1. How many 500 milliliter bottles can be filled into a 5 liter bottle? (There are 1000 milliliters in a liter).
(**A**) 5   (**B**) 500   (**C**) 50   (**D**) 100   (**E**) 10

2. Four AOPS users, popcorn1, alberty44, lego101, and paperplates, either do or don't do their homework. If a person did his/her homework, that person tells the truth. Otherwise the person lies. All four users said something about how many, out of the four of them, did their homework.
popcorn1: Nobody did their homework.
alberty44: 1 person did their homework.
lego101: 2 people did their homework.
paperplates: 3 people did their homework.
Who is correct?
(**A**) popcorn1   (**B**) alberty44   (**C**) lego101   (**D**) paperplates
(**E**) Two users are correct.

3. Paco the Prairie Dog and his 3 friends are getting one-scoop ice creams. However, he only has enough Prairie bucks to buy one-scoops for 3 people (total of 3 scoops). If they want to split the ice cream evenly, what fraction of one-scoop will each person receive?
(**A**) $\frac{1}{2}$ (**B**) $\frac{3}{5}$ (**C**) 1   (**D**) $\frac{3}{4}$ (**E**) $\frac{1}{3}$

4. I have 5 less marbles than John. John has 9 more marbles than Jenny. Jenny has 10 less marbles than Luke. If Luke has 37 marbles, how many marbles do I have?
(**A**) 31   (**B**) 32   (**C**) 33   (**D**) 34   (**E**) 35

5. What is half the volume of a 2 by 7 by 21 rectangular prism when all the sides are quadrupled?
(**A**) 9400   (**B**) 9404   (**C**) 9408   (**D**) 9410   (**E**) 9414

6. Meredith arrives to work with either her husband and/or daughter. There is a $\frac{3}{4}$ chance that she arrives with her husband and $\frac{5}{6}$ chance she arrives with her daughter, Ellis. What is the probability that she arrives with both her husband and Ellis?
(**A**) $\frac{7}{12}$ (**B**) $\frac{1}{2}$ (**C**) $\frac{2}{3}$ (**D**) $\frac{8}{15}$ (**E**) 1

7. How many 4 digit numbers can you make out of 2, 3, 4,and 8 that are divisible by the number 4?
(**A**) 2   (**B**) 4   (**C**) 6   (**D**) 8   (**E**) 10

8. In Bubble World, $a+b$ actually equals to $(a+b)(a^2)$ in Earth terms. What is, in Earth terms, $1+1$ in Bubble terms?
(**A**) 0   (**B**) 1   (**C**) 2   (**D**) 3   (**E**) 4

9. What is the one-fourth the area of a rhombus with the longer diagonal being 10, and 2 angles are 120 degrees? Express your answer in simplest
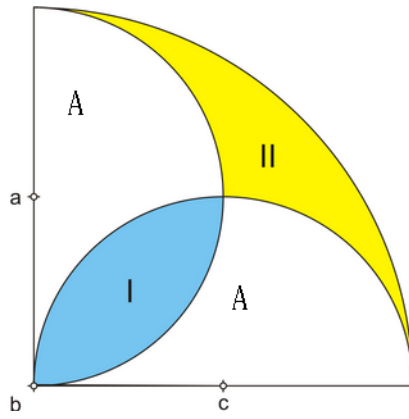
radical form.

(**A**) $\frac{25\sqrt{3}}{6}$ (**B**) $\sqrt{50}$ (**C**) $\frac{50\sqrt{3}}{3}$ (**D**) 50   (**E**) $\frac{10\sqrt{3}}{3}$

10. In a semicircle with the diameter of 8, A rectangle with the longer side on the diameter is inscribed in the semicircle. If the origin of the circle divides the longer side of the rectangle into two equal parts, what is half the perimeter of the rectangle?
(**A**) $4\sqrt{2}$ (**B**) $6\sqrt{2}$ (**C**) 11   (**D**) $100\sqrt{2}$ (**E**) Other answer

11. Which one of these statements are true if Alejandro can tell lies or truths, Bolombo only tells lies, and Carlos Juan can do either?
A: Carlos Juan is lying.
B: Alejandro is telling the truth.
C: Bolombo is lying.
(**A**) A   (**B**) A and C   (**C**) C   (**D**) None are true   (**E**) All

12. How many 0's are in the factorial of 50?
(**A**) 8   (**B**) 9   (**C**) 10   (**D**) 11   (**E**) 12

13. Juanny can chose 27 cupcakes from 4 different flavors: strawberry, pistachio, chocolate, and vanilla. How many ways are there for her to do this?
Note: She does not have to pick at least one of each kind.
(**A**) 4   (**B**) 100   (**C**) 245   (**D**) 4060   (**E**) 17550

14. A square is inscribed within a circle and the circle is inscribed within an equilateral triangle. One side of the square measures 1cm. How many centimeters are in one side of the triangle?
(**A**) $\sqrt{2}$ (**B**) $\sqrt{3}$ (**C**) 2   (**D**) $\sqrt{6}$ (**E**) Other

15. In SHS, there are between 1050 and 1100 students. If 16 students are to be in each classroom, there is one student short of making a full class. If 18 students are assigned a classroom, there are 9 students short from making a full class. How many kids attend SHS? (**A**) 1071   (**B**) 1072   (**C**) 1070   (**D**) 1081   (**E**) 1077

16. JB is thrown out of a plane at the altitude of 17290 feet. Right after being thrown out of the plane, he has a parachute and the convection currents slow his fall to 27 feet per second. After the first 5697 feet, JB's parachute falls apart, and his fall increases by 73 feet per second. At the altitude of 593 feet, JB falls at a rate of 148.25 feet per second. How many minutes did it take for JB to fall before he lands?
(**A**) 345 seconds   (**B**) 315 seconds   (**C**) 320seconds   (**D**) 325 seconds   (**E**) 335 seconds

17. What is the units digit of the sum of the units digits of all the squares from 1 to 2016 ?
(**A**) 6   (**B**) 5   (**C**) 3   (**D**) 2   (**E**) 7

18. Which number, when multiplied and added to the quantity $\frac{3y+9}{7}$ has the same result when the same number is added and then divided from the quantity $\frac{3y+9}{7}$?

    (**A**) 0   (**B**) 4   (**C**) 2   (**D**) 5   (**E**) 1

19. What is the remainder of $5^{2017}+3^{2016}+2^{2015}+9^{2014}$ when divided by 5?

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

20. A cylinder with a smaller radius is inside a cylinder with a larger radius. The heights of the cylinders are the same. The top of the two cylinders form two concentric circles. There is a chord of the length 14 running through the circle of the outer cylinder. The chord is tangent to the circle of the inner cylinder. If the height is 12 what is the volume of the area outside the smaller cylinder but inside the larger cylinder?

    (**A**) $598pi$ (**B**) $589pi$ (**C**) $72pi$ (**D**) $588pi$ (**E**) $84pi$
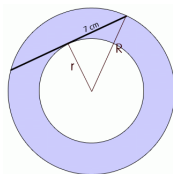
21. A knight is said to attack another knight if it is on a square where it can be on the other knight's position in the next move. (remember, a knight moves in an L shape, down/up/sideways 3, then down/up/sideways 2, or vice versa) What is the maximum number of squares that knights can occupy on an 8 by 12 chessboard such that no knights are attacking each other?

    (**A**) 24   (**B**) 32   (**C**) 36   (**D**) 42   (**E**) 48

22. In the Political Committee of the North Pole, there are 5 democrats, 2 independents, and 3 republicans. If at least 2 people from each group needs to sign the Polar Bear Law in order for it to pass, what is the probability of this law passing? Assume that it is equally likely for someone to vote yes or no.

    (**A**) $\frac{10}{36}$ (**B**) $\frac{13}{36}$ (**C**) $\frac{29}{72}$ (**D**) $\frac{13}{128}$ (**E**)

23. What number is a third of the smallest number besides 6, 28, and 496 that is twice the sum of its factors?

    (**A**) $2709\frac{1}{3}$ (**B**) 2709   (**C**) $2709\frac{2}{3}$ (**D**) 8182   (**E**) 8218

24. What is the smallest positive integer y that contains the digit 7 and when expressed as $\frac{1}{y}$ is a terminating decimal?

    (**A**) 27   (**B**) 1575   (**C**) 32768   (**D**) 78125   (**E**) 32678

25. In the diagram below, a large quarter circle is divided into 4 regions. If the length of the same quarter circle is $21pi$, what is the area of region I?

(**A**) $441pi - 441$ (**B**) $220.5pi - 441$ (**C**) $441pi - 220.5$ (**D**) $441pi - 441$ (**E**) $220.5pi - 220.5$