Instructions of as use the new runVector2d.py program

In **Windows operating system**:

After the download the **repository** access the runVector2d.py program and give two clicks and follow the news instructions in display. Too will can run the runVector2d.py program using the Command Prompt or Windows Power Shell in **Windows 11** typed the following command:

C:\Users\UserName> py runVector2d.py program
Or
C:\Users\UserName> python runVector2d.py program

[Warning]: No type the following command:

C:\Users\UserName> python3 runVector2d.py program

to run the runVector2d.py program in Command Prompt or Windows Power Shell in **Windows 11**.

In **Linux operating system**:

After the download the **repository** access the runVector2d.py program file. Exist two options to run the runVector2d.py program.

1.) In any Terminal linux type the following command:

python3 runVector2d.py after key ENTER

2.) Open and run the runVector2d.py program file using the IDLE3 and use the Run ==> Run Module options. After follow the news instructions in display.

-_- [Warning]: When using the runVector2d.py program file in Command Prompt or Windows Power Shell in **Windows 11** or in any Terminal linux and this program request any [data enter] type the [components] of the Vectors or the [coordinates] of the given points, and after key ENTER to continue, Ok!

Now will use the runVector2d.py program in examples below.

Example1 – Given the vectors: a = <3,1> and b=<-2,4>, find the Scalar Product a * b of this vectors.
Solution: Use the option: [1] and enter the [components]: a1 = 3, a2 = 1, b1 = -2, and b2 = 4 when requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:

A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 1

[TO FIND THE [SCALAR PRODUCT] OF [TWO VECTORS: A and B] IN THE PLANE]

- Attribute the [Components] of the [1º vectorA]!

- Enter the [coefficient] of the [Component: (i) or (a1)]?
(ª<ª) Enter the [new] value? 3

- Introduce the [coefficient] of the [Component: (j) or (a2)]?
(ª<ª) Enter the [new] value? 1

- Provide the [Components] of the [2º vectorB]!

- Enter the [coefficient] of the [Component: (i) or (b1)]?
(ª<ª) Enter the [new] value? -2

- Introduce the [coefficient] of the [Component: (j) or (b2)]?
(ª<ª) Enter the [new] value? 4

[Answer]

-- The [vectorA]: vectorA [3.0, 1.0]
-- The [vectorB]: vectorB [-2.0, 4.0]

-- The [Vector] of the [terms of the Scalar Product]: vectorA*B = [-6.0, 4.0]
-- The [Scalar Product(vectorAB)] of the vectors is: -2.00

. . . Key [ENTER] to exit -- Ok! . . .

[Warning]:

When any user run the runVector2d.py program to solve exercises that provide the [coordinates] of the given vertice points: A, B, and C to triangleABC do the folowing:

(xA,yA) = (xP, yP) ==> xP = xA and yP = yA replace the coordinates: xA and yA into the coordinates: xP and yP of the point: P when the runVector2d.py program request to enter the coordinates: xP and yP. Of the same manner to the vertexes B and C so:

(xB,yB) = (xQ, yQ) ==> xQ = xB and yQ = yB replace the coordinates: xB and yB into the coordinates: xQ and yQ of the point: Q when the runVector2d.py program request to enter the coordinates: xQ and yQ.

(xC,yC) = (xR, yR) ==> xR = xC and yR = yC replace the coordinates: xC and yC into the coordinates: xR and yR of the point: R when the runVector2d.py program request to enter the coordinates: xR and yR.

Of the same manner do to the vertice points: A, B, C, and D of the parallelogram. Replace your coordinates so:

$$(xA,yA) = (xP, yP) ==> xP = xA \text{ and } yP = yA$$
$$(xB,yB) = (xQ, yQ) ==> xQ = xB \text{ and } yQ = yB$$
$$(xC,yC) = (xR, yR) ==> xR = xC \text{ and } yR = yC$$
$$(xD,yD) = (xS, yS) ==> xS = xD \text{ and } yS = yD$$

When the runVector2d.py program request enter the [coordinates] of the points: P, Q, R, and S. Will be confused standardize the letters: A, B, and C to the vectors and too to the vertexes points: A, B, and C of the Triangle into the code of the classes developed.

Example2 – Find the dimensions of the triangleABC given the vertice points: A(-1,0), B(2,1), and C(1,-2)

Solution: Do: A(-1,0) = P(xP,yP) ==> xP = -1, and yP = 0
B(2,1) = Q(xQ,yQ) ==> xQ = 2, and yQ = 1
C(1,-2) = R(xR,yR) ==> xR = 1, and yR = -2

Begin run the runVector2d.py program with the option[2] and provide the coordinates: xP = -1, yP = 0, xQ = 2, yQ = 1, xR = 1, and yR = -2, when the runVector2d.py program request.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]

To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 2

[TO CALCULATE THE SIDES: SIDE_A, SIDE_B, AND SIDE_C, THE PERIMETER(P), THE HEIGHTS: H1,H2, AND H3, AND THE]
[AREA(A) OF THE [TRIANGLE(PQR)] GIVEN THE [COORDINATES] OF THE [VERTICE POINTS: P, Q, AND R [IN THE PLANE]]

--Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

- The (Point P): P (-1.0, 0.0)
- The (Point Q): Q (2.0, 1.0)
- The (Point R): R (1.0, -2.0)

 [Answer]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

-- The [vectorA] = vectorQR [-1.0, -3.0]
-- The [vectorB] = vectorRP [-2.0, 2.0]
-- The [vectorC] = vectorPQ [3.0, 1.0]

-- The [sideA] = ||vectorQR|| of the triangle(PQR) is: 3.16
-- The [sideB] = ||vectorRP|| of the triangle(PQR) is: 2.83
-- The [sideC] = ||vectorPQ|| of the triangle(PQR) is: 3.16

-- The [terms] of the [Scalar Product(PQºQR)] is: [-3.0, -3.0]
-- The [terms] of the [Scalar Product(QRºRP)] is: [2.0, -6.0]
-- The [terms] of the [Scalar Product(RPºPQ)] is: [-6.0, 2.0]

-- The [Scalar Product(PQºQR)] is: -6.00
-- The [Scalar Product(QRºRP)] is: -4.00
-- The [Scalar Product(RPºPQ)] is: -4.00

-- The [Perimeter] of the [triangle(PQR)] is 9.15
-- The [Height(h1) relative as sideQR] is 2.53
-- The [Height(h2) relative as sideRP] is 2.83
-- The [Height(h3) relative as sidePQ] is 2.53
-- The [Area(A)] of the [triangle(PQR)] is 4.0

. . . Key [ENTER] to exit -- Ok! . . .

To calculate all the threes Inner angles of the TrianglePQR type the option [6] when requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]

- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 6

[TO FIND THE THREES SIDES AND [INNER ANGLES] OF THE [TRIANGLE(PQR)]]
[GIVENS THE [COORDINATES] OF THE POINTS: P, Q, AND R IN THE PLANE]

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

- The (Point P): P (-1.0, 0.0)
- The (Point Q): Q (2.0, 1.0)
- The (Point R): R (1.0, -2.0)

 [Answer]

- The [vectorB]=vectorPR [2.0, -2.0]
- The [vectorC]=vectorPQ [3.0, 1.0]

- The [vectorA]=vectorQR [-1.0, -3.0]
- The [vectorC]=vectorQP [-3.0, -1.0]

- The [vectorA]=vectorRQ [1.0, 3.0]
- The [vectorB]=vectorRP [-2.0, 2.0]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

        -- The [sideA]=|vectorA| of the triangle(PQR)] is: 3.16

-- The [terms] of the [Scalar Profuct(AC°AB)] is the vector[AC°AB]: [6.0, -2.0]
-- The [value] of the [Scalar Profuct(AC°AB)] is: 4.00
        - The value of the [ALPHA ANGLE] was calculate is: 63.43

        -- The [sideB]=|vectorB| of the triangle(PQR)] is: 2.83

-- The [terms] of the [Scalar Profuct(BCºBA)] is the vector[BCºBA]: [3.0, 3.0]
-- The [value] of the [Scalar Profuct(BCºBA)] is: 6.00
    - The value of the [BETA ANGLE] was calculate is: 53.13

    -- The [sideC]=|vectorC| of the triangle(PQR)] is: 3.16

-- The [terms] of the [Scalar Profuct(CBºCA)] is the vector[CBºCA]: [-2.0, 6.0]
-- The [value] of the [Scalar Profuct(CBºCA)] is: 4.00
    - The value of the [GAMA ANGLE] was calculate is: 63.43

    -- The triangle(PQR) is [Isosceles]!

-- The [Add] of the [Inner Angles: ALPHA, BETA, GAMA] is 180.0

- THE [ADD] OF THE [INNER ANGLES] OF THE [TRIANGLE-PQR] is 180.00

--[END CALCULUS-OK!]--

. . . Key [ENTER] to exit -- Ok! . . .

New Example2.1 - Now determine the measures of the sides: sideA, sideB, and sideC, perimeter(P), height(h1,h2.h3), and Area(A) of the TrianglePQR whose vertexes are P(-5,7), Q(1,-3), and R(3, 1).

Solution: To find the sides: sideA, sideB, and sideC as too the perimeter(P), and Area(A) key in option: [2] and after ENTER. Wait the runVector2d.py program request enter the [coodinates] of the vertice points: P, Q, and R according viewed below.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]

- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 2

**[TO CALCULATE THE SIDES: SIDE_A, SIDE_B, AND SIDE_C, THE PERIMETER(P),
    THE HEIGHTS: H1,H2, AND H3, AND THE]**
**[AREA(A) OF THE [TRIANGLE(PQR)] GIVEN THE [COORDINATES] OF THE
    [VERTICE POINTS: P, Q, AND R [IN THE PLANE]]**

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 7

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -3

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

- The (Point P): P (-5.0, 7.0)
- The (Point Q): Q (1.0, -3.0)
- The (Point R): R (3.0, 1.0)

 [Answer]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

-- The [vectorA] = vectorQR [2.0, 4.0]
-- The [vectorB] = vectorRP [-8.0, 6.0]
-- The [vectorC] = vectorPQ [6.0, -10.0]

-- The [sideA] = ||vectorQR|| of the triangle(PQR) is: 4.47
-- The [sideB] = ||vectorRP|| of the triangle(PQR) is: 10.00
-- The [sideC] = ||vectorPQ|| of the triangle(PQR) is: 11.66

-- The [terms] of the [Scalar Product(PQºQR)] is: [12.0, -40.0]
-- The [terms] of the [Scalar Product(QRºRP)] is: [-16.0, 24.0]
-- The [terms] of the [Scalar Product(RPºPQ)] is: [-48.0, -60.0]

-- The [Scalar Product(PQºQR)] is: -28.00
-- The [Scalar Product(QRºRP)] is: 8.00
-- The [Scalar Product(RPºPQ)] is: -108.00

-- The [Perimeter] of the [triangle(PQR)] is 26.13
-- The [Height(h1) relative as sideQR] is 9.84
-- The [Height(h2) relative as sideRP] is 4.40
-- The [Height(h3) relative as sidePQ] is 3.77
-- The [Area(A)] of the [triangle(PQR)] is 22.00

. . . Key [ENTER] to exit -- Ok! . . .

New Example2.2 - Now determine the measures of the sides: sideA, sideB, and sideC, perimeter(P), height(h1,h2.h3), and Area(A) of the TrianglePQR whose vertexes are P(-3,1), Q(-1,7), and R(-4, -2).

Solution: To find the sides: sideA, sideB, and sideC as too the perimeter(P), and Area(A) key in option: [2] and after ENTER. Wait the runVector2d.py program request enter the [coodinates] of the points: P, Q, and R according viewed below.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[º>º] Provide the [new] value? 2

[TO CALCULATE THE SIDES: SIDE_A, SIDE_B, AND SIDE_C, THE PERIMETER(P), THE HEIGHTS: H1,H2, AND H3, AND THE]
[AREA(A) OF THE [TRIANGLE(PQR)] GIVEN THE [COORDINATES] OF THE [VERTICE POINTS: P, Q, AND R [IN THE PLANE]]

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 7

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -4

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

- The (Point P): P (-3.0, 1.0)
- The (Point Q): Q (-1.0, 7.0)
- The (Point R): R (-4.0, -2.0)

[Answer]

[NO EXIST THE TRIANGLE(PQR) WITH THE [COORDINATES] OF THE GIVEN POINTS: P(xP,yP), Q(xQ,yQ), AND]
[R(xR,yR) -- OK! BY [THEOREM OF THE PLANE GEOMETRY] THE BUILDING OF THE TRIANGLE(PQR) USING THE]
[COMPASS AND RULER ONLY IS POSSIBLE WHEN:]

[sideA < sideB + sideC] and
[sideB < sideA + sideC] and
[sideC < sideA + sideB]

. . . Key [ENTER] to exit -- Ok! . . .

Example3 – Find the measures of the sides: sideA, sideB, and sideC, the perimeter(P), the height(h1,h2.h3), and Area(A), Scalar Products: c*a, b*c, a*b, and the Inner Angles of the TrianglePQR whose vertexes are P(-6,0), Q(10,-5), and R(-2, 4).

Solution: To find the sides: sideA, sideB, and sideC as too the perimeter(P), and Area(A) key in option: [2] and after Key ENTER. Wait the runVector2d.py program request and enter the [coodinates] of the vertice points: P, Q, and R according viewed below.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 2

**[TO CALCULATE THE SIDES: SIDE_A, SIDE_B, AND SIDE_C, THE PERIMETER(P),
    THE HEIGHTS: H1,H2, AND H3, AND THE]**
**[AREA(A) OF THE [TRIANGLE(PQR)] GIVEN THE [COORDINATES] OF THE
   [VERTICE POINTS: P, Q, AND R [IN THE PLANE]]**

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -6

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 10

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -5

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

- The (Point P): P (-6.0, 0.0)
- The (Point Q): Q (10.0, -5.0)
- The (Point R): R (-2.0, 4.0)

 [Answer]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

-- The [vectorA] = vectorQR [-12.0, 9.0]
-- The [vectorB] = vectorRP [-4.0, -4.0]
-- The [vectorC] = vectorPQ [16.0, -5.0]

-- The [sideA] = ||vectorQR|| of the triangle(PQR) is: 15.00
-- The [sideB] = ||vectorRP|| of the triangle(PQR) is: 5.66
-- The [sideC] = ||vectorPQ|| of the triangle(PQR) is: 16.76

-- The [terms] of the [Scalar Product(PQºQR)] is: [-192.0, -45.0]
-- The [terms] of the [Scalar Product(QRºRP)] is: [48.0, -36.0]
-- The [terms] of the [Scalar Product(RPºPQ)] is: [-64.0, 20.0]

-- The [Scalar Product(PQºQR)] is: -237.00
-- The [Scalar Product(QRºRP)] is: 12.00
-- The [Scalar Product(RPºPQ)] is: -44.00

-- The [Perimeter] of the [triangle(PQR)] is 37.42
-- The [Height(h1) relative as sideQR] is 5.60
-- The [Height(h2) relative as sideRP] is 14.85
-- The [Height(h3) relative as sidePQ] is 5.01
-- The [Area(A)] of the [triangle(PQR)] is 42.00

        . . . Key [ENTER] to exit -- Ok! . . .

To calculate all the threes Inner Angles of the TrianglePQR type the option: [6] when requested by runVector2d.py program.

        [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
        [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
                --[Version: 2.0 -- Stable]--

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 6

[TO CALCULATE THE [PERIMETER(P), HEIGHTS(H1,H2,H3), AND AREA(A) OF THE]
**[[TRIANGLE-PQR] GIVENS THE [COORDINATES] OF THE [POINTS: P, Q, AND R] **
IN THE PLANE]**

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -6

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 10

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -5

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -2

(ª<ª) Enter the [new] value? 4

- The (Point P): P (-6.0, 0.0)
- The (Point Q): Q (10.0, -5.0)
- The (Point R): R (-2.0, 4.0)

 [Answer]

- The [vectorB]=vectorPR [4.0, 4.0]
- The [vectorC]=vectorPQ [16.0, -5.0]

- The [vectorA]=vectorQR [-12.0, 9.0]
- The [vectorC]=vectorQP [-16.0, 5.0]

- The [vectorA]=vectorRQ [12.0, -9.0]
- The [vectorB]=vectorRP [-4.0, -4.0]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

        -- The [sideA]=|vectorA| of the triangle(PQR)] is: 15.00

-- The [terms] of the [Scalar Profuct(AC°AB)] is the vector[AC°AB]: [64.0, -20.0]
-- The [value] of the [Scalar Profuct(AC°AB)] is: 44.00
- The value of the [ALPHA ANGLE] was calculate is: 62.35

        -- The [sideB]=|vectorB| of the triangle(PQR)] is: 5.66

-- The [terms] of the [Scalar Profuct(BC°BA)] is the vector[BC°BA]: [192.0, 45.0]
-- The [value] of the [Scalar Profuct(BC°BA)] is: 237.00
        - The value of the [BETA ANGLE] was calculate is: 19.52

        -- The [sideC]=|vectorC| of the triangle(PQR)] is: 16.76

-- The [terms] of the [Scalar Profuct(CB°CA)] is the vector[CB°CA]: [-48.0, 36.0]
-- The [value] of the [Scalar Profuct(CB°CA)] is: -12.00
        - The value of the [GAMA ANGLE] was calculate is: 98.13

        -- The triangle(PQR) is [Scalene]!

-- The [Add] of the [Inner Angles: ALPHA, BETA, GAMA] is 180.0

- THE [ADD] OF THE [INNER ANGLES] OF THE [TRIANGLE-PQR] is 180.00

        --[END CALCULUS-OK!]--

        . . . Key [ENTER] to exit -- Ok! . . .

Example4 – Find the cossine of the angle between the vectors a = i – 3j and b = -4i + j.

Solution: Use the option: [5] and enter the [components]: a1 = 1, a2 = -3, b1 = -4, and b2 = 1 when requested by runVector2d.py program.

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 5

[TO CALCULATE THE [VALUE] OF THE [COSSINE THETA] BETWEEN THE [TWO VECTORS]: A AND B]

- Attribute the [Components] of the [1º vectorA]!

- Enter the [coefficient] of the [Component: (i) or (a1)]?
(ª<ª) Enter the [new] value? 1

- Introduce the [coefficient] of the [Component: (j) or (a2)]?
(ª<ª) Enter the [new] value? -3

- Provide the [Components] of the [2º vectorB]?

- Enter the [coefficient] of the [Component: (i) or (b1)]?
(ª<ª) Enter the [new] value? -4

- Introduce the [coefficient] of the [Component: (j) or (b2)]?
(ª<ª) Enter the [new] value? 1

 [Answer]

-- The [vectorA]: vectorA [1.0, -3.0]
-- The [vectorB]: vectorB [-4.0, 1.0]

-- The [VectorA*B]: [-4.0, -3.0]
-- The [value] finded of |A*B| is: 13.04
-- The [length] of a ||vectorA||: 3.16
-- The [length] of a ||vectorB||: 4.12
-- The [Scalar Product] of the [VectorA*B] is: -7.00

 [Answer]

-- The value of the [COSSINE THETA IN RADIANS] calculated is: -0.54

      . . . Key [ENTER] to exit -- Ok! . . .

New Example5 – Find the follow [distances] between the given points: P(3,-5), Q(2,8), and R(-3, 4).
Solution: Use the option: [10] and after provide the [coordinates] of the given previous points when requested
by runVector2d.py program.

Note: The old option: [6] in runvectors2dim.py file was excluded in new runVector2d.py program file. The
option: [10] will calculate the following new [distances]: PQ, PR, and QR in accordance with the given points.
Enter the [coordinates] of the previous points after type the option: [10] and follow the new instructions of the
runVector2d.py program in display. See the processing below, OK!

       [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
       [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
                --[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
   S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]

- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 10

[TO FIND THE [VECTOR(A)] THAT REPRESENT THE TWO GIVENS POINTS: P, AND Q]
[AND TOO THE [LENGTH] OF THE VECTOR(A) = |VECTOR(PQ)|]

[TO GET THE [VECTOR(B)] THAT REPRESENT THE TWO GIVENS POINTS: P, AND R]
[AND TOO THE [LENGTH] OF THE VECTOR(B) = |VECTOR(PR)|]

[TO FIND THE [VECTOR(C)] THAT REPRESENT THE TWO GIVENS POINTS: Q, AND R]
[AND TOO THE [LENGTH] OF THE VECTOR(C) = |VECTOR(QR)|]

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -5

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 8

- The (Point P): P (3.0, -5.0)
- The (Point Q): Q (2.0, 8.0)

 [Answer]

-- The [vectorA]: vectorA=vectorPQ [-1.0, 13.0]
-- The [lenghtPQ = distPQ] is the ||vectorPQ||: 13.04

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -5

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

- The (Point P): P (3.0, -5.0)
- The (Point R): R (-3.0, 4.0)

 [Answer]

-- The [vectorB]: vectorB=vectorPR [-6.0, 9.0]
-- The [lenghtPR = distPR] is the ||vectorPR||: 10.82

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 8

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

- The (Point Q): Q (2.0, 8.0)
- The (Point R): R (-3.0, 4.0)

 [Answer]

-- The [vectorC]: vectorC=vectorQR [-5.0, -4.0]
-- The [lenghtQR = distQR] is the ||vectorQR||: 6.40

. . . Key [ENTER] to exit -- Ok! . . .

Warning: The Example4 from the instructions-v1.3_User.pdf file finded only the distance(D) between two points: P and Q.

New information to all the users:

In this repository was added a new ParallelogramPQRS.pdf file with the following drawings: drawing1 and drawing2 to all user view and follow the previous Examples: 6(drawing1) and **New Example7**(drawing2).

Example6 – Find the sides: A and B, Heights: (h1 and h2), the Perimeter(P), and Area(S) of the parallelogramPQRS given the [coordinates] of the vertice points: P(-1,2), Q(2,0), R(7,1), and S(4,3).

Solution: Use the option: [3] and after Key in option: [2] and provide the [coordinates] of the previous points when requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 3

[TO GET THE SIDES: SIDE_A AND SIDE_B, PERIMETER(P), [HEIGHTS: H1 AND H2], AND [AREA(S)] OF THE]
[[PARALLELOGRAM(PQRS)]GIVENS THE [COORDINATES] OF THE [VERTICES POINTS: P, Q, R AND S] IN THE PLANE]

- Key [1] if in problem is given the [coordinates] of the three vertices: P, Q, and R. After follow the new [instructions] in [Display] to find the [coordinates: xS, and yS] relative as point: S below - Ok!

- Key [2] if in problem is given the [coordinates] of the four vertice points: P, Q, R, and S.

[º>º] Provide the [new] value? 2

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 2

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 7

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

-- Give the [coordinates]: (xS, yS) of the (point S)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 4

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

- The (Point P): P (-1.0, 2.0)
- The (Point Q): Q (2.0, 0.0)
- The (Point R): R (7.0, 1.0)
- The (Point S): S (4.0, 3.0)

 [Answer]

-- The [vectorPQ]: vectorPQ [3.0, -2.0]
-- The [vectorPS]: vectorPS [5.0, 1.0]

-- The [sideA] relative as |vectorPQ|: 3.61
-- The [sideB] relative as |vectorPS|: 5.10
-- The [Perimeter(P)] is: 17.41

-- The [terms] of the Scalar Product(vectorPSºPQ) is: [15.0, -2.0]
-- The [Scalar Product(PQºPS)] is: 13.0
-- The Cossine of theta: 0.71
-- The [Theta angle] between vectors: vectorPQ and vectorPS is: 45.00
-- The Sine of alpha: 0.71
-- The [Alpha angle] between vectors: vectorPQ and vectorQR is: 135.00

            -_- The [Height(h1)] relative as [sideB] is: 2.55
            ----------------------- or --------------------------------
            º<º The [Height(h2)] relative as [sideA] is: 3.61

-- The [Area(S)] of the [Parallelogram(PQRS)]: 13.00

        . . . Key [ENTER] to exit -- Ok! . . .

New Example7 – Given the [coordinates] of the three vertice points: P(-6,0), Q(3,1), and R(1,-4) of a parallelogramPQRS. Find the following dimensions: the [coordinates: xS and yS], the sides: A and B, the inner angles: PSQ = Θ and SPR = α, the Heights: (h1 and h2), the Perimeter(P), and Area(S).

Solution: Type the option: [3] and in option: [1]. After key in option: [3] and provide the [coordinates] of the previous points when requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 3

**[TO GET THE SIDES: SIDE_A AND SIDE_B, PERIMETER(P), [HEIGHTS: H1 AND H2], AND
   [AREA(S)] OF THE]**
**[[PARALLELOGRAM(PQRS)] GIVEN THE [COORDINATES] OF THE [VERTICES POINTS: P,
   Q, R AND S] IN THE PLANE]**

- Key [1] if if problem is given the [coordinates] of the three vertices: P, Q, and R. After
  follow the new [instructions] in [Display] to find the [coordinates: xS, and yS] relative as
  point: S below - Ok!

- Key [2] if in problem is given the [coordinates] of the four vertices: P, Q, R, and S.

[º>º] Provide the [new] value? 1

-- Type [1] to find the [coordinates: xM and yM] of the middle point: M in [diagonal: SP]
   Use the [coordinates: xQ, yQ, xR, and yR] of the points: Q and R.

-- Type [2] to find the [coordinates: xL and yL] of the middle point: L in [diagonal: SQ]
  Use the [coordinates: xP, yP, xR, and yR] of the points: P and R.

-- Type [3] to find the [coordinates: xK and yK] of the middle point: K in [diagonal: SR]
  Use the [coordinates: xP, yP, xQ, and yQ] of the points: P and Q.

[º>º] Provide the [new] value? 3

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -6

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

- The (Point P): P (-6.0, 0.0)
- The (Point Q): Q (3.0, 1.0)

 [Answer]

-- The MidPoint_K(xK,yK): (-1.5, 0.5)

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

- The (Point R): R (1.0, -4.0)

 [Answer]

-- The [Coordenates] of the point S:

-- The [Coordinate]: xS is -4.00
-- The [Coordinate]: yS is 5.00

-- The [vectorRP]: vectorRP [-7.0, 4.0]
-- The [vectorRQ]: vectorRQ [2.0, 5.0]

-- The [sideA] relative as |vectorRP|: 8.06
-- The [sideB] relative as |vectorRQ|: 5.39
-- The [Perimeter(P)] is: 26.89

-- The [terms] of the Scalar Product(vectorRPºRQ) is: [-14.0, 20.0]
-- The [Scalar Product(RPºRQ)] is: 6.0
-- The Cossine of theta: 0.14
-- The [Theta angle] between vectors: vectorRP and vectorRQ is: 82.06
-- The Sine of alpha: 0.99
-- The [Alpha angle] between vectors: vectorRP and vectorPS is: 97.94

```
-------------------------------------------------------------
-_- The [Height(h1)] relative as [sideB] is: 7.98
---------------------- or ----------------------
°<° The [Height(h2)] relative as [sideA] is: 5.33
-------------------------------------------------------------
```

-- The [Area(S)] of the [Parallelogram(PQRS)]: 43.00

. . . Key [ENTER] to exit -- Ok! . . .

Warning: When the problem provide only the [coordinates] of the three vertice points: P, Q, and R, draw this points in |R² cartesian plane to view if the [diagonal] will be a of the segments: SP or SQ or SR.

In any ParallelogramPQRS have by definition:
SQ // PR and SP // QR
The [Height(h1) is the projection of PP1 in sideSQ
The [Height(h2) is the projection of QQ1 in sideSP
By drawing2 have the right triangles: PP1S and QQ1S.
The height(h1) = projection: PP1 < sideSP(hypotenuse) and the height(h2) = projection: QQ1 < sideSQ(hypotenuse).

By theorem: ≡ : identical or Congruent
SQ ≡ PR and SP ≡ QR
The diagonals: PQ ≡ SR
The Inner Angles: PSQ = Ө = PRQ and SPR = α = RQS
The add of the inner angles: Ө + α = 180°
The diagonals: PQ and SR meet in the middle-point: K(xK, yK).

Warning: The *old VectorModule2Dim.py module* and *runvectors2dim.py program files version: 1.3* will not find the height: h2 as too no the Inner Angle: α.

Example8 – Find the addition and subtraction of the vectors a = -11i + 4j and b = 3i - j.
Solution: Use the option: [8] and enter the [components]: a1 = -11, a2 = 4, b1 = 3, and b2 = -1 when requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]

- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 8

[TO FIND THE [ADDITION AND SUBTRACTION] OF [TWO VECTORS: A and B] IN THE PLANE]

- Attribute the [Components] of the [1º vectorA]!

- Enter the [coefficient] of the [Component: (i) or (a1)]?
(ª<ª) Enter the [new] value? -11

- Introduce the [coefficient] of the [Component: (j) or (a2)]?
(ª<ª) Enter the [new] value? 4

- Provide the [Components] of the [2º vectorB]?

- Enter the [coefficient] of the [Component: (i) or (b1)]?
(ª<ª) Enter the [new] value? 3

- Introduce the [coefficient] of the [Component: (j) or (b2)]?
(ª<ª) Enter the [new] value? -1

-- The [vectorA]: vectorA [-11.0, 4.0]
-- The [vectorB]: vectorB [3.0, -1.0]

[Answer]

- The [Addition]: vector[a+b]: [-8.0, 3.0]
- The [Subtraction]: vector[a-b]: [-14.0, 5.0]

. . . Key [ENTER] to exit -- Ok! . . .

Example9 – Find the Theta angle between the vectors a = -3i + 5 and b = 7i - 2j.
Solution: Use the option: [4] and enter the [components]: a1 = -3, a2 = 5, b1 = 7, and b2 = -2 when
requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 4

[WILL FIND THE [VALUE] OF THE [THETA ANGLE] BETWEEN [TWO VECTORS] GIVEN: A AND B]

- Attribute the [Components] of the [1º vectorA]!

- Enter the [coefficient] of the [Component: (i) or (a1)]?
(ª<ª) Enter the [new] value? -3

- Introduce the [coefficient] of the [Component: (j) or (a2)]?
(ª<ª) Enter the [new] value? 5

- Provide the [Components] of the [2º vectorB]?

- Enter the [coefficient] of the [Component: (i) or (b1)]?
(ª<ª) Enter the [new] value? 7

- Introduce the [coefficient] of the [Component: (j) or (b2)]?
(ª<ª) Enter the [new] value? -2

[Answer]

-- The [vectorA]: vectorA [-3.0, 5.0]
-- The [vectorB]: vectorB [7.0, -2.0]

-- The VectorA*B: [-21.0, -10.0]
-- The [length] of a ||vectorA||: 5.83
-- The [length] of a ||vectorB||: 7.28
-- The [value] finded of |A*B| is: 42.45
-- The [Scalar Product] of the [VectorA*B] is: -31.00

-- The value of the [THETA ANGLE IN DEGREES] calculated is: 136.91

. . . Key [ENTER] to exit -- Ok! . . .

Example10 – The three displacement vectors A, B, and C are specified by their magnitudes A = 10, B = 7, and C = 8, respectively, and by their respective direction angles with the horizontal direction θ = 35º, β = -110º, and φ = 30º. The physical units of the magnitudes are centimeters. Find the Resultant(|R) Vector.
Solution: Use the option: [9] and enter the datas problem when requested by runVector2d.py program.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 9

[TO GET THE VALUE OF THE RESULTANT(|R) VECTOR]

+ How much [Vectors] will necessary to get the [Resultant(R) Vector]?
[º>º] Provide the [new] value? 3

[Warning]
- All the [Vectorials Components] will can be:
  [positive] or [negative] or Zero!

+ What are the arguments: [angle] and [radius] of the (1º) [vector]?

- Enter with the [new value] of the [angle] in degree?
(ª<ª) Enter the [new] value? 35
- Provide the [new value] of the [radius] of vector?
[º<º] Type a [new] value? 10

                    _-_ . . .[Running]. . . _-_

 [Answer]

- The component of the (1)º [vector]: Vx(1)= 8.19
- The component of the (1)º [vector]: Vy(1)= 5.74

[Warning]:
[THE [PREVIOUS COMPONENTS]: Vx(1) AND Vy(1) BEEN CALCULED; BUT]
[[NO EXIST RESULTANT(R) VECTOR] TO A ONLY VECTOR!]

+ What are the arguments: [angle] and [radius] of the (2º) [vector]?

- Enter with the [new value] of the [angle] in degree?
(ª<ª) Enter the [new] value? -110
- Provide the [new value] of the [radius] of vector?
[º<º] Type a [new] value? 7

                    _-_ . . .[Running]. . . _-_

 [Answer]

- The component of the (2)º [vector]: Vx(2)= -2.39
- The component of the (2)º [vector]: Vy(2)= -6.58

+ What are the arguments: [angle] and [radius] of the (3º) [vector]?

- Enter with the [new value] of the [angle] in degree?
(ª<ª) Enter the [new] value? 30
- Provide the [new value] of the [radius] of vector?
[º<º] Type a [new] value? 8

                    _-_ . . .[Running]. . . _-_

 [Answer]

- The component of the (3)º [vector]: Vx(3)= 6.93
- The component of the (3)º [vector]: Vy(3)= 4.00

+ The sum of all the components of x_axis: Rx = 12.73
+ The sum of all the components of y_axis: Ry = 3.16

+ The resultant vector: [Resultant(R)_Vector] = 13.11
+ The [theta angle] in [degrees] = 13.94

[End Processing of the [RESULTANTVECTOR CLASS]--Ok!]

. . . Key [ENTER] to exit -- Ok! . . .

(New) Example10 – Find the components: Vx and Vy of a vector in polar form given the angle Ө = 57º and radius r = 23.

Solution: Use the option: [9] and enter the datas problem when requested by runVector2d.py program. After follow keying [1] in keyboard to a only vector.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
   S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
   A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
   the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
   between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
   of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
   To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
   To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
   key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
   Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
   the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
   meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
   key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 9

[TO GET THE VALUE OF THE RESULTANT(|R) VECTOR]

+ How much [Vectors] will necessary to get the [Resultant(R) Vector]?
[º>º] Provide the [new] value? 1

[Warning]
- All the [Vectorials Components] will can be:
  [positive] or [negative] or Zero!

+ What are the arguments: [angle] and [radius] of the (1º) [vector]?

- Enter with the [new value] of the [angle] in degree?
(ª<ª) Enter the [new] value? 57
- Provide the [new value] of the [radius] of vector?
[º<º] Type a [new] value? 23

               _-_ . . .[Running]. . . _-_

* [answer] *

- The component of the 1 vector: Vx(1) = 12.53
- The component of the 1 vector: Vy(1) = 19.29

--[Warning]:
[THE [PREVIOUS COMPONENTS]: Vx(1) AND Vy(1) BEEN CALCULED; BUT]
[[NO EXIST RESULTANT(R) VECTOR] TO A ONLY VECTOR!]

[End Processing of the [RESULTANTVECTOR.PY FUNCTION]--Ok!]

        . . . Key [ENTER] to exit -- Ok! . . .

Now view the [new] exceptions when the user attribute values [Negative] or [Zero] to the radius of any vector.
Below will resolve the same previous Example 10.

        [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
        [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
                    --[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]

- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 9

[TO GET THE VALUE OF THE RESULTANT(|R) VECTOR]

+ How much [Vectors] will necessary to get the [Resultant(R) Vector]?
[º>º] Provide the [new] value? 1

[Warning]
- All the [Vectorials Components] will can be:
  [positive] or [negative] or Zero!

+ What are the arguments: [angle] and [radius] of the (1º) [vector]?

- Enter with the [new value] of the [angle] in degree?
(ª<ª) Enter the [new] value? 57
- Provide the [new value] of the [radius] of vector?
[º<º] Type a [new] value? -23

  _ === _
   º>º   [Warning!]:
  [~]   **[No exist none [vector] when the [component]: radius is:]
         [A Negative float number: radius < 0] or [Zero: radius = 0] -- Ok!]

[º<º] Type a [new] value? 0

  _ === _
   º>º   [Warning!]:
  [~]   **[No exist none [vector] when the [component]: radius is:]
         [A Negative float number: radius < 0] or [Zero: radius = 0] -- Ok!]

[º<º] Type a [new] value? ENTER

  _ === _
  @<@   [Warning!]: could not convert string to float: ''
  [-]   **[NO KEY ANY OTHER CHARACTER OR [ENTER] IN THE KEYBOARD]**

          [TYPE ALWAYS A NEW [POSITIVE FLOAT NUMBER] TO THE [RADIUS]]
          [IN NEXT INSTRUCTION -- OK!]

[º<º] Type a [new] value? 23

[Answer]

- The component of the (1)º [vector]: Vx(1)= 12.53
- The component of the (1)º [vector]: Vy(1)= 19.29

[Warning]:
[THE [PREVIOUS COMPONENTS]: Vx(1) AND Vy(1) BEEN CALCULED; BUT]
[[NO EXIST RESULTANT(R) VECTOR] TO A ONLY VECTOR!]

[End Processing of the [RESULTANTVECTOR CLASS]--Ok!]

. . . Key [ENTER] to exit -- Ok! . . .

Example11 – Given the vectors: a = 2i + 3j and b = 5i -j find the [vectors and modules]: a + b, a – b, |a + b|, |a – b|, and 2a – 3b.
Solution – Begin run the runVector2d.py program and key the option[11] and wait the display present instructions to select the options: [1] or [2]. Follow type the option[1] and provide the [components]; a1 = 2, a2 = 3, b1 =5, and b2 = -1. Following the program will wait the user enter the [coefficients]. Do (1º) [coefficient] = 1 and (2º)[coefficient] = 1 and after key ENTER to process.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]

- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 11

[GIVENS [TWO VECTORS: A AND B] MULTIPLYED BY THE [SCALARS]: [COEFFIC1] AND [COEFFIC2] OR]

[GIVENS [THE POINTS: P, Q, AND R] FIND [TWO VECTORS]: VECTOR(A)=VECTOR(PQ) AND VECTOR(B)=VECTOR(PR)]

[AND MULTIPLY BY THE [SCALARS]: [COEFFIC1] AND [COEFFIC2] AND TOO GET THE [ADDITION] AND [SUBTRACTION]]

- To enter the [Components] of the [vectors] type [1].
- To introduce the [Coordinates] of the [points] type [2].
(º>º) Provide the [new] value? 1

- Provide the [Components] of the [vectors]: vectorA and vectorB.

- Attribute the [Components] of the [1º vectorA]!

- Enter the [coefficient] of the [Component: (i) or (a1)]?
(ª<ª) Enter the [new] value? 2

- Introduce the [coefficient] of the [Component: (j) or (a2)]?
(ª<ª) Enter the [new] value? 3

- Provide the [Components] of the [2º vectorB]?

- Enter the [coefficient] of the [Component: (i) or (b1)]?
(ª<ª) Enter the [new] value? 5

- Introduce the [coefficient] of the [Component: (j) or (b2)]?
(ª<ª) Enter the [new] value? -1

-- The [vectorA]: vectorA [2.0, 3.0]
-- The [vectorB]: vectorB [5.0, -1.0]

- Enter with new [value] to the (1º)[coefficient]?
(ª<ª) Enter the [new] value? 1
- Give the new [value] to the (2º)[coefficient]?
(ª<ª) Enter the [new] value? 1

 [Answer]

+ The [product]: (coeffic1)*[vectorA] = coeffic1*vectorA [2.0, 3.0]
+ The [product]: (coeffic2)*[vectorB] = coeffic2*vectorB [5.0, -1.0]

-- The [Addition] = (coeffic1)vectorA+(coeffic2)vectorB [7.0, 2.0]
-- The [Subtraction] = (coeffic1)vectorA-(coeffic2)vectorB [-3.0, 4.0]

-- The [length] of the |vectorAddition| is: 7.28
-- The [length] of the |vectorSubtraction| is: 5.00

. . . Key [ENTER] to exit -- Ok! . . .

After the **previous processing** the [vectors and modules]: a + b, a − b, |a + b|, |a − b| was finded.
Now to get the vector: 2a − 3b and module: |2a -3b| , run the runVector2d.py program again and key the option[11] and wait the display present instructions to select the options: [1] or [2]. Follow type the option[1] and provide again the [components]: a1 = 2, a2 = 3, b1 = 5, and b2 = -1. The program will wait the user enter the [coefficients]. Do (1°)[coefficient] = 2 and (2°)[coefficient] = -3 and after key ENTER to process.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
   S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
   A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
   the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
   between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
   of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
   To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
   To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
   key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
   Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
   the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
   meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
   key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 11

**[GIVENS [TWO VECTORS: A AND B] MULTIPLYED BY THE [SCALARS]:
   [COEFFIC1] AND [COEFFIC2] OR]**

**[GIVENS [THE POINTS: P, Q, AND R] FIND [TWO VECTORS]:
   VECTOR(A)=VECTOR(PQ) AND VECTOR(B)=VECTOR(PR)]**

**[AND MULTIPLY BY THE [SCALARS]: [COEFFIC1] AND [COEFFIC2] AND
   TOO GET THE [ADDITION] AND [SUBTRACTION]]**

- To enter the [Components] of the [vectors] type [1].
- To introduce the [Coordinates] of the [points] type [2].

(º>º) Provide the [new] value? 1

- Provide the [Components] of the [vectors]: vectorA and vectorB.

- Attribute the [Components] of the [1º vectorA]!

- Enter the [coefficient] of the [Component: (i) or (a1)]?
(ª<ª) Enter the [new] value? 2

- Introduce the [coefficient] of the [Component: (j) or (a2)]?
(ª<ª) Enter the [new] value? 3

- Provide the [Components] of the [2º vectorB]?

- Enter the [coefficient] of the [Component: (i) or (b1)]?
(ª<ª) Enter the [new] value? 5

- Introduce the [coefficient] of the [Component: (j) or (b2)]?
(ª<ª) Enter the [new] value? -1

-- The [vectorA]: vectorA [2.0, 3.0]
-- The [vectorB]: vectorB [5.0, -1.0]

- Enter with new [value] to the (1º)[coefficient]?
(ª<ª) Enter the [new] value? 2
- Give the new [value] to the (2º)[coefficient]?
(ª<ª) Enter the [new] value? -3

 [Answer]

+ The [product]: (coeffic1)*[vectorA] = coeffic1*vectorA [4.0, 6.0]
+ The [product]: (coeffic2)*[vectorB] = coeffic2*vectorB [-15.0, 3.0]

-- The [Addition] = (coeffic1)vectorA+(coeffic2)vectorB [-11.0, 9.0]
-- The [Subtraction] = (coeffic1)vectorA-(coeffic2)vectorB [19.0, 3.0]

-- The [length] of the |vectorAddition| is: 14.21
-- The [length] of the |vectorSubtraction| is: 19.24

. . . Key [ENTER] to exit -- Ok! . . .

Example12 – Given the points: P(2, 0), Q(0, 3), and R(3, 4) find the [vectors and modules]: a + b, a – b, |a + b|, and |a – b|.
Solution – Again run the runVector2d.py program and key the option[11] and wait the display present instructions to select the options: [1] or [2]. Follow type the option[2] and provide the [coordinates]; xP = 2, yP = 0, xQ = 0, yQ = 3, xR = 3 and yR = 4. Following the program will wait the user enter the [coefficients]. Do (1º)[coefficient] = 1 and (2º)[coefficient] = 1 and after key ENTER to process.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]

- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 11

[GIVENS [TWO VECTORS: A AND B] MULTIPLYED BY THE [SCALARS]: [COEFFIC1] AND [COEFFIC2] OR]

[GIVENS [THE POINTS: P, Q, AND R] FIND [TWO VECTORS]: VECTOR(A)=VECTOR(PQ) AND VECTOR(B)=VECTOR(PR)]

[AND MULTIPLY BY THE [SCALARS]: [COEFFIC1] AND [COEFFIC2] AND TOO GET THE [ADDITION] AND [SUBTRACTION]]

- To enter the [Components] of the [vectors] type [1].
- To introduce the [Coordinates] of the [points] type [2].
(º>º) Provide the [new] value? 2

- Give the [Coordinates] of the [givens points: P and Q].

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 0

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

- The (Point P): P (2.0, 0.0)
- The (Point Q): Q (0.0, 3.0)

 [Answer]

-- The [vectorA]: vectorA=vectorPQ [-2.0, 3.0]
-- The [lenghtPQ = distPQ] is the ||vectorPQ||: 3.61

- Enter the [Coordinates] of the [givens points: P and R].

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

- The (Point P): P (2.0, 0.0)
- The (Point R): R (3.0, 4.0)

 [Answer]

-- The [vectorB]: vectorB=vectorPR [1.0, 4.0]
-- The [lenghtPR = distPR] is the ||vectorPR||: 4.12

-- The [vectorA]: vectorA [-2.0, 3.0]
-- The [vectorB]: vectorB [1.0, 4.0]

- Enter with new [value] to the (1º)[coefficient]?
(ª<ª) Enter the [new] value? 1
- Give the new [value] to the (2º)[coefficient]?
(ª<ª) Enter the [new] value? 1

 [Answer]

+ The [product]: (coeffic1)*[vectorA] = coeffic1*vectorA [-2.0, 3.0]
+ The [product]: (coeffic2)*[vectorB] = coeffic2*vectorB [1.0, 4.0]

-- The [Addition] = (coeffic1)vectorA+(coeffic2)vectorB [-1.0, 7.0]
-- The [Subtraction] = (coeffic1)vectorA-(coeffic2)vectorB [-3.0, -1.0]

-- The [length] of the |vectorAddition| is: 7.07
-- The [length] of the |vectorSubtraction| is: 3.16

. . . Key [ENTER] to exit -- Ok! . . .

New information to all the users:
In this repository too was added a new TrianglePQR.pdf file.

New Example-13: Given the vertice points: P(2,3), Q(-3,-2), and R(5,-4) of a TrianglePQR in |R² Plane. Determine the following dimensions below. [Warning]: below of each item will process the solution.

1. Find the sides: sideA, sideB, and sideC, the Perimeter, Heights: h1, h2, and h3, the Area(S).
Solution – Begin the runVector2d.py program and key the option[2] and wait the display present instructions.


```
        **[ WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM ]**
        **[ TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE  [PLANE] ]**
                      --[Version: 2.0 -- Stable]--


    **[INSTRUCTIONS OF USE]**

    - To find the [Scalar Product: a * b] between [two vectors] key [1]
    - To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
      TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
    - To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and  [Area(S)] of the
      [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
      S(xS,yS)] key [3]
    - To find the [angle] between [two vectors] in plane key [4]
    - To determine the [value] of the [CossineTheta] between the [two vectors]:
      A and B key [5]
    - To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
      the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
    - To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
      between [ points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS) ] or in the sides: PQ, PR, and QR
      of a Triangle(PQR).key [7]
    - To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
    - To calculate the [Resultant(|R) Vector] key [9]
    - To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
      To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
      To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
      key [10]
    - To get the [Addition] and [Subraction] between [Two Vectors: A and B]
      Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
    - To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
    - To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
    - To calculate the [ Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR) ] of the triangle(PQR) with
      the [Coordinates] given of the [ Middle points: K(xK,yK), L(xL,yL), and M(xM,yM) ] key [14]
    - To get the [Coordinates] of any a of the [ Points: D(xD,yD) or E(xE,yE), or F(xF,yF) ] that are
      meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
      key [15]
    - To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

    [§] Select an previous [option] that will used--Ok!

    [º>º] Provide the [new] value? 2

    **[ TO CALCULATE THE SIDES: SIDE_A, SIDE_B, AND SIDE_C, THE PERIMETER(P),
         THE HEIGHTS: H1,H2, AND H3, AND THE ]**
    **[  AREA(A) OF THE  [TRIANGLE(PQR)] GIVEN THE [COORDINATES] OF THE
       [ VERTICE POINTS: P, Q, AND R [ IN THE PLANE]  ]**
```

--Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

- The (Point P): P (2.0, 3.0)
- The (Point Q): Q (-3.0, -2.0)
- The (Point R): R (5.0, -4.0)

 [Answer]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

-- The [vectorA] = vectorQR [8.0, -2.0]
-- The [vectorB] = vectorRP [-3.0, 7.0]
-- The [vectorC] = vectorPQ [-5.0, -5.0]

-- The [sideA] = ||vectorQR|| of the triangle(PQR)] is: 8.25
-- The [sideB] = ||vectorRP|| of the triangle(PQR)] is: 7.62
-- The [sideC] = ||vectorPQ|| of the triangle(PQR)] is: 7.07

-- The [terms] of the [Scalar Product(PQºQR)] is: [-40.0, 10.0]
-- The [terms] of the [Scalar Product(QRºRP)] is: [-24.0, -14.0]
-- The [terms] of the [Scalar Product(RPºPQ)] is: [15.0, -35.0]

-- The [Scalar Product(PQºQR)] is: -30.00
-- The [Scalar Product(QRºRP)] is: -38.00
-- The [Scalar Product(RPºPQ)] is: -20.00

-- The [Perimeter] of the [triangle(PQR)] is 22.93
-- The [Height(h1) relative as sideQR] is 6.06
-- The [Height(h2) relative as sideRP] is 6.57
-- The [Height(h3) relative as sidePQ] is 7.07
-- The [Area(A)] of the [triangle(PQR)] is 25.00

. . . Key [ENTER] to exit -- Ok! . . .

2. Will Get the three Inner Angles: Alpha(α), Beta(β), and Gama(γ) of the TrianglePQR.
Solution – Again begin the runVector2d.py program and key the option[6] and wait the display present instructions.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 6

**[TO FIND THE THREES SIDES: SIDEA, SIDEB, AND SIDEC, THE [INNER ANGLES:
   ALPHA, BETA, AND GAMA]]**
**[OF THE   [TRIANGLE(PQR)] GIVENS THE [COORDINATES] OF THE POINTS: P, Q,
   AND R IN THE PLANE]**

--Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

- The (Point P): P (2.0, 3.0)
- The (Point Q): Q (-3.0, -2.0)
- The (Point R): R (5.0, -4.0)

[Answer]

- The [vectorB]=vectorPR [3.0, -7.0]
- The [vectorC]=vectorPQ [-5.0, -5.0]

- The [vectorA]=vectorQR [8.0, -2.0]
- The [vectorC]=vectorQP [5.0, 5.0]

- The [vectorA]=vectorRQ [-8.0, 2.0]
- The [vectorB]=vectorRP [-3.0, 7.0]

==
[EXIST THE TRIANGLE(PQR) WITH THE GIVEN POINTS: P, Q, AND C -- OK!]
==

-- The [sideA]=|vectorA| of the triangle(PQR)] is: 8.25

-- The [terms] of the [Scalar Profuct(ACºAB)] is the vector[ACºAB]: [-15.0, 35.0]
-- The [value] of the [Scalar Profuct(ACºAB)] is: 20.00
        - The value of the [ALPHA ANGLE] was calculate is: 68.20

-- The [sideB]=|vectorB| of the triangle(PQR)] is: 7.62

-- The [terms] of the [Scalar Profuct(BCºBA)] is the vector[BCºBA]: [40.0, -10.0]
-- The [value] of the [Scalar Profuct(BCºBA)] is: 30.00
        - The value of the [BETA ANGLE] was calculate is: 59.04

-- The [sideC]=|vectorC| of the triangle(PQR)] is: 7.07

-- The [terms] of the [Scalar Profuct(CBºCA)] is the vector[CBºCA]: [24.0, 14.0]
-- The [value] of the [Scalar Profuct(CBºCA)] is: 38.00
        - The value of the [GAMA ANGLE] was calculate is: 52.77

        -- The triangle(PQR) is [Scalene]!

-- The [Add] of the [Inner Angles: ALPHA, BETA, GAMA] is 180.0

- THE [ADD] OF THE [INNER ANGLES] OF THE [TRIANGLE-PQR] is 180.00

. . . Key [ENTER] to exit -- Ok! . . .

[Warning]: The next items: 3. until 6. and too the next **New Example 14**, only will can be solved using the runVector2d.py program file.

3. Determine the [coordinates] of the three Middle points: K(xK,yK), L(xL, yL), and M(xM,yM).
Solution – Now begin he runVector2d.py program and type the option[7] and wait the display present instructions. After key the option[1].

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 7

================================
[WILL DETERMINE THE [MIDPOINTS]:]
================================

- Type [1] to find the [Middle points] of the sides: PQ, PR, and QR of a Triangle(PQR).
- Type [2] to determine the [Middle Point: K(xK,yK)] relative as points: P(xP,yP) and Q(xQ,yQ).
- Type [3] to get the [Middle Point: L(xL,yL)] relative as points: Q(xQ,yQ) and R(xR,yR).

- Type [4] to find the [Middle Point: M(xM,yM)] relative as points: R(xR,yR) and S(xS,yS).
- Type [5] to calculate the [Middle Point: N(xN,yN)] relative as points: S(xS,yS) and P(xP,yP).

[º>º] Provide the [new] value? 1

-- [Middle point: K(xK,yK) relative as sidePQ.
-- [Middle point: L(xL,yL) relative as sidePR.
-- [Middle point: M(xM,yM) relative as sideQR.

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

- The (Point P): P (2.0, 3.0)
- The (Point Q): Q (-3.0, -2.0)

 [Answer]

-- The MidPoint_K(xK,yK): (-0.5, 0.5)

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

- The (Point P): P (2.0, 3.0)
- The (Point R): R (5.0, -4.0)

 [Answer]

-- The MidPoint_L(xL,yL): (3.5, -0.5)

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

- The (Point Q): Q (-3.0, -2.0)
- The (Point R): R (5.0, -4.0)

 [Answer]

-- The MidPoint_M(xM,yM): (1.0, -3.0)

. . . Key [ENTER] to exit -- Ok! . . .

[Warning] : The previous options: [2] until [5] will find only the [coordinates] of each Middle-points: K(xK,yK) or L(xL,yL) or M(xM,yM) or N(xN,yN) between the points: P, Q, R, and S.

4. Calculate the three medians: PM, QL, and RK.

Solution – Run the runVector2d.py program and type the option[12] and wait the display present instructions. After key the option[1]

[Warning]: The previous option: [7] and [1] calculed the three Middle points: K(xK, yK), L(xL,yL), and M(xM,YM) of the sides: sideA, sideB, and sideC of the TrianglePQR. Use this **previous option only** when the **problem request** to find only the three Middle points: K, L, and M of the TrianglePQR. Here will not necessary use this previous option because of new option: [12] and [1] created in **Medianas** class of the Vector2DClassModule.py module will find the Middle point M(xM,yM) before of determine the [Median. PM].

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
   S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
   the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
   between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
   of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
   To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
   To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
   key [10]

- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? 12

===
[TO DETERMINE THE MEDIANAS OF THE TRIANGLE(PQR)]
===

        - Key [1] to find the new medianaPM or
        - Key [2] to find the new medianaQL or
        - Key [3] to find the new medianaRK.

[º>º] Provide the [new] value? 1

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

- The (Point Q): Q (-3.0, -2.0)
- The (Point R): R (5.0, -4.0)

 [Answer]

-- The MidPoint_M(xM,yM): (1.0, -3.0)

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

 [Answer]

-- The terms of the [vectorPM]: [-1.0, -6.0]
-- The [mediana: PM] finded is 6.08

Propose Exercise:

Now all users using the [Coordinates: xP=2, yP=3, xQ=-3, yQ= -2, xR=5, and yR= -4] of the previous vertice points: P, Q, and R of the TrianglePQR. Calculate the medians: QL and RK. Again begin run the runVector2d.py program and follow key the options: [12] and [2] to find the median: QL and after follow type in options: [12] and [3] to determine the median: RK.

[Answer]

-- The terms of the [vectorQL]: [6.5, 1.5]
-- The [mediana: QL] finded is 6.67

-- The terms of the [vectorRK]: [-5.5, 4.5]
-- The [mediana: RK] finded is 7.11

5. Find the [coordinates: xD, yD, xE, yE, xF, and yF] of the three points: D, E, and F that the bisectrixes: PD, QE, and RF meet in sides: QR, PR, and PQ of the TrianglePQR.

Solution – Again run the runVector2d.py program and type the option[15] and wait the display present instructions. After key the option[1]

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]

- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 15

[TO GET ANY A OF THE [POINTS: D(xD,yD) or E(xE,yE), or F(xF,yF)] IN THE SIDES:]
[QR, PR, AND PQ OF A TRIANGLE(PQR)]

- What's the point: D, or E, or F will get?

      -- Type [1] to find the [coordinate] of the point: D(xD,yD).
      -- Type [2] to find the [coordinate] of the point: E(xE,yE).
      -- Type [3] to find the [coordinate] of the point: F(xF,yF).

[º>º] Provide the [new] value? 1

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

 [Answer]

-- The [coordinate: xD] is 0.85
-- The [coordinate: yD] is -2.96

     . . . Key [ENTER] to exit -- Ok! . . .

Continue run the runVector2d.py program and type the option[15] and wait the display present instructions. After key the option[2]

      [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
      [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
           --[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 15

[TO GET ANY A OF THE [POINTS: D(xD,yD) or E(xE,yE), or F(xF,yF)] IN THE SIDES:]
[QR, PR, AND PQ OF A TRIANGLE(PQR)]

- What's the point: D, or E, or F will get?

        -- Type [1] to find the [coordinate] of the point: D(xD,yD).
        -- Type [2] to find the [coordinate] of the point: E(xE,yE).
        -- Type [3] to find the [coordinate] of the point: F(xF,yF).

[º>º] Provide the [new] value? 2

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

[Answer]

-- The [coordinate: xE] is 3.38
-- The [coordinate: yE] is -0.23

Continue the run the runVector2d.py program and type the option[15] and wait the display present instructions. After key the option[3]

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 15

[TO GET ANY A OF THE [POINTS: D(xD,yD) or E(xE,yE), or F(xF,yF]] IN THE SIDES:]
[QR, PR, AND PQ OF A TRIANGLE(PQR)]

- What's the point: D, or E, or F will get?

-- Type [1] to find the [coordinate] of the point: D(xD,yD).
-- Type [2] to find the [coordinate] of the point: E(xE,yE).
-- Type [3] to find the [coordinate] of the point: F(xF,yF).

[º>º] Provide the [new] value? 3

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

[Answer]

-- The [coordinate: xF] is -0.40
-- The [coordinate: yF] is 0.60

. . . Key [ENTER] to exit -- Ok! . . .

6. Calculate the bisectrixes: PD, QE, and RF of the TrianglePQR.
Solution – Again run the runVector2d.py program and type the option[16] and wait the display present instructions. After key the option[1]

-_-[Warning]: The previous option: [15] with the options: [1] or [2] or [3] calculed the [coordinates] of the three points: D(xD, yD), E(xE,yE), and F(xF,yF) in sides: sideA, sideB, and sideC of the TrianglePQR. Used this **previous option only** when the **problem request** to find only [coordinates] of the three points: D, E, and F in TrianglePQR. Here will not necessary use this previous option because of new option: [16] with the options: [1], [2], and [3] was developed in **BisectrixTriangle** class of the Vector2DClassModule.py module will find the point: D(xD,yD) before of determine the [Bisectrix: PD]. Of the same manner to the points: E(xE,yE), and F(xF,yF) that will find the Bisectrix: QE and RF of the TrianglePQR.

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]

- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 16

[TO FIND ANY A OF THE [BISECTRIXS: PD, QE, and RF] OF INNER ANGLES OF A TRIANGLE(PQR)]

- What's the bisectrix: PD, or QE, or RF of a Triangle(PQR) will determine?

        -- Key [1] to calculate the [bisectrixPD]
        -- Key [2] to calculate the [bisectrixQE]
        -- Key [3] to calculate the [bisectrixRF]

[º>º] Provide the [new] value? 1

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

 [Answer]

-- The [coordinate: xD] is 0.85
-- The [coordinate: yD] is -2.96

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

 [Answer]

-- The value finded of the [bisectrixPD] of the Triangle(PQR) is 6.07

        . . . Key [ENTER] to exit -- Ok! . . .

Now run the runVector2d.py program and type the option[16] and wait the display present instructions. After key the option[2]

        [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
        [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
                --[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
   S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
   To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
   To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
   key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]

- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 16

[TO FIND ANY A OF THE [BISECTRIXS: PD, QE, and RF] OF INNER ANGLES OF A TRIANGLE(PQR)]

- What's the bisectrix: PD, or QE, or RF of a Triangle(PQR) will determine?

        -- Key [1] to calculate the [bisectrixPD]
        -- Key [2] to calculate the [bisectrixQE]
        -- Key [3] to calculate the [bisectrixRF]

[º>º] Provide the [new] value? 2

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

[Answer]

-- The [coordinate: xE] is 3.38
-- The [coordinate: yE] is -0.23

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

 [Answer]

-- The value finded of the [bisectrixQE] of the Triangle(PQR) is 6.63

Again run the runVector2d.py program and type the option[16] and wait the display present instructions. After key the option[3]

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 16

[TO FIND ANY A OF THE [BISECTRIXS: PD, QE, and RF] OF INNER ANGLES OF A TRIANGLE(PQR)]

- What's the bisectrix: PD, or QE, or RF of a Triangle(PQR) will determine?

    -- Key [1] to calculate the [bisectrixPD]
    -- Key [2] to calculate the [bisectrixQE]
    -- Key [3] to calculate the [bisectrixRF]

[º>º] Provide the [new] value? 3

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -3

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -2

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

[Answer]

-- The [coordinate: xF] is -0.40
-- The [coordinate: yF] is 0.60

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -4

 [Answer]

-- The value finded of the [bisectrixRF] of the Triangle(PQR) is 7.09

. . . Key [ENTER] to exit -- Ok! . . .

New Example 14 – Given the [coordinates] of the Middle-points: K(-2,0), L(1,4), and M(4,1) of the sides: PQ, PR, and QR of a trianglePQR find the [coordinates: xP, yP, xQ, yQ, xR, and yR] of the three vertice points: P, Q, and R. After determine the [coordinates: xG, and yG] of the [Center of Gravity: G].

Solution: - Run the runVector2d.py program and type the option[14] and wait the display present instructions. After key the option[1].

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:

A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 14

[TO FIND THE VERTICES: P(xP.yP), Q(xQ,yQ), AND R(xR,yR) OF A TRIANGLE(PQR)]

- Type [1] to find the vertice: P(xP,yP) triangle(PQR).
- Type [2] to get the vertice: Q(xQ,yQ) triangle(PQR).
- Type [3] to find the vertice: R(xR,yR) triangle(PQR).

[º>º] Provide the [new] value? 1

-- Give the [coordinates]: (xK, yK) of the (Mid_point K)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Give the [coordinates]: (xL, yL) of the (Mid_point L)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

-- Give the [coordinates]: (xM, yM) of the (Mid_point M)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 4

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

[Answer]

- The (Point P): P (-5.0, 3.0)

Solution: - Continue the run the runVector2d.py program and type the option[14] and wait the display present instructions. After key the option[2].

[WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
[TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
--[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h)], and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 14

[TO FIND THE VERTICES: P(xP.yP), Q(xQ,yQ), AND R(xR,yR) OF A TRIANGLE(PQR)]

         - Type [1] to find the vertice: P(xP,yP) triangle(PQR).
         - Type [2] to get the vertice: Q(xQ,yQ) triangle(PQR).
         - Type [3] to find the vertice: R(xR,yR) triangle(PQR).

[º>º] Provide the [new] value? 2

-- Give the [coordinates]: (xK, yK) of the (Mid_point K)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Give the [coordinates]: (xL, yL) of the (Mid_point L)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

-- Give the [coordinates]: (xM, yM) of the (Mid_point M)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 4

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

 [Answer]

- The (Point Q): Q (1.0, -3.0)

        . . . Key [ENTER] to exit -- Ok! . . .

Solution: - Again run the runVector2d.py program and type the option[14] and wait the display present instructions. After key the option[3].

          [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
          [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
                     --[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
   TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
   [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
   S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
   A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
   the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
   between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
   of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
   To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
   To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
   key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
   Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
   the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]

- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 14

[TO FIND THE VERTICES: P(xP.yP), Q(xQ,yQ), AND R(xR,yR) OF A TRIANGLE(PQR)]

- Type [1] to find the vertice: P(xP,yP) triangle(PQR).
- Type [2] to get the vertice: Q(xQ,yQ) triangle(PQR).
- Type [3] to find the vertice: R(xR,yR) triangle(PQR).

[º>º] Provide the [new] value? 3

-- Give the [coordinates]: (xK, yK) of the (Mid_point K)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -2

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 0

-- Give the [coordinates]: (xL, yL) of the (Mid_point L)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 4

-- Give the [coordinates]: (xM, yM) of the (Mid_point M)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 4

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 1

 [Answer]

- The (Point R): R (7.0, 5.0)

        . . . Key [ENTER] to exit -- Ok! . . .

Geted the following vertice points:

- The (Point P): P (-5.0, 3.0)
- The (Point Q): Q (1.0, -3.0)
- The (Point R): R (7.0, 5.0)

Now follow type the option[13] to determine the [Center of Gravity].

Solution: - Run the runVector2d.py program and type the option[13] and wait the display present instructions.

        [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
        [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
                --[Version: 2.0 -- Stable]--

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]: A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)] between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)] To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)] To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)] key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B] Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR) key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

(º>º) Provide the [new] value? 13

[TO DETERMINE THE [CENTROID: G(xG,yG)] OF A TRIANGLE(PQR) GIVEN:]
[THE [COORDINATES] OF THE [POINTS]: P(xP,yP), Q(xQ,yQ), AND R(xR,yR)]

-- Enter the [coordinates]: (xP, yP) of the (point P)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? -5

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 3

-- Introduce the [coordinates]: (xQ, yQ) of the (point Q)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 1

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? -3

-- Provide the [coordinates]: (xR, yR) of the (point R)?

* Introduce the 1º[Coordinate(x)].
(ª<ª) Enter the [new] value? 7

* Enter with the 2º[Coordinate(y)].
(ª<ª) Enter the [new] value? 5

- The (Point P): P (-5.0, 3.0)
- The (Point Q): Q (1.0, -3.0)
- The (Point R): R (7.0, 5.0)

 [Answer]

-- The [Coordenates] of the [Centroid_ G(xG,yG)] in the Triangle(PQR):

-- The [Coordinate]: xG is 1.00
-- The [Coordinate]: yG is 1.67

 . . . Key [ENTER] to exit -- Ok! . . .

[Warning]: In new version: 2.0 of the runVector2d.py program was improve the security of datas enter to the user type only *positive integer number* in the menu options. View below using the runVector2d.py program when any user type: -2 or p or @ or J or 0(zero) or key ENTER.

 [WELCOME IN USING THE [RUNVECTOR2D.PY] PROGRAM]
 [TO [SOLVE] VARIOUS PROBLEMS OF [VECTORS] IN THE [PLANE]]
 --[Version: 2.0 -- Stable]--

[INSTRUCTIONS OF USE]

- To find the [Scalar Product: a * b] between [two vectors] key [1]
- To calculate the sides: sideA, sideB and sideC, [Perimeter(P)], [Heights(h), and [Area(A)] of the
  TrianglePQR with he [coordinates] of the given [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [2]
- To get the sides: sideA, and sideB, the Perimeter(P), the [Heights: h1 and h2], and [Area(S)] of the
  [Parallelogram(PQRS)] with the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and
  S(xS,yS)] key [3]
- To find the [angle] between [two vectors] in plane key [4]
- To determine the [value] of the [CossineTheta] between the [two vectors]:
  A and B key [5]
- To find the three sides and [Inner Angles: ALPHA, BETA, and GAMA] of the [Triangle(PQR)] with
  the [coordinates] of the [points: P(xP,yP), Q(xQ,yQ), and R(xR,yR)] key [6]
- To Determine the following [Middle Points]: K(xK,yK), L(xL,yL), M(xM,yM)] and N(xN,yN)]
  between [points: P(xP,yP), Q(xQ,yQ), R(xR,yR), and S(xS,yS)] or in the sides: PQ, PR, and QR
  of a Triangle(PQR).key [7]
- To get the [Addition and Subtraction] of [Two Vectors: A and B] key [8]
- To calculate the [Resultant(|R) Vector] key [9]
- To find the [VectorA and lenght|A|] with the [coordinates] of the [points: P(xP,yP), and Q(xQ,yQ)]
  To get the [VectorB and lenght|B|] with the [coordinates] of the [points: P(xP,yP), and R(xR,yR)]
  To find the [VectorC and lenght|C|] with the [coordinates] of the [points: Q(xQ,yQ), and R(xR,yR)]
  key [10]
- To get the [Addition] and [Subraction] between [Two Vectors: A and B]
  Multiplyed by scalars: [coeffic1 and coeffic2] key [11]
- To determine the [Medianas: PM, QL, and RK] of the triangle(PQR) key [12]
- To find the [Centroid: G(xG, yG)] of the triangle(PQR) key [13]
- To calculate the [Vertices: P(xP.yP), Q(xQ,yQ), and R(xR,yR)] of the triangle(PQR) with
  the [Coordinates] given of the [Middle points: K(xK,yK), L(xL,yL), and M(xM,yM)] key [14]
- To get the [Coordinates] of any a of the [Points: D(xD,yD) or E(xE,yE), or F(xF,yF)] that are
  meeted with the [bisectrixs: PD or QE or RF] in the sides: QR or PR or PQ of a Triangle(PQR)
  key [15]
- To determine any a of the [bisectrixs: PD or QE or RF] of a Triangle(PQR) key [16]

[§] Select an previous [option] that will used--Ok!

[º>º] Provide the [new] value? -2

[NO TYPE AN [NEGATIVE INTEGER NUMBER] or equal [ZERO]--Ok!]

[º>º] Provide the [new] value? p

 ////
º<º [Warning!]: invalid literal for int() with base 10: 'p'
[~] [TYPE AN [NEW POSITIVE INTEGER NUMBER]
      [IN NEXT INSTRUCTION -- OK!]

[º>º] Provide the [new] value? @

 ////
º<º [Warning!]: invalid literal for int() with base 10: '@'
[~] [TYPE AN [NEW POSITIVE INTEGER NUMBER]
      [IN NEXT INSTRUCTION -- OK!]

[º>º] Provide the [new] value? J

 ////
º<º [Warning!]: invalid literal for int() with base 10: 'J'
[~] [TYPE AN [NEW POSITIVE INTEGER NUMBER]
      [IN NEXT INSTRUCTION -- OK!]

[º>º] Provide the [new] value? 0

[NO TYPE AN [NEGATIVE INTEGER NUMBER] or equal [ZERO]--Ok!]

[º>º] Provide the [new] value? ENTER

 ////
º<º [Warning!]: invalid literal for int() with base 10: ''
[~] [TYPE AN [NEW POSITIVE INTEGER NUMBER]
      [IN NEXT INSTRUCTION -- OK!]

[º>º] Provide the [new] value? 23

          [NEITHER OF THE PREVIOUS OPTIONS WAS SELECTED]
          [RUN THE RUNVECTOR2D.PY PROGRAM AGAIN -- OK!]

          . . . Key [ENTER] to exit -- Ok! . . .

[Warning]: The runVector2d.py program will follow only when the user typer any *positive integer number* between 1 to 16 – Ok! If type any positive integer number bigger than 16 the user will have that run the runVector2d.py program again.View the last previous test.

Note: The Components of Vectors and Coordinates of Points will can be: Negative or Zero or Positive; but the options of menu of the runVector2d.py program only can be typed *positive integer number*.

With the use of the [version: 2.0] runVector2d.py program and Vector2DClassModule.py module in previous examples all users viewed the new performance that insert into as *new code*.

[Warning]:

Any user that try solve all the Examples of the instructions1-v2.0_User.pdf without use the runVector2d.py program and Vector2DClassModule.py module files using pencil and paper will duty use a Scientific Calculator as help to determine the values: roots of the Vectors: |A|, |B|, and |C| modulus.

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