Adding and Subtracting Fractions

Fraction Equivalence

Overview of Fractions

Diagnostic Test

Partitioning
the whole / unit into equal parts

Ordering fractions

Adding and Subtracting fractions

Part 1: Estimating

Multiplying and dividing fractions

**Estimation of Addition and Subtraction of fractions**

**Prior knowledge**

Students have developed “fraction sense” through the use of fraction strips/ fractions circles

Students have developed skills to enable them to order fractions (same numerator, same denominator, using 0, ½ and 1 as benchmarks, doubling)

**Learning Outcomes**

* use order and equivalence ideas to estimate addition and subtraction of fractions

**Materials**

Fraction strips or strips of paper for making them are provided or students can draw number lines.

Fraction circles on transparencies and opaque paper – large set for class demonstration and students can also draw them in their copies and shade parts.

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| **Student Learning Tasks: Teacher Input** | Student Activities: Possible and Expected Responses  | Teachers’ Support and Actions | Checking Understanding |
| **Estimating answers for addition of fractions** |  |  |  |
| Revise equivalent fractionsEstimate the answer to Choose from 1,2,18,20 | Students who have good mental images of fractions will approximate 11/12 to 1 and 7/8 to 1 and get answer 2. | Students who answer 18/20 are using whole number reasoning. Ask them to estimate the answer first (approx 2) and compare with the answer using their ordering strategies.  |  |
| Does this answer make sense? ExplainIf you are having difficulties make a drawing of a fraction strip in ninths and another one in thirds. | NoAn estimate would be 1+1/3 = 1 1/3or 8/9 +1/9=1Answer given does not make sense as it is less than 1 and 1/3 >1/9The answer is between 8/9 and 1/3. | For students who are having difficulty ask the following questions:1.What does $\frac{11}{12}$ mean? What number is it near?2.What does $\frac{7}{8}$ mean? What number is it near?3.Draw it out(go back to particitonin? and ordering ..recap)1. Is the answer given (9/12)bigger than 1?No
2. How much would you need to add to 8/9 to get 1?1/9
3. Is 1/3 bigger or smaller than 1/9? Bigger
4. Is there anything you can add to make it bigger than 1?
5. Does the answer now make sense? The answer should be >1
 | Are students using their ordering strategies and pictures of fractions to enable them to make estimates?Are they using equivalent fractions? |
| **Estimate** where on this number line the answer to 8/9+1/3 will be? Between 0 and ½, ½ and 1, 1 and 1 ½, 1 ½ and 2?You do not have to give an exact answer at this stage. | As 1/3 < ½ and 8/9  1 the answer will be between 1 and 1 ½.8/9 1/3 | Teacher draws a number line on the board and students draw one in their copies.Teacher checks students’ copies and if they are having difficulty, asks them to show both fractions on 2 number lines underneath each other. |  |

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| **Estimating answers for subtraction of fractions** |  |  |  |
| A carton contains ¾ litres of juice. I pour 1/6 litres from the carton into a glass. Estimate how much is left in the carton? Is the answer more or less than ½ litreWhat happens when you pour out some juice out of carton -> I have less left so now my answer is going to be smaller because I am subtractingOther Questions1. When you pour out a liquid what will happen?2. Will the fraction get bigger or smaller?3. How will something get smaller?4. What would you have to pour out to have $\frac{1}{2}$ L left ?5. Now compare what you poured out with $\frac{1}{6}$th ...Equivalent fractions.6. Is it bigger / smaller ? | If I take away ¼ of a litre from ¾ litres I will have 2/4 or ½ litre left. 1/6 is less than ¼ so I will have a bit more than ½ litre left.. | Students having difficulty with this could use fraction circles to visualise that 1/6 is less than ¼. The teacher could overlap transparencies of these on the OHP or students could draw them. Drawings do not have to be exact but circles should at least be roughly the same size. | Have students seen that this is a subtraction problem? Can they visualise or draw representations of the fractions in order to make a reasonable estimate. |
| Ella ran laps around the running track. Bill ran laps around the track. Who ran farthest?**Approximately** what is the difference between the two distances? Explain how you reached an answer. The exact answer is not required. | They both ran 12 laps so there is no difference there.2/3 > 1/4 so Ella ran farther than Bill.1/3 > ¼ (smaller pieces of the whole)2/3 -1/3 = 1/32/3-1/4>1/3So Ella ran a bit more than 1/3 of a lap more than Bill.Fraction strip drawings:

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 | Teacher writes the problem on the board and gives students some time to think. Students who have difficulty with fractions should be asked also and led by questioning to find their way through. Encouraging those with difficulties to draw or use pre - drawn fraction strips and overlaying should help greatly.  | Check difference leads to subtraction?Can they visualise / draw? |
| **Student Activity 1 – working in pairs to estimate answers to addition and subtraction problems.** |  | Allow students to move at their own pace. Some students may only finish ½ of these questions, but with understanding, and more able students may get all of them done. | Can students provide reasons why their estimates make sense?  |

**Student Activity 1**

Estimate the answer to each of these problems using fraction strips or fraction circles.

**Place an X on the number line to show the interval in which your estimate lies.**

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Reason for estimate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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Reason for estimate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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How would you make a fraction strip of 20ths from one of 10ths?

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Reason for estimate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
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1. Marian won a prize in the local lotto. She put  of her winnings into a savings account. She gave of the remainder to her sister and spent the rest on buying a car. Her sister received €2000 from Mary. How much did Marian win? How much did she spend on the car?

(Use fraction strips if necessary to model the problem.)

1. Kevin has built an apartment block. He has 12 apartments sold which is of the all the apartments. How many apartments are in the entire apartment block? Model this using a fraction strip.

**Homework -** Do the following answers make sense? Give a reason. The first question is done as an example. Exact answers are not required. Common denominators are not required.

1. ? This does not make sense as 11/12 <1 and if I take away ¼ , my answer has to be less than 1 but 
2.   Does this make sense? \_\_\_\_\_\_\_\_\_\_

Reason: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1.  Does this make sense? \_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1.  Does this make sense? \_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1.  Does this make sense? \_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1.  Does this make sense? \_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1.  Does this make sense? \_\_\_\_\_\_\_\_\_\_

Reason \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The line below represents of the length of a fish I caught. Draw a line representing the approx length of the fish.

## Explain how you worked out the length of the fish. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| 1 unit or 1 “whole” |
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**Possible answers for some of the questions on Student Activity 1**

Estimate the answer to each of these problems using fraction strips or fraction circles.

**Place an X on the number line to show the interval in which your estimate lies.**

1.  





 **Estimate and reason**: Answer is between 1 1/2 and 2 as both fractions are very close to 1 but less than 1.

1.  





**Estimate and reason**: Between ½ and 1 and close to 1 as both are very close to ½ but less and ½+ ½ =1



1. 

How would you make a fraction strip of 20ths from one of 10ths?





**Estimate and reason**: Between 0 and ½ as both fractions are close to 0.

1.  





**Estimate and reason**: Between 1 and 1 ½ as 3/5 >1/2 (3/6 =1/2) and 5/9 >1/2 (5/10 =1/2)

1.  





**Estimate and reason**: Between 0 and ½ and close to ½.

 2/6 and 1/6 = ½ and 1/7 < 1/6.

1. Using fraction strips

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2000 =1/6
6/6 = 12000 and she spent 4000 on the car,

1. Using fraction strips

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3/7 =12 1/7 =4 7/7 =28