NON-GRADED QUIZ ON NUMBER THEORY - ANSWERS

(1) Perform the following whole number computations:

(a) 608 + 79

(b) 608 – 79

(c) 608 × 79

(d) 608 ÷ 79

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  1        59 1                    007 r 55
 608      608      608      79 ) 608
+ 79     - 79     × 79           -553
 687      529     5472            55
                 42560
                 48032
```

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(2) (a) List the prime numbers less than 100.

(b) List the first 10 square numbers.

(c) List the first 5 cube numbers.

(a) 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

(b) 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

(c) 1, 8, 27, 64, 125

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(3) The terms "carry" and "borrow" are no longer used when adding and subtracting. What term is used instead? What does that term mean?

"regrouping"

Regrouping means that you can exchange 10 for a "1" or you can exchange a "1" for a "10" when you move from one place value to the next place value.

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(4) What do the following words mean in mathematics?

per = divide

quotient = divide

sum = add

product = multiply

difference = subtract

of = multiply

each = divide (usually)

total = add

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(5) Write 215,369 in expanded notation using exponents.

$(2 \times 10^5) + (1 \times 10^4) + (5 \times 10^3) + (3 \times 10^2) + (6 \times 10^1) + (9 \times 10^0)$

or

$(2 \times 10^5) + (1 \times 10^4) + (5 \times 10^3) + (3 \times 10^2) + (6 \times 10) + (9 \times 1)$

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(6) Round off 0.215369 to the nearest thousandth.

0.215369 → **0.215**

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(7) Estimate 35 × 65

35 → 30 or 40

65 → 60 or 70

Because the numbers are exactly in the middle, we'll round the first number DOWN to 30 and the second number UP to 70: 30 × 70 = **2100**

We could have also rounded the first number UP to 40 and the second number DOWN to 60: 40 × 60 = **2400**

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(8) What is the GCF and the LCM of the following?

(a) 6 and 8

(b) 12 and 10

(c) 12 and 15

(d) 2 and 3

2 is prime

3 is prime

6 = 2 × 3

8 = 2 × 2 × 2

10 = 2 × 5

12 = 2 × 2 × 3

15 = 3 × 5

GCF of 6 & 8 = **2**

LCM of 6 & 8 = 2 × 2 × 2 × 3 = **24**

GCF of 12 & 10 = **2**

LCM of 12 & 10 = 2 × 2 × 3 × 5 = **60**

GCF of 12 and 15 = **3**

LCM of 12 and 15 = 2 × 2 × 3 × 5 = **60**

GCF of 2 and 3 = **1**

LCM of 2 and 3 = 2 × 3 = **6**

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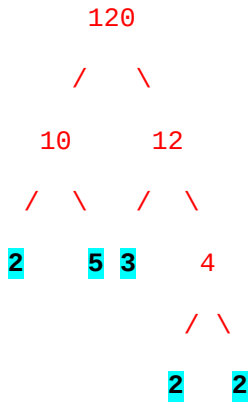
(9) Give the prime factorization of 120.

Using a factor tree, break down the number into factors until each branch ends with a prime number:



120 = 2 × 2 × 2 × 3 × 5 or $\mathbf{2^3 \times 3 \times 5}$

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(10) Perform the following computations:

(a) 12.345×10^3

(b) $12.345 \div 10^3$

(c) 58×10^2

(d) $58 \div 10^2$

When multiplying by a positive power of 10, move the decimal one place right for each power. When dividing by a positive power of 10, move the decimal point one place left for each power.

(a) 12345.

(b) 0.012345

(c) 5800.

(d) 0.58

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(11) Which of the following has a 3 in the hundredths place?

(a) 123.456

(b) 1234.56

(c) 1.23456

(d) 12.3456

The hundredths place is two right of the one's place where the decimal point is.

1.23456

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(12) Classify these numbers as odd, even, prime, composite, rational, irrational, whole, natural, and integer.

We'll use "O" for odd, "E" for even, "P" for prime, "C" for composite, "R" for rational, "I" for irrational, "W" for whole, "N" for natural, and "Z" for integer.

(a) 91 → O, C, R, W, N, Z

(b) -91 → R, Z

(c) 1/9 → R

(d) 3.14 → R

(e) $3.3333\overline{3}$ → R

(f) $\sqrt{2}$ → I

(g) $\sqrt{4}$ → E, P, R, W, N, Z

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(13) Compute:

$$10 + (12 - 5) \times 4$$

Following the order of operations,

P → 10 + **(12 – 5)** × 4 = 10 + **7** × 4

M → 10 + **7 × 4** = 10 + **28**

A → 10 + 28 = **38**

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(14) Give a counterexample for each of the following:

(a) All prime numbers are odd

(b) The sum of two consecutive numbers is always even

(c) Odd numbers are always multiples of 3 or 5.

(a) 2 is a prime number, and it isn't odd

(b) 3 and 4 are consecutive numbers, their sum is 7, which isn't even

(c) 13 is an odd number and it isn't a multiple of 3 or 5 (13 is a prime number so it is only a multiple of 1 & 13)

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(15) Explain the algorithm for long division.

STEP 1: Divide the divisor into the first digit of the dividend. Write that quotient above the first digit of the dividend.

STEP 2: Multiply the quotient times the divisor and write that below the first digit of the dividend.

STEP 3: Subtract

STEP 4: Bring down one more digit of the dividend to form a new (partial) dividend

STEP 5: Repeat the four steps above until you run out of digits to bring down in Step 4.

STEP 6: Any leftover dividend is the remainder.

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(16) Joe fills up his car every 3 days. Bob fills up his car every 7 days. Assuming both fill up their cars on the January 1st, how many days of the year are both cars filled up on the same day?

The LCM of 3 days and 7 days is 21 days.

There are 365 days in a year so divide 365 by 21.

365 ÷ 21 = 17 with a remainder

Adding the first day of the year, there will be **18 days** when both Joe and Bob fill up their cars on the same day.

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(17) Using the letters a, b, and c, give example of the following properties:

(a) Associative

(b) Commutative

(c) Distributive

(d) Inverse

(e) Identity

Associative → $(a + b) + c = a + (b + c)$

Commutative → $a + b = b + a$

Distributive → $a(b + c) = ab + ac$

Inverse → $a + -a = 0$ or $a \times \frac{1}{a} = 1$

Identity → $a + 0 = a$ and $a \times 1 = a$

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(18) Answer the following:

(a) 12 pencils go in each box. How many boxes will be needed for 77 pencils?

(b) How many 3-foot boards can be cut from sixteen 8-foot boards?

(a) 77 ÷ 12 = 6 r 5 so 7 boxes will be needed, but the 7th box will only have 5 pencils in it.

(b) 8 ÷ 3 = 2 r 2 (but we can't use that 2-foot left over piece). Thus, each 8-foot board can give us two 3-foot boards. As such, 16 8-foot boards results in 16 × 2 = **32** 3-foot boards.

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