1. Two successive discounts of 10% have the same effect as a single discount of

(A) 18%

(B) 19%

(C) 20%

(D) 21%

(E) 22%

2. If *x*+2*y* = 11 and 3*x*+*y* = 13, then *x*+*y* =

(A) 3

(B) 4

(C) 5

(D) 6

(E) 7

3. A pair of fair dice is thrown. What is the probability that the two numbers that appear differ by exactly 2?

(A)

(B)

(C)

(D)

(E)

4. If 2*a* = 5 and 2*b* = 3, then =

(A)

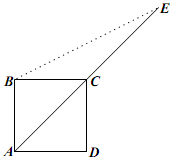
(B)

(C)

(D)

(E)

5. The area of the square *ABCD* is 1. Diagonal *AC* is extended its own length to the point *E*, so that *C* is the midpoint of segment *AE*. Find the length of segment *BE*.



(A)

(B) 2

(C)

(D)

(E)

6. Suppose that . Then

(A) 9

(B) 15

(C) 18

(D) 24

(E) 27

7. Find the sum of the infinite series

(A)

(B)

(C)

(D)

(E)

8. For all real numbers *x*, the function *f*(*x*) satisfies . Find *f*(5).

(A) 4

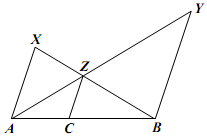
(B)

(C) 8

(D)

(E) 12

9. In the diagram below, the line segments *AX* and *BY* are parallel to the segment *CZ*. If the length of *AX* is 4 and the length of *BY* is 6, then the length of *CZ* is



(A)

(B)

(C)

(D)

(E)

10. If *a* is a solution to *x*2-*x*-1 = 0, what is the value of *a*6-2*a*5+*a*3+5?

(A) 0

(B) 1

(C) 3

(D) 5

(E) 9

11. Find the number of times between 1 o'clock and 4 o'clock when the hour hand is perpendicular to the minute hand.

(A) 2

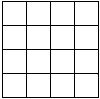
(B) 3

(C) 4

(D) 5

(E) 6

12. Suppose that the squares in the array below are filled with the integers 1 through 16 so that each integer is used just once. Suppose further that every row and every column in the resulting array has the same sum. What is this common sum?



(A) 33

(B) 34

(C) 35

(D) 38

(E) 37

13. On the set *N* = {0, 1, 2, …} of natural numbers, an operation \* is defined by *a*\**b* = . Which of the following properties is true about the system *N* coupled with \*?

*A*. The operation \* is commutative.

*B*. The operation \* is associative.

*C*. There is an identity element.

*D*. Each element has an inverse.

(A) Only *A*

(B) Only *C* and *D*

(C) Only *A*, *B*, and *C*

(D) Only *A*, *C*, and *D*

(E) *A*, *B*, *C*, and *D*

14. Find the number of ordered pairs (*x*, *y*), with *x* and *y* both integers, that satisfy the equation

*x*2-4*y*2 = -3.

(A) 0

(B) 2

(C) 3

(D) 4

(E) 6

15. Two circular disks, each of radius 1 cm, are centered at points *A* and *B*, respectively. The distance between *A* and *B* is cm. Find the area ofthe intersection of the two disks, in cm2.

(A)

(B)

(C)

(D)

(E)

16. A circular lighthouse floor has a circular rug in the center. The lighthouse keeper observes that if he places a 10-foot pole on the floor so that each end touches the wall, then it is tangent to the rug. Find the area of the floor that is not covered by the rug.



(A) 5*π*

(B) 15*π*

(C) 20*π*

(D) 25*π*

(E) 100*π*

17. In the expansion , the sum

(A) 256

(B) 512

(C) 528

(D) 540

(E) 1024

18. Which equation describes a hyperbola with an asymptote of slope 2?

(A)

(B)

(C)

(D)

(E)

19. Find the value of .

(A)

(B)

(C) 2

(D) 3

(E)

20. Suppose that we label each of 8 cards with +1 on one side and -1 on theother. The cards are randomly dealt onto a table, so that either side ofeach card is equally likely to be facing up. Let *x*be the absolute value of the sum of the numbers that are facing up. The most likely value of *x* is

(A) 0

(B) 2

(C) 4

(D) 6

(E) 8

21. If John gets a 97 on his next math test, his average will be 90. If he gets 73, his average will be 87. How many tests has John already taken?

(A) 3

(B) 4

(C) 5

(D) 6

(E) 7

22. The largest integer *n* such that 2*n* divides 179-99 is

(A) 3

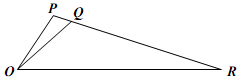
(B) 4

(C) 5

(D) 6

(E) 7

23. In the triangle below, angle *POR* is 60. Assume that the line segments *OQ* and *QR* have the same length, and line segments *OP* and *PQ* have the same length. Find the angle *QRO*.



(A) 18

(B) 20

(C) 22.5

(D) 26

(E) 30

24. Find the sum of the following finite series, , whose *n*th term is .

(A) 3

(B) 3.8

(C) 4

(D) 4.6

(E) 4.8

25. What is the radius of the circle which circumscribes a triangle with sides of lengths 2, 3, and 4?

(A)

(B)

(C)

(D) 2.5

(E) 2.25

26. How many permutations of the numbers 1, 2, 3, 4, 5, 6, 7 have 1 somewhere to the left of 2, 2 somewhere to the left of 3, and 3 somewhere to the left of 4?

(A) 100

(B) 180

(C) 200

(D) 210

(E) 230

27. If *r*, *s*, and *t* are the complex roots of the equation then *r*2+*s*2+*t*2 =

(A) -6

(B) 6

(C) -4

(D) 4

(E) 2

28. For each real number *x*, let *f*(*x*) be the minimum of the numbers 4*x*+1, *x*+2, and -2*x*+4. Then the maximum value of *f*(*x*) is

(A) 2

(B)

(C)

(D)

(E) 3

29. Find the product cos(20) cos(40) cos(80).

(A)

(B)

(C)

(D)

(E) None of these

30. A number *m* = 111…11 consists entirely of 1's in its decimal representation, and is divisible by 13. Which number below need not divide *m*?

(A) 3

(B) 7

(C) 11

(D) 17

(E) 37