1. 080801a
If $6.54 \times 10^n = 65{,}400$, what is the value of *n*?

[A] 4 [B] -5 [C] 5 [D] -3

2. 080802a
Which letter has both line and point symmetry?

[A] T [B] H [C] S [D] B

3. 080803a, P.I. A.S.20
Marilyn selects a piece of candy at random from a jar that contains four peppermint, five cherry, three butterscotch, and two lemon candies. What is the probability that the candy she selects is *not* a cherry candy?

[A] 0 [B] $\frac{9}{14}$ [C] $\frac{5}{14}$ [D] $\frac{14}{14}$

4. 080804a, P.I. A.M.2
The formula for converting temperatures in degrees Celsius to degrees Fahrenheit is $F = \frac{9}{5}C + 32$. If the temperature is 20°C, what is the temperature in degrees Fahrenheit?

[A] 43.1 [B] 68 [C] 4 [D] 33.8

5. 080805a, P.I. A.M.1
Andy drives 80 miles to get to the Thruway, drives 100 miles on the Thruway, and then drives an additional 75 miles after leaving the Thruway. If the entire trip took 5 hours and he made no stops, what was his average speed, in miles per hour?

[A] 65 [B] 250 [C] 255 [D] 51

6. 080806a, P.I. A.N.1
Which property is illustrated by the equation $4x(2x-1) = 8x^2 - 4x$?

[A] commutative [B] identity

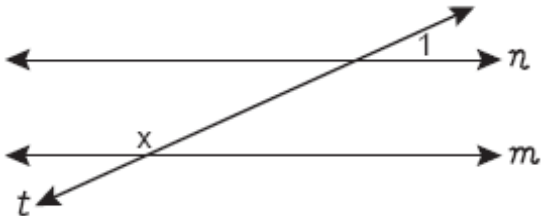
[C] distributive [D] associative

7. 080807a, P.I. A.A.13
What is the sum of $2m^2 + 3m - 4$ and $m^2 - 3m - 2$?

[A] $3m^2 + 6m - 6$ [B] $m^2 - 6$

[C] $3m^2 - 6$ [D] $m^2 + 6m - 2$

8. 080808a
In the accompanying diagram, line *n* is parallel to line *m*, line *t* is a transversal, and $m\angle 1 = 24$.



What does *x* equal, in degrees?

[A] 24 [B] 114 [C] 66 [D] 156

9. 080809a, P.I. A.N.5
If a machine that prints designs on T-shirts prints 500 shirts in 3 hours, how many hours will it take to print designs on 1,800 shirts?

[A] 6 [B] 10.8 [C] 9.8 [D] 12

10. 080810a, P.I. A.N.1
The sum of two negative numbers always has to be

[A] negative [B] positive

[C] an integer [D] zero

11. 080811a, P.I. A.A.5
The width, *w*, of a rectangular rug is 4 less than its length, ℓ. Which expression represents the area of the rug?

[A] $\ell(4-\ell)$ [B] $\ell(\ell-4)$

[C] $2w + 2\ell$ [D] $2(\ell-4) + 2\ell$

12. 080812a, P.I. A.A.22
What is the value of *m* in the equation $2m-(m+1)=0$?

[A] $\frac{1}{3}$ [B] -1 [C] 1 [D] 0

13. 080813a, P.I. G.G.26
What is the converse of the statement "If $a^2+b^2=c^2$, then ΔABC is a right triangle"?

[A] If $a^2+b^2=c^2$, then ΔABC is not a right triangle.

[B] If ΔABC is not a right triangle, then $a^2+b^2=c^2$.

[C] If ΔABC is a right triangle, then $a^2+b^2=c^2$.

[D] $a^2+b^2=c^2$ if, and only if, ΔABC is a right triangle.

14. 080814a, P.I. G.G.45
Pentagon *ABCDE* is similar to pentagon *FGHIJ*. The lengths of the sides of *ABCDE* are 8, 9, 10, 11, and 12. If the length of the longest side of pentagon *FGHIJ* is 18, what is the perimeter of pentagon *FGHIJ*?

[A] 50 [B] 100 [C] 56 [D] 75

15. 080815a
Which inequality is shown on the accompanying graph?

[A] $x<-1$ [B] $x\geq -1$

[C] $x\leq -1$ [D] $x>-1$

16. 080816a, P.I. A2.S.11
A teacher wants to divide her class into groups. Which expression represents the number of different 3-person groups that can be formed from a class of 22 students?

[A] ${}_{22}C_3$ [B] ${}_{22}P_3$

[C] 3! [D] $22\cdot 21\cdot 20$

17. 080817a, P.I. A.A.12
What is $6x^3+4x^2+2x$ divided by $2x$?

[A] $4x^2+2x$ [B] $3x^2+2x$

[C] $3x^2+2x+1$ [D] $4x^2+2x+1$

18. 080818a
The greatest common factor of $4a^2b$ and $6ab^3$ is

[A] $12ab$ [B] $2ab$

[C] $2ab^2$ [D] $24a^3b^4$

19. 080819a, P.I. G.G.25
The statement “Maya plays on the basketball team or Maya joins the ski club” is *false*. Which statement is true?

[A] Maya plays on the basketball team and Maya joins the ski club.

[B] Maya does not play on the basketball team and Maya does not join the ski club.

[C] Maya does not play on the basketball team and Maya joins the ski club.

[D] Maya plays on the basketball team and Maya does not join the ski club.

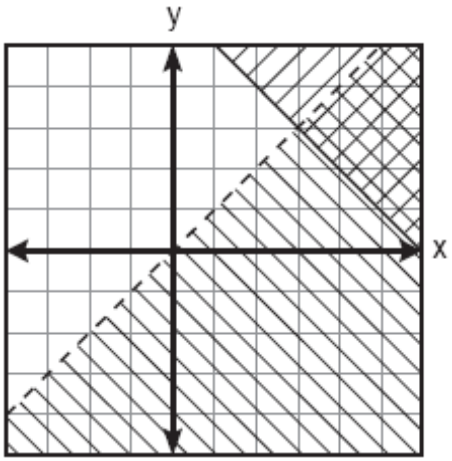
20. 080820a, P.I. G.G.36
The measures of five of the interior angles of a hexagon are 150°, 100°, 80°, 165°, and 150°. What is the measure of the sixth interior angle?

[A] 75° [B] 180° [C] 80° [D] 105°

21. 080821a, P.I. A.A.15
For which value of *x* is the expression $\frac{3x-3}{x-5}$ undefined?

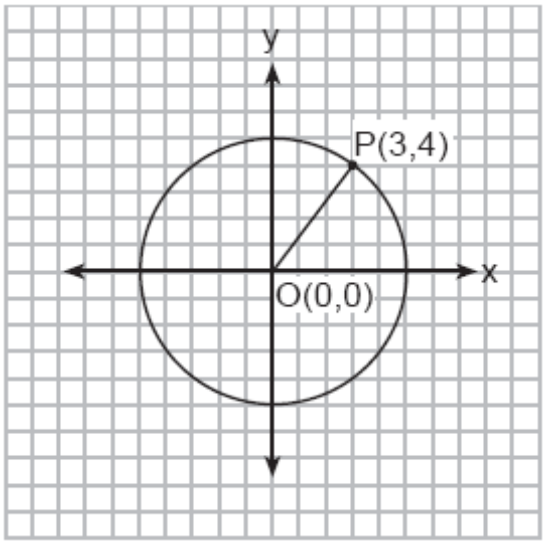
[A] 5 [B] -1 [C] 1 [D] -5

22. 080822a, P.I. A.A.40
Which point is in the solution set of the system of inequalities shown on the accompanying graph?



[A] (3,3) [B] (0,0) [C] (2,3) [D] (5,2)

23. 080823a, P.I. G.G.72
In the accompanying diagram, the center of circle O is (0,0), and the coordinates of point P are (3,4). If $\overline{OP}$ is a radius, what is the equation of the circle?



[A] $x^2 + y^2 = 9$ [B] $x^2 + y^2 = 5$

[C] $x^2 + y^2 = 25$ [D] $x^2 + y^2 = 16$

24. 080824a, P.I. A.A.12
The expression $(-4a^3b)^2$ is equivalent to

[A] $-16a^6b^2$ [B] $16a^6b^2$

[C] $16a^5b^2$ [D] $8a^6b^2$

25. 080825a, P.I. A.A.28
For which equation is the solution set $\{-5,2\}$?

[A] $x^2 + 3x - 10 = 0$ [B] $x^2 - 3x = 10$

[C] $x^2 + 3x = -10$ [D] $x^2 - 3x + 10 = 0$

26. 080826a, P.I. A.N.7
When the Smith family decided to have their new house built, they found that there were 60 different choices involving location, style, and color. If they had their choice of 2 locations and 5 styles, how many choices of color did they have?

[A] 12 [B] 50 [C] 6 [D] 53

27. 080827a
In a survey, 450 high school students were asked for their preference of fast food for lunch. The accompanying circle graph represents the results.

How many students preferred salad?

[A] 300 [B] 75 [C] 150 [D] 60

28. 080828a

A line with a slope of $\frac{1}{3}$ passes through the point (3,6). Which point also lies on this line?

[A] (6,3) [B] (-6,3)

[C] (-3,-3) [D] (7,6)

29. 080829a, P.I. G.G.26

Which statement is logically equivalent to "If I sleep, then I will not eat"?

[A] If I eat, then I will sleep.

[B] If I do not eat, then I will sleep.

[C] If I do not sleep, then I will eat.

[D] If I eat, then I will not sleep.

30. 080830a, P.I. G.G.33

Phil is cutting a triangular piece of tile. If the triangle is scalene, which set of numbers could represent the lengths of the sides?

[A] {5,5,8} [B] {2,4,7}

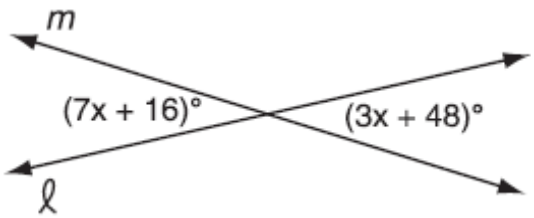
[C] {3,5,8} [D] {4,5,6}

31. 080831a, P.I. A.A.22

Solve for x: $0.35x + 0.6 = 0.1x + 1$

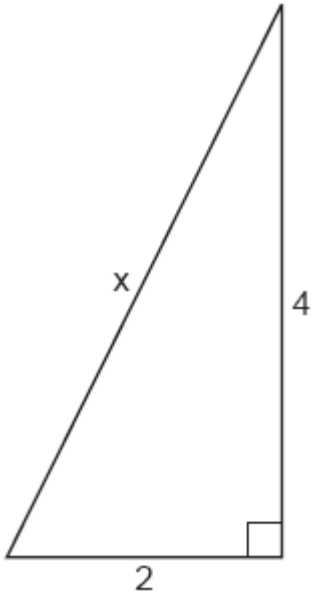
32. 080832a

The accompanying diagram shows intersecting lines ℓ and m. Solve for the value of x.



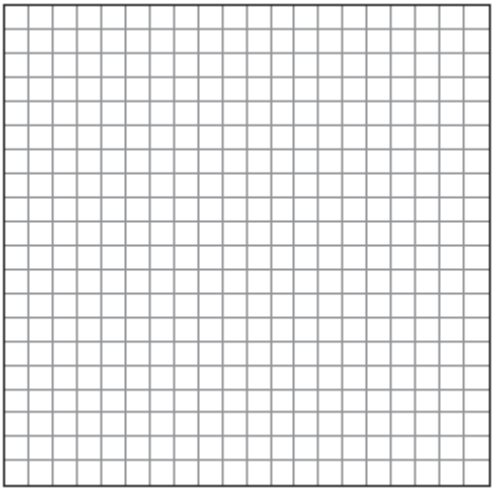
33. 080833b, P.I. A.N.2

Theo determined that the correct length of the hypotenuse of the right triangle in the accompanying diagram is $\sqrt{20}$. Fiona found the length of the hypotenuse to be $2\sqrt{5}$. Is Fiona's answer also correct? Justify your answer.

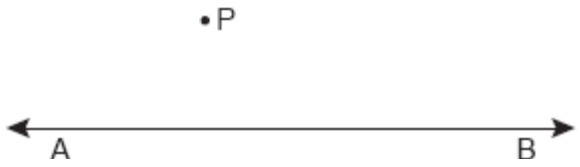


34. 080834a

One endpoint of a line segment is (6,2). The midpoint of the segment is (2,0). Find the coordinates of the other endpoint. [The use of the grid is optional.]

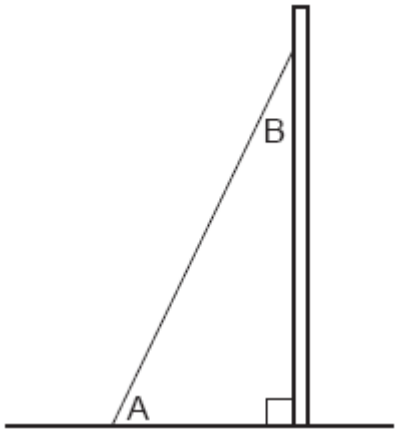


35. 080835a, P.I. G.G.19
Using a compass and straightedge, construct the line that is perpendicular to $\overleftrightarrow{AB}$ and that passes through point *P*. Show all construction marks.

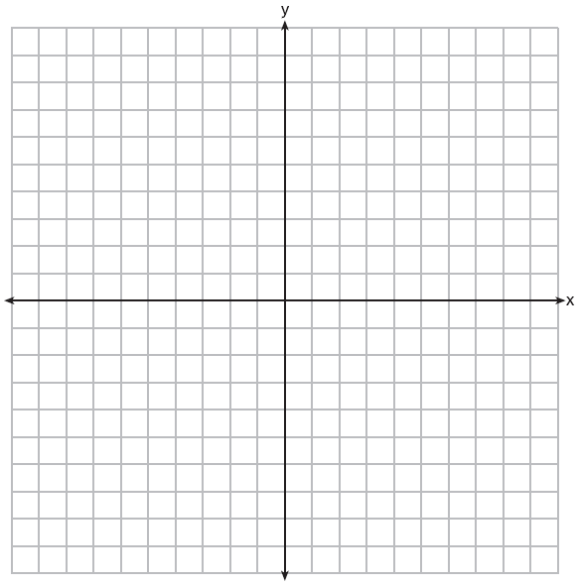


36. 080836a, P.I. A.A.6
The mean of three numbers is 25. The second number is four less than twice the first. The third number is two more than four times the first. Find the *smallest* number.

37. 080837a, P.I. G.G.30
A billboard on level ground is supported by a brace, as shown in the accompanying diagram. The measure of angle *A* is 15° greater than twice the measure of angle *B*. Determine the measure of angle *A* and the measure of angle *B*.



38. 080838a, P.I. G.G.54
On the accompanying set of axes, draw ΔABC, whose coordinates are $A(-7,9)$, $B(-2,8)$, and $C(-3,4)$. Then draw, label, and state the coordinates of $\Delta A'B'C'$, the image of ΔABC after the transformation that maps (x, y) to $(-x,-y)$. Based on your diagram, identify the type of transformation that was performed.

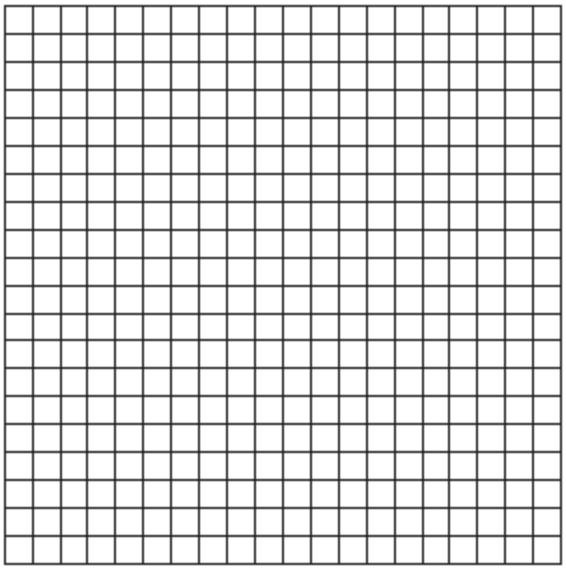


39. 080839a, P.I. A.G.9

Solve the following system of equations algebraically or graphically for x and y:

$$y = x^2 + 4x + 6$$

$$y = 2x + 6$$



[1] A

[2] B

[3] B

[4] B

[5] D

[6] C

[7] C

[8] D

[9] B

[10] A

[11] B

[12] C

[13] C

[14] D

[15] B

[16] A

[17] C

[18] B

[19] B

[20] A

[21] A

[22] D

[23] C

[24] B

[25] A

[26] C

[27] B

[28] B

[29] D

[30] D

[31]
[2] 1.6, 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] 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 incorrect procedure.

[32]
[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, such as $7x+16+3x+14=180$.
or [1] A correct equation is written, but no further correct work is shown.
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.

[33]
[2] Yes, and both answers are shown to be equivalent using either decimal approximation or simplification of radicals.
[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] Yes, but an incomplete explanation is given, such as stating that $2\sqrt{5}$ and $\sqrt{20}$ are equivalent or that $\sqrt{20}$ simplifies to $2\sqrt{5}$, but no work is shown to support this.
[0] Yes, 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.

[2] (-2,-2), and appropriate work is shown, such as the use of the midpoint formula, a correct graph of the line segment showing the slope, or an appropriate explanation of how the missing endpoint is found.
[1] Appropriate work is shown, but one computational or graphing error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as finding (4,1), the midpoint of the given points.
or [1] A correct graph of the line segment is drawn, but the coordinates are not stated.
or [1] (-2,-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.

[34]

[2] A correct construction is drawn, showing all necessary arcs.
[1] All of the construction arcs are drawn, but the perpendicular line is not drawn.
or [1] A line perpendicular to $\overleftrightarrow{AB}$ is constructed correctly, but it does not pass through point *P*.
[0] A drawing that is not an appropriate construction 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.

[35]

[3] 11, and appropriate work is shown, such as solving an equation 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 to find the three numbers, but a number other than the smallest is identified.
or [2] The trial-and-error method is used to find the correct solution, but only two trials and appropriate checks are shown.
or [2] One error is made in representing the three numbers algebraically, but an appropriate equation is written and solved correctly.
[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, such as not dividing $7x - 2$ by 3.
or [1] Two errors are made in representing the three numbers algebraically, but an appropriate equation is written and solved correctly.
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] 11, 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 incorrect procedure.

[36]

[3] $m\angle A = 65$ and $m\angle B = 25$, and appropriate work is shown.
[2] Appropriate work is shown, but one computational error is made.
or [2] Appropriate work is shown to find 65 and 25, but the angles are not labeled or are labeled incorrectly.
or [2] An incorrect expression is written for angle *A*, but an appropriate equation is solved, and appropriate measures of angle *A* and angle *B* are found.
or [2] Appropriate work is shown to find $x = 25$, but no further correct 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, such as solving the equation $3x + 15 = 180$ for both the measures of angle *A* and angle *B*.
or [1] A correct equation is written, but no further correct work is shown.
or [1] $m\angle A = 65$ and $m\angle B = 25$, but no work is shown.
[0] $m\angle A = 65$ or $m\angle B = 25$, but no work is shown.
or [0] 65 and 25, but no work is shown, and the angles are not labeled or are labeled incorrectly.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an
[37] obviously incorrect procedure.

[4] ΔABC and $\Delta A'B'C'$ are graphed and labeled correctly, and the coordinates of $\Delta A'B'C'$ are stated as $A'(7,-9)$, $B'(2,-8)$, and $C'(3,-4)$, and point reflection or dilation with a factor of -1. (Note: rotation or rotation of 180° is an acceptable answer.)
[3] ΔABC and $\Delta A'B'C'$ are graphed and labeled correctly, but the coordinates of $\Delta A'B'C'$ are not stated or are stated incorrectly but a correct transformation is stated.
or [3] ΔABC and $\Delta A'B'C'$ are graphed and labeled correctly, and the coordinates of $\Delta A'B'C'$ are stated correctly, but the type of transformation is not stated or is stated incorrectly.
or [3] ΔABC is not graphed, but $\Delta A'B'C'$ is graphed and labeled correctly, and its coordinates are stated correctly, and a correct transformation is stated.
or [3] ΔABC is graphed incorrectly, but $\Delta A'B'C'$ is graphed and labeled appropriately, its coordinates are stated appropriately, and an appropriate type of transformation is stated.
[2] ΔABC is graphed correctly, but one conceptual error is made, such as graphing an incorrect transformation, but the points are labeled appropriately, its coordinates are stated appropriately, and an appropriate type of transformation is stated.
or [2] ΔABC is not graphed, but $\Delta A'B'C'$ is graphed and labeled correctly, and its coordinates are stated correctly, but the type of transformation is not stated or is stated incorrectly.
or [2] ΔABC and $\Delta A'B'C'$ are graphed and labeled correctly, but the coordinates of and the type of transformation are not stated or are stated incorrectly
or [2] ΔABC and $\Delta A'B'C'$ are not graphed, but the correct coordinates of $\Delta A'B'C'$ and a correct transformation are stated.
[1] Either ΔABC or $\Delta A'B'C'$ is graphed correctly, but the coordinates of $\Delta A'B'C'$ and the type of transformation are not stated or are stated incorrectly.
[38] or [1] $A'(7,-9)$, $B'(2,-8)$, and $C'(3,-4)$, but

no further correct work is shown.
or [1] A correct transformation is stated, 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.

[4] (-2,2) and (0,6), and appropriate algebraic or graphic work is shown.
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] Appropriate algebraic work is shown, but only one solution is found correctly or only the *x*-values or the *y*-values are found correctly.
or [3] Both equations are graphed correctly showing two points of intersection, but the coordinates are not stated or are stated incorrectly.
[2] Appropriate work is shown, but two or more computational or graphing errors are made, but appropriate coordinates are stated.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The equation $y = x^2 + 4x + 6$ is graphed correctly, but no further correct work is shown.
or [2] (-2,2) and (0,6), but a method other than an algebraic or graphic solution is used, such as trial and error with at least three trials and appropriate checks.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] The system of equations is simplified to a single equation, but no further correct work is shown.
or [1] The equation $y = 2x + 6$ is graphed correctly, 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 the solutions are not found.
or [1] (-2,2) and (0,6), but no algebraic or graphic work is shown or the trial-and-error method is used and fewer than three trials and appropriate checks are shown.
[0] (-2,2) or (0,6), but no algebraic or graphic work is shown or the trial-and-error method is used and fewer than three trials and appropriate checks are 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.