Pre-Algebra

2010

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Indiana State Mathematics Contest

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

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Next year's math contest date: April 23, 2011

1) $0.00002 \div 0.004$ is equal to

      A) 0.00005   B) 0.00002   C) 0.005   D) 5.0×10^{-2} E) 2.0×10^{-1}

2) $\dfrac{10}{0.01} - 10$ is equal to

      A) 990   B) 900   C) -90   D) -9   E) 9

3)   The integer closest to $\sqrt{\dfrac{60.1}{0.99} + 3.95}$ is

      A) 3   B) 8   C) 9   D) 25   E) 64

4)   Of the following five numbers, 1.1, 1.01, 1.001, 1.0101, 1.00101, the one that is the least is

      A) 1.1

      B) 1.01

      C) 1.001

      D) 1.0101

      E) 1.00101

5)   Of the numbers 0.5129, 0.9, 0.89, and 0.289, the sum of the smallest and the largest is

      A) 1.189   B) 0.8019   C) 1.428   D) 1.179   E) 1.4129

6)   The smallest number in the set $\{(-2.3)^2, 1.03, \sqrt{4}, (1.02)^2, (1.25)^2\}$ is

      A) $(-2.3)^2$ B) 1.03   C) $\sqrt{4}$ D) $(1.02)^2$ E) $(1.25)^2$

7)	$\dfrac{(0.03)^3}{0.0009}$ equals

	A) 3			B) 1			C) 0.3			D) 0.03			E) 0.003

8)	$\left(0.1 + \dfrac{1}{0.1}\right)^2$ equals

	A) 100.01		B) 12.1		C) 102.01		D) 1.21		E) 111.1

9)	Of the following sets of angles, the one which could be the angles of an isosceles triangle is

	A) 40°, 60°, 80°

	B) 91°, 8°, 91°

	C) 70°, 70°, 70°

	D) 50°, 50°, 70°

	E) 54°, 72°, 54°

10)	The number of degrees in one interior angle of a regular polygon is x. In terms of x, the number of sides of the polygon is

	A) $\dfrac{2x+360}{90}$		B) $\dfrac{180}{2x}$		C) $\dfrac{360}{180+x}$		D) $\dfrac{360}{x}$		E) $\dfrac{360}{180-x}$

11)	A triangle ABC is obtuse-angled at C. The bisectors of the exterior angle at A and B meet $\overline{BC}$ and $\overline{AC}$ at D and E respectively. If $AB = AD = BE$, then the measure of $\angle ACB$ is equal to

	A) 105°		B) 108°		C) 144°		D) 135°		E) none of these

12) The lengths of the sides of a triangle are $7-b$, $b+1$, and $4b-2$. The number of values of b for which the triangle is isosceles is

A) 0   B) 1   C) 2   D) 3   E) none of these

13) The average of 0.5, $\dfrac{2}{3}$, and 0.75 is

A) $\dfrac{2}{3}$ B) $\dfrac{23}{36}$ C) $\dfrac{23}{12}$ D) $\dfrac{23}{24}$ E) none of these

14) The average of $\dfrac{2}{3}$, 0.7 and $\dfrac{11}{20}$ is

A) $\dfrac{115}{20}$ B) $1\dfrac{11}{12}$ C) $1\dfrac{3}{4}$ D) $\dfrac{23}{36}$ E) $1\dfrac{7}{12}$

15) The regular price of a pencil is 10 cents and a special sale price for Mondays is 5 cents. If Karen bought 15 pencils on Saturday and 10 on Monday, then how much did she pay for pencils?

A) $50   B) $1.50   C) $2   D) $3   E) none of these

16) Of the following, the one which is not a natural number is

A) $8366 \div 2$

B) $21014 \div 7$

C) $509 \div 5$

D) $3500 \div 25$

E) $380100 \div 20$

17)　The integer 119 is exactly divisible by

　　A)　2　　　　B)　3　　　　C)　5　　　　D)　7　　　　E)　none of these

18)　The number of natural number divisors of 60, excluding 1 and 60, is

　　A)　4　　　　B)　10　　　　C)　11　　　　D)　12　　　　E)　3

19)　If $xy = 6$, $yz = 36$, $z^3 + 1 = 217$, then the value of xyz is

　　A)　648　　　　B)　1296　　　　C)　48　　　　D)　36　　　　E)　none of these

20)　If a, b, and c are real numbers such that $a^2 + b^2 + c^2 = 1$, then the minimum value of $ab + bc + ca$ is

　　A)　-1　　　　B)　$-\dfrac{1}{3}$　　　　C)　0　　　　D)　$\dfrac{1}{2}$　　　　E)　$-\dfrac{1}{2}$

21)　If $a,$　$a + d,$ and $9d + a$ $(d > 0),$ are the sides of a right-angled triangle, then the ratio $a{:}d$ is

　　A)　4:1　　　　B)　8:1　　　　C)　20:21　　　　D)　20:1　　　　E)　none of these

22)　The side, front, and bottom faces of a rectangular solid have areas of x , $\dfrac{y}{2}$, and $8xy$ square centimeters, respectively. The volume of the solid, in cubic centimeters is

　　A)　xy

　　B)　$2xy$

　　C)　x^2y^2

　　D)　$4xy$

　　E)　Cannot be determined from the information given.

23) $90 + 91 + 92 + 93 + 94 + 95 + 96 + 97 + 98 + 99 =$

     A) 845   B) 945   C) 1005   D) 1025   E) 1045

24)   The points $A(30, 40)$, $B(40, 30)$, $C(-30, -40)$, $D(30, -40)$, and $E(40, -30)$ are marked on a coordinate grid. The line segment that is horizontal is

     A) $\overline{AD}$ B) $\overline{BE}$ C) $\overline{BC}$ D) $\overline{CD}$ E) $\overline{AB}$

25)   The point (400, -300) is reflected in the x-axis. The image is then reflected in the y-axis. The coordinates of the point in its final position are

     A) (300, -400)   B) (-300, 400)   C) (-400, 300)   D) (-400, -300)   E) (-300, -400)

26)   If the point (10, 40) is reflected in the line $y = -10$, then its image is

     A) (30, 40)   B) (-10, 40)   C) (10,0)   D) (10, -60)   E) none of these

27)   If the point (a, b) is first reflected in the line $y = 0$, and the resulting point reflected in the line $x = 1$, the image is the point

     A) $(a - 2, -b)$ B) $(-a, 2 - b)$ C) $(2 - a, -b)$ D) $(1 - a, -b)$ E) $(a - 1, -b)$

28)   If (2, 5) is the midpoint of the line segment joining (5, y) and (x, 7), then $x + y$ is equal to

     A) 6   B) 5   C) 7   D) 12   E) none of these

29)   If $ax + 3y = 5$ and $2x + cy = 3$ represent the same straight line, then $a + c$ equals

A) 5   B) $\dfrac{77}{15}$ C) $\dfrac{19}{15}$ D) $\dfrac{31}{5}$ E) $\dfrac{77}{10}$

30)   The ratio of boys to girls in a class is 2:3. If there are 30 students in the class, how many more girls than boys are in the class?

A) 1   B) 3   C) 5   D) 6   E) none of these

31)   If a and b are the x- and y- intercepts of a line which passes through the point (2, 1), then

A) $a(b - 1) = 2b$

B) $a = 2b$

C) $b = 2a$

D) $b(a - 1) = 2a$

E) none of these

32)   The lines $x = 0$, $y = 0$, and $2x + y = 4$ form a triangle. The number of points with integral coordinates which are inside this triangle is

A) 0   B) 1   C) 2   D) 3   E) more than 3

33)   If the area of the square is 36, then the area of the inscribed circle is

A) 36π B) 6π C) 9π D) 12π E) 81π

34) The area of a given circle is 9π cm^2. The diameter of this circle, in cm, is

     A)   9   B)   3   C) $\dfrac{3}{2}$ D) $\dfrac{9}{2}$ E)   6

35) A number which is a multiple of 15, but not a multiple of 18 is:

     A)   180   B)   360   C)   450   D)   420   E)   520

36) 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   B)   8   C)   9   D)   480   E)   none of these

37) The difference between a 7.5% sales tax and a 7% sales tax on an item priced at $200 before tax is:

     A) $0.10   B) $1.00   C) $5.00   D) $10.00   E)   none of these

38) If a and b are two integers with $b > a$, then the number of integers between a and b is

     A) $b - a - 1$

     B) $b - a + 1$

     C) $b - a$

     D) $b - a - 2$

     E)   none of these

39) An unusual die has its six faces labeled 1, 2, 3, 5, 7, 9. If two such dice are rolled, and the numbers showing on the upper faces are added, then the number of possible different sums is

     A)   36   B)   16   C)   15   D)   14   E)   13

40) On each play in a game any one of 5, 4, 3, 2, or 0 points can be scored. The number of combinations of these scores which yield a total of 30 points in 7 plays is

     A)   3   B)   4   C)   5   D)   6   E)   none of these