

CHAPTER 3 Fractions: Addition and Subtraction**EXERCISE 3a (p. 33)**

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|------------------|-------------------|--------------------|-------------------|
| 1. $\frac{1}{6}$ | 5. $\frac{2}{6}$ | 9. $\frac{1}{2}$ | 13. $\frac{3}{7}$ |
| 2. $\frac{3}{8}$ | 6. $\frac{7}{10}$ | 10. $\frac{3}{10}$ | 14. $\frac{2}{6}$ |
| 3. $\frac{1}{3}$ | 7. $\frac{1}{4}$ | 11. $\frac{5}{12}$ | 15. $\frac{4}{8}$ |
| 4. $\frac{5}{6}$ | 8. $\frac{3}{4}$ | 12. $\frac{1}{4}$ | 16. $\frac{1}{6}$ |

EXERCISE 3b (p. 34)

This may be used for discussion.

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| 1. a) $\frac{1}{60}$ b) $\frac{9}{60}$ c) $\frac{30}{60}$ d) $\frac{45}{60}$ | 11. $\frac{150}{500}$ |
| 2. $\frac{5}{7}$ | 12. $\frac{45}{120}$ |
| 3. $\frac{11}{31}$ | 13. $\frac{37}{3600}$ |
| 4. $\frac{51}{365}$ | 14. $\frac{35}{80}$ |
| 5. $\frac{35}{100}$ | 15. a) $\frac{10}{32}$ b) $\frac{8}{32}$ c) $\frac{25}{32}$ |
| 6. $\frac{90}{500}$ | 16. $\frac{15}{40}$ $\frac{25}{40}$ |
| 7. $\frac{35}{180}$ | 17. a) $\frac{20}{62}$ b) $\frac{10}{62}$ c) $\frac{48}{62}$ |
| 8. $\frac{3}{31}$ | 18. a) $\frac{12}{37}$ b) $\frac{8}{37}$ c) $\frac{29}{37}$ |
| 9. $\frac{17}{61}$ | 19. a) $\frac{9}{14}$ b) $\frac{3}{14}$ |
| 10. $\frac{5}{21}$ | |

EXERCISE 3c (p. 37)

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|---|---------|---------|----------|------------|
| 7. 6 | 13. 15 | 19. 18 | 25. 300 | 31. 55 |
| 8. 4 | 14. 12 | 20. 30 | 26. 110 | 32. 500 |
| 9. 21 | 15. 100 | 21. 10 | 27. 40 | 33. 10 000 |
| 10. 36 | 16. 6 | 22. 10 | 28. 1000 | |
| 11. 18 | 17. 16 | 23. 100 | 29. 90 | |
| 12. 4 | 18. 18 | 24. 8 | 30. 8000 | |
| 34. a) $\frac{12}{24}$ b) $\frac{8}{24}$ c) $\frac{4}{24}$ d) $\frac{18}{24}$ e) $\frac{10}{24}$ f) $\frac{9}{24}$ | | | | |
| 35. a) $\frac{6}{45}$ b) $\frac{20}{45}$ c) $\frac{27}{45}$ d) $\frac{15}{45}$ e) $\frac{42}{45}$ f) $\frac{9}{45}$ | | | | |
| 36. a) $\frac{27}{36}$ b) $\frac{20}{36}$ c) $\frac{6}{36}$ d) $\frac{10}{36}$ e) $\frac{21}{36}$ f) $\frac{24}{36}$ | | | | |
| 37. a) $\frac{12}{72}$ b) $\frac{12}{16}$ c) $\frac{12}{14}$ d) $\frac{12}{15}$ e) $\frac{12}{18}$ f) $\frac{12}{24}$ | | | | |
| 38. b) $\frac{2}{3} = \frac{6}{9}$ e) $\frac{7}{10} = \frac{70}{100}$ | | | | |

EXERCISE 3d (p. 38)

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|------------------|-------------------|--------------------|-------------------|-------|
| 1. $\frac{1}{2}$ | 9. $\frac{3}{8}$ | 16. $\frac{4}{11}$ | 23. $\frac{3}{5}$ | 30. < |
| 2. $\frac{5}{6}$ | 10. $\frac{6}{7}$ | 17. $\frac{2}{7}$ | 24. $\frac{5}{8}$ | 31. < |
| 3. $\frac{4}{5}$ | 11. $\frac{3}{5}$ | 18. $\frac{5}{8}$ | 25. < | 32. > |
| 4. $\frac{2}{9}$ | 12. $\frac{3}{4}$ | 19. $\frac{3}{11}$ | 26. > | 33. < |

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|------------------|--------------------|--------------------|---------|---------|
| 5. $\frac{3}{8}$ | 13. $\frac{3}{11}$ | 20. $\frac{7}{9}$ | 27. $<$ | 34. $>$ |
| 6. $\frac{3}{4}$ | 14. $\frac{5}{7}$ | 21. $\frac{9}{11}$ | 28. $<$ | 35. $<$ |
| 7. $\frac{3}{7}$ | 15. $\frac{5}{11}$ | 22. $\frac{2}{5}$ | 29. $>$ | 36. $>$ |
| 8. $\frac{5}{6}$ | | | | |

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| 37. $\frac{7}{30}, \frac{1}{2}, \frac{3}{5}, \frac{2}{3}$ | 41. $\frac{1}{2}, \frac{17}{28}, \frac{5}{7}, \frac{3}{4}, \frac{11}{14}$ | 45. $\frac{3}{4}, \frac{17}{24}, \frac{2}{3}, \frac{7}{12}, \frac{1}{6}$ |
| 38. $\frac{4}{10}, \frac{5}{8}, \frac{13}{20}, \frac{3}{4}$ | 42. $\frac{2}{5}, \frac{1}{2}, \frac{14}{25}, \frac{3}{5}, \frac{7}{10}$ | 46. $\frac{4}{5}, \frac{23}{30}, \frac{11}{15}, \frac{7}{10}, \frac{2}{3}$ |
| 39. $\frac{1}{3}, \frac{1}{2}, \frac{7}{12}, \frac{5}{6}$ | 43. $\frac{5}{6}, \frac{7}{9}, \frac{2}{3}, \frac{11}{18}, \frac{1}{2}$ | 47. $\frac{3}{4}, \frac{5}{8}, \frac{19}{32}, \frac{1}{2}, \frac{7}{16}$ |
| 40. $\frac{3}{8}, \frac{2}{5}, \frac{1}{2}, \frac{7}{10}, \frac{17}{20}$ | 44. $\frac{3}{4}, \frac{7}{10}, \frac{13}{20}, \frac{3}{5}, \frac{1}{2}$ | 48. $\frac{5}{6}, \frac{4}{5}, \frac{3}{4}, \frac{7}{12}, \frac{1}{2}$ |

Simplifying fractions: this is the first time that the word “factor” is used. It will need explanation and much discussion to clarify its meaning, e.g. is 2 a factor of 14; what are the factors of 6? Factors are discussed again in Chapter 12, and Exercise 12a could be done now. Children not familiar with simplifying fractions need a lot of discussion before they do any themselves. Discussion of the other words used for simplifying is needed, i.e. reducing and cancelling. (Cancelling really means the act of removing the common factors.)

EXERCISE 3e (p. 42)

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|------------------|--------------------|-------------------|--------------------|--------------------|
| 1. $\frac{1}{3}$ | 7. $\frac{1}{3}$ | 13. $\frac{1}{5}$ | 19. $\frac{3}{5}$ | 25. $\frac{4}{5}$ |
| 2. $\frac{3}{5}$ | 8. $\frac{2}{3}$ | 14. $\frac{2}{5}$ | 20. $\frac{2}{5}$ | 26. $\frac{4}{7}$ |
| 3. $\frac{1}{3}$ | 9. $\frac{1}{2}$ | 15. $\frac{2}{7}$ | 21. $\frac{5}{9}$ | 27. $\frac{1}{3}$ |
| 4. $\frac{1}{2}$ | 10. $\frac{1}{4}$ | 16. $\frac{1}{3}$ | 22. $\frac{7}{11}$ | 28. $\frac{9}{11}$ |
| 5. $\frac{1}{3}$ | 11. $\frac{2}{7}$ | 17. $\frac{1}{2}$ | 23. $\frac{3}{4}$ | 29. $\frac{3}{4}$ |
| 6. $\frac{1}{2}$ | 12. $\frac{3}{10}$ | 18. $\frac{1}{5}$ | 24. $\frac{3}{11}$ | 30. $\frac{4}{5}$ |

EXERCISE 3f (p. 43)

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|--------------------|---------------------|---------------------|---------------------|---------------------|
| 1. $\frac{3}{4}$ | 8. $\frac{2}{5}$ | 15. $\frac{1}{2}$ | 22. $\frac{15}{23}$ | 29. $\frac{9}{17}$ |
| 2. $\frac{1}{2}$ | 9. $\frac{11}{21}$ | 16. $\frac{9}{10}$ | 23. $\frac{8}{9}$ | 30. $\frac{12}{19}$ |
| 3. $\frac{5}{11}$ | 10. $\frac{1}{2}$ | 17. $\frac{3}{4}$ | 24. $\frac{2}{3}$ | 31. $\frac{13}{30}$ |
| 4. $\frac{10}{13}$ | 11. $\frac{11}{13}$ | 18. $\frac{11}{19}$ | 25. $\frac{4}{5}$ | 32. $\frac{5}{9}$ |
| 5. $\frac{19}{23}$ | 12. $\frac{4}{5}$ | 19. $\frac{1}{2}$ | 26. $\frac{2}{5}$ | 33. $\frac{1}{2}$ |
| 6. $\frac{3}{7}$ | 13. $\frac{6}{7}$ | 20. $\frac{2}{5}$ | 27. $\frac{23}{31}$ | 34. $\frac{25}{99}$ |
| 7. $\frac{3}{5}$ | 14. $\frac{9}{17}$ | 21. $\frac{6}{11}$ | 28. $\frac{11}{14}$ | |

Addition and subtraction of fractions: many pupils try to add or subtract at the same time as changing denominators and are then baffled by their inevitable mistakes. This is a case where they should be encouraged to write down each step, as shown in the worked examples, so that they separate the two operations.

EXERCISE 3g (p. 45)

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|--------------------|---------------------|----------------------|---------------------|---------------------|
| 1. $\frac{13}{15}$ | 9. $\frac{19}{42}$ | 16. $\frac{33}{100}$ | 23. $\frac{13}{15}$ | 30. 1 |
| 2. $\frac{23}{40}$ | 10. $\frac{41}{42}$ | 17. $\frac{19}{20}$ | 24. $\frac{3}{4}$ | 31. $\frac{39}{40}$ |
| 3. $\frac{11}{30}$ | 11. $\frac{82}{99}$ | 18. $\frac{5}{8}$ | 25. $\frac{19}{20}$ | 32. $\frac{13}{18}$ |
| 4. $\frac{29}{35}$ | 12. $\frac{47}{90}$ | 19. $\frac{8}{9}$ | 26. $\frac{17}{24}$ | 33. $\frac{17}{20}$ |
| 5. $\frac{29}{30}$ | 13. $\frac{7}{10}$ | 20. $\frac{13}{18}$ | 27. $\frac{19}{20}$ | 34. $\frac{17}{18}$ |
| 6. $\frac{39}{56}$ | 14. $\frac{13}{16}$ | 21. $\frac{13}{20}$ | 28. $\frac{11}{12}$ | 35. $\frac{19}{30}$ |
| 7. $\frac{25}{42}$ | 15. $\frac{17}{21}$ | 22. $\frac{13}{22}$ | 29. $\frac{6}{7}$ | 36. $\frac{2}{3}$ |
| 8. $\frac{20}{21}$ | | | | |

EXERCISE 3h (p. 47)

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|--------------------|--------------------|---------------------|---------------------|--------------------|
| 1. $\frac{2}{3}$ | 6. $\frac{3}{7}$ | 11. $\frac{7}{15}$ | 16. $\frac{1}{12}$ | 21. $\frac{1}{8}$ |
| 2. $\frac{1}{2}$ | 7. $\frac{5}{13}$ | 12. $\frac{1}{3}$ | 17. $\frac{9}{100}$ | 22. $\frac{1}{4}$ |
| 3. $\frac{5}{17}$ | 8. $\frac{3}{5}$ | 13. $\frac{18}{55}$ | 18. $\frac{19}{56}$ | 23. $\frac{1}{6}$ |
| 4. $\frac{11}{20}$ | 9. $\frac{5}{21}$ | 14. $\frac{1}{9}$ | 19. $\frac{3}{16}$ | 24. $\frac{4}{15}$ |
| 5. $\frac{2}{5}$ | 10. $\frac{5}{21}$ | 15. $\frac{3}{26}$ | 20. $\frac{4}{15}$ | |

EXERCISE 3i (p. 49)

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|-------------------|--------------------|--------------------|--------------------|----------------------|
| 1. $\frac{3}{8}$ | 6. $\frac{5}{12}$ | 11. $\frac{3}{4}$ | 16. $\frac{1}{16}$ | 21. $\frac{19}{100}$ |
| 2. $\frac{5}{7}$ | 7. $\frac{3}{5}$ | 12. $\frac{1}{2}$ | 17. $\frac{2}{9}$ | 22. $\frac{1}{4}$ |
| 3. $\frac{1}{16}$ | 8. $\frac{17}{18}$ | 13. $\frac{1}{18}$ | 18. $\frac{7}{20}$ | 23. $\frac{5}{18}$ |
| 4. $\frac{5}{12}$ | 9. $\frac{17}{50}$ | 14. $\frac{1}{12}$ | 19. $\frac{1}{8}$ | 24. $\frac{1}{30}$ |
| 5. $\frac{9}{50}$ | 10. $\frac{1}{2}$ | 15. $\frac{1}{5}$ | 20. $\frac{1}{3}$ | |

EXERCISE 3j (p. 50) Intended for the above average; can be used for discussion with others.

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|----------------------------------|----------------------------------|--------------------------------|-------------------------------|---|
| 1. $\frac{13}{15}, \frac{2}{15}$ | 2. $\frac{11}{15}, \frac{4}{15}$ | 3. $\frac{1}{3}, \frac{1}{12}$ | 4. $\frac{3}{8}, \frac{7}{8}$ | 5. $\frac{11}{40}, \frac{19}{20}, \frac{7}{40}$ |
|----------------------------------|----------------------------------|--------------------------------|-------------------------------|---|

EXERCISE 3k (p. 52)

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|--------------------|-------------------|----------------------|----------------------|---------------------|
| 1. $2\frac{1}{4}$ | 5. $9\frac{7}{9}$ | 9. $25\frac{2}{5}$ | 13. $13\frac{4}{9}$ | 17. $13\frac{2}{3}$ |
| 2. $4\frac{3}{4}$ | 6. $3\frac{1}{2}$ | 10. $10\frac{4}{11}$ | 14. $15\frac{1}{6}$ | 18. $13\frac{2}{5}$ |
| 3. $6\frac{1}{6}$ | 7. $6\frac{3}{4}$ | 11. $13\frac{5}{8}$ | 15. $7\frac{10}{11}$ | 19. $24\frac{1}{3}$ |
| 4. $5\frac{3}{10}$ | 8. $5\frac{1}{8}$ | 12. $11\frac{6}{7}$ | 16. $12\frac{5}{6}$ | 20. $4\frac{9}{10}$ |

EXERCISE 3l (p. 52)

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|-------------------|-------------------|--------------------|--------------------|---------------------|
| 1. $\frac{13}{3}$ | 5. $\frac{57}{7}$ | 9. $\frac{11}{3}$ | 13. $\frac{19}{5}$ | 17. $\frac{19}{10}$ |
| 2. $\frac{33}{4}$ | 6. $\frac{33}{5}$ | 10. $\frac{11}{2}$ | 14. $\frac{43}{9}$ | 18. $\frac{20}{3}$ |

3. $\frac{17}{10}$

7. $\frac{20}{7}$

11. $\frac{37}{5}$

15. $\frac{35}{4}$

19. $\frac{59}{8}$

4. $\frac{98}{9}$

8. $\frac{25}{6}$

12. $\frac{22}{9}$

16. $\frac{73}{7}$

20. $\frac{101}{10}$

EXERCISE 3m (p. 53)

1. $5\frac{1}{7}$

4. $2\frac{1}{2}$

7. $13\frac{2}{3}$

9. $8\frac{1}{6}$

11. $7\frac{2}{5}$

2. $9\frac{5}{6}$

5. $16\frac{2}{5}$

8. $7\frac{1}{9}$

10. $10\frac{7}{10}$

12. $6\frac{1}{2}$

3. $4\frac{8}{11}$

6. $7\frac{1}{4}$

EXERCISE 3n (p. 54)

Again it is important to encourage the writing down of each step so that only one operation is performed at a time.

1. $5\frac{3}{4}$

7. $4\frac{9}{20}$

13. $11\frac{3}{14}$

19. $10\frac{1}{10}$

25. $15\frac{2}{5}$

2. $3\frac{5}{6}$

8. $3\frac{3}{14}$

14. $8\frac{1}{16}$

20. $11\frac{1}{10}$

26. $15\frac{4}{5}$

3. $5\frac{23}{40}$

9. $7\frac{7}{10}$

15. $12\frac{1}{16}$

21. $11\frac{1}{2}$

27. $14\frac{51}{100}$

4. $9\frac{4}{9}$

10. $13\frac{17}{21}$

16. $11\frac{9}{10}$

22. $17\frac{3}{7}$

28. $17\frac{13}{32}$

5. $5\frac{29}{36}$

11. $10\frac{13}{16}$

17. $8\frac{3}{10}$

23. $17\frac{3}{16}$

29. $22\frac{2}{7}$

6. $4\frac{1}{6}$

12. $6\frac{1}{3}$

18. $18\frac{1}{2}$

24. $21\frac{1}{18}$

30. $22\frac{1}{2}$

EXERCISE 3p (p. 56)

1. $1\frac{5}{8}$

9. $1\frac{7}{10}$

16. $2\frac{25}{28}$

23. $\frac{3}{4}$

30. $1\frac{1}{2}$

2. $1\frac{13}{15}$

10. $3\frac{11}{35}$

17. $1\frac{3}{4}$

24. $1\frac{27}{35}$

31. $2\frac{5}{6}$

3. $1\frac{1}{6}$

11. $2\frac{2}{15}$

18. $3\frac{7}{20}$

25. $1\frac{3}{8}$

32. $2\frac{7}{8}$

4. $\frac{3}{4}$

12. $3\frac{1}{4}$

19. $3\frac{9}{35}$

26. $2\frac{7}{10}$

33. $3\frac{9}{10}$

5. $5\frac{5}{12}$

13. $3\frac{3}{10}$

20. $6\frac{2}{33}$

27. $3\frac{1}{2}$

34. $\frac{2}{3}$

6. $1\frac{1}{2}$

14. $2\frac{4}{63}$

21. $3\frac{3}{28}$

28. $2\frac{1}{2}$

35. $1\frac{1}{6}$

7. $1\frac{5}{14}$

15. $3\frac{7}{24}$

22. $1\frac{5}{8}$

29. $\frac{7}{9}$

36. $2\frac{16}{21}$

8. $2\frac{3}{10}$

EXERCISE 3q (p. 56)

1. a) $1\frac{5}{21}$

b) $\frac{11}{24}$

c) $\frac{35}{72}$

d) $2\frac{1}{6}$

e) $\frac{11}{12}$

2. a) $2\frac{1}{4}$

b) $3\frac{1}{5}$

3. a) $\frac{3}{7}$

b) $\frac{17}{30}$

4. a) $\frac{1}{2}, \frac{3}{5}, \frac{13}{20}, \frac{7}{10}$

b) $\frac{7}{12}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$

c) $\frac{3}{5}, \frac{7}{10}, \frac{71}{100}, \frac{17}{20}$

5. a) $<$

b) $>$

c) $>$

6. a) $\frac{3}{11}$

b) $\frac{7}{22}$

c) $\frac{9}{11}$

EXERCISE 3r (p. 57)

1. a) $\frac{2}{15}$ b) $1\frac{7}{10}$ c) $\frac{3}{22}$ d) $6\frac{7}{12}$ e) $\frac{1}{2}$ f) $2\frac{13}{20}$
 2. a) $\frac{7}{8}$ b) $1\frac{5}{6}$ c) $\frac{12}{13}$
 3. a) $\frac{13}{100}$ b) $\frac{233}{366}$
 4. a) $>$ b) $<$ c) $<$
 5. a) $\frac{3}{10}, \frac{7}{20}, \frac{3}{8}, \frac{2}{5}$ b) $\frac{3}{10}, \frac{2}{5}, \frac{7}{15}, \frac{1}{2}$ c) $\frac{17}{32}, \frac{9}{16}, \frac{5}{8}, \frac{3}{4}$
 6. a) $\frac{15}{28}$ b) $\frac{2}{7}$

EXERCISE 3s (p. 57)

1. a) $\frac{43}{140}$ b) $\frac{17}{45}$ c) $\frac{1}{8}$ d) $3\frac{1}{12}$ e) 0 f) 5
 2. a) $1\frac{3}{8}$ b) $2\frac{2}{5}$ c) $\frac{5}{16}$
 3. a) $<$ b) $<$
 4. a) $\frac{1}{2}, \frac{3}{5}, \frac{3}{4}, \frac{5}{6}$ b) $\frac{1}{2}, \frac{5}{9}, \frac{2}{3}, \frac{5}{6}$
 5. a) $\frac{7}{60}$ b) $\frac{1}{3}$ c) $\frac{38}{79}$
 6. a) $\frac{17}{19}$ b) $\frac{13}{19}$

EXERCISE 3t (p. 58)

1. a) $1\frac{1}{6}$ b) $\frac{5}{8}$ c) $\frac{1}{12}$ d) $2\frac{9}{20}$ e) $\frac{11}{12}$ f) $3\frac{2}{3}$
 2. a) $4\frac{3}{8}$ b) $\frac{1}{8}$ c) $2\frac{4}{7}$
 3. a) $\frac{5}{24}$ b) $\frac{1}{10}$ c) $\frac{5}{12}$
 4. a) $>$ b) $<$
 5. a) $\frac{5}{11}, \frac{1}{2}, \frac{23}{44}, \frac{13}{22}$ b) $\frac{5}{9}, \frac{7}{12}, \frac{2}{3}, \frac{3}{4}$
 6. a) $\frac{1}{5}$ b) $\frac{8}{15}$ c) $\frac{1}{3}$