2012 Hoover HS Math Tournament
Pre-Algebra Written Test

1. Solve the equation: $3x + 4(2 - x) + 9 = 18$

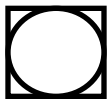
a) -1 b) - ½ c) -3 d) 2 e)NOTA

2. A line passes through the point (3 , -5). What must be true?

I the line passes through quadrant IV
II the line has a slope of $-5/3$
III the line passes through the origin

a) I only b) I & II only c) I & II & III d) III only e)NOTA

3. A circle is drawn inside a square as shown. The area of the circle is π square units. Find the area of the square.



a) 4 b) 4π c) π^2 d) 2 e)NOTA

4. Simplify: $[(3 \times 10^2)^4 (8.1 \times 10^2)^2] \div (9 \times 10^4)^4$

a) 8.1×10^3 b) 2.7×10^{-3} c) 3×10^{-2} d) 8.1×10^{-5} e)NOTA

5. A 20 percent price increase would then require what percent decrease to yield the original amount?

a) 15.25 % b) 20 % c) $16\frac{2}{3}\%$ d) $83\frac{1}{3}\%$ e)NOTA

6. What number comes next in the geometric pattern? 1, 1.1 , 1.21 , 1.331 , 1.4641 , 1.61051 , ?

a) 1.771561 b) 1.1567651 c) 1.82002 d) 1.51123901 e)NOTA

7. If a, b and c are all integers and $a < b < c$, which of the following statements is true?

I. $ac > b$
II. $a < a - c$

a) Sometimes I, Sometimes II b) Sometimes I, Always II
c) Always I, Never II. d) Always I, Sometimes II e)NOTA

8. There are 600 tickets total in a raffle with only one winning ticket. You buy 12 tickets. What are the odds that you bought the winning ticket?

a) 1:600 b) 1:49 c) 1:50 d) 1:12 e)NOTA

9. The ratio of the sides for a quadrilateral are: 1:2:3:4. If the longest side has a measure of 20 units, find the perimeter of the quadrilateral.

a) 45 units b) 400 units c) 80 units d) 40 units e)NOTA

10. Find the sum of the integers from 20 to 79 inclusive.

a) 2970 b) 1800 c) 1580 d) 3000 e) NOTA

11. The Hoover Wrestling Booster Club offers memberships for $10. With a membership you get $1 off the normal $3 ticket price. Including the membership fee, how many tickets must you buy so that you average $2.50 per ticket?

a) 10 b) 20 c) 22 d) 30 e)NOTA

12. Exponents: find the value of x in the equation: $7^{2x} = 49^{16}$

a) 16 b) 8 c) 32 d) 4 e)NOTA

13. A one mile long train traveling at 60 mph is approaching a 2 mile long train traveling 40 mph. The trains are traveling towards each other on adjacent tracks. How long will it take from the time the front of each train passes each other until the end of each train passes each other?

a) 3.3 hr. b) .03 hr. c) .05 hr. d) .3 hr. e)NOTA

14. You roll a standard fair six-sided number cube (a die) five times. What is the probability of getting an even number all five times?

a) 1/2 b) 1/5 c) 1/4 d) 1/32 e)NOTA

15. A spherical ball of clay with a volume of 216 cm^3 is reshaped into a cube. Find the surface area of the cube.

a) 72 cm^2 b) 219 cm^2 c) 216 cm^2 d) 36 cm^2 e)NOTA

16. Each side of a cube is increased by 50%. By what percent does the volume of the cube increase?

a) 125 % b) 50 % c) 150 % d) 237.5 % e)NOTA

17. The signal transmitted by a radio station forms a circular listening area. To reduce costs the station must reduce its transmission power. This causes the radius of its listening area to be reduced by 10%. By what percent is the listening area reduced?

a) 19% b) 3.14 % c) 20% d) 10% e)NOTA

18. Find the units digit when 17^{76} is multiplied out.

a) 7 b) 9 c) 3 d) 1 e)NOTA

19. Find the area bound by the system of inequalities: $\begin{cases} x \leq 0 \\ y \leq \frac{1}{2}x + 4 \\ y \geq -2 \end{cases}$

a) 16 $units^2$ b) 36 $units^2$ c) 18 $units^2$ d) 4 $units^2$ e)NOTA

20. A 20% increase in x results in the same amount as a 20% decrease in y. Find the ratio of x : y

a) 2:3 b) 1:2 c) 1:5 d) 3:4 e)NOTA

21. Simplify: $\frac{8!+7!+6!}{8!-7!-6!}$

a) 4/3 b) -3 c) 3/4 d) 3 e)NOTA

22. The profile of a parabola shaped bowl is formed according to the equation $y = \frac{2x^2}{3}$. If the top of the bowl is 6 inches wide, how deep is the bowl?

a) 4 in. b) 24 in. c) 9 in. d) 6 in. e)NOTA

23. Each locker in a school has a random 3-number combination, where all three numbers are integers. The integers are from 0 to 49 inclusive and can repeat. Find the probability that the first number in the combination is a 12.

a) $\frac{1}{12}$ b) $\frac{1}{125000}$ c) $\frac{1}{150}$ d) $\frac{1}{50}$ e)NOTA

24. Segment AB has the following endpoints: A (4 , 6) B (-7 , 3). If AB is a diameter of circle D, find the length of the radius of circle D.

a) $\frac{\sqrt{130}}{2}$ b) $\sqrt{65}$ c) $10\sqrt{13}$ d) $\sqrt{130}$ e)NOTA

25. Two water pipes are filling a pool. The pool has a volume of 6000 cubic feet. One of the pipes by itself could fill the pool in 12 hours. The other pipe by itself could fill the pool in 20 hours. How long will it take the pipes to fill the pool if they are both on?

a) 7.1 hours b) 10.5 hours c) 7.5 hours d) 16 hours e)NOTA

TB1: If a and b are integers, find the value of a + b in the equation: $3a\pi + 2a = b + 12\pi$
TB2: Find the measure of one interior angle in a regular pentagon.
TB3: Find the slope of the line: $3x + 2y = 5$