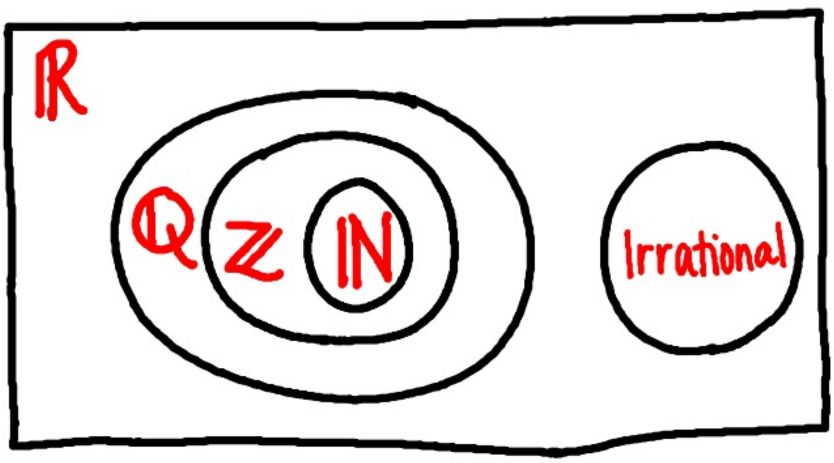
Name: ______________________ Block: _____ Date: ______________

LESSON 1.1 NOTES - DIFFERENT TYPES OF NUMBERS

TYPE	SYMBOL	DEFINITION
Natural	$\mathbb{N}$	Counting #s that start from 0. 0, 1, 2, 3, ...
Rational	$\mathbb{Q}$	A number that can be written as a fraction. 3, 0.2, 1/3
Irrational		A number that cannot be written as a fraction. π
Integers	$\mathbb{Z}$	Negative + Positive whole numbers. -3, -2, -1, 0, 1, 2, 3, ...
Real #s	$\mathbb{R}$	All #s including rational, irrational, natural #s, + integers.



EXAMPLE #1: *Find a rational number between ¼ and ⅝ .*

$1/3$ or $1/2$

EXAMPLE #2: *Mark each cell to indicate which number set(s) the number belongs to.*

	-2	$\frac{3}{7}$	$\sqrt{13}$	3π	10 000
Irrational			✓	✓	
$\mathbb{N}$					✓
$\mathbb{Z}$	✓				✓
$\mathbb{Q}$	✓	✓			✓
$\mathbb{R}$	✓	✓	✓	✓	✓

EXAMPLE #3: *Look at the list of numbers:* $\sqrt{5},\ -\frac{3}{7},\ \pi,\ -5,\ 7,\ 2^3$

(a) Which numbers are integers? $-5, 7, 2^3$

(b) Which numbers are both rational and negative? $-3/7$ + -5

(c) Which numbers are not rational? $\sqrt{5}$ + π

(d) Which numbers are not natural? $\sqrt{5}, -3/7, \pi,$ + -5

LESSON 1.2 NOTES - APPROXIMATION & ESTIMATION

ROUNDING RULE:

- If the digit to the right of the digit you are rounding is <5, then the digit being rounded stays the same.
- If the digit to the right of the digit you are rounding is ≥ 5, then the digit being rounded increases by one.

EXAMPLE #1: *Use the rule above to round the following numbers:*

(a) *1056.68 yen to the nearest yen* 1057

(b) *546.21 cm to the nearest 10 cm* 550

(c) *23.35 mm to the nearest mm* 23

(d) *621317 to the nearest 100* 621300

PLACE ORDER STRUCTURE OF NUMBERS:

1	0	0	0	0	0	0	.	0	0	0
millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones		tenths	hundredths	thousandths

EXAMPLE #2: *Round 23.682 to 1 decimal place, then 2 decimal places.*

23.7 23.68

SIGNIFICANT FIGURES:

** ON THE IB EXAMINATION, STUDENTS ARE ASKED TO GIVE ALL FINAL ANSWERS TO AN EXACT VALUE OR TO THREE SIGNIFICANT FIGURES (if the question does not request a specific degree of accuracy).

- If a number is greater than or equal 1, the first significant figure is the first digit in the number. The second and third significant figures come after it.
- If a number is less than 1, the first significant figure is the first **non-zero** digit after the decimal point.

EXAMPLE #3: *Round the following numbers to three significant figures.*

(a) 0.00056384 $= 0.000564$

(b) 4.607054 $= 4.61$

EXAMPLE #4: *(a) Find the area of a circle with radius of 6.81 cm.*

$A = \pi(6.81)^2 = 145.6948151$

(b) Write down your answer from (a) to three significant figures.

146

(c) Use your answer from (b) to calculate the volume of a cylinder with base radius 6.81 cm and height 14.25 cm using the formula $V = \text{base area} \times \text{height}$.

$V = 146 \times 14.25 = 2080.5$

(d) Re-calculate the volume of the cylinder using the formula $V = \pi r^2 h$

$V = \pi(6.81)^2(14.25) = 2076.151115$

(e) Find the difference between the answer to (c) and the answer to (d).

$2080.5 - 2076.15115 = \boxed{4.348885}$

EXAMPLE #5: *Zita's mother has told her that she can redecorate her room. The room measures 5.68 m by 3.21 m. Zita wants to buy new carpet for the floor.*

(a) Estimate the fl oor area of Zita's room to the nearest metre.

$A = 5.68 \times 3.21 \approx 18$

(b) Based on your answer from (a), what area of carpet do you suggest Zita should Buy? 19, because the actual area is 18.2328

(c) Find the accurate floor area using your GDC and determine whether your suggestion in part (b) is sensible.

YES

PERCENTAGE ERROR:

Estimating and rounding always involves error. The size of the error determines how accurate something is. The small the area, the more accurate the estimate is.

Percentage error $\varepsilon = \left|\frac{v_A - v_E}{v_E}\right| \times 100\%$, where v_A = approximate (estimated) value and v_E = exact value.

EXAMPLE #6: *At the beginning of a problem, Ben writes $\sqrt{13} = 3.6$. He chooses to use the rounded answer of '3.6' rather than the exact value of $\sqrt{13}$ in the calculations that follow. So, instead of calculating $(2+\sqrt{13})^3$, he calculates, $(2+3.6)^3$. What is his percentage error?*

$V_A = (2+3.6)^3 = 175.616$

$V_E = (2+\sqrt{13})^3 = 176.1387819$

$\varepsilon = \left|\frac{-.5227819}{176.1387819}\right| \times 100$

$= \boxed{0.297\%}$