Chapter 2 : Linear and simultaneous equations

2A Algebraic expressions

1.
    a. 8y
    b. Y-7
    c. 30 + y
    d. $\frac{3y}{y+6}$
    e. $\frac{y}{2} + 4$
    f. 6y -3y = 3y
2.
    a. 5x + y
    b.
        i. 20
        ii. 85
        iii. 280
3.
    a. 96
    b. 3
    c. 1728
    d. 4.5
    e. 30
    f. 24/7
    g. 11664
    h. 169
    i. 28
    j. 5/3
    k. 61
    l. 44
    m. 18
    n. -18
    o. 32
    p. 15/4

4.
   a. 30m^2
   b. New base: 10+x new height : 6-y
   c. New area = ½ * (10+x) * (6-y)

5.
   a. N/15
   b. Nm/15

6. 64π

2B simplifying algebraic expressions

1.
   a. $-2x^2 + 5x + 7$
   b. $2xy + 2y + 3x$
   c. a+9b
   d. $3x^2 - 2x$
   e. 9mn−3m−4n
   f. 4ab+3a+2b
   g. $y^2 - y + 7$
   h. p+6q
   i. 6rs−2s
   j. 10z−5
   k. $-x^3 + 2x^2 + x$
   l. 11bc−4b
2.
   a. P = 8x + 12
   b. P= 4x + 9
   c. P = 12x + 4

3.

a. $24x^2y$
b. 36abc
c. $8x^3y$
d. $30m^2n$
e. $42y^2z$
f. $20a^2b$
g. $48x^2y$
h. $12z^2y$
i. 4xy
j. 6ab
k. $9m^2n$
l. 6yz

4.

a. 2y
b. 5x
c. 3y
d. $5a^2$
e. 4xy
f. 3b
g. 2m
h. $4x^2$
i. $4a^3$
j. $6b^2$
k. 7xy
l. $7m^2n$

5.

a. $4xy^2$
b. $7a^2\ b - 2ab^2$
c. $9m^2\ n\ - 5mn^2$
d. $5x^2\ y\ +\ 3y$
e. $11p^2\ q - 2pq^2$
f. $16rs - 3rs^3$

2C expanding algebraic expressions

1.
   a. 5x+15
   b. 7y-14
   c. 4ab + 20a
   d. $6z^2 - 12z$
   e. $2x^2 y - 6x^2$
   f. $-6mm - 12m^2$
   g. $8k^2 - 40k$
   h. $-12p^2 - 8p$
   i. $9y^2 + 9yx$
   j. $3x^2 y - 12x^2$
   k. -5ab -35a
   l. -21z + 3za
2.
   a. 6y + 12
   b. 8x -10
   c. $6z^2 - 2z$
   d. $6m^2 - 21m$
   e. 3x + 16
   f. $5a^2 + 28a$
   g. $8p^2 + 6p$
   h. 2n – 15
   i. $18q^2 - 5q$
   j. $2b^2 + 7b + 12$
   k. $3c^2 + 26c - 10$
   l. $11x^2 + 8x$
   m. $2r^2 + 15r$
   n. -3y – 6
   o. $6v^2 - 17v$
   p. $13k^2 + 7k$
   q. $t^2 + 20t$
   r. $6w^2 - 10w$

3.

a. 200-z
b. (200-z)/5
c. (800-4z)/5

4.

5t -9

5.

p/6

6.

3g/2

7.

0.15y – 1800

8.

a. $3x^2 + 10x + 8 \quad cm^2$

b. $y^2 + \frac{13}{2} y + \frac{15}{2} \quad m^2$

c. $\frac{9x^2}{2} + \frac{27x}{2} + 7 \quad m^2$

d. $\pi r^2 + 6\pi r + 9\pi \quad cm^2$

9.

a. Length = 15y + 6

Width = 6y + 2

b. length = 5y/2 + 1

width = 2y + 2/3

c. difference in length :25y/2 +5

difference in width: 4y + 4/3

10.

180y + 200

2D solving linear equations

1.

a. y=2
b. y=7
c. x=-1/7
d. h=-8
e. z=4
f. x=-2
g. w=13
h. z=21/2
i. x=-34/3
j. y=7
k. p=6
l. q=-22/5
m. x=20/7
n. x=3
o. x=19/2
p. x=0.3
q. x=5
r. x=8
s. y=-38/3
t. z=-27/4
u. x=-19/2
v. z=6
w. y=28
x. y=6

2.

a. a = c-2b

b. $a = \frac{c+4d}{b}$

c. $a = d(b - c)$

d. $a = \frac{cd}{b}$

e. $a = \frac{b}{3} + \frac{d}{3}$

f. $a = \frac{c+4d}{b}$

g. $a = -\frac{bc}{3}$

h. $a = \frac{2b(d-e)}{c}$

3. $1125

4. y=4

5. The value of b is 7
   The solution for x is 1

6. p = 5.16

2E equation with brackets

1.

x=-3	y=2	m=-2
p=6	x=-1	x=0
y=1/2	n=4/3	x=4/5
q=-15	x=5/6	y=11/7
x=3	p=19/4	x=3/5
x=19/3	y=-10/13	z=11/2
b=-26/7	p=18/5	x=-3/5
c=17/2	l=26/3	k=-3
h=7/4	n=-37/4	x=23/10

2. 12 weeks

3. 5 hours

4. 2x – 150 + 300 = 1200

   x = 525

5. 200 photos
6.
   a. $4y + 6 - 4y = 2y - 8 - 4y$

      $6 = -2y - 8$

      $y = -7$

   b. $4y + 6 - 2y = 2y - 8 - 2y$

      $2y + 6 = -8$

      $y = -7$

   c. method (b) is preferable because it simplifies the equation more directly. By subtracting 2y, the equation immediately reduces the $2y + 6 = -8$ which has fewer terms to manage.

7.
   a. $x = 3$
   b. $x = 1.25$
   c. $x = 7/3$
   d. $x = -10$

2F solving word problems

1. the number is 10
2. Noah collected : $214

   Emma collected :$242
3. Mia bought 5 notebooks and 10 pens

4. Leo rented the bike for 9 days

5. I am 20 years old

6. 3p + 4

7. train Y will catch up to Train X at 3:00 pm

8. Ben : 9.8 years

   Emma : 13.8 years

   Liam : 19.6 years

   Rachel : 6.8 years

2G Inequalities

1. n/a

2.

$x \leq 3$	$x > 4$	$x \geq 5$
$x \leq 20$	$x \geq 42$	$x < 27$
$x \leq 8$	$x < -42$	$x > -2$
$x \leq -2$	$x < 28$	$x \geq 0$
$x \geq -5$	$x < -12$	$x \leq 0$
$x < 3.5$	$x \leq 8/9$	$x < 5.5$
$5 < x < 11$	$x > 4$	$x \leq 7$
$x > -2$	$x \leq 3$	$x \leq 5$

3. $px \leq 160$

4. $x < 12$

5. It will take Emma at least 23 weeks to reach her savings goal.

6. $v < 10$ the maximum number of visits per month that will make Gym Fit the cheaper option is **9 visits**.

7. $y \leq 23$ Tom's age is at most 23 years old.

8. $x \leq 12$meters The width must be 12 meters or less to satisfy the fencing requirements.

2H Using formulas

1.

x=(y-b)/m	x=(y+5)/k +2	x = (z+q)/p
x = (a-c)/b	x=3z/5 - y	x = p/(y-t)
x=(t-h)/4	x=(a-yb)/y	$x=\sqrt{(f-k)/g}$ or $x=-\sqrt{(f-k)/g}$
x=t(k-w)/5	$x=\sqrt{r(a+b)}$ or $x=-\sqrt{r(a+b)}$	x=y/(b+c)

2.

a. d=3

b. h=5

c. h≈5.73

d. x=16384

3. w=220 liters

4. a=500 square meters

5. n=30

6.

a. d=28 meters

b. u=7.5m/s

2I solve simultaneous equations by substitution

1.

x=-10/3 y=-11/3	x=53/6 y=19/6
x=6/5 y=38/5	x=29/7 y=11/7
x= 26/5 y=-4/5	x=13/9 y=25/9

2.

x=6/5 y=28/5	x=7 y=31
x=6 y=-1	x=57/13 y=11/13

3.

x=2/3 y=13/3	x=11 y=29
x=-22 y=-37	x=4/5 y=46/5

4.

x=32/11 y=9/11	x=9/23 y=58/23
x=28/15 y=-6/5	x=115/43 y=83/43

5.

Mary is 17 years old and her sister is 7 years old

2J solve simultaneous equations by elimination

1.

x=4 y=3/2	x=28/15 y=7/9
x=3 y=-1	x=5/7 y=5
x=5/2 y=0	x=-2 y=-3
x=1 y=8	x=1/2 y=2

2.

x=51/13 y= -3/13	x=162/37 y=161/37
x=26/17 y=23/17	x=19/7 y=53/7
x= 25/7 y=15/7	x= 37/21 y=26/7
x= 139/43 y= 135/43	x=31/12 y=11/6
x= 71/36 y=59/18	x=6/5 y=-16/5

3.

x=67/23 y=20/23	x=112/43 y=54/43
x=64/29 y=-9/29	x=64/17 y=-3/17
x=69/41 y=90/41	x=52/31 y=15/31
x=79/59 y=-67/59	x=5/3 y=3

4.

a. Total bottles equation: x + y=40

Total cost equation: 3x + 5y =150

b. x=25(soft drinks) y=15(juice bottles)

c. x=40-y

d. 3(40-y)+5y = 150

x=25 y=15

2K Application of simultaneous equation

1.

a. x: the cost of one notebook

y: the cost of one pen

b. Liam's purchase: $7x + 2x = 34$

Emma's purchase: $4x + 5y = 28$

c. $x = 38/9$ $y = 20/9$

d. The cost of each notebook is approximately $4.22 and the cost of each pen is approximately $2.22.

2. The question has an error

3. 6 hours

4. The question has an error

5. red: 70/3 (approximately 23.33 red marbles)

blue: 50/3 (approximately 16.67 blue marbles)

6. 39