

1. 010001a, P.I. 7.N.18

The expression  $\sqrt{93}$  is a number between

- [A] 3 and 9                      [B] 9 and 10  
[C] 8 and 9                      [D] 46 and 47

2. 010002a, P.I. 7.N.3

Which number has the greatest value?

- [A]  $1\frac{2}{3}$     [B]  $\frac{\pi}{2}$     [C]  $\sqrt{2}$     [D] 1.5

3. 010003a, P.I. G.G.25

Mary says, "The number I am thinking of is divisible by 2 or it is divisible by 3." Mary's statement is false if the number she is thinking of is

- [A] 6            [B] 11            [C] 15            [D] 8

4. 010004a, P.I. A.A.20

Which expression is a factor of  $x^2 + 2x - 15$

- [A]  $(x - 3)$                       [B]  $(x + 15)$   
[C]  $(x + 3)$                       [D]  $(x - 5)$

5. 010005a, P.I. 6.S.5

What was the median high temperature in Middletown during the 7-day period shown in the table below?

Daily High Temperature in Middletown	
Day	Temperature (°F)
Sunday	68
Monday	73
Tuesday	73
Wednesday	75
Thursday	69
Friday	67
Saturday	63

- [A] 73            [B] 70            [C] 69            [D] 75

6. 010006a, P.I. A.A.1

If the number represented by  $n-3$  is an odd integer, which expression represents the next greater odd integer?

- [A]  $n - 5$     [B]  $n - 2$     [C]  $n - 1$     [D]  $n + 1$

7. 010007a, P.I. G.G.54

When the point  $(2, -5)$  is reflected in the  $x$ -axis, what are the coordinates of its image?

- [A]  $(-5, 2)$                       [B]  $(2, 5)$   
[C]  $(-2, 5)$                       [D]  $(5, 2)$

8. 010008a, P.I. A.A.12

The expression  $(x^2z^3)(xy^2z)$  is equivalent to

- [A]  $x^3y^2z^4$                       [B]  $x^3y^3z^4$   
[C]  $x^2y^2z^3$                       [D]  $x^4y^2z^5$

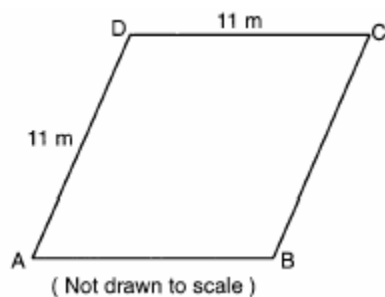
9. 010009a, P.I. A.N.5

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

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

10. 010010a, P.I. G.G.33

A plot of land is in the shape of rhombus  $ABCD$  as shown below.



Which can *not* be the length of diagonal  $AC$ ?

- [A] 24 m    [B] 11 m    [C] 18 m    [D] 4 m

11. 010011a, P.I. A.A.22

If  $9x + 2a = 3a - 4x$ , then  $x$  equals

- [A]  $a$  [B]  $\frac{a}{13}$  [C]  $-a$  [D]  $\frac{5a}{12}$

12. 010012a

If the circumference of a circle is  $10\pi$  inches, what is the area, in square inches, of the circle?

- [A]  $10\pi$  [B]  $25\pi$   
[C]  $100\pi$  [D]  $50\pi$

13. 010013a, P.I. A.N.8

How many different 4-letter arrangements can be formed using the letters of the word "JUMP," if each letter is used only once?

- [A] 24 [B] 4 [C] 12 [D] 16

14. 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] 200 g  
[C] 555 g [D] 48.65 g

15. 010015a, P.I. 8.N.2

If  $t = -3$ , then  $3t^2 + 5t + 6$  equals

- [A] -6 [B] 18 [C] -36 [D] 6

16. 010016a, P.I. A.A.17

The expression  $\frac{y}{x} - \frac{1}{2}$  is equivalent to

- [A]  $\frac{2y-x}{2x}$  [B]  $\frac{1-y}{2x}$   
[C]  $\frac{y-1}{x-2}$  [D]  $\frac{x-2y}{2x}$

17. 010017a, P.I. A.S.20

The party registration of the voters in Jonesville is shown in the table below.

Registered Voters in Jonesville	
Party Registration	Number of Voters Registered
Democrat	6,000
Republican	5,300
Independent	3,700

If one of the registered Jonesville voters is selected at random, what is the probability that the person selected is *not* a Democrat?

- [A] 0.333 [B] 0.667  
[C] 0.600 [D] 0.400

18. 010018a, P.I. A.N.4

If the number of molecules in 1 mole of a substance is  $6.02 \times 10^{23}$ , then the number of molecules in 100 moles is

- [A]  $6.02 \times 10^{24}$  [B]  $6.02 \times 10^{25}$   
[C]  $6.02 \times 10^{21}$  [D]  $6.02 \times 10^{22}$

19. 010019a, P.I. A.A.13

When  $3a^2 - 2a + 5$  is subtracted from  $a^2 + a - 1$ , the result is

- [A]  $-2a^2 + 3a - 6$  [B]  $2a^2 - 3a + 6$   
[C]  $2a^2 - 3a - 6$  [D]  $-2a^2 + 3a + 6$

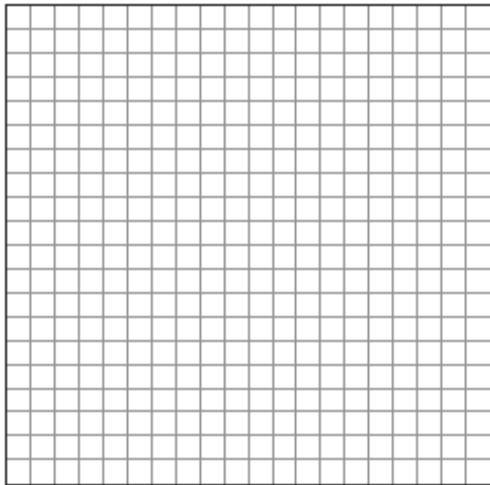
20. 010020a, P.I. G.G.22

The distance between parallel lines  $\ell$  and  $m$  is 12 units. Point A is on line  $\ell$ . How many points are equidistant from lines  $\ell$  and  $m$  and 8 units from point A.

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

21. 010021a

The midpoint  $M$  of line segment  $AB$  has coordinates  $(-3,4)$ . If point  $A$  is the origin,  $(0,0)$ , what are the coordinates of point  $B$ ?  
[The use of the accompanying grid is optional.]

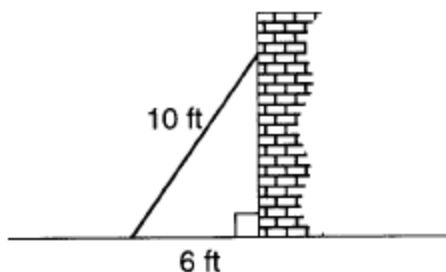


22. 010022a, P.I. A.A.7

Mary and Amy had a total of 20 yards of material from which to make costumes. Mary used three times more material to make her costume than Amy used, and 2 yards of material was not used. How many yards of materials did Amy use for her costume?

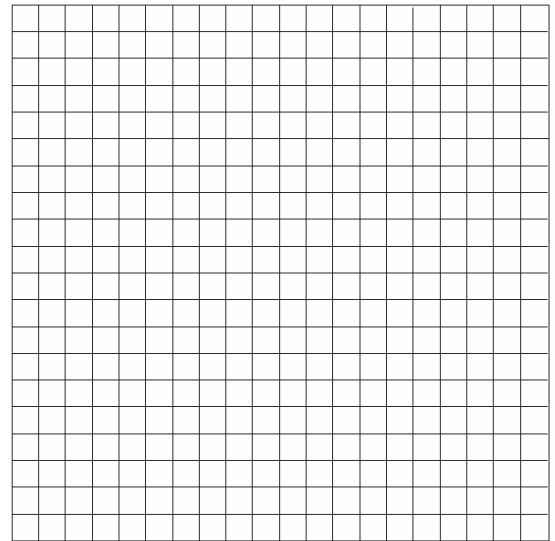
23. 010023a, P.I. A.A.45

A wall is supported by a brace 10 feet long, as shown in the diagram below. If one end of the brace is placed 6 feet from the base of the wall, how many feet up the wall does the brace reach?



24. 010024a

A straight line with slope 5 contains the points  $(1,2)$  and  $(3,K)$ . Find the value of  $K$ .  
[The use of the accompanying grid is optional.]



25. 010025a, P.I. G.G.39

Al says, "If  $ABCD$  is a parallelogram, then  $ABCD$  is a rectangle." Sketch a quadrilateral  $ABCD$  that shows that Al's statement is not always true. Your sketch must show the length of each side and the measure of each angle for the quadrilateral you draw.

26. 010026a, P.I. A.A.6

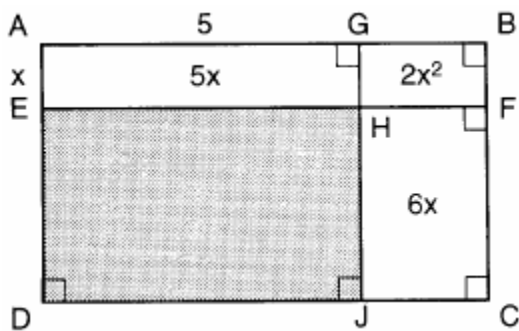
Judy needs a mean (average) score of 86 on four tests to earn a midterm grade of B. If the mean of her scores for the first three tests was 83, what is the *lowest* score on a 100-point scale that she can receive on the fourth test to have a midterm grade of B?

27. 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?

28. 010028a, P.I. A.G.1

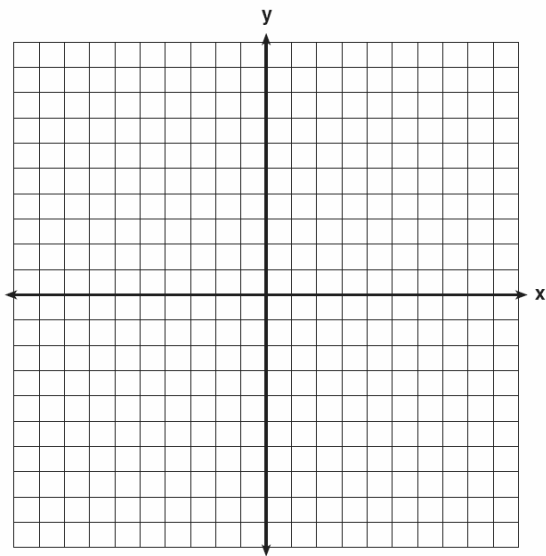
In the figure below, the large rectangle,  $ABCD$ , is divided into four smaller rectangles. The area of rectangle  $AEHG = 5x$ , the area of rectangle  $GHFB = 2x^2$ , the area of rectangle  $HJCF = 6x$ , segment  $AG = 5$ , and segment  $AE = x$ .



- Find the area of the shaded region.
- Write an expression for the area of the rectangle  $ABCD$  in terms of  $x$ .

29. 010029a

On the set of axes provided below, sketch a circle with a radius of 3 and center at  $(2,1)$  and also sketch the graph of the line  $2x + y = 8$ .



- What is the total number of points of intersection of the two graphs?

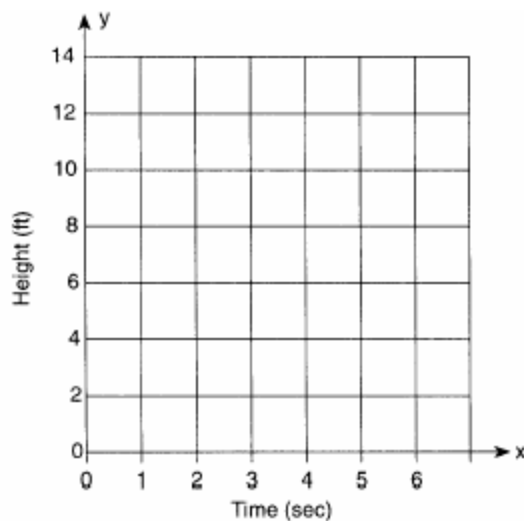
30. 010030a

The volume of a rectangular pool is 1,080 cubic meters. Its length, width, and depth are in the ratio 10:4:1. Find the number of meters in each of the three dimensions of the pool.

31. 010031a, P.I. A.G.4

Amy tossed a ball in the air in such a way that the path of the ball was modeled by the equation  $y = -x^2 + 6x$ . In the equation,  $y$  represents the height of the ball in feet and  $x$  is the time in seconds.

- Graph  $y = -x^2 + 6x$  for  $0 \leq x \leq 6$  on the grid provided below.



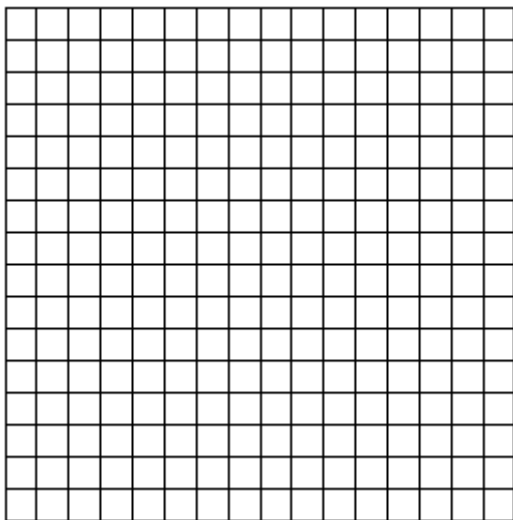
- At what time,  $x$ , is the ball at its highest point?

32. 010032a, P.I. A.S.5

In the time trials for the 400-meter run at the state sectionals, the 15 runners recorded the times shown in the table below.

400-Meter Run	
Time (sec)	Frequency
50.0–50.9	
51.0–51.9	II
52.0–52.9	
53.0–53.9	III
54.0–54.9	IIII

*a* Using the data from the frequency column, draw a frequency histogram on the grid provided below.



*b* What percent of the runners completed the time trial between 52.0 and 53.9 seconds?

33. 010033a, P.I. A.A.7

A group of 148 people is spending five days at a summer camp. The cook ordered 12 pounds of food for each adult and 9 pounds of food for each child. A total of 1,410 pounds of food was ordered.

*a* Write an equation or a system of equations that describes the above situation and define your variables.

*b* Using your work from part *a*, find:

- (1) the total number of adults in the group
- (2) the total number of children in the group

34. 010034a, P.I. A2.S.12

Three roses will be selected for a flower vase. The florist has 1 red rose, 1 white rose, 1 yellow rose, 1 orange rose and 1 pink rose from which to choose.

*a* How many different three rose selections can be formed from the 5 roses?

*b* What is the probability that 3 roses selected at random will contain 1 red rose, 1 white rose, and 1 pink rose?

*c* What is the probability that 3 roses selected at random will *not* contain an orange rose?

35. 010035a, P.I. A.A.7

The Excel Cable Company has a monthly fee of \$32.00 and an additional charge of \$8.00 for each premium channel. The Best Cable Company has a monthly fee of \$26.00 and additional charge of \$10.00 for each premium channel. The Horton family is deciding which of these two cable companies to subscribe to.

*a* For what number of premium channels will the total monthly subscription fee for the Excel and Best Cable companies be the same?

*b* The Horton family decides to subscribe to 2 premium channels for a period of one year.

(1) Which cable company should they subscribe to in order to spend less money?

(2) How much money will the Hortons save in one year by using the less expensive company?

- [1] B
- [2] A
- [3] B
- [4] A
- [5] C
- [6] C
- [7] B
- [8] A
- [9] B
- [10] A
- [11] B
- [12] B
- [13] A
- [14] C
- [15] B
- [16] A
- [17] C
- [18] B
- [19] A
- [20] B

[2] (-6,8) or -6,8 or  $x = -6$  and  $y = 8$  and an appropriate explanation is given, such as graphing the line or doubling the coordinates.

[1] One correct coordinate and one incorrect coordinate are found.

or [1] An appropriate method is shown, such as algebraic or graphing, but computational mistakes are made.

or [1] (-6,8) or -6,8 or  $x = -6$  and  $y = 8$  and no explanation is given.

or [1] Substitutions are correct for the midpoint formula, but computational mistakes are made.

or [1] The student properly locates point B on the graph but does not state its coordinates.

or [1] Point A and point M are reversed, resulting in B(3,-4), and an explanation is given.

[0] Only the midpoint of  $\overline{AM}$   $(-\frac{3}{2}, 2)$  is

found.

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

[21] incorrect procedure.

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[2] 4.5 and an appropriate method is shown, such as the equation  $3x + x + 2 = 20$  or some trial and error or arithmetic process.

[1] An appropriate method is shown, but the correct answer is not found.

or [1] 4.5 and no work is shown.

or [1] The student solves the equation  $x + 3x - 2 = 20$  and answers 5.5.

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

[22] incorrect procedure.

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[2] 8 and the use of trigonometry, the Pythagorean theorem, or Pythagorean triple is shown.

[1] The Pythagorean theorem or trigonometry is used, but a computational mistake is made or substitution is incorrect, such as

$$6^2 = 10^2 + x^2.$$

[1] 8 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

[23] incorrect procedure.

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[2] 12 and an appropriate explanation is given.

[1] The student uses an appropriate method,

such as showing  $\frac{k-2}{3-1} = 5$  or graphing of a

line through (1,2) having a slope of 5, but the correct answer is not found.

or [1] 12 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

[24] incorrect procedure.

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[2] The student draws a parallelogram, which is not a rectangle, with four sides and four angles labeled, such as angles of 60, 120, 60, and 120 and sides of 4, 6, 4, and 6.

[1] A parallelogram or rhombus, not a square, is drawn, which does not have measures for all lengths or angles.

[0] Angles and/or lengths are not appropriate for a parallelogram.

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

[25] obviously incorrect procedure.

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[3] 95 and an appropriate method is shown that obtains an answer, such as  $344 - 249$  or a similar equation or method.

or [3] Four scores are tried that round off to an average of 86, such as 93 or 94. Round off to 86 must be shown.

[2] An appropriate method is shown, but one computational mistake is made.

[1] The student understands weighted average and shows that the average of 83 for 3 tests is a total of 249 points.

or [1] 95 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

[26] incorrect procedure.

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[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

[27] incorrect procedure.

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a [2] 15 and an appropriate method is shown, such as finding  $GB = JC = 2x$  and  $FC = ED = HJ = 3$ .

[1] 15 and no work is shown.

or [1] At least one of the values is correct, as shown above, and the area is calculated based on the incorrect value.

b [1] Any form equivalent to  $(2x+5)(x+3)$

is shown, such as  $5x + 2x^2 + 6x + 15$ .

or [1] Any correct total area based on the students incorrect answer in part a is found.

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

[28] obviously incorrect procedure.

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- a [2] A correct circle is sketched with its center at (2,1) and a radius of 3 and the line  $2x + y = 8$  is drawn.  
[1] Only one of the graphs is sketched correctly.  
b [1] 2  
or [1] The correct number of intersections is found, based on the incorrect graphs drawn in 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.
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- [29] [3] 3, 12, and 30 and an appropriate arithmetic method or equation is shown, such as  $40x^3 = 1080$ .  
[2] An appropriate equation or method is shown, but not all three dimensions are found.  
or [2] An appropriate method is shown, and although one computational mistake is made, the student does find three dimensions based on this mistake, such as dividing 1080 by 40 incorrectly.  
[1] The student shows that multiplication is required to find volume but sets up an incorrect method and does not find three dimensions.  
or [1] 3, 12, and 30 and no work is shown.  
[0] The sum is used instead of the product,  
or [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] [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- a [3] A parabola is correctly graphed through (0,0), (1,5), (2,8), (3,9), (4,8), (5,5), and (6,0).  
[2] The correct table of values is shown but is not graphed through the entire domain.  
or [2] The correct points are graphed but as a broken line graph not a curve.  
or [2] At least three values are correctly calculated and graphed.  
[1] At least two of the values are correctly calculated, and the student tried to graph all points.  
b [1] 3  
or [1] The correct time, x, for an incorrect graph in part a is found.  
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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- [31] a [2] An appropriate histogram is drawn with both axes labeled with a correct numerical scale.  
[1] A correct bar graph is drawn.  
or [1] The parts of the histogram are not labeled.  
or [1] Equal interval scales are not shown.  
or [1] One error on frequency calculation is made.  
[0] Two or more mistakes on frequency calculation are made.  
b [2] 60% and an appropriate explanation is given.  
[1] An appropriate method to find percent is shown, but a mistake is made in reading the chart, such as  $\frac{6}{15} = 40\%$  or  $\frac{9}{15}$  is shown but not given as a percent answer.  
or [1] 60% and no explanation is given.  
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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- [32] [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.



a [2] An appropriate equation or system is shown, such as  $x + y = 148$  and  $12x + 9y = 1410$  or one equation such as  $12(148 - x) + 9x = 1410$  with variables identified.

[1] The student shows appropriate equation(s), but variables are not defined.

or [1] One mistake in equation(s) is made, or only one equation with two variables is shown, but variables are defined.

b(1) [1] 26 and an appropriate method is shown, such as solving the equation or making a table.

or [1] An appropriate answer is found based on incorrect equation(s) obtained in part a.

b(2) [1] 122 and an appropriate method is shown, such as  $148 - 26$ .

or [1] An appropriate answer is found based on incorrect equation(s) obtained in part a.

b (1) and b (2) [1] 26 and 122 and 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

[33] obviously incorrect procedure.

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a [2] 10 and an appropriate tree diagram, list, sample space, or  ${}_5C_3 = 10$  is shown.

[1] 10 and no work is shown.

or [1] An appropriate method is shown, but not all 10 possible combinations are listed

b [1]  $\frac{1}{10}$

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

c [1]  $\frac{4}{10}$  or  $\frac{2}{5}$  or 0.4

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

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

[34] an obviously incorrect procedure.

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a [2] 3 and an appropriate method is shown, such as trial and error or the equation  $32 + 8x = 26 + 10x$ .

[1] 3 and no work is shown.

or [1] An appropriate method is shown, but an incorrect answer is found.

b (1) [1] Best Cable Company and an appropriate explanation is given.

b (2) [1] \$24 and an appropriate explanation is given.

b (1) and b (2) [1] Best Cable Company and \$24 and 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

[35] obviously incorrect procedure.

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