$$104 \quad \frac{5000}{R} \quad 1 \quad \frac{R}{100}^{2} \quad 1 \qquad \text{[From (1)]}$$

$$104 \quad \frac{5000}{R} \quad \frac{(1 \quad R)^2 \quad (100)^2}{100000}$$

$$104 \quad \frac{1}{R}(100 \quad R \quad 100)(100 \quad R \quad 100)$$

$$104 \quad \frac{1}{2R}(200 \quad R).R$$

$$104 \quad \frac{200 \quad R}{2}$$

$$208 \quad 200 \quad R \qquad\qquad R \quad 8\%$$

MCQ's

1. (b) **2.** (c) **3.** (b) **4.** (a)
5. (c) **6.** (d) **7.** (d)

7 Algebraic Expressions and Factorisation

Exercise 7.1

1. (a) $2x \quad 7x \quad \{2 \quad 7\} \quad \{x \quad x\} \quad 14 \quad x^2 \quad 14x^2$

(b) $3x^2 \quad 6x^3 \quad \{3 \quad 6\} \quad \{x^2 \quad x^3\} \quad 18 \quad x^{2 \quad 3} \quad 18x^5$

(c) $(\ 7x^2\ ) \quad 2y \quad \{\ 7 \quad 2\} \quad x^2 \quad y \quad 14x^2 y$

(d) $\frac{3}{2}x^2 y^2 \qquad \frac{6}{7}xy^2 \qquad \frac{3}{2} \quad \frac{6}{7} \quad \{x^2 \quad x\} \quad \{y^2 \quad y^2\}$

$$\frac{18}{14} \quad \{x^{2 \quad 1}\} \quad \{y^{2 \quad 2}\}$$

$$\frac{18}{14}x^3 y^4 \quad \frac{9}{7}x^3 y^4$$

2. (a) Multiply $3x$, $4x^2$ and $7x^3$ $\quad 3x \quad 4x^2 \quad 7x^3$

$$\{3 \quad 4 \quad 7\} \quad \{x \quad x^2 \quad x^3\}$$

$$84 \quad \{x^{1 \quad 2 \quad 3}\} \quad 84x^6$$

(b) Multiply a^3, $6a^2 b$ and $2b^3$ $\quad a^3 \quad 6a^2 b \quad 2b^3$

$$\{\ 6 \quad 2\} \quad \{a^3 \quad a^2 \quad b \quad b^3\}$$

$$12 \quad \{a^{3 \quad 2}\} \quad \{b^{1 \quad 3}\} \quad 12a^5 b^4$$

(c) Multiply $16x^6$, $10xy^2$ and $\frac{3}{5}x^2 y^2$ $\quad 16x^6 \quad 10xy^2 \quad \frac{3}{5}x^2 y^2$

$$16 \quad 10 \quad \frac{3}{5} \quad \{x^6 \quad x \quad y^2 \quad x^2 \quad y^2\}$$

$$\{16 \quad 2 \quad 3\} \quad \{x^6 \quad x \quad x^2\} \quad \{y^2 \quad y^2\}$$

$$96\{x^{6 \quad 1 \quad 2}\}\{y^{2 \quad 2}\}$$

$$96x^2 y^4$$

(d) Multiply $2p^4$, $4p^4q^2$ and $\frac{3}{8}pq^2$ $2p^4$ $4p^4q^2$ $\frac{3}{8}pq^2$

2 4 $\frac{3}{8}$ $\{p^4$ p^4 q^2 p $q^2\}$

$\{3\}$ $\{p^4$ p^4 $p\}$ $\{q^2$ $q^2\}$

3 $\{p^4$ 4 $1\}$ $\{q^2$ $2\}$

$3p^9q^4$

3. (a) $(2x$ $y)$ by $(3x$ $5)$ $y(2x$ $y)$ $(3x$ $5y)$

$3x(2x$ $y)$ $5y(2x$ $y)$

$6x^2$ $3y$ $10xy$ $5y^2$

$6x^2$ $13xy$ $5y^2$

(b) Multiply $(3a$ $2)$ by $(2a$ $5)$ $(3a$ $2)$ $(2a$ $5)$

$2a(3a$ $2)$ $5(3a$ $2)$

$6a^2$ $4a$ $15a$ 10

$6a^2$ $11a$ 10

(c) Multiply $(p$ $q)$ by $(p$ $q)$ $p(p$ $q)$ $q(p$ $q)$

p^2 pq pq q^2

p^2 q^2

(d) Multiply $\frac{1}{2}x^2$ y^2 by x^2 $\frac{1}{2}y^2$ x^2 $\frac{1}{2}x^2$ y^2 $\frac{1}{2}y^2$ $\frac{1}{2}x^2$ y^2

$\frac{1}{2}x^4$ x^2y^2 $\frac{1}{4}x^2y^2$ $\frac{1}{2}y^4$

$\frac{1}{2}x^4$ $\frac{3}{4}x^2y^2$ $\frac{1}{2}y^4$

4. (a) Product of $(3x)$ $(2x^2$ $6x$ $7)$ $(3x)$ $(2x^2$ $6x$ $7)$

$6x^3$ $18x^2$ $21x$

(b) Product of $\frac{1}{2}xy$ $(x^2$ $2xy$ $y^2)$ $\frac{1}{2}xy$ $(x^2$ $2xy$ $y^2)$

$\frac{1}{2}x^3y$ x^2y^2 $\frac{1}{2}xy^3$

(c) Product of a^2 $(a^3$ $3a^2b$ b^3 $3ab^2)$ a^2 $(a^3$ $3a^2b$ b^3 $3ab^2)$

a^5 $3a^4b$ a^2b^3 $3a^3b^2$

(d) Product of $-\frac{3}{5}p^2q$ $(p^4$ q^4 $2p^2q^2)$ $-\frac{3}{5}p^2q$ $(p^4$ q^4 $wp^2q^2)$

$-\frac{3}{5}p^6q$ $-\frac{3}{5}p^2q^5$ $\frac{6}{5}p^4q^3$

5. (a) Multiply $(a$ $b)$ by $(a^2$ $b^2)$ $(a$ $b)$ $(a^2$ $b^2)$

$a(a^2$ $b^2)$ $b(a^2$ $b^2)$

a^3 ab^2 ba^2 b^3

(b) Multiply $(p^2$ $q^2)$ $(p^2$ $q^2)$ $p^2(p^2$ $q^2)$ $q^2(p^2$ $q^2)$

p^4 p^2q^2 p^2q^2 q^4

p^4 q^4

(c) Multiple $\frac{3}{5}x \quad \frac{1}{3}y$ by $\frac{3}{5}x \quad \frac{1}{3}y$ $\quad \frac{3}{5}x \quad \frac{1}{3}y \quad \frac{3}{5}x \quad \frac{1}{3}y$

$\frac{3}{5}x \quad \frac{3}{5}x \quad \frac{1}{3}y \quad \frac{1}{3}y \quad \frac{3}{5}x \quad \frac{1}{3}y$

$\frac{9}{25}x^2 \quad \frac{3}{15}xy \quad \frac{3}{15}xy \quad \frac{1}{9}y^2 \quad \frac{9}{25}x^2 \quad \frac{1}{9}y^2$

(d) Multiple $(p^2 \quad q^2)$ by $(p^2 \quad pq \quad q^2)$ $\quad (p^2 \quad q^2) \quad (p^2 \quad pq \quad q^2)$

$p^2(p^2 \quad pq \quad q^2) \quad q^2(p^2 \quad pq \quad q^2)$

$p^4 \quad p^3q \quad p^2q^2 \quad p^2q^2 \quad pq^3 \quad q^4$

$p^4 \quad p^3q \quad 2p^2q^2 \quad pq^3 \quad q^4$

6. (a) Multiply $(a \quad 2b)$ by $(2a \quad b)$

$$\begin{array}{rl} a \quad 2b & \\ 2a \quad b & \\ \hline 4a^2 \quad 4ab & \text{(Multiply by } 2a\text{)} \\ ab \quad 2b^2 & \text{(Multiply by } b\text{)} \\ \hline 4a^2 \quad 5ab \quad 2b^2 & \text{(Add the terms vertically)} \end{array}$$

(b) Multiply $(p^2 \quad q^2)$ by $(p^2 \quad q^2)$

$$\begin{array}{rl} p^2 \quad q^2 & \\ p^2 \quad q^2 & \\ \hline p^4 \quad p^2q^2 & \text{(multiply by } p^2\text{)} \\ p^2q^2 \quad q^4 & \text{(multiply by } q^2\text{)} \\ \hline p^4 \quad q^4 & \text{(Add the terms vertically)} \end{array}$$

(c) Multiply $\frac{3}{5}x \quad \frac{1}{3}y$ by $\frac{3}{5}x \quad \frac{1}{3}y$

$$\begin{array}{rl} \frac{3}{5}x \quad \frac{1}{3}y & \\ \frac{3}{5}x \quad \frac{1}{3}y & \\ \hline \frac{9}{25}x^2 \quad \frac{3}{15}yx & \text{(multiply by } \frac{3}{5}x\text{)} \\ \frac{3}{15}yx \quad \frac{1}{9}y^2 & \text{(multiply by } \frac{1}{3}y\text{)} \\ \hline \frac{9}{25}x^2 \quad \frac{1}{9}y^2 & \text{(Add the terms vertically)} \end{array}$$

(d) $(x \quad y)(x^2 \quad y^2 \quad xy)$

$$\begin{array}{rl} x^2 \quad y^2 \quad yx & \\ x \quad y & \\ \hline x^3 \quad xy^2 \quad yx^2 & \text{(Multiply by } x\text{)} \\ y^2x \quad yx^2 \quad y^3 & \\ \hline x^3 \quad y^3 & \text{(Add the terms vertically)} \end{array}$$

7. (a) $c(b\ \ a)\ \ b(a\ \ c)\ \ a(b\ \ c)\ \ bc\ \ ac\ \ ba\ \ bc\ \ ab\ \ ac\ \ 0$

(b) $x(x\ \ y^2\ \ z)\ \ y^2(x\ \ y\ \ z)\ \ z(x\ \ y^2)$

$x^2\ \ xy^2\ \ zx\ \ y^2x\ \ y^3\ \ zy^2\ \ zx\ \ zy^2$

$x^2\ \ xy^2\ \ y^2x\ \ y^3\ \ yz\ \ zy^2$

8. (a) $6x^2y(z^2\ \ y^2)\ \ 6x^2y\ \ (z^2\ \ y^2)$

$(x\ \ 1, y\ \ 2$ and $z\ \ 3)$

$6(1)^2(2)(3)^2\ \ 6(1)^2(2)^3$

$6\ \ 1\ \ 2\ \ 9\ \ 6\ \ 1\ \ 8$

$108\ \ 48\ \ 60$

(b) $(4y\ \ z)(z\ \ 4y)\ \ (4y\ \ z)\ \ (z\ \ 4y)$

$4y(z\ \ 4y)\ \ z(z\ \ 4y)$

$4yz\ \ 16y^2\ \ z^2\ \ 4zy$

$z^2\ \ 16y^2$

$(z\ \ 3$ and $y\ \ 2)$

$(3)^2\ \ 16(2)^2$

$9\ \ 16\ \ 4\ \ 9\ \ 64\ \ \ 55$

(c) $(2x\ \ 2y)^2\ \ 4x^2\ \ 4y^2\ \ 8xy\qquad\qquad (x\ \ 1$ and $y\ \ 2)$

$4(1)^2\ \ 4(2)^2\ \ 8\ \ 1\ \ 2$

$4\ \ 4\ \ 4\ \ 16$

$4\ \ 16\ \ 16\ \ 20\ \ 16\ \ 4$

(d) $(x\ \ y\ \ z)(x\ \ y\ \ z)\ \ x(x\ \ y\ \ z)\ \ y(x\ \ y\ \ z)\ \ z(x\ \ y\ \ z)$

$x^2\ \ yx\ \ zx\ \ yx\ \ y^2\ \ zy\ \ zx\ \ yz\ \ z^2$

$x^2\ \ y^2\ \ z^2\ \ 2xy\ \ 2zx\ \ 2yz\qquad (x\ \ 1, y\ \ 2$ and $z\ \ 2)$

$(1)^2\ \ (2)^2\ \ (3)^2\ \ 2\ \ 1\ \ 2\ \ 2\ \ 3\ \ 1\ \ 2\ \ 2\ \ 3$

$1\ \ 4\ \ 9\ \ 4\ \ 6\ \ 12\ \ 36$

9. Product of $(2x\ \ 3y)$ and $(x^2\ \ 2xy\ \ y^2)$

$(2x\ \ 3y)\ \ (x^2\ \ 2xy\ \ y^2)$

$2x(x^2\ \ 2xy\ \ y^2)\ \ 3y(x^2\ \ 2xy\ \ y^2)$

$2x^3\ \ 4x^2y\ \ 2xy^2\ \ 3x^2y\ \ 6xy^2\ \ 3y^3$

$2x^3\ \ 7x^2y\ \ 8xy^2\ \ 3y^3$

Verification : $(2x\ \ 3y)(x^2\ \ 2xy\ \ y^2)\ \ 2x^3\ \ 7x^2y\ \ 8xy^2\ \ 3y^3$

LHS $(2x\ \ 3y)(x^2\ \ 2xy\ \ y^2)$

$(2\ \ \ 1\ \ 3\ \ 2)[(\ 1)^2\ \ 2\ \ \ 1\ \ 2\ \ (2)^2][x\ \ (\ 1), y\ \ z]$

$(\ 2\ \ 6)(1\ \ (\ 4)\ \ 4)$

$4(1\ \ 4\ \ 4)$

$4\ \ 1\ \ 4$

RHS $2x^3\ \ 7x^2y\ \ 8xy^2\ \ 3y^3$

$2(\ 1)^3\ \ 7\ \ (\ 1)^2\ \ 2\ \ 8\ \ \ 1\ \ (2)^2\ \ 3(2)^3$

$2\ \ 7\ \ 1\ \ 2\ \ 8\ \ 4\ \ 3\ \ 8$

$2\ \ 14\ \ 32\ \ 24\ \ 38\ \ 34\ \ 4$

Hence, LHS RHS verified.

10. Product of $(x^3 \quad 2x^2 \quad 5x \quad 1)$ and $(x^2 \quad 7x \quad 1)$

$(x^3 \quad 2x^2 \quad 5x \quad 1) \quad (x^2 \quad 7x \quad 1)$

$x^2(x^3 \quad 2x^2 \quad 5x \quad 1) \quad 7x(x^3 \quad 2x^2 \quad 5x \quad 1) \quad 1(x^3 \quad 2x^2 \quad 5x \quad 1)$

$(x^4 \quad 2x^4 \quad 5x^3 \quad x^2) \quad (7x^4 \quad 14x^3 \quad 35x^2 \quad 7x) \quad (x^3 \quad 2x^2 \quad 5x \quad 1)$

$x^5 \quad 2x^4 \quad 7x^4 \quad 5x^3 \quad 14x^3 \quad x^3 \quad x^2 \quad 35x^2 \quad 2x^2 \quad 7x \quad 5x \quad 1$

$x^5 \quad 9x^4 \quad 10x^3 \quad 32x^2 \quad 2x \quad 1$

Exercise 7.2

1. (a) $3\sqrt{y} \quad 4y \quad 7y^2 \quad 3(y)^{1/2} \quad 4y \quad 7y^2$ It is not a polynomial.

(b) $\sqrt{2x} \quad x^2 \quad x^3$ It is a polynomial in variable x.

(c) $\frac{-}{3}x^2 \quad 4x \quad 12$ It is a polynomial in variable x.

(d) $2x^{\ 2} \quad 3x^{\ 1} \quad 5 \quad 4x \quad \frac{2}{x^2}\frac{1}{} \quad \frac{3}{x}\frac{1}{} \quad 5 \quad 4x$ It is not a polynomial.

(e) $\sqrt{a}x^{1/2} \quad ax \quad 7x^2 \quad 5$ It is not a polynomial.

(f) $x^3 \quad x^{\ 3} \quad x^3 \quad \frac{1}{x^3}$ It is not a polynomial.

2. (a) Divide $12x^2y^3$ by $3xy$

$12x^2y^3 \quad 3xy \quad \frac{12x^2y^3}{3xy} \quad 4xy^2$

(b) Divide $36abc^2$ by $(\ 9ac)$

$36abc^2 \quad 9ac \quad \frac{36abc^2}{9ac} \quad 4bc$

(c) Divide $60p^2q^2r^2$ by $12pqr^2$

$60p^2q^2r^2 \quad 12pqr^2 \quad \frac{60p^2q^2r^2}{12\,pqr^2} \quad 5\,pq$

(d) Divide $25x^2yz$ by $3xyz$

$25x^2yz \quad 3xyz \quad \frac{25x^2yz}{3xyz} \quad \frac{25}{3}x$

3. (a) $5x^3 \quad 30x^2 \quad 45x$ divide by $5x$

$5x^3 \quad 3x^2 \quad 45x \quad 5x \quad \frac{5x^3 \quad 30x^2 \quad 45x}{5x}$

$\frac{5x^3}{5x} \quad \frac{30x^2}{5x} \quad \frac{45x}{5x}$

$x^2 \quad 6x \quad 9$

(b) $8x^2y^2 \quad 6xy^2 \quad 10x^2y^3$ divide by $2xy$

$8x^2y^2 \quad 6xy^2 \quad 10x^2y^3 \quad 2xy \quad \frac{8x^2y^2}{2xy} \quad \frac{6xy^2}{2xy} \quad \frac{10x^2y^3}{2xy}$

$\frac{8x^2y^2}{2xy} \quad \frac{6xy^2}{2xy} \quad \frac{10x^2y^3}{2xy} \quad 4xy \quad 3y \quad 5xy^2$

(c) $4x^3 \quad 8x^2 \quad 2$ divide by $(\quad 2x)$

$$4x^3 \quad 8x^2 \quad 2 \quad 2x \quad \frac{4x^3 \quad 8x^2 \quad 2}{2x}$$

$$\frac{4x^3}{2x} \quad \frac{8x^2}{2x} \quad \frac{2}{2x} \qquad 2x^2 \quad 4x \quad x$$

(d) $10a^2b \quad 6ab \quad 12ab^2$ by $3ab$

$$10a^2b \quad 6ab \quad 12ab^2 \quad 3ab$$

$$\frac{10a^2b}{3ab} \quad \frac{6ab}{3ab} \quad \frac{12ab^2}{3ab} \quad \frac{10}{3}a \quad 2 \quad 4b$$

4. (a) $(x^2 \quad 12x \quad 35)$ divide by $(x \quad y)$

$$x \quad 7\overline{)x^2 \quad 12x \quad 35}(x \quad 5$$

$$x^2 \quad 7x$$

$$(\quad) \quad (\quad)$$

$$5x \quad 35$$

$$5x \quad 35$$

$$(\quad) \quad (\quad)$$

$$0$$

(b) $6x^2 \quad 13x \quad 6$ divide by $(2x \quad 3)$

$$2x \quad 3\overline{)6x^2 \quad 13x \quad 6}(3x \quad 2$$

$$6x^2 \quad 9x$$

$$(\quad) \quad (\quad)$$

$$4x \quad 6$$

$$4x \quad 6$$

$$0$$

(c) $12x^3 \quad 20x^2 \quad 9x \quad 15$ divide by $(3x \quad 5)$

$$3x \quad 5\overline{)12x^3 \quad 20x^2 \quad 9x \quad 15}(4x^2 \quad 3$$

$$(\quad)12x^2 \quad (\quad) \quad 20x^2$$

$$0 \qquad 9x \quad 15$$

$$(\bar{\quad}) \quad 9x \quad (\quad) \quad 15$$

$$0$$

(d) $a^3 \quad 6a^2 \quad 11a \quad 6$ divide by $(a^2 \quad 5a \quad 6)$

$$a^2 \quad 5a \quad 6\overline{)a^3 \quad 6a^2 \quad 11a \quad 6}(a \quad 1$$

$$(\quad)a^3 \quad (\quad) \quad 5a^2 \quad (\quad) \quad 6a$$

$$a^2 \qquad 5a \qquad 6$$

$$(\quad) \quad a^2 \quad (\quad) \quad 5a \quad (\quad) \quad 6$$

$$0$$

(e) $p^4 \quad p^2 \quad 1$ divide by $p^2 \quad p \quad 1$

$$p^2 \quad p \quad 1\,)\overline{p^4 \quad p^2 \quad 1\,(\,p^2 \quad p \quad 1}$$
$$(\quad)\,p^4 \quad (\quad)\,p^3 \quad (\quad)\,p^2$$
$$p^3 \quad 1$$
$$(\quad)\,p^3 \quad (\quad)\,p^2 \quad (\quad)\,p$$
$$p^2 \quad p \quad 1$$
$$p^2 \quad p \quad 1$$
$$(\quad) \quad (\quad) \quad (\quad)$$
$$0$$

(f) $6y^5 \quad 4y^4 \quad 3y^3 \quad 1$ divide $(3^2 \quad y \quad 1)$

$$3y^2 \quad y \quad)\overline{6y^5 \quad 4y^4 \quad 3y^3 \quad 1\,(\,2y^3 \quad y^2 \quad y}$$
$$6y^2 \quad 2y^4 \quad 2y^3$$
$$(\quad) \quad (\quad) \quad (\quad)$$
$$6y^4 \quad 5y^3 \quad 1$$
$$6y^4 \quad 2y^3 \quad 2y^2$$
$$(\quad) \quad (\quad) \quad (\quad)$$
$$-3y^3 \quad 2y^2 - 1$$
$$3y^3 \quad y^2 \quad y \quad 1$$
$$(\quad) \quad (\quad) \quad (\quad) \quad (\quad)$$
$$3y^2 \quad y \quad 1$$
$$3y^2 \quad y \quad 1$$
$$(\quad) \quad (\quad) \quad (\quad)$$
$$0$$

5. (a) Divide $4x^3 \quad x \quad 1$ by $(2x \quad 1)$

$$2x \quad 1\,)\overline{4x^3 \quad x \quad 1\,(\,2x^2 \quad x}$$
$$4x^3 \quad 2x^2$$
$$(\quad) \quad (\quad)$$
$$2x^2 \quad x \quad 1$$
$$2x^2 \quad x$$
$$(\quad) \quad (\quad)$$
$$1$$

(b) Divide $2a^3 \quad 5a^2 \quad 8a \quad 4$ by $(2a \quad 1)$

$$2a \quad 1\,)\overline{2a^3 \quad 5a^2 \quad 8a \quad 4\,(\,a^2 \quad 2a \quad 3}$$
$$2a^3 \quad a^2$$
$$(\quad) \quad (\quad)$$
$$4a^2 \quad 8a \quad 4$$
$$4a^2 \quad 2a$$
$$(\quad) \quad (\quad)$$
$$6a \quad 4$$
$$6a \quad 3$$
$$(\quad) \quad (\quad)$$
$$1$$

6. (a) Divide $m^4 \quad m^3 \quad m^2$ by $m \quad 1$

$$m \quad 1 \overline{)m^4 \quad m^3 \quad m^2} \,(\, m^3 \quad m^2 \quad m \quad 1$$
$$\underline{m^4 \quad m^3}$$
$$m^2$$

(b) Divide $(x^4 \quad 1)$ by $(x \quad 1)$

$$x \quad 1 \overline{)x^4 \quad 1} \,(\, x^3 \quad x^2 \quad x \quad 1$$
$$\underline{x^4 \quad x^3}$$
$$x^3 \quad 1$$
$$\underline{x^3 \quad x^2}$$
$$x^2 \quad 1$$
$$\underline{x^2 \quad x}$$
$$x \quad 1$$
$$\underline{x \quad 1}$$
$$2$$

Quotient $x^3 \quad x^2 \quad x \quad 1$; Remainder 2

Verification

Dividend (Divisor × quotient) remainder

$(x \quad 1)(x^3 \quad x^2 \quad x \quad 1) \quad 2$

$x(x^3 \quad x^2 \quad x \quad 1) \quad 1(x^3 \quad x^2 \quad x \quad 1) \quad 2$

$x^4 \quad x^3 \quad x^2 \quad x \quad x^3 \quad x^2 \quad x \quad 1 \quad 2$

$x^4 \quad 1 \quad 2$

$x^4 \quad 1$

7. $(4x^4 \quad 2x^3 \quad 6x^2 \quad x \quad 5) \quad 2x^2 \quad x \quad 2$

$$2x^2 \quad x \quad 2 \overline{)4x^4 \quad 2x^3 \quad 6x^2 \quad x \quad 5} \,(\, 2x^2 \quad 2x$$
$$\underline{4x^2 \quad 2x^3 \quad 4x^2}$$
$$4x^3 \quad 2x^2 \quad x \quad 5$$
$$\underline{4x^3 \quad 2x^2 \quad 4x}$$
$$3x \quad 5$$

8. $x^4 \quad x^3 \quad 8x^2 \quad ax \quad b$ dividend by $x^2 \quad 1$

$$x^2 \quad 1 \overline{)4x^4 \quad 2x^3 \quad 6x^2 \quad x \quad 5} \,(\, x^2 \quad x \quad 7$$
$$\underline{x^4 \quad x^2}$$
$$x^3 \quad 7x^2 \quad ax \quad b$$
$$x^3 \quad 7x^2 \quad 1x \quad 7$$

For the remainder to be zero than $a \quad 1, b \quad 7$
Hence, a's values $\quad 1$, b's value $\quad 7$

9. $t^3 \quad 2t^2 \quad 3t \quad 18$ divide by $t \quad 3$

$$t \quad 3 \overline{)t^3 \quad 2t^2 \quad 3t \quad 18} \left(t^2 \quad t \quad 6 \right.$$

$$t^2 \quad 3t^2$$
$$(\quad) \quad (\quad)$$
$$t^2 \quad 3t - 18$$
$$t^2 \quad 3t$$
$$(\quad)$$
$$6t \quad 18$$
$$6t \quad 18$$
$$(\quad) \quad (\quad)$$
$$0$$

Yel, the quotient $t^2 \quad t \quad 6$ Remainder $\quad 0$

Exercise 7.3

1. (a) $(5x \quad 3y)^2$

$\because \quad (a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

Here, $a \quad 5x$ and $b \quad 3y$

$(5x \quad 3y)^2 \quad (5x)^2 \quad (3y)^2 \quad 2(5x)(3y)$

$25x^2 \quad 9y^2 \quad 30xy.$

(b) $(5 \quad 12x^2)^2$

$\because \quad (a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

Here $a \quad 5$ and $b \quad 12x^2$

$(5 \quad 12x^2)^2 \quad (5)^2 \quad (12x^2)^2 \quad 2(5)(12x^2)$

$25 \quad 144x^4 \quad 120x^2.$

(c) $5x \quad \frac{1}{5y}^2$

$\because \quad (a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

Here $a \quad 5x, b \quad \frac{1}{5y}$

$5x \quad \frac{1}{5y}^2 \quad (5x)^2 \quad \frac{1}{5y}^2 \quad 2(5x) \quad \frac{1}{5y}$

$25x^2 \quad \frac{1}{25y^2} \quad \frac{2x}{y}$

(d) $(3x \quad 4y)^2$

Here, $a \quad 3x, b \quad 4y$

$\because \quad (a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

$(3x \quad 4y)^2 \quad (3x)^2 \quad (4y)^2 \quad (2)(3x)(4y)$

$9x^2 \quad 16y^2 \quad 24xy.$

(e) $\sqrt{3}x \quad \frac{1}{5}y^{2}$

Here $a \quad \sqrt{3}x, b \quad \frac{1}{5}y$

$\because \quad (a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

$\sqrt{3}x \quad \frac{1}{5}y^{2} \quad (\sqrt{3}x)^2 \quad \frac{1}{5}y^{2} \quad 2(\sqrt{3}x) \quad \frac{1}{5}y$

$3x^2 \quad \frac{1}{25}y^2 \quad \frac{2\sqrt{3}}{5}xy.$

(f) $(x \quad 3y) \quad (x \quad 3y)$

$(x \quad 3y) \quad (x \quad 3y) \quad (x \quad 3y)^2$

$(x)^2 \quad (3y)^2 \quad 2(x)(3y)$

$x^2 \quad 9y^2 \quad 6xy.$

2. (a) $9x^2 \quad 49y^2 \quad 42xy$

Here $x \quad 3$ and $y \quad 1$

$9x^2 \quad 49y^2 \quad 42xy \quad (3x)^2 \quad (7y)^2 \quad 2 \quad 3x \quad 7y$

$(3x \quad 7y)^2$

$3 \quad 3 \quad 7 \quad 1)^2 \qquad$ (when $x \quad 3, y \quad 1$)

$(9 \quad 7)^2 \quad (16)^2 \quad 256.$

(b) $25x^2 \quad 64y^2 \quad 80xy$

Here, $x \quad 4, y \quad z$

$25x^2 \quad 64y^2 \quad 80xy \quad (5x)^2 \quad (8y)^2 \quad (2)(5x)(8y)$

$(5x \quad 8y)^2$

$= (5 \quad 4 \quad 8 \quad 2)^2 \qquad (\because x \quad 4$ and $y \quad 2)$

$(20 \quad 16)^2 \quad (4)^2 \quad 16$

3. (a) $2x \quad 3y \quad 8$

On squaring both sides

$(2x \quad 3y)^2 \quad (8)^2$

$4x^2 \quad 9y^2 \quad 2 \quad 2x \quad 3y \quad 64$

$4x^2 \quad 9y^2 \quad 12(xy) \quad 64$

$4x^2 \quad 9y^2 \quad 12(2) \quad 64 \qquad (\because xy \quad 2)$

$4x^2 \quad 9y^2 \quad 64 \quad 24$

$4x^2 \quad 9y^2 \quad 40.$

(b) $3x \quad 7y \quad 8$ on squaring both sides

$(3x \quad 7y)^2 \quad (8)^2$

$9x^2 \quad 49y^2 \quad 2 \quad 3x \quad 7y \quad 64$

$9x^2 \quad 49y^2 \quad 42(xy) \quad 64$

$9x^2 \quad 49y^2 \quad 42(\quad 1) \quad 64$

$9x^2 \quad 49y^2 \quad 42 \quad 64$

$$9x^2 \quad 49y^2 \quad 64 \quad 42$$
$$9x^2 \quad 49y^2 \quad 22$$

4. (i) $x \quad \frac{1}{x} \quad 6$

Squaring both sides

$$x \quad \frac{1}{x}^{\,2} \quad (6)^2$$
$$x^2 \quad \frac{1}{x^2} \quad 2 \quad x \quad \frac{1}{x} \quad 36$$
$$x^2 \quad \frac{1}{x^2} \quad 2 \quad 36$$
$$x^2 \quad \frac{1}{x^2} \quad 36 \quad 2$$
$$x^2 \quad \frac{1}{x^2} \quad 34.$$

(ii) $x^2 \quad \frac{1}{x^2} \quad 34$ squaring on both side

$$x^2 \quad \frac{1}{x^2}^{\,2} \quad (34)^2$$
$$(x^2)^2 \quad \frac{1}{x^2}^{\,2} \quad 2 \quad x^2 \quad \frac{1}{x^2} \quad 1156$$
$$x^4 \quad \frac{1}{x^4} \quad 2 \quad 1156$$
$$x^4 \quad \frac{1}{x^4} \quad 1156 \quad 2 \quad 1154.$$

5. (a) $x \quad \frac{1}{x} \quad 5$ squaring on both sides

$$x \quad \frac{1}{x}^{\,2} \quad (5)^2$$
$$x^2 \quad \frac{1}{x^2} \quad 2 \quad 25$$
$$x^2 \quad \frac{1}{x^2} \quad 25 \quad 2$$
$$x^2 \quad \frac{1}{x^2} \quad 27.$$

(b) $x^2 \quad \frac{1}{x^2} \quad 27$ squaring on both sides

$$x^2 \quad \frac{1}{x^2}^{\,2} \quad (27)^2$$
$$(x^2)^2 \quad \frac{1}{x^2}^{\,2} \quad 2 \quad x^2 \quad \frac{1}{x^2} \quad 729$$

$$x^4 \quad \frac{1}{x^4} \quad 2 \quad 729$$

$$x^4 \quad \frac{1}{x^4} \quad 729 \quad 2$$

$$x^4 \quad \frac{1}{x^4} \quad 727.$$

6. (a) $(4x \quad 5y)(4x \quad 5y) \quad (4x)^2 \quad (5y)^2 \qquad [\because (a \quad b).(a \quad b) \quad a^2 \quad b^2]$

$16x^2 \quad 25y^2$

(b) $(ab \quad cd)(ab \quad cd) \quad (ab)^2 \quad (cd)^2 \qquad [\because (a \quad b).(a \quad b) \quad a^2 \quad b^2]$

(c) $(ab \quad cd)(ab \quad cd) \quad (ab)^2 \quad (cd)^2 \qquad [\because (a \quad b).(a \quad b) \quad a^2 \quad b^2]$

$(x^4 \quad 1)(x^4 \quad 1)$

$(x^4)^4 \quad (1)^2$

$x^8 \quad 1$

(d) $x \quad \frac{y}{5} \quad 1 \quad x \quad \frac{y}{5} \quad 1 \quad x \quad \frac{y}{5}^2 \quad (1)^2 \qquad [\because (a \quad b).(a \quad b) \quad a^2 \quad b^2]$

$x^2 \quad \frac{y^2}{25} \quad \frac{2xy}{5} \quad 1 \qquad [\because (a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab]$

7. (a) $(103)^2 \quad (100 \quad 3)^2$

We know that $(a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

then $(100 \quad 3)^2 \quad (100)^2 \quad (3)^2 \quad 2(100)(3)$

$10000 \quad 9 \quad 600$

$106009.$

(b) $(91)^2 \quad (100 \quad 9)^2$

We know that, $(a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

then, $(100 \quad 9)^2 \quad (100)^2 \quad (9)^2 \quad 2(100) \quad (9)$

$= 10000 \quad 81 \quad 1800 \quad 10081 \quad 1800 \quad 8281.$

(c) $(0.98)^2 \quad (1 \quad 0.02)^2$

then $(1 \quad 0.02)^2 \quad (1)^2 \quad (0.02)^2 \quad 2(1) \quad (0.02)$

$1 \quad 0.0004 \quad 0.04 = 0.9604.$

(d) $(97)^2 \quad (100 \quad 3)^2$

We know that, $(a \quad b)^2 \quad a^2 \quad b^2 \quad 2ab$

$(100 \quad 3)^2 \quad (100)^2 \quad (3)^2 \quad 2 \quad 100 \quad 3$

$10000 \quad 9 \quad 600$

$10009 \quad 600 \quad 9409.$

(e) $103 \quad 97$

We know that, $a^2 \quad b^2 \quad (a \quad b)(a \quad b)$

$103 \quad 97 \quad (100 \quad 3)(100 \quad 3) \quad (100)^2 \quad (3)^2$

$10000 \quad 9 \quad 9991.$

(f) $104 \quad 104 \quad (100 \quad 4)^2$

$(100)^2 \quad (4)^2 \quad 2 \quad 100 \quad 4$

$10000 \quad 16 \quad 800 \quad 10816.$

(g) $166 \quad 166 \quad 134 \quad 134 \quad (166)^2 \quad (134)^2$

$(166 \quad 134)(166 \quad 134) \quad [\because a^2 \quad b^2 \quad (a \quad b)(a \quad b)]$

$(300)(32) \quad 9600.$

(h) $0.78 \quad 0.78 \quad 0.22 \quad 0.22$

$(0.78)^2 \quad (0.22)^2$

$(0.78 \quad 0.22)(0.78 \quad 0.22) \qquad [\because a^2 \quad b^2 \quad (a \quad b)(a \quad b)]$

$(1)(0.56) = 0.56.$

(i) $0.54 \quad 0.54 \quad 0.46 \quad 0.46 \quad (0.54)^2 \quad (0.46)^2$

$(0.54 \quad 0.46)(0.54 \quad 0.46) \qquad [\because a^2 \quad b^2 \quad (a \quad b)(a \quad b)]$

$(1.00)(0.08) \quad 0.08$

Exercise 7.4

1. (a) $(x \quad 2y \quad 5z)^2$

$\because \quad (a \quad b \quad c)^2 \quad a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ac$

$(x \quad 2y \quad 5z)^2 \quad (x)^2 \quad (\ 2y)^2 \quad (\ 5z)^2 \quad 2(x \quad \ 2y)$

$2(\ 2y) \quad (\ 5z) \quad 2(x)(\ 5z)$

$x^2 \quad 4y^2 \quad 25z^2 \quad 4xy \quad 20yz \quad 10xz$

(b) $\frac{1}{4}x \quad \frac{1}{2}y \quad 16 \quad ^2$

$\because \quad (a \quad b \quad c)^2 \quad a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca$

$\frac{1}{4}x \quad \frac{1}{2}y \quad 16 \quad ^2 \quad \frac{1}{4}x \quad ^2 \quad \frac{1}{2}y \quad ^2 \quad (16)^2 \quad 2 \quad \frac{1}{4}x \quad \frac{1}{2}y$

$2 \quad \frac{1}{2}y \quad (16) \quad 2(16) \quad \frac{1}{4}x$

$\frac{1}{16}x^2 \quad \frac{1}{4}y^2 \quad 256 \quad \frac{1}{4}xy \quad 16y \quad 8x.$

(c) $\frac{a}{b} \quad \frac{b}{c} \quad \frac{c}{d} \quad ^2$

$\because \quad (a \quad b \quad c)^2 \quad a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca$

then $\frac{a}{b} \quad \frac{b}{c} \quad \frac{c}{d} \quad ^2 \quad \frac{a}{b} \quad ^2 \quad \frac{b}{c} \quad ^2 \quad \frac{c}{d} \quad ^2 \quad 2 \quad \frac{a}{b} \quad \frac{b}{c}$

$2 \quad \frac{b}{c} \quad \frac{c}{d} \quad 2 \quad \frac{c}{d} \quad \frac{a}{b}$

$\frac{a^2}{b^2} \quad \frac{b^2}{c^2} \quad \frac{c^2}{d^2} \quad 2 \quad \frac{a}{c} \quad 2 \quad \frac{b}{d} \quad 2 \quad \frac{ac}{bd}.$

2. $x^2 \quad 4y^2 \quad 9z^2 \quad 4xy \quad 12yz \quad 6xz$

$x^2 \quad 4y^2 \quad 9z^2 \quad 4xy \quad 12yz \quad 6xz$

$(x)^2 \quad (2y)^2 \quad (3z)^2 \quad 2(x \quad 2y) \quad 2(2y \quad 3z) \quad 2(3z \quad x)$

$(x \quad 2y \quad 3z)^2 \qquad (\because a \quad b \quad c^2 \quad a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca)$

Now, on putting the value of x, y and z.

$x \quad 8, \ y \quad 7$ and $z \quad 6$

then $(x \quad 2y \quad 3z)^2 \quad [8 \quad (2 \quad 7) \quad (3 \quad 6)]^2$

$(8 \quad 14 \quad 18)^2 \quad (40)^2 \quad 1600.$

3. $x^2 \quad 4y^2 \quad 25z^2 \quad 4xy \quad 20yz \quad 10xz$

$(x)^2 \quad (\ 2y)^2 \quad (\ 5z)^2 \quad 2(x \quad 2y) \quad 2(\ 2y \quad 5z) \quad 2(x \quad 5z)$

$\{(x \quad (\ 2y) \quad (\ 5z)\}^2 \quad (x \quad 2y \quad 5z)^2$

$[\because (a \quad b \quad c)^2 \quad a^2 \quad b^2 \quad c^2 \quad 2ab \quad 12b \quad 2ca)]$

Now, on putting the value of x, y and $x \quad 9$, $y \quad 2$ and $z \quad 1$.

then $(x \quad 2y \quad 5z)^2 \quad \{9 \quad (2 \quad 2) \quad (5 \quad 1)\}^2$

$[9 \quad 4 \quad 5]^2$

$[9 \quad 9]^2 \quad [0]^2 \quad 0.$

4. $x \quad y \quad z \quad 12$ squaring both the sides.

$(x \quad y \quad z)^2 \quad (12)^2$

$x^2 \quad y^2 \quad z^2 \quad 2xy \quad 2yz \quad 2zx \quad 144$

$(x^2 \quad y^2 \quad z^2) \quad (2xy \quad 2yz \quad 2zx) \quad 144$

$\because \quad x^2 \quad y^2 \quad z^2 \quad 64$

$64 \quad (2xy \quad 2yz \quad 22x) \quad 144$

$2xy \quad 2yz \quad 2zx \quad 144 \quad 64 \quad 80$

$2(xy \quad yz \quad zx) \quad 80$

$xy \quad yz \quad zx \quad \frac{80}{2} \quad 40.$

5. $x \quad y \quad z \quad 8$ squaring both sides.

$(x \quad y \quad z)^2 \quad (8)^2$

$x^2 \quad y^2 \quad z^2 \quad 2xy \quad 2yz \quad 2xz \quad 64$

$x^2 \quad y^2 \quad z^2 \quad 2(xy \quad yz \quad xz) \quad 64$

$x^2 \quad y^2 \quad z^2 \quad 2(13) \quad 64 \qquad (\because xy \quad yz \quad xz \quad 13)$

$x^2 \quad y^2 \quad z^2 \quad 26 \quad 64$

$x^2 \quad y^2 \quad z^2 \quad 64 \quad 26 \quad 38.$

6. $x^2 \quad y^2 \quad z^2 \quad 35$ on using identity

$(x \quad y \quad z)^2 \quad x^2 \quad y^2 \quad z^2 \quad 2xy \quad 2yz \quad 2xz$

$(x \quad y \quad z)^2 \quad (x^2 \quad y^2 \quad z^2) \quad 2(xy \quad yz \quad zx)$

$(x \quad y \quad z) \quad \sqrt{35 \quad 2(23)} \qquad (\because x^2 \quad y^2 \quad z^2 \quad 35 \text{ and } xy \quad yz \quad zx \quad 23)$

$\sqrt{35 \quad 46} \quad \sqrt{81} \qquad (\ x \quad y \quad z \quad 9)$

7. (a) $(2x \quad p \quad c)^2 \quad (2x \quad p \quad c)^2$

$(2x \quad p \quad c \quad 2x \quad p \quad c).(2x \quad p \quad c \quad 2x \quad p \quad c)$

$[\because (a^2 \quad b^2) \quad (a \quad b)(a \quad b)]$

$4x(2p \quad 2c)$

$4x \quad 2(p \quad c)$

$8x(p \quad c)$

(b) $(x^2 \quad y^2 \quad z^2)^2 \quad (x^2 \quad y^2 \quad z^2)^2$

$(x^2 \quad y^2 \quad z^2 \quad x^2 \quad y^2 \quad z^2).(x^2 \quad y^2 \quad z^2 \quad x^2 \quad y^2 \quad z^2)$

$[\because a^2 \quad b^2 \quad (a \quad b)(a \quad b)]$

$2x \quad (2y^2 \quad 2z^2)$

$4x^2 \ (y^2 \quad z^2)$

$4x^2 \ (y \quad z)(y \quad z)$

(c) $(a \quad b \quad c)^2 \quad (a \quad b \quad c)^2 \quad (a \quad b \quad c)^2$

$\because \quad (a \quad b \quad c)^2 \quad a^2 \quad b^2 \quad 2ab \quad 2bc \quad 2ca$

$(a \quad b \quad c)^2 \quad (a \quad b \quad c)^2 \quad (a \quad b \quad c)^2$

$(a^2 \quad b^2 \quad 2ab \quad 2bc \quad 2ca) \quad (a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca)$

$(a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca)$

$a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca \quad a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca$

$a^2 \quad b^2 \quad c^2 \quad 2ab \quad 2bc \quad 2ca$

$3a^2 \quad 3b^2 \quad 3c^2 \quad 2ab \quad 2ca \quad 2bc$

$3(a^2 \quad b^2 \quad c^2) \quad 2ab \quad 2bc \quad 2ca).$

Exercise 7.5

1. (a) $(3x \quad 2y)^3$

$\because \quad (a \quad b)^3 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$

$(3x \quad 2y)^3 \quad 27x^3 \quad 8y^3 \quad 3(3x \quad 2y)(3x \quad 2y)$

$27x^3 \quad 8y^3 \quad (18xy)(3x \quad 2y) \quad 27x^3 \quad 8y^3 \quad 54x^2y \quad 36xy^2.$

(b) $\left(\frac{1}{3}x \quad \frac{5}{3}y\right)^3$

$\because \quad (a \quad b)^3 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$

$\left(\frac{1}{3}x \quad \frac{5}{3}y\right)^3 \quad \frac{1}{27}x^3 \quad \frac{125}{27}y^3 \quad 3\left(\frac{1}{3}x \quad \frac{5}{3}y\right)\left(\frac{1}{3}x \quad \frac{5}{3}y\right)$

$\frac{1}{27}x^3 \quad \frac{125}{27}y^3 \quad \frac{5}{3}xy \quad \frac{1}{3}x \quad \frac{5}{3}y$

$\frac{1}{27}x^3 \quad \frac{125}{27}y^3 \quad \frac{5}{9}x^2y \quad \frac{25}{9}xy^2.$

(c) $\left(\frac{1}{3x} \quad \frac{2}{5y}\right)^3$

$\because \quad (a \quad b)^2 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$

$\left(\frac{1}{3x} \quad \frac{2}{5y}\right)^3 \quad \frac{1}{27x^3} \quad \frac{8}{125y^3} \quad 3\left(\frac{1}{3x} \quad \frac{2}{5y}\right)\left(\frac{1}{3x} \quad \frac{2}{5y}\right)$

$\frac{1}{27x^3} \quad \frac{8}{125y^3} \quad \frac{2}{5xy} \quad \frac{1}{3x} \quad \frac{2}{5y}$

$\frac{1}{27x^3} \quad \frac{8}{125y^3} \quad \frac{2}{15x^2y} \quad \frac{4}{25xy^2}.$

2. (a) $(1004)^3 \quad (1000 \quad 4)^3$

$\because \quad (a \quad b)^3 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$

$(1000 \quad 4)^3 \quad (1000)^3 \quad (4)^3 \quad 3(1000 \quad 4)(1000 \quad 4)$

$1000 \quad 1000 \quad 1000 \quad 64 \quad 12000(1004)$

$1000000064 \quad 12048000 \quad 1012048064.$

(b) $(599)^3 \quad (600 \quad 1)^3$

$\because \quad (a \quad b)^3 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$

$(600 \quad 1)^3 \quad (600)^3 \quad (1)^3 \quad 3 \quad (600 \quad 1)(600 \quad 1)$

$216000000 \quad 1 \quad 1800(599)$

$216000000 \quad 1 \quad 1078200$

$214921799.$

(c) $(9.8)^3 \quad (10 \quad 0.2)^3$

$(10)^3 \quad (0.2)^3 \quad 3(10 \quad 0.2)(10 \quad 0.2)$

$1000 \quad 0.008 \quad 6(10 \quad 0.2)$

$1000 \quad 0.008 \quad 60 \quad 1.2$

$= 941.192.$

(d) $(8.01)^3 \; (8.01)^3 \quad (8 \quad 0.01)^3$

$\because \quad (a \quad b)^3 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$

$(8 \quad 0.01)^3 \quad (8)^3 \quad (0.01)^3 \quad 3(8 \quad 0.01)(8 \quad 0.01)$

$512 \quad 0.000001 \quad 0.24(8.01)$

$512 \quad 0.000001 \quad 1.9224$

$513.922401.$

3. $x \quad y \quad 5$

On cubing both sides.

$(x \quad y)^3 \quad (5)^3$

$x^3 \quad y^3 \quad 3xy(x \quad y) \quad 125$

$x^3 \quad y^3 \quad 3(6)(5) \quad 125 \qquad (\because x \quad y \quad 5 \text{ and } xy \quad 6)$

$x^3 \quad y^3 \quad 125 \quad 90 \quad 35.$

4. $x \quad y \quad 12$

On cubing both sides

$(x \quad y)^3 \quad (12)^3$

$x^3 \quad y^3 \quad 3xy(x \quad y) \quad 1728$

$x^3 \quad y^3 \quad 3 \quad 27(12) \quad 1728 \qquad (\because xy \quad 27 \text{ and } x \quad y \quad 12)$

$x^3 \quad y^3 \quad 1728 \quad 972 \quad x^3 \quad y^3 \quad 756.$

5. $x \quad y \quad 4$

On cubing both sides.

$(x \quad y)^3 \quad (4)^3$

$x^3 \quad y^3 \quad 3(xy)(x \quad y) \quad 64$

$x^3 \quad y^3 \quad 3(21)(4) \quad 64 \qquad (\because xy \quad 21, x \quad y \quad 4)$

$x^3 \quad y^3 \quad 252 \quad 64$

$x^3 \quad y^3 \quad 64 \quad 252$

$x^3 \quad y^3 \quad 316.$

6. $3x \quad 2y \quad 11$

On cubing with sides.

$$(3x \quad 2y)^3 \quad (11)^3$$

$$(3x)^3 \quad (2y)^3 \quad 3(3x \quad 2y)(3x \quad 2y) \quad 1331$$

$$27x^3 \quad 8y^3 \quad 18xy(3x \quad 2y) \quad 1331$$

$$27x^3 \quad 8y^3 \quad 18 \quad 12 \quad 11 \quad 1331 \qquad (\because xy \quad 12 \text{ and } 3x \quad 2y \quad 11)$$

$$27x^3 \quad 8y^3 \quad 1331 \quad 2376$$

$$27x^3 \quad 8y^3 \quad 3707.$$

7. $x \quad \frac{1}{x} \quad 7$

On cubing both sides.

$$x \quad \frac{1}{x}^{\,3} \quad (7)^3$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \quad x \quad \frac{1}{x} \; x \quad \frac{1}{x} \quad 343$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \; x \quad \frac{1}{x} \quad 343$$

$$x^3 \quad \frac{1}{x^3} \quad (3 \quad 7) \quad 343 \qquad \because x \quad \frac{1}{x} \quad 7$$

$$x^3 \quad \frac{1}{x^3} \quad 343 \quad 21$$

$$x^3 \quad \frac{1}{x^3} \quad 322.$$

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

On cubing both sides.

$$x \quad \frac{1}{x}^{\,3} \quad (5)^3$$

$$\because \quad (a \quad b)^3 \quad a^3 \quad b^3 \quad 3ab(a \quad b)$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \; x \quad \frac{1}{x} \quad x \quad \frac{1}{x} \quad 125$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \; x \quad \frac{1}{x} \quad 125$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \quad 5 \quad 125$$

$$x^3 \quad \frac{1}{x^3} \quad 125 \quad 15$$

$$x^3 \quad \frac{1}{x^3} \quad 140.$$

9. $x^2 \quad \frac{1}{x^2} \quad 7$

On putting

$$x \quad \frac{1}{x}^2 \quad x^2 \quad \frac{1}{x^2} \quad 2 \qquad \because \; x^2 \quad \frac{1}{x^2} \quad 7$$

$$x \quad \frac{1}{x}^2 \quad 7 \quad 2$$

$$x \quad \frac{1}{x}^2 \quad 9 \qquad x \quad \frac{1}{x} \quad 3$$

Now, on cubing the both sides

$$x \quad \frac{1}{x}^3 \quad (3)^3$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \; x \quad \frac{1}{x} \quad x \quad \frac{1}{x} \quad 27$$

$$x^3 \quad \frac{1}{x^3} \quad 3(3) \quad 27 \qquad \because x \quad \frac{1}{x} \quad 3$$

$$x^3 \quad \frac{1}{x^3} \quad 9 \quad 27$$

$$x^3 \quad \frac{1}{x^3} \quad 27 \quad 9$$

$$x^3 \quad \frac{1}{x^3} \quad 18.$$

10. $x^2 \quad \frac{1}{x^2} \quad 27$

On putting $\quad x \quad \frac{1}{x}^2 \quad x^2 \quad \frac{1}{x^2} \quad 2$

$\because \quad x^2 \quad \frac{1}{x^2} \quad 27$

$$x \quad \frac{1}{x}^2 \quad 27 \quad 2 \qquad x \quad \frac{1}{x}^2 \quad 25$$

$$x \quad \frac{1}{x} \quad 5.$$

Now, on cubing both sides

$$x \quad \frac{1}{x}^3 \quad (5)^3$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \; x \quad \frac{1}{x} \quad x \quad \frac{1}{x} \quad 125$$

$$x^3 \quad \frac{1}{x^3} \quad 3 \quad (5) \quad 125 \qquad \because x \quad \frac{1}{x} \quad 5$$

$$x^3 \quad \frac{1}{x^3} \quad 125 \quad 15$$

$x^3 \quad \frac{1}{x^3} \quad 140.$

11. (a) $(a \quad 3b)^3 \quad (a \quad 3b)^3$

$[a^3 \quad (3b)^3 \quad 3(a \quad 3b)(a \quad 3b)] \quad [a^3 \quad (3b)^3 \quad 3(a \quad 3b)(a \quad 3b)$

$[a^3 \quad 27b^3 \quad 9ab(a \quad 3b)] \quad [a^3 \quad 27b^3 \quad 9ab(a \quad 3b)]$

$a^3 \quad 27b^3 \quad 9a^2b \quad 27ab^2 \quad a^3 \quad 27b^3 \quad 9a^2b \quad 27ab^2$

$2a^3 \quad 54ab^2.$

(b) $\frac{1}{3}a \quad \frac{2}{3}b^{\ 3} \quad \frac{1}{3}a \quad \frac{2}{3}b^{\ 3}$

$\frac{1}{3}a^{\ 3} \quad \frac{2}{3}b^{\ 3} \quad 3\ \frac{a}{3} \quad \frac{2b}{3} \quad \frac{a}{3} \quad \frac{2b}{3}$

$\frac{1}{3}a^{\ 3} \quad \frac{2}{3}b^{\ 3} \quad 3\ \frac{a}{3} \quad \frac{2}{3}b \quad \frac{a}{3} \quad \frac{2b}{3}$

$\frac{1 \quad a^3}{27} \quad \frac{8b^3}{27} \quad \frac{2ab}{3} \quad \frac{a}{3} \quad \frac{2b}{3} \quad \frac{a^3}{27} \quad \frac{8b^3}{27} \quad \frac{2}{3}ab \quad \frac{a}{3} \quad \frac{2b}{3}$

$\frac{a^3}{27} \quad \frac{8b^3}{27} \quad \frac{2a^2b}{9} \quad \frac{4ab^2}{9} \quad \frac{a^3}{27} \quad \frac{8b^3}{27} \quad \frac{2a^2b}{9} \quad \frac{4ab^2}{9}$

$\frac{a^3}{27} \quad \frac{8b^3}{27} \quad \frac{2a^2b}{9} \quad \frac{4ab^2}{9} \quad \frac{a^3}{27} \quad \frac{8b^3}{27} \quad \frac{2a^2b}{9} \quad \frac{4ab^2}{9}$

$2\ \frac{8b^3}{27} \quad 2\ \frac{2a^2b}{9} \quad \frac{16b^3}{27} \quad \frac{4a^2b}{9}.$

Exercise 7.6

1. (a) $12p^2q \quad 2 \quad 2 \quad 3 \quad p \quad p \quad q$

(b) $16xy^2z \quad 2 \quad 2 \quad 2 \quad 2 \quad x \quad y \quad y \quad z$

(c) $20a^2b^2c^2 \quad 2 \quad 2 \quad 5 \quad a \quad a \quad b \quad b \quad c \quad c$

(d) $21m^2np^2 \quad 3 \quad 7 \quad m \quad m \quad n \quad p \quad p$

2. (a) Common factors of $2xy$ and $12x^2y \quad 2xy$

(b) Common factors of $3m^2$ and $15m^4 \quad 5m^2$

(c) Common factors of $3ax^2y$ and $18axy \quad 3axy$

(d) Common factors of $25p^2q^4$ and $15pq^2 \quad 5pq^2$

3. (a) $3x^2(2 \quad 5x \quad 7x^2)$

Common factors of $6x^2 \quad 15x^3 \quad 21x^4 \quad 3x^2$

(b) $9x^2y^2(y \quad 3x \quad 4)$

Common factors of $9x^2y^3 \quad 18x^3y^2 \quad 36x^2y^2 \quad 9x^2y^2$

(c) $5a(a^2bc \quad 3b^3 \quad 5a^2)$

Common factors of $5a^3bc \quad 15ab^3 \quad 25a^3 \quad 5a$

(d) $8(p^3 \quad 29^3 \quad 4r^3)$

Common factors of $8p^3 \quad 16q^3 \quad 32r^3 \quad 8$

4. (a) $(x \quad 3)x \quad (x \quad 3)y \quad (x \quad y)(x \quad 3)$

(b) $3a(x \quad 4y) \quad 2b(x \quad 4y) \quad (3a \quad 2b)(x \quad 4y)$

(c) $\quad 4(a \quad 2b) \quad 8(a \quad 2b)^2 \quad 4(a \quad 2b)[\ 1 \quad 2(a \quad 2b)] \quad 4(a \quad 2b)[\ 1 \quad 2a \quad 4b]$

(d) $5(m \quad n)^2 \quad 6(m \quad n) \quad (m \quad n)[5(m \quad n) \quad 6] \quad (m \quad n)[5m \quad 5n \quad 6]$

5. (a) $abc \quad ab \quad c \quad 1 \quad ab(c \quad 1) \quad 1(c \quad 1) \quad (ab \quad 1)(c \quad 1)$

(b) $pq^2 \quad pr^2 \quad pq \quad r^2 \quad p^2q \quad pq \quad pr^2 \quad r^2$

$pq(p \quad 1) \quad r^2(p \quad 1) \quad (p \quad r^2)(p \quad 1)$

(c) $4x^2 \quad 2y^2 \quad x^2y^2 \quad 8 \quad 4x^2 \quad x^2y^2 \quad 2y^2 \quad 8$

$x^2(4 \quad y^2) \quad 2(y^2 \quad 4)$

$(x^2 \quad 2)(y^2 \quad 4)$

(d) $ax^2 \quad by^2 \quad bx^2 \quad ay^2 \quad ax^2 \quad bx^2 \quad ay^2 \quad by^2$

$x^2(a \quad b) \quad y^2(a \quad b)$

$(x^2 \quad y^2)(a \quad b)$

6. (a) $x^2 \quad 16 \quad (x)^2 \quad (4)^2 \qquad$ [Using $x^2 \quad y^2 \quad (x \quad y)(x \quad y)$]

$(x \quad 4)(x \quad 4)$

(b) $4 \quad 36y^2 \quad (2)^2 \quad (6y)^2$

$(2 \quad 6y)(2 \quad 6y) \qquad$ [Using $x^2 \quad y^2 \quad (x \quad y)(x \quad y)$]

(c) $a^4b^4 \quad c^4 \quad (a^2b^2)^2 \quad (c^2)^2 \quad$ [Using $a^2 \quad b^2 \quad (a \quad b)(a \quad b)$]

$(a^2b^2 \quad c^2)(a^2b^2 \quad c^2)$

$(a^2b^2 \quad c_2)(a^2b^2 \quad c^2)(a^2b^2 \quad c^2)$

(d) $m^2 \quad (n \quad p)^2 \quad (m)^2 \quad (n \quad p)^2$ [Using $a^2 \quad b^2 \quad (a \quad b)(a \quad b)$]

$(m \quad n \quad p)(m \quad n \quad p)$

(e) $8p^3 \quad 2p \quad 2p(4p^2 \quad 1) \qquad$ [Using $a^2 \quad b^2 \quad (a \quad b)(a \quad b)$]

$2p((2p)^2 \quad (1)^2)$

$2p(2p \quad 1)(2p \quad 1)$

(f) $16x^4 \quad (z \quad x)^4 \quad (4x^2)^2 \quad [(z \quad x)^2]^2$

$(4x^2 \quad (z \quad x)^2)[4x^2 \quad (2x)^2]$

$[4x^2 \quad (z \quad x)(z \quad x)][4x^2 \quad (z \quad x)(z \quad x)]$

7. (a) $y^2 \quad 18y \quad 81$

$(y)^2 \quad 2 \quad y \quad 9 \quad (9)^2 \qquad$ [Using $(a \quad b)^2 \quad a^2 \quad 2ab \quad b^2$]

$(y \quad 9)^2$

(b) $x^4 \quad 22x^2 \quad 121$

$(x^2)^2 \quad 2 \quad x \quad 11 \quad (11)^2$ [Using $(a \quad b)^2 \quad a^2 \quad 2ab \quad b^2$]

$(x^2 \quad 11)^2$

(c) $p^6 \quad 4p^3 \quad 4$

$(p^3)^2 \quad 2 \quad p^3 \quad 2 \quad (2)^2$ [Using $(a \quad b)^2 \quad a^2 \quad 2ab \quad b^2$]

$(p^3 \quad 2)^2$

(d) $a^2 \quad 2ab \quad b^2 \quad 16$

$(a^2 \quad 2ab \quad b^2) \quad (4)^2$ [Using $(a \quad b)^2 \quad a^2 \quad 2ab \quad b^2$]

$(a \quad b)^2 \quad (4)^2$ [Using $(a^2 \quad b^2) \quad (a \quad b)(a \quad b)$]

$(a \quad b \quad 4)(a \quad b \quad 4)$

(e) $9z^2 \quad x^2 \quad 4y^2 \quad 4xy$

$9z^2 \quad (x^2 \quad 4y^2 \quad 4xy)$ [Using $(a \quad b)^2 \quad a^2 \quad 2ab \quad b^2$]

$9z^2 \quad (x)^2 \quad (2y)^2 \quad 2 \quad x \quad 2y$

$9z^2 \quad (x \quad 2y)^2$ [Using $(a^2 \quad b^2) \quad (a \quad b)(a \quad b)$]

$(3z)^2 \quad (x \quad 2y)^2$

$(3z \quad x \quad 2y)(3z \quad x \quad 2y)$

(f) $x^8 \quad y^8 \quad x^4 \quad y^4$

$(x^4)^2 \quad (y^4)^2 \quad (x^2)^2 \quad (y^2)^2$ [Using $(a^2 \quad b^2) \quad (a \quad b)(a \quad b)$]

$(x^4 \quad y^4)(x^4 \quad y^4) \quad (x^2 \quad y^2)(x^2 \quad y^2)$

$(x^4 \quad y^4)(x^2 \quad y^2)(x^2 \quad y^2) \quad (x^2 \quad y^2)$

$(x^2 \quad y^2)(x^4 \quad y^4 \quad 1) \quad (x^2 \quad y)^2$

$(x^2 \quad y^2)(x^2 \quad y^4 \quad 1) \quad (x \quad y)(x \quad y)$

8. (a) $x^2 \quad 9x \quad 20$

$x^2 \quad 5x \quad 4x \quad 20$

$x(x \quad 5) \quad 4(x \quad 5)$

$(x \quad 4)(x \quad 5)$

(b) $x^2 \quad 14x \quad 13$

$x^2 \quad 13x \quad x \quad 13$

$x(x \quad 13) \quad 1(x \quad 13)$

$(x \quad 1)(x \quad 13)$

(c) $p^2 \quad 2p \quad 15$

$p^2 \quad 2p \quad 15$

$p(p \quad 3) \quad 5(p \quad 3)$

$(p \quad 5)(p \quad 3)$

(d) $m^2 \quad 11mn \quad 18n^2$

$m^2 \quad 9mn \quad 2mn \quad 18n^2$

$m(m \quad 9) \quad 2n(m \quad 9n)$

$(m \quad 9n)(m \quad 2n)$

(e) $m^2 \quad 3m \quad 70$

$m^2 \quad 10m \quad 7m \quad 70$

$m(m \quad 10) \quad 7(m \quad 10)$

$(3x \quad 4)(x \quad 2)$

$(m \quad 7)(m \quad 10)$

(f) $3x^2 \quad 10x \quad 8$

$3x^2 \quad 74x \quad 4x \quad 8$

$3x(x \quad 2) \quad 4(x \quad 2)$

$(3x \quad 4)(x \quad 2)$

(g) $10p^2 \quad 11p \quad 3$

$10p^2 \quad 5p \quad 6p \quad 3$

$5p(2p \quad 1) \quad 3(2p \quad 1)$

$5p \quad 3)(2p \quad 1)$

(h) $11a^2 \quad 54a \quad 63$

$11a^2 \quad 21a \quad 33a \quad 63$

$a(11a \quad 2a) \quad 3(11a \quad 21)$

$(a \quad 3)(11a \quad 21)$

(i) $12y^2 \quad 28y \quad 5 \quad 12y^2 \quad 2y \quad 30y \quad 5 \quad 2y(6y \quad 1) \quad 5(6y \quad 1)$

$(2y \quad 5)(6y \quad 1)$

MCQ's

1.	(b)	**2.**	(a)	**3.**	(c)	**4.**	(d)
5.	(a)	**6.**	(c)	**7.**	(d)	**8.**	(d)