

Lesson Title: Animal Estimators

Grade: 5th

Content standard: 5.NF2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g. by using visual fraction models or equations to represent the problem. **Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers .**

Materials: Animal number line (attached number line is 0-4, but could be increased in length). Standard number line (attached number line is 0-4 with each whole divided into 24ths). Note: I ran the attached lines through a poster maker and laminator and then cut them out and taped them together. Magnetic strips that are labeled with each group's name that can be positioned on the number line. Set of addition and subtraction problems whose sums or difference fall in the range 0-4. The problems should include mixed numbers, improper fractions, whole numbers, and simple fractions. Fractions should use a variety of the following denominators: 2,3,4,6,8,12,24.

Shared experience and procedure details:

Divide class into groups of 3-4 students and assign a number or name for each group. Display animal number line on the board. The animal number line is partitioned and labeled with numbers at 0,1,2,3,and 4. The space between each number is not partitioned, but below the line is a sequence of 12 animal pictures that can be named by the students to indicate an approximate position on the line above. The sequence of 12 pictures repeats itself starting at each new whole on the line. Therefore the students can name a position on the line by saying "2 dolphin" which would indicate a position on the line above the dolphin that appears between 2 and 3. "3 dolphin" would indicate a position above the dolphin between 3 and 4.

Write an addition or subtraction problem on the board. Without paper or pencil, each group will submit the position (e.g. 3 lion or 0 penguin or if the group estimates the answer to be at a whole number they can submit 0, 1, 2, 3, or 4 as their answer) on the number line that they estimate is closest to the actual sum or difference. Locate the estimates of each group with magnetic arrow strips at the position of each estimate on the number line. When the estimates of all groups have been displayed on the animal number line, attach second number line directly below animal number line and position it so the two lines are vertically aligned. Solve the problem exactly on the 2nd line and determine which estimate was closest to the actual answer. Award a point to group(s) with the closest estimate.

At an appropriate point in the game, give the class an additional problem, i.e. $1\frac{2}{3} + 7/8$. Ask them to estimate the sum on the animal number line and record the answer on a sticky note. Distribute 5 step lesson papers and ask them to draw a picture and write about how they mentally

got an answer.

Possible Picture: The students may draw number line pictures and show approximate lengths of addends and then put those length together. The students may show what benchmarks are closest to each addend and then add those benchmarks together. Adjustments to the final answer may then be made to compensate for differences between benchmarks and addends. Students may mentally use algorithms for adding fractions to get an answer and then locate approximately that position on the number line.

Possible People Talk: The students may discuss use of benchmarks to use as a substitute for addends. The students may discuss how the relative sizes of the numerators and denominators tell them which benchmark to use. The students may describe how they mentally computed using a standard algorithm.

Feature Talk: numerator, denominator, estimate, animals, number line, fractions, mixed numbers, improper fractions, add, subtract, compensate, adjust, whole, benchmarks

Possible Symbolic Representation: Number line jumps that show benchmarks as roughly equal to addends. Formal fraction notation that substitutes benchmark for addends. Use of animal position on the number line as a substitute for formal fraction notation.



