104a, P.I. A.A.7

Three times as many robins as cardinals visited a bird feeder. If a total of 20 robins and cardinals visited the feeder, how many were robins?

- [A] 20 [B] 5 [C] 15 [D] 10

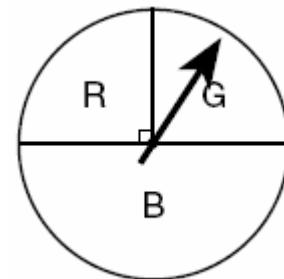
5. 010105a, P.I. A.A.19

One of the factors of $4x^2 - 9$ is

- [A] $(2x + 3)$ [B] $(x - 3)$
[C] $(x + 3)$ [D] $(4x - 3)$

6. 010106a, P.I. A2.S.13

At a school fair, the spinner represented in the accompanying diagram is spun twice.



What is the probability that it will land in section G the first time and then in section B the second time?

- [A] $\frac{1}{4}$ [B] $\frac{1}{2}$ [C] $\frac{1}{16}$ [D] $\frac{1}{8}$

7. 010107a, P.I. A.N.1

If a and b are integers, which equation is always true?

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

8. 010108a, P.I. A.A.13

The sum of $3x^2 + 4x - 2$ and $x^2 - 5x + 3$ is

- [A] $4x^2 - x + 1$ [B] $4x^2 + x - 1$
[C] $4x^2 + x + 1$ [D] $4x^2 - x - 1$

9. 010109a, P.I. A.A.14

If $x \neq 0$, the expression $\frac{x^2 + 2x}{x}$ is equivalent to

- [A] 4 [B] $3x$ [C] $x + 2$ [D] 2

10. 010110a

Helen is using a capital H in an art design.

The H has

- [A] only one line of symmetry
- [B] two lines of symmetry and two points of symmetry
- [C] only two points of symmetry
- [D] two lines of symmetry and only one point of symmetry

11. 010111a, P.I. 7.N.5

The distance from Earth to the Sun is approximately 93 million miles. A scientist would write that number as

- [A] 93×10^7
- [B] 9.3×10^6
- [C] 93×10^{10}
- [D] 9.3×10^7

12. 010112a, P.I. G.G.26

Given the statement: "If two sides of a triangle are congruent, then the angles opposite these sides are congruent."

Given the converse of the statement: "If two angles of a triangle are congruent, then the sides opposite these angles are congruent." What is true about this statement and its converse?

- [A] The statement is false but its converse is true.
- [B] Neither the statement nor its converse is true.
- [C] Both the statement and its converse are true.
- [D] The statement is true but its converse is false.

13. 010113a, P.I. 7.A.10

Which equation could represent the relationship between the x and y values shown in the accompanying table?

x	y
0	2
1	3
2	6
3	11
4	18

[A] $y = 2^x$

[B] $y = x^2$

[C] $y = x^2 + 2$

[D] $y = x + 2$

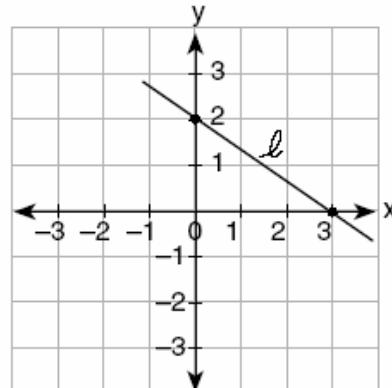
14. 010114a, P.I. A.N.8

A locker combination system uses three digits from 0 to 9. How many different three-digit combinations with no digit repeated are possible?

- [A] 30
- [B] 1,000
- [C] 504
- [D] 720

15. 010115a, P.I. 8.G.13

What is the slope of line ℓ in the accompanying diagram?



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

16. 010116a, P.I. A.A.23

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

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

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

17. 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] 29 [B] 56 [C] 42 [D] 14

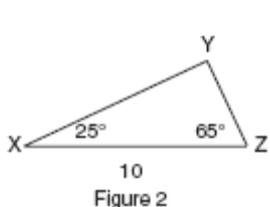
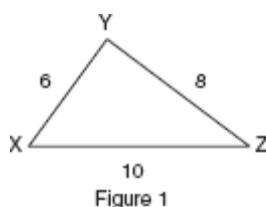
18. 010118a, P.I. 6.S.5

From January 3 to January 7, Buffalo recorded the following daily high temperatures: 5° , 7° , 6° , 5° , and 7° . Which statement about the temperatures is true?

- [A] median = mode [B] mean = median
[C] mean = mode [D] mean < median

19. 010119a, P.I. G.G.30, G.G.48

In which of the accompanying figures are segments XY and YZ perpendicular?



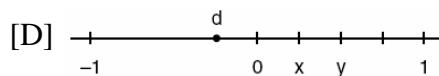
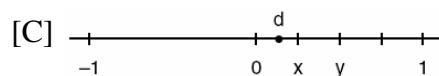
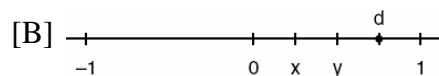
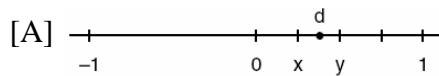
- [A] neither figure 1 nor figure 2

- [B] figure 2 only [C] figure 1, only
[D] both figure 1 and figure 2

20. 010120a, P.I. 7.N.3

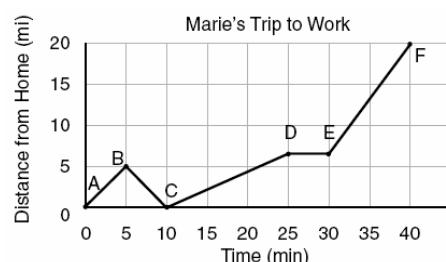
Let x and y be numbers such that

$0 < x < y < 1$, and let $d = x - y$. Which graph could represent the location of d on the number line?



21. 010121a, P.I. 8.A.3

The accompanying graph shows Marie's distance from home (A) to work (F) at various times during her drive.



a Marie left her briefcase at home and had to return to get it. State which point represents when she turned back around to go home and explain how you arrived at that conclusion.

b Marie also had to wait at the railroad tracks for a train to pass. How long did she wait?

22. 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?

23. 010123a, P.I. A.G.2

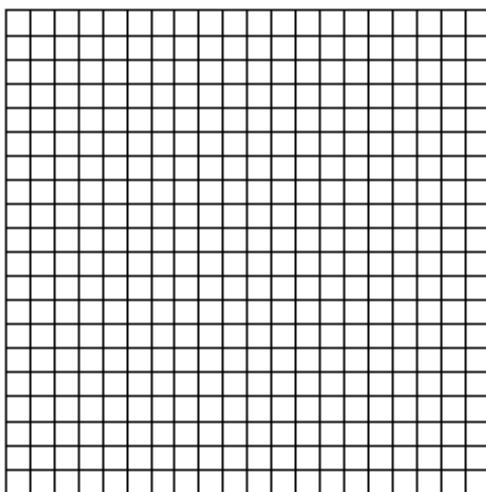
A cardboard box has length $x - 2$, width $x + 1$, and height $2x$.

a Write an expression, in terms of x , to represent the volume of the box.

b If $x = 8$ centimeters, what is the number of cubic centimeters in the volume of the box?

24. 010124a, P.I. G.G.54

The coordinates of the endpoints of \overline{AB} are $A(0,2)$ and $B(4,6)$. Graph and state the coordinates of A' and B' , the images of A and B after \overline{AB} is reflected in the x -axis.



25. 010125a, P.I. A.A.6

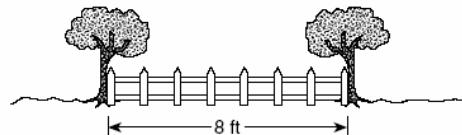
Two trains leave the same station at the same time and travel in opposite directions. One train travels at 80 kilometers per hour and the other at 100 kilometers per hour. In how many hours will they be 900 kilometers apart?

26. 010126a, P.I. A2.S.12

Sal has a small bag of candy containing three green candies and two red candies. While waiting for the bus, he ate two candies out of the bag, one after another, without looking. What is the probability that both candies were the same color?

27. 010127a, P.I. G.G.22

Steve has a treasure map, represented in the accompanying diagram, that shows two trees 8 feet apart and a straight fence connecting them. The map states that treasure is buried 3 feet from the fence and equidistant from the two trees.

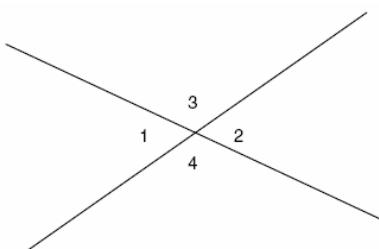


a Sketch a diagram to show all the places where the treasure could be buried. Clearly indicate in your diagram where the treasure could be buried.

b What is the distance between the treasure and one of the trees?

28. 010128a, P.I. 8.G.3

In the accompanying figure, two lines intersect, $m\angle 3 = 6t + 30$, and $m\angle 2 = 8t - 60$. Find the number of degrees in $m\angle 4$.



29. 010129a, P.I. G.G.25

Mark says, "The number I see is odd." Jan says, "That same number is prime." The teacher says, "Mark is correct or Jan is correct." Some integers would make the teacher's statement true while other integers would make it false. Give and explain one example of when the teacher's statement is true. Give and explain one example of when the teacher's statement is false.

30. 010130a, P.I. A.A.7

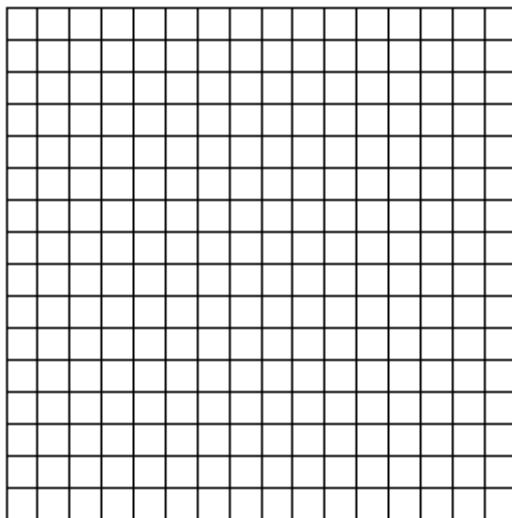
Juan has a cellular phone that costs \$12.95 per month plus 25¢ per minute for each call. Tiffany has a cellular phone that costs \$14.95 per month plus 15¢ per minute for each call. For what number of minutes do the two plans cost the same?

31. 010131a, P.I. A.A.26

Solve algebraically for x : $\frac{1}{x} = \frac{x+1}{6}$

32. 010132a, P.I. A.S.5

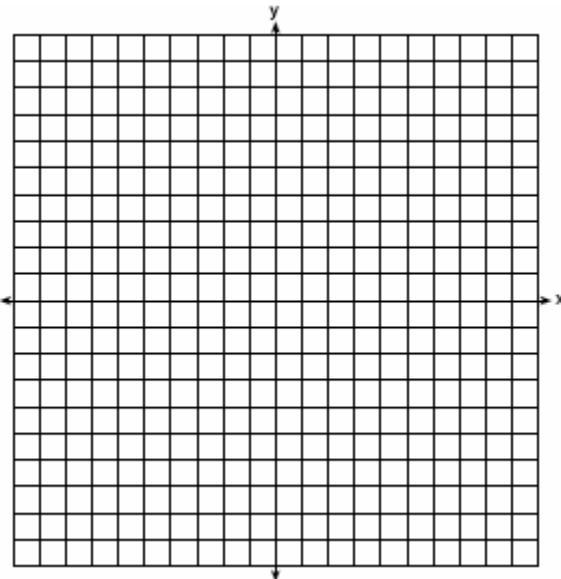
On a science quiz, 20 students received the following scores: 100, 95, 95, 90, 85, 85, 85, 80, 80, 80, 80, 75, 75, 75, 70, 70, 65, 65, 60, 55. Construct a statistical graph, such as a histogram or a stem-and-leaf plot, to display this data. [Be sure to title the graph and label all axes or parts used.]



33. 010133a, P.I. G.G.74

John uses the equation $x^2 + y^2 = 9$ to represent the shape of a garden on graph paper.

- a Graph $x^2 + y^2 = 9$ on the accompanying grid.



- b What is the area of the garden to the nearest square unit?

34. 010134a, P.I. A.A.7

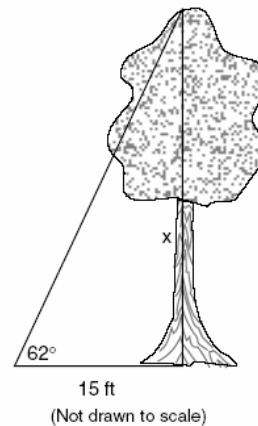
There were 100 more balcony tickets than main-floor tickets sold for a concert. The balcony tickets sold for \$4 and the main-floor tickets sold for \$12. The total amount of sales for both types of tickets was \$3,056.

- a Write an equation or a system of equations that describes the given situation. Define the variables.

- b Find the number of balcony tickets that were sold.

35. 010135a, P.I. A.A.44

Find, to the *nearest tenth of a foot*, the height of the tree represented in the accompanying diagram.



- [1] C _____
- [2] C _____
- [3] B _____
- [4] C _____
- [5] A _____
- [6] D _____
- [7] D _____
- [8] A _____
- [9] C _____
- [10] D _____
- [11] D _____
- [12] C _____
- [13] C _____
- [14] D _____
- [15] C _____
- [16] A _____
- [17] B _____
- [18] B _____
- [19] D _____
- [20] D _____
- a [1] B, and an appropriate explanation is given.
b [1] 5 minutes
a and b
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [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 incorrect procedure.
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- [22] a [1] Either $(x - 2)(x + 1)(2x) = V$ or the same expression without “= V” is shown.
or [1] $2x^3 - 2x^2 - 4x$ or an equivalent expression is shown.
b [1] 864
or [1] The student substitutes appropriately into an incorrect part a equation.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [23] [2] $A' (0, -2)$ and $B' (4, -6)$ are stated, and an appropriate graph is drawn.
[1] Only one endpoint, A' or B' , is graphed and stated correctly.
or [1] Both endpoints are reflected in other than the x -axis, and the coordinates are graphed and stated correctly, such as:
 y -axis $A' (0, 2)$ and $B' (-4, 6)$
 $y = x$ $A' (2, 0)$ and $B' (6, 4)$
Origin $A' (0, -2)$ and $B' (-4, -6)$
or [1] Both points A' and B' are stated correctly, but no graph is drawn.
or [1] An appropriate graph is drawn, but no coordinates or incorrect coordinates are labeled.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [24]

[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 incorrect procedure.

[25]

[3] $\frac{8}{20}$ or an equivalent answer, and appropriate work is shown, such as using a tree diagram or writing the equation

$$\frac{6}{20} + \frac{2}{20} = \frac{8}{20}.$$

[2] One computational error is made in finding $\frac{6}{20}$ or $\frac{2}{20}$, but an appropriate sum is found.

or [2] $\frac{2}{20}$ and $\frac{6}{20}$ are found, but no sum is shown.

[1] $\frac{6}{20}$ or $\frac{2}{20}$, and appropriate work is shown.

or [1] An appropriate answer is found, using replacement with a tree diagram or an equation such as $\frac{3}{5} \bullet \frac{3}{5} + \frac{2}{5} \bullet \frac{2}{5} = \frac{13}{25}$.

or [1] $\frac{8}{20}$, 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.

[26]

a [2] A correct sketch is drawn that shows two possible locations, such as parallel lines and a perpendicular bisector. Students can draw their own sketch or use the diagram given.

[1] A correct sketch is drawn, but with no indication of where the treasure is buried.
or [1] A partial sketch is drawn, showing either the distances from the fence or the distance from the trees.

b [1] 5 feet

or [1] An appropriate answer is found for an incorrect part a.

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

[27]

[3] 120, and appropriate work is shown, such as $6t + 30 + 8t - 60 = 180$.

[2] The student finds correctly the unknown, $t = 15$, but does not find the measure of angle 4.

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

[1] The student forms an incorrect equation, such as setting the two angles equal, and arrives at $t = 45$ and an angle of 300.

or [1] 120, 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.

[28]

[3] At least one example is shown that makes the statement true, such as 2, 3, 5, 7, 9, or a defined variable; and one example is shown that makes the statement false, such as any even number other than 2, with a correct explanation that shows that the student can recognize odd numbers and prime numbers. The explanation can be in words or as a Venn diagram.

[2] Two correct examples are shown, one that shows the statement is true and one that shows the statement is false, but no explanation or an inappropriate explanation is given.

or [2] Only one correct example is shown, but an appropriate explanation is given.

[1] Only one correct example is shown, and no explanation or an incorrect explanation is given.

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

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- [29]
- [3] 20, and appropriate work is shown, such as an equation, trial and error, or a graph.
- [2] Appropriate work is shown, such as $12.95 + 0.25x = 14.95 + 0.15x$, but one computational error is made.
- or [2] Appropriate work is shown, but an answer of \$17.95 is found.
- or [2] 20, and only a check is shown.
- [1] The student starts appropriate work to find when the prices are equal but does not complete it, such as starting to solve the correct equation, showing one incorrect trial, or drawing an incomplete graph.
- 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.
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- [30]

[4] 2 and -3, and a correct quadratic equation is shown, such as $x(x + 1) = 6$, and solved algebraically.

[3] The student shows a correct quadratic equation but makes one algebraic error and carries it to solution or no solution for the equation generated.

or [3] Correct work is shown, but only one root is found as the answer.

[2] A correct quadratic equation is used, but two or more errors are made.

or [2] An incorrect quadratic equation of equal difficulty is shown and solved appropriately.

[1] The student cross multiplies but produces only a linear equation that is solved appropriately.

or [1] 2 and -3, but no algebraic 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.

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- [31]

[4] The student draws a histogram, a stem-and-leaf plot, or any other acceptable statistical graph, with proper labels and a title.

[3] The student makes one or two minor errors, such as a lack of label, title, or connected dots.

[2] The student makes several minor errors or one major error, such as not accounting for all 20 scores.

[1] The student draws just the beginning of a graph.

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

[32]

- a [2] The student draws a circle with its center at $(0,0)$ and a radius of 3.
[1] The student draws a circle, but it has an incorrect center or radius.
b [2] 28, and appropriate work or the expression 9π is shown, which rounds to 28.
or [2] An appropriate area is shown for the incorrect figure in part a.
[1] The correct expression is shown, but the answer is left as 9π , not rounded, or not rounded correctly.
or [1] An incorrect radius is used, but the area is rounded appropriately.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [33]

- a [2] The student writes an appropriate system of equations, such as $b = f + 100$ and $4b + 12f = 3,056$, and defines the variables.
or [2] The student writes an appropriate equation, such as $4(100 + x) + 12x = 3,056$, and defines the variable.
[1] A correct equation or correct equations are shown, but the variables are not defined.
or [1] One error is made in the setup, such as $b + f = 100$.
[0] The student only defines the variables.
b [2] 266, and appropriate work is shown, using an algebraic solution or a correct trial-and-error method.
or [2] Appropriate work is shown for an incorrect part a equation or system of equations.
[1] Work is shown, but the answer is inappropriate, such as \$1,064.
or [1] 266, but no work is shown.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
-
- [34]

- [4] 28.2, and an appropriate equation is shown, such as $\tan 62 = \frac{x}{15}$.
[3] Appropriate work is shown, but the answer is rounded incorrectly.
or [3] The student uses the correct tangent function and rounds the answer, but makes one computational error.
[2] The student uses the correct tangent function, but makes several errors.
or [2] An incorrect trigonometric function is used, but appropriate work is shown.
[1] The tangent function is indicated, but the ratio is set up incorrectly.
or [1] 28.2, 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.
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- [35]