

Indiana State Mathematics Contest
2015

Pre-Algebra

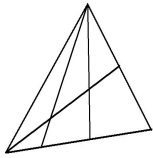
Do not open this test booklet until you have been advised to do so
by the test proctor.

This test was prepared by faculty at **Indiana State University**

Next year's math contest date: Saturday, April 23, 2016

1. The average of 12 , $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ is:
- a. $3\frac{2}{3}$ b. $3\frac{23}{36}$ c. $3\frac{23}{12}$ d. $3\frac{23}{24}$ e. $3\frac{23}{48}$
2. The difference between a 6.5% sales tax and a 6% sales tax on an item priced at \$400 before tax is:
- a. \$0.20 b. \$2.00 c. \$10.00 d. \$20.00 e. None of these
3. Twenty and forty-seven thousandths is equal to:
- a. 20.47 b. 20.047 c. 20.47 d. 20.0047 e. None of these
4. If 700 is divided into three parts in the ratio of 1:3:6, then the largest part is equal to:
- a. 70 b. 210 c. 350 d. 420 e. 490
5. The approximate number of seconds in ten years is equal to:
- a. 3,000,000,000 seconds
b. 30,000,000 seconds
c. 150,000,000 seconds
d. 500,000,00 seconds
e. 300,000,000 seconds
6. $\frac{1}{100}$ of 0.01% is:
- a. 0.1 b. 0.001 c. 0.0001 d. 0.00001 e. 0.000001
7. A merchant reduces the price of a \$250.00 item by 35%. The sale price is:
- a. \$ 241.25
b. \$ 87.50
c. \$ 162.50
d. \$ 172.50
e. None of the above

8. What is the total number of positive divisors of 105?
 a. 7 b. 8 c. 9 d. 16 e. 20
9. Currently, John is two times as old as his son and three times as old as his daughter. If their total age six years ago was 59, find the sum of their present ages.
 a. 65 b. 71 c. 79 d. 85 e. None of these
10. How many triangles are in the figure below?



- a. 8 b. 9 c. 12 d. 15 e. 18
11. Susan had two-thirds as much money as Mary at first. After receiving half of Mary's money, Susan had \$210. How much money did Susan and Mary have at first?
 a. \$240 b. \$300 c. \$360 d. \$420 e. None of these
12. If you walk for 45 minutes at a rate of 4 mph and then run for 30 minutes at a rate of 10 mph, how many miles have you gone at the end of one hour and 15 minutes?
 a. 3.5 miles b. 7 miles c. 8 miles d. 480 miles e. None of these
13. If the radius of a circle is decreased by 50%, the area is decreased by:
 a. 25% b. 50% c. 75% d. 100% e. None of these
14. The number halfway between $10\frac{1}{8}$ and $10\frac{7}{12}$ is:
 a. $10\frac{2}{5}$ b. $10\frac{1}{2}$ c. $10\frac{1}{3}$ d. $10\frac{11}{48}$ e. $10\frac{17}{48}$

15. Sixteen points are on the circumference of a circle. How many lines will it take to connect every point to every other point?

- a. 16 b. 80 c. 120 d. 160 e. 240

16. A, B, and C each can be any digit 0 through 9, possibly the same. The seven digit whole number: **20ABC01** is a perfect square. What is the middle digit, B?

- a. 1 b. 3 c. 5 d. 7 e. 9

17. $30 \div 2 + 3 \times 2$

By inserting exactly one pair of parentheses into this expression, HOW MANY of the following five numbers can be produced?

2 3.75 12 21 36

- a. ONE b. TWO c. THREE d. FOUR e. FIVE

18. A sidewalk 3 feet wide borders a flowerbed that is 8 feet by 10 feet. What is the area of the sidewalk in square feet?

- a. 224 b. 144 c. 80 d. 60 e. None of these

19. A train traveling at 30 miles per hour reaches a tunnel that is 9 times as long as the train. If the train takes 2 minutes to completely clear the tunnel, then how long is the train in feet? (1 mile equals 5280 feet)

- a. 528 feet b. 1056 feet c. 2640 feet d. 5280 feet e. None of these

20. If 6 men build a wall 20 feet long, 6 feet high, and 4 feet wide in 16 days, in what time will 24 men build one that is 200 feet long, 8 feet high, and 6 feet wide? (**The Scholar's Arithmetic**, Daniel Adams, 1815.)

- a. 32 days b. 48 days c. 60 days d. 80 days e. 96 days

21. How many positive factors of 36 are also multiples of 6?

- a. 2 b. 3 c. 4 d. 5 e. 6

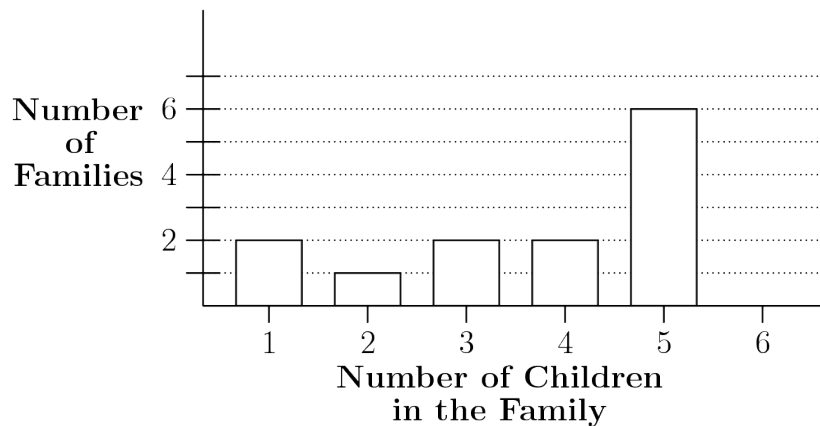
22. An unknown number of cookie jars are placed in a room. The first cookie jar has 297 cookies inside it. The second jar contains 290 cookies. The third one has 283 inside it. Following the pattern, the last jar contains 129 cookies. How many cookies are there in total?

- a. 4899 b. 5112 c. 5325 d. 5538 e. 5751

23. If the sum of five consecutive integers is 1200, what is the product of the largest and the smallest integers?
- a. 57600 b. 57596 c. 57584 d. 57564 e. None of these
24. Given a right triangle whose three sides are consecutive even integers, find its area.
- a. 24 b. 40 c. 60 d. 84 e. None of these
25. Twenty one years ago, Aaron was thirty four years older than Grace was. Eleven years from now, the total of their ages will be one hundred thirty six. Claire's age is the median of the trio. How old could Claire be now?
- a. 35 years old b. 41 years old c. 80 years old d. 100 years old e. None of these
26. What is the probability of being dealt a face card then a spade from a standard deck of 52 cards?
- a. $\frac{3}{52}$ b. $\frac{1}{17}$ c. $\frac{1}{13}$ d. $\frac{5}{52}$ e. None of these
27. The area of a circle is $16\pi \text{ cm}^2$. The circumference of this circle is, in cm:
- a. 8π b. 24 c. 8 d. 4π e. None of these
28. Two fair dice are rolled. What are the odds that the product of the two numbers on the top is 12?
- a. $\frac{1}{8}$ b. $\frac{1}{9}$ c. $\frac{1}{6}$ d. $\frac{5}{31}$ e. None of these
29. How many prime numbers are between 100 and 150?
- a. 8 b. 9 c. 10 d. 11 e. 12
30. If the area of a square is 144, then the circumference of its' inscribed circle is:
- a. 144π b. 12π c. 15π d. 71π e. None of these
31. Grace is ten years older than Eddie. Daniel is two years older than Haley. Paavan is three years younger than Leo. Harry is twenty years older than Aaron. Eddie is one year younger than Samhita. Aaron is two years younger than Leo. Casey is two years younger than Samhita. Aaron is five year older than Casey. Haley is one year older than Harry. Akash is nine years older than Casey. When listing all people's ages in ascending order, whose age will be the median?
- a. Leo b. Casey c. Daniel d. Eddie e. Harry

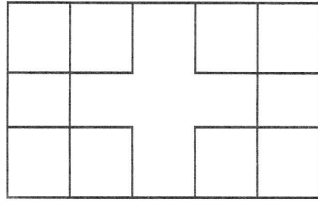
32. Four children were born at City Hospital yesterday. Assume each child is equally likely to be a boy or a girl. Which of the following outcomes is most likely?
- (A) all 4 are boys
 - (B) all 4 are girls
 - (C) 2 are girls and 2 are boys
 - (D) 3 are of one gender and 1 is of the other gender
 - (E) all of these outcomes are equally likely

33. The graph shows the distribution of the number of children in the families of the students in Ms. Jordan's English class. The median number of children in the family for this distribution is



- a. 1 b. 2 c. 3 d. 4 e. 5
34. On the last day of school, Mrs. Wonderful gave jelly beans to her class. She gave each boy as many jelly beans as there were boys in the class. She gave each girl as many jelly beans as there were girls in the class. She brought four hundred jelly beans, and when she finished, she had six jelly beans left. There were two more boys than girls in her class. How many students were in her class?
- a. 26 b. 28 c. 30 d. 32 e. 34
35. For the game show *Who Wants To Be A Millionaire?*, the dollar values of each question are shown in the following table (where K = 1000).
- | Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|----------|-----|-----|-----|-----|----|----|----|----|-----|-----|-----|------|------|------|-------|
| Value | 100 | 200 | 300 | 500 | 1K | 2K | 4K | 8K | 16K | 32K | 64K | 125K | 250K | 500K | 1000K |
- Between which two questions is the percent increase of the value the smallest?
- (A) From 1 to 2 (B) From 2 to 3 (C) From 3 to 4 (D) From 11 to 12 (E) From 14 to 15

36. How many rectangles of any size are in the following figure?

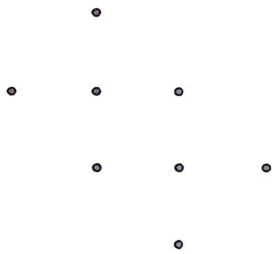


- a. 24 b. 22 c. 20 d. 18 e. None of these

37. Chinthan, whose dog Silly runs 12 miles per hour, jogs at 5 miles per hour, and Krishan walks 3 miles per hour. Chinthan and Krishan start at the same point moving in the same direction, but Chinthan and his dog depart 30 minutes after Krishan depart. How far will Silly run if he runs back and forth between Chinthan and Krishan until Chinthan catches up with Krishan?

- a. 8 miles b. 9 miles c. 10 miles d. 12 miles e. None of these

38. How many right triangles can be created by connecting points on the unit grid below?



- a. 28 b. 22 c. 18 d. 15 e. None of these

39. A man is running through a train tunnel. When he is $\frac{4}{11}$ of the way through, he hears a train approaching the tunnel from behind him at a speed of 44 mph (miles per hour). Whether he runs ahead or runs back, he will reach an end of the tunnel at the same time the train reaches that end. Assume he runs at a constant rate. At what rate, in miles per hour, is he running?

- a. 10 mph b. 11 mph c. 12 mph d. 14 mph e. 15 mph

40. Points A, B, C, and D are placed in that order on a number line so that $AB = 2BC = CD$. What is the ratio of BD to AD?

- a. $\frac{1}{2}$ b. $\frac{3}{4}$ c. $\frac{2}{5}$ d. $\frac{1}{5}$ e. $\frac{3}{5}$