2) Subtract the following fractions:

a) $\frac{8}{15} - \frac{4}{9}$

$$\frac{8 \times 3 - 4 \times 5}{45} = \frac{24 - 20}{45} = \frac{4}{45}$$

3	15, 9
3	5, 3
5	5, 1
	1, 1

L.C.M. = 45

b) $\frac{11}{13}$ $\frac{-5}{7}$

13	13, 7
7	1, 7
	1, 1

L.C.M. = 91

$$\frac{11\times7 - 5\times13}{91} = \frac{77-65}{91} = \frac{12}{91}$$

c) $\frac{13}{17}$ $\frac{-7}{10}$

17	17, 10
10	1, 10
	1, 10

L.C.M. = 170

$$\frac{13\times10 - 7\times17}{170} =$$

$$= \frac{130-119}{170} = \frac{11}{170}$$

d) $\frac{15}{19}$ - $\frac{9}{13}$

19	19, 13
13	1, 13
	1, 1

L.C.M. = 247

$$\frac{15\times13 - 9\times19}{247}$$

$$= \frac{195-171}{247} = \frac{24}{247}$$

e) $\frac{7}{9} \quad \frac{-4}{15}$

$$\frac{7\times5 - 4\times3}{45}$$

$$= \frac{35-12}{45} = \frac{23}{45}$$

3	9, 15
3	3, 5
5	1, 5
	1, 1

L.C.M. 45

h) $6\frac{3}{17} - 4 = \frac{105}{17} - \frac{4}{1}$

17	17 , 1
	1 , 1

L.C.M. = 17

$= \frac{105 \times 1 - 4 \times 17}{17} = \frac{105 - 68}{17} = \frac{37}{17}$

e) $\frac{16}{27} - \frac{7}{18}$

2	27 , 18
3	27 , 9
3	9 , 3
3	3 , 1
	1 , 1

$= \frac{16 \times 2 - 7 \times 3}{54}$

$= \frac{32 - 21}{54} = \frac{11}{54}$

g) $13\frac{7}{9} - 8\frac{5}{12}$

$= 13\frac{7}{9} - 8\frac{5}{12} = \frac{124}{9} - \frac{101}{12}$

$= \frac{124 \times 4 - 101 \times 3}{36}$

$= \frac{496 - 303}{36} = \frac{193}{36}$

3	9, 12
3	3, 4
2	1, 4
2	1, 2
	1, 1

L.C.M. = 36

i) $30\frac{3}{4} - 25 = \frac{123}{4} - \frac{25}{1}$

2	4, 1
2	2, 1
	1, 1

L.C.M. = 4

$= \frac{123 \times 1 - 25 \times 4}{4}$ ~~$= 123 \times 1 = 25$~~

$= \frac{123 - 100}{4} = \frac{23}{4}$

j) $20\frac{7}{12} - 15 = \frac{247}{12} - \frac{15}{1}$

2	12, 1
2	6, 1
3	3, 1
	1, 1

L.C.M. = 12

$= \frac{247 \times 1 - 15 \times 12}{12} =$

$= \frac{247 - 180}{12} = \frac{77}{12}$

k) $12\frac{7}{8} - 11\frac{1}{2} = \frac{103}{8} - \frac{23}{2}$

2	8, 2
2	4, 2
2	2, 1
	1, 1

L.C.M. = 8

$= \frac{103 \times 1 - 23 \times 4}{8}$ $= \frac{103 - 92}{8}$

$= \frac{11}{8}$

1) $100\frac{1}{4} - 99 = \frac{401}{4} - \frac{99}{1}$

2	4, 1
2	2, 1
	1, 1

L.C.M = 4

$= \frac{401 \times 1 - 99 \times 4}{4} = \frac{401 - 396}{4}$

$= \frac{5}{4}$

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3) Simplify :

a) $\frac{7}{12} + \frac{9}{12} - \frac{5}{12}$

$= \frac{7\times1 + 9\times1 - 5\times1}{12}$

$= \frac{7+9-5}{12} = \frac{11}{12}$

2	12, 12, 12
2	6, 6, 6
3	3, 3, 3
	1, 1, 1

L.C.M. = 12

b) $\frac{9}{10} - \frac{3}{5} + \frac{7}{8} = \frac{9}{10} + \frac{7}{8} - \frac{3}{5}$

$= \frac{9\times4 + ~~3\times8~~ 7\times5 - 3\times8}{40}$

$= \frac{36+35-24}{40} = \frac{71-24}{40} = \frac{47}{40}$

2	10, 8, 5
2	5, 4, 5
2	5, 2, 5
5	5, 1, 5
	1, 1, 1

L.C.M. = 40

c) $\frac{15}{12} - \frac{2}{3} - \frac{1}{2} + 7 = \frac{5}{12} + \frac{7}{1} - \frac{2}{3} - \frac{1}{2}$

2	12, 1, 3, 2
2	6, 1, 3, 1
3	3, 1, 3, 1
	1, 1, 1, 1

L.C.M. = 12

$$= \frac{5+7\times12 - 2\times4 - 1\times6}{12}$$

$$= \frac{5+84-8-6}{12} = \frac{75}{12}$$

d) $\frac{1}{2} + \frac{3}{4} - \frac{5}{8} - \frac{1}{16}$

2	2, 4, 8, 16
2	1, 2, 4, 8
2	1, 1, 2, 4
2	1, 1, 1, 2
	1, 1, 1, 1

L.C.M. = 16

$$= \frac{1\times8 + 3\times4 - 5\times2 - 1\times1}{16}$$

$$= \frac{8+12-10-1}{16} = \frac{9}{16}$$

e) $8\frac{3}{4} + 7\frac{1}{2} - 3\frac{1}{4} - 2\frac{1}{2}$

2	4, 2, 4, 2
2	2, 1, 2, 1
	1, 1, 1, 1

L.C.M. = 4

$$= \frac{35}{4} + \frac{15}{2} - \frac{13}{4} - \frac{5}{2}$$

$$= \frac{35\times1 + 15\times2 - 13\times1 - 5\times2}{4}$$

$$= \frac{35+30-13-10}{4} = \frac{42}{4}$$

f) $10\frac{5}{6} - 7\frac{2}{3} + 8\frac{1}{3} - 5\frac{1}{2}$

$= \frac{65}{6} + \frac{25}{3} - \frac{23}{3} - \frac{11}{2}$

2	6, 3, 3, 2
3	3, 3, 3, 1
	1, 1, 1, 1

L.C.M. = 6

$= \frac{65\times1 + 25\times2 - 23\times2 - 11\times3}{6}$

$= \frac{65 + 50 - 46 - 33}{6} = \frac{36}{6}$

g) $5\frac{5}{12} - 6 + 8 - 5\frac{3}{5}$

$= \frac{65}{12} - \frac{6}{1} + \frac{8}{1} + \frac{65}{12} + \frac{8}{1} - \frac{6}{1} - \frac{28}{5}$

2	12, 1, 1, 5
2	6, 1, 1, 5
3	3, 1, 1, 5
5	1, 1, 1, 5
	1, 1, 1, 1

L.C.M. = 60

$= \frac{65\times5 + 8\times60 - 6\times60 - 28\times12}{60}$

$= \frac{325 + 480 + 360 + 336 - 1,501}{60}$

g) $5\frac{5}{12} - 6 + 8 - 5\frac{3}{5}$

2	12, 1, 1, 5
2	6, 1, 1, 5
3	3, 1, 1, 5
5	1, 1, 1, 5
	1, 1, 1, 1

$= \frac{65}{12} + \frac{8}{1} - \frac{6}{1} - \frac{28}{5}$

$= \frac{65 \times 5 + 8 \times 60 - 6 \times 60 - 28 \times 12}{60}$ L.C.M. = 60

$= \frac{325 + 480 - 360 - 336}{60} = \frac{109}{60}$

h) $10\frac{1}{4} + 6\frac{3}{8} - 15 + 1\frac{1}{2}$

2	4, 8, 2, 1
2	2, 4, 1, 1
2	1, 2, 1, 1
	1, 1, 1, 1

L.C.M. = 8

$= \frac{41}{4} + \frac{51}{8} + \frac{3}{2} - \frac{15}{1}$

$= \frac{41 \times 2 + 51 \times 1 + 3 \times 4 - 15 \times 8}{8}$

$= \frac{82 + 51 + 12 - 120}{8} = \frac{-25}{8}$

1) $23 - 20\frac{1}{2} + 15\frac{3}{5} - 5$

$= \frac{25}{1} + \frac{78}{5} - \frac{41}{2} - \frac{5}{1}$

2	1, 5, 2, 1
5	1, 5, 1, 1
	1, 1, 1, 1

L.C.M = 10

$= \frac{25 \times 10 + 78 \times 2 - 41 \times 5 - 5 \times 10}{10}$

$= \frac{250 + 156 - 205 - 50}{10} = \frac{151}{10}$

ii) $\frac{9}{14} - 1\frac{2}{7} + 4\frac{3}{7} - 1\frac{2}{21}$

$= \frac{9}{14} + \frac{31}{7} - \frac{9}{7} - \frac{23}{21}$

2	4, 7, 7, 21
2	2, 7, 7, 21
3	1, 7, 7, 21
3	1, 7, 7, 9
3	1, 7, 7, 3
7	1, 7, 7, 1
	1, 1, 1, 1

L.C.M = 756

$= \frac{9 \times 54 + 31 \times 108 - 9 \times 84 - 23 \times 36}{756}$

$$= \frac{486 + 3348 - 756 - 828}{756} = \frac{2250}{756}$$