

2014 Hoover HS Math Tournament
Pre-Algebra Written Test

1. Find the sum of 131_4 and 110011_2 in base 10.

- a) 110142 b) 26 c) 70 d) 131 e)NOTA

2. A circle with center (4 , 6) has one diameter endpoint at (10 , 14). Find the area of the circle.

- a) 100π units² b) 20π units² c) 400π units² d) 10π units² e)NOTA

3. If a and b are integers and $3b\pi + 14 = 12a\pi + 7a$, find the value of a + b

- a) 10 b) 22 c) 11 d) 36 e) NOTA

4. Many types of trees have concentric rings that can be counted in order to determine the tree's age. Each ring represents one year. A proportion can be written to compare ages and rings for the same type of tree. If one oak tree with a 24 inch diameter has 12 rings then how old would an oak tree be if it has a 38 inch diameter?

- a) 40 years b) 19 years c) 72 years d) 24 years e)NOTA

5. In your pocket you have exactly six bills. They are: three \$10 bills, two \$5 bills and one \$1 bill. You randomly grab two bills at the same time from your pocket. Find the probability that you got both \$5 bills.

- a) $\frac{2}{15}$ b) $\frac{1}{6}$ c) $\frac{1}{3}$ d) $\frac{1}{15}$ e)NOTA

6. On a Tuesday, a teacher took roll and noticed that $33\frac{1}{3}\%$ of the class was absent. If the teacher counts only 18 students present how many students would be in a full class?

- a) 24 b) 30 c) 27 d) 36 e)NOTA

7. The average temperature for a 5 day period was 72°F. After the 6th day the 6-day average was 74°F. What was the temperature on the 6th day?

- a) 73° b) 84° c) 106.7° d) 82° e)NOTA

8. The median height of the 23 players on a boys' lacrosse team is 5ft. 9 in. Find the greatest possible number of boys who could be less than 5 ft. 9 in.

- a) 12 b) 22 c) 11 d) 10 e)NOTA

9. The fraction $\frac{21}{30}$ is the same as which sum:

- a) $\frac{1}{3} + \frac{2}{15} + \frac{1}{2}$ b) $\frac{2}{3} + \frac{1}{15} + \frac{1}{60}$ c) $\frac{1}{6} + \frac{1}{5} + \frac{1}{3}$ d) $\frac{20}{15} + \frac{1}{15}$ e)NOTA

10. A third of all the students at a math tournament are girls. 75% of the girls have blonde hair. A third of the blonde haired girls are from out of state. 10% of the out of state blonde haired girls are tall. If there are 20 tall, out of state blonde girls at the math tournament, how many boys are at the math tournament?

- a) 1600 b) 2400 c) 800 d) 1800 e) NOTA

11. If a & b are integers and $(a \cdot b)^3 < 0$ then what can be true:

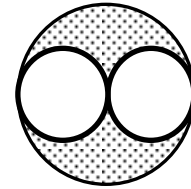
- I. $a < 0$ and $b < 0$
 II. $a > 0$ and $b < 0$
 III. $a < 0$ and $b > 0$

- a) just I b) II or III c) I or III d) I or II e)NOTA

12. Find the sum of all the integers from -50 to 70 inclusive.

- a) 1200 b) 20 c) 1210 d) 2400 e)NOTA

13. A large circle with radius r units, contains two congruent smaller circles as shown.
 Find the area of the shaded region in terms of r .



- a) $2\pi r^2$ units² b) πr units² c) $\frac{\pi r^2}{2}$ units² d) $\frac{\pi r^2}{4}$ units² e)NOTA

14. If $a @ b = \frac{a+2b}{a-2b}$, find the value of $\frac{4 @ 5}{5 @ 4}$

- a) $\frac{14}{-3}$ b) $\frac{7}{26}$ c) $\frac{14}{13}$ d) $\frac{13}{14}$ e)NOTA

15. If $x > 0$ and $x = 2 \cdot a \cdot 4 \cdot a \cdot 6 \cdot a \cdot 8$, what value of a would make x a perfect square?

- a) 2 b) 3 c) 4 d) 6 e)NOTA

16. An 88 foot diameter Ferris wheel picks up riders from the ground and rotates counter clockwise. If a rider is picked up and rotates 2430° before stopping, how many total feet has the rider traveled?

- a) 594π ft. b) 297π ft. c) 1936π ft. d) 1188π ft. e)NOTA

17. You would like to have some spending money for the summer. You get a part-time job at the local gym which pays \$9 per hour. The employer must keep 10% of your paycheck for federal taxes. If your first check after taxes is for \$145.80, how many hours did you work?

- a) 16.4 b) 18 c) 19 d) 20.5 e)NOTA

18. A square and a circle have the same area. If the perimeter of the square is π units, find the circumference of the circle.

- a) 2π units b) $\frac{\pi^2}{16}$ units c) $\pi\sqrt{\pi}$ units d) $\pi\sqrt{2}$ units e)NOTA

19. Using just quarters and/or dimes, how many different ways are there to make \$10.00? (order does not matter)

- a) 41 b) 30 c) 20 d) 21 e)NOTA

20. A solid piece of steel is in the shape of a cylinder. The cylinder has a radius of 3 feet and a height of 3 feet. If the cylinder is reformed into the shape of a cone with the same volume as the cylinder and same 3 foot radius what is the height of the cone?

- a) 3 ft. b) 6 ft. c) 9 ft. d) 27 ft. e)NOTA

21. During a recent survey of 120 high school students the following question was asked: How many times do you drink soft drinks during the day? The following frequency chart shows the results.

Numbers of times	0	1	2	3	4
Frequency	21	34	42	13	10

Find the mean number of times, rounded to the tenth place, the survey shows that students drink soft drinks during the day.

- a) 1.6 b) .6 c) 12.0 d) 2.5 e)NOTA

22. The symbol \sum is sigma notation and it means to find the sum. $\sum_3^6 x$ means to find the sum of the integers from 3 to 6 inclusive: $3+4+5+6 = 18$.

Find the following: $\sum_6^{10} x + \sum_4^{10} x + \sum_2^{10} x = ?$

- a) 120 b) 153 c) 141 d) 143 e)NOTA

23. You have 11 nickels and 4 pennies. Using one or more of the coins, how many different amounts can be made?

- a) 44 b) 59 c) 15 d) 60 e)NOTA

24. On the interval from $x = 4$ to $x = 12$, find the area between the graph of $y = \frac{1}{2}x + 4$ and the x-axis.

- a) 64 units² b) 48 units² c) 60 units² d) 36 units² e)NOTA

25. A train leaves Union Station going east at a speed of 120mph. Another train leaves Union Station at the same time traveling south at a speed of 50mph. How many hours, rounded to the tenth place, will it take for the trains to be 900 miles away from each other?

- a) 6.2 hours b) 5.3 hours c) 12.9 hours d) 6.9 hours e)NOTA

Tiebreakers

TB1: The year 2013 contains 4 unique digits that can be put into consecutive increasing order. Using any of the ten possible digits, what was the last year this occurred?

TB2: Find the integer value of y : $2(x - \pi) + 3x\pi = 4 + y\pi$

TB3: The value $\sqrt{2112}$ is between what two consecutive integers?