For each question, choose "E" if none of the listed answers is correct.

1. The distance betwe	een the points $(-5,4)$	(-2) and $(7, -5, 6)$ is	closest to which integer?
A. 15	B. 16	C. 17	D. 18

- 2. Line *b* has equation 2x y = 7. Find the equation of line *a*, which is perpendicular to line *b* and passes through (2,3).
 - A. x + 2y = 13 B. x + 2y = 8 C. x 2y = 13 D. x 2y = 8

3. Points A, B, and P have coordinates (2, 3), (8, 12), and (x, y), respectively. If point P is on line segment \overline{AB} such that AP:PB = 2:3, then what is the value of $\frac{x}{a}$?

A.
$$\frac{1}{2}$$
 B. $\frac{1}{4}$ C. $\frac{2}{3}$ D. $\frac{3}{4}$

4. Consider the circle $x^2 + y^2 = 25$ and a line tangent to this circle at the point (3, 4). What is the area enclosed by the triangle formed by the x-axis, the y-axis, and this tangent line?

A. $\frac{325}{24}$	B. $\frac{625}{24}$	C. $\frac{325}{12}$	D. $\frac{625}{12}$

5. Point A is the midpoint of \overline{MO} . If M and O have coordinates (-2,5) and (3,3), respectively, then what are the sum of the coordinates of Point A?

A. $\frac{3}{2}$	B. $\frac{9}{2}$	C. $\frac{13}{2}$	D. 5
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6. The distance from	(x, 2) to $(-5, x)$ is 13.	Find the product of the	ne possible x-values.
A70	B75	C140	D150

For questions 7 and 8, use the ΔABC with coordinates A(2, 8), B(-6, 9), and C(-8, -8). 7. Find the length of median \overline{BE} .

$A.2\sqrt{17}$	B. 3√10	C. √95	D. 9√2

8. If D is the centroid of \triangle ABC, then what is the length of \overline{DC} ? A. $\sqrt{97}$ B. $\sqrt{105}$ C. $\sqrt{137}$ D. $\sqrt{265}$

9. A rectangular region is bounded by the lines x = -3, y = 13, x = 7, and y = 5, while a circular region is described by $x^2 + y^2 - 24x + 10y + 153 = 0$. What is the slope of a single line which divides both of these regions into two congruent pieces each?

A.
$$-\frac{7}{5}$$
 B. $-\frac{5}{7}$ C. $\frac{7}{5}$ D. $\frac{5}{7}$

10. A quadrilateral has vertices A(-3, -1), B(1,7), C(5,5), and D(1, -3). What is the most precise name for this quadrilateral?

A. Parallelogram B. Rectangle C. Rhombus D. Square

11. What is the shortest distance from the point (2, -5) to the line 3x + 4y + 14 = 0? A. $\frac{2\sqrt{5}}{5}$ B. $\frac{18\sqrt{5}}{5}$ C. $\frac{2}{5}$ D. $\frac{18}{5}$ 12. Points H(-1,0), J(3, -5), and K(1,4) are the midpoints of the sides of Δ XYZ. If the coordinates of X, Y, and Z are (a, b), (c. d), and (e, f), then what is the value of a + b + c + d + e + f? A. 2 B. 4 C. 6 D. 8

13. Quadrilateral ABCD has coordinates A(0,0), B(6,1), C(6,3), and D(-2,5). Find the coordinates of a point P that minimizes the sum AP + BP + CP + DP.

A. $\left(\frac{5}{2}, \frac{9}{4}\right)$ B. $\left(\frac{1}{2}, \frac{5}{2}\right)$ C.(4,2) D. (2,4)

14. Cali has begun to form a triangle by choosing vertices at (5, -1) and (-3,5). She asks Valentina for a third ordered pair to complete her triangle. As it turns out, Valentina suggests a point (a, b) which doesn't complete a triangle at all. What is the value of 3a + 4b?

A. 11 B.	$3\sqrt{41}$	C. $\sqrt{269}$	D. 17
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15. After the epic fail Valentina had in the previous problem, she recovers by selecting a different point (x, y) to complete the triangle (using her new point and Cali's two points), and chooses a point which actually makes the triangle a right triangle. Which is the most accurate description of the locus of points in the Cartesian plane from which Valentina could have chosen her new point?

A. A Line	B. Two parallel lines
C. Two perpendicular lines	D. A circle and two parallel lines

16. A regular octagon ABCDEFGH has vertices A(1,0) and B(5,0). If the coordinates of vertices E and F are (h, i) and (j, k) respectively, then find the value of the product hijk.

A. 640	В. 320	$C.240 + 160\sqrt{2}$	D. 160 + 160 $\sqrt{2}$

17. Carlos begins a journey at the origin on the coordinate plane. He heads east one unit, north 2 units, west 3 units, south four units, and progresses each time traveling exactly 1 more unit than the previous segment after turning 90° counterclockwise. What are Carlos's coordinates at the moment he has travelled a total of 2016 units?

A. (-32, -31) B. (-32, -30) C.(-31, 32) D. (-32, 32)

18. ΔXYZ consists of vertices X(0,15), Y(0,0), and point Z on the positive x-axis. Let *n* be the value of the greatest possible x-coordinate for the point Z such that the perimeter of ΔXYZ does not exceed 60. What is the sum of the digits of the number *n*?

A. 1 B. 2 C. 3 D. 10 19. The circles $(x - 3)^2 + (y + 2)^2 = 90$ and $(x + 5)^2 + (y - 3)^2 = 91$ intersect at points A and B. Find the slope of \overline{AB} . A. -2 B. $-\frac{3}{4}$ C. $\frac{4}{5}$ D. $\frac{8}{5}$

20. How many lattice points (points with integer coordinates) are in the region $x^2 + y^2 \le 19$? A. 56 B. 57 C. 60 D. 61 21. Rocco is building a linear fence on his ranch. The grid location of the first post he installs is at (-3, -8), and the fifth post he installs is found at (9,12). If he continues in the same direction, always maintaining equal spacing between posts, then what are the coordinates of the 63^{rd} post Rocco installs?

A. (180,297) B. (183,302) C. (186,307) D. (189,312)

22. A concrete plant is located at the point (18, 2). A job site is located at (6, 10). After leaving the concrete plant, the concrete truck must stop somewhere along the x-axis to get sand and somewhere along the y-axis to get water before going to the job site. The driver wants to minimize the total distance traveled, so he stops at (a, b) to get sand, and stops at (c, d) to get water. What is the value of a + b + c + d?

23. Yorly plays a game where she begins at point A_1 with coordinates (2015,2016). She then progresses from point $A_n(x_n, y_n)$ to the point $A_{n+1}(x_{n+1}, y_{n+1})$ using the following rules for coordinates:

a.) if x_n is even, then $x_{n+1} = \frac{x_n}{2}$,

b.) if
$$x_n$$
 is odd, then $x_{n+1} = 2x_n$,

c.) if
$$y_n$$
 is even, then $y_{n+1} = \frac{y_n}{2}$

d.) if y_n is odd, then $y_{n+1} = 2y_n$.

What are Yorly's coordinates when she is standing at point A_{2016} ?

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A. (4030,63)B. (4030,126)C.(2015,63)D. (2015,126)
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24. Three consecutive vertices of a convex kite ABCD are A(-1,5), B(2,4), and C(3,1). What are the coordinates of the fourth vertex, given that the area enclosed by the kite is 32 square units?

A. (-4, -2) B. (-7, -5) C. (-5, -3) D. (-6, -4)

25. A region is bounded by the lines y = 0, x = -1, x = 2, and 2x + 3y = 13, and this region is revolved about the line x = 2. What is the volume of the resulting solid? A. 52π B. 45π C. 39π D. 33π

26. If the same region described in problem 25 was revolved instead about the line y = 0, then what is the volume of the resulting solid?

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A. \frac{117\pi}{4} B. 49\pi C. 52\pi D. 147\pi
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27. Jonathan and Charlie are known to ride their bikes at an equal speed of $8\sqrt{5}$ miles per hour. Jonathan leaves the point (-1,6) at the same moment Charlie leaves the point (3, -2), and they are both headed for the point (-3, -5). To the nearest minute, how many minutes will Charlie have to wait on Jonathan before he arrives? Assume a unit scale on either axis is equivalent to one mile.

A. 8 B. 15 C. 18 D. 23

28. Find the degree measure of the acute angle between the lines x - 2y = 5 and x + 3y = 5.

A.22 $\frac{1}{2}$ B.3	c.52	$2\frac{1}{2}$ C	D. 45
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29. Given two circles of radius length 4 centered at (3,0) and (19,0), there is one tangent line drawn that is tangent to both of these two circles which also intersects the positive x-axis and the positive y-axis. If the equation of this tangent line is written in the form Ax + 3y = C where A and C are real numbers, what is the value of the product 3AC?

A. 99 B. 3	3 C.99 $\sqrt{3}$	D. 33√3
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30. Consider A(4,4), B(0,8) and the line 3x - 4y = 0. If point C(x, y) is on line segment \overline{AB} such that the distance from C to the given line is exactly 3, then find the value of $\frac{y}{x}$.

A. $\frac{59}{47}$	B. $\frac{47}{59}$	C. $\frac{17}{39}$	D. $\frac{39}{17}$
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