

INVESTIGATION # 10

Unit Fractions

Task #1: Find a fraction between these pairs of fractions:

$$\frac{1}{5} \text{ and } \frac{1}{7}, \frac{1}{10} \text{ and } \frac{1}{11}, \frac{6}{7} \text{ and } \frac{6}{8}, \frac{7}{11} \text{ and } \frac{8}{11}$$

Task #2: Fractions with a numerator of one are known as Unit Fractions.
Find a fraction between these pairs of unit fractions.

$$\frac{1}{5} \text{ and } \frac{1}{6} \quad \frac{1}{7} \text{ and } \frac{1}{9} \quad \frac{1}{11} \text{ and } \frac{1}{14}$$

Task #3: Attempt to find a unit fraction between the pairs of unit fractions in Task #2. Find a rule about when this is possible and when it is not possible.

Task #4: $\frac{1}{5}$ and $\frac{1}{6}$ are Consecutive Unit Fractions as their denominators are consecutive.

Explain what the following algebraic expression says about fractions between Consecutive Unit Fractions:

$$\frac{1}{x}, \frac{1}{x+1} \Rightarrow \frac{x+x+1}{2.x.(x+1)} = \frac{2x+1}{2x^2+2x}$$

ASSESSMENT TASK

UNIT FRACTIONS

1. [2 marks] Which of these are unit fractions? $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{7}$, $\frac{7}{11}$, $\frac{1}{12}$, $\frac{4}{1}$

2. [2 marks] Find a fraction between these fractions: $\frac{8}{13}$, $\frac{9}{14}$

3. [2 marks] Find a fraction between these fractions: $\frac{1}{20}$, $\frac{1}{21}$

4. [2 marks] Is it possible to find a **unit** fraction between $\frac{1}{20}$, $\frac{1}{21}$?

5. [1,1 mark] Find a **unit** fraction between:

(a) $\frac{1}{12}$ *and* $\frac{1}{14}$

(b) $\frac{1}{15}$ *and* $\frac{1}{20}$

6. [3 marks] The fractions $\frac{1}{3}$ *and* $\frac{1}{5}$ are consecutive **odd** unit fractions.

The algebraic expression here shows a method of finding a fraction between consecutive unit fractions: $\frac{1}{x}, \frac{1}{x+1} \Rightarrow \frac{x+x+1}{2.x.(x+1)} = \frac{2x+1}{2x^2+2x}$

Write the algebraic expression for finding a fraction between consecutive **odd** unit fractions using the same approach.

7. [3 marks] If the fraction $\frac{21}{160}$ is exactly half way between $\frac{1}{5}$ and some other fraction, what is this other fraction?