Category 1 – Numerical Representations & Relationships

PLACE VALUE AND VALUE OF A DIGIT CR

place value: increases by a factor of 10 from right to left and decreases by a factor of 10 from left to right; place value to decimal's left is 1; **value of a digit = digit x place value**

Example: In 927,154,803.63, the value of 4 is $4 \times 1{,}000 = 4{,}000$.

Place	Place Value	Digit	Value of Digit
hundred millions	100,000,000	9	900,000,000
ten millions	10,000,000	2	20,000,000
millions,	1,000,000	7	7,000,000
hundred thousands	100,000	1	100,000
ten thousands	10,000	5	50,000
thousands,	1,000	4	4,000
hundreds	100	8	800
tens	10	0	0
ones.	1	3	3
tenths	0.1	6	0.6
hundredths	0.01	3	0.03

expanded notation: expression that adds value of ea[ch]

Examples: 10,000,021 → expanded notation: 10,000,...
0.16 (*sixteen hundredths*) → expanded notation: 0.1 + ...
value of 1 is 0.1 (*one tenth*); value of 6 is 0.06 (*six hundred...*)

COMPARING, ORDERING, ROUNDING WH[OLE] NUMBERS

1. Line up the same place values in columns.
2. Starting from the left, compare the digits.
3. If the digits in a column are the same, go to next column (to right) and compare. Do this until a co[lumn]
4. Compare the different digits to se[e which number is larger.]

= is equal to
> is greater th[an]
< is less than

Example: 101,938,600...

Example: 2013 Sales by City
Order the cities ... | $973,251
from largest to ...
smallest sales ...

1 > [0 ...]s place, so ...
Austin ... B > 3
in thousan[ds] place, s...
El Paso is next large...
... El Paso ... Dallas

rounding: used to ... place

Examples: If the digit ... [pla]ce's right is 5 ... 5, round up. If the digit to right ... e digit in the ... ing place.

Number	Round ...	Answer	... cause ...
...	hundred thou...	...1,300,00...	...t of 3 is 0; 0 < 5
...	hundred thou...	...,400,0...	...ght of 3 is 8; 8 > 5
...,805,699	...	2,810,...	... right of 8...
...1,796	... nds	81,8...000	right of...

[WRI]TING [COM]PARING [O]RDERING D[ECIMALS]

...number ... digits to the right of the dec...

Decimal	Ones	...	Hundredths	Model
1.06	...	0	...	
0.09	0	0	9	
1.1	1	1	0	
0.8	0	8	0	

Align decimal points to compare (left to right) or u...

Example: 0.09, 0.8, 1.06, 1.1 lists the decimals shown above from least to greatest (because $0.09 < 0.8 < 1.06 < 1.1$).

RELATING DECIMALS TO MONEY AND NUMBER LINE

1.06 or $1.06	0.09 or $0.09	... or $1.10	0.8 or $0.80

0.09
0 B   C

Example: On number line ... ch point ... sents 0.53?
There are 10 spaces betwe... s... spac...
Point A is 5 spaces and a little ... Point ... 0.53.

RELATING DECIMALS TO FRAC[TIONS] CR

Read[ing] ... [de]cimal correctly helps ... u write it i[n fr]action form. Say t[he] ... decimal and n... the tenths ... hundredths.

Decimal	Re...	Fraction
1.06	... hundre...	$1\frac{6}{100}$
...	... hundredths	...
...)	eight ten... eight ... hundredths)	$\frac{8}{10}$ (or $\frac{..}{100}$)

Exam[ple]: Which box is heavier? ... w as fractions. Compare.

Box ... 36 lb $\frac{5}{10}$ $\frac{50}{100} > \frac{..}{100}$
B... 0.5 lb   use ... tion ... compare
... r: Box B   ... nator   numerators

... imal or fraction ca... be shown as a distance from zero.

0.1   0.3 0.4   0.5   0.6 0.65

0.8... $\frac{1}{10}$ ... $\frac{10 \text{ in } 1 \text{ whole}}{}$

large inter[val] $\frac{1}{10} = \frac{10}{100}$ → 6 large intervals = $0.6 = \frac{6}{10} = \frac{60}{100}$
small interva[l] $\frac{1}{100}$ = $\frac{..}{100} = 0.05$ → $0.6 + 0.05 = 0.65$; $\frac{60}{100} + \frac{5}{100} = \frac{65}{100}$

EQUIVALENCE AND COMPARING FRACTIONS CR

[T]o find equivalent fractions, multiply both the numerator and den[omi]nator by the same non-zero factor (does not change fraction's value; $\frac{a}{a} = 1$ for $a \neq 0$, so you are multiplying by 1).

[Ex]ample: $\frac{1}{6} = \frac{1}{6} \times 1 = \frac{1}{6} \times \frac{5}{5} = \frac{1 \times 5}{6 \times 5} = \frac{5}{30}$ → so, $\frac{1}{6} = \frac{5}{30}$

..., divide by 1. **Example:** $\frac{4}{6} = \frac{4}{6} \div 1 = \frac{4}{6} \div \frac{2}{2} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$ → so, $\frac{4}{6} = \frac{2}{3}$

To see if two fractions are equal, (1) find equivalent fractions with same denominator, (2) see if the same factor multiplied by each numerator calculates its denominator, or (3) use models.

Examples: Ted measures the volume of oil in 5 bowls.

Q-1: Do Bowls A and B have the same amount of oil?
A-1: Multiply Bowl A's volume by $\frac{3}{3}$ to get the <u>same denominator</u> as Bowl B. $\frac{2}{3} = \frac{2}{3} \times 1 = \frac{2}{3} \times \frac{3}{3} = \frac{2 \times 3}{3 \times 3} = \frac{6}{9}$
<u>No</u>, Bowl A ($\frac{6}{9}$ qt) does not equal Bowl B ($\frac{5}{9}$ qt).

Q-2: Do Bowls C and D have the same amount of oil? ...

Bowls	
A	$\frac{2}{3}$ qt
B	$\frac{5}{9}$ qt
C	$\frac{3}{6}$ qt
D	$\frac{5}{10}$ qt
...	$\frac{3}{7}$ qt

... gic.

..., and ... D

... harts.
... e as = $3\frac{1}{2}$
... nto

$\frac{1}{2} = \frac{1}{2} + \frac{1}{2} = 1 = \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ ☒ ☒ $\frac{..}{..} = 1 + 1 + 1 + \frac{1}{2} = 3 + \frac{1}{2} = 3\frac{1}{2}$

CR Symbol indicates section aligns to Texas College and Career Readiness Standards.