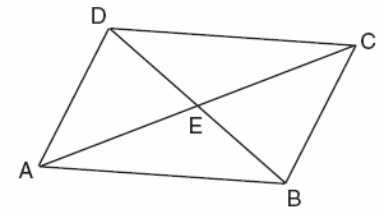
1. 080201a, P.I. A.A.26
On a map, 1 centimeter represents 40 kilometers. How many kilometers are represented by 8 centimeters?

[A] 48 [B] 320 [C] 5 [D] 280

2. 080202a, P.I. G.G.38
In the accompanying diagram of parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{DB}$ intersect at *E*, $AE = 3x - 4$, and $EC = x + 12$.



What is the value of *x*?

[A] 40 [B] 20 [C] 16 [D] 8

3. 080203a, P.I. G.G.22
What is the total number of points equidistant from two intersecting straight roads and also 300 feet from the traffic light at the center of the intersection?

[A] 1 [B] 2 [C] 4 [D] 0

4. 080204a, P.I. A.N.7
Juan has three blue shirts, two green shirts, seven red shirts, five pairs of denim pants, and two pairs of khaki pants. How many different outfits consisting of one shirt and one pair of pants are possible?

[A] 84 [B] 420 [C] 130 [D] 19

5. 080205a, P.I. G.G.26
Given the statement: "If two lines are cut by a transversal so that the corresponding angles are congruent, then the lines are parallel." What is true about the statement and its converse?

[A] The statement and its converse are both false.

[B] The statement and its converse are both true.

[C] The statement is false, but its converse is true.

[D] The statement is true, but its converse is false.

6. 080206a
If the area of a square garden is 48 square feet, what is the length, in feet, of one side of the garden?

[A] $4\sqrt{6}$ [B] $12\sqrt{2}$

[C] $16\sqrt{3}$ [D] $4\sqrt{3}$

7. 080207a, P.I. A.A.17
The sum of $\frac{3}{x} + \frac{2}{5}$, $x \neq 0$, is

[A] $\frac{2x+15}{5x}$ [B] $\frac{5}{x+5}$

[C] $\frac{2x+15}{x+5}$ [D] $\frac{1}{x}$

8. 080208a, P.I. 7.N.17
The number 0.14114111411114 . . . is

[A] integral [B] rational

[C] irrational [D] whole

9. 080209a, P.I. A.A.13

When $-2x^2+4x+2$ is subtracted from x^2+6x-4, the result is

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

[C] $-x^2+10x-2$ [D] $-3x^2-2x+6$

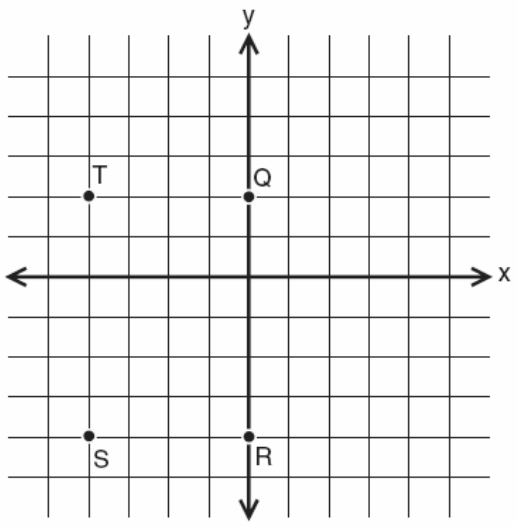
10. 080210a, P.I. 7.N.5

If 0.0347 is written by a scientist in the form 3.47×10^n, the value of *n* is

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

11. 080211a, P.I. G.G.61

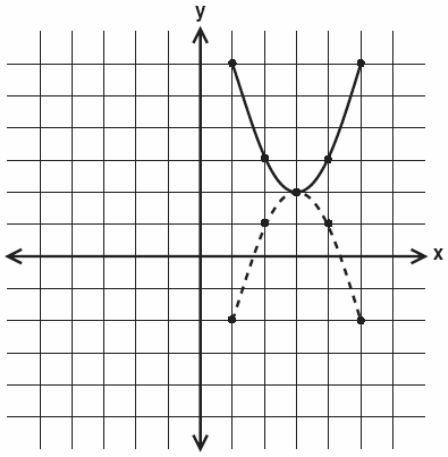
If x = -2 and y = -1, which point on the accompanying set of axes represents the translation $(x,y)\rightarrow(x+2,y-3)$?



[A] *Q* [B] *R* [C] *S* [D] *T*

12. 080212a, P.I. G.G.56

In the accompanying diagram, which transformation changes the solid-line parabola to the dotted-line parabola?



[A] line reflection, only

[B] rotation, only [C] translation

[D] line reflection or rotation

13. 080213a, P.I. A.A.6

How many times larger than $\frac{1}{4}x$ is $5x$?

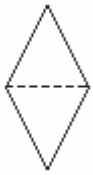
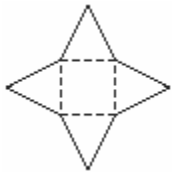
[A] $\frac{5}{4}$ [B] 20 [C] 9 [D] $\frac{4}{5}$

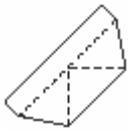
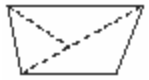
14. 080214a, P.I. G.G.33

If the lengths of two sides of a triangle are 4 and 10, what could be the length of the third side?

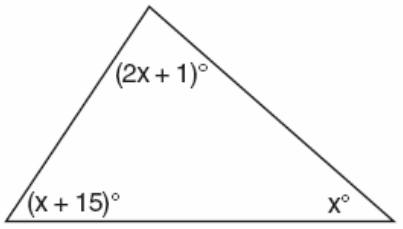
[A] 16 [B] 14 [C] 6 [D] 8

15. 080215a
Which piece of paper can be folded into a pyramid?

[A]  [B] 

[C]  [D] 

16. 080216a, P.I. G.G.30
What is the measure of the largest angle in the accompanying triangle?



[A] 56 [B] 46.5 [C] 83 [D] 41

17. 080217a
M is the midpoint of $\overline{AB}$. If the coordinates of A are (-1,5) and the coordinates of M are (3,3), what are the coordinates of B?

[A] (2,8) [B] (-5,7)

[C] (7,1) [D] (1,4)

18. 080218a, P.I. A.A.23
If $2m + 2p = 16$, p equals

[A] $16 - m$ [B] $9m$

[C] $16 + 2m$ [D] $8 - m$

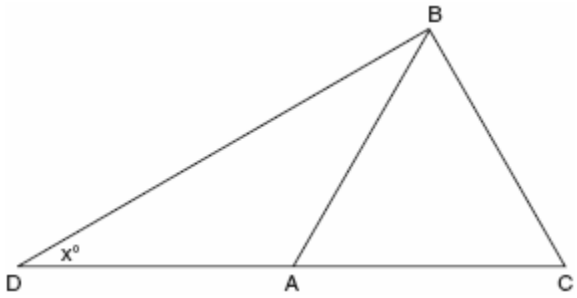
19. 080219a, P.I. A.A.6
If $2x + 5 = -25$ and $-3m - 6 = 48$, what is the product of x and m?

[A] -270 [B] -33 [C] 3 [D] 270

20. 080220a
In the graph of $y \leq -x$, which quadrant is completely shaded?

[A] III [B] I [C] II [D] IV

21. 080221a, P.I. G.G.31
In the accompanying diagram of ΔBCD, ΔABC is an equilateral triangle and $AD = AB$. What is the value of x, in degrees?



22. 080222a, P.I. A.N.1
In the addition table for a subset of real numbers shown below, which number is the inverse of 3? Explain your answer.

⊕	1	2	3	4
1	2	3	4	1
2	3	4	1	2
3	4	1	2	3
4	1	2	3	4

23. 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?

24. 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?

25. 080225a, P.I. A.N.5
In bowling leagues, some players are awarded extra points called their "handicap." The "handicap" in Anthony's league is 80% of the difference between 200 and the bowler's average. Anthony's average is 145. What is Anthony's "handicap"?

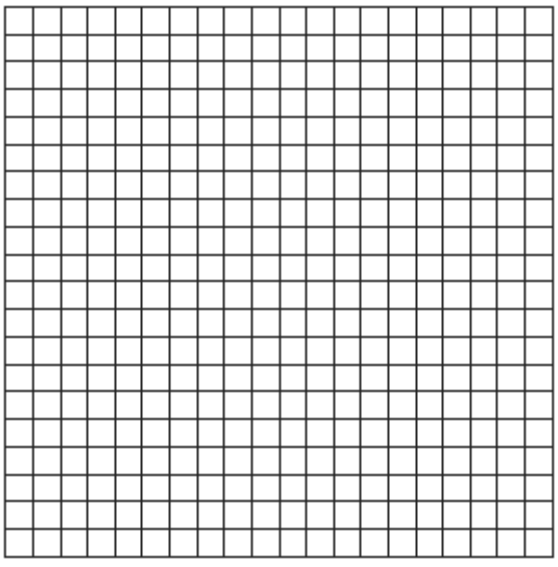
26. 080226a, P.I. A.RP.11
In a telephone survey of 100 households, 32 households purchased Brand A cereal and 45 purchased Brand B cereal. If 10 households purchased both items, how many of the households surveyed did *not* purchase either Brand A or Brand B cereal?

27. 080227a, P.I. A.A.6
Tamika could not remember her scores from five mathematics tests. She did remember that the mean (average) was exactly 80, the median was 81, and the mode was 88. If all her scores were integers with 100 the highest score possible and 0 the lowest score possible, what was the *lowest* score she could have received on any one test?

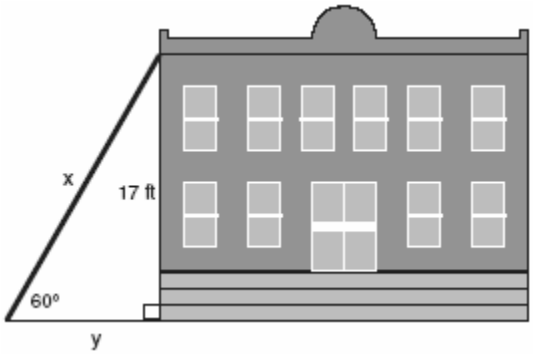
28. 080228a, P.I. A.N.5
There are 28 students in a mathematics class. If $\frac{1}{4}$ of the students are called to the guidance office, $\frac{1}{3}$ of the remaining students are called to the nurse, and, finally, $\frac{1}{2}$ of those left go to the library, how many students remain in the classroom?

29. 080229a, P.I. A2.S.11
On a bookshelf, there are five different mystery books and six different biographies. How many different sets of four books can Emilio choose if two of the books must be mystery books and two of the books must be biographies?

30. 080230a
On the accompanying grid, graph a circle whose center is at (0,0) and whose radius is 5. Determine if the point (5,-2) lies on the circle.



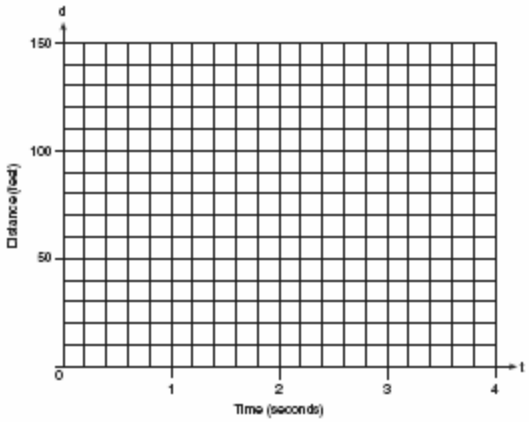
31. 080231a, P.I. A.A.44
In the accompanying diagram, *x* represents the length of a ladder that is leaning against a wall of a building, and *y* represents the distance from the foot of the ladder to the base of the wall. The ladder makes a 60° angle with the ground and reaches a point on the wall 17 feet above the ground. Find the number of feet in *x* and *y*.



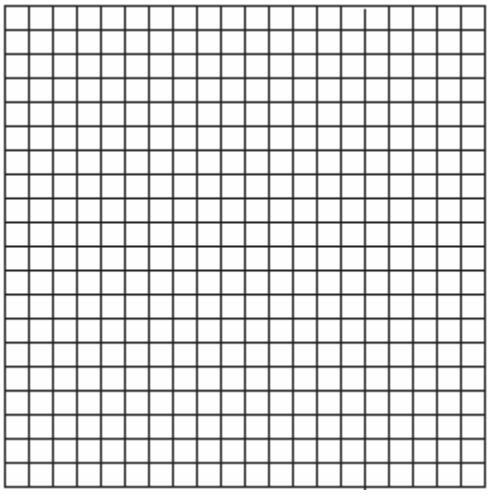
32. 080232a, P.I. A.A.8
A rectangular park is three blocks longer than it is wide. The area of the park is 40 square blocks. If *w* represents the width, write an equation in terms of *w* for the area of the park. Find the length and the width of the park.

33. 080233a, P.I. A.A.7
Tanisha and Rachel had lunch at the mall. Tanisha ordered three slices of pizza and two colas. Rachel ordered two slices of pizza and three colas. Tanisha's bill was $6.00, and Rachel's bill was $5.25. What was the price of one slice of pizza? What was the price of one cola?

34. 080234a, P.I. A.A.27
Greg is in a car at the top of a roller-coaster ride. The distance, *d*, of the car from the ground as the car descends is determined by the equation $d = 144 - 16t^2$, where *t* is the number of seconds it takes the car to travel down to each point on the ride. How many seconds will it take Greg to reach the ground?



35. 080235a, P.I. G.G.68
Determine the distance between point $A(-1,-3)$ and point $B(5,5)$. Write an equation of the perpendicular bisector of $\overline{AB}$. [The use of the accompanying grid is optional.]



[1] B

[2] D

[3] C

[4] A

[5] B

[6] D

[7] A

[8] C

[9] A

[10] C

[11] B

[12] D

[13] B

[14] D

[15] B

[16] C

[17] C

[18] D

[19] D

[20] A

[21]
[2] 30, and appropriate work is shown or an appropriate explanation is given.
[1] Angles of the equilateral triangle are shown to be 60°, but x is not determined or is determined incorrectly.
or [1] 30, but no work is shown or 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 incorrect procedure.

[22]
[2] 1, and an appropriate explanation is given, such as when 1 is added to 3, the result is the identity element, 4; therefore 1 is the inverse of 3.
[1] $1 + 3 = 4$, but the identity element is not identified.
or [1] 4 is identified as the inverse because the identity element and inverse element are confused.
or [1] 1, but 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.

[23]
[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 incorrect procedure.

[24]
[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 incorrect procedure.

[2] 44, and appropriate work is shown, such as 0.8(200 - 145).
[1] Appropriate work is shown, but one computational or conceptual error is made.
or [1] 44, 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] 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.
[26]

[3] 63, and appropriate work is shown, such as 400 - (81 + 88 + 88) and determining the highest and lowest possible scores remaining that total 143.
[2] Appropriate work is shown, but one computational error is made.
[1] A total of 400 is shown, but one conceptual error is made, such as 257 is subtracted, and then 143 is split into 72 and 71, resulting in an answer of 71.
or [1] Appropriate work is shown, but more than one computational error is made.
or [1] No answer or an incorrect answer is found, but a list such as ___, ___, 81, 88, 88 is shown.
or [1] 63, 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.
[27]

[3] 7, and appropriate work is shown or an appropriate explanation is given.
[2] Appropriate work is shown, but one computational error is made.
or [2] No answer or an incorrect answer is found, but $\frac{1}{4}$ of 28 and $\frac{1}{3}$ of 21 are calculated correctly to arrive at 14.
[1] Appropriate work is shown, but more than one computational error is made.
or [1] No answer or an incorrect answer is found, but $\frac{1}{4}$ of 28 is calculated correctly to arrive at 21.
or [1] 7, 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] 150, and appropriate work is shown, such as ${}_5C_2 \bullet {}_6C_2$.
[2] Appropriate work is shown, but one computational error is made.
or [2] All the possible combinations of two mystery books and all the possible combinations of two biographies are calculated, but the answers are not multiplied.
[1] Appropriate work is shown, but more than one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as the computation ${}_{11}C_4 = 330$.
or [1] 150, 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.
[29]

[3] The circle is graphed correctly, and appropriate work shows that (5,-2) does not lie on the circle.
[2] The circle is graphed correctly, but the work fails to show that (5,-2) does not lie on the circle.
[1] The circle is graphed incorrectly, but the location of (5,-2) is determined appropriately, based on the incorrect graph.
[0] Yes or no, 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.

[30]

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[4] $x = 19.62990915$ and $y = 9.814954576$ or equivalent answers, and appropriate work is shown, such as $\sin 60° = \frac{17}{x}$ and $\tan 60° = \frac{17}{y}$ or the Pythagorean theorem.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, and the correct answers are found, but not identified.
[2] Appropriate work is shown, but one conceptual error is made, such as $\sin 60° = \frac{x}{17}$.
or [2] Appropriate work is shown, but more than one computational or rounding error is made.
[1] Appropriate work is shown, but two conceptual errors are made, such as $\sin 60° = \frac{x}{17}$ and $\tan 60° = \frac{y}{17}$.
or [1] $x = 19.62990915$ and $y = 9.814954576$ or equivalent answers, 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]

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[4] $w(w+3) = 40$, width = 5, and length = 8, and appropriate work is shown.
[3] $w(w+3) = 40$ and appropriate work is shown, but one computational error is made in finding the length and width.
or [3] $w(w+3) = 40$ and appropriate work is shown, but only the width is found.
[2] $w(w+3) = 40$ and appropriate work is shown, but the length and width are not identified.
or [2] $w(w+3) = 40$ and appropriate work is shown, but more than one computational error is made in finding the length and width.
or [2] An incorrect equation of equal difficulty is solved appropriately for the length and width.
[1] $w(w+3) = 40$, but no further correct work is shown.
or [1] Appropriate work is shown, but one conceptual error is made, such as solving the equation $2w + 2w + 6 = 40$.
or [1] $w(w+3) = 40$, width = 5, and length = 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.

[32]

[4] $1.50 for one slice of pizza and $0.75 for one cola, and appropriate work is shown, such as $3x + 2y = \$6$ and $2x + 3y = \$5.25$.
[3] Appropriate work is shown, but one computational error is made.
or [3] Appropriate work is shown, but only the price of one slice of pizza or the price of one cola is found correctly.
[2] Appropriate work is shown, but more than one computational error is made.
or [2] An incorrect system of equations of equal difficulty is solved appropriately to calculate the cost of one slice of pizza and one cola.
[1] $1.50 for one slice of pizza and $0.75 for one cola, 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]

[4] 3, and an appropriate algebraic or graphic solution is shown.
[3] The equation is graphed correctly, but the time to reach the ground is not identified.
or [3] Appropriate work is shown for an algebraic solution, but either no solution is found or the negative root is not rejected.
or [3] An appropriate algebraic solution is shown, but one computational error is made.
[2] The equation is graphed incorrectly, but an appropriate time to reach the ground is identified.
or [2] The equation is factored incorrectly, but an appropriate solution is found.
[1] 3, 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]

[4] 10 and $y-1=-\frac{3}{4}(x-2)$ or an equivalent equation, and appropriate work is shown.
[3] Appropriate work is shown, but one computational error is made.
[2] Appropriate work is shown, but more than one computational error is made.
or [2] Appropriate work is shown, but one conceptual error is made in determining the distance or the equation of the line.
or [2] The length, the midpoint, and the slope of $\overline{AB}$ are found correctly, but no equation or an incorrect equation is given for the perpendicular bisector.
or [2] Only a correct equation of the perpendicular bisector is found.
[1] The correct distance is found, but no attempt is made to find the equation of the perpendicular bisector.
or [1] The midpoint and slope of $\overline{AB}$ are found correctly, but no further correct work is shown.
or [1] The slope of $\overline{AB}$ and the slope of the perpendicular bisector are calculated correctly.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[35]