Foundations for College Algebra
Fall 2017
Quiz #1

SHOW ALL WORK QUIZ!

1. Use the chart below to place a check mark indicating which sets the item on the left is a member of.

	$\mathbb{N}$	$\mathbb{w}$	$\mathbb{Z}$	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{R}$
$\sqrt{25}$	✓	✓	✓	✓	✓	✓
-0.0001	✓	✓	✓	✓	✓	✓
$\dfrac{8}{31}$	✓	✓	✓	✓	✓	✓
-2	✓	✓	✓	✓	✓	✓

2. Covert the following repeating decimal to a fraction: $-0.\overline{27}$. Show **all** steps.

Let $x = -0.\overline{27}$ & multiply by 100 to move the decimal two places right.

$$100x = -27.\overline{27}$$
$$x = -0.\overline{27}$$
$$\overline{}$$
$$99x = -27$$
$$x = -\frac{27}{99} = \boxed{-\frac{3}{11}}$$

3. Let $n, m, k \in \mathbb{N}$, where $n = mk$, the write the definition of a *prime number p* in $\mathbb{N}$.

$$p = p \cdot 1; \text{ because } \frac{p}{1} = p \ \& \ \frac{p}{p} = 1$$

For #4 and #5 determine if the following statements are true or false and, **support your answer** in your own words.

4. Some whole numbers are irrational.

$\boxed{\text{False}}$, irrational numbers can not be written as a ratio of two integers, where a whole number can be by dividing by the integer "1".

note: $\subseteq$ means subset of
e.g. $\{1\} \subseteq \{1,2,3\}$

5. No rational numbers are natural numbers.

True, because rational numbers are, by definition, the ratio of two integers.* However, a natural number can be made into a rational by using a "1" as the denominator.
So, $Q \neq N$, but $N \subseteq Q$ if $n \in N$ is divided by "1".

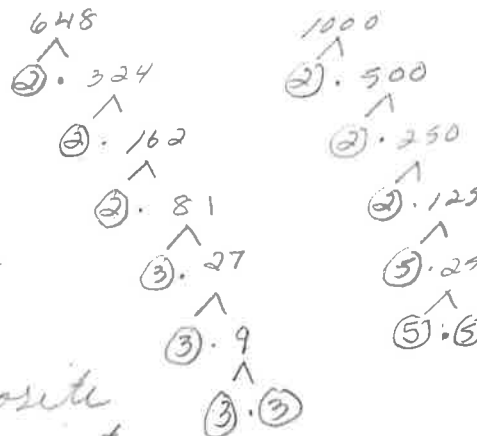* except division by zero.

6. Give the definition of rational numbers.

$Q = \left\{ \dfrac{m}{n} \mid m, n \in \mathbb{Z} \text{ and } n \neq 0 \right\}$

7. Write 7.648 as a ratio of two integers and simplify if possible.

$7\dfrac{648}{1000} = 7\dfrac{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3}{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5}$

"1"

$= 7\dfrac{81}{125}$

$= \dfrac{7 \cdot 125 + 81}{125} = \dfrac{956}{125} = 7.648 \checkmark$

648
②· 324
②· 162
②· 81
③· 27
③· 9
③·③

1000
②· 500
②· 250
②· 125
⑤· 25
⑤·⑤

8. What do we mean when we say a number is *Composite*?

A number is said to be Composite if it can be decomposed into a unique product of prime numbers.

9. Define *The Fundamental Theorem of Arithmetic*.

The theorem says that any natural number has a unique product of prime numbers as its factors.

10. Write 326 as a product of primes.

$326 = 2 \cdot 163$

②·⑯③