UNIT 22 EXERCISES 11-15

QUAD/POLY

2006A 11. Which of the following describes the graph of the equation $(x+y)^2 = x^2 + y^2$?

(A) the empty set **(B)** one point **(C)** two lines **(D)** a circle

(E) the entire plane

2002A 12. Both roots of the quadratic equation $x^2 - 63x + k = 0$ are prime numbers. The number of possible values of k is

(A) 0 **(B)** 1 **(C)** 2 **(D)** 4 **(E)** more than four

2005B 12. The quadratic equation $x^2 + mx + n = 0$ has roots that are twice those of $x^2 + px + m = 0$, and none of m, n and p is zero. What is the value of n/p?

(A) 1 **(B)** 2 **(C)** 4 **(D)** 8 **(E)** 16

2006B 12. The parabola $y = ax^2 + bx + c$ has vertex (p, p) and y-intercept $(0, -p)$, where $p \neq 0$. What is b?

(A) $-p$ **(B)** 0 **(C)** 2 **(D)** 4 **(E)** p

2015B

12. Let a, b, and c be three distinct one-digit numbers. What is the maximum value of the sum of the roots of the equation $(x-a)(x-b)+(x-b)(x-c)=0$?

(A) 15 **(B)** 15.5 **(C)** 16 **(D)** 16.5 **(E)** 17

2017B

12. What is the sum of the roots of $z^{12}=64$ that have a positive real part?

(A) 2 **(B)** 4 **(C)** $\sqrt{2}+2\sqrt{3}$ **(D)** $2\sqrt{2}+\sqrt{6}$

(E) $(1+\sqrt{3})+(1+\sqrt{3})i$

2012B

13. Two parabolas have equations $y=x^2+ax+b$ and $y=x^2+cx+d$, where a, b, c, and d are integers (not necessarily different), each chosen independently by rolling a fair six-sided die. What is the probability that the parabolas have at least one point in common?

(A) $\frac{1}{2}$ **(B)** $\frac{25}{36}$ **(C)** $\frac{5}{6}$ **(D)** $\frac{31}{36}$ **(E)** 1

2005B 14. A circle having center $(0, k)$, with $k > 6$, is tangent to the lines $y = x$, $y = -x$ and $y = 6$. What is the radius of this circle?

(A) $6\sqrt{2} - 6$ **(B)** 6 **(C)** $6\sqrt{2}$ **(D)** 12 **(E)** $6 + 6\sqrt{2}$

2007A 14. Let a, b, c, d, and e be distinct integers such that

$$(6 - a)(6 - b)(6 - c)(6 - d)(6 - e) = 45.$$

What is $a + b + c + d + e$?

(A) 5 **(B)** 17 **(C)** 25 **(D)** 27 **(E)** 30