Name:_____   Date:_____

Math 9 Honours Ch1 Review:

Rational & Irrational Numbers   Prime Factorizations

Square Roots and Mixed Radicals   Conversion with Decimals and Fractions

Factoring Trinomials   Divisibility Rules

BEDMAS with Irrational numbers

Note: For the chapter test, please review all the assignments given through out the chapter. Calculators are not allowed

1. What are the properties of a rational number.

2. Provide 3 or more examples of an Irrational number

3. How do you determine that a value is a perfect square/cube from it's prime factorization

4. Evaluate the following without a calculator. Show your steps. Give your answer in exact form:

    i) $0.8 \div 0.\overline{142875} - 0.375$ ii) $0.\overline{9} + 0.1\overline{2} + 0.\overline{123}$ iii) $0.\overline{1} \div 0.\overline{2} + 0.\overline{72} \times 0.375$

5. Given that 1/13 =0.076… and   2/13 = 0.153, then what is the 100th digit in the decimal expansion of 7/13?

6. Convert the following number to a fraction: i) $0.0\overline{773}$ ii) $0.023\overline{445}$

7. What is the sum of $0.00\overline{883} \ and \ 0.03\overline{25}$. Write your answer as a fraction in lowest terms.

8. Given that "x' is an integer and $N = \sqrt{55 - x^2}$. If "N" is a rational number then how many possible values of "x" are there?

9. Given that $N = \dfrac{\sqrt{3^3 \times 4^5 \times 5^3 \times 11^3}}{\sqrt{3^a \times 4^b \times 5^c \times 11^d}}$. If "N" is a rational number, then what is the lowest value of

    $a + b + c + d$?

10. Arrange the following from least to greatest: $5\sqrt[3]{7}, \ \sqrt{33}, \ \sqrt[3]{200}, \ \sqrt[4]{1210}, \ 2.5\sqrt{6}$

11. Convert the following to mixed radicals: $\sqrt{10!}$

12. If $a\sqrt[3]{b} = \sqrt[3]{20!}$, then what is the lowest value of $a+b$?

13. $\sqrt{a} \times \sqrt[3]{b} = \sqrt[p]{a^m \times b^n}$, what are the lowest possible values of "m" , "n", and "p"?

14. Given that $N = 2^3 \times 4^3 \times 5^3 \times 6^4$, how many factors does "N" have?

15. Using the value of "N" from above, how many factors does "N" have that are perfect squares?

16. Given that $N = \left(x^2 - 13x + 36\right)(x+3)$ and "N" is a perfect square. What are all the possible values of "x"?

17. Given that $N = 2(x-1)(x+2)(3x-1)$ and "N" is a perfect square. What are all the possible values of "x"?

18. When given the prime factorization with a missing term, what is the value of the term required to create a perfect square/cube
   a) Given that "N" is an integer, what is the lowest value of "k" if "k" is an positive integer?

   $$N = \sqrt{32k} \qquad\qquad N = \sqrt{3^3 6^3 7^1 (k+1)} \qquad\qquad N = \sqrt[3]{5^2 7^3 (k-1)}$$

   b) Challenge: Given that "N" is a perfect square, what is the lowest integer value of "k" if $k \geq 1$. (Note: "N" needs to be a perfect square, not an integer)

   $$N = \sqrt{32k} \qquad\qquad N = \sqrt{3^3 6^3 7^1 (k+1)}$$

   c) what is the lowest integer value of "k" if $k \geq 1$, such that "N" is a perfect cube

   $$N = (30k+5)(15k+4)$$

19. Prove that sum of $1 + 3 + 5 + ... + 13 + 15 + 17 + ...(2n+1)$ will always be a perfect square. Note: "n" is a natural number.

20. How many positive integers less than 1000 is equal to the product of three different primes?

21.
The product of N consecutive four-digit positive integers is divisible by 2010^2. What is the least possible value of N?

(A) 5   (B) 12   (C) 10   (D) 6   (E) 7

22.
If $x^2yz^3 = 7^4$ and $xy^2 = 7^5$, then xyz equals

(A) 7   (B) 7^2 (C) 7^3 (D) 7^8 (E) 7^9

23. Solve problems involving divisibility rules:
   a) Given that $N = 2389b$ and is divisible by 12. What is the lowest value for "b"

22.

A five-digit positive integer is created using each of the odd digits 1, 3, 5, 7, 9 once so that

- the thousands digit is larger than the hundreds digit,
- the thousands digit is larger than the ten thousands digit,
- the tens digit is larger than the hundreds digit, and
- the tens digit is larger than the units digit.

Find as many number that satisfy these properties:

23. Find a number that contains all the digits from 0 to 9 (repetitions allowed) such that when you multiply it with any number from 1 to 18, the product will also contain digits from 0 to 9 (repetitions allowed and can be in any order). Hint the number is a big value: