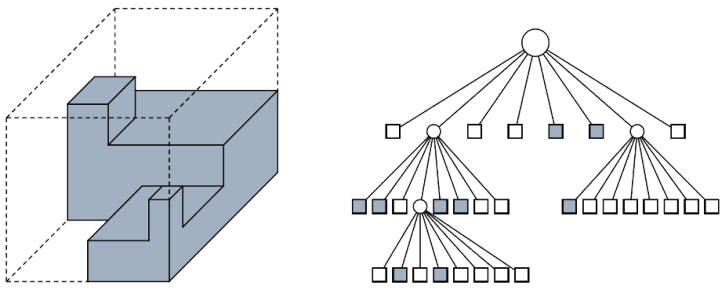
Started on	Monday, 21 June 2021, 11:14 AM
State	Finished
Completed on	Monday, 21 June 2021, 12:47 PM
Time taken	1 hour 32 mins
Grade	Not yet graded

Question **1**

Partially correct

Mark 0.50 out of 1.00

The following figure represents:



Select one or more:

- [ ] a. Solid object description by cubes
- [ ] b. Cube based composition of pixels
- [ ] c. Pixel based 3D structure
- [x] d. Octree describing a 3D object ✔

Your answer is partially correct.

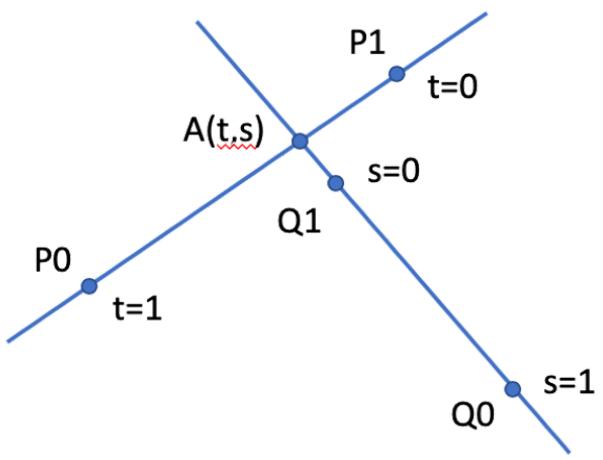
You have correctly selected 1.

Question **2**

Correct

Mark 1.00 out of 1.00

The intersection A(t,s) of the lines P0P1 and Q0Q1 in the figure, could have the following coordinate values:



Select one:

- (•) a. t=0.7, s=-1.7 ✔
- ( ) b. t=7.34, s=-0.75
- ( ) c. t=-2.5, s=-0.17
- ( ) d. t=1.35, s=5.7

Your answer is correct.

Question **3**

Correct

Mark 1.00 out of 1.00

The key positions for an animation are computed by:

Select one or more:

- [x] a. Direct kinematics ✔
- [x] b. Modeling physical systems ✔
- [ ] c. Linear interpolation
- [ ] d. Curve interpolation

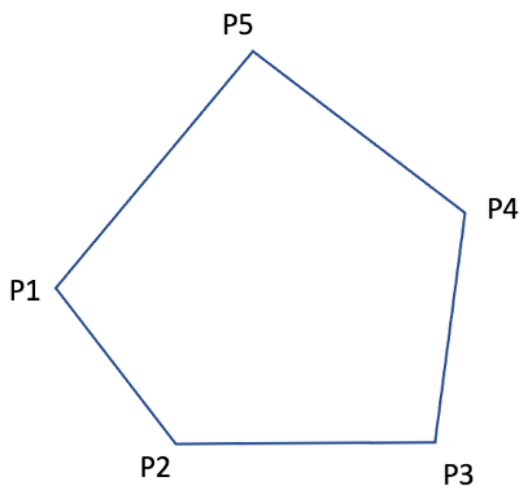
Your answer is correct.

Question **4**

Correct

Mark 1.00 out of 1.00

The convex polygon given by the vertices P1,P2,P3,P4,P5 has true some of the following properties:



Select one or more:

- [ ] a. Always the polygon may be inscribed within a circle
- [x] b. Cross product of any two consecutive edges is positive ✔
- [ ] c. At least one edge extension intersects the polygon
- [x] d. Any angle of the polygon is less than 180^o ✔

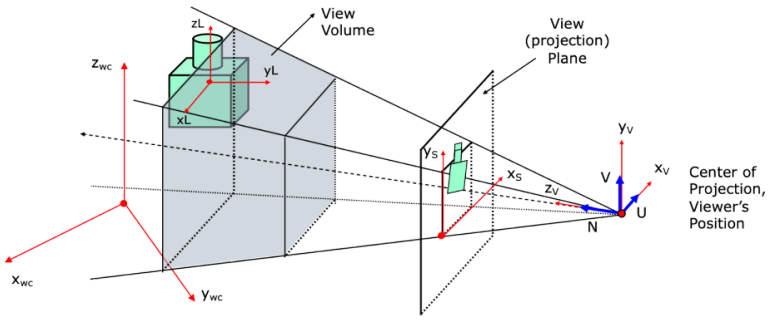
Your answer is correct.

Question **5**

Incorrect

Mark 0.00 out of 1.00

Along the graphics pipeline the following operations are executed:



Select one or more:

- [x] a. 2D clipping operations against the rectangular window. ✔
- [x] b. 3D clipping algorithms in the screen plane ✖
- [ ] c. Rotation, scaling and translation operations of 3D objects in the application coordinate system
- [ ] d. Transformation operation from vectors to pixels in the view coordinate system

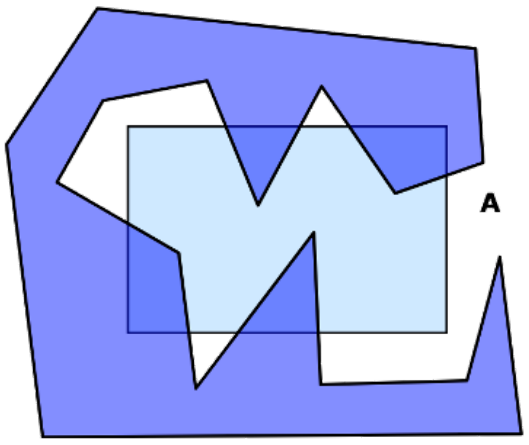
Your answer is incorrect.

Question **6**

Complete

Marked out of 5.00

Let be in the plane the polygon A given by its vertices A1, A2, ..., An, and the rectangular window by vertices W1, ..., W4 in counter clockwise direction. Explain the Sutherland-Hodgman algorithm for clipping the polygon A against the rectangular window W.



Step 1 : Let us consider the polygon A and the vertices in counterclockwise direction and the rectangular w

Step 2 : Clip the polygon A with respect to W and we look at the following rules :

- If S is in the interior and P is interior, then we save P

- If S is in the interior and P is in the exterior, then we are going to add the intersection between the line and the windows

- If S is in the exterior and P is in the interior, then we are going to add I and P

- If S is the exterior and P is in the exterior, we are not going to add anything

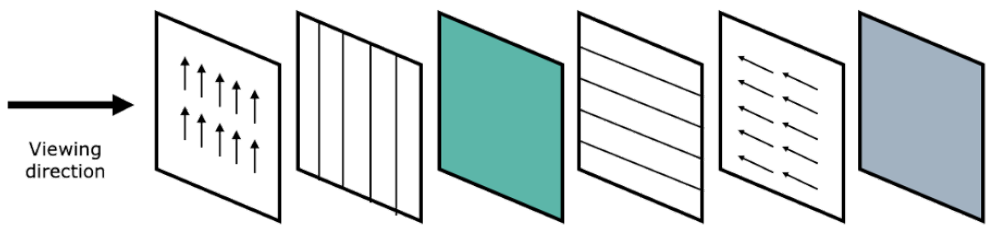
The result is the clipped windows formed with the polygons

Question **7**

Correct

Mark 1.00 out of 1.00

The following statements are true about the device in the figure:



Select one or more:

- [x] a. For each pixel an electric field of different intensity is created ✔
- [ ] b. It is a vector type display device
- [ ] c. The resolution depends only on the video memory capacity of the computer
- [x] d. Controls the polarization of light as it passes through liquid crystals placed in an electric field ✔

Your answer is correct.

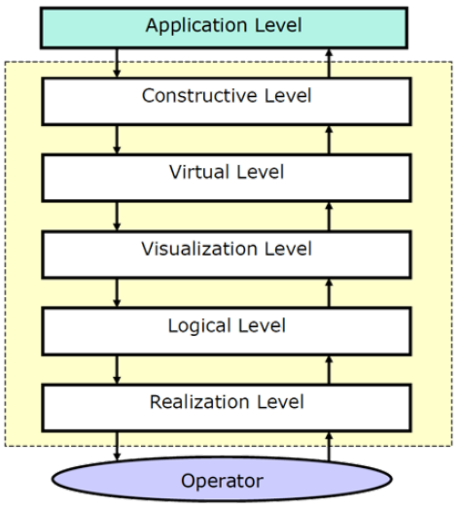
Question **8**

Correct

Mark 1.00 out of 1.00

To which level of the CGRM model (Computer Graphics Reference Model) can belong the following graphics primitive:

Line (1271.3, 56.2, 1472.45, 56.2)



Select one:

- a. Visualization Level
- b. Virtual Level
- c. Logical Level
- d. Constructive Level ✔

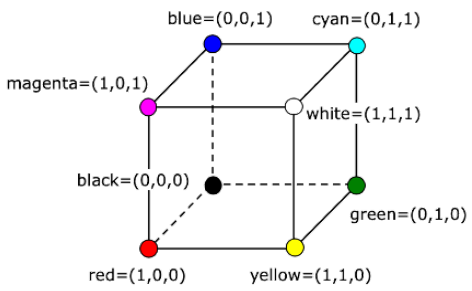
Your answer is correct.

Question **9**

Correct

Mark 1.00 out of 1.00

What does this figure represent?



Select one or more:

- a. Describe the ability to combine the colors by addition ✔
- b. Psychological complementarity of colors
- c. Relationship to the CIE color standard
- d. RGB color cubic space ✔

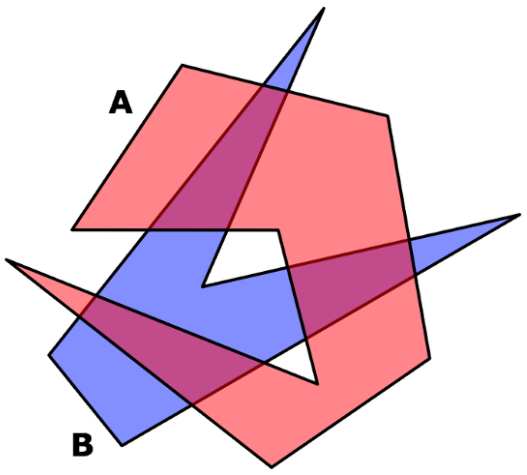
Your answer is correct.

Question **10**

Complete

Marked out of 5.00

Let be in the plane the polygon A given by its vertices A1, A2, ..., An, and the polygonal window by vertices B1, ..., Bn in counter clockwise direction. Explain the Weiler-Atherton algorithm for clipping the polygon A against the polygonal window B.



The Weiler-Atherton algorithm produces separate polygons for each visible fragment

We have 4 cases :

out - > in : Add clip vertex, Add end vertex

in -> in : Add end vertex

in -> out : Add clip vertex, Cache old direction, Follow clip edge until new crossing found or reach vertex already added

out - > out

Build the list of vertices for both polygons in the counterclokwise direction

Compute the intersection points between polygon A and the window B

Inset the intersection points

Identify the entering and leaving intersection points into the windows polygon

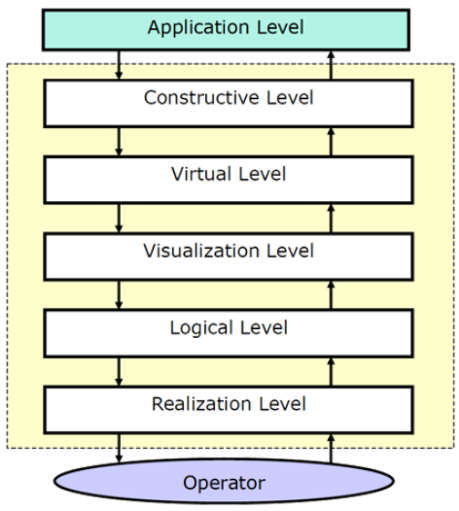
We look for the clipped polygons, start at an intersection point and follow the arrow on polygon A, if we see an intersectiong pont we swap to the left hand loop. If we see an leaving intersection we swap to right hand loop. A loop is finished when we arrive back at start. Repeat for all entering points.

Question **11**

Incorrect

Mark 0.00 out of 1.00

What level of the following CGRM (Computer Graphics Reference Model) model supports the portability of the graphic model across the network:



Select one:

- a. Logical Level
- b. Visualization Level
- c. Constructive Level ✖
- d. Virtual Level

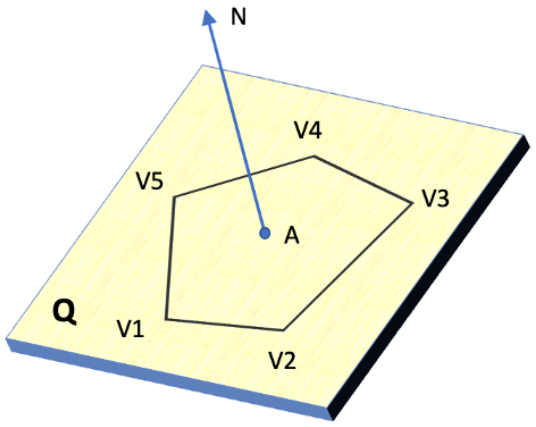
Your answer is incorrect.

Question **12**

Partially correct

Mark 0.50 out of 1.00

Let be the convex polygon with vertices V1,V2,V3,V4,V5 in the plane Q.
The normal vector N to the plane Q can be computed by:



Select one or more:

- [x] a. Cross product of vectors V1V2 and V2V3 ✔
- [ ] b. Cross product of vectors V2V3 and V4V5
- [ ] c. Cross product of vectors V3V2 and V2V1
- [ ] d. Dot product of vectors V1V2 and V3V4

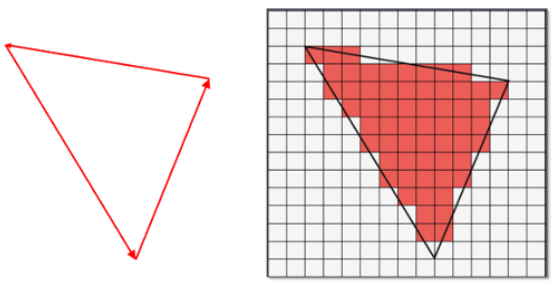
Your answer is partially correct.

Question **13**

Correct

Mark 1.00 out of 1.00

The following assertions about vector graphics are true:



Select one or more:

- [ ] a. Application model attributes are associated to pixels
- [ ] b. No semantic information
- [x] c. Vector graphics includes less visual information then raster image ✔
- [x] d. The scene of objects consists of points, lines, polylines and polygons ✔

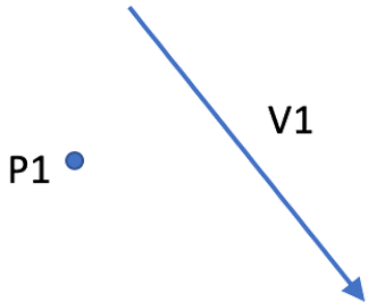
Your answer is correct.

Question **14**

Correct

Mark 1.00 out of 1.00

By subtracting one point P1(x1, y1, z1) and a vector V1(vx1, vy1, vz1) the result is:



Select one:

- a. One point P2(x2,y2,z2), where x2=x1-vx1, y2=y1-vy1, z2=z1-vz1 ✔
- b. Two points P1(x1,y1,z1) and P2(x2,y2,z2), where x2=x1-vx1, y2=y1-vy1, z2=z1-vz1
- c. Two vectors V1(vx1,vy1,vz1) and V2(x2,y2,z2), where vx2=x1-vx1, vy2=y1-vy1, vz2=z1-vz1
- d. One vector V2(vx2,vy2,vz2), where vx2=x1-vx1, vy2=y1-vy1, vz2=z1-vz1

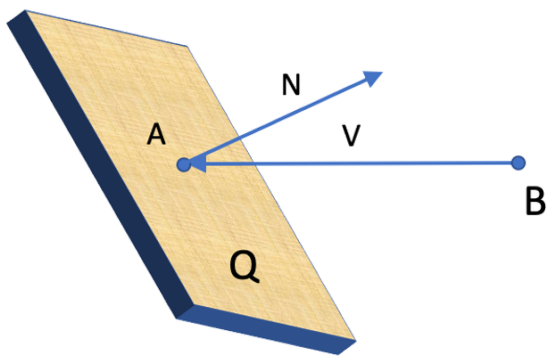
Your answer is correct.

Question **15**

Correct

Mark 1.00 out of 1.00

The distance of the point B to the plane Q is given by:



Select one:

- a. The dot product of normalized vectors V and N
- b. The dot product of vector V and N
- c. The dot product of vector V and N, if N is normalized
- d. The module of the dot product of vector V and N, if N is normalized ✔

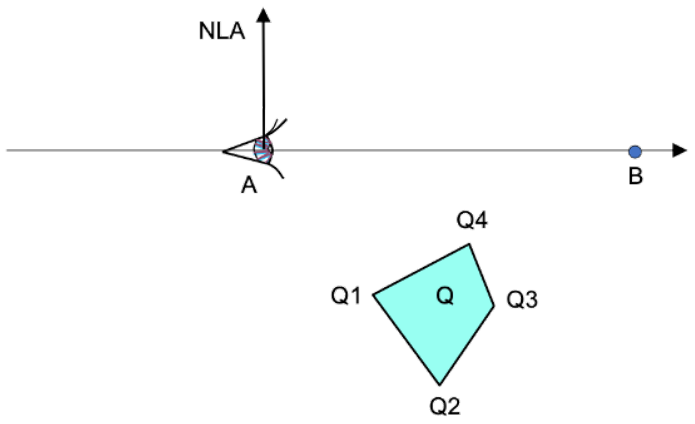
Your answer is correct.

Question **16**

Correct

Mark 1.00 out of 1.00

The viewer looks at point B. To determine if object Q is to the right of the viewer, we can use:



Select one or more:

- a. Cross product between right normal vector NRA of AB and vectors AQi, i=1,2,3,4
- b. Cross product of vector AB and vectors AQi, i=1,2,3,4 ✔
- c. Dot product of the left normal vector NLA of line AB and vectors AQi, i=1,2,3,4 ✔
- d. Dot product of vector AB and vectors AQi, i=1,2,3,4

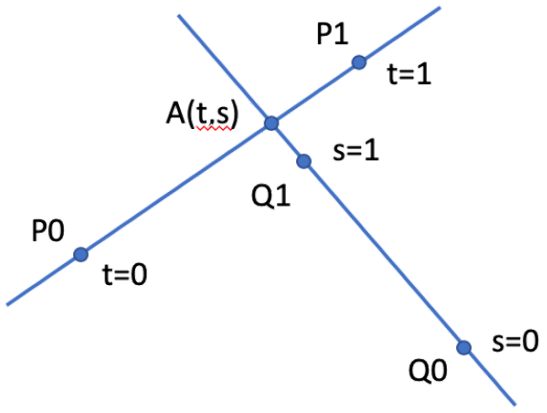
Your answer is correct.

Question **17**

Correct

Mark 1.00 out of 1.00

The intersection A(t,s) of the lines P0P1 and Q0Q1 in the figure, could have the following coordinate values:



Select one:

- a. t=0.34, s=0.75
- b. t=1.35, s=-1.7
- c. t=-2.5, s=0.17
- d. t=0.75, s=1.7 ✔

Your answer is correct.

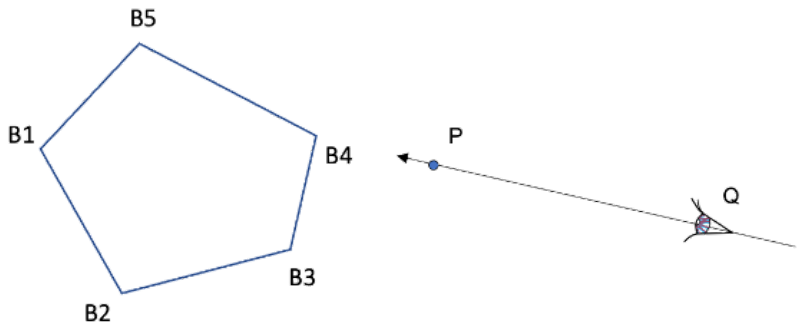
Question **18**

Complete

Marked out of 5.00

Let us consider in the plane an observer in position Q looking toward point P, and a polygon. The coordinates in the plane are given for the positions Q and P, and polygon B with the vertices B1, B2, B3, B4 and B5. Explain the methods for determining the followings:

1. If the polygon is convex or concave
2. In the favorable case of point 1, using the Cyrus-Beck algorithm, determine whether the observer is looking exactly at the polygon B
3. If the Cyrus-Beck algorithm was applied in the previous step, compute efficiently the distance from point P to the polygon B



1. The polygon is convex. If we check all the cross products we have the same sign.

We classify the edges by front face and back face.

- dot product v • n > 0 (front face, entering face, near face),

- v • n < 0 (back face, leaving face, far face)

For each face compute intersection with view ray;

Compute max(tnear) and min(tfar)

Initialize tnear to large negative value, tfar to large positive value

If (plane is back-facing) and (t< tfar) then tfar = t

If (plane is front-facing) and (t> tnear) then tnear = t

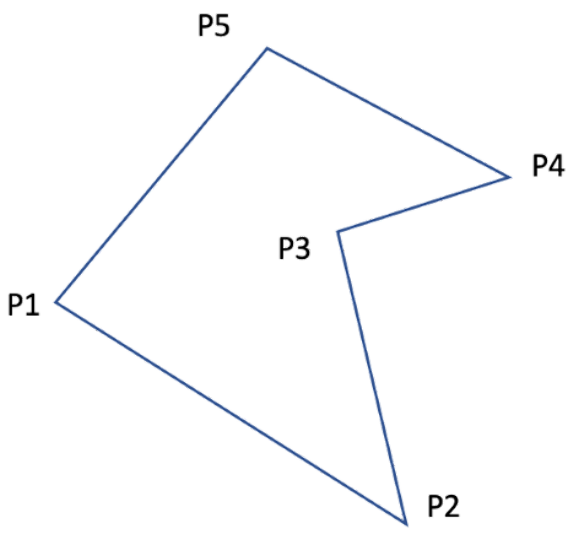
If (tnear > tfar) then (exit – ray misses)

Question **19**

Incorrect

Mark 0.00 out of 1.00

The concave polygon given by the vertices P1,P2,P3,P4,P5 has some of the following properties:



Select one or more:

- [ ] a. At each vertex the polygon turns to the left
- [ ] b. At least three consecutive vertices are ordered clockwise
- [x] c. At least one cross product of two consecutive edges is negative ✔
- [x] d. All angles are less than 180^o ✖

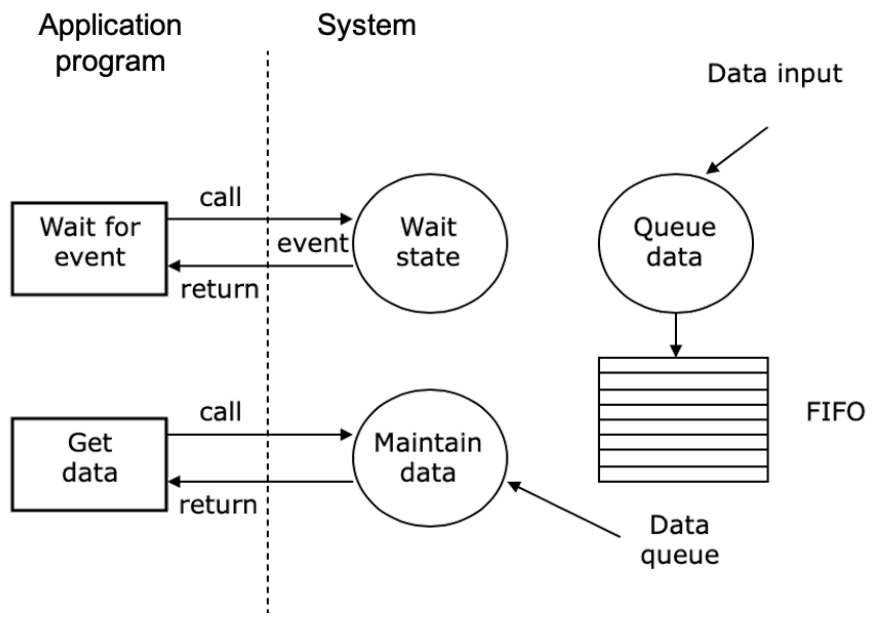
Your answer is incorrect.

Question **20**

Correct

Mark 1.00 out of 1.00

The following statements are true for the following figure:



Select one or more:

- a. It describes the reading a key code from a keyboard
- b. It is the input mode implemented in GKS to read data from an asynchronous input channel ✔
- c. It describes the reading of data from a file
- d. It is the description of the Event Input Mode in GKS ✔

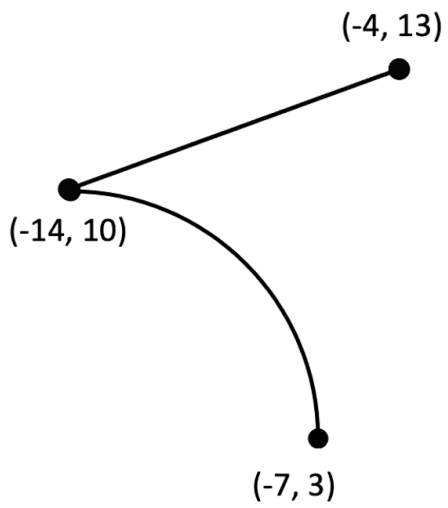
Your answer is correct.

Question **21**

Complete

Marked out of 5.00

Explain a method based on the Bresenham algorithm to render the following shape in the figure, consisting of a line segment and a quarter circle:



We render the circle segment with midpoint circle algorithm

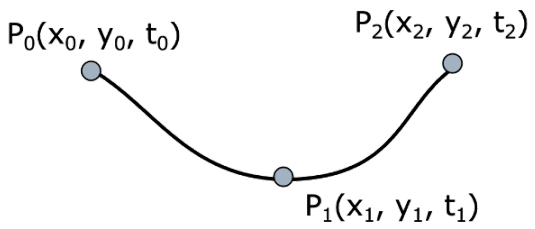
We transalte the circle to have the center in origin (-14,10)

Question **22**

Partially correct

Mark 0.50 out of 1.00

What are the main requirements on the key point P1 on the smooth animation trajectory?



Select one or more:

- [x] a. The first derivative to be continue on P1 ✔
- [ ] b. The time spent on the segments P0P1 and P1P2 to be the same
- [ ] c. The trajectory to be continue on P1
- [ ] d. The shape of object on P1 to be constant

Your answer is partially correct.

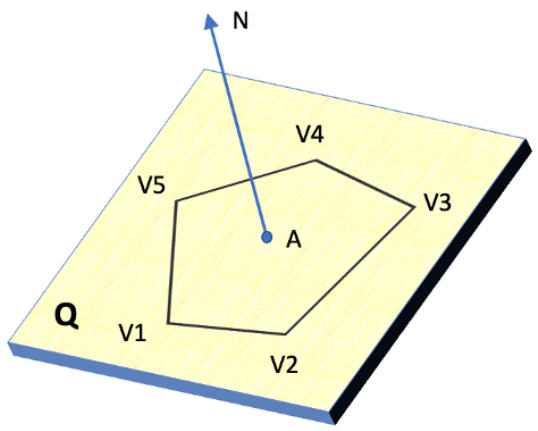
You have correctly selected 1.

Question **23**

Correct

Mark 1.00 out of 1.00

Let be the convex polygon with vertices V1,V2,V3,V4,V5 in the plane Q. The normal vector -N (minus N) to the plane Q can be computed by:



Select one or more:

- [ ] a. Dot product of vectors V4V3 and V3V2
- [ ] b. Cross product of vectors V1V2 and V2V3
- [x] c. Cross product of vectors V3V2 and V2V1 ✔
- [x] d. Cross product of vectors V2V3 and V1V2 ✔

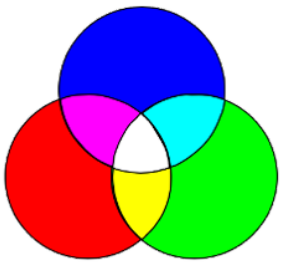
Your answer is correct.

Question **24**

Correct

Mark 1.00 out of 1.00

The additive principle of obtaining colors is used at:



Select one:

- a. Constructive solution of paper printers
- b. Obtain the white color by filtering the basic colors
- c. Use basic colors Cyan, Magenta Yellow
- d. Constructive solution of color Cathode Ray Tubes (CRT) ✔

Your answer is correct.

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