

# Factoring Review

## Common Factoring

5 Factor.

- |                     |                       |
|---------------------|-----------------------|
| (a) $-12x + 4y$     | (b) $4xa - 8xb$       |
| (c) $2a^2 - 6a$     | (d) $-13ab - 39ac$    |
| (e) $18a^4 - 27a^3$ | (f) $6x^2 - 4x$       |
| (g) $15xy - 10xy^2$ | (h) $6a - 12a^5$      |
| (i) $28a^2 - 4ab$   | (j) $49mn - 14m^2n^2$ |

How would you check your answers above?

6 Express each of the following in factored form.

- |                                       |                             |
|---------------------------------------|-----------------------------|
| (a) $x^4 - 5x^3 + 3x^2$               | (b) $x^2 + 4xy - x$         |
| (c) $12x^2 - 24x + 30$                | (d) $abx^2 + 6aby - 8aby^2$ |
| (e) $ax^3 - 5ax^2 + 3ax$              | (f) $10x^3 - 50x^2 + 30x$   |
| (g) $4m^3 - 8m^2 + 6m$                | (h) $3x^2 - 12xy + 9y^2$    |
| (i) $45a^2b - 15ab^2 - 60ab$          |                             |
| (j) $10a^3b^3 - 20a^2b^2 - 10ab$      |                             |
| (k) $6p^2q^2 + 3p^3q^2 - 9p^2q^3$     |                             |
| (l) $9ax^2 - 18axy + 6ay^2$           |                             |
| (m) $64x^6y^2 - 32x^4y^4 + 128x^2y^6$ |                             |

7 For each of the following

- identify the common factor,
- express in factored form.

- |                             |                           |
|-----------------------------|---------------------------|
| (a) $x(a+b) + y(a+b)$       | (b) $2x(a-b) - y(a-b)$    |
| (c) $3x(x+1) - 2(x+1)$      | (d) $a(2a-3b) - b(2a-3b)$ |
| (e) $2x(2x-5y) - 3y(2x-5y)$ |                           |
| (f) $a(a-3b) + 2b(a-3b)$    | (g) $x(x-2y) + 5y(x-2y)$  |

## Grouping

9 Factor each of the following. You may need to group the terms to find a common factor.

- |                               |
|-------------------------------|
| (a) $2ax - 3bx - 2ay + 3by$   |
| (b) $a^2 - ab + ac - bc$      |
| (c) $am + an + bm + bn$       |
| (d) $6am - 9an - 2bm + 3bn$   |
| (e) $bc - ab + b^2 - ac$      |
| (f) $x^2 + y - xy - x$        |
| (g) $2mx + 4x + 2my + 4y$     |
| (h) $3mxy - 6mx - 3nxy + 6nx$ |

regular

brackets

# Answers to . Common factoring . Grouping

## 7.6 exercise/page 231

- 1a)  $3x^2 - 6x$  b)  $2a^2 - 2a$  c)  $-3x^2 - 9x$  d)  $6y^2 + 15y$  e)  $5x^2y - 5xy^2$   
 f)  $-2x^2 + 2xy$  g)  $-3x^2y - 3x^2y^2$  h)  $2a^3b - 2a^2b^2$  i)  $3x^3 - 9x^2 - 3x$   
 j)  $-3a^3 + 6a^2 + 3a$  k)  $-6x^2 + 9x^2 + 3x$  l)  $-2m^2 + 6m^2n - 2mn^2$   
 m)  $-2a^2 + 3a^2b - a^2c$  n)  $-2x^2 + 2xy + 2xz$  2a)  $-4y$  b)  $-3xy$  c)  $-3x^2$   
 d)  $-3ab$  e)  $2ab$  f)  $-4x^2y^2$  g)  $2y^2$  h)  $\frac{3x^2}{y}$  3a)  $4xy$  b)  $4xy$  c)  $8ab$  d)  $3x^2$  e)  $y^2$   
 f)  $5m$  g)  $a$  h)  $6a$  i)  $25ax$  j)  $3$  4a)  $3$  b)  $(x - y)$  c)  $2x$  d)  $2a - 3$  e)  $x^2$  f)  $2xy$   
 g)  $(x^2 - 2x + 3)$  h)  $(2c^3 - 3bc^2 - 4a)$  5a)  $4(-3x + y)$  b)  $4x(a - 2b)$   
 c)  $2a(a - 3)$  d)  $-13a(b + 3c)$  e)  $9a^2(2a - 3)$  f)  $2x(3x - 2)$  g)  $5xy(3 - 2y)$   
 h)  $6a(1 - 2a^4)$  i)  $4a(7a - b)$  j)  $7mn(7 - 2mn)$  6a)  $x^2(x^2 - 5x + 3)$   
 b)  $x(x + 4y - 1)$  c)  $6(2x^2 - 4x + 5)$  d)  $ab(x^2 + 6y - 6y^2)$  e)  $ax(x^2 - 5x + 3)$   
 f)  $10x(x^2 - 5x + 3)$  g)  $2m(2m^2 - 4m + 3)$  h)  $3(x^2 - 4xy - 3y^2)$   
 i)  $15ab(3a - b - 4)$  j)  $10ab(a^2b^2 - 2ab - 1)$  k)  $3p^2q^2(2 + p - 3q)$   
 l)  $3a(3x^2 - 6xy + 2y^2)$  m)  $32x^2y^2(2x^4 - x^2y^2 + 4y^4)$  7a)  $(a + b)(x + y)$   
 b)  $(a - b)(2x - y)$  c)  $(x + 1)(3x - 2)$  d)  $(2a - 3b)(a - b)$  e)  $(2x - 5y)(2x - 3y)$   
 f)  $(a - 3b)(a + 2b)$  g)  $(x - 2y)(x + 5y)$  8)  $(a + b)(2x - 3y)$  9a)  $(x - y)(2a - 3b)$   
 b)  $(a - b)(a + c)$  c)  $(m + n)(a + b)$  d)  $(3a - b)(2m - 3n)$  e)  $(b + c)(b - a)$   
 f)  $(x - y)(x - 1)$  g)  $2(m + 2)(x + y)$  h)  $3x(m - n)(y - 2)$  10a)  $31.4$  m)  $c) 2\pi(R - r)$   
 \*11)  $100.48$  m \*12)  $100.5$  m 13a)  $-84$  b)  $-84$  d) (b) 14a)  $-60$  b)  $32$

# Simple Trinomial

4 Factor each of the following completely.

- |                          |                         |
|--------------------------|-------------------------|
| (a) $k^2 + 4k - 5$       | (b) $x^2 + 12x + 35$    |
| (c) $m^2 + 10m - 11$     | (d) $x^2 + xy - 12y^2$  |
| (e) $y^2 + 10y + 9$      | (f) $t^2 + 2t - 48$     |
| (g) $m^2 - m - 42$       | (h) $s^2 - 5st - 50t^2$ |
| (i) $t^2 - 9t + 20$      | (j) $56 - 15x + x^2$    |
| (k) $x^2 - 12xy - 85y^2$ | (l) $y^2 + 8y + 15$     |
| (m) $m^2 - 4m - 21$      | (n) $y^2 + y - 240$     |
| (o) $32 + 12t + t^2$     | (p) $s^2 - s - 240$     |

- 4 (a)  $(k+5)(k-1)$  (b)  $(x+7)(x+5)$  (c)  $(m+11)(m-1)$   
 (d)  $(x+4y)(x-3y)$  (e)  $(y+9)(y+1)$  (f)  $(t+8)(t-6)$   
 (g)  $(m-7)(m+6)$  (h)  $(s-10t)(s+5t)$  (i)  $(t-5)(t-4)$   
 (j)  $(8-x)(7-x)$  (k)  $(x-17y)(x+5y)$  (l)  $(y+3)(y+5)$   
 (m)  $(m-7)(m+3)$  (n)  $(y-15)(y+16)$  (o)  $(8+t)(4+t)$   
 (p)  $(s-16)(s+15)$  5 (a)  $2(x^2+8x-48)$  (b)  $2(x+12)(x-4)$

# Difference of Squares

6 Factor each of the following.

- |                   |                     |
|-------------------|---------------------|
| (a) $a^2 - b^2$   | (b) $y^2 - x^2$     |
| (c) $a^2 - 4b^2$  | (d) $x^2 - 1$       |
| (e) $4m^2 - 9n^2$ | (f) $9k^2 - 16m^2$  |
| (g) $1 - 25y^2$   | (h) $16y^2 - 25x^2$ |
| (i) $25m^2 - 36$  | (j) $4t^2 - 25s^2$  |
| (k) $49 - 9m^2$   | (l) $-x^2 + 36$     |

10 Factor each of the following. Be careful! Two of the following cannot be factored. Which ones are they?

- |                      |                       |
|----------------------|-----------------------|
| (a) $m^2n^2 - 25$    | (b) $x^2y^2 - 4$      |
| (c) $100 - a^2b^2$   | (d) $64 - m^2n^2$     |
| (e) $x^2y^2 - 3^2$   | (f) $a^2b^2 - k^2$    |
| (g) $x^2y^2 + 4$     | (h) $1 - 25a^2b^2$    |
| (i) $(mn)^2 - 6m^2$  | (j) $(4pq)^2 - 16p^2$ |
| (k) $100m^2 - 64n^2$ | (l) $25x^2y^2 - 1$    |

- (g)  $(3-4R)(3+4R)$  6 (a)  $(a-b)(a+b)$  (b)  $(y-x)(y+x)$   
 (c)  $(a-2b)(a+2b)$  (d)  $(x-1)(x+1)$  (e)  $(2m-3n)(2m+3n)$   
 (f)  $(3k-4m)(3k+4m)$  (g)  $(1-5y)(1+5y)$  (h)  $(4y-5x)(4y+5x)$   
 (i)  $(5m-6)(5m+6)$  (j)  $(2t-5s)(2t+5s)$  (k)  $(7-3m)(7+3m)$   
 (l)  $(-x+6)(x+6)$  7 2(m-6)(m+6) 8 (a)  $3(m-4)(m+4)$   
 (b)  $(xy-6)(xy+6)$  10 (a)  $(mn-5)(mn+5)$  (b)  $(xy-2)(xy+2)$   
 (c)  $(10-ab)(10+ab)$  (d)  $(8-mn)(8+mn)$  (e)  $(xy-3)(xy+3)$   
 (f)  $(ab-k)(ab+k)$  (g) can't (h)  $(1-5ab)(1+5ab)$  (i) can't  
 (j)  $16p^2(q-1)(q+1)$  (k)  $4(5m-4n)(5m+4n)$  (l)  $(5xy-1)(5xy+1)$

# Perfect Square Trinomial

5 Factor each of the following. Which two questions can not be factored?

- |   |                              |
|---|------------------------------|
| (a) $y^2 + 4y + 4$                      | (b) $x^2 - 6x + 9$           |
| (c) $a^2 + 12a + 36$                    | (d) $m^2 - 10m + 25$         |
| (e) $4y^2 + 4y + 4$                     | (f) $1 + 4x + 4x^2$          |
| (g) $x^2 - 6xy + 9y^2$                  | (h) $4x^2 + 4xy + y^2$       |
| (i) $9a^2 - 12ab + 4b^2$                | (j) $9 - 24y + 16y^2$        |
| (k) $4a^2 + 12ab + 9b^2$                | (l) $9m^2 - 30mn + 25n^2$    |
| (m) $x^2 - 12xy + 36y^2$                | (n) $81 - 36y + 4y^2$        |
| (o) $a^2 + a + \frac{1}{4}$             | (p) $a^4 - 2a^2 + 1$         |
| (q) $1 - 4y^2 + 4y^4$                   | (r) $y^2 - 3y + \frac{9}{4}$ |
| (s) $1 - \frac{1}{2}y + \frac{1}{4}y^2$ | (t) $4x^4 - 12x^2 + 9$       |

- (i)  $4y^2$  (j)  $9a^2$  (k)  $4a^2 + 12ab + 9b^2$  (l)  $9m^2 - 30mn + 25n^2$  (m)  $x^2 - 12xy + 36y^2$  (n)  $81 - 36y + 4y^2$  (o)  $a^2 + a + \frac{1}{4}$  (p)  $a^4 - 2a^2 + 1$  (q)  $1 - 4y^2 + 4y^4$  (r)  $y^2 - 3y + \frac{9}{4}$  (s)  $1 - \frac{1}{2}y + \frac{1}{4}y^2$  (t)  $4x^4 - 12x^2 + 9$

Note: (s) does not factor  
(e) only common factored

# Decomposition

Express each of the following in factored form.

- |                           |                           |
|---------------------------|---------------------------|
| (a) $2y^2 + 3y + 1$       | (b) $3x^2 - 5x - 2$       |
| (c) $2y^2 + 5y - 12$      | (d) $6x^2 + 5x + 1$       |
| (e) $5x^2 - 11x + 2$      | (f) $6m^2 - 11m - 10$     |
| (g) $2y^2 + 5y + 2$       | (h) $6y^2 - 13y + 6$      |
| (i) $3x^2 - 19xy - 14y^2$ | (j) $3m^2 + 13m + 4$      |
| (k) $10x^2 - 28x + 16$    | (l) $3y^2 + y - 30$       |
| (m) $8y^2 + 14y - 15$     | (n) $4x^2 - 17xy - 15y^2$ |

- e)  $(x-5y)(x-5y)$  6a)  $(2y+1)(y+1)$  b)  $(3x+1)(x-2)$  c)  $(2y-3)(y+4)$   
d)  $(3x+1)(2x+1)$  e)  $(5x-1)(x-2)$  f)  $(3m+2)(2m-5)$  g)  $(2y+1)(y+2)$   
h)  $(3y-2)(2y-3)$  i)  $(3x+2y)(x-7y)$  j)  $(3m+1)(m+4)$  k)  $2(5x-4)(x-2)$   
l)  $(3y+10)(y-3)$  m)  $(2y+5)(4y-3)$  n)  $(4x+3y)(x-5y)$  7a)  $3y-1$   
b)  $3x-2$  c)  $3p+2q$  d)  $2a-3b$  e)  $5y-1$  f)  $m-3n$  g)  $5p+3q$  h)  $4x-5y$