

Category III (Grades 7&8)

1. Find the last digit of the number $217^{202^{1333}}$

- A) 1 B) 3 C) 9 D) 7

2. Find the value of

$$\left(6.3 : \left(-\frac{9}{20}\right) - 2,6 : \left(-\frac{1}{20}\right)\right) \cdot \left(-\frac{4}{19}\right) - \frac{0.6}{-0.36}$$

- A) -6 B) $-\frac{13}{2}$ C) 13 D) $-\frac{19}{3}$

3. $(-2x - 3y)^2 + (-2x + 3y)^2 =$

- A) $8x^2 + 18y^2$ B) $-24xy$ C) $(4x^2 + 12xy + 9y^2)$ D) $18y^2 - 4x^2$

4. $\frac{9^5 \cdot 6^9}{16^2 \cdot 3^{19}} = ?$

- A) 4 B) 2 C) $\frac{4}{3}$ D) 6

5. Given sum $8 + 8 + 8 + \dots + 8$ is equal to 4^{36} . How many assemblies does the sum contain?

- A) 35 B) 8^{23} C) 21 D) 8^{33}

6. The angle A of triangle ABC is 60° , and intersects the bisector of angle A, the median B of the vertex, and the elevation point C from the vertex C. Find \angle the ACB.

- A) 30° B) 45° C) 80° D) 60°

7. Solve equation $(4a^2 + 3)^2 + (7 - 4a^2)^2 - 2(4a^2 + 3)(4a^2 - 7) = a + 96$

- A) $a = 3.5$ B) $a = 4$ C) $a = 4.5$ D) $a = 5$

8. If $111\ 111 - 222 = a^2$, Then $a =$

- A) 111 B) 223 C) 333 D) 443

9. The price of fabric has risen by 12% of its price. What percentage of the new price is the old price?

- A) $\frac{225}{3}\%$ B) $\frac{625}{7}\%$ C) $\frac{565}{6}\%$ D) $\frac{338}{5}\%$

10. The President of Dollarstan is deciding between two income tax plans. According to one of the plans, all residents would pay tax equal to 10% of their yearly income (if this income is positive). According to the other plan, the first 150,000 D-dollars of a resident's yearly income would not be taxed, and the tax (if any) would equal 16% of any yearly income over 150,000 D-dollars. The President cannot decide which tax plan to propose because his own tax under either plan is the same. What is the yearly income (in D-dollars) of the President of Dollarstan? Note that this income is a positive number.

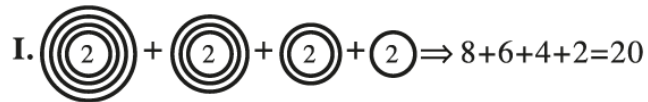
A) 400 000

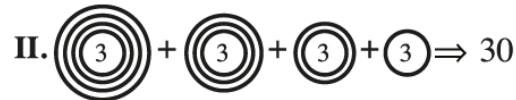
B) 240 000

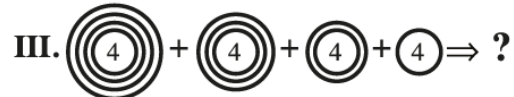
C) 320 000

D) 480 000

11. With the given rule, find the last expression.

I.  $\Rightarrow 8+6+4+2=20$

II.  $\Rightarrow 30$

III.  $\Rightarrow ?$

A) 40

B) 44

C) 48

D) 52

12. Which number should replace the question mark?

1	
3	2
7	5
15	26
31	?

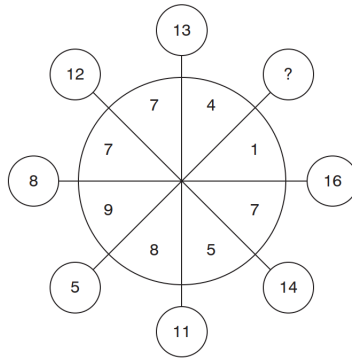
A) 64

B) 123

C) 677

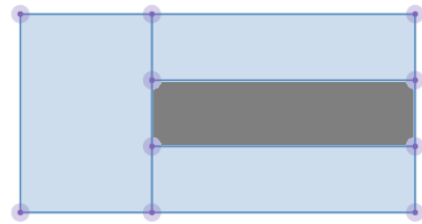
D) 942

13. Which number should replace the question mark?



- A) 17 B) 15 C) 11 D) 18

14. A rectangle whose length is twice its width, is divided into 4 rectangles with equal areas. How do the sides of a darkened rectangle relate to each other?



- A) 1:6 B) 1:4 C) 2:7 D) 2:9

15. What is the sum of the roots of the following equation?

$$||x| - 6| = 4$$

- A) 0 B) 4 C) 10 D) 14

16. Find the value of k for which the equation will have no solution.

$$(k^2 + k - 12)x = k + 4$$

- A) -4 B) 3 C) 2 D) 0

17. Arrange the numbers a, a^2, a^3, a^4, a^5 in ascending order, if $-1 < a < 0$

- A) a, a^2, a^3, a^4, a^5 B) a, a^3, a^4, a^2, a^5
 C) a^5, a^3, a, a^4, a^2 D) a, a^3, a^5, a^4, a^2

18. Three pairs of skis and four pairs of four skates were paid \$ 47. How much does one pair of skis and skates cost, if two pairs of skates cost \$1 more than ski pair.

- A) 10 B) 14 C) 16 D) 9

19. April 1 is Tuesday. What day will be November 19 of the same year?

- A) Monday B) Friday C) Wednesday D) Sunday

20. Solve the inequality $|1 - x| < 2x + 1$

- A) $x \in (-2; +\infty)$ B) $x \in (0; +\infty)$ C) $x \in (-2; 0)$ D) $x \in (2; +\infty)$

21. How many people should we invite to a party so that at least 6 of them have a birthday in one month?

- A) 88 B) 61 C) 72 D) 60

22. 25 cm³ of water comes from the tap in 1 minute. How many liters of water will come out of the tap in 1 day?

- A) 32 B) 36 C) 30 D) 42

23. There are twenty people working in an office. The first group of five works between 8.00 A.M. and 2.00 P.M. The second group of ten works between 10.00 A.M. and 4.00 P.M. And the third group of five works between 12 noon and 6.00 P.M. There are three computers in the office which all the employees frequently use. During which of the following hours are the computers likely to be used the most?

- A) 10.00 A.M. - 12 noon B) 12 noon - 2.00 P.M.
 C) 1.00 P.M. - 3.00 P.M. D) 2.00 P.M. - 4.00 P.M.

24. If L denotes /, M denotes ×, P denotes + and Q denotes -, then which of the following statements is true?

- A) $32 P 8 L 16 Q 4 = - 3/2$ B) $6 M 18 Q 26 L 13 P 7 = 173/13$
 C) $11 M 34 L 17 Q 8 L 3 = 38/3$ D) $9 P 9 L 9 Q 9 M 9 = - 71$

25. The equation of the graph given in the figure is:

- A) $x - 4y = 0$; B) $x + 2y = 0$;
 C) $x^2 - 2xy - 8y^2 = 0$; D) $x^2 - 4y^2 = 0$;

