1. During registration a student discovers that he may register for a Mathematics class at the hours of 8:00, 10:00, or 11:00; English at 9:00, 10:00, or 11:00; and Science at 8:00, 10:00, or 11:00. In how many different ways can he schedule the three courses?

(A) 12

(B) 27

(C) 15

(D) 18

(E) 10

2. Where is a root of the equation . Another of its roots is

(A) 4*i*

(B)

(C)

(D)

(E)

3.

(A)

(B)

(C)

(D)

(E) None of (A) through (D)

4. The value of the product

(A)

(B) .505

(C)

(D)

(E)

5. Bob starts from the east end and Jane from the west end of a swimming pool, and both swim two lengths of the pool at constant rates. They pass each other twice, each time going in opposite directions. The first time they pass they are 20 feet from the east end, and the second time they are 18 feet from the west end. Assuming that each made an instantaneous turn when they reached an end of the pool, how long is the pool, in feet?

(A) 36

(B) 38

(C) 40

(D) 42

(E) 44

6.

(A)

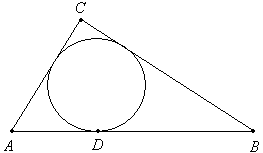
(B)

(C)

(D)

(E)

7. A circle is inscribed in right triangle *ABC*, where the right angle is at point *C*. The circle is tangent to the segment *AB* at *D* and the lengths of the segments *AD* and *DB* are 7 and 13, respectively. Find the area of the triangle.



(A) 91

(B) 96

(C) 100

(D) 104

(E) 109

8. For each positive integer *n*, define . What is the value of ?

(A) 4

(B) 8

(C) 9

(D) 10

(E) 100

9. If (*x*, *y*) is a point on the circle *x*2+*y*2= 1 and the distance from (*x*, *y*) to (0, 1) is , then *y* =

(A) 0.28

(B) 0.25

(C)

(D) 0.24

(E) 0.2

10. The area of the region consisting of those points (*x*, *y*) for which and

is

(A) 2

(B) *π*-2

(C) 1.5

(D) 0.5*π*-1

(E) 1

11. The numbers 1, 2, 3, …, 100 are written on 100 cards with one number on each card. The cards are placed into a hat, and one card is selected. The sizes and shapes of the cards are such that the probability of having selected the card labeled with the number *n* is equal to *n* times the probability of having selected the card labeled 1.What is the probability that the card labeled 50 was selected?

(A)

(B)

(C)

(D)

(E)

12. A tank has three independent inlet pipes, *A*, *B*, and *C*. *A* and *B* will fill the tank in *z* minutes; *A* and *C* will fill the tank in *y* minutes; and *B* and *C* will fill the tank in *x* minutes. How long will it take for pipe *A* alone to fill it?

(A)

(B)

(C)

(D)

(E)

13. A triangle has sides of lengths 1, 2, and . The measure in radians of the angle opposite the side of length is

(A)

(B)

(C)

(D)

(E)

14. The largest integer that is less than is

(A) 250

(B) 250+10

(C) 250+100

(D) 250+1000

(E) 250+105-1

15. When expanded, the product can be written as . The value of is

(A) 11!

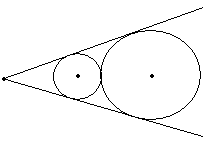
(B) 11!-9!

(C) 27(9!)

(D)

(E)

16. Two circles, one of radius 8 and one of radius 18, are tangent (i.e., they intersect at exactly one point). There are two lines each of which is tangent to both circles, as shown in the diagram. The distance from the intersection of these lines to the center of the circle with radius 8 is



(A) 16.2

(B) 18.5

(C) 20.8

(D) 22.6

(E) 24.4

17. The value of sin705 is

(A)

(B)

(C)

(D)

(E)

18. The 9 numbers 1, 2, 3, …, 9 are put into a 3×3 array so that each number occurs exactly once. The probability that the sum of the numbers in at least one horizontal row is greater than 21 is

(A)

(B)

(C)

(D)

(E)

19. A bag contains 5 red marbles and 5 green marbles. One marble is drawn, its color recorded, and then placed back into the bag. This process is repeated until a green marble is found. Given that the first green marble is found on an odd-numbered draw, what is the probability that it is found on the fifth draw?

(A)

(B)

(C)

(D)

(E)

20. How many incongruent trapezoids *ABCD* with side *AB* parallel to side *CD* have sides of lengths *AB* = 16, *BC* = 13, *CD* = 10, and *DA* = 6?

(A) 0

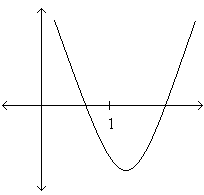
(B) 1

(C) 2

(D) 3

(E) Infinitely many

21. Suppose the graph of *y* = *ax*2+*bx*+*c* is as shown. Then among the expressions *ab*, *ac*, *b*, *a*+*b*+*c*, *a*-*b*+*c* how many are positive?



(A) 1

(B) 2

(C) 3

(D) 4

(E) 5

22. For each positive integer *n*, let Then for *n* ≥ 7,

(A) *n*

(B) *n*+1

(C) *n*-1

(D) *n*+2

(E) *n*-1

23. A point *P* and a circle *C* of radius 5 lie in a plane. The shortest distance from *P* to *C* is 8. A line passing through *P* intersects *C* at exactly one point *X*; a second line passing through *P* intersects *C* at exactly one point *Y*. What is the distance from *X* to *Y*?

(A)

(B) 9

(C) 8

(D)

(E)

24. Suppose *ABCD* is a quadrilateral, inscribed in a circle. Then among the following identities: sin*A* = sin*C*

sin*A*+sin*C* = 0

cos*B*+cos*D* = 0

cos*B* = cos*D*

How many are always true?

(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

25. A particle moves inside the square with vertices *A* = (0, 0), *B* = (1, 0), *C*= (1, 1), and *D* = (0, 1). It begins at the point , travels to some point on the edge , then travels to some point on the edge , then travels to some pointontheedge , and then travels to the point (, 0). The minimum distance the particlecould have travelled on such a journey is

(A)

(B)

(C)

(D) 3

(E) None of these

26. The graph of the ellipse is rotated clockwise around the origin by an angle of radians. The equation of the resulting graph can be written in the form . The value of *a* is

(A) 1

(B) -2

(C) 4

(D) 8

(E) 13

27. For the equation which of the following is a correct statement?

(A) It does not have any real roots

(B) It has an integer root

(C) It has a positive root

(D) The sum of the reciprocals of the roots is less than -1

(E) None of (A) through (D) is correct

28. Suppose that *n* is a positive integer having exactly 5 digits and that no two of the 5 digits are the same. Then must be divisible by which of the following?

(A) 5

(B) 7

(C) 8

(D) 9

(E) None of (A) through (D)

29. If *S* is a set of positive integers ≤ 100 with no two distinct elements of *S* summing to an element of {7, 12, 33, 45, 69, 81}, then the maximum number of elements *S* can have is

(A) 56

(B) 60

(C) 64

(D) 65

(E) 68

30. Let *S* be the set of positive integers that divide at least one of the numbers 1, 11, 111, 1111, ... For example, 3 is in *S* since 3 divides 111. The number of elements in *S* that are less than 100 is

(A) 22

(B) 28

(C) 34

(D) 40

(E) 48