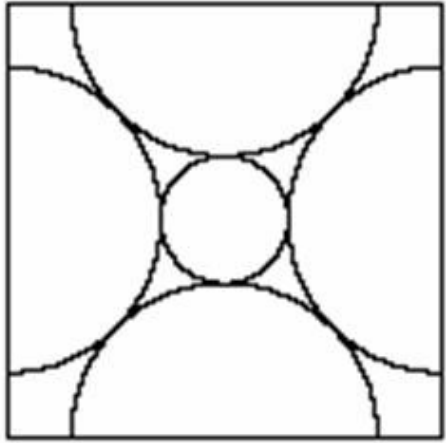


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Math Kangaroo
Level of grades 1-5



multiplied by 7, is smaller than 2003
 A) 256 B) 266 C) 276 D) 286

2. A flower-bed in our garden has the shape of a circle with a diameter c m. Another flower-bed, the area of which is four times greater than the area of the flower-bed in our garden. What is the diameter of this flower-bed?
 A) 2.4 m B) 3.6 m C) 4.8 m D) 6.4 m E) 9.6 m

3. If $1 - \frac{4}{x} + \frac{4}{x^2} = 0$, then $\frac{2}{x}$ is equal to

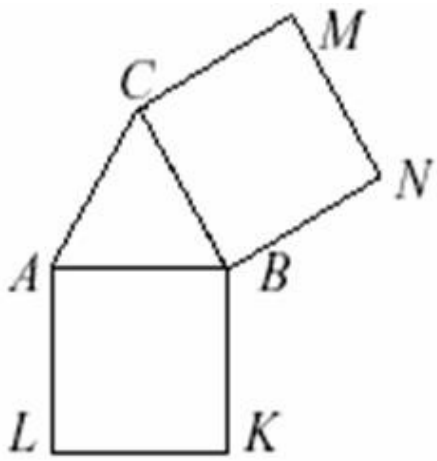
- A) -1 B) 1 C) 2 D) -2 E) 4

4. In triangle ABC the measure of angle C is three times greater than the measure of angle A and the measure of angle B is two times greater than the measure of angle A .
 Triangle ABC is

- A) Equilateral B) Isosceles C) Obtuse D) Right E) Acute

5. The fifth number in the sequence $x, y, x + y, x + 2y, 2x + 3y, 3x + 5y$ equals 7. The sum of these six numbers is equal to

- A) 7 B) 8 C) 14 D) 21 E) 28



6. Squares were made on sides AB and BC of the equilateral triangle ABC (see the figure).
 The measure of the angle CNK is equal to

- A) 75° B) 90° C) 105° D) 120° E) 150°

7. Which of the numbers below is odd regardless of the value of the natural number n ?

- A) $2003n$ B) $n^2 + 2003$ C) n^3 D) $n + 2004$ E) $2n^2 + 2003$

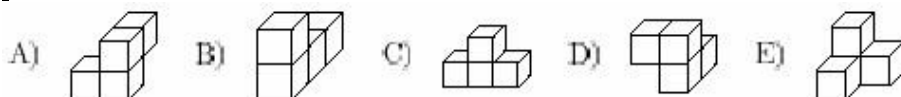
8. For any positive natural numbers a, b, m, n , satisfying the equation $\frac{m}{n} = \frac{a}{a-b}$ the sum $\frac{a}{b} + \frac{m}{n}$ equals:

- A) $\frac{ab}{mn}$ B) $\frac{nb}{ma}$ C) $\frac{mb}{na}$ D) $\frac{mn}{ab}$ E) $\frac{am}{bn}$

9. What is the area of the triangle indicated in the figure?

- A) 16 B) 32 C) 48 D) 12 E) 22

10. A rectangular prism was made out of four blocks, each consisting of four little cubes. Three of these blocks are shown completely in the picture. Which of the blocks below has the same shape as the white block?

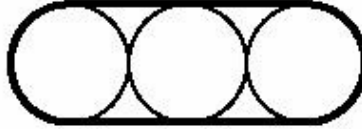
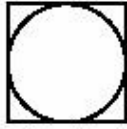


Problems 4 points each

11. Which of the numbers below is greatest?

- A) 22222 B) 2222^2 C) 222^{22} D) 22^{222} E) 2^{2222}

12. The area of the square shown in the picture equals a . The area of each circle equals b . What is the area of the figure circled with the bold line?



- A) $3b$ B) $2a + b$ C) $a + 2b$ D) $3a$ E) $a + b$

13. The number $a = 111\dots11$ is made out of 2003 digits, all equal to 1. What is the sum of the digits of number $2003 \times a$?

- A) 10,000 B) 10,015 C) 10,020 D) 10,030 E) 2003×2003

14. In rectangle $ABCD$ points P, Q, R, S are respectively the midpoints of sides AB, BC, CD and DA (see the picture). Let T be the midpoint of segment RS . What fraction of the area of rectangle $ABCD$ is the area of triangle PQT ?

- A) $\frac{5}{16}$ B) $\frac{1}{4}$ C) $\frac{1}{5}$ D) $\frac{1}{6}$ E) $\frac{3}{8}$

15. It takes 15 minutes for a cyclist to travel from town A to town B and to return to town A. On the way from A to B the cyclist's speed equals 5 m/s, and his speed on the way back is 4 m/s. The distance between towns A and B equals

- A) 4.05 km B) 8.1 km C) 0.9 km D) 2 km E) 2.25 km

16. When a barrel is 30% empty, it contains 30 liters more water than when it is 30% full. What is the capacity of the barrel?

- A) 60 liters B) 75 liters C) 90 liters D) 100 liters E) 120 liters

17. The value of the product $(1 + \frac{1}{2}) \times (1 + \frac{1}{3}) \times \dots \times (1 + \frac{1}{2003})$ equals:

- A) 2004 B) 2003 C) 2002 D) 1002 E) 1001

18. Let $x = \sqrt{2} + \sqrt{6}$, $y = \sqrt{2 + \sqrt{3}}$. Then

- A) $x = y$ B) $2x = y$ C) $x = 2y$ D) $x = y + 1$ E) $x = y + 2$

19. What is the sum of all four-digit numbers consisting of only two zeros, the digit 2 and the digit 3 (2003 is an example of this kind of a number)?

- A) 5,005 B) 5,555 C) 16,665 D) 1,110 E) 15,555

20. By symbols bc and abc we indicate respectively two- and three-digit numbers with c as the digit of ones, b as the digit of tens, and a as the digit of hundreds. Let letters x, y, z indicate different digits, and let the sum of numbers xx, yy, zz be equal to the three-digit number zyx . Then the letter x represents the digit

- A) 1 B) 2 C) 7 D) 8 E) 9

Problems 5 points each

21. Four children P, Q, R, S made the following statements:

P: "Q, R and S are girls."

Q: "P, R and S are boys."

R: "P and Q are lying."

S: "P, Q and R are saying the truth." How many of the children were telling the truth?

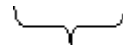
- A) 0 B) 1 C) 2 D) 3 E) This cannot be solved.

22. In the picture there is a square, four semi-circles with centers in the midpoints of the square's sides and radii of 1, and a small circle tangent to the four semi-circles. The radius of the small circle equals

- A) $\sqrt{2}-1$ B) $\frac{1}{2}\pi-1$ C) $\sqrt{3}-1$ D) $\sqrt{5}-1$ E) $\sqrt{7}-1$

23. What are the last four digits of the sum $1 + 11 + 111 + \dots + 111\dots11$?

_____ 2003 digits



- A) 0123 B) 1123 C) 2003 D) 2123 E) 2223

24. Each of two students changed two of the digits in the number 888, and came up with a new three-digit number divisible by 8. What is the greatest possible difference between the numbers created that way?

- A) 800 B) 840 C) 856 D) 864 E) 904

25. In the picture four squares are shown and the lengths of their sides are indicated. What is the difference between the combined area of the shaded regions and the combined area of the black regions?

- A) 25 B) 36 C) 44 D) 64 E) 0

26. For a certain natural number n the fraction $\frac{5n+6}{8n+7}$ can be reduced. By what number?

- A) 7 B) 11 C) 13 D) 17 E) 19

27. What is the greatest number of consecutive integers such that the sum of the digits of none of them is divisible by 5?

- A) 5 B) 6 C) 7 D) 8 E) 9

28. There are six sticks with lengths 2, 4, 4, 10, 22, 37. How many isosceles trapezoids can be constructed, each time using

all six sticks?

- A) 1 B) 2 C) 3 D) 4 E) 5

- 29. The first student wrote the number 1 on the board, the second student wrote the number 2, and the third one and each of the following students wrote a number that was the quotient of the number written before the last one and the last number. What did the tenth student write?

- A) 2^{-10} B) 256 C) 2^{-13} D) 1024 E) 2^{34}

- 30. We are writing all numbers, with at most 5 digits, such that each one can only be made up of the digits 0 and 1. How many times does the digit 1 appear in all these numbers?

- A) 36 B) 48 C) 80 D) 160 E) 320

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