****

**LAGOOZ SCHOOLS**

**THIRD TERM**

**LEARNER’S E-NOTE**

**SUBJECT: FURTHER MATHS**

**CLASS: SS1**

**THIRD TERM E-LEARERS NOTE**

**SUBJECT: FURTHER MATHEMATICS SS1**

**SCHEME OF WORK**

**WEEKS: TOPICS**

1.Quadratic Inequality in one Variable using the inequality sign <, > ,≤, ≥.

2.Flow chart/Calculating Devices

3.Gradients of Straight lines and Curves

4.Straightl ine(Angle of slope and angle between lines)

5.Vectors Modulus of a Vector

6.Magnitude of a Vector/a unit Vector

7.Scalar products of two and three–dimensional vectors

8.Straight line and angle between lines II

9.Roots of Quadratic equation I(Sum and Products of roots

10.Roots of Quadratic equation II (Symmetric properties of roots)

11-12.Revision and Examination.

**WEEK1:Quadratic inequality in one Variable Using <,>,≤,≥**

**Quadratic Inequality :**Quadratic inequality is ani nequality involving quadratic equation using inequality sign. This type of inequality usually leads to solution set of two different answers.It can also be regarded as second degree inequality ax2+bx+c≤0orax2+bx+c≥0. Inequality of this form can be solved analytically or graphically.

**Example:** Find the solution set of the inequality x2–x-12<0

**Solution :**Factorize the quadratic inequality above

x2-4x+3x–12<0

x(x–4)+3(x-4)<0

(x+3)(x-4)<0

x+3<0,x<0-3,x<-3or

x–4<0,x<0+4,x<4

Combine x<-3 and x<4 to find the solution set.

Therefore, Solution set={x:-3<x<4}.

**Example:**Find the solution set of the inequality x2–2x-3>0

**Solution:** x2+x–3x-3>0

x(x+1)–3(x+1)>0

(x-3)(x+1)>0

x-3>0,x>0+3,x>3or

x+1>0,x>0-1,x>-1

**Note:**The greater value.retains the original inequality sign while the lesser value take the reversed inequality sign.

Hence, solution set ={x:x<-1orx>3}

**Example:** Ifm=2x2+9x–35.Find the range of values for which m < 0.

**Solution:** 2x2+9x-35<0

2x2+14x-5x-35<0

2x(x+7)-5(x+7)<0

(2x-5)(x+7)<0

2x-5<0,x<5/2

x+7<0,x>-7

Hence, solution set={x:-7<x<5/2}

**Example:** Find the solution set of the inequality x2+x-12≥0

**Solution:** x2+x-12≥0

x2+4x-3x-12≥0

x(x+4)-3(x+4)≥0

(x-3)(x+4)≥0

Either x-3≥0 and x+4≥0

x≥3 and x≥-4≥

Hence ,solution set={x:x≤-4orx≥3}

The solution set of the inequality 2x2+5x+3≥0is………………………………………………

**Assessment:** Find the solution set of these inequalities

1. 3x2+5x+2≤0
2. X2–x-12≥0
3. 3x2–x-4<0
4. 2x2+x–6>0

**Ticket-out:**Find the solution set of the following inequalities

1. 4x2-3x-3<0
2. 2x2+5x+3>0
3. X2+7x+10≤0
4. 5x2+6x+1≥
5. 6x2-5x-1<0

|  |
| --- |
|  |

**WEEK2**

***Reference Materials:*** New Further Mathematics project1, by Adigunetal.Page178

***Previous Knowledge :***Students can identify calculating devices.

***Instructional Materials:*** Charts showing flow charts.

***Content*** **FLOWCHART**

A flow chart is a diagrammaticalr epresentation of a solution to a problem.

**Example:** The perimeter of a rectangle is 2(l+b). Draw a flow chart to determine and represent the information.

**Advantages of flow charts**

1. A flow chart play savery important rolein computer programming.
2. It facilitates the interpretation and solution of problems.
3. It can be easily understood.
4. It can help in planning and development of algorithm for solving problems.

ASSESSMENT: (i) Use a flow chart to determine and represent the area of a rectangle A=LXB

(ii) ------- is a diagrammatical representation of a solution to a problem.

TICKET–OUT: (i) Use a flow chart to determine and represent the area of a circle A=πr2

(ii) Enumerate what each symbol (plane shape)represents in flow chart

**WEEK3**

***Topic:*** Gradients of straight lines and curves

***Sub-topic:*** Gradients of straight lines

***Duration:*** 40 minutes

***Learning Objectives:*** By the end of the lesson, students should be able to calculate the gradient of a straight line.

***Reference Materials:*** i. New General Mathematics for SSS2, by M.FMacraeetal.Pages 184–192.

***Previous Knowledge*:**Students can draw the graph of a linear equation(straight- line graph).

***Instructional Materials*:**Graph board and graph book.

***Content:* GRADIENT OF A STRAIGHT LINE**

The gradient of a straight line is the rate of change of y compared with x.

For example, if the gradient is 2, then for any increase in x, y increases two times as much.

Gradient of AB= IncreaseinyfromAtoB=MB

IncreaseinxfromAtoB AM

**Example**

Find the gradient of the line joining P (7,-2) and Q (-1,2)

Gradient of PQ = increase in y=-AQ

Increase in xPA

=

**Example2**

Find the gradient of the line 7x+4y–8=0

Re-arrange the equation:4y=-7x+8

y=+2

Therefore,gradient (m)=,y–intercept (c)=2

**SKETCHING GRAPHS OF STRAIGHT LINES**

Given the equation

y=3x–2,gradient=3,y–intercept (c)=-2

2x+3y=6,gradient=,y–intercept (c)=2

**Example**

Sketch the graph of the line whose equation is 4x–3y=12

**Solution**

When x=0,-3y=12

y=-4

The line crosses the y–axis at (0,-4).

When y=0,4x=12

x=3

The line crosses the x–axis at (3,0).

Fromthegraph:

Gradient m=

==

y–intercept =-4

**Lines paralle to axes**

Any line parallel to the x–axis has a gradient of zero.The equation of such lines is always in the form

***y = c***, where ***c*** may be any number.

The figure below shows the graph of y =5 and y =-3.

Notice that the equation of the x –axis is y =0

------------------------------------

-------------------------------------

The gradient of a line that is parallel to the y–axis is undefined. The equations of such lines are always in the form **x= *a***, where ***a.***may be any number.

The figure below shows the graph of line x=2 and.x =-4.

Notice that the equation of the y–axis is x=0

**EQUATION OF A STRAIGHT LINE**

Equation of a straight line is of the form y = mx +c , where m is the gradient and c is the y–intercept.

**Example1**

Determine the equation of a straight line whose gradient isand passes through the point(-3,2).

**Solution**

Using the formula y–y1=m(x-x1)

Where(x1,y1)=(-3,2)and m=

y–2=(x+3)

3y–6=-x–3

x+3y=3

**Example2**

Find the equation of the straight line passing through the points(1,4)and(-2,6).

Using the formula

=

Where=(x1,y1)=(1,4)and(x2,y2)=(-2,6),the equation is

=

cross multiply

-3y+12=2x–2

2x+3y=14

**GRADIENT OF A CURVE**

**Example**

Draw the graph of y=for values of x from – 2 to 3. Find the gradient of the curve at the point where x has the value(a)(b)–2

**Solution**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | -2 | -1 | 0 | 1 | 2 | 3 |
| y | 1 | ¼ | 0 | ¼ | 1 | 2¼ |

(a)Gradient of the curve where x=3

=gradient of tangent PT

= =2.25 =2¼=9=11/2

1.5 1.56

(b)Gradient of curve where x=-2

=gradient of tangent QR

=-=-1 =-1

1

**WEEK4**

***Topic:*** Straight line

***Sub-topic:*** Angle of slope and angle between lines

***Duration:*** 80minutes

***Learning Objectives:*** By the end of the lesson, students should be able to calculate the angle of slope and angle between two lines.

***Reference Materials:*** New Further Mathematics Project 2 by M.R Tuttuh Adegun

***Previous Knowledge*:** Students can draw the graph of a linear equation(straight-line graph).

***Instructional Materials*:** Graph board and graph book.

***Content:* ANGLEOFSLOPE**

**Example:** Find the gradient of the line joining(3,2)and(7,10)and the angle of slope of the line.

**Solution**

Let m be the gradient of the line,then

m=

Let  be the angle of slope of the line;then:





**ANGLE BETWEEN TWO LINES**

***Condition for Parallelism***

If two lines are parallel,the angle between them is zero,hence 

**Example:** Determine ifAB isparallel to PQ in each of the following.

1. A(3,1);B(4,3)and P(4,6);Q(5,8)
2. A(-1,-2);B(2,-3)and P(5,4);Q(6,7)

**Solution**

1. Letbe the gradient joining A and B andbe the gradient joining PandQ.





Since;**AB||PQ**

1. Let be the gradient joining A and B andbe the gradient joining Pand Q.





Since;**AB is not parallel to PQ**

**CONDITION FOR PERPENDICULARITY**

If the lines are perpendicular,and;therefore:

1+





**Example:** Determine if AB is parallel to PQ in each of the following.

1. A(5,-1);B(3,2)and P(2,4);Q(5,6)
2. A(-1,-2);B(2,-3)and P(5,4);Q(6,7)

**Solution**

1. Letbe the gradient joining A and B andbe the gradient joining Pand Q.





Since;**AB is perpendicular to PQ**

1. Letbe the gradient joining A and B andbe the gradient joining PandQ.





Since;**AB is perpendicular to PQ**

**EQUATION OF A.LINE**

***The equation of a straight line is given by: y=mx+c***

**Example:** Find the gradient and intercept on the y-axis of the following lines:

1. y=3x–4
2. y=-½x–3

**Solution:**

1. Compare y=3x–4 with y=mx+c; Hence the gradient is 3,intercept on y-axis is-4
2. Gradientis–½,intercept on y-axis

**GRADIENTAND ONE POINT FORM**

**Example:** Find the equation of a straight line ofslope 2,if it passes through the point(3,-2)

y-

m=2;

Hence the equation of the straight lineis:

y–(-2)=2(x–3)

y+2=2x–6

y=2x-6-2=2x–8

**y=2x–8**

**WEEK5**

***Topic:*** Vectors

***Sub-topic:*** Modulus of a vector

***Duration:*** 80minutes

***Learning Objectives:*** By the end of the lesson, students should be able to perform simple operations on vectors.

***Reference Materials:*** New Further Mathematics Project2 by M.RTuttuh Adegun

***Previous Knowledge*:**Students can perform arithmetic operations on vectors

***Instructional Materials*:** Mathematical set.

***Content:* MAGNITUDEOF A VECTOR**

The magnitude of a vector a,sometimes called the modulus of the vector is represented by |a|.

**ZeroVector:** The zero vector is a vector with zero magnitude.

**Unit Vector:** The unit vector is the vector represented by a and is such that **a=|a|a**

**Negative Vector:** The negative vector of a is written as–a

**Equality of vector:** Two vectors are equal when they have same magnitude and direction.

**Example:** Find the modulus of each of the following vectors

1. 3i+4j
2. -2i–5j
3. 

**Solution**

1. Let r=3i+4j; then|r|=
2. Let r=-2i–5j; then|r|=
3. Let .r=;then|r|=

**Example:** If;find the modulus and direction cosines of:

1. 
2. 

**Solution**



1. 

|r1+r2|=

Letcosbe the direction cosines of

cos



1. 

||=

Letcosbe the direction cosines of

cos



**UNIT VECTOR**

**Example:** Find the unit vectors in the directions of the following vectors

1. r=21+3j
2. q=4i–5j
3. p=7i+2j–3k
4. t=3i-5j-3k

**Solution**

1. Letbe the unit vector in the direction of r;then



1. Letbe the unit vector in the direction of q;then



1. Letbe the unit vector in the direction of p;then



1. Letbe the unit vector in the direction of t;then



**ARITHMETIC OPERATIONS ON VECTORS**

**Example:** Ifp=2i-3j;q=3i+5j andr=i+j;Find the values of

1. 2p+q+3r
2. 3p–2q

**Solution**

1. 2p=2(2i–3j)=4i–6j

3r=3(i+j)=3i+3j

Therefore;2p+q+3r=(4i–6j)+(3i+5j)+(3i+3j)

=**10i+2j**

1. 3p=3(3i–3j)=9i–9j

2q=2(3i+5j)=6i+10j

Therefore 3p–2q=(9i–9j)–(6i+10j)=**3i–19j**

**Example:** Given that =a–b and =2a+3b,where **a=2i+3j** and **b=3i–2j**,find



=(2a+3b)–(a–b)

=2a+3b–a+b=**a+4b**

=(2i+3j)+4(3i–2j)=14i–5j

***Evaluation:***NewFurther Mathematics Project2, by M.RTuttuh Adegun etal.Page264, Exercise14,no5

***Conclusion:*** Teacher summarizes the topic, marks the students’notes, do correction and allows the students to copy.

***Assignment:***NewFurtherMathematicsProject2,byM.RTuttuhAdegunetal.Page262,Exercise14,no 6

**WEEK6**

**MAGNITUDE OF A VECTOR**

The magnitude of a vectora, sometimes called the modulus of the vector is represented by |a|.

**ZeroVector:** The zero vector is a vector with zero magnitude.

**Unit Vector:** The unit vector is the vector represented by a and is such that 8**a=|a|a**

**Negative Vector:** The negative vector of a is writtenas–a

**Equality of vector:** Two vectors are equal when they have same magnitude and direction.

**Example:** Find the modulus of each of the followingvectors

1. 3i+4j
2. -2i–5j
3. 

**Solution**

1. Letr=3i+4j;then|r|=
2. Letr=-2i–5j;then|r|=
3. Letr=;then|r|=

**Example:** If;find the modulus and direction cosines of:

1. 
2. 

**Solution**



1. 

|r1+r2|=

Let cosbe the direction cosines of

cos



1. 

||=

Letcosbe the direction cosines of

cos



***Evaluation:*** New Further Mathematics Project2, by M.RTuttuh Adegunetal. Page262, Exercise14,no 10

***Conclusion:***Teacher summarizes the topic, marks the students’notes, do correction and allows the students to copy.

***Assignment:*** New Further Mathematics Project2, by M.RTuttuh Adegun

**UNIT VECTOR**

**Example:** Find the unit vectors in the directions of the following vectors

1. r=21+3j
2. q=4i–5j
3. p=7i+2j–3k
4. t=3i-5j-3k

**Solution**

1. Letbe the unit vector in the direction of r;then



1. Letbe the unit vector in the direction of q;then



1. Letbe the unit vector in the direction of p;then



1. Letbe the unit vector in the direction of t;then



***Evaluation:***New Further Mathematics Project2, by M.RTuttuh Adegunetal. Page262,Exercise14,no10

***Conclusion:***Teacher summarizes the topic, marks the students’notes, does correction and allows the students to copy.

***Assignment:*** New Further Mathematics Project2, by M.RTuttuhAdegunetal.Page262,Exercise14,no12

**ARITHMETIC OPERATIONS ON VECTORS**

**Example:** Ifp=2i-3j;q=3i+5jandr=i+j;Find the valuesof

1. 2p+q+3r
2. 3p–2q
3. 2p=2(2i–3j)=4i–6j

3r=3(i+j)=3i+3j

Therefore;2p+q+3r=(4i–6j)+(3i+5j)+(3i+3j)

=**10i+2j**

1. 3p=3(3i–3j)=9i–9j

2q=2(3i+5j)=6i+10j

Therefore3p–2q=(9i–9j)–(6i+10j)=**3i–19j**

**Example:** Given that =a–b and =2a+3b,where **a=2i+3j**and**b=3i–2j**,find 



=(2a+3b)–(a–b)

=2a+3b–a+b=**a+4b**

=(2i+3j)+4(3i–2j)=14i–5j

***Evaluation:*** New Further Mathematics Project2 ,by M.RTuttuh Adegunetal.Page262,Exercise14,no5

***Conclusion:***Teacher summarizes the topic, marks thecstudents’notes, does correction and allows the students to copy.

***Assignment:***New Further Mathematics Project2, by M.RTuttuh Adegunetal.Page262,Exercise14,no6

**WEEK7**

**SCALAR PRODUCTSOFTWOANDTHREE–DIMENSIONALVECTORS**

TWO–DIMENTIONALVECTORS:Thesearevectorscontainingletteriandjonly.

Their product is equal to zero. i.eixj=0orjxi=0. In this case the angle between them is 900 i.e the cosine of angle, cosθ= 0where θ=900. Hence,the two vectors are perpendicular to each other.

But in the case of ixiorjxj, their product is equal to 1, the angle between them is 00, the cosine of angle between the two vectors is1 i.e cosθ=1where θ=00.ixi=1,jxj=1.In this case ,the two vectors are parallel to each other. There verse is the case for the sine of an angle between. two parallel and perpendicular vectors.This scalar product is also called dot product.

**Example:**Findthescalarproductbetweenthetwovectorsa=2i+3jandb=5i–3j

**Solution:**a.b=(2i+3j).(5i-3j)

=2.5+3.-3=10-9=1

**Example:**Find the scalar products between the vectors m=-4i–j and n=7i-5j

**Solution:**m.n=(-4i–j).(7i-5j)

=-4.7+-1.-5=-28+5=-23

The scalar product between the two vectors a=-6i-2jandb=3i+6jis……………………..

**Assessment:**Find the scalar or dot product of the following vectors.

1. a=9i+2jandb=-10i+3j
2. m=-i-2jandn=8i+2j
3. r=-4i-6jands=-5i–9j
4. u=7i+4jandv=8i–7j

**Ticket–out:**Find the scalar or dot product of these vectors

(i)a=-i-j andb=-6i–7j

(ii)a=6i–2j andb=i-4j

(iii)p=9i-7j andq=-3i+4j

(iv)m=5i+2j andn=i-6j

(v)r=-5i+3jands=3i-5j.

**VECTORSIN THREE–DIMENSIONS:**This type of vectors consists of three letters i, j and k respectively. Their scalar or dot products operation is the same as that of the two–dimensional vectors.

**Examples:**Find the scalar or dot product of the following vectors

1. p=2i-3j–kandq=-5i+j-4k
2. a=-7i+2j–8kandb=4i–j-6k
3. m=2i–j–kandn=-7i–j+8j

p.q=2.-5+-3.1+-1.-4

=-10-3+4=-9

(b)a.b=(-7i+2j-8k).(4i–j-6k)

=-7.4+2.-1+-8.-6

=-14-2+48=32

(c)m.n=(2i–j–k).(-7i–j+8j)

=2.-7+-1.-1+-1.8

=-14+1–8=-21

The scalar or dot product between the two vectorcp=4i+3j–k and q=-5i+2j–7kis……..

**Assessment:**Find the scalar or dot product of the following vectors

1. p=2i+3j+4k andq=4i–3j-2k
2. a=-9i-5j-3k andb=6i-7j+8k
3. m=5i–j-2k and n=6i+11j-12k
4. r=3i+2j+2kand s=4i-5j+5k

**Ticket–out:**Find the scalar or dot product of these vectors

1. x=–i-2j+2kandy=3i-4j+5k
2. a=6i+2j+2kandb=7i-4j+3k
3. m=9i+3j–3kandn=-7i-6j+5k
4. p=-i-3j–7kandq=5i-6j+k

**WEEK8**

***Topic:*** Straight line

***Sub-topic:*** Angle between lines

***Duration:*** 80minutes

***Learning Objectives:*** By the end of the lesson, students should be able to calculate the angle between two lines.

***Reference Materials:*** New Further Mathematics Project2 by M.RTuttuh Adegun

***Previous Knowledge*:** Students can draw the graph of a linear equation(straight-linegraph).

***Instructional Materials*:** Graph board and graph book.

***Content:* ANGLE BETWEEN TWO LINES**

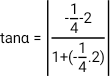
The acute angle between lines of gradient m1 and m2



**Example:** Find the acute angle between the lines x+4y=12 and y–2x+6=0.

**Solution**

The gradients are-1/4 and2

=|4.5|=77.47o

**GRADIENT INTERCEPT FORM**

The gradient intercept form of the equation of a line is y=mx+c

**Example:**Determine the equation of the line whose gradient is-2 and y-intercept is3..

**Solution**

Let the equation of the line be y=mx+c,where m=-2 and c=3

Hence,the equation of the line is **y=-2x+3**

***Presentation:***

StepI:Teacher revises the last topic with the students and does necessary corrections.

StepII:Teacher introduces the new topic to the students and explains by giving illustrative examples.

StepIII:Teacher welcomes and answers questions from the students.

StepIV:Teacher gives notes to the students and ensures they copy correctly.

StepV:Teacher evaluates the students on topic discussed.

***Evaluation:*** 1. Determine the equation of the line whose gradient is 3and y-intercept is-4.

2. Find the acute angle between the lines 2y=3x–8 and5y=x+7.

***Conclusion:***Teacher summarizes the topic, marks the students’notes, does correction and allows the students to copy.

***Assignment:*** 1. Determine the equation of the line whose gradient is 3¼ and y-interceptis-6.

2. Find the acute angle between the lines 2y=-5x+8 and y=3x-7.

**PERIOD3**

***Topic:*** Equation of a straight line

***Sub-topic:*** Gradient and one point form and two point form

***Duration:*** 40minutes

***Learning Objectives:*** By the end of the lesson, students should be able to determine the equation of a line in different forms.

***Reference Materials*:**i.New Further Mathematics for SSS2 Project2.

***Previous Knowledge*:** Students can calculate angle between two lines.

***Instructional Materials* :**Graph book.

***Content:*****GRADIENTANDONEPOINTFORM**

Equation of a line through(x,y)with gradient m is **y–y1=m(x–x1)**

**Example:** A straight line has a gradient of-3/2 and passesthroughthepoint(1,4).Finditsequationanditsinterceptonthey-axis

S**olution**

Inthiscase(x,y)=(1,4)andm=-3/2

Sotheequationis

y–4=-(x–1)

* 2y–8=-3(x–1)
* **2y+3x=11**

**Soy=-**;Hencetheinterceptony-axisis5½

**GRADIENTANDTWOPOINTFORM**

Equation of a line through the two points(x1,y1)and(x2,y2)is**=**

**Example:** Find the equation of a line AB which passes through the points(1,-1)and(-2,-13)

**Solution**

**=****;**

Thereforey+1=4x–4

* y=4x–5.

Thus the gradient of AB is 4.

***Evaluation:***Find the equation of a line AB which passes through the points(-2,-3)and(-2,-13)

***Conclusion:***Teacher summarizes the topic, marks the students’notes, does correction and allows the students to copy.

***Assignment:*** Find the equation of a line AB which passes through the points(-1,2)and(3,0)

***Assignment:*** New General Mathematics for SSS2 ,by M.FMacraeetal. Page190, Exercise16d,no2a,2c

**WEEK9**

**ROOTS OF QUADRATIC EQUATION1(SUM & PRODUCTS OF ROOTS)**

Generally, if α and β are the roots of the quadratic equationax2+bx+c=0, such that

α+β=-b/a and αβ=c/a.The following can be deduced from the above values:

1. α2+β2(b)α3+β3(c)α–β
2. α2 +β2=(α+β)2

=α2+β2+2αβ

α2+β2=(α+β)2-2αβ

1. Similarly,α3+β3=(α+β)3-3αβ(α+β)
2. (α–β)=±√(α+β)2-4αβ

**Example:**If α and β are the roots of the quadratic equation x2+5x+6=0.

Find the values of(a)α2+β2(b)α3+β3(c)α–β

**Solutions:**(a)α+β=-b/a=-5/1=-5,αβ=c/a=6/1=6

α2+β2=(-5)2-2x6=25–12=13

1. α3+β3=(α+β)3-3αβ(α+β)

=(-5)3-3x6(-5)=-125+90=-35

(c)α-β=±√(-5)2-4x6=±√25-24

=±√1=±1

**Example:**If α and β are the roots of the quadratic equation2x2–x-6=0.Find the quadratic equation whose roots are(a)α2&β2(b)1-α&1–β

**Solution:**The quadratic equation is given by:x2–(sum of the roots)x+products of the roots=0

α+β=-b/a=½,αβ=c/a=-6/2=-3

α2+*β2=(1/2)2-2x-3,*

*¼+6=25/4*

*Product of roots:α2β*2*=(-3)*2*=9*

*Hence the quadratic equation is:x2–(25/4)x+9=0*

4x2-25x+36=0

(b)Sum=1–α+1–β=2–α–β=2–(α+β)

2-1/2=4-1/2=3/2

Product:(1–α)(1–β)=1–β–α+αβ

1–(α+β)+αβ

1. ½=2-½-3=½-3=1-6/2=-5/2

Hence,the quadratic equation is:x2–(3/2)x-5/2=0

2x2–3x-5=0

The formula of α2+β2andα-βare…………………………..&……………………………………

**Assessment:**Exercise1D,page18Questions i-v&vii-x. New Further Mathematics Project2

**Ticket–out:** Exercise 2D,page19 Questions(I)-(v),New.Further Mathematics Project2

**WEEK10**

**THE ROOTS OF QUADRATIC EQUATION 2(Symmetric Properties of roots)**

Symmetric Properties of roots deal with equality and inequality of the roots of quadratic equations.

We recal that if α &β are the roots of the quadratic equation ax2+bx+c=0,then

α+β=-b/aαβ=c/a

They are symmetric in the sense that if α and β are interchanged, either the relation remains the same or is multiplied by-1

**Example:**Ifα≠β,determine whether or not each of the following is symmetric:

1. α+β(b)α3+β3(c)αβ(d)α2+β2(e)2α+3β(f)α2-β2(g)α3-β3

**Solution:**(a)α+β=β+α(symmetric)

1. α3+β3=β3+α3(symmetric
2. αβ=βα(symmetric)
3. α2+β2=β2+α2(symmetric)
4. 2α+3β≠3α+2β(a symmetric)
5. α2-β2≠β2–α2(a symmetric)
6. α3-β3≠β3–α3(a symmetric)

α+β=β+α is said to be………………………………………………………..

**Assessment:**Exercise12&13D page19,Questions(i)&(ii)

**Ticket-out:**Exercise 4&5Dpage19,Questions(I)&(ii)