

KCATM 2011

Word Problems: Team

1. A restaurant's fixed-price dinner includes an appetizer, an entrée, and dessert. If the restaurant offers 4 different types of appetizers, 5 different types of entrees, and 3 different types of desserts, how many different ways are there to order a fixed-price dinner assuming you choose all three courses?

- A. 120
- B. 60
- C. 12
- D. 5

2. Linda paid \$38 for a jacket that was on sale for 25% of the original price. What was the original price of the jacket?

- A. \$60
- B. \$72
- C. \$96
- D. \$152

3. At a recent audition for a school play, 1 out of 3 students who auditioned were asked to come to a second audition. After the second audition, 75% of those asked to the second audition were offered parts. If 18 students were offered parts, how many students went to the first audition?

- A. 24
- B. 48
- C. 56
- D. 72

4. Two cards are drawn at random from a standard deck of 52 cards, without replacement. What is the probability of drawing a 7 and a king in that order?

- A. $\frac{4}{51}$
- B. $\frac{4}{52}$
- C. $\frac{4}{256}$
- D. $\frac{4}{663}$

5. The weekly salaries of six employees at McDonalds are \$140, \$220, \$90, \$180, \$140, and \$200. Find the mean salary for these six salaries.

- A. \$140
- B. \$160
- C. \$161.67
- D. \$180

6. How long will it take for the population of a certain country to triple if its annual growth rate is 5.3%? Round your answer to the nearest year.
- A. 1 year
 - B. 9 years
 - C. 21 years
 - D. 57 years
7. Nine people attend a concert, and all sit in the same row, which has exactly nine seats. Find the number of ways the group can sit in this row if two of the people in the group must sit together.
- A. 20,160
 - B. 40,320
 - C. 60,120
 - D. 30,160
8. The first three digits of a university telephone exchange are 452. If all the sequences of the remaining four digits are equally likely, what is the probability that a randomly selected university phone number contains seven distinct digits?
- A. 0.0024
 - B. 0.8400
 - C. 0.5040
 - D. 0.5714
9. The sum of the three smallest primes and one other prime is 77. What is the product of these four primes?
- A. 77
 - B. 426
 - C. 2010
 - D. 6510
10. How many elements are in the sample space of rolling one die?
- A. 6
 - B. 12
 - C. 24
 - D. 36

11. An architect needs to design a rectangular room with an area of 75 square feet. What dimensions should she use in order to minimize the perimeter? Round to the nearest hundredth, if necessary.

- A. 15 ft by 75 ft
- B. 8.66 ft by 8.66 ft
- C. 8.66 ft by 18.75 ft
- D. 18.75 ft by 18.75 ft

12. Both x and y are positive numbers less than 2. Every positive number less than 2 is equally likely to be the value of x ; and every positive number less than 2 is equally likely to be the value of y . What is the probability that x and y differ by less than 1?

- A. 0
- B. .5
- C. .75
- D. 1

13. From the 99 positive integers less than 100, I chose as many different numbers as I could so that no subset of my numbers had the sum of 100. If the sum of all my numbers was as large as possible, what was the smallest number I actually chose?

- A. 1
- B. 2
- C. 45
- D. 50

14. At time, t , the position of a body moving along the x -axis is $x(t) = t^3 - 27t^2 + 240t$ meters. Find the body's acceleration each time the velocity is zero.

- A. $a(10) = 6m/sec^2; a(8) = -6m/sec^2$
- B. $a(20) = 120m/sec^2; a(16) = 20m/sec^2$
- C. $a(10) = -6m/sec^2; a(8) = 6m/sec^2$
- D. $a(10) = 0m/sec^2; a(8) = 0m/sec^2$

15. A ball dropped from the top of a building has a height of $h(t) = 256 - 16t^2$ meters after t seconds. How long does it take the ball to reach the ground?

- A. 64 seconds
- B. 4 seconds
- C. 8 seconds
- D. 16 seconds

16. Suppose a fair coin is thrown twice. What is the probability of getting a head on the first toss and a tail on the second toss?

- A. $1/8$
- B. $1/4$
- C. $1/2$
- D. $3/4$

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- A. $1/4$
- B. $1/2$
- C. $3/4$
- D. 1

18. My area code is a positive 3-digit number. Add 7 to it and the result is divisible by 7. Add 8 instead, and the result is divisible by 8. Add 9 instead, and the result is divisible by 9. What is my area code?

- A. 312
- B. 913
- C. 816
- D. 504

19. A ladder is slipping down a vertical wall. If the ladder is 10 ft long and the top of it is slipping at the constant rate of 3 ft/sec, how fast is the bottom of the ladder moving along the ground when the bottom is 8 ft from the wall?

- A. 2.3 ft/sec
- B. 3.8 ft/sec
- C. 0.38 ft/sec
- D. 0.8 ft/sec

20. From 1970 through 1980, the population of City Q increased by 20%. From 1980 through 1990, the population increased by 30%. What was the combined percent increased for the period 1970 – 1990?

- A. 36%
- B. 50%
- C. 56%
- D. 60%

21. One empty cylinder has three times the height and twice the diameter of another empty cylinder. How many fillings of the smaller cylinder would be equivalent to one filling of the larger cylinder?

- A. 6
- B. $6\sqrt{2}$
- C. 12
- D. 18

22. In a certain club, the average age of the male members is 35 and the average age of the female members is 25. If 20% of the members are male, what is the average age of all the club members?

- A. 27
- B. 28
- C. 29
- D. 30

23. The Profit in dollars from the sale of x thousand compact disc players is $P(x) = x^3 - 5x^2 + 9x + 5$. Find the marginal profit when the value of x is 5.

- A. \$39
- B. \$34
- C. \$45
- D. \$50

24. Of the integers between 10^3 and 10^4 that have no repeated digit, how many have digits that increase from left to right?

- A. 10
- B. 126
- C. 254
- D. 402

25. One number is 5 times another number and their sum is -60. What is the lesser of the two numbers?

- A. -10
- B. -12
- C. -48
- D. -50

26. An 8-bit binary word is a sequence of 8 digits, of which each may be either a 0 or a 1. How many different 8-bit words are there?
- A. 16
 - B. 64
 - C. 128
 - D. 256
27. Suppose that consumption of electricity grows at 9.5% per year, compounded continuously. Find the number of years before the use of electricity has tripled. Round your answer to the nearest hundredth.
- A. 1.16
 - B. 31.58
 - C. 11.56
 - D. 0.12
28. Pump A can fill a pool in 5 hours. Pump B can fill the same pool in 20 hours. How long will it take to fill the pool if both pumps are used?
- A. 3 hours
 - B. $3\frac{7}{8}$ hours
 - C. 4 hours
 - D. 25 hours
29. The position of a weight attached to a spring is $s(t) = -7\cos(24\pi \cdot t)$ after t seconds. What is the maximum height that the weight reaches above the equilibrium position and when does it first reach the maximum height?
- A. The maximum height of 14 inches is first reached after 6 seconds.
 - B. The maximum height of 7 inches is first reached after 0.04 seconds.
 - C. The maximum height of 7 inches is first reached after 12 seconds.
 - D. The maximum height of 14 inches is first reached after 12 seconds.
30. Suppose that a room contains 4 people. What is the probability that at least two of them have a common birthday?
- A. 0.011
 - B. 0.016
 - C. 0.250
 - D. 0.984

31. A certain radioactive isotope has a half-life of approximately 1850 years. How many years would be required for a given amount of this isotope to decay to 40% of that amount? Round your answer to the nearest year.

- A. 1363 years
- B. 2406 years
- C. 1110 years
- D. 2446 years

32. There is only one set of four consecutive positive integers such that the sum of the cubes of three of them is equal to the cube of the remaining one. What is the smallest of these four integers?

- A. 3
- B. 4
- C. 5
- D. 6

33. It costs a restaurant owner 12 cents per glass for soda, which is sold for \$1.25 per glass. How many glasses of soda must the restaurant owner sell to make a profit of \$3616?

- A. 3,200
- B. 2,893
- C. 4,520
- D. 30,133

34. How many positive integers less than 50 are multiples of 4 but not multiples of 6?

- A. 6
- B. 8
- C. 10
- D. 12

35. What is the maximum possible area, in square inches, of a rectangle with a perimeter of 20 inches?

- A. 15
- B. 20
- C. 25
- D. 30

36. One can determine a student's score S on a certain test by dividing the number of wrong answers (w) by 4 and subtracting the result from the number of right answers (r). This relation is expressed by which of the following formulas?

A. $S = \frac{r - w}{4}$

B. $S = r - \frac{w}{4}$

C. $S = \frac{r}{4} - w$

D. $S = 4r - w$

37. If the lengths, in inches, of all three sides of a triangle are integers, and one side is 7 inches long, what is the least possible perimeter of the triangle in inches?

A. 10

B. 15

C. 21

D. 24

38. A car moving with an initial velocity of 10 mph accelerates at the rate of $a(t) = 2.4t$ mph/sec for 7 seconds. How fast is the car going when the 7 seconds are up?

A. 26.8 mph

B. 46.8 mph

C. 78.9 mph

D. 68.8 mph

39. Let $V = 4\pi r^2$ describe the volume of a right circular cylinder of height 4 feet and radius r feet. Find the instantaneous rate of change of the volume with respect to the radius when $r = 8$.

A. 16π ft³/ft

B. 8π ft³/ft

C. 64π ft³/ft

D. 32π ft³/ft

40. How many ways can a committee of seven members be divided into three subcommittees of size three, two, and two?

A. 12

B. 84

C. 210

D. 5040