

EXERCISE 6

- (1) Add $x^3 + 2x^2 - 3x + 4$ and $2x^3 - 5x^2 + 8x - 11$.
(2) Subtract $3x^2 - 5x + 7$ from $4x^3 - 3x + 2$.

Find the products of the following:

- (3) $(a - c)(a - b)$ (7) $a^2(a + 2b)(a - 2b)$
(4) $(3a + 4b)^2$ (8) $(a + 2)(a - 6)(3a - 1)$
(5) $(2a - 5)^2$ (9) $(a^2 + 3a - 1)(a - 4)$
(6) $(5a + 4)(2a - 1)$ (10) $(3a^2 - a - 2)(a^2 + 2a + 3)$
(11) Divide $12x^4 - 16x^2 + 8x$ by $4x$.
(12) Divide $2x^3 - 5x^2 - x + 2$ by $x - 1$.
(13) Divide $x^3 + 8y^3$ by $x + 2y$.

Factorize the following by taking out common factors:

- (14) $10a^2b^2 - 15ab^3$ (16) $a(b - c) + d(c - b)$
(15) $(a - b)^2 + (a - b)$

Factorize the following by grouping terms, **when possible**. If there are no factors, say so.

- (17) $ab - 12cd + 3bc - 4ad$ (20) $a^3 + a^2 + a + 1$
(18) $ab^2 - 1 + a - b^2$ (21) $6cd + 2bc - 9ad - 3ab$
(19) $a(a - c) - b(b - c)$

Factorize the following (difference of 2 squares):

- (22) $4x^2 - 25$ (26) $(3x + 2)^2 - (x - 5)^2$
(23) $x^2 - 36y^2z^4$ (27) $9(x + y)^2 - 4(x - y)^2$
(24) $x^2 - (y - z)^2$ (28) $18 - 8(x + y)^2$
(25) $4x^2 - (x - 4y)^2$ (29) $x^4 - y^4$

Use factors to calculate the following:

- (30) $(78.3)^2 - (73.3)^2$ (31) $(999)^2 - 1$

Factorize (perfect squares):

- (32) $4x^2 - 4x + 1$ (34) $(x + y)^2 + 6(x + y) + 9$
(33) $25x^2 + 30xy + 9y^2$ (35) $16x^2 - 72xy + 81y^2$

Factorize the following by inspection, **when possible**. If there are no factors, say so. Check your answers mentally.

- (36) $x^2 + 10x + 9$ (38) $x^2 - 3x - 28$
(37) $x^2 + 7x + 10$ (39) $x^2 - 13x + 40$

$$(40) 2x^2 + 7x + 3$$

$$(41) 3x^2 - 10x + 8$$

$$(42) 5x^2 - 4x + 1$$

$$(43) 4x^2 + 11x - 3$$

$$(44) 2x^2 - 22x + 48$$

$$(45) 12x^2 + 33x - 9$$

$$(46) 25x^2 + 40x + 16$$

$$(47) 42 - x - 30x^2$$

$$(48) 10 - 43x + 12x^2$$

$$(49) 6x^2 + 5x - 6$$

$$(50) 8x^2 + 7x - 15$$

$$(51) 40x^2 - 50x - 15$$

$$(52) 17x - 10 - 3x^2$$

$$(53) 6x^2 - 17xy + 10y^2$$

$$(54) 1 + 12xy + 35x^2y^2$$

$$(55) x^2 - 5x(y - z) - 6(y - z)^2$$

Harder factorization (begin by grouping terms suitably):

$$(56) 1 - x^2 - y - xy$$

$$(57) xz - 2yz - x^2 + 4y^2$$

$$(58) 36 - 9x^2 + 6xy - y^2$$

$$(59) 9a^2 - 16x^2 - 16xy - 4y^2$$

$$(60) 4x^2 - 12xy + 9y^2 - 36$$

$$(61) x^2 + 8x + 16 - 25y^2$$

$$(62) x^2 - 10x + 25 - 4y^2 - 12yz - 9z^2$$

Express as the product of as many factors as possible:

$$(63) x^5 - 81x$$

$$(64) 4(x^2 - 2)^2 - (x^2 + 5x + 2)^2$$

$$(65) 4x^2 + x - 1 - 4x^3$$

Find in factors, the H.C.F. and L.C.M. of:

$$(66) 6x^2 - 42x + 60, 30x^2 - 70x + 20, 2x^3 - 8x^2 + 8x.$$

$$(67) 4x^2 + 6x + 2, 10x^2 + 6x - 4, 2x^3 + 2x^2.$$

Express in the simplest form, stating the restrictions on the variables:

$$(68) \frac{5}{y-4} - \frac{4}{y+1}$$

$$(69) \frac{7}{4x-3y} - \frac{2}{3x+2y}$$

$$(70) \frac{y^2}{y^2+y-6} - \frac{y}{y+3}$$

$$(71) \frac{3}{y^2+13y+40} + \frac{1}{y^2+9y+20}$$

$$(72) \frac{3}{y+4} + \frac{4}{y+3} - \frac{7}{y+7}$$

$$(73) \frac{y}{y^2-5y+6} - \frac{2y+3}{y^2+y-6} + \frac{y-5}{y^2-9}$$

$$(74) \frac{y^2+3y+2}{y+4} - \frac{y^2+3y-4}{2y^2+y-1}$$

$$(75) \frac{y^2 + 10y + 24}{y^2 - 25} \div \frac{y + 4}{y + 5}$$

$$(77) \frac{x^2 - 9}{3xy} \div \left(\frac{x + 3}{6x^2} \cdot \frac{2x - 3}{xy^2} \right)$$

$$(76) \frac{y^4 - 1}{x + 1} \cdot \frac{x^2 - 1}{y + 1} \div \frac{y - 1}{y^2}$$

(78) Some of the following statements are equations and some identities. Find which are which.

(a) $7(x + 6) - 6(x + 7) = x$

(c) $a(b - c) + b(c - a) + c(a - b) = 0$

(b) $7(x + 6) + 6(x - 7) = x$

(d) $x^2 + 4(x - 3) = x^2 - 4(x + 3) - 8x$

Solve the following equations:

(79) $7(5 - 3x) = 5(7 - 2x)$

(82) $\frac{x}{3} - \frac{x}{6} + \frac{x}{4} - 20 = 0$

(80) $2x(3 - 2x) = 4x(5 - x) - 7$

(83) $\frac{5x + 1}{12} - \frac{3x + 1}{5} = \frac{1 - 7x}{40}$

(81) $2(x - 7) - \frac{5x}{6} = \frac{1}{6}$

(84) What number must be added to both numerator and denominator of $\frac{4}{9}$ to make $\frac{2}{3}$?

(85) Make F the subject of the formula $c = \frac{5}{9}(F - 32)$.

(86) Make A the subject of the formula $n(A - B) = 2A$.

(87) Make x the subject of the formula $k = \frac{x + y}{x - y}$.

(88) Make u the subject of the formula $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$.

(89) Make L the subject of the formula $T = 2\pi \sqrt{\frac{L}{g}}$.

(90) Make v the subject of the formula $m = \frac{m_0}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$

Find v if $c = 3 \times 10^8$.

and $m = 1.5 m_0$

(91) Make r the subject of the formula $A = P \left(1 + \frac{r}{100}\right)^n$.

(92) Make n the subject of the formula $A = P \left(1 + \frac{r}{100}\right)^n$.

EXERCISE 6 P. 68

- (1) $3x^2 - 3x^2 + 5x - 7$ (2) $4x^3 - 3x^2 + 2x - 5$ (3) $a^2 - ac + bc - ab$
 (4) $9a^2 + 24ab + 16b^2$ (5) $4a^2 - 20a + 25$ (6) $10a^2 + 3a - 4$ (7) $a^4 - 4a^2b^2$
 (8) $3a^3 - 13a^2 - 32a + 12$ (9) $a^3 - a^2 - 13a + 4$ (10) $3a^4 + 5a^2 + 5a^2 - 7a - 6$
 (11) $3x^2 - 4x + 2$ (12) $2x^2 - 3x - 4 \dots - 2$ (13) $x^2 - 2xy + 4y^2$ (14) $5ab^2(2a - 3b)$
 (15) $(a - b)(a - b + 1)$ (16) $(b - c)(a - d)$ (17) $(b - 4d)(a + 3c)$ (18) $(a - 1)(b^2 + 1)$

- (19) $(a - b)(a + b - c)$ (20) $(a^2 + 1)(a + 1)$ (21) $(2c - 3a)(3d + b)$ (22) $(2x + 5)(2x - 5)$
 (23) $(x + 6yz^2)(x - 6yz^2)$ (24) $(x + y - z)(x - y + z)$ (25) $(3x - 4y)(x + 4y)$ (26) $(4x - 3)(2x + 7)$
 (27) $(5x + y)(x + 5y)$ (28) $2(3 + 2x + 2y)(3 - 2x - 2y)$ (29) $(x^2 + y^2)(x + y)(x - y)$ (30) 758
 (31) 998000 (32) $(2x - 1)^2$ (33) $(5x + 3y)^2$ (34) $(x + y + 3)^2$ (35) $(4x - 9y)^2$
 (36) $(x + 9)(x + 1)$ (37) $(x + 5)(x + 2)$ (38) $(x - 7)(x + 4)$ (39) $(x - 8)(x - 5)$
 (40) $(2x + 1)(x + 3)$ (41) $(3x - 4)(x - 2)$ (42) no factor (43) $(4x - 1)(x + 3)$
 (44) $2(x - 3)(x - 8)$ (45) $3(x + 3)(4x - 1)$ (46) $(5x + 4)^2$ (47) $(6 + 5x)(7 - 6x)$
 (48) $(1 - 4x)(10 - 3x)$ (49) $(3x - 2)(2x + 3)$ (50) $(8x + 15)(x - 1)$ (51) $5(4x + 1)(2x - 3)$
 (52) $(x - 5)(2 - 3x)$ (53) $(6x - 5y)(x - 2y)$ (54) $(7xy + 1)(5xy + 1)$ (55) $(x - 6y + 6z)(x + y - z)$
 (56) $(1 + x)(1 - x - y)$ (57) $(x - 2y)(z - x - 2y)$ (58) $(6 + 3x - y)(6 - 3x + y)$
 (59) $(3a + 4x + 2y)(3a - 4x - 2y)$ (60) $(2x - 3y + 6)(2x - 3y - 6)$ (61) $(x + 5y + 4)(x - 5y + 4)$
 (62) $(x + 2y + 3z - 5)(x - 2y - 3z - 5)$ (63) $x(x^2 + 9)(x + 3)(x - 3)$
 (64) $(3x - 1)(x + 2)(x + 1)(x - 6)$ (65) $(2x + 1)(2x - 1)(1 - x)$ (66) H.C.F. = $2(x - 2)$;
 L.C.M. = $30x(x - 5)(x - 2)^2(3x - 1)$ (67) H.C.F. = $2(x + 1)$; L.C.M. = $2x^2(x + 1)(2x + 1)(5x - 2)$

(68) $y \neq 4, y \neq -1$;

$\frac{y + 21}{(y - 4)(y + 1)}$ (69) $x \neq \frac{3}{4}y, x \neq -\frac{2}{3}y$; $\frac{13x + 20y}{(4x - 3y)(3x + 2y)}$ (70) $y \neq -3, y \neq 2$; $\frac{2y}{(y + 3)(y - 2)}$

(71) $y \neq -8, y \neq -5, y \neq -4$; $\frac{4}{(y + 4)(y + 8)}$ (72) $y \neq -7, y \neq -4, y \neq -3$; $\frac{25y + 91}{(y + 3)(y + 4)(y + 7)}$

(73) $y \neq -3, y \neq 2, y \neq 3$; $\frac{-y + 19}{(y - 3)(y - 2)(y + 3)}$ (74) $y \neq -4, y \neq -1, y \neq \frac{1}{2}$; $\frac{(y + 2)(y - 1)}{2y - 1}$

(75) $y \neq \pm 5, y \neq -4$; $\frac{y + 6}{y - 5}$ (76) $x \neq -1, y \neq -1, y \neq 0, y \neq 1$; $y^2(y^2 + 1)(x - 1)$

(77) $x \neq -3, x \neq 0, x \neq \frac{3}{2}, y \neq 0$; $\frac{2x^2y(x - 3)}{2x - 3}$ (78) a. Identity b. Equation c. Identity

d. Equation (79) 0 (80) $\frac{1}{2}$ (81) $12\frac{1}{7}$ (82) 48 (83) -17 (84) 6

(85) $F = \frac{9}{5}C + 32$ (86) $A = \frac{nB}{n - 2}$ (87) $x = \frac{(k + 1)y}{k - 1}$ (88) $u = \frac{vf}{v - f}$ (89) $L = \frac{T^2g}{4\pi^2}$

(90) $v = \sqrt{1 - (m_0/m)^2}$ (91) $r = 100 [(A/P)^{1/n} - 1]$ (92) $n = \frac{\log A - \log P}{\log(1 + \frac{r}{100})}$
 $\pm 2.237 \times 10^8$