

Dear Parents / Students

Due to the unprecedented situation, Knowledgeplus Training center is mobilized and will keep accompanying and supporting our students through this difficult time. Our Staff will be continuously, sending notes and exercises on a weekly basis through what's app and email. Students are requested to copy the notes and do the exercises on their copybooks. The answers to the questions below will be made available on our website on [knowledgeplus.mu/support.php](http://knowledgeplus.mu/support.php). Please note that these are extra work and notes that we are providing our students and all classes will be replaced during the winter vacation. We thank you for your trust and are convinced that, together, we will overcome these troubled times.

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## Knowledgeplus Training Center

### Mathematics

#### Garde 7

#### Week 4

### Notes and Exercise

**Note:(All the Notes, Examples and Exercise are on the photos and Note:(Please copy all the Notes, Examples and Exercises on your copy book).**

## Mathematics form 4 and 5

### Algebra - Algebraic Representation and Formula.

Evaluation of algebraic expressions and formulae

o A variable is a symbol or letter that is used to represent some unknowns.

o A constant or coefficient can be attached in front of a variable or a group of variables to form a term.

Example:

$3x$  →  $3$        $x$   
 term              coefficient      variable

$4x^2y$  →  $4$        $x^2y$   
 term              coefficient      Variables.

o There can be one or more terms in an algebraic expression

o Evaluate of Algebraic Expression

- step 1 Substitute a number for the variables.

step 2 Carry out the Computation

↓  
 (the action of mathematical calculation)

Example

Given that  $p = -2$ ,  $q = 3$  and  $r = -1$ ,  
Find the value of

$$(i) \frac{p^2q + 2pqr}{q^3}$$

$$(iii) \frac{p(r^2 - q^3) - 3q}{r}$$

$$(ii) 2r + \sqrt{\frac{-p}{r} + \frac{6}{q}}$$

$$(iv) (p - 2q)^{r+q}$$

$$(i) \frac{p^2q + 2pqr}{q^3} = \frac{(-2)^2(3) + 2(-2)(3)(-1)}{(3)^3}$$

$$= \frac{12 + 12}{27}$$

$$= \frac{24}{27}$$

$$= \frac{8}{9} \text{ (Ans)}$$

$$(ii) 2r + \sqrt{\frac{-p}{r} + \frac{6}{q}} = 2(-1) + \sqrt{\frac{-(-2)}{-1} + \frac{6}{3}}$$

$$= -2 + \sqrt{-2 + 2}$$

$$= -2 + \sqrt{0}$$

$$= -2 \text{ (Ans)}$$

$$(iii) \frac{p(r^2 - q^3) - 3q}{r} = \frac{-2(1 - 27) - 3(3)}{-1}$$

$$= \frac{-2(1 - 27) - 9}{-1}$$

$$= -52 - 9$$

$$= -61 \text{ (Ans)}$$

$$\begin{aligned}
 \text{(iv) } (p-2q)^{k+q} &= (-2 - 2(3))^{-1+3} \\
 &= (-8)^2 \\
 &= 64 \text{ Ans}
 \end{aligned}$$

**Exercises: Ex[1,3,12,15,24,18,21,25]**

1 Given that  $a = 2$ ,  $b = -5$  and  $c = 4$ , find the value of

- (i)  $a - 3b$ ,
- (ii)  $(a + c)b$ ,
- (iii)  $2c^2$ .

June 90/I/2

3 Given that  $a = \frac{1}{2}$ ,  $b = -2$  and  $c = 1$ , find the value of

- (i)  $a + b + c$ ,
- (ii)  $abc$ ,
- (iii)  $\frac{b}{a - c}$ .

Nov. 90/I/3

12 Given that  $p = 2$ ,  $q = -3$  and  $r = 4$ , find the value of

- (a)  $5p - 2q$ ,
- (b)  $pq + pr$ ,
- (c)  $pr^2$ .

Nov. 92/I/3

15 Given that  $p = 4$ ,  $q = -2$  and  $r = 3$ , find the value of

- (a)  $2p + 3q$ ,
- (b)  $(p + r)q$ ,
- (c)  $r^2 - q^2$ .

June 93/I/1

24 Given that  $x = 2$  and  $y = -3$ , find the value of

- (a)  $5x - 4y$ ,
- (b)  $xy^2$ .

[1]

[1]

June 95/I/2

18 It is given that  $x = \frac{1}{2}$ ,  $y = \frac{2}{3}$  and  $z = \frac{3}{4}$ .

Find the value of

- (a)  $xyz$ ,
- (b)  $x - y + z$ ,
- (c)  $\frac{x}{y}$ .

Nov. 93/I/8

21 Given that  $r = 7$ ,  $s = 2$  and  $t = -5$  find the value of

- (a)  $r + s + t$ , [1]
- (b)  $3s^2$ , [1]
- (c)  $\frac{4r + s}{t}$ , [1]

June 94/I/1



25 Given that  $a = 3$ ,  $b = 2$  and  $c = -4$ , find the value of

(a)  $8b - ac$ , [1]

(b)  $2a^2$ . [1]

Nov. 95/1/3

Quadratic equation

Linear expression and linear equation

Solving linear equation

Example: Solve the following equation → find the

(i)  $2x - 5 = 0$  (ii)  $5(2x + 3) = 4$  value of the variable.

(i)  $2x - 5 = 0$

$2x = 5$

$x = \frac{5}{2}$

$x = 2\frac{1}{2}$

(ii)  $5(2x + 3) = 4$

$10x + 15 = 4$

$10x = 4 - 15$

$10x = -11$

$x = -\frac{11}{10}$

$x = -1\frac{1}{10}$

**Exercise: Ex[3]-(i)-(v) and Ex[4]-(i)-(v).**

3. Solve for x (i)  $2x - 1 = 5$  (ii)  $3x + 1 = 10$  (iii)  $1 - 2x = 5$  (iv)  $2 - 3x = 0$  (v)  $x - 5 = -3$ .

4. Solve for x (i)  $3(x - 2) = 6$  (ii)  $2(x + 5) - 1 = 10$  (iii)  $2 - 3(2x - 1) = 0$   
 (iv)  $2(2x + 1) = 3(x + 4)$  (v)  $2(1 - 3x) = 5(x - 4)$  (vi)  $3(2x + 1) = 1 - 2(x - 4)$ .

## Factorisation of quadratic expressions

1. Factorisation of quadratic expression of the type  $ax^2 + b$  (constant term = 0)

Example:

Factorise (i)  $3x^2 + 4x$  (ii)  $4x^2 - 8x$

(i)  $3x^2 + 4x = x(3x + 4)$  Remove Common only  
In this case  $x$  is Common

(ii)  ~~$4x^2 - 8x = 2x(2x - 4)$~~

(i)  $4x^2 - 8x = 2x(2x - 4)$  In this case 2 is common

Exercise: Success in Mathematics Form 4

Pg 21 Ex 2.3.0(2) (i) - (v)

2. Factorisation of quadratic expression where the coefficient of  $x^2$  is 1 (Type  $x^2 + bx + c$ )

To factorise an expression of the type  ~~$x^2$~~   $x^2 + bx + c$ , you need to find two real numbers for which:

Sum =  $b$  (Sum = the coefficient of  $x$ )

Product =  $c$  (Product = the constant term)

## Factorisation of $ax^2 + bx + c$

Recall that

$$\begin{aligned} (x+2)(x+3) &= x(x+3) + 2(x+3) \\ &= x^2 + 3x + 2x + 6 \\ &= x^2 + 5x + 6 \end{aligned}$$

Thus, the factorisation of  $x^2 + 5x + 6$  is  $(x+2)(x+3)$

Example

(a)  $x^2 + 9x + 20$       (b)  $x^2 - 7x + 10$

Solution

$$\begin{aligned} x^2 + 9x + 20 &= x^2 + 4x + 5x + 20 & P = ac = 1 \times 20 = 20 \\ &= x(x+4) + 5(x+4) & S = b = 9 \\ &= (x+4)(x+5) & F = 4, 5 \end{aligned}$$

$$\begin{aligned} (b) \quad x^2 - 7x + 10 &= x^2 - 2x - 5x + 10 & P = 10 \\ &= x(x-2) - 5(x-2) & S = -7 \\ &= (x-2)(x-5) & F = -2, -5 \end{aligned}$$

$P =$  Product of  $a$  and  $c$

$S =$  sum =  $b$

$$ax + \underbrace{bx + c}_{\text{sum}}$$

$F =$  Factor: the factor it must be the factor when that you multiply you get the product and the factor that you add (sum) you get the sum.

Exercise: Factorise

(a)  $x^2 + 4x + 3$       (b)  $x^2 + 8x + 15$       (c)  $x^2 + 10x + 16$

(d)  $x^2 - 7x + 12$       (e)  $x^2 - 23x + 30$

(f)  $x^2 - 2x + 1$



Complete factorisation of  $ax^2+bx+c$

Example

Factorise completely

(a)  $2x^2+6x+4$       (b)  $3x^2-15x+18$

Solution

$$\begin{aligned} \text{(a)} \quad 2x^2+6x+4 &= 2x^2+2x+4x+4 & P &= 2 \times 4 = 8 \\ &= 2x(x+1)+4(x+1) & S &= 6 \\ &= (x+1)(2x+4) & F &= 2, 4 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad 3x^2-15x+18 &= 3x^2-6x-9x+18 & P &= 3 \times 18 = 54 \\ &= 3x(x-2)-9(x-2) & S &= -15 \\ &= (x-2)(3x-9) & F &= \cancel{3}, \cancel{6}, -9 \end{aligned}$$

Exercises

Factorise completely

(a)  $2x^2+10x+12$       (b)  $3x^2-18x+24$

(c)  $5x^2+40x-45$       (d)  $4x^2-12x-40$

(e)  $6x^2-42x+72$       (f)  $7x^2-14x-105$

(g)  $3x^2-3x-60$       (h)  $4x^2+4x-120$

(i)  $5x^2-20x-60$



## Solving of quadratic equation by using factorisation

The general procedure to solve a quadratic equation is as follows:

1. Make the right-hand side equal to zero.
2. Factorise the left hand side.
3. Equate each linear factor to zero and find the corresponding values of  $x$ .

### Example

Solve the following equations:

(i)  $x^2 - 3x = 10$       (ii)  $x(2x+3) = 2$

(iii)  $(x-2)^2 = 25$

### Solution

(i)  $x^2 - 3x = 10$

$$x^2 - 3x - 10 = 0 \quad P = -10$$

$$x^2 + 2x - 5x - 10 = 0 \quad S = -3$$

$$x(x+2) - 5(x+2) = 0 \quad F = 2, -5$$

$$(x+2)(x-5) = 0$$

either  $x+2=0$  or  $x-5=0$

$$x = -2 \quad x = 5$$

### method 2

$$x^2 - 3x = 10$$

$$x^2 - 3x - 10 = 0$$

$$(x+2)(x-5) = 0$$

either  $x+2=0$  or  $x-5=0$

$$x = -2 \quad x = 5$$

$P = -10$  Note: As the coefficient of  $x^2$  is 1, you just have to take the factors.

$$S = -3$$

$$F = 2, -5$$

$$\begin{aligned}
 \text{(ii)} \quad x(2x+3) &= 2 \\
 2x^2 + 3x &= 2 \\
 2x^2 + 3x - 2 &= 0 & P &= -4 \quad (2 \times 2) \\
 2x^2 - x + 4x - 2 &= 0 & S &= 3 \\
 x(2x-1) + 2(2x-1) &= 0 & F &= -1, 4 \\
 (2x-1)(x+2) &= 0 \\
 \text{either } 2x-1 &= 0 & \text{or } x+2 &= 0 \\
 2x &= 1 & x &= -2 \\
 x &= \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii)} \quad (x-2)^2 &= 25 \\
 x-2 &= \pm\sqrt{25} & \text{Note: when} \\
 x-2 &= \pm 5 \\
 x &= 2 \pm 5 \\
 \text{either } x &= 2+5 & \text{or } x &= 2-5 \\
 x &= 7 & x &= -3.
 \end{aligned}$$

Note: when square root square goes to right hand side (RHS) it become  $\pm\sqrt{\quad}$ .

### Exercise: Ex[3]-(i)-(viii)

3. Solve the following equations

(i)  $2x^2 + 3x - 2 = 0$

(ii)  $2x^2 + 7x - 4 = 0$

(iii)  $2x^2 - 3x - 5 = 0$

(iv)  $6x^2 + x - 5 = 0$

(v)  $3x^2 - x = 2$

(vi)  $4x^2 + 13x = -3$

(vii)  $2x(x-5) = -8$

(viii)  $x(3x-10) = 8$