

**2000 Hoover High School Mathematics Tournament**  
**7<sup>th</sup> Grade Examination**

1. If triangle  $ABC$  is similar to triangle  $XYZ$  and  $YZ/BC = 2$ , then what is the ratio of the perimeter of triangle  $ABC$  to that of triangle  $XYZ$ ?

- a. 1                      b.  $1/2$                       c. 2                      d.  $1/4$                       e. NOTA

2. Which of the following cannot exist?

- a. an acute isosceles triangle
- b. an obtuse isosceles triangle
- c. an isosceles right triangle
- d. an obtuse right triangle
- e. all of these can exist

3. Evaluate:

$$\frac{2 + 4 + 6 + 8 + \cdots + 18 + 20}{3 + 6 + 9 + 12 + \cdots + 27 + 30}$$

- a.  $20/3$                       b.  $3/2$                       c.  $2/3$                       d.  $1/3$                       e. NOTA

4.  $a$ ,  $b$ , and  $c$  are whole numbers satisfying  $a < 2b$  and  $b < 3c$ . If  $c = 50$ , what is the maximum possible value of  $a$ ?

- a. 297                      b. 298                      c. 299                      d. 300                      e. NOTA

5. Compute the value of  $\frac{2^{10} \cdot 2^9 \cdot 2^8}{2^5 \cdot 2^5 \cdot 2^5 \cdot 2^5 \cdot 2^5}$ .

- a. 2                      b. 4                      c. 8                      d.  $\frac{2^{22}}{5}$                       e. NOTA

6. If a square has area 64, then what is the length of one of its diagonals?

- a.  $16\sqrt{2}$                       b. 16                      c.  $8\sqrt{2}$                       d. 8                      e. NOTA

7. If  $a$  is 20% of  $b$ ,  $b$  is 400% of  $c$ , and  $c$  is 75% of  $d$ , the what percent of  $a$  is  $d$  (to the nearest percent)?

- a. 60%                      b. 67%                      c. 100%                      d. 167%                      e. NOTA

8. If a 6 foot tall man stands 9 feet in front of a 15 foot tall lamppost, then how long is the man's shadow?

- a. 3.6                      b. 6                      c. 9                      d. 10                      e. NOTA

9.  $1^2 + 2^3 + 3^4 + 4^5 = (?)$

- a. 39                      b. 10                      c. 513                      d. 1114                      e. NOTA

10. If two fair dice are rolled, find the probability that two 6's show on the dice.

- a. 1/3                      b. 1/6                      c. 1/12                      d. 1/36                      e. NOTA

11. The length of the base of triangle *A* is twice that of triangle *B*, but the height of triangle *B* is 3 times that of triangle *A*. Find the ratio of the area of triangle *A* to that of triangle *B*.

- a. 1/3                      b. 1/2                      c. 2/3                      d. 3/2                      e. NOTA

12. Out of a class of 8 boys and 8 girls, a committee of 4 is to be selected such that it is neither all boys nor all girls. In how many ways can this be done?

- a. 448                      b. 784                      c. 1232                      d. 1680                      e. NOTA

13. Compute in base 10:

$$1_2 + 10_2 + 100_2 + 1000_2 + 10000_2 + 100000_2.$$

- a. 64                      b. 63                      c. 32                      d. 31                      e. NOTA

14. Simplify:

$$1 + \frac{2}{1 + \frac{2}{1 + \frac{2}{1}}}$$

- a. 11/5                      b. 5/3                      c. 8/5                      d. 2                      e. NOTA

15. Find the value of the following expression:

$$2 \div 3 - 4 \times 2^{(1+2)} - (6 \times 5).$$

- a. 184/3                      b. 124/3                      c. -124/3                      d. -184/3                      e. NOTA

16. A square and an equilateral triangle share a side of length 4. Find the absolute value of the difference of their areas.

- a.  $16 - 4\sqrt{3}$                       b.  $16 - 8\sqrt{3}$                       c. 8                      d. 4                      e. NOTA

17. Four years ago, Sally was twice as old as Jimmy was. If Sally is 5 years older than Jimmy, then how old will Jimmy be in 4 years?

- a. 4                      b. 8                      c. 12                      d. 16                      e. NOTA

18.  $\frac{50^2 - 49^2}{6^2 - 5^2} = (?)$

- a. 1                      b. 99                      c. 11                      d. 9                      e. NOTA

19. What number is half of seventy percent of three times sixty?
- a.  $140/3$       b. 63      c. 90      d. 126      e. NOTA
20. The sides of a triangle are 13, 5, and 12. What is the triangle's area?
- a. 30      b.  $65/2$       c. 78      d. 15      e. NOTA
21.  $1 + (-2) + 3 + (-4) + \dots + 19 + (-20) = (?)$
- a. -19      b. -10      c. 10      d. 19      e. NOTA
22. If two cups of coffee and one piece of cheesecake cost \$3.50 while one cup of coffee and two pieces of cheesecake cost \$5.50, the how much does one cup of coffee and one piece of cheesecake cost?
- a. \$2.50      b. \$2.75      c. \$3.00      d. \$3.25      e. NOTA
23. How many of the first fifty positive whole numbers are prime numbers?
- a. 12      b. 13      c. 14      d. 15      e. NOTA
24. Three of the angles of a pentagon measure  $112^\circ$ ,  $94^\circ$ , and  $102^\circ$ . If the difference of the measures of the other angles is  $18^\circ$ , then what is the measure of the largest angle of the pentagon?
- a.  $132^\circ$       b.  $125^\circ$       c.  $119^\circ$       d.  $112^\circ$       e. NOTA
25. What is the 30<sup>th</sup> term of the sequence?  
1, 2, 5, 10, 17, 26, 37, 50, ...
- a. 962      b. 901      c. 842      d. 785      e. NOTA

### TIEBREAKERS

1. Compute the sum of the first 100 positive multiples of 4.
2. John went to bed at 10:14 pm on Sunday. Since John was so tired, he slept until Thursday morning at 9:53 am. How many minutes was John asleep?
3. In how many distinguishable ways can the letters of the word APPLESEED be arranged?