පුනරීක්ෂණ අභ්‍යාසය

1. හිස්තැන් පුරවන්න.

a. $(a + b)^2 = a^2 + 2ab + \underline{b^2}$

b. $(a - b)^2 = \underline{a^2} - 2ab + b^2$

c. $(x + 2)^2 = x^2 + 4x + \underline{4}$

d. $(y + 3)^2 = y^2 + \underline{6y} + 9$

e. $(a - 5)^2 = \underline{a^2} - 10a + 25$

f. $(b - 1)^2 = b^2 - \underline{2b} + \underline{1}$

g. $(4 + x)^2 = 16 + \underline{8x} + \underline{x^2}$

h. $(7 - t)^2 = 49 - \underline{14t} + t^2$

i. $(2x + 1)^2 = 4x^2 + \underline{4x} + 1$

j. $(3b - 2)^2 = \underline{9b^2} - 12b + \underline{4}$

2. ප්‍රසාරණය කරන්න.

a. $(2m + 3)^2$ b. $(3x - 1)^2$ c. $(5 + 2x)^2$

d. $(2a + 3b)^2$ e. $(3m - 2n)^2$ f. $(2x + 5y)^2$

$a.\ (2m + 3)^2 = (2m)^2 + 2 \times 2m \times 3 + 3^2$
$$= 4m^2 + 12m + 9$$

$b.\ (3x - 1)^2 = (3x)^2 - 2 \times 3x \times 1 + 1^2$
$$= 9x^2 - 6x + 1$$

$c.\ (5 + 2x)^2 = (5)^2 + 2 \times 5 \times 2x + (2x)^2$
$$= 25 + 20x + 4x^2$$

$d.\ (2a + 3b)^2 = (2a)^2 + 2 \times 2a \times 3b + (3b)^2$
$$= 4a^2 + 12ab + 9b^2$$

$e.\ (3m - 2n)^2 = (3m)^2 - 2 \times 3m \times 2n + (2n)^2$
$$= 9m^2 - 12mn + 4n^2$$

$f.\ (2x + 5y)^2 = (2x)^2 + 2 \times 2x \times 5y + (5y)^2$
$$= 4x^2 + 20xy + 25y^2$$

3. ද්විපද ප්‍රකාශනයක වර්ගායිතයක් ලෙස ලිවීමෙන් පහත දැක්වෙන එක් එක් වර්ගය අගයන්න.

    a. 32^2 **b.** 103^2 **c.** 18^2 **d.** 99^2

a. 32^2
$$= (30 + 2)^2$$
$$= 30^2 + 2 \times 30 \times 2 + 2^2$$
$$= 900 + 120 + 4$$
$$= \underline{\underline{1024}}$$

b. 103^2
$$= (100 + 3)^2$$
$$= 100^2 + 2 \times 100 \times 3 + 3^2$$
$$= 10000 + 600 + 9$$
$$= \underline{\underline{10609}}$$

c. 18^2
$$= (20 - 2)^2$$
$$= 20^2 - 2 \times 20 \times 2 + 2^2$$
$$= 400 - 80 + 4$$
$$= \underline{\underline{324}}$$

d. 99^2
$$= (100 - 1)^2$$
$$= 100^2 - 2 \times 100 \times 1 + 1^2$$
$$= 10000 - 200 + 1$$
$$= \underline{\underline{9801}}$$

6.1 අභ්‍යාසය

1. සුදුසු වීජීය පද හෝ සංඛ්‍යා හෝ වීජීය ලකුණු (+ හෝ −) හෝ යොදා ගනිමින් හිස්තැන් පුරවන්න.

    a. $(x + 3)^3 = x^3 + 3 \times x^2 \times 3 + 3 \times x \times 3^2 + 3^3 = x^3 + \square + \square + 27$

    b. $(y + 2)^3 = y^3 + 3 \times \square \times \square + 3 \times \square \times \square + 2^3 = y^3 + 6y^2 + \square + \square$

    c. $(a - 5)^3 = a^3 + 3 \times a^2 \times (-5) + 3 \times a \times (-5)^2 + (-5)^3 = a^3 - \square + \square - 125$

    d. $(3 + t)^3 = \square + 3 \times \square \times \square + 3 \times \square \times \square + \square = \square + 27t + \square + t^3$

    e. $(x - 2)^3 = x^3 \square 3 \times \square \times \square + 3 \times \square \times \square + (-2)^3 = x^3 \square \square + 12x - \square$

a. $(x + 3)^3 = x^3 + 3 \times x^2 \times 3 + 3 \times x \times 3^2 + 3^3$
$$= x^3 + \boxed{9x^2} + \boxed{27x} + 27$$

b. $(y + 2)^3 = y^3 + 3 \times \boxed{y^2} \times \boxed{2} + 3 \times \boxed{y} \times \boxed{2^2} + 2^3$
$$= y^3 + 6y^2 + \boxed{12y} + \boxed{8}$$

c. $(a - 5)^3 = (a + (-5))^2 = a^3 + 3 \times a^2 \times (-5) + 3 \times a \times (-5)^2 + (-5)^3$
$$= a^3 - \boxed{15a^2} + \boxed{75a} - \boxed{125}$$

d. $(3 + t)^3 = \boxed{3^3} + 3 \times \boxed{3^2} \times \boxed{t} + 3 \times \boxed{3} \times \boxed{t^2} + \boxed{t^3}$
$$= \boxed{27} + 27t + \boxed{9t^2} + t^3$$

e. $(x - 2)^3 = (x + (-2))^2 = x^3 \boxed{+} 3 \times \boxed{x^2} \times \boxed{(-2)} + 3 \times \boxed{x} \times \boxed{(-2)^2} + (-2)^3$
$$= x^3 \boxed{-} 6x^2 + 12x - \boxed{8}$$

2. ප්‍රසාරණය කරන්න.

a. $(m+2)^3$	**b.** $(x+4)^3$	**c.** $(b-2)^3$	**d.** $(t-10)^3$
e. $(5+p)^3$	**f.** $(6+k)^3$	**g.** $(1+b)^3$	**h.** $(4-x)^3$
i. $(2-p)^3$	**j.** $(9-t)^3$	**k.** $(-m+3)^3$	**l.** $(-5-y)^3$
m. $(ab+c)^3$	**n.** $(2x+3y)^3$	**o.** $(3x+4y)^3$	**p.** $(2a-5b)^3$

a. $(m+2)^3 = m^3 + 3 \times m^2 \times 2 + 3 \times m \times 2^2 + 2^3$

$\qquad = \underline{\underline{m^3 + 6m^2 + 12m + 8}}$

b. $(x+4)^3 = x^3 + 3 \times x^2 \times 4 + 3 \times x \times 4^2 + 4^3$

$\qquad = \underline{\underline{x^3 + 12x^2 + 48x + 64}}$

c. $(b-2)^3 = b^3 - 3 \times b^2 \times 2 + 3 \times b \times 2^2 - 2^3$

$\qquad = \underline{\underline{b^3 - 6b^2 + 12b - 8}}$

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$(b-2)^3 = \{b + (-2)\}^3$

$\qquad = b^3 + 3 \times b^2 \times (-2) + 3 \times b \times (-2)^2 + (-2)^3$

$\qquad = b^3 + 3 \times b^2 \times (-2) + 3 \times b \times 4 + (-8)$

$\qquad = \underline{\underline{b^3 - 6b^2 + 12b - 8}}$

d. $(t-10)^3 = t^3 - 3 \times t^2 \times 10 + 3 \times t \times 10^2 - 10^3$

$\qquad = \underline{\underline{t^3 - 30t^2 + 300t - 1000}}$

<div align="center">හෝ</div>

$(t-10)^3 = \{t + (-10)\}^3$

$\qquad = t^3 + 3 \times t^2 \times (-10) + 3 \times t \times (-10)^2 + (-10)^3$

$\qquad = t^3 + 3 \times t^2 \times (-10) + 3 \times t \times 100 + (-1000)$

$\qquad = \underline{\underline{t^3 - 30t^2 + 300t - 1000}}$

e. $(5+p)^3 = 5^3 + 3 \times 5^2 \times p + 3 \times 5 \times p^2 + p^3$

$\qquad = \underline{\underline{125 + 75p + 15p^2 + p^3}}$

f. $(6+k)^3 = 6^3 + 3 \times 6^2 \times k + 3 \times 6 \times k^2 + k^3$

$\qquad = \underline{\underline{216 + 108k + 18k^2 + k^3}}$

g. $(1+b)^3 = 1^3 + 3 \times 1^2 \times b + 3 \times 1 \times b^2 + b^3$

$\qquad = \underline{\underline{1 + 3b + 3b^2 + b^3}}$

h. $(4-x)^3 = 4^3 - 3 \times 4^2 \times x + 3 \times 4 \times x^2 - x^3$

$\qquad = \underline{\underline{64 - 48x + 12x^2 - x^3}}$

i. $(2-p)^3 = 2^3 - 3 \times 2^2 \times p + 3 \times 2 \times p^2 - p^3$

$\qquad = \underline{\underline{8 - 12p + 6p^2 - p^3}}$

j. $(9-t)^3 = 9^3 - 3 \times 9^2 \times t + 3 \times 9 \times t^2 - t^3$

$\qquad = \underline{\underline{729 - 243t + 27t^2 - t^3}}$

k. $(-m+3)^3 = (-m)^3 + 3 \times (-m)^2 \times 3 + 3 \times (-m) \times 3^2 + 3^3$

$\qquad = \underline{\underline{-m^3 + 9m^2 - 27m + 27}}$

<div align="center">හෝ</div>

$(-m+3)^3 = (3-m)^3$

$\qquad = 3^3 - 3 \times 3^2 \times m + 3 \times 3 \times m^2 - m^3$

$\qquad = \underline{\underline{27 - 27m + 9m^2 - m^3}}$

l. $(-5-y)^3 = (-5)^3 + 3 \times (-5)^2 \times (-y) + 3 \times (-5) \times (-y)^2 + (-y)^3$

$\qquad = \underline{\underline{-125 - 75y - 15y^2 - y^3}}$

<div align="center">හෝ</div>

$(-5-y)^3 = \{-1(5+y)\}^3$

$\qquad = (-1)^3 (5+y)^3$

$\qquad = -1(5^3 + 3 \times 5^2 \times y + 3 \times 5 \times y^2 + y^3)$

$\qquad = -1(125 + 75y + 15y^2 + y^3)$

$\qquad = \underline{\underline{-125 - 75y - 15y^2 - y^3}}$

m. $(ab+c)^3 = (ab)^3 + 3 \times (ab)^2 \times c + 3 \times (ab) \times c^2 + c^3$

$\qquad = \underline{\underline{a^3b^3 + 3a^2b^2c + 3abc^2 + c^3}}$

n. $(2x+3y)^3 = (2x)^3 + 3 \times (2x)^2 \times (3y) + 3 \times (2x) \times (3y)^2 + (3y)^3$

$\qquad = 8x^3 + 3 \times (4x^2) \times (3y) + 3 \times (2x) \times (9y^2) + (27y^3)$

$\qquad = \underline{\underline{8x^3 + 36x^2y + 54xy^2 + 27y^3}}$

o. $(3x + 4y)^3 = (3x)^3 + 3 \times (3x)^2 \times (4y) + 3 \times (3x) \times (4y)^2 + (4y)^3$

$\qquad = 27x^3 + 3 \times (9x^2) \times (4y) + 3 \times (3x) \times (16y^2) + (64y^3)$

$\qquad = \underline{\underline{27x^3 + 108x^2y + 144xy^2 + 64y^3}}$

p. $(2a - 5b)^3 = (2a)^3 - 3 \times (2a)^2 \times (5b) + 3 \times (2a) \times (5b)^2 - (5b)^3$

$\qquad = 8a^3 - 3 \times (4a^2) \times (5b) + 3 \times (2a) \times (25b^2) - (125b^3)$

$\qquad = \underline{\underline{8a^3 - 60a^2b + 150ab^2 - 125b^3}}$

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3. පහත දැක්වෙන එක් එක් වීජීය ප්‍රකාශනය ද්විපද ප්‍රකාශනයක සනායිතයක් ලෙස ලියා දැක්වන්න.

a. $a^3 + 3a^2b + 3ab^2 + b^3$ **b.** $c^3 - 3c^2d + 3cd^2 - d^3$

c. $x^3 + 6x^2 + 12x + 8$ **d.** $y^3 - 18y^2 + 108y - 216$

e. $1 + 3x + 3x^2 + x^3$ **f.** $64 - 48x + 12x^2 - x^3$

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a. $a^3 + 3a^2b + 3ab^2 + b^3 = \underline{(a + b)^3}$

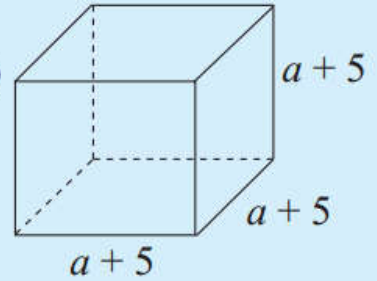**b.** $c^3 - 3c^2d + 3cd^2 - d^3 = \underline{(c - d)^3}$

c. $x^3 + 6x^2 + 12x + 8$

$= x^3 + 3 \times x^2 \times 2 + 3 \times x \times 4 + 8$

$= x^3 + 3 \times x^2 \times 2 + 3 \times x \times 2^2 + 2^3$

$= \underline{\underline{(x + 2)^3}}$

d. $y^3 - 18y^2 + 108y - 216$

$= y^3 - 3 \times y^2 \times 6 + 3 \times y \times 36 - 216$

$= y^3 - 3 \times y^2 \times 6 + 3 \times y \times 6^2 - 6^3$

$= \underline{\underline{(y - 6)^3}}$

e. $1 + 3x + 3x^2 + x^3$

$= 1^3 + 3 \times 1^2 \times x + 3 \times 1 \times x^2 + x^3$

$= \underline{\underline{(1 + x)^3}}$

f. $64 - 48x + 12x^2 - x^3$

$= 64 - 3 \times 16 \times x + 3 \times 4 \times x^2 - x^3$

$= 4^3 - 3 \times 4^2 \times x + 3 \times 4 \times x^2 - x^3$

$= \underline{\underline{(4 - x)^3}}$

$$\text{සනකයේ පරිමාව} = (a + 5)^3$$
$$= a^3 + 3 \times a^2 \times 5 + 3 \times a \times 5^2 + 5^3$$
$$= \underline{a^3 + 15a^2 + 75a + 125}$$

5. $(x + 3)^3$ යන්න ප්‍රසාරණය කර,

    (i) $x = 2$

    (ii) $x = 4$

අවස්ථා සඳහා පිළිතුර සත්‍යාපනය කරන්න.

$$(x + 3)^3 = x^3 + 3 \times x^2 \times 3 + 3 \times x \times 3^2 + 3^3$$

(i) $x = 2$ විට   වම් පැ. $= (2 + 3)^3$
$$= (5)^3$$
$$= 125$$

දකුණු පැ. $= 2^3 + 3 \times 2^2 \times 3 + 3 \times 2 \times 3^2 + 3^3$
$$= 2^3 + 9 \times 2^2 + 27 \times 2 + 27$$
$$= 8 + 36 + 54 + 27$$
$$= 125$$
$$= \text{වම් පැ.}$$

$$\therefore (2 + 3)^3 = 2^3 + 3 \times 2^2 \times 3 + 3 \times 2 \times 3^2 + 3^3 \text{ වේ.}$$

$$(x + 3)^3 = x^3 + 3 \times x^2 \times 3 + 3 \times x \times 3^2 + 3^3$$

(ii) $x = 4$ විට   වම් පැ. $= (4 + 3)^3$
$$= (7)^3$$
$$= 343$$

දකුණු පැ. $= 4^3 + 3 \times 4^2 \times 3 + 3 \times 4 \times 3^2 + 3^3$
$$= 64 + 3 \times 16 \times 3 + 3 \times 4 \times 9 + 27$$
$$= 64 + 144 + 108 + 27$$
$$= 343$$
$$= \text{වම් පැ.}$$

$$\therefore (4 + 3)^3 = 4^3 + 3 \times 4^2 \times 3 + 3 \times 4 \times 3^2 + 3^3 \text{ වේ.}$$

6. සනායිත පිළිබඳ දැනුම භාවිතයෙන්, දී ඇති සංඛ්‍යාත්මක ප්‍රකාශනවල අගය සොයන්න.

(i) $64 - 3 \times 16 \times 3 + 3 \times 4 \times 9 - 27$

(ii) $216 - 3 \times 36 \times 5 + 3 \times 6 \times 25 - 125$

(i) $\quad 64 - 3 \times 16 \times 3 + 3 \times 4 \times 9 - 27$

$= 4^3 - 3 \times 4^2 \times 3 + 3 \times 4 \times 3^2 - 3^3$

$= (4 - 3)^3$

$= (1)^3$

$= \underline{\underline{1}}$

(ii) $\quad 216 - 3 \times 36 \times 5 + 3 \times 6 \times 25 - 125$

$= 6^3 - 3 \times 6^2 \times 5 + 3 \times 6 \times 5^2 - 5^3$

$= (6 - 5)^3$

$= (1)^3$

$= \underline{\underline{1}}$

7. පහත දැක්වෙන එක එකක අගය, ද්විපද ප්‍රකාශනයක සනායිතයක් ලෙස ලියා සොයන්න.

a. 21^3 **b.** 102^3 **c.** 17^3 **d.** 98^3

a. $\quad 21^3 = (20 + 1)^3$

$= 20^3 + 3 \times 20^2 \times 1 + 3 \times 20 \times 1^2 + 1^3$

$= 8000 + 3 \times 400 + 60 + 1$

$= 8000 + 1200 + 60 + 1$

$= \underline{\underline{9261}}$

b. $\quad 102^3 = (100 + 2)^3$

$= 100^3 + 3 \times 100^2 \times 2 + 3 \times 100 \times 2^2 + 2^3$

$= 1000000 + 3 \times 10000 \times 2 + 3 \times 100 \times 4 + 8$

$= 1000000 + 60000 + 1200 + 8$

$= \underline{\underline{1061208}}$

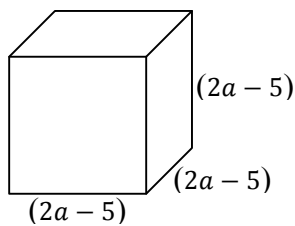*c*. $17^3 = (20 - 3)^3$

$\qquad = 20^3 - 3 \times 20^2 \times 3 + 3 \times 20 \times 3^2 - 3^3$

$\qquad = 8000 - 3 \times 400 \times 3 + 3 \times 20 \times 9 - 27$

$\qquad = 8000 - 3600 + 540 - 27$

$\qquad = \underline{\underline{4913}}$

<div align="center">හෝ</div>

$\quad 17^3 = (10 + 7)^3$

$\qquad = 10^3 + 3 \times 10^2 \times 7 + 3 \times 10 \times 7^2 + 7^3$

$\qquad = 1000 + 3 \times 100 \times 7 + 3 \times 10 \times 49 + 343$

$\qquad = 1000 + 2100 + 1470 + 343$

$\qquad = \underline{\underline{4913}}$

d. $98^3 = (100 - 2)^3$

$\qquad = 100^3 - 3 \times 100^2 \times 2 + 3 \times 100 \times 2^2 - 2^3$

$\qquad = 1000000 - 3 \times 10000 \times 2 + 3 \times 100 \times 4 - 8$

$\qquad = 1000000 - 60000 + 1200 - 8$

$\qquad = \underline{\underline{941192}}$

8. පැත්තක දිග $2a - 5$ cm වූ සනකයක පරිමාව a ඇසුරෙන් සොයන්න.

<div align="center">සනකයේ පරිමාව $= (2a - 5)^3$</div>

$\qquad = (2a)^3 - 3 \times (2a)^2 \times 5 + 3 \times (2a) \times 5^2 - 5^3$

$\qquad = 8a^3 - 3 \times 4a^2 \times 5 + 3 \times (2a) \times 25 - 125$

$\qquad = \underline{\underline{8a^3 - 60a^2 + 150a - 125 \; cm^3}}$

9. $x^3 - 3x^2y + 3xy^2 - y^3$ යන්න සාධිතයක් ලෙස ලියා දක්වා එනයින්
$25^3 - 3 \times 25^2 \times 23 + 3 \times 25 \times 23^2 - 23^3$ හි අගය සොයන්න.

$\quad x^3 - 3x^2y + 3xy^2 - y^3 = (x - y)^3$

x වෙනුවට 25 ද y වෙනුවට 23 ද ආදේශයෙන්,

$25^3 - 3 \times 25^2 \times 23 + 3 \times 25 \times 23^2 - 23^3 = (25 - 23)^3$

$\qquad\qquad\qquad\qquad\qquad\qquad = (2)^3$

$\qquad\qquad\qquad\qquad\qquad\qquad = \underline{\underline{8}}$