

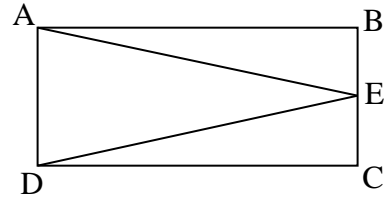
Seventh Grade Test - Excellence in Mathematics Contest – 2012

12. For how many natural numbers N is $\frac{N}{60}$ greater than $\frac{1}{4}$ AND less than $\frac{2}{3}$?
- A. 23 B. 24 C. 25 D. 26 E. 30
13. The average of five different positive odd numbers is 15.
What is the largest possible value of any one of these five numbers?
- A. 19 B. 27 C. 39 D. 59 E. 71
14. A 9.0 earthquake and resulting tsunami struck Japan at approximately 3 PM on Friday, March 11, 2011.
About 211 hours later, 80-year old Sumi Abe and her 16-year old grandson Jin Abe were found alive in the damaged kitchen of their collapsed house. When were they found?
- A. 10 AM Saturday, March 19 B. 11 PM Saturday, March 19
C. 10 AM Sunday, March 20 D. 11 PM Sunday, March 20
E. 8 PM Saturday, March 19
15. One side of square A is five times the length of one side of square B.
How many times greater is the area of square A than the area of square B?
- A. 5 B. 10 C. 15 D. 20 E. 25
16. The sum of four numbers is 1473.23. The average of three of the numbers is 438.8.
What is the fourth number?
- A. 156.83 B. 157.19 C. 344.81 D. 368.3075 E. 1034.43
17. Jui Chin put \$10 into savings on January 1, \$20 on February 1, \$30 on March 1, and so on. Each month he saved \$10 more than the previous month.
Mui Tze put \$1 into savings on January 1, \$2 on February 1, \$4 on March 1, and so on. Each month she saved twice as much as the previous month.
At the end of one year, how much more had Mui Tze saved than Jui Chin?
- A. \$1268 B. \$3315 C. \$3435 D. \$7410 E. \$7411
18. In basketball, a player can score by making 2-point shots, 3-point shots, or 1 point for each free throw made. In one game, Loni made four of seven 2-point shots, two of five 3-point shots, and attempted 16 free throws.
If she scored 24 points, what percent of her free throws did she make?
- A. 37.5% B. 50% C. 60% D. 62.5% E. $66\frac{2}{3}\%$
19. Several rectangles with a perimeter of 14 inches have widths and lengths that are a whole number of inches.
How many different areas are possible for these rectangles?
- A. 1 B. 2 C. 3 D. 4 E. 6

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20. If the perimeter of rectangle ABCD is 160 inches and CD = 48 inches, what is the area of triangle AED?

- A. 640 in^2 B. 704 in^2 C. 768 in^2
D. 840 in^2 E. 2688 in^2



21. A pizza is cut into N identical slices. Philippe eats the last four slices which was $\frac{2}{5}$ of the pizza. What is N?

- A. 10 B. 12 C. 15 D. 16 E. 20

22. What is the ratio of the number of degrees in an interior angle of a regular octagon to the number of degrees in an interior angle of a regular hexagon?

- A. $\frac{1}{2}$ B. $\frac{9}{8}$ C. $\frac{3}{4}$ D. $\frac{9}{4}$ E. $\frac{3}{8}$

23. If $N+4$ is an odd number, then how many of these four numbers must be odd?

$$3N; \quad 4N+1; \quad N^2; \quad \frac{N+1}{2}$$

- A. 0 B. 1 C. 2 D. 3 E. 4

24. In a 6-year period from January 1, 2005 to January 1, 2011, the Pierce Auger Observatory in Argentina detected 1.6 million particle showers caused by cosmic rays. What rate is this in terms of *particle showers per hour*? Round to one decimal place.

- A. 30.4 B. 182.6 C. 304.4 D. 1862.5 E. 1095.9

25. The average of 18 consecutive odd numbers is 50. What is the largest of these 18 numbers?

- A. 59 B. 67 C. 69 D. 79 E. 85

26. To swim 800 m in her family's rectangular pool, Fran could swim the length 50 times or she could swim the perimeter of the pool 16 times. In square meters, what is the area of the pool?

- A. 144 B. 196 C. 400 D. 544 E. 800

27. The sum of A and B is 44. Also, A is 28 larger than B. What is $A \div B$?

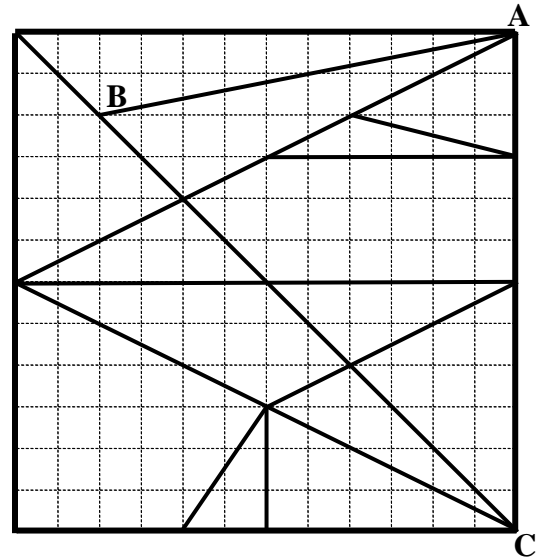
- A. 1.75 B. 2 C. 2.5 D. 4 E. 4.5

28. In the following expression, the variables **a**, **b**, **c**, and **d** are replaced by the numbers 1, 2, 3, and 4, but not necessarily in that order. Each letter is for a different number. What is the minimum possible value of: $\mathbf{a * b^c - d}$?

- A. -2 B. -1 C. 0 D. 1 E. 2

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About 2500 years ago the Greek mathematician Archimedes studied the geometry of a game called Stomachion. The game consisted of 14 polygonal pieces that fit together to form a 12 by 12 square grid (see the diagram). The 14 pieces do not overlap and every vertex of each shape lies exactly on a lattice point of this grid.



29. What is the area of triangle ABC?

- A. 60 square units B. 60.5 square units
- C. 61.5 square units D. 62 square units
- E. 62.5 square units

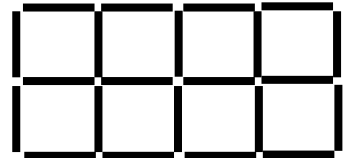
30. In the diagram for Stomachion, what is the perimeter of triangle ABC? Round your answer to the nearest tenth of a unit.

- A. 32.0 units B. 33.5 units C. 35.5 units D. 35.9 units E. 36.3 units

31. A bicyclist climbs a 10-mile mountain road at an average rate of 8 miles per hour and then descends the same 10-mile route at an average rate of 30 mph. What is his average speed in miles per hour for this 20-mile ride? Round your answer to one decimal place.

- A. 12.6 B. 13.5 C. 16.2 D. 17.0 E. 19.0

32. Twenty-two rods of equal length are needed to build this 2 by 4 array of 8 small squares. How many rods would be needed to construct a 2 by 40 array of 80 small squares?



- A. 200 B. 202 C. 206 D. 216 E. 220

33. There are 4 red marbles, 5 blue marbles, 6 green marbles, and 7 yellow marbles in a bag. Without looking, what is the minimum number of marbles that must be drawn from the bag to be absolutely sure that at least three of the balls drawn are the same color?

- A. 9 B. 10 C. 12 D. 18 E. 21

34. Three men start work at 6:00 AM to dig two holes. Assume that each worker digs at the same rate. One of them works alone and finishes digging a 3 foot by 3 foot by 3 foot hole at 8:00 AM. The other two men work together to dig a 6 foot by 6 foot by 6 foot hole. At what time will these two men finish?

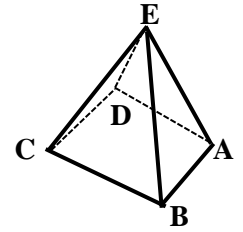
- A. 8:00 AM B. 10:00 AM C. 2:00 PM D. 4:00 PM E. 10:00 PM

35. When a fair 6-sided die is rolled, the bottom face cannot be seen. What is the probability that the product of the numbers on the other five faces is a multiple of 40?

- A. 1/3 B. 1/2 C. 2/3 D. 5/6 E. 1

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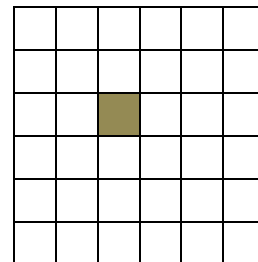
36. The base of this pyramid is a rectangle ABCD with $AB = 10$ cm and $BC = 18$ cm. The height of the pyramid is 12 cm. Also, $AE = BE = CE = DE$. What is the sum of the areas, in square centimeters, of the five faces of this pyramid?



- A. 516 B. 524 C. 544 D. 564 E. 600
37. A 200 ml mixture is 80% water and 20% bleach. How much water must be added to dilute the mixture to 5% bleach?
- A. 160 ml B. 300 ml C. 320 ml D. 600 ml E. 640 ml
38. The product of the digits of many 4-digit numbers is 96. What is the sum of the greatest and the least such 4-digit numbers?
- A. 9779 B. 9889 C. 9999 D. 10,550 E. 10,560

39. In this 6 by 6 grid of squares, there are squares in size from 1 by 1 to 6 by 6. Using the grid lines, what is the total number of squares (of all sizes) which include the shaded square?

- A. 18 B. 20 C. 26
D. 28 E. 91



40. Complete this 4 by 4 grid so that the numbers 1, 2, 3, and 4 occur in every row and in every column. In addition, the three greater than and less than symbols indicate which of the two adjacent numbers is larger or smaller.

What is the sequence of numbers in the SECOND row (from the top)?

- A. 2341 B. 3421 C. 3241
D. 4231 E. 4321

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