1. For the line with equation $2x + 3y = 6$, let m be its slope, and b its y-intercept. Which equation below represents a line with slope b and y-intercept m?

A. $6x - 3y = 2$ B. $3x - 6y = 2$ C. $3y - 6x = 2$ D. $6y - 3x = 2$ E. $3x + 6y = 2$

2. If $f(x) = x^2 - x$ and $g(x) = x + 2$, what is the value of $g(f(-4)) - f(g(-4))$?

A. 0 B. 16 C. -16 D. 12 E. -12

3. A rhombus is a parallelogram with four equal sides. In rhombus ABCD, $m\angle A = 50°$. Then $m\angle BDC =$

A. 65° B. 55° C. 50° D. 40° E. not enough information to find it

4. Bread A has 1 g of fiber and 4 g of protein per slice, while Bread B has 2 g of fiber and 3 g of protein per slice. How many slices of bread must you eat to get exactly 16 g of fiber and 39 g of protein?

A. 9 B. 10 C. 11 D. 12 E. 13

5. What is $\log_8 128$?

A. 2 B. $2\frac{1}{7}$ C. $2\frac{1}{4}$ D. $2\frac{1}{3}$ E. $2\frac{1}{2}$

6. How many diagonals of the regular decagon JKLMNOPQRS do not intersect diagonal JN?

A. 6 B. 7 C. 10 D. 13 E. 19

7. Let P be the point of intersection of the lines with equations $2x + 3y = 1$ and $3x - 2y = 21$. What is the equation of the line passing through P and the origin?

A. $3x + 5y = 0$ B. $5x + 3y = 0$ C. $3x - 5y = 0$ D. $5x - 3y = 0$ E. There is no such line

8. One stamp is randomly selected from a 10x10 sheet of stamps. What is the probability that the stamp is not on the border?

A. 0.36 B. 0.40 C. 0.60 D. 0.64 E. 0.81

9. Each letter of the alphabet is translated to its position in the alphabet (so that A becomes 1, B becomes 2, etc), the resulting numbers are substituted into the function $f(x) = |x - 12.5| + 0.5$, and these numbers are translated back into letters. What does AMATYC become?

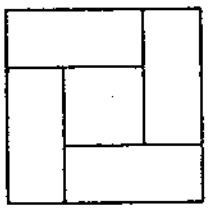
10. Which of the following functions has the same graph as $y = 2\cos x$?

A. $y = \cos 2x$ B. $y = 2\sin\left(x - \frac{\pi}{2}\right)$ C. $y = 2\sin\left(x + \frac{\pi}{2}\right)$ D. $y = 2\sin(x - \pi)$ E. $y = 2\sin(x + \pi)$

11. How many two-digit numbers (first digit not zero) are divisible by the sum of their digits?

A. 10 B. 15 C. 16 D. 23 E. 24

12. Four congruent rectangles are arranged as in the picture to form a square. If the perimeter of one of the rectangles is 20, what is the area enclosed by the square formed by the outside edges of the rectangles?



A. 20 B. 50 C. 64 D. 80 E. 100

13. If $(2^{2002})(5^{2005})$ is written in standard form, what is the sum of its digits?

A. 1 B. 5 C. 7 D. 8 E. 13

14. A standard deck of 52 playing cards (26 red, 26 black) is separated into two piles. The first pile contains 7 times as many black cards as red cards. The second pile contains a number of red cards which is an integer multiple of the number of black cards in the second pile. How many red cards are in the second pile?

A. 2 B. 12 C. 14 D. 16 E. 24

15. Eighty people are trapped in a ski lodge. They have enough food to last eight days. It takes five days to reach help (and five days for help to get back to the lodge). What is the fewest number of people to send for help (with sufficient food) so that those staying behind will be rescued before food runs out?

A. 10 B. 16 C. 20 D. 24 E. 32

16. The 3-digit numbers x and y (first digits not zero) have the property that the digits of y are the digits of x in reverse order. If $z = x + y$, how many different values of z are possible?

A. 140 B. 150 C. 160 D. 170 E. 180

17. Let $f(x) = \frac{(x^m - 1)}{(x^n - 1)}$ be the function with the smallest integer values of m and n such that f(x) has a vertical asymptote at $x = -1$, a hole at $x = 1$ and a slant (oblique) asymptote at $y = x$. What is the product mn ?

A. 2 B. 3 C. 6 D. 8 E. 12

18. Let ABCD be a square with sides of length 30, let M be the midpoint of side AB, and E be the point where $\overline{DM}$ intersects $\overline{AC}$. What is the area contained in quadrilateral BCEM ?

A. 300 B. 325 C. 350 D. 375 E. 400

19. The parabola with equation $y = x(r - x)$ is tangent to the parabola with equation $y = x^2 + 10$ in the first quadrant. What is r?

A. $\frac{44}{5}$ B. $4\sqrt{5}$ C. 9 D. $5\sqrt{3}$ E. $\frac{25\sqrt{2}}{4}$

20. Triangle ABC has vertices A(0,0) and B(1,0), and vertex C lies on the circle whose equation is $x^2 + (y - 2)^2 = 1$. Let m be the smallest possible area of such a triangle and M the largest possible area. What is true about the product mM?

A. $mM \le 1/2$ B. $1/2 < mM \le 1$ C. $1 < mM \le 1.5$ D. $1.5 < mM \le 2$ E. $mM > 2$