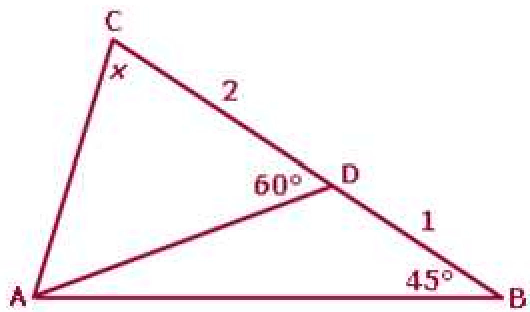


1. In the figure, point D divides side BC of triangle ABC into segments BD and DC of lengths 1 and 2 units respectively. Given that ÐADC = 60° and ÐABD = 45°, what is the measure of angle x in degrees?

A. 55

B. 60

C. 70

D. 75

E. 90

2. If two integers are chosen at random out of the set {2, 5, 7, 8}, what is the probability that their product will be of the form a^2 – b^2, where a and b are both positive integers?

A. 2/3

B. 1/2

C. 1/3

D. 1/4

E. 1/6

3. If the product of all the unique positive divisors of n, a positive integer which is not a perfect cube, is n^2, then the product of all the unique positive divisors of n^2 is

(A) n^3

(B) n^4

(C) n^6

(D) n^8

(E) n^9

4. The sum of four consecutive odd numbers is equal to the sum of 3 consecutive even numbers. Given that the middle term of the even numbers is greater than 101 and lesser than 200, how many such sequences can be formed?

(A) 12

(B) 17
(C) 25
(D) 33
(E) 50

5. An isosceles triangle with one angle of 120° is inscribed in a circle of radius 2. This triangle is rotated 90° about the center of the circle. What is the total area covered by the triangle throughout this movement, from starting point to final resting point?

A. $4\pi/3$

B. $8\pi/3$

C. 4π

D. $4\pi/3-\sqrt{3}$

E. $25\pi/12-\sqrt{3}$

6. A box contains three pairs of blue gloves and two pairs of green gloves. Each pair consists of a left-hand glove and a right-hand glove. Each of the gloves is separate from its mate and thoroughly mixed together with the others in the box. If three gloves are randomly selected from the box, what is the probability that a matched set (i.e., a left- and right-hand glove of the same color) will be among the three gloves selected?

(A) 3/10
(B) 23/60
(C) 7/12
(D) 41/60
(E) 5/6

7. The function $g(x)$ is defined for integers x such that if x is even, $g(x) = x/2$ and if x is odd, $g(x) = x + 5$. Given that $g(g(g(g(g(x))))) = 19$, how many possible values for x would satisfy this equation?

A. 1
B. 5
C. 7

D. 8

E. 11

8. Arrow AB which is a line segment exactly 5 units along with an arrowhead at A is to be constructed in the xy-plane. The x and y coordinates of A and B are to be integers that satisfy the inequalities $0 \le x \le 9$ and $0 \le y \le 9$. How many different arrows with these properties can be constructed ?

A. 50

B. 168

C. 200

D. 368

E. 536

9. How many even 3 digit integers greater than 700 with distinct non zero digits are there ?

A. 729

B. 243

C. 108

D. 88

E. 77

10. If 10! - 2*(5!)^2 is divisible by 10^n, what is the greatest value of n?

A. 1

B. 2

C. 3

D. 4

E. 5

11. How many values can the integer $p=|x+3|-|x-3|$ assume?

A)6

B)7

C)13

D)12

E)Infinite values

12. Twenty meters of wire is available to fence off a flower bed in the form of a circular sector. What must the radius of the circle in meters be, if we wish to have a flower bed with the greatest possible surface area?

(A) $2\sqrt{2}$
(B) $2\sqrt{5}$
(C) 5
(D) $4\sqrt{2}$
(E) none of these

13. Daniel is playing a dice game in which a dice is rolled 5 times. If a number turns up exactly 3 times then the game is won. Daniel has thrown the dice two times and got number 4 both times. What is the probability that Daniel will win the game ?
Note: the dice is an unbiased die with numbers 1 to 6

a) 1/216
b) 75/216
c) 80/216
d) 90/216
e) 100/216

14. What is the probability of getting a sum of 8 or 14 when rolling 3 dice simultaneously?

A. 1/6
B. 1/4
C. 1/2
D. 21/216
E. 32/216

15. If 2^x + 2^y = x^2 + y^2, where x and y are nonnegative integers, what is the greatest possible value of |x – y|?

(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

16. How many numbers that are not divisible by 6 divide evenly into 264,600?

(A) 9
(B) 36
(C) 51
(D) 63
(E) 72

17. An integer between 1 and 300, inclusive, is chosen at random. What is the probability that the integer so chosen equals an integer raised to an exponent that is an integer greater than 1?

A. 17/300
B. 1/15
C. 2/25
D. 1/10
E. 3/25

18. A sequence of numbers (geometric sequence) is given by the expression: $g(n)=5 *(-1/2)^n$. If the sequence begins with $n = 1$, what are the first two terms for which $|g(n) - g(n+1)| < 1/1000$?

A. $g(10)$, $g(11)$
B. $g(11)$, $g(12)$
C. $g(12)$, $g(13)$
D. $g(13)$, $g(14)$
E. $g(14)$, $g(15)$

19. A bus from city M is traveling to city N at a constant speed while another bus is making the same journey in the opposite direction at the same constant speed. They meet in point P after driving for 2 hours. The following day the buses do the return trip at the same constant speed. One bus is delayed 24 minutes and the other leaves 36 minutes earlier. If they meet 24 miles from point P, what is the distance between the two cities?

A. 48
B. 72
C. 96
D. 120
E. 192

20. If 3(ab)^3+9(ab)^2−54ab/ [(a−1)(a+2)]=0, and a and b are both non-zero integers, which of the following could be the value of b?

I. 2
II. 3
III. 4

(A) I only
(B) II only
(C) I and II only
(D) I and III only
(E) I, II, and III

21. In a certain sequence, every term after the first is determined by multiplying the previous term by an integer constant greater than 1. If the fifth term of the sequence is less than 1000, what is the maximum number of non-negative integer values possible for the first term?

A) 60
B) 61
C) 62
D) 63
E) 64

22. In the x-y plane, point (p, q) is a lattice point if both p and q are integers. Circle C has a center at (-2, 1) and a radius of 6. Some points, such as the center (-2, 1), are inside the circle, but a point such as (4, 1) is on the circle but not in the circle. How many lattice points are in circle C?

(A) 36
(B) 72
(C) 89
(D) 96
(E) 109

23. On a partly cloudy day, Derek decides to walk back from work. When it is sunny, he walks at a speed of s miles/hr (s is an integer) and when it gets cloudy, he increases his speed to (s + 1) miles/hr. If his average speed for the entire distance is 2.8 miles/hr, what fraction of the total distance did he cover while the sun was shining on him?

A. 1/4

B. 4/5

C. 1/5

D. 1/6

E. 1/7

24. x@y = 2√x + y^2. How many unique sums of x and y result, if x@y is an integer less than 15?

(A) 9

(B) 10

(C) 21

(D) 27

(E) 30

25. Ms. Barton has four children. You are told correctly that she has at least two girls but you are not told which two of her four children are those girls. What is the probability that she also has two boys? (Assume that the probability of having a boy is the same as the probability of having a girl.)

(A) 1/4

(B) 3/8

(C) 5/11

(D) 1/2

(E) 6/11

26. How many different combinations of outcomes can you make by rolling three standard (6-sided) dice if the order of the dice does not matter?

(A) 24

(B) 30

(C) 56

(D) 120

(E) 216

27. If integer C is randomly selected from 20 to 99, inclusive. What is the probability that C^3 - C is divisible by 12 ?

A. 1/2
B. 2/3
C. 3/4
D. 4/5
E. 1/3

28. A big cube is formed by rearranging the 160 coloured and 56 non-coloured similar cubes in such a way that the exposure of the coloured cubes to the outside is minimum. The percentage of exposed area to the coloured is :

A. 25.9%
B. 44.44%
C. 35%
D. 61%
E. None of these

29. The elevator in an eleven-story office building travels at the rate of one floor per 1/4 minute, which allows time for picking up and discharging passengers. At the main floor and at the top floor, the operator stops for 1 minute. How many complete trips will an operator make during a 7-hour period?

A) 88
B) 56
C) 42
D) 60
E) 64

30. Pipe A can fill a tank in 32 minutes. Pipe B can fill the same tank 6 times faster than pipe A. If both the pipes are connected to the tank so that they fill the tank simultaneously, how long will it take for the empty tank to overflow?

A. 4 minutes

B. 32/7 minutes

C. 192/7 minutes

D. 224/7 minutes

E. 28 minutes

31. Set S consists of numbers 2, 3, 6, 48, and 164. Number K is computed by multiplying one random number from set S by one of the first 10 non-negative integers, also selected at random. If Z=6^K, what is the probability that 678,463 is not a multiple of Z?

A. 10%
B. 25%
C. 50%
D. 90%
E. 100%

32. We define f(n) as the highest power of 7 that divides n. What is the minimum value of k such that f(1)+f(2)+....+f(k) is a positive multiple of 7 ?

(A) 7
(B) 49
(C) 56
(D) 91
(E) 98

33. Two kinds of Vodka are mixed in the ratio 1:2 and 2:1 and they are sold fetching the profit 10% and 20% respectively. If the vodkas are mixed in equal ratio and the individual profit percent on them are increased by 4/3 and 5/3 times respectively, then the mixture will fetch the profit of

A. 18%
B. 20%
C. 21%
D. 23%
E. Cannot be determined

34. An alloy of copper and aluminum has 40% copper. An alloy of Copper and Zinc has Copper and Zinc in the ratio 2:7. These two alloys are mixed in such a way that in the overall alloy, there is more aluminum than Zinc, and copper constitutes x% of this alloy. What is the range of values x can take?

A) 30% ≤ x ≤ 40%

B) 32.5% ≤ x ≤ 40%

C) 32.5% ≤ x ≤ 42%

D) 33.33% ≤ x ≤ 40%

E) 33.33 % ≤ x ≤ 42%

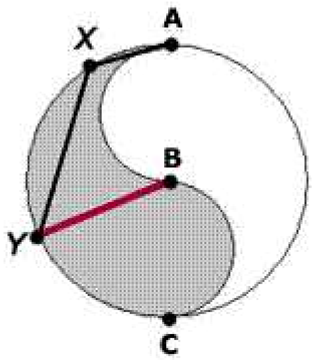
35. How many integral values of k are possible, if the lines 3x+4ky+6 = 0, and kx-3y+9 = 0 intersect in the 2nd quadrant.

A. 5
B. 4
C. 3
D. 6
E. 2

36. List T consist of 30 positive decimals, none of which is an integer, and the sum of the 30 decimals is S. The estimated sum of the 30 decimals, E, is defined as follows. Each decimal in T whose tenths digit is even is rounded up to the nearest integer, and each decimal in T whose tenths digits is odd is rounded down to the nearest integer. If 1/3 of the decimals in T have a tenths digit that is even, which of the following is a possible value of E - S ?

I. -16
II. 6
III. 10

A. I only
B. I and II only
C. I and III only
D. II and III only
E. I, II, and III



37. In the diagram, points A, B, and C are on the diameter of the circle with center B. Additionally, all arcs pictured are semicircles. Suppose angle YXA = 105 degrees. What is the ratio of the area of the shaded region above the line YB to the area of the shaded region below the line YB? (Note: Diagram is not drawn to scale and angles drawn are not accurate.)

(A) ¾
(B) 5/6
(C) 1
(D) 7/5
(E) 9/7

38. If a circle passes through points (9, 2√3), (7, 0), and (11, 0), what is the diameter of the circle?

A) 4/√3

B) 4

C) 8/√3

D) 4∗√3

E) 8

39. How many integers less than 100 have exactly 4 odd factors but no even factors?

A. 11
B. 13
C. 15

D. 17

E. 19

40. If $|12x-5|>|7-6x|$, which of the following CANNOT be the product of two possible values of x?

A. -12

B. -7/5

C. -2/9

D. 4/9

E. 17

41. In how many ways can 5 different marbles be distributed in 4 identical pockets?

A. 24

B. 51

C. 120

D. 625

E. 1024

42. During the month of April, the average temperatures on day n in two cities A and B are denoted by TA(n) and TB(n) respectively. The average temperature in city A on any day is the average of the average temperatures of the previous two days in city A. The average temperature in city B on any day is the average of the average temperatures of the previous two days in city B. If TA(1) = 30, TA(2) = 35, TB(1) = 35 and TB(2) = 30, which of the following statements must be true?

I. TA(4) - TB(4) > TA(29) - TB(29)

II. TA(4) + TB(4) = TA(29) + TB(29)

III. |TA(n+1) - TA(n)| = |TB(n+1) - TB(n)| for n>3

A. II only

B. III only

C. I and II only

D. II and III only

E. I, II and III

43. A fair coin is tossed 6 times. What is the probability of getting no any two heads on consecutive tosses?

A. 21/64

B. 42/64

C. 19/64

D. 19/42

E. 31/64

Horse Name	Odds of Placing in the top three
The Baron	$\frac{3}{5}$
Happy Cynic	$\frac{7}{10}$
California Girl	$\frac{3}{4}$
Love Song	$\frac{1}{4}$
Inamorata	$\frac{1}{2}$

44. The chart below lists the odds that a horse will place in the top three. As part of a contest, if at least 2 of the horses that a person bets upon finish in the top three, the bettor receives a T-shirt. If Cecilia bets on The Baron, Happy Cynic, and Inamorata, what is the probability that she does not receive a T-shirt?

A. 3/50

B. 21/100

C. 29/100

D. 35/100

E. 65/100

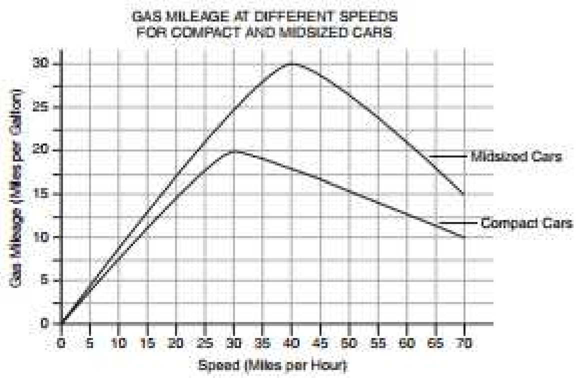
45. A bag contains 3 red and 2 black ball. Another bag contains 4 red and 5 black balls. A ball is drawn from the first bag and is placed in the second. A ball is then drawn from the second. What is the probability that this draw of red ball is due to the drawing of red ball from the first bag ?

A. 3/5

B. 2/5

C. 4/25

D. 3/10
E. 15/23



46. The figure above shows gas mileage at different speeds for all compact and midsize cars. John drove a compact car at 30 miles per hour for 1 hour and at 50 miles per hour for 30 minutes. Jill drove a midsize car at 40 miles per hour for 1 hour and at 60 miles per hour for 30 minutes. The total amount of fuel consumed by Jill's car is approximately what percent of the total amount of fuel consumed by John's car?

A. 80%
B. 90%
C. 110%
D. 140%
E. 145%

47. The function p(n) on non-negative integer n is defined in the following way: the units digit of n is the exponent of 2 in the prime factorization of p(n), the tens digit is the exponent of 3, and in general, for positive integer k, the digit in the 10^(k-1) th place of n is the exponent on the kth smallest prime (compared to the set of all primes) in the prime factorization of p(n). For instance, p(102) = 20, since 20 = (5^1)(3^0)(2^2). What is the smallest positive integer that is not equal to p(n) for any permissible n?

(A) 1
(B) 29
(C) 31
(D) 1,024
(E) 2,310

48. A customer using a certain telephone calling plan pays a fee of $25 per month, and then receives a discount of 40% on the regular charge for all calls made to country A. If calls to country A are regularly charged at $1.60 per minute for the first 3 minutes, and $0.80 per minute for each minute thereafter, what is the maximum the customer could have saved over regular prices if he was charged for 1 hour of calls made to country A in a certain month?

A. $8.75
B. $12
C. $13.40
D. $17.40
E. $24.40

49. For how many different pairs of positive integers (a, b) can the fraction 215215 be written as the sum 1/a + 1/b?

(A) 4

(B) 5

(C) 8

(D) 9

(E) 10

50. Let a “2-placer” be a terminating decimal, between 0 and 1, for which the shortest possible representation has exactly 2 decimal places. For example, 0.09 and 0.87 are 2-placers, but 0.70 is not a 2-placer (because it can be written as 0.7, with only one decimal place). If m, n, and the product of m and n are each 2-placers, how many different values are possible for the sum m + n?

A) 40
B) 48
C) 60
D) 72
E) 197

51. How many even integers n, where 100 <= n <= 200, are divisible neither by seven nor by nine?

(A) 37
(B) 38
(C) 39
(D) 40
(E) 46

52. A botanist selects n^2 trees on an island and studies (2n + 1) trees everyday where n is an even integer. He does not study the same tree twice. Which of the following cannot be the number of trees that he studies on the last day of his exercise?

A. 13
B. 28
C. 17
D. 31
E. 79

53. Points A and B are 120 km apart. A motorcyclist starts from A to B along straight road AB with speed 30 kmph. At the same time a cyclist starts from B along a road perpendicular to road AB, with a speed of 10 kmph. After how many hours will the distance between them be the least?

A. 3 hours
B. 3.4 hours
C. 3.5 hours
D. 3.6 hours
E. None

54. A man arrives at a railway station 90 minutes before the time at which he had ordered his carriage to meet him. He walks at the rate of 4kmph and meets the carriage 8Km from his house and reaches 1 hour earlier than usual time. What is the speed of the carriage and distance from the station to his house?

1)8kmph,12Km
2)12kmph,16km
3)4kmph,12km
4)None of these

55. Darcy, Gina, Ray and Susan will be the only participants at a meeting. There will be three soft chairs in the room where the meeting will be held and one hard chair. No one can bring more chairs into the room. Darcy and Ray will arrive simultaneously, but Gina and Susan will arrive individually. The probability that Gina will arrive first is 1/3, and the probability that Susan will arrive first is 1/3. The probability that Gina will arrive last is 1/3, and the probability that Susan will arrive last is 1/3. Upon arriving at the meeting, each of the participants will select a soft chair, if one is available.

If Darcy and Ray arrive and see only one unoccupied soft chair, they will flip a fair coin to determine who will sit in that chair. By what percent is the probability that Darcy will sit in a soft chair greater than the probability that Gina will sit in a soft chair?

A. 50%
B. 25%
C. 16 2/3%
D. 12 1/2%
E. 0%

56. How many 3-digit integers between 100 and 200 have a digit that is the average (arithmetic mean) of the other 2 digits?

A. 1
B. 7
C. 9
D. 11
E. 19

57. How many 4-digit numbers can be formed by using the digits 0-9, so that the numbers contains exactly 3 distinct digits?

(A) 1944
(B) 3240
(C) 3850
(D) 3888
(E) 4216

58. Consider a regular polygon of p sides. The number of values of p for which the polygon will have angles whose values in degrees can be expressed in integers?

A. 24
B. 23
C. 22
D. 20
E. 21

59. Three circles with radii of 2 cm, 3 cm and 5 cm, respectively are on the same plane. If the centers of the three circles are all on the same line and each circle is tangent to at least one of the other two circles, then what is the shortest possible distance, in cm, between the center of the largest circle and the center of the smallest circle?

A) 0
B) 1
C) 3
D) 7
E) 13

60. If a and b are distinct integers and a^b=b^a, how many solutions does the ordered pair (a, b) have?

(A) None
(B) 1
(C) 2
(D) 4
(E) Infinite

61. A cylindrical tank of radius R and height H must be redesigned to hold approximately twice as much liquid. Which of the following changes would be farthest from the new design requirements?

A. A 100% increase in R and a 50% decrease in H
B. A 30% decrease in R and a 300% increase in H
C. A 10% decrease in R and a 150% increase in H
D. A 40% increase in R and no change in H
E. A 50% increase in R and a 20% decrease in H

62. Brenda and Sally run in opposite direction on a circular track, starting at diametrically opposite points. They first meet after Brenda has run 100 meters. They next meet after Sally has run 150 meters

past their first meeting point. Each girl runs at a constant speed. What is the length of the track in meters?

A. 250
B. 300
C. 350
D. 400
E. 500

63. Suppose x is an integer such that $(x^2-x-1)^{(x+2)}=1$. How many possible values of x exist?

A. 1
B. 2
C. 3
D. 4
E. 5

64. Louie takes out a three-month loan of $1000. The lender charges him 10% interest per month compounded monthly. The terms of the loan state that Louie must repay the loan in three equal monthly payments. To the nearest dollar, how much does Louie have to pay each month?

A. 333
B. 383
C. 402
D. 433
E. 483

65. How many different pairs of integers (a, b) exist such that $2 <= a <= 200$ and $a + b > a^b$? (Two pairs of numbers are considered different if either a or b differs. For example, (2, 3) and (2, 4) are considered different, although they don't satisfy the requirements of this problem.)

A) 594
B) 738
C) 5,940
D) 19,800
E) 20,298

66. Baseball's World Series matches 2 teams against each other in a best-of-seven series. The first team to win four games wins the series and no subsequent games are played. If you have no special information about either of the teams, what is the probability that the World Series will consist of fewer than 7 games?

(A) 12.5%
(B) 25%
(C) 31.25%
(D) 68.75%
(E) 75%

67. The positive value of x that satisfies the equation (1 + 2x)^5 = (1 + 3x)^4 is between

A. 0 and 0.5
B. 0.5 and 1
C. 1 and 1.5
D. 1.5 and 2
E. 2 and 2.5

68. When the number 777 is divided by the integer N, the remainder is 77. How many integer possibilities are there for N?

A. 2
B. 3
C. 4
D. 5
E. 6

69. A cyclist travels the length of a bike path that is 225 miles long, rounded to the nearest mile. If the trip took him 5 hrs, rounded to the nearest hour, then his average speed must be between:

A. 38 and 50 mph
B. 40 and 50 mph
C. 40 and 51 mph
D. 41 and 50 mph
E. 41 and 51 mph

70. How many positive integers less than 1000 are multiples of 5 but NOT of 4 or 7?

(A) 114
(B) 121
(C) 122
(D) 129
(E) 136

71. A set of five positive integers has an arithmetic mean of 150. A particular number among the five exceeds another by 100. The rest of the three numbers lie between these two numbers and are equal. How many different values can the largest number among the five take?

(A) 18
(B) 19
(C) 21
(D) 42
(E) 59

72. If $y=|x+5|-|x-5|$, then y can take how many integer values?

A. 5
B. 10
C. 11
D. 20
E. 21

73. If a is the sum of x consecutive positive integers. b is the sum of y consecutive positive integers. For which of the following values of x and y is it impossible that a = b?

A. x = 2; y = 6
B. x = 3; y = 6
C. x = 7; y = 9
D. x = 10; y = 4
E. x = 10; y = 7

74. The number 523abc is divisible by 7,8,9. Then what is the value of a*b*c

A. 504

B. 532

C. 210

D. 180

E. 280

75. a, b, c, d are positive integers such that exactly one of the following inequalities is false. Which inequality is false?

(A) $a<b$

(B) $c<d$

(C) $a+c<b+c$

(D) $a+c<b+d$

(E) $a<b+c+d$

76. How many triangles with positive area can be drawn on the coordinate plane such that the vertices have integer coordinates (x,y) satisfying $1 \le x \le 3$ and $1 \le y \le 3$?

(A) 72

(B) 76

(C) 78

(D) 80

(E) 84

77. There are 100 freshmen at a particular college, all of whom must take at least one of the three core classes: Art, Biology, and Calculus. Of these freshmen, 17 take only Biology, 10 take only Calculus, 5 take all three classes, and 20 take Art and exactly one of the other two core classes. If the number of freshmen who take only Art is 3 times the number of freshmen who take every core class except Art, how many freshmen take Art?

(A) 25

(B) 32

(C) 36

(D) 48

(E) 61

78. Jerry and Jim run a race of 2000 m. First, Jerry gives Jim a start of 200m and beats him by 30 seconds. Next, Jerry gives Jim a start of 3mins and is beaten by 1000m. Find the time in minutes in which Jerry and Jim can run the race seperately?

A. 8,10

B. 4,5

C. 5,9

D. 6,9

E. 7,10

79. A circle is inscribed in a square with an area of 121 square units. If the diameter of a marble ball is 1.5π, then how many different combinations of 9 distinct marbles can fit around the circumference of the circle?

A. 7

B. 63

C. 1633

D. 181440

E. 362880

80. An ant is clinging to one corner of a box in the shape of a cube. The ant wants to get to the most distant corner of the box by crawling only along the edges of the cube and without ever revisiting a place it has been. How many different paths can the ant take to the most distant corner?

A. 6

B. 12

C. 18

D. 24

E. 30

81. A dealer offers a cash discount of 20% and still makes a profit of 20% when he further allows 16 articles to be sold at the cost price of 12 articles to a particular sticky bargainer. How much percent above the cost price were his articles listed?

A. 100%

B. 80%

C. 75%

D. 66+2/3%

E. 55%

82. Allen starts from X, goes to Y. At the same time Bob starts from Y and goes towards X. Once Allen reaches Y he changes his direction and returns to X. Once Bob reaches X, he changes his direction and returns to Y. Throughout Allen travels at 54 kmph and Bob travels at 72kmph. By the time they meet for the second time, Bob covers 36 km more than Allen. Find the distance between X and Y.

a)144km

b)72 km

c)126km

d)84 km

e)42km

83. There are three secretaries who work for four departments. If each of the four departments have one report to be typed out, and the reports are randomly assigned to a secretary, what is the probability that all three secretary are assigned at least one report?

A. 8/9

B. 64/81

C. 4/9

D. 16/81

E. 5/9

84. If x is the smallest positive integer that is not prime and not a factor of 50!, what is the sum of the factors of x?

A. 51

B. 54

C. 72

D. 162

E. 50!+2

85. Pipe A and Pipe B fill water into a tank of capacity 1000 litres at the rate of 100 litres/minute and 25 litres/minute respectively. Pipe C drains water from the same tank at the rate of 50litres/minute.

Pipe A is kept open for a minute and then closed, then pipe B is kept open for a minute and then closed, followed by a drain pipe C for a minute and then closed. This process is repeated until the tank is full. How long will it take to fill the tank.

A) 39 mins

B) 40 mins

C) 39 mins and 20 secs

D) 37 mins

E) 41 mins

86. Of the three-digit integers greater than 660, how many have two digits that are equal to each other and the remaining digit different from the other two?

(A) 47

(B) 60

(C) 92

(D) 95

(E) 96

87. On planet Simplon, each year has 12 months, each of which consists of exactly 30 days. If Simplon experiences a political scandal every 2/3 of a year, an environmental crisis every 1/6 of a year, and a terrible movie opening every 1/36 of a year, then what is the ratio of the number of political scandals to the number of environmental crises to the number of terrible movie openings experienced over a five year period on Simplon? (Assume that all three events happen 2/3, 1/6, and 1/36 of a year after the beginning of the first year, and recur at their respective rates after that.)

A. 24 : 4 : 1

B. 1 : 4 : 24

C. 4 : 15 : 90

D. 1 : 6 : 36

E. 3 : 10 : 72

88. If x is the reciprocal of a positive integer, then the maximum value of x^y, where y = -x^2, is achieved when x is the reciprocal of

A. 1

B. 2

C. 3

D. 4

E. 5

89. How many distinct four-digit numbers can be formed by the digits {1, 2, 3, 4, 5, 5, 6, 6}?

A. 280

B. 360

C. 486

D. 560

E. 606

90. y = x^2 + bx + 256 cuts the x axis at (h, 0) and (k, 0). If h and k are integers, what is the least value of b?

A. 0

B. –32

C. –255

D. –256

E. –257

91. A certain company plans to sell Product X for p dollars per unit, where p is randomly chosen from all possible positive values not greater than 100. The monthly manufacturing cost for Product X (in thousands of dollars) is 12 - p, and the projected monthly revenue from Product X (in thousands of dollars) is p(6 - p). If the projected revenue is realized, what is the probability that the company will NOT see a profit on sales of Product X in the first month of sales?

A. 0

B. 1/100

C. 1/25

D. 99/100

E. 1

92. In a village of 100 households, 75 have at least one DVD player, 80 have at least one cell phone, and 55 have at least one MP3 player. If x and y are respectively the greatest and lowest possible number of households that have all three of these devices, x – y is:

A. 65

B. 55

C. 45

D. 35

E. 25

93. How many different four letter words can be formed (the words need not be meaningful) using the letters of the word MEDITERRANEAN such that the first letter is E and the last letter is R?

A. 59

B. 11!/(2!*2!*2!)

C. 56

D. 23

E. 11!/(3!*2!*2!*2!)

94. Of a group of people, 10 play piano, 11 play guitar, 14 play violin, 3 play all the instruments, 20 play only one instrument. How many play 2 instruments?

A. 3

B. 6

C. 9

D. 12

E. 15

95. Ax(y) is an operation that adds 1 to y and then multiplies the result by x. If x = 2/3, then Ax(Ax(Ax(Ax(Ax(x))))) is between

(A) 0 and ½

(B) ½ and 1

(C) 1 and 1½

(D) 1½ and 2

(E) 2 and 2½

96. If m^2<225 and n−m=−10, what is the difference between the smallest possible integer value of 3m+2n3m+2n and the greatest possible integer value of 3m+2n?

A. -190

B. -188

C. -150

D. -148

E. -40

97. Alan's regular hourly wage is 1.5 times Barney's regular hourly wage, but Barney gets paid at twice his regular wage for any hours he works on Saturday. Both men work an integer number of hours on any given day. If Alan and Barney each worked for the same total non-zero number of hours last week, and earned the same total in wages, which of the following must be true?

I. Alan worked fewer hours Monday through Friday than did Barney.

II. Barney worked at least one hour on Saturday.

III. Barney made more money on Saturday than did Alan.

A.I only

B. II only

C. I and II only

D. I and III only

E. II and III only

98. At the post office, a letter must go through a sorting process with four distinct steps. Step 1: Mail is picked up every half hour, beginning at 6:00 am. Step 2: Mail is dropped off at the sorting center 1/4 hour later. Step 3: Mail is sorted by zip code and stamped every 1 hour, beginning at 7:00 am, and sent to regional sorting centers 1/3 hour later. Step 4: At the regional sorting centers, incoming mail is put into the system every 30 minutes, beginning at 8:00 am, and sent to individual mail carriers 45 minutes later. Assuming that all mail is picked up, sorted, and dropped off on time, what is the least total amount of time that it could take the letter to go through all four steps?

(A) 2 hours 45 minutes

(B) 2 hours 15 minutes

(C) 1 hour 45 minutes

(D) 1 hour 20 minutes

(E) 1 hour 15 minutes

99. The average score in an examination of 10 students of a class is 60. If the scores of the top five students are not considered, the average score of the remaining students falls by 5. The pass mark was 40 and the maximum mark was 100. It is also known that none of the students failed. If each of the top five scorers had distinct integral scores, the maximum possible score of the topper is

A) 87

B) 95

C) 99

D) 100

E) 103

100. A cylindrical tank with radius 3 meters is filled with a solution. The volume at t minutes is given by V = (-t^2 + 12t + 24)π m3. At 4 minutes, there are d meters of unused vertical space in the tank. At 6 minutes, there are only 1/3*d meters of space remaining. What is the height of the tank?

A. 6+(5/9)
B. 6+(8/9)
C. 7+(1/3)
D. 7+(5/9)
E. 8

101. How many 4 digit numbers are there, if it is known that the first digit is even, the second is odd, the third is prime, the fourth (units digit) is divisible by 3, and the digit 2 can be used only once?

A. 20
B. 150
C. 225
D. 300
E. 320

102. Matt is touring a nation in which coins are issued in two amounts, 2¢ and 5¢, which are made of iron and copper, respectively. If Matt has ten iron coins and ten copper coins, how many different sums from 1¢ to 70¢ can he make with a combination of his coins?

A. 66
B. 67
C. 68
D. 69
E. 70

103. 4 individuals arrive separately at an orchestra concert with assigned seating tickets for exactly 4 seats in a special section. The first person to arrive loses his ticket stub after entry but remembers the section and sits randomly in one of the 4 seats. After that, each person arrives and takes his or her assigned seat in the section if it is unoccupied, and one of the unoccupied seats at random otherwise. What is the probability that the last person to arrive gets to sit in his assigned seat?

A. 1/4
B. 3/8
C. 1/2
D. 5/8
E. 3/4

104. How many positive integers less than 10,000 are there in which the sum of the digits equals 5?

(A) 31
(B) 51
(C) 56
(D) 62
(E) 93

105. How many combinations of three letters taken from letters (a, a, b, b, c, c, d) are possible?

A. 12
B. 13
C. 35
D. 36
E. 56

106. 3 cooks have to make 80 burgers.They are known to make 20 pieces every minute working together.The 1st cook began workin alone and made 20 pieces having worked for sometime more than

3 mins.The remaining part of the work was done by second and 3rd cook working together.It took a total of 8 minutes to complete the 80 burgers.How many minutes would it take the 1st cook alone to cook 160 burgers?

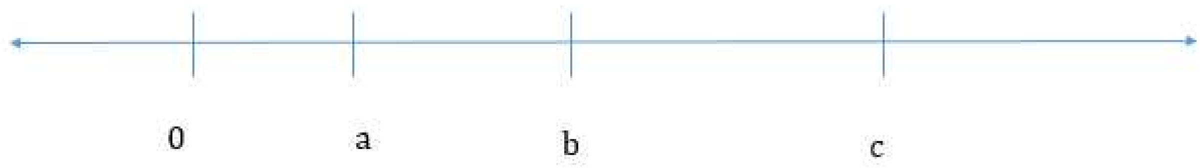
A. 16 minutes
B. 24 mins
C. 32 mins
D. 40 mins
E. 30 mins

107. Three men A, B and C working together can do a work in 30 days. They start the work together and A works for 3 days and takes rest on the fourth day, B works for 5 days and takes rest on the next two days and C works for 7 days and takes rest on the next three days. In how many days will the work be completed ? (A, B, C work at the same rate)

A. 39
B. 40
C. 42
D. 41
E. 45

108. In the game of Yahtzee, a "full house" occurs when a player rolls five fair dice and the result is two dice showing one number and the other three all showing another (three of a kind). What is the probability that a player will roll a full house on one roll of each of the three remaining dice if that player has already rolled a pair on the first two?

A. 1/3
B. 5/54
C. 5/72
D. 5/216
E. 1/1296



109. On the number line shown, the distance between 0 and a, a and b, and a and c is in the ratio of 1:2:3. If the distance of point b from 15 is twice the distance of point a from 15, what is the value of |c|?

A. 9
B. 27
C. 36
D. 45
E. 54

110. At a local beach, the ratio of little dogs to average dogs to enormous dogs is 2:5:8. Late in the afternoon, the ratio of little dogs to average dogs doubles and the ratio of little dogs to enormous dogs increases. If the new percentage of little dogs and the new percentage of average dogs are both integers and there are fewer than 30 total dogs at the beach, which of the following represents a possible new percentage of enormous dogs?

A. 25%

B. 40%

C. 50%

D. 55%

E. 70%

111. After multiplying a positive integer A, which has n digits, by (n+2), we get a number with (n+1) digits, all of whose digits are (n+1). How many instances of A exist?

A. None

B. 1

C. 2

D. 8

E. 9

112. Set A consists of 2 positive integers, and set B consists of 3 positive integers. If the median of set A is 5, and the average (arithmetic mean) of set B is 3, then which of the following must be true?

I. The median of the combined sets is less than 5

II. The mean of the combined sets is less than 4

III. The median of set B is less than 5

A) II only

B) III only

C) I and II

D) II and III

E) I, II and III

113. The price of a bushel of corn is currently $3.20, and the price of a peck of wheat is $5.80. The price of corn is increasing at a constant rate of 5x cents per day while the price of wheat is decreasing at a constant rate of x(2^1/2) - x cents per day. What is the approximate price when a bushel of corn costs the same amount as a peck of wheat?

(A) $4.50

(B) $5.10

(C) $5.30

(D) $5.50

(E) $5.60

114. Two different primes may be said to “rhyme” around an integer if they are the same distance from the integer on the number line. For instance, 3 and 7 rhyme around 5. What integer between 1 and 20, inclusive, has the greatest number of distinct rhyming primes around it?

(A) 12

(B) 15

(C) 17

(D) 18

(E) 20

115. Jane gave Karen a 5 m head start in a 100 race and Jane was beaten by 0.25m. In how many meters more would Jane have overtaken Karen?

A 5m

B. 7m

C. 4.5m

D. 5.25m

E. 6m

116. A not-so-good clockmaker has four clocks on display in the window. Clock #1 loses 15 minutes every hour. Clock #2 gains 15 minutes every hour relative to Clock #1 (i.e., as Clock #1 moves from 12:00 to 1:00, Clock #2 moves from 12:00 to 1:15). Clock #3 loses 20 minutes every hour relative to Clock #2. Finally, Clock #4 gains 20 minutes every hour relative to Clock #3. If the clockmaker resets all four clocks to the correct time at 12 noon, what time will Clock #4 display after 6 actual hours (when it is actually 6:00 pm that same day)?

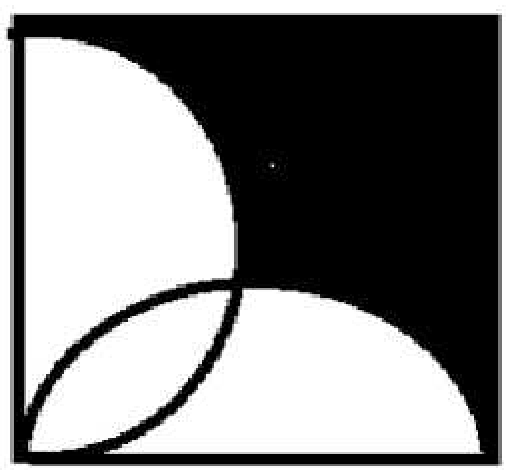
A. 5:00

B. 5:34

C. 5:42

D. 6:00

E. 6:24



117. The side of a square has the length of 8. What is the area of the region shaded?

A. $48-8\pi$

B. $48-6\pi$

C. $24+6\pi$

D. 16+8π

E. 64-8π

118. If $-2<x\le5$, then which of the following MUST be true?

A) $-1<x^2<16$

B) $4<x^2\le254$

C) $0\le x^2\le16$

D) $0<x^2\le25$

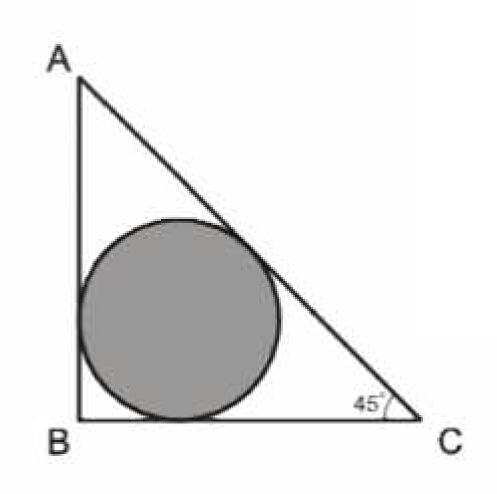
E) $-4\le x^2<36$

119. In a certain mathematical activity, we have five cards with five different prime numbers on them. We will distribute these five cards among three envelope: all could go in any envelope, or they could be broken up in any way among the envelopes. Then in each envelop, we find the product of all the cards in that envelope: that is the “number” of the envelope. An envelope containing no cards has the number 1. We then put the three envelope numbers in order, from lowest to highest, and that is our set. How many different sets can be produced by this process?

(A) 41
(B) 89
(C) 125
(D) 243
(E) 512

120. A mixed doubles tennis game is to be played between two teams. There are four married couples. No team is to consist of a husband and his wife. What is the maximum number of games that can be played.

A. 12
B. 21
C. 36
D. 42
E. 46



121. A circle is inscribed inside right triangle ABC shown above. What is the area of the circle, if the leg AB of the right triangle is 4?

A. $4\pi(\sqrt{2}-1)^2$

B. $8\pi(\sqrt{2}-1)^2$

C. 2π

D. 4π

E. $8\pi(1-\sqrt{2})$

122. A firm's annual revenue grows twice as fast as its costs. In 2007 it operated at a $1000 loss, it broke even in 2008, and in 2009 its revenues were 44% higher than in 2007. If the firm's revenues and costs grew at a constant rate over this period, what was its profit in 2009?

A. 700
B. 1000
C. 1300
D. 1600
E. 2000

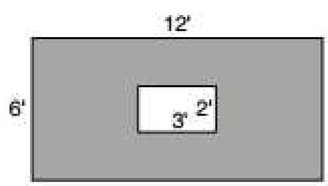
123. $|x+3| - |4-x| = |8+x|$ How many solutions will this equation have?

A. 0

B. 1
C. 2
D. 3
E. 4

124. If x is any integer from -6 to 2 inclusive, how many values of x satisfy the following inequality: $2 - |x^3 + 10x^2 - 24x| < 2$?

A) 5
B) 6
C) 7
D) 8
E) 9



125. How many 2-inch by 3-inch rectangular tiles are required to tile this shaded region?

A. Less than 10
B. 10—100
C. 101—1,000
D. 1,001—1,500
E. 1,500+

126. In racing over a given distance d at uniform speed, A can beat B by 20 yards, B can beat C by 10 yards, and A can beat C by 28 yards. Then d, in yards, equal

A. not determined by the give information
B. 58
C. 100
D. 116
E. 120

127. If x+|x|+y=7 and x+|y|-y=6 what is x+y=?

A. 1
B. -1
C. 3
D. 5
E. 13

128. A set of consecutive positive integers beginning with 1 is written on the blackboard. A student came along and erased one number. The average of the remaining numbers is 35 7/17. What was the number erased?

A. 7
B. 8
C. 9
D. 15
E. 17

129. A man cycling along the road noticed that every 12 minutes a bus overtakes him and every 4 minutes he meets an oncoming bus. If all buses and the cyclist move at a constant speed, what is the time interval between consecutive buses?

A. 5 minutes
B. 6 minutes
C. 8 minutes
D. 9 minutes
E. 10 minutes

130. How many numbers between 1 to 300 are divisible by 11 and 13 but not by both?

A. 45
B. 46
C. 48
D. 50
E. 52

131. For positive integers k and n, the k-power remainder of n is defined as r in the following equation:

$n = k^w + r$, where w is the largest integer such that r is not negative. For instance, the 3-power remainder of 13 is 4, since $13 = 3^2 + 4$. In terms of k and w, what is the largest possible value of r that satisfies the given conditions?

A. $(k - 1)k^w - 1$

B. $k^w - 1$

C. $(k + 1)k^w - 1$

D. $k^{(w+1)} - 1$

E. $(k + 1)k^{(w+1)} - 1$

132. If the prime factorization of the integer q can be expressed as $a^{2x}.b^{x}.c^{3x-1}$, where a, b, c, and x are distinct positive integers, which of the following could be the total number of factors of q?

(A) 3j + 4, where j is a positive integer

(B) 5k + 5, where k is a positive integer

(C) 6l + 2, where l is a positive integer

(D) 9m + 7, where m is a positive integer

(E) 10n + 1, where n is a positive integer

133. A cylindrical water tower with radius 5 m and height 8 m is 3/4 full at noon. Every minute, .08π m3 is drawn from tank, while .03π m3 is added. Additionally, starting at 1pm and continuing each hour on the hour, there is a periodic drain of 4π m3. From noon, how many hours will it take to drain the entire tank?

A. 20 2/7

B. 20 6/7

C. 21

D. 21 3/7

E. 22

134. Ben and Shari have invited three other couples to their apartment for a game of charades. Everyone is to be split into two equal teams, but each team must consist of either two couples or no couples. How many different pairs of teams are possible?

(A) 11

(B) 14
(C) 22
(C) 35
(D) 70

135. In a game of chess the moves of whites and blacks alternate with whites having the first move. During a certain chess tournament whites have made 2319 moves altogether while blacks have made 2315 moves. If in any game the side that made the last move did not lose, which of the following can be true about the tournament?

I. Blacks lost 5 games
II. Blacks won more games than whites
III. All games ended in a draw

A. III only
B. I and II only
C. I and III only
D. II and III only
E. I, II, and III

136. A square wooden plaque has a square brass inlay in the center, leaving a wooden strip of uniform width around the brass square. If the ratio of the brass area to the wooden area is 25 to 39, which of the following could be the width, in inches, of the wooden strip?

I. 1
II. 3
III. 4

(A) I only
(B) II only
(C) I and II only
(D) I and III only
(E) I, II , and III

137. If the average of 5x and 8y is greater than 90, and x is twice y, what is the least integer value of x ?

A. 4
B. 5
C. 20
D. 21
E. 23

138. The workforce of a certain company comprised exactly 10,500 employees after a four-year period during which it increased every year. During this four-year period, the ratio of the number of workers from one year to the next was always an integer. The ratio of the number of workers after the fourth year to the number of workers after the the second year is 6 to 1. The ratio of the number of workers after the third year to the number of workers after the first year is 14 to 1. The ratio of the number of workers after the third year to the number of workers before the four-year period began is 70 to 1. How many employees did the company have after the first year?

(A) 50
(B) 70
(C) 250
(D) 350
(E) 750

139. A cyclist travels the length of a bike path that is 225 miles long, rounded to the nearest mile. If the trip took him 5 hrs, rounded to the nearest hour, then his average speed must be between:

A. 38 and 50 mph
B. 40 and 50 mph
C. 40 and 51 mph
D. 41 and 50 mph
E. 41 and 51 mph

140. If 5 dollars and 35 crowns is equivalent to 7 pounds, and 4 dollars and 4 pounds is equivalent to 56 crowns, 1 pound and 28 crowns is equivalent to how many dollars?

$7.00
$7.50
$8.50
$9.00
$10.00

141. A straight picket fence is composed of x pickets each of which is 1/2 inch wide. If there are 6 inches of space between each pair of pickets, which of the following represents the length of fence in feet?

A. 13x/2
B. 13x/2 - 6
C. 13x/24
D. (13x+1)/24
E. (13x-12)/24

142. A trail mix company keeps costs down by employing the peanuts:cashews:almonds ratio of 10:4:1 in each bag of up to 75 total nuts. What is the maximum percentage by which the company could decrease its number of peanuts per bag and still have peanuts constitute more than half the total amount of nuts?

(A) 30%
(B) 40%
(C) 49%
(D) 50%
(E) 60%

143. If an integer n is to be chosen at random from the integers 1 to 96, inclusive, what is the probability that n(n + 1)(n + 2) will be divisible by 8?

A. 1/4
B. 3/8
C. 1/2
D. 5/8
E. ¾

144. How many positive integers less than 30 are either a multiple of 2, an odd prime number, or the sum of a positive multiple of 2 and an odd prime?

A. 29
B. 28
C. 27

D. 25

E. 23

145. Car B begins moving at 2 mph around a circular track with a radius of 10 miles. Ten hours later, Car A leaves from the same point in the opposite direction, traveling at 3 mph. For how many hours will Car B have been traveling when car A has passed and moved 12 miles beyond Car B?

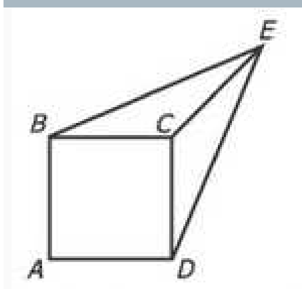
A. 4pi – 1.6

B. 4pi + 8.4

C. 4pi + 10.4

D. 2pi – 1.6

E. 2pi – 0.8



146. In the figure, each side of square ABCD has length 1, the length of line Segment CE is 1, and the length of line segment BE is equal to the length of line segment DE. What is the area of the triangular region BCE?

A. 1/3

B. √2/4

C. 1/2

D. √2/2

E. 3/4

147. A certain car's price decreased by 2.5% (from the original price) each year from 1996 to 2002, during that time the owner of the car invested in a new carburetor and a new audio system for the car,

which increased car's price by $1,500. If the price of the car in 1996 was $22,000, what is the car's price in 2002?

A. $18,400
B. $19,500
C. $20,200
D. $20,400
E. $21,100

148. Two liquids are mixed in the ratio 3:2 and the vendor gains 10% by selling the mixture at $11/liter. If the first liquid costs $2 more than the second, find the cost price of first liquid.

A. $8
B. $10.8
C. $6
D. $8.8
E. $4

149. How many diagonals does a polygon with 18 sides have if three of its vertices, which are adjacent to each other, do not send any diagonals?

A. 10
B. 25
C. 58
D. 90
E. 91

150. A happy number is a positive integer defined in the following way: in sequence A for integer i > 0, the term A(i+1) equals the sum of the squares of digits of Ai. If An=1 for some positive integer n, then A0 is happy. Which of the following is NOT happy?

A. 7
B. 10
C. 13
D. 16
E. 19