Jakarta International School

7th Grade

Practice Test - Blue

Factors, Fractions, and Exponents

Name: _____

Date: _____

Score: $\frac{\quad}{33}$

Clearly SHOW or EXPLAIN how you arrive at ALL your answers !!!

1. The **divisibility rule for 11** is: A number is divisible by 11 if the difference between the sum of the odd numbered digits (1st, 3rd, 5th...) and the sum of the even numbered digits (2nd, 4th...) is 0 or is divisible by 11.

   Digit b is the units digit in the six-digit number 213,20b, which is divisible by 11. What is the value of b? (1 point)

2. What is the smallest positive integer that has 2, 3, 4, 6, 7, and 12 as factors? (1 point)

3. What is the number of positive factors of 1296? (1 point)

4. If n is an integer and $20 < 2^n < 200$, what is the sum of all the possible values of n? (1 point)

5. A. What is the smallest positive integer by which 90 could be multiplied to make the product a perfect square? (1 point)

B. What is the smallest positive integer by which 90 could be multiplied to make the product a perfect cube? (1 point)

6. What is the greatest common factor of $114b^3c^2d$ and $51a^4bc^3$? (1 point)

7. The number 100 can be written as the sum of a 1-digit prime number and a 2 digit prime number. What is the product of these prime numbers? (1 point)

8. Decide whether the following statement is true or false. Explain your answer.

A. Each integer has a unique prime factorization. (1 point)

B. If a and b are prime, $a \bullet b$ is prime. (1 point)

9. A fraction is equivalent to $\frac{3}{8}$. Its denominator is 125 more than its numerator. What is the fraction? Give 2 other fractions containing variables that are equivalent to $\frac{3}{8}$.
(2 point)

10. Simplify the following fractions and clearly show what you are doing to both the numerator and the denominator. (2 points)

a) $\dfrac{108x^3z^4}{288x^5y^3z^2}$

b) $\dfrac{6n^4m}{(2n^3)^3}$

11. For negative integers a and b, tell whether the statement is always true. If it is always true, explain why. If the statement is not always true, give a counterexample. (1 point)

$$\frac{a}{b^2} < \frac{a}{b}$$

12. If 4/5 of the students in Ms. Newman's class use 5/6 of the desks in the room, what is the least possible number of students in the class? (1 point)

13. Is 4^{12} or 4^{44} four times the value of 4^{11}? Show/Explain. (1 point)

14. What is the value of n such that $3^n = 9^9 \times 27^{27} \times 81^{81}$ (1 point)

15. Explain why 2^{-3} is not a negative number (1 point)

16. Write the expression without a fraction bar $\frac{a^9b^3}{a^7b^8}$ (1 point)

17. Simplify $\frac{12x^5}{18x^8}$ (1 point)

18. Falling Leaves

Last weekend I was watching leaves fall from a tree. As the wind picked up and the leaves fell faster, I noticed an interesting pattern:

The first minute, only one leaf fell. During each passing minute, the number of leaves that fell was equal to the total on the ground plus one.

A. If this pattern continued, how many leaves fell during the 12th minute? the 24th? (1 point)

B. Write an expression to represent how many leaves would fall during the **n**th minute. (1 point)

19. Write the number in scientific notation. (2 points)

A. The time it takes for light to travel one meter is .000000000334 seconds.

B. The distance from earth to the star Vega is 239,000,000,000,000,000 meters

20.Power Consumption Problem: Suppose that a house has 12 100-watt light bulbs.

a. A kilowatt (kw) of electrical power is 1000 watts. How many kilowatts do the 12 bulbs require in all? (1 point)

b. If the lights stay on an average of 8 hours a day, how many hours in all will they be on in a year? (1 point)

c. The amount of energy used by the lights is measured in kilowatt-hours, abbreviated kwh. This number is found by multiplying the number of kilowatts by the number of hours. How many kilowatt-hours in all will the bulbs use in a year? (1 point)

d. Suppose that electricity costs 7.8 cents per kwh. There are 100 cents in a dollar. How many dollars would be spent on lighting in a year? (1 point)

e. How much money could be saved by:

   i. Using 60- watt bulbs instead of 100 watt (1 point)

   ii. Burning the lights (100-watt) 6 hours a day instead of 8? (1 point)

21. Locker Dilemma – You are about to enter your brand new school for the first time. The teachers, however, have gotten together and decided to perform a little ritual. All 150 students of the school need to line up and enter the school one at a time. The first student entering will open all 150 lockers. The second student will enter and close every second locker. The third student will change every third locker… and so on. You are the last in line! But as you are waiting for your turn, you realize you can figure out which lockers will be open after your turn. You amaze your teachers! Which lockers are open? (2 points)