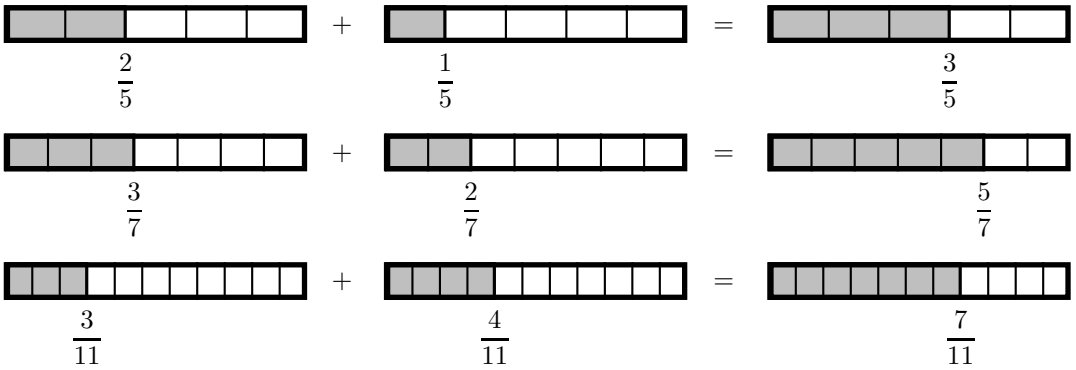
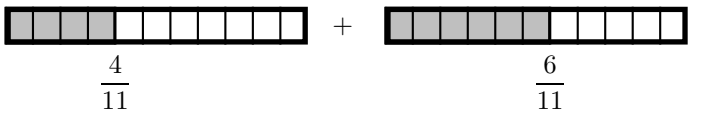
Addition of fractions. Professor Luis Fernández

Fractions with the same denominator

Recall: To add two fractions with the same denominator, one just has to add the numerators and leave the same denominator. This is clear from the pictures:



In the following exercises, add using the pictures, as in the following example:

1. $\frac{4}{11}+\frac{6}{11}=$  $=\frac{10}{11}$

2. $\frac{4}{6}+\frac{2}{6}=$  $=$ ——

3. $\frac{2}{9}+\frac{6}{9}=$  $=$ ——

4. $\frac{2}{5}+\frac{3}{5}=$  $=$ ——

5. $\frac{7}{15}+\frac{6}{15}=$  $=$ ——

Now without pictures. Remember to write the answer in lowest terms.

6. $\frac{3}{7}+\frac{4}{7}=\frac{7}{7}=1$ (example)

7. $\frac{4}{12}+\frac{5}{12}=$

8. $\frac{6}{5}+\frac{7}{5}=$

9. $\frac{3}{12}+\frac{14}{12}=$

10. $\frac{4}{9}+\frac{2}{9}=$

11. $\frac{1}{15}+\frac{42}{15}=$

12. $\frac{3}{6}+\frac{13}{6}=$

13. $\frac{7}{2}+\frac{1}{2}=$

14. $\frac{2}{13}+\frac{6}{13}=$

Fractions with different denominators

Recall: To add fractions with different denominators, first find equivalent fractions that have **the same** denominator, and then add them as above.

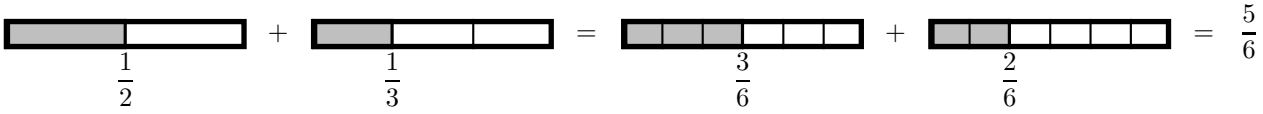
For example, $\frac{2}{5}+\frac{4}{3}=\frac{6}{15}+\frac{20}{15}=\frac{26}{15}$.

How do we find the common denominator? The point is to find a number that can be divided by the given denominators. **Any** number is good.

One option that always works is to use the product of the denominators as the new denominator, as in the last example. But sometimes the new denominator is a very big number, and it is easier to use the Least Common Multiple of the denominators as the common denominator.

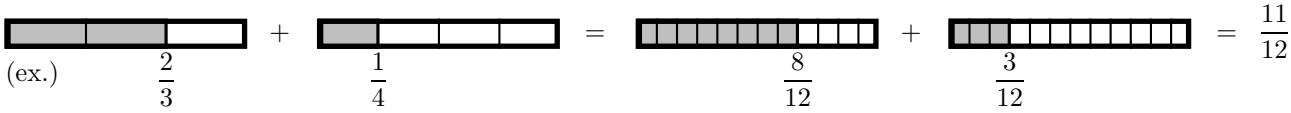
For example, $\frac{7}{15}+\frac{5}{20}=\frac{28}{60}+\frac{15}{60}=\frac{43}{60}$.

In pictures: the point is that unless we have the same number of divisions of the bar in both fractions, we cannot add them. However, we always have the option of subdividing the bars further, as follows:



Note that we are dividing the halfs in thirds and the thirds in halfs, so the common denominator is the product of the two denominators: $2 \cdot 3 = 6$.

In the following exercises, represent the two fractions using a common denominator and add:

15. (ex.) 

16. 

17. 

18. 

19. 

Now without pictures: Add the following fractions. Make sure to write the final answer in lowest terms.

20. $\frac{4}{5} + \frac{3}{4} = \frac{16}{20} + \frac{15}{20} = \frac{31}{20}$ (ex.)

21. $\frac{4}{3} + \frac{2}{6} =$ — + — =

22. $\frac{2}{5} + \frac{7}{4} =$ — + — =

23. $\frac{5}{4} + \frac{1}{6} =$ — + — =

24. $\frac{5}{12} + \frac{3}{4} =$ — + — =

25. $\frac{3}{7} + \frac{3}{4} =$ — + — =

26. $\frac{5}{8} + \frac{2}{5} =$ — + — =

27. $\frac{5}{6} + \frac{1}{4} =$ — + — =

28. $\frac{7}{3} + \frac{6}{5} =$ — + — =

29. $\frac{3}{7} + \frac{1}{2} =$ — + — =

30. $\frac{2}{6} + \frac{3}{5} =$ — + — =

31. $\frac{8}{10} + \frac{7}{4} =$ — + — =

32. $\frac{1}{2} + \frac{5}{6} =$

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

34. $1 + \frac{3}{4} =$

35. $\frac{5}{3} + \frac{7}{4} =$

36. $2 + \frac{2}{5} =$

37. $4 + \frac{3}{2} =$

Subtraction of fractions

Subtraction is done using the same idea, only that in the end you subtract the numerators instead of subtracting.

For example: $\frac{3}{5} - \frac{1}{4} = \frac{12}{20} - \frac{5}{20} = \frac{7}{20}$.

Subtract the following fractions:

38. $\frac{5}{4} - \frac{1}{6} =$ — − — =

39. $\frac{5}{12} - \frac{1}{4} =$ — − — =

40. $\frac{4}{7} - \frac{2}{5} =$ — − — =

41. $\frac{5}{8} - \frac{2}{5} =$ — − — =

42. $\frac{5}{6} - \frac{1}{4} =$ — − — =

43. $\frac{7}{3} - \frac{6}{5} =$ — − — =

44. $\frac{5}{4} - \frac{2}{3} =$

45. $\frac{5}{3} - \frac{1}{9} =$

46. $\frac{1}{1} - \frac{2}{5} =$

47. $\frac{1}{1} - \frac{1}{6} =$

48. $1 - \frac{1}{4} =$

49. $\frac{8}{7} - \frac{1}{1} =$

50. $\frac{5}{2} - 1 =$

51. $\frac{9}{3} - \frac{4}{7} =$

52. $\frac{7}{2} - \frac{3}{5} =$