UNIT 5 EXERCISES 11-15

CO-ORD

2011B

11. A frog located at (x, y), with both x and y integers, makes successive jumps of length 5 and always lands on points with integer coordinates. Suppose that the frog starts at $(0, 0)$ and ends at $(1, 0)$. What is the smallest possible number of jumps the frog makes?

(A) 2 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 6

2015B

11. The line $12x + 5y = 60$ forms a triangle with the coordinate axes. What is the sum of the lengths of the altitudes of this triangle?

(A) 20 **(B)** $\frac{360}{17}$ **(C)** $\frac{107}{5}$ **(D)** $\frac{43}{2}$ **(E)** $\frac{281}{13}$

2016B

11. How many squares whose sides are parallel to the axes and whose vertices have coordinates that are integers lie entirely within the region bounded by the line $y = \pi x$, the line $y = -0.1$, and the line $x = 5.1$?

(A) 30 **(B)** 41 **(C)** 45 **(D)** 50 **(E)** 57

1999

12. What is the maximum number of points of intersection of the graphs of two different fourth degree polynomial functions $y = p(x)$ and $y = q(x)$, each with leading coefficient 1?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 8

2004A 12. Let $A = (0, 9)$ and $B = (0, 12)$. Points A' and B' are on the line $y = x$, and $\overline{AA'}$ and $\overline{BB'}$ intersect at $C = (2, 8)$. What is the length of $\overline{A'B'}$?

(A) 2 **(B)** $2\sqrt{2}$ **(C)** 3 **(D)** $2 + \sqrt{2}$ **(E)** $3\sqrt{2}$

2005A 12. A line passes through $A(1, 1)$ and $B(100, 1000)$. How many other points with integer coordinates are on the line and strictly between A and B?

(A) 0 **(B)** 2 **(C)** 3 **(D)** 8 **(E)** 9

2012A 12. A square region $ABCD$ is externally tangent to the circle with equation $x^2+y^2 = 1$ at the point $(0, 1)$ on the side CD. Vertices A and B are on the circle with equation $x^2 + y^2 = 4$. What is the side length of this square?

(A) $\frac{\sqrt{10}+5}{10}$ **(B)** $\frac{2\sqrt{5}}{5}$ **(C)** $\frac{2\sqrt{2}}{3}$ **(D)** $\frac{2\sqrt{19}-4}{5}$ **(E)** $\frac{9-\sqrt{17}}{5}$

2015A 12. The parabolas $y = ax^2 - 2$ and $y = 4 - bx^2$ intersect the coordinate axes in exactly four points, and these four points are the vertices of a kite of area 12. What is $a + b$?

(A) 1 **(B)** 1.5 **(C)** 2 **(D)** 2.5 **(E)** 3

2001 13. The parabola with equation $y = ax^2 + bx + c$ and vertex (h, k) is reflected about the line $y = k$. This results in the parabola with equation $y = dx^2 + ex + f$. Which of the following equals $a + b + c + d + e + f$?

(A) $2b$ **(B)** $2c$ **(C)** $2a + 2b$ **(D)** $2h$ **(E)** $2k$

2004A 13. Let S be the set of points (a, b) in the coordinate plane, where each of a and b may be -1, 0, or 1. How many distinct lines pass through at least two members of S?

(A) 8 **(B)** 20 **(C)** 24 **(D)** 27 **(E)** 36

2007A

13. A piece of cheese is located at $(12, 10)$ in a coordinate plane. A mouse is at $(4, -2)$ and is running up the line $y = -5x + 18$. At the point (a, b) the mouse starts getting farther from the cheese rather than closer to it. What is $a + b$?

(A) 6 **(B)** 10 **(C)** 14 **(D)** 18 **(E)** 22

2010A

13. For how many integer values of k do the graphs of $x^2 + y^2 = k^2$ and $xy = k$ not intersect?

(A) 0 **(B)** 1 **(C)** 2 **(D)** 4 **(E)** 8

2013A

13. Let points $A = (0, 0)$, $B = (1, 2)$, $C = (3, 3)$, and $D = (4, 0)$. Quadrilateral $ABCD$ is cut into equal area pieces by a line passing through A. This line intersects $\overline{CD}$ at point $(\frac{p}{q}, \frac{r}{s})$, where these fractions are in lowest terms. What is $p + q + r + s$?

(A) 54 **(B)** 58 **(C)** 62 **(D)** 70 **(E)** 75

2008A

14. What is the area of the region defined by the inequality $|3x-18|+|2y+7|\le 3$?

(A) 3 **(B)** $\frac{7}{2}$ **(C)** 4 **(D)** $\frac{9}{2}$ **(E)** 5

2009A

14. A triangle has vertices $(0,0)$, $(1,1)$, and $(6m,0)$, and the line $y=mx$ divides the triangle into two triangles of equal area. What is the sum of all possible values of m?

(A) $-\frac{1}{3}$ **(B)** $-\frac{1}{6}$ **(C)** $\frac{1}{6}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{1}{2}$