

1. 010901ia, P.I. A.M.2

On a certain day in Toronto, Canada, the temperature was  $15^{\circ}$  Celsius (C). Using the formula  $F = \frac{9}{5}C + 32$ , Peter converts this temperature to degrees Fahrenheit (F). Which temperature represents  $15^{\circ}\text{C}$  in degrees Fahrenheit?

- [A] 35    [B] 59    [C] 85    [D] -9

2. 010902ia, P.I. A.M.1

What is the speed, in meters per second, of a paper airplane that flies 24 meters in 6 seconds?

- [A] 30    [B] 4    [C] 18    [D] 144

3. 010903ia, P.I. A.S.22

The faces of a cube are numbered from 1 to 6. If the cube is rolled once, which outcome is *least* likely to occur?

- [A] rolling a number less than 6  
[B] rolling an odd number  
[C] rolling an even number  
[D] rolling a number greater than 4

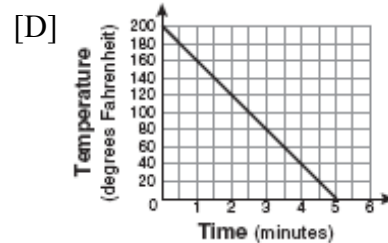
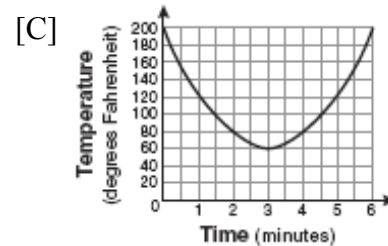
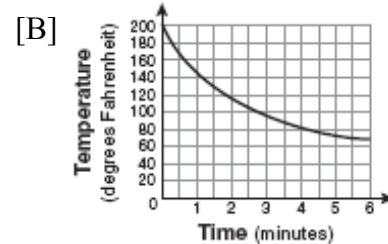
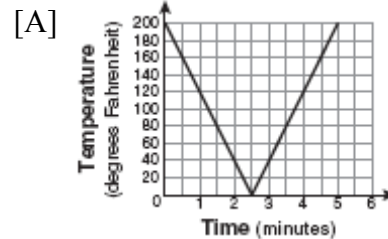
4. 010904ia, P.I. A.A.6

Tamara has a cell phone plan that charges \$0.07 per minute plus a monthly fee of \$19.00. She budgets \$29.50 per month for total cell phone expenses without taxes. What is the maximum number of minutes Tamara could use her phone each month in order to stay within her budget?

- [A] 271    [B] 150    [C] 421    [D] 692

5. 010905ia, P.I. A.G.4

Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?



6. 010906ia, P.I. A.A.26

What is the solution of  $\frac{k+4}{2} = \frac{k+9}{3}$ ?

- [A] 5    [B] 1    [C] 6    [D] 14

7. 010907ia, P.I. A.S.4  
Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?

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

8. 010908ia, P.I. A.A.9  
The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams,  $t$ , that remained in the tournament after  $r$  rounds?

[A]  $t = 64(1.5)^r$       [B]  $t = 64(r)^{0.5}$   
[C]  $t = 64(-0.5)^r$       [D]  $t = 64(0.5)^r$

9. 010909ia, P.I. A.A.19  
The expression  $9x^2 - 100$  is equivalent to

[A]  $(3x - 10)(3x + 10)$   
[B]  $(3x - 100)(3x - 1)$   
[C]  $(9x - 100)(x + 1)$       [D]  $(9x - 10)(x + 10)$

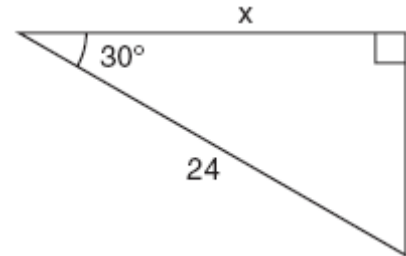
10. 010910ia, P.I. A.A.35  
What is an equation of the line that passes through the points  $(3, -3)$  and  $(-3, -3)$ ?

[A]  $y = 3$       [B]  $x = -3$   
[C]  $y = -3$       [D]  $x = y$

11. 010911ia, P.I. A.A.23  
If the formula for the perimeter of a rectangle is  $P = 2l + 2w$ , then  $w$  can be expressed as

[A]  $w = \frac{P - 2l}{2}$       [B]  $w = \frac{P - 2w}{2l}$   
[C]  $w = \frac{2l - P}{2}$       [D]  $w = \frac{P - l}{2}$

12. 010912ia, P.I. A.A.44  
In the right triangle shown in the diagram below, what is the value of  $x$  to the nearest whole number?



[A] 14      [B] 28      [C] 21      [D] 12

13. 010913ia, P.I. A.A.33  
What is the slope of the line that passes through the points  $(2, 5)$  and  $(7, 3)$ ?

[A]  $\frac{8}{9}$       [B]  $\frac{9}{8}$       [C]  $-\frac{5}{2}$       [D]  $-\frac{2}{5}$

14. 010914ia, P.I. A.A.28  
What are the roots of the equation  $x^2 - 10x + 21 = 0$ ?

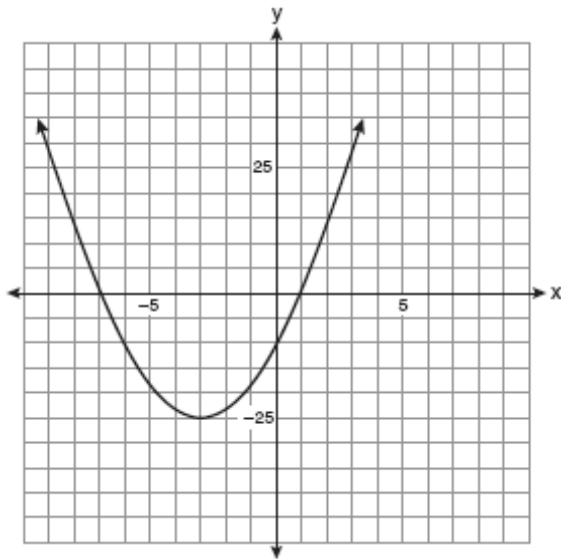
[A] -5 and -5      [B] 3 and 7  
[C] -3 and -7      [D] 1 and 21

15. 010915ia, P.I. A.A.5  
Rhonda has \$1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine  $x$ , the number of nickels she has?

[A]  $0.15(x + 6) = 1.35$   
[B]  $0.05(x + 6) + 0.10x = 1.35$   
[C]  $0.05 + 0.10(6x) = 1.35$   
[D]  $0.05x + 0.10(x + 6) = 1.35$

16. 010916ia, P.I. A.G.10

Which equation represents the axis of symmetry of the graph of the parabola below?



- [A]  $y = -3$                       [B]  $y = -25$   
[C]  $x = -3$                       [D]  $x = -25$

17. 010917ia, P.I. A.A.29

The set  $\{1,2,3,4\}$  is equivalent to

- [A]  $\{x|1 < x < 4, \text{ where } x \text{ is a whole number}\}$   
[B]  $\{x|0 < x \leq 4, \text{ where } x \text{ is a whole number}\}$   
[C]  $\{x|0 < x < 4, \text{ where } x \text{ is a whole number}\}$   
[D]  $\{x|1 < x \leq 4, \text{ where } x \text{ is a whole number}\}$

18. 010918ia, P.I. A.A.26

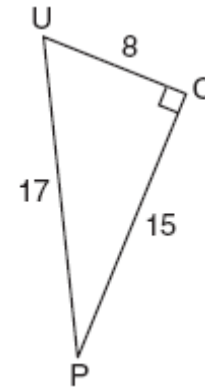
What is the value of  $x$  in the equation

$$\frac{2}{x} - 3 = \frac{26}{x}?$$

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

19. 010919ia, P.I. A.A.42

The diagram below shows right triangle  $UPC$ .



Which ratio represents the sine of  $\angle U$ ?

- [A]  $\frac{8}{15}$       [B]  $\frac{15}{17}$       [C]  $\frac{15}{8}$       [D]  $\frac{8}{17}$

20. 010920ia, P.I. A.N.2

What is  $\sqrt{72}$  expressed in simplest radical form?

- [A]  $8\sqrt{3}$                               [B]  $3\sqrt{8}$   
[C]  $6\sqrt{2}$                               [D]  $2\sqrt{18}$

21. 010921ia, P.I. A.A.17

What is  $\frac{6}{5x} - \frac{2}{3x}$  in simplest form?

- [A]  $\frac{4}{15x}$       [B]  $\frac{4}{2x}$       [C]  $\frac{8}{15x}$       [D]  $\frac{8}{15x^2}$

22. 010922ia, P.I. A.A.11

Which ordered pair is a solution of the system of equations  $y = x^2 - x - 20$  and  $y = 3x - 15$ ?

- [A]  $(0, 5)$                               [B]  $(5, -1)$   
[C]  $(-1, -18)$                               [D]  $(-5, -30)$

23. 010923ia, P.I. A.S.3  
A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?
- [A] randomly surveying 50 people during the day in a mall  
[B] randomly surveying 75 people during the day in a clothing store  
[C] surveying 10 people who work in a sporting goods store  
[D] surveying the first 25 people who enter a grocery store

24. 010924ia, P.I. A.A.1  
The length of a rectangular room is 7 less than three times the width,  $w$ , of the room. Which expression represents the area of the room?

- [A]  $3w - 7$                       [B]  $3w^2 - 7w$   
[C]  $3w - 4$                       [D]  $3w^2 - 4w$

25. 010925ia, P.I. A.A.15  
The function  $y = \frac{x}{x^2 - 9}$  is undefined when the value of  $x$  is

- [A] -3, only                      [B] 3, only  
[C] 3 or -3                      [D] 0 or 3

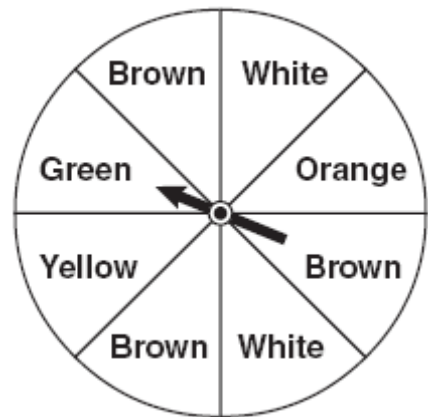
26. 010926ia, P.I. A.A.38  
Which equation represents a line that is parallel to the line  $y = 3 - 2x$ ?

- [A]  $y = 3 - 4x$                       [B]  $4x + 2y = 5$   
[C]  $2x + 4y = 1$                       [D]  $y = 4x - 2$

27. 010927ia, P.I. A.N.4  
What is the product of  $8.4 \times 10^8$  and  $4.2 \times 10^3$  written in scientific notation?

- [A]  $35.28 \times 10^{11}$                       [B]  $12.6 \times 10^{11}$   
[C]  $3.528 \times 10^{12}$                       [D]  $2.0 \times 10^5$

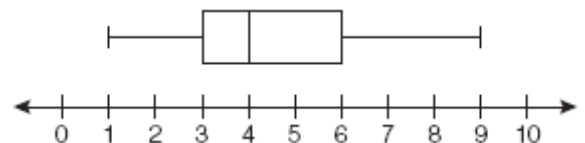
28. 010928ia, P.I. A.S.23  
Keisha is playing a game using a wheel divided into eight equal sectors, as shown in the diagram below. Each time the spinner lands on orange, she will win a prize.



If Keisha spins this wheel twice, what is the probability she will win a prize on *both* spins?

- [A]  $\frac{1}{16}$     [B]  $\frac{1}{64}$     [C]  $\frac{1}{4}$     [D]  $\frac{1}{56}$

29. 010929ia, P.I. A.S.6  
A movie theater recorded the number of tickets sold daily for a popular movie during the month of June. The box-and-whisker plot shown below represents the data for the number of tickets sold, in hundreds.

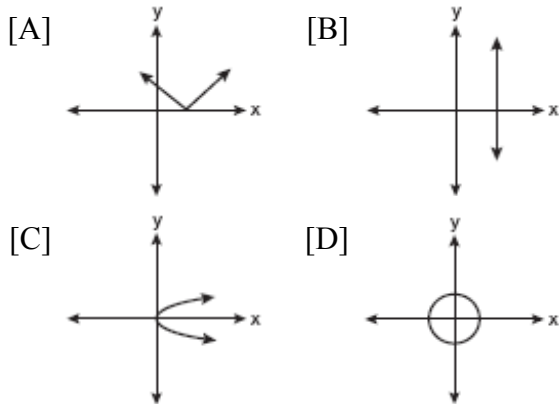


Which conclusion can be made using this plot?

- [A] The mean of the attendance is 400.  
[B] The second quartile is 600.  
[C] The range of the attendance is 300 to 600.  
[D] Twenty-five percent of the attendance is between 300 and 400.

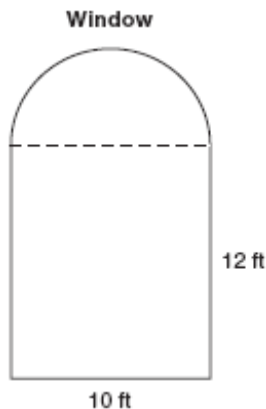
30. 010930ia, P.I. A.G.3

Which graph represents a function?



31. 010931ia, P.I. A.G.1

A window is made up of a single piece of glass in the shape of a semicircle and a rectangle, as shown in the diagram below. Tess is decorating for a party and wants to put a string of lights all the way around the outside edge of the window.



To the *nearest foot*, what is the length of the string of lights that Tess will need to decorate the window?

32. 010932ia, P.I. A.A.12

Simplify:  $\frac{27k^5m^8}{(4k^3)(9m^2)}$

33. 010933ia, P.I. A.N.5

The table below represents the number of hours a student worked and the amount of money the student earned.

Number of Hours ( $h$ )	Dollars Earned ( $d$ )
8	\$50.00
15	\$93.75
19	\$118.75
30	\$187.50

Write an equation that represents the number of dollars,  $d$ , earned in terms of the number of hours,  $h$ , worked. Using this equation, determine the number of dollars the student would earn for working 40 hours.

34. 010934ia, P.I. A.M.3

Sarah measures her rectangular bedroom window for a new shade. Her measurements are 36 inches by 42 inches. The actual measurements of the window are 36.5 inches and 42.5 inches. Using the measurements that Sarah took, determine the number of square inches in the area of the window. Determine the number of square inches in the actual area of the window. Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*.

35. 010935ia, P.I. A.A.18

Perform the indicated operation and simplify:

$$\frac{3x+6}{4x+12} \div \frac{x^2-4}{x+3}$$

36. 010936ia, P.I. A.G.2

A soup can is in the shape of a cylinder. The can has a volume of  $342 \text{ cm}^3$  and a diameter of 6 cm. Express the height of the can in terms of  $\pi$ . Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly 36 cm. Explain your answer.

37. 010937ia, P.I. A.A.10

Solve the following system of equations algebraically:

$$3x + 2y = 4$$

$$4x + 3y = 7$$

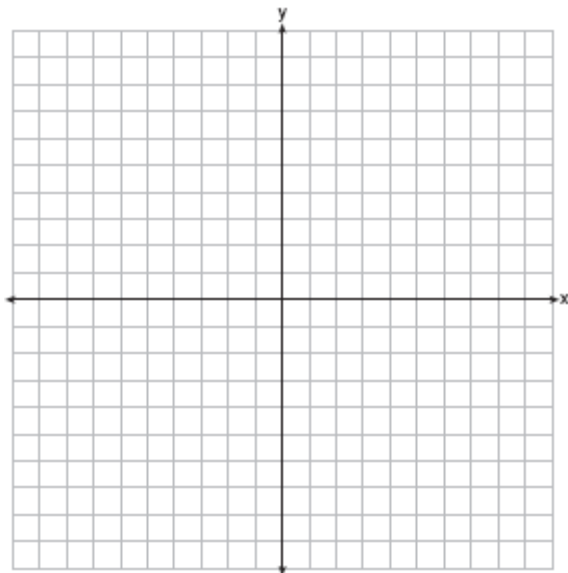
[Only an algebraic solution can receive full credit.]

38. 010938ia, P.I. A.G.7

On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

$$2x - y \geq 6$$

$$x > 2$$



39. 010939ia, P.I. A.S.19

A restaurant sells kids' meals consisting of one main course, one side dish, and one drink, as shown in the table below.

Kids' Meal Choices

Main Course	Side Dish	Drink
hamburger	French fries	milk
chicken nuggets	applesauce	juice
turkey sandwich		soda

Draw a tree diagram or list the sample space showing all possible kids' meals. How many different kids' meals can a person order? Jose does not drink juice. Determine the number of different kids' meals that do *not* include juice. Jose's sister will eat *only* chicken nuggets for her main course. Determine the number of different kids' meals that include chicken nuggets.

- [1] B \_\_\_\_\_
- [2] B \_\_\_\_\_
- [3] D \_\_\_\_\_
- [4] B \_\_\_\_\_
- [5] B \_\_\_\_\_
- [6] C \_\_\_\_\_
- [7] B \_\_\_\_\_
- [8] D \_\_\_\_\_
- [9] A \_\_\_\_\_
- [10] C \_\_\_\_\_
- [11] A \_\_\_\_\_
- [12] C \_\_\_\_\_
- [13] D \_\_\_\_\_
- [14] B \_\_\_\_\_
- [15] D \_\_\_\_\_
- [16] C \_\_\_\_\_
- [17] B \_\_\_\_\_
- [18] B \_\_\_\_\_
- [19] B \_\_\_\_\_
- [20] C \_\_\_\_\_
- [21] C \_\_\_\_\_
- [22] C \_\_\_\_\_
- [23] C \_\_\_\_\_
- [24] B \_\_\_\_\_
- [25] C \_\_\_\_\_
- [26] B \_\_\_\_\_
- [27] C \_\_\_\_\_
- [28] B \_\_\_\_\_

[29] D \_\_\_\_\_

[30] A \_\_\_\_\_

[2] 50, and appropriate work is shown.  
[1] Appropriate work is shown, but one computational or rounding error is made.  
or [1] Appropriate work is shown, but one conceptual error is made,  
or [1] 50, but no work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[31] \_\_\_\_\_

[2]  $\frac{3k^2m^6}{4}$  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]  $\frac{3k^2m^6}{4}$ , 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.

[32] \_\_\_\_\_

[2]  $d = 6.25h$  or an equivalent equation and 250, 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] A correct equation is written, but no further correct work is shown.

or [1] Appropriate work is shown to find 250, but the equation is missing or is incorrect.

[0] 250, 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

[33] \_\_\_\_\_

[3] 1,512 and 1,551.25 and 0.025, and appropriate work is shown.

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

[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, such as dividing by 1,512.

or [1] Appropriate work is shown to find 1,512 and 1,551.25, but no further correct work is shown.

or [1] 1,512 and 1,551.25 and 0.025, but no work is shown.

[0] 1,512 or 1,551.25 or 0.025, 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

[34] obviously incorrect procedure.

[3]  $\frac{3}{4x-8}$  or  $\frac{3}{4(x-2)}$ , and appropriate work is shown.

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

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

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

or [1]  $\frac{3}{4x-8}$  or  $\frac{3}{4(x-2)}$ , 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

[35] incorrect procedure.

[3]  $\frac{38}{\pi}$  or an equivalent answer in terms of  $\pi$ , and 2, and appropriate work is shown, and an appropriate explanation is given.

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

or [2] Appropriate work is shown and an appropriate explanation is given, but the correct height of the can is expressed as a decimal.

or [2]  $\frac{38}{\pi}$  and 2, and appropriate work is

shown, but an appropriate explanation is not given.

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

[1] Appropriate work is shown, but one conceptual error is made, but an appropriate explanation is given.

or [1]  $\frac{38}{\pi}$  and 2, but no work is shown.

[0]  $\frac{38}{\pi}$  or 2, 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

[36] obviously incorrect procedure.

- [4]  $(-2,5)$  or  $x = -2$  and  $y = 5$ , and appropriate algebraic work is shown.
- [3] Appropriate algebraic work is shown, but one computational error is made, but appropriate values are found for  $x$  and  $y$ .
- or [3]  $x = -2$  or  $y = 5$ , and appropriate algebraic work is shown.
- [2] Appropriate algebraic work is shown, but two or more computational errors are made, but appropriate values are found for  $x$  and  $y$ .
- or [2] Appropriate algebraic work is shown, but one conceptual error is made.
- or [2]  $(-2,5)$  or  $x = -2$  and  $y = 5$ , but a method other than an algebraic method is used.
- [1] Appropriate algebraic work is shown, but one conceptual error and one computational error are made.
- or [1] The trial-and-error method is used to find the correct solution, but fewer than three trials and appropriate checks are shown.
- or [1]  $x = -2$  or  $y = 5$ , but a method other than an algebraic method is used.
- or [1]  $(-2,5)$  or  $x = -2$  and  $y = 5$ , but no work is shown.
- [0]  $x = -2$  or  $y = 5$ , but no work is shown.
- or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [4] Both inequalities are graphed and shaded correctly, and at least one is labeled, and a point in the solution set is identified.
- [3] Appropriate work is shown, but one graphing error is made, such as drawing a solid line for  $x > 2$  or shading incorrectly, but an appropriate point in the solution set is identified.
- or [3] Both inequalities are graphed and shaded correctly, and a point in the solution set is identified correctly, but the graphs are not labeled or are labeled incorrectly.
- or [3] Both inequalities are graphed and shaded correctly, and at least one is labeled, but no point in the solution set is identified.
- [2] Appropriate work is shown, but two or more graphing errors are made, but an appropriate point in the solution set is identified.
- or [2] Appropriate work is shown, but one conceptual error is made, such as graphing the lines  $x = 2$  and  $y = 2x - 6$  and identifying the point of intersection.
- or [2] One of the inequalities is graphed and shaded correctly, and at least one is labeled, but no further correct work is shown.
- [1] Appropriate work is shown, but one conceptual error and one graphing error are made, but an appropriate point in the solution set is identified.
- or [1] Both inequalities are graphed incorrectly, but an appropriate point in the solution set is identified.
- or [1] The lines  $x = 2$  and  $y = 2x - 6$  are graphed correctly, and at least one is labeled, but no further correct work is shown.
- or [1] A point in the solution set is identified and shown to be correct by checking in both inequalities, but no graphs are drawn.
- [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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[4] A correct tree diagram or sample space is given, and 18 total meals, 12 meals without juice, and 6 meals with chicken nuggets.

[3] A correct tree diagram or sample space is given, but either 18, 12, or 6 is missing or is incorrect.

or [3] The fundamental counting principle is used to find 18 total meals, 12 meals without juice, and 6 meals with chicken nuggets, but no tree diagram or sample space is given.

or [3] An incorrect tree diagram or sample space is given, but an appropriate number of meals is found for all three categories.

[2] A correct tree diagram or sample space is given, but an appropriate number of meals is found for only one category.

or [2] An incorrect tree diagram or sample space is given, but an appropriate number of meals is found for only two categories.

[1] A correct tree diagram or sample space is given, but no number of meals is found correctly.

or [1] An incorrect tree diagram or sample space is given, but an appropriate number of meals is found for only one category.

or [1] 18 total meals, 12 meals without juice, and 6 meals with chicken nuggets, but no work is shown.

[0] 18 total meals or 12 meals without juice or 6 meals with chicken nuggets, 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

[39] obviously incorrect procedure.