CHAPTER 2 Equations, Inequalities and Formulae

The first part of this chapter revises directed numbers, collection of like terms, and solution of linear equations.

EXERCISE 2a (p. 27)

Can be used as a quick reminder of directed numbers.

1. >
2. <
3. <
4. >
5. <
6. <
7. –2
8. –11
9. 3
10. 1
11. –4
12. 0
13. –8
14. –2
15. 4
16. 12
17. –8
18. 2
19. –2
20. 48
21. 35

EXERCISE 2b (p. 28)

Simplification of algebraic expressions, including practice in the use of directed numbers.

1. Not possible
2. $2a$
3. Not possible
4. $7v$
5. $2x$
6. $p + q$
7. $4x - 2y$
8. $5u$
9. $3b - a$
10. $4c + 2d$

EXERCISE 2c (p. 29)

1. xy
2. a^2
3. $6s^2$
4. $12x^2$
5. $\frac{u}{v}$
6. $\frac{-a}{b}$
7. 1
8. $\frac{3b}{c}$
9. Not possible
10. Not possible
11. $-mn$
12. Not possible
13. $-2a$
14. $4p^3$
15. $\frac{2u}{w}$
16. Not possible
17. $6st$
18. $2p^2$
19. –4q
20. $r + 4s$
21. $\frac{4p}{q}$
22. $6st$
23. $-2b^2$
24. $\frac{x}{y}$
25. $3b - 2a$
26. $a^2 - a$
27. $3a - 3b$
28. $6a - 4c - 2b$
29. $2z - y$
30. $6x + 4y + 2z$
31. $p + 3q - 2r$
32. $x - y$
33. $5q - p$
34. $a^2 + ab - 2a + 2b$
35. $x^2 + y^2 - 2xy$
36. $2b - 6c$
37. $2p - 2q$
38. $w^2 + x^2$
39. $8n - 2m$
40. $2b - 8c$

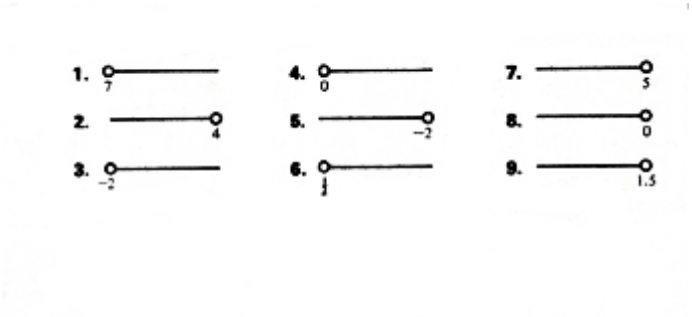
EXERCISE 2d (p. 31)

Can be used for discussion and as a reminder about the meaning of "equation" before beginning the work on inequalities.

1. $p = -\frac{2}{3}$
2. $s = \frac{1}{2}$
3. $x = 3\frac{1}{2}$
4. $a = \frac{1}{5}$
5. $x = 1$
6. y = 1

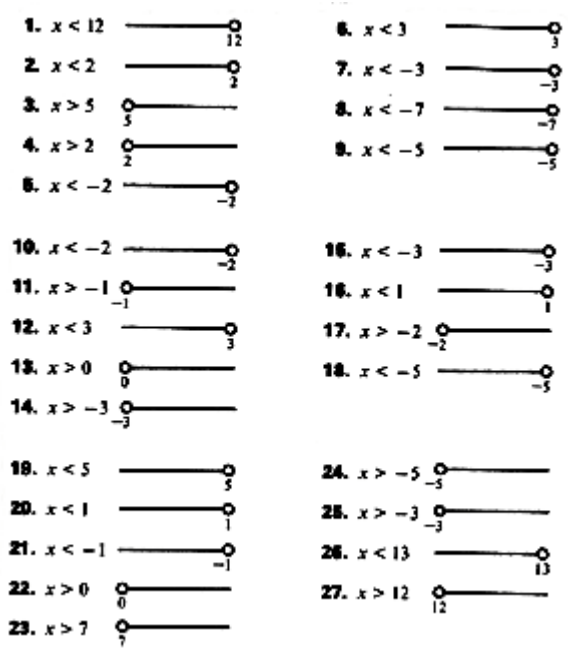
7. $x = 2$
8. $a = 4$
9. $x = \frac{1}{2}$
10. $x = 2$
11. $x = -\frac{1}{2}$
12. $x = -5$
13. $x = -\frac{1}{7}$
14. $y = 3\frac{1}{3}$
15. $x = 2\frac{4}{7}$
16. $x = 3\frac{2}{3}$
17. $a = -11$
18. $p = 0$
19. $w = 2$
20. $x = 5$
21. $x = 6\frac{1}{2}$
22. $x = -\frac{1}{6}$
23. $x = 2\frac{1}{2}$
24. $x = 1\frac{3}{4}$
25. $x = \frac{3}{14}$
26. $b = 19$
27. $x = \frac{5}{6}$
28. $x = -1$
29. $x = 2$
30. $x = \frac{1}{2}$

EXERCISE 2e (p. 32)
Work in Exercise 1m should be discussed before this section. Numbers 10–15 can be used for discussion.



10. a) 2,3,4,6,7 b) 2,5,7,8,9 c) 2,3,7,9 d) 2,3,4,6,7 e) 2,3,4,7,9
12. a) $5 > 3$; Yes b) $1 > -1$; Yes c) $-2 > -4$; Yes d) $7 > 5$; Yes
13. a) $0 > -1$; Yes b) $-4 > -5$; Yes c) $-7 > -8$; Yes d) $2 > 1$; Yes
14. a) $1 < 6$; Yes b) $-3 < 2$; Yes c) –6 less than –1; Yes d) $3 < 8$; Yes

EXERCISE 2f (p. 33)
Numbers 28–32 can be used for discussion.



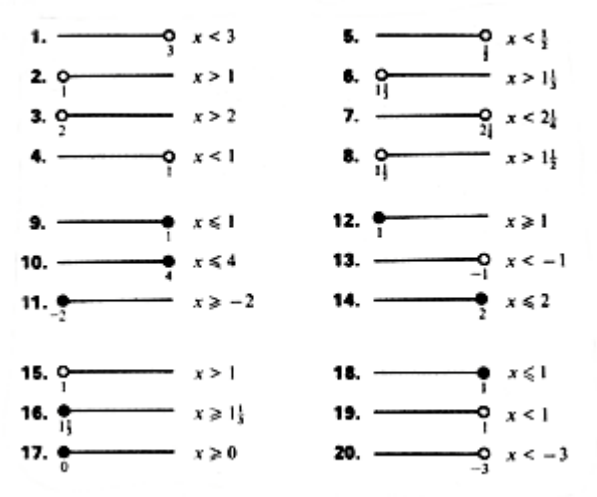
28. a) $24 < 72$ b) $3 < 9$ c) $6 < 18$ d) $2 < 6$ e) $-24 < -72$ f) $-4 < -12$
a) Yes b)Yes c) Yes d) Yes e) No f) No

29. a) $72 > -24$ b) $9 > -3$ c) $18 > -6$ d) $6 > -2$ e) $-72 > 24$ f) $-12 > 4$
a) Yes b)Yes c) Yes d) Yes e) No f) No

30. a) $-36 < -12$ b) $-4\frac{1}{2} < -1\frac{1}{2}$ c) $-9 < -3$ d) $-3 < -1$
e) $36 < 12$ f) $6 < 2$
a) Yes b)Yes c) Yes d) Yes e) No f) No

32. Only when you are multiplying by a positive number.

EXERCISE 2g (p. 35)



21. a) $x > 3$ b) $2 \leq x \leq 3$ c) No values of x
22. a) $0 \leq x \leq 1$ b) $x \leq 0$ c) No values of x
23. a) $-2 < x \leq 4$ b) No values of x c) $x < -2$
24. a) $-3 < x < -1$ b) $x < -3$ c) No values of x

25. $x < 12$; $x > -1$; $-1 < x < 12$
26. $x \leq -1$; $x \geq 3$; No values of x
27. $x \leq 7$; $x \geq -2$; $-2 \leq x \leq 7$
28. $x > 1$; $x < 2$; $1 < x < 2$
29. $x > 2$; $x < 3$; $2 < x < 3$
30. $x < 2$; $x > -1$; $-1 < x < 2$
31. $x \geq -1$; $x < 2$; $-1 \leq x < 2$
32. $x > \frac{1}{2}$; $x \leq 3$; $\frac{1}{2} < x \leq 3$
33. $2 < x < 5$
34. $-3 \leq x \leq 2$
35. $x < -2$
36. $0 < x < 2$
37. $x \geq 1$
38. $-4 < x < 2$
39. $x < -3$
40. $x < -1$
41. $1\frac{4}{5} < x < 3$
42. $\frac{1}{2} < x < 1$

EXERCISE 2h (p. 38)
These problems are slightly harder than those in Book 2A. A general discussion on units is advisable and Numbers 11–20 can be used for this purpose, although the most able pupils can work through these on their own.

1. $a = b + c$
2. $m = 2(n + p)$
3. $z = xy$
4. $a = 2bc$
5. $v = n^2$
6. $d = e - f$
7. $x = \frac{y}{2}$
8. $a = \frac{b}{2c}$
9. $k = 2u + 3v$
10. $x = 2y - z$
11. $n = p + p^2$
12. $v = u + at$
13. $R = Np$
14. $y = nx$
15. $X = xy$
16. $N = y + z$
17. $P = \frac{x+y}{50}$
18. $b = \frac{ac}{1000}$
19. $n = 1 + 2m$
20. $R = \frac{x}{10} + \frac{y}{5}$

EXERCISE 2i (p. 40)
Gives more practice in the use of directed numbers

1. $p = 8$
2. $v = 2$
3. $z = \frac{3}{4}$
4. $a = 2$
5. $x = 25$
6. $C = 30$
7. $x = 24$
8. $p = 6$
9. $S = 10$
10. $v = -5$
11. $p = 4$
12. $a = 9$
13. $r = 2\frac{2}{3}$
14. $n = \frac{1}{2}$
15. $a = 2$
16. $V = 32$
17. $p = 21$
18. $a = 6$

EXERCISE 2j (p. 41)
Numbers 1–20 require one operation. Numbers 21–36 require two operations. Some of these involve division of, say, $x + y$ by another letter or number. It is a good idea to encourage the use of brackets in this situation, e.g. $2a = x + y$, $2a = (x + y)$, $a = \frac{(x+y)}{2}$.

1. $s = p - r$
2. $y = x - 3$
3. $b = a + c$
4. $Y = X + Z$
5. $s = r - 2t$
6. $m = k - l$
7. $v = u + 5$
8. $y = z - x$
9. $P = N + Q$
10. $u = v - 10t$
11. $y = \frac{x}{2}$
12. $t = 2v$
13. $b = \frac{a}{c}$
14. $u = 3t$
15. $m = kl$
16. $b = \frac{a}{3}$
17. $n = 10X$
18. $u = \frac{v}{t}$
19. $w = 100z$
20. $p = qn$
21. $s = \frac{P-r}{2}$
22. $t = \frac{u-v}{3}$
23. $c = \frac{b-a}{4}$
24. $v = \frac{V-3u}{2}$
25. $w = \frac{x+y}{2}$
26. $t = \frac{l-k}{4}$
27. $y = \frac{x-w}{6}$
28. $s = \frac{It-N}{2}$
29. $y = \frac{4x}{3}$
30. $t = \frac{u-v}{5}$
31. $I = 10(A - P)$
32. $y = 3(x - z)$
33. $R = \frac{IV}{2}$
34. $r = \frac{p+w}{2}$
35. $c = 2(a - b)$
36. $r = 5(q - p)$
37. $u = v - at$; $u = 140$
38. $B = A - \frac{C}{100}$; $B = 17.5$
39. $C = NP$; $C = 40$
40. $x = 2(z + 3t)$; $x = -10$

41. a) $a = b + 2c$ b) $a = 4$ c) $b = a - 2c$
42. a) $x = 2yz$ b) $x = 12$ c) $y = \frac{x}{2z}$
43. a) $d = e^2 + 2f$ b) $f = \frac{d-e^2}{2}$ c) $f = \frac{1}{2}$
44. a) $R = \frac{3xn}{25}$ b) $R = 4.8$

EXERCISE 2k (p. 44)

1. a) Length b) Volume c) Area d) Volume e) Length f) Area
2. a) Length b) Volume c) Volume d) Length e) Area f) Area
3. a) cm b) cm^2 c) cm^2 d) cm^3 e) cm f) cm^3
4. a) Area b) Area c) Length d) Volume e) Volume f) Length g) Length h) Area i) Area
5. (c) and (e) are wrong
6. $2r$ represents a length because it contains only one letter representing a length unit.
7. 2

EXERCISE 2l (p. 45)

1. a) -4 b) -1 c) -2
2. a) $4x$ b) $6b$ c) $-3x^3$
3. a) $a + b$ b) $a + 5b$
4. a) $x = 1\frac{1}{4}$ b) $x = 4\frac{2}{3}$
5. a) $x > 2$ b) $x \leq 6$ c) $-2 < x < 1\frac{1}{2}$

6. a) $r = \frac{v-u}{4}$ b) $r = \frac{ps}{5}$

7. a) $P = 37\frac{1}{2}$ b) 40

EXERCISE 2m (p. 46)

1. a) 13 b) 2 c) 4

2. a) $10a - 3b$ b) $4x + x^2$ c) $2ab$

3. a) $3y - 2x$ b) $2y - 6x$

4. a) $a = -1$ b) $x = \frac{7}{8}$

5. a) $x > 1$ b) $x > -1$ c) $-1 < x < 1$

6. a) $d = \frac{C}{\pi}$ b) $d = \frac{a+s}{7}$

7. a) $u = 56$ b) $u = -86$