1. If x and y are positive integers, and $x + y + xy = 20$, what is the value of $x + y$?

(a) 8

(c) 7

(b) 5

(d) 2

2. Find the largest factor of 123,456 that is less than 123,456.

(a) 51210

(c) 61201

(b) 61728

(d) 61181

3. Ronald can paint a fence in 1 hour by himself, and mark can paint a fence in 2 hours by himself. How many minutes does it take Ronald and Mark to paint a fence together?.

(a) 32

(c) 24

(b) 12

(d) 40

4. When 1 liter of a 40% vinegar solution is mixed with 2 liters of an 80% vinegar solution and 1 liter of water, what percent of the resulting solution is vinegar?

(a) 29%

(b) 28%

(c) 50%

(d) 22%

5. The radius of a circle is twice the edge of a cube. If the surface area of the cube is 54, find the area of the circle.

(a) 13 π

(b) 36π

(c) 14 π

(d) 21 π

6. A sequence of numbers generated accordingly to a pattern begins as follows: 1, 2, 4, 7, 11, 16, 22,… …. What is the difference between the 2010th term and the 2011th term?

(a) 2010

(b) 2000

(c) 2013

(d) 2017

7. What is the smallest number of equilateral triangles of side length 0.99 that are required to completely cover up an equilateral triangle of side length 1?

(a) 6

(c) 5

(b) 4

(d) 3

8. In the barn there are 70 animals: some are chickens and the rest are pigs. Jason counts 200 legs. Assume all pigs have four legs and all chickens have two. How many pigs are in the barn?

(a) 50

(c) 10

(b) 30

(d) 20

9. If x is real, find the smallest value that x^2-2x-2 can be.

(a) -6

(c) -3

(b) -2

(d) -7

10. There are 69 kids in a room where 1/3 of the kids are boys. Everyone is required to eat a cupcake. 40 kids said they prefer chocolate frosting. 8 girls want vanilla frosting. How many boys want chocolate frosting?

(a) 4

(b) 3

(c) 9

(d) 2

11. If $x^2-4x+3=0$, find $x + 3/x$

(a) 7

(b) 4

(c) 5

(d) 2

12. An n x n magic square is a grid containing the numbers 1 through n2, such that the sums of the numbers in each row, column, and diagonal of the magic square are the same. Find the sum of the numbers in any given row of a 5 by 5 magic square.

(a) 63

(b) 65

(c) 67

(d) 68

13. How many positive integers k are there for which 64 - k is the square of an integer?

(a) 8

(b) 17

(c) 10

(d) 11

14. In Dr. Nevard's Topics in Advanced Mathematics class, six people are taking a test. The possible scores are integers between 0 and 6, inclusive. If the median of the scores is 0.5, the range of the scores is 6, and the mean of the scores is 1.5, write down all the students' scores in increasing order.

(a) 0,0,0,1,4,6

(b) 0,0,0,1,3,6

(c) 0,0,0,2,5,6

(d) 0,0,0,1,2,6

15. Rectangle ABCD has lengths $\overline{AB} = 15$ and $\overline{BC} = 10$. E is a point on $\overline{AD}$ such that $\overline{AE} = 1$. Find the area of triangle BCE.

(a) 72

(b) 75

(c) 77

(d) 74

16. For some nonnegative reals x; y; z, we have $x + y + z = 80$ and $2x + 3y + 4z = 180$. If M and m are the maximum and minimum values for $100x + 80y + 50z$, find M - m.

(a) 130

(c) 100

(b) 120

(d) 150

17. At the Zen County Academies, a chess club consists of 8 students. A team must be formed by choosing 4 students from this club. How many possible teams can be formed?

(a) 70

(c) 80

(b) 50

(d) 60

18. Ben decides to participate in a 10-mile marathon. He begins the race running at 6 mph. Unfortunately, 30 minutes into the race he begins walking at 1 mph. He continues at this pace until the last half-mile, at which point he sprints to the finish line at 10 mph. How long did he take to complete the entire race?

(a) 200 minutes

(c) 500 minutes

(b) 421 minutes

(d) 423 minutes

19. Lily is rowing a boat at a constant speed of 5 mph. She drops her Barbie in the water, and the doll swims in the same direction at 60 mph. In 3 hours, how far will Lily be from the barbie?

(a) 126 miles

(c) 123 miles

(b) 165 miles

(d) 144 miles

20. How many 3 x 3 x 3 blocks does it take to completely fill a 12 x 15 x 18 box?

(a) 128

(c) 120

(b) 126

(d) 129

21. If Chris has a colony of bacteria that doubles in population every half-hour, how many bacteria will he have at the end of four hours if he starts with 2 bacteria?

(a) 512

(c) 513

(b) 533

(d) 522

22. Mike is thinking of a number that leaves a remainder of 9 when divided by 16. What remainder does Mike's number leave when divided by 4?

(a) 1

(c) 7

(b) 8

(d) 5

23. Alex, Jongwhan, and Michael each claims that he is the fattest among them. In order to find the truth, they decide to step on the scale two at a time. Alex and Jongwhan together weigh 210 pounds, Jongwhan and Michael together weigh 205 pounds, and Michael and Alex together weigh 221 pounds. Find how much Jongwhan weighs.

(a) 92

(c) 95

(b) 93

(d) 97

24. Jerry and Henry decide to have a 5 mile running competition. Jerry runs at a speed of 110 yards every 30 seconds for 3 miles, then walks the rest of the way at a speed of 55 yards every 30 seconds the rest of the way. Henry runs at a speed of 5 miles per hour. Who wins? (1760 yards=1 mile)

(a) Heegin

(b) Jenny

(c) Both

(d) None of them

25. What is the smaller angle formed between the minute hand and the hour hand at 6:09?

(a) 110.5^0

(b) 120.5^0

(c) 130.5^0

(d) 170.5^0

26. Three boys run around a track with constant speed. They start at the same point and then end at the same point 48 minutes later. The fastest one ran 6 minutes per lap, and the slowest one ran 8 minutes per lap. Given that the three boys each run at a different speed, how long did it take the middle one to run a lap?

(a) 46/6

(b) 47/7

(c) 48/7

(d) 49/9

27. If the sum of the costs of a bag of Corn Chips and a bag of Popcorn is 87 cents, a bag of Popcorn and a bag of Frosted Flakes is 76 cents, and a bag of Corn Chips and a bag of Frosted Flakes costs 99 cents, what is the total price, in cents, for a bag of each kind?

(a) 121

(c) 127

(b) 131

(d) 129

28. Find the sum of the reciprocals of the factors of 20.

(a) 17/14

(c) 16/15

(b) 18/24

(d) 21/10

29. Paul is trying to wrap his friends locker for her birthday. The locker is 5 feet tall and 9 inches wide. However, he needs to cut out a 4 x 4 in square along the edge for the lock. If Paul can cut 3 inches of wrap per second, and his special wrapping paper is five feet long and five feet wide, what is the shortest time needed for Paul to cover the locker, assuming it takes 1 minute to tape the wrapping paper to the locker?

(a) 84 seconds

(c) 40 seconds

(b) 320 seconds

(d) 180 seconds

30. A new ice cream store, Amazing Ice, has opened in town. An order of ice cream is made by choosing a flavor, topping and cone. At Amazing Ice, a customer can choose from 29 flavors, 15 toppings and 3 cones. The old ice cream store in town, Country Creamery, still thinks it has more orders, with 27 flavors, 19 toppings and 2 cones. How many more orders does the ice cream store with more orders have than the one with less?

(a) 379

(c) 322

(b) 210

(d) 333

31. What is the 2010th term of the sequence 1,9, 6, 3, 1, 9,6, 3, 1, 9, 6, 3, 1, 9, 6, 3,……?

(a) 2

(c) 7

(b) 9

(d) 8

32. Rosy is doing back to school shopping. She must buy three packs of paper for every two binders and one pack of pens for every pack of paper she buys. Each binder costs $3.00, each pack of paper costs $2.00, and each pack of pens cost $1.00. If each of Rosy's 10 teachers requires her to buy a binder, how much money does she spend?

(a) $78

(c) $85

(b) $75

(d) $95

33. Steven takes a test where his raw score can be calculated by the following formula: c- w/4 , where c is the number correct and w is the number wrong (answers left blank give 0 points). If Steven's raw score on a 100 question test was 57, what is the maximum number of problems Steven could have answered correctly?

(a) 81

(c) 51

(b) 35

(d) 65

34. How many integers n are there such that $n = n^3$?

(a) 3

(c) 7

(b) 5

(d) 8

35. Evaluate: 1 + 2 - 3 + 4 + 5 + 6 - 7 + 8 + 9 + 10 - 11 + ……+ 97 + 98 - 99 + 100.

(a) 2500

(c) 2130

(b) 2133

(d) 2153

36. Jongwhan, Mark, Robin and Kelly have jobs in Flatland. Jongwhan works every 5 days as a camp counselor. Mark works every 3 days as a cashier. Robin works every 6 days as a chef. Kelly works every 7 days as a computer technician. Today they are all working at their jobs. In how many days from today will they next be working on the same day again?

(a) 122

(b) 123

(c) 213

(d) 210

37. A prime number is a positive whole number whose only positive divisors are 1 and itself. For instance, 2, 3, 5, and 7 are examples of prime numbers. What is the largest prime number smaller than 100?

(a) 93

(b) 95

(c) 97

(d) 94

38. You flip a coin 6 times. What is the probability that all 6 flips are tails?

(a) 9/66

(b) 1/64

(c) 3/64

(d) 9/64

39. Ben has a prime number. Jane subtracts 35 from it, and the result is still a prime number. Find Ben's prime number.

(a) 57

(c) 37

(b) 27

(d) 47

40. How much money does Hannibal save after eating at Chili's if he applies tax on tip on meal instead of applying tip on tax on meal. Assume Hannibal spent 20 dollars on his meal, gave 20% tip, and paid 10% tax.

(a) 4

(c) 0

(b) 3

(d) 1

41. Triangle ABC is similar to triangle DEF. If $\overline{AB} = 3$, $\overline{BC} = 4$, and $\overline{DE} = 6$, find the length of $\overline{EF}$.

(a) 8

(c) 7

(b) 3

(d) 4

42. Charlie the Unicorn is trying to climb up Candy Mountain. He climbs 3000 feet every day but falls 1200 feet every night when he sleeps. If the mountain is 10800 yards tall, how many days does it take Charlie to climb up the entire mountain?

(a) 11 days

(b) 14 days

(c) 13 days

(d) 18 days

43. A triangle is called isosceles if two of its sides have the same length. Triangle ABC is isosceles with angle A = 50^0. What is the sum of all distinct possible values of angle C?

(a) 170

(b) 195

(c) 180

(d) 186

44. Find the sum of the counting numbers from 1 to 26 inclusive.

(a) 322

(b) 304

(c) 351

(d) 323

45. How many positive integers less than 100 are not multiples of 2 or 3?

(a) 33
(c) 22
(b) 20
(d) 28

46. How many prime numbers are less than 20?

(a) 5
(c) 6
(b) 3
(d) 8

47. 1, 1, 2, 3, 5, 8, . . . What is the tenth number of this sequence?

(a) 56
(c) 68
(b) 55
(d) 61

48.

Given $x \clubsuit y = \dfrac{2x+3y}{4y-2x}$. Compute $6 \clubsuit (2 \clubsuit 3)$.

(a) 188/44

(c) -135/44

(b) -155/21

(d) -121/22

49. What is 1 + 1 x (1 + 1 x (1 + 1 x (1 + 1 x 1)))?

(a) 9

(c) 8

(b) 5

(d) 7

50. Compute 4 x (0.00002 + 0.00020 + 0.00200 + 0.02000 + 0.20000 + 2.0000) + .00002.

(a) 8.523

(c) 2.235

(b) 8.562

(d) 8.889

Answers:

1. a	2. b	3. d	4. c	5. b	6. a
7. d	8. b	9. c	10. d	11. b	12.b
13.a	14. d	15. b	16. c	17. a	18. d
19. b	20. c	21. a	22. a	23. d	24. b
25. c	26. c	27. b	28. d	29. a	30. a
31. b	32. c	33. d	34. a	35. a	36. d
37. c	38. b	39. c	40. c	41. a	42. d
43. b	44. c	45. a	46. d	47. b	48. c
49. b	50. d				