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2022 Q1 - Course 2 - 1st opportunity - Oct 4 2022- Requires Respondus LockDown Browser

Due 4 Oct 2022 at 16:00 **Points** 10 **Questions** 28 **Available** until 4 Oct 2022 at 17:00 **Time limit** None Requires Respondus LockDown Browser

Instructions

COURSE "Geospatial data: Concepts, acquisition and management" - 2022

Written open book exam (10 points) contributing 100% of the course mark

Date/Time: 4 October 2022 from 14:00 to 16:00 (120 minutes)

2022 October 14

The following steps and measures have been taken during the process of scoring the test and calculation of the course mark:

1. Questions and answers were reviewed. For some questions we have modified the model answer and scoring (in favor of students). These questions will have relevant comments/feedback.
2. Test score has been rounded to the nearest 1st decimal. This is the test score you'll find in CANVAS.
3. Cutting score (test score at which you pass the course with a 6) was set at 5.0 and a linear transformation as given in the regulations of the examination board was applied to calculate course marks. The course mark, base upon this opportunity, is listed in CANVAS. Your official/final course mark will be listed in OSIRIS (and could be different because of other/earlier attempts).

Access via the LDB to the CANVAS course: https://canvas.utwente.nl/courses/10630

Access via the LDB to the Living Textbook: https://ltb.itc.utwente.nl/page/498

The first opportunity of the online written test will take place in your designated cluster. You have to sign a registry and setup your laptop before the test starts. Late entries are not allowed. You are requested to be present 15 minute test starts.

Subjects covered by the examination

	Points	Approx. Time
Spatial Data Models (SDM)	0,9	11
EM-Radiation & Analysing reflected and emitted radiation	1,6	19
Data Acquisition (GIS and RS)	1,6	19
Spatial Reference Systems & Image reprojection and resampling	1,6	19

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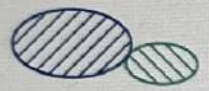
Question 1

0.3 / 0.3 pts

Match the GIS task described on the left with the topological relationship that you would use to complete it on the right.
Select from the following topological relationships:

1	is inside 
2	 contains
3	meets 
4	 overlaps
5	is equal to 
6	is disjoint from 

Correct! You want to find all the municipalities (polygon) that are neighboring the capital district (province) in a certain province — 3

Correct! You want to identify the parcel (polygon) in which a series of trees (points) are planted — 2

Correct! You want to select all bus stations (points) that are located within a certain city neighborhood (polygon) — 1

Correct! You want to calculate the total area of cropland (polygon) growing on clayey soil (polygon) — 4

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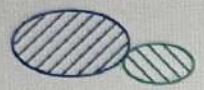
3	meets 
4	 overlaps
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Correct! You want to find all the municipalities (polygon) that are neighboring the capital district (province) in a certain province — 3

Correct! You want to identify the parcel (polygon) in which a series of trees (points) are planted — 2

Correct! You want to select all bus stations (points) that are located within a certain city neighborhood (polygon) — 1

Correct! You want to calculate the total area of cropland (polygon) growing on clayey soil (polygon) — 4

Other Incorrect Match Options:

- 5
- 6

0 / 0.3 pts

Question 2

Network (TIN). Which of the statements below about TINs are correct?

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Question 2

0 / 0.3 pts

A common data structure used to represent geographic phenomena is the Triangulated Irregular Network (TIN). Which of the statements below about TINs are correct? There are two (2) correct answers. An incorrect answer cancels a correct answer.

- ☐ TIN is a type of raster representation, and it is therefore unsuitable to represent continuous phenomena like elevation
- ☐ TIN is a type of vector representation, and it is therefore unsuitable to represent continuous phenomena like elevation

Correct answer

- ☐ By applying a Delaunay triangulation, we ensure that triangles are as equal-sided as possible and that for each triangle the circumcircle through its anchor points does not contain any other anchor points

You Answered

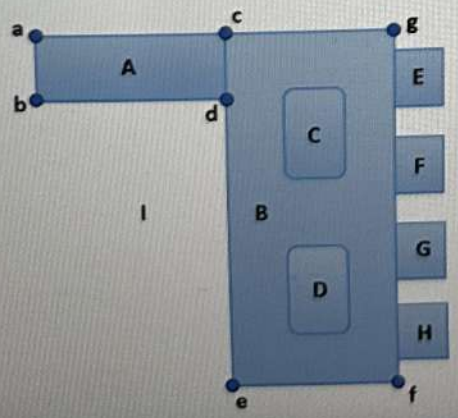
- ☑ A TIN is a vector representation, but it stores a set of attribute values for every plane constructed by its three anchor points

Correct!

- ☑ The plane fitted through the three anchor points of the TIN has a fixed aspect and gradient. By creating the elevation TIN we therefore also construct the slope of the terrain

Question 3

0.15 / 0.3 pts



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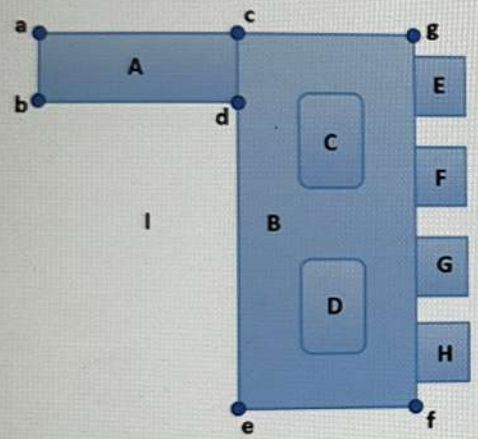
Question 3

0.15 / 0.3 pts



Above you see a simple topological model. Indicate whether the following statements about it are true or false.

"B meets A, F and G" is a topological feature of this model [Select]

"C disjoint D" is a non-topological feature of this model [Select]

"The areas of E, F, G and H are similar" is a topological feature of this model [Select]

The following line belongs to the model

From	To	Left	Right
c	d	B	A

True

The following line belongs to the model

From	To	Left	Right
g	c	B	I

[Select]

The following polygon belongs to the model

From	To	Left	Right
a	c	I	A
c	d	B	A
d	b	A	I
b	a	A	I

[Select]

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The following line belongs to the model

From	To	Left	Right
c	d	B	A

True

The following line belongs to the model

From	To	Left	Right
g	c	B	I

[Select]

The following polygon belongs to the model

From	To	Left	Right
a	c	I	A
c	d	B	A
d	b	A	I
b	a	A	I

[Select]

Answer 1:

You Answered — False

Correct answer — True

Answer 2:

Correct answer — False

You Answered — True

Answer 3:

Correct! — False

Answer 4:

Correct! — True

Answer 5:

Correct answer — True

You Answered — False

False. You selected this answer.

Answer 6:

Correct! — False

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Question 4

0.2 / 0.4 pts

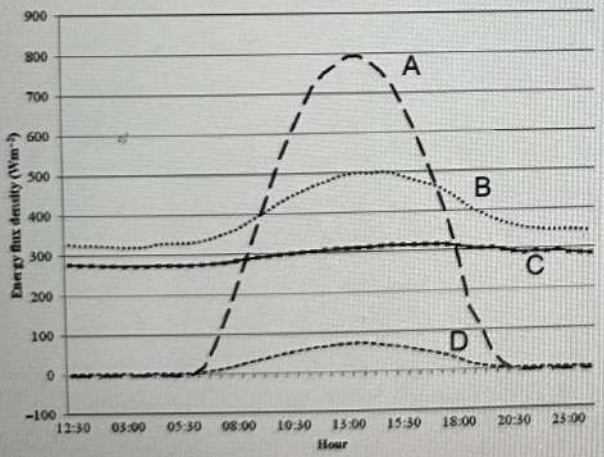
The net radiation Rnet at BOA is composed of 4 components:

Rnet= (SW↓in - SW↑out) + (LW↓in - LW↑out)

Where:

- SW↓in is the incoming shortwave radiation
- SW↑out is the outgoing shortwave radiation
- LW↓in is the incoming longwave radiation
- LW↑out is the outgoing longwave radiation

The 4 curves below are radiation measurements at BOA (surface) during a clear day with relatively constant air temperature, lower than the surface temperature during that day. The measurements are acquired by 4 radiometers. 2 are designed to operate in the range 300-3000 nm and the other 2 in the range 8000 - 14000 nm. 2 radiometers look upwards and 2 look downwards.



Match the component of the net radiation Rnet with the curves in the graph.

Correct! SW↓in — A

Correct! SW↑out — D

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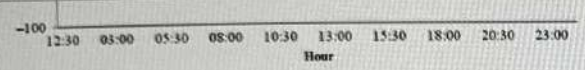

Match the component of the net radiation Rnet with the curves in the graph.

Correct! SW↓in — A

Correct! SW↑out — D

You Answered LW↓in — B

Correct answer C

You Answered LW↑out — C

Correct answer B

Reasoning: SW are 0 during the night, so they ca only be A and D. SW incoming is higher (A) than the reflected (D).
LW happens at "Earth" temperatures. The Sun does not emit much in long wave. As the Earth and the atmosphere are the source and they are always there (day and night), the LW can only be curves B and C. The emission depends on the temperature of the object. The air temperature remains constant so the incoming radiation to BOA where the source is the atmosphere can only be C. The outgoing is B what is very logical as the temperature of the land heats up during the day.

0 / 0.4 pts

Question 5

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Question 5

0 / 0.4 pts

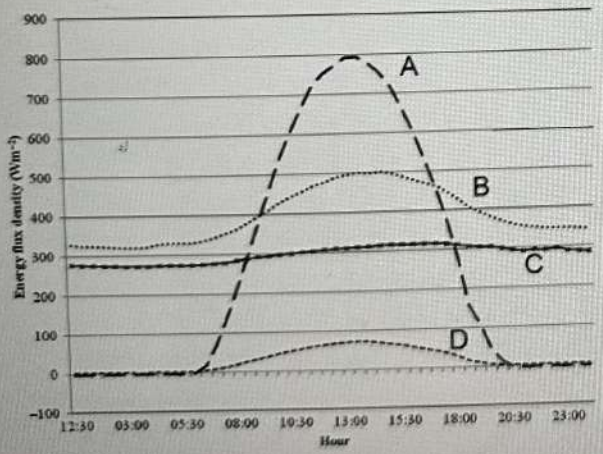
The net radiation Rnet at BOA is composed of 4 components:

Rnet= (SW↓in - SW↑out) + (LW↓in - LW↑out)

Where:

- SW↓in is the incoming shortwave radiation
- SW↑out is the outgoing shortwave radiation
- LW↓in is the incoming longwave radiation
- LW↑out is the outgoing longwave radiation

The 4 curves below are radiation measurements at BOA (surface) during a clear day with relatively constant air temperature, lower than the surface temperature during that day. The measurements are acquired by 4 radiometers. 2 are designed to operate in the range 300-3000 nm and the other 2 in the range 8000 - 14000 nm. 2 radiometers look upwards and 2 look downwards.



Match the instrument which was used for each measurement with the curve

You Answered

Curve A is measured with

8000 nm - 14000 nm looking

300 nm - 3000 nm looking up

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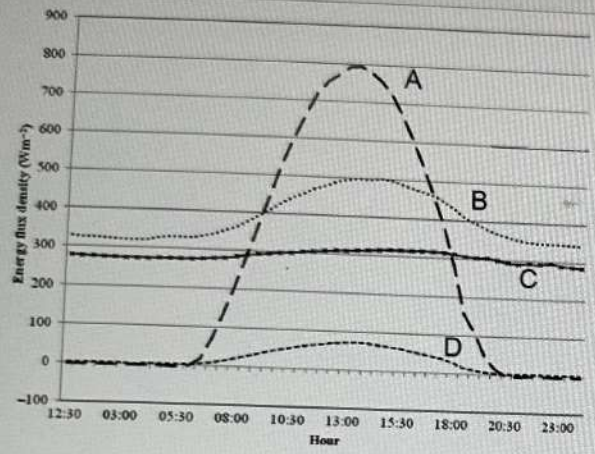

Match the instrument which was used for each measurement with the curve

You Answered

Curve A is measured with

8000 nm -14000 nm lookin

Correct answer 300 nm - 3000 nm looking up

You Answered

Curve B is measured with

300 nm - 3000 nm looking u

Correct answer 8000 nm -14000 nm looking down

You Answered

Curve C is measured with

300 nm - 3000 nm looking d

Correct answer 8000 nm -14000 nm looking up

You Answered

Curve D is measured with

8000 nm -14000 nm lookin

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Hour

Match the instrument which was used for each measurement with the curve

You Answered

Curve A is measured with 8000 nm –14000 nm looking

Correct answer 300 nm - 3000 nm looking up

You Answered

Curve B is measured with 300 nm - 3000 nm looking u

Correct answer 8000 nm –14000 nm looking down

You Answered

Curve C is measured with 300 nm - 3000 nm looking d

Correct answer 8000 nm –14000 nm looking up

You Answered

Curve D is measured with 8000 nm –14000 nm looking

Correct answer 300 nm - 3000 nm looking down

Question 6

0 / 0.8 pts

There are 2 adjacent objects, 1 bright (reflective) and one dark (low reflective). The **albedo** of both is calculated at BOA, with values 0.8 and 0.1 respectively.
The reflected radiation in the whole shortwave range at BOA of the dark object is 10.

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Question 6

0 / 0.8 pts

There are 2 adjacent objects, 1 bright (reflective) and one dark (low reflective). The **albedo** of both is calculated at BOA, with values 0.8 and 0.1 respectively. The reflected radiation in the whole shortwave range at BOA of the dark object is 10.

What is the reflected radiation in the whole shortwave range at BOA of the bright object? Enter a number without decimals. 0.8

Is the sky radiance in the whole shortwave range calculated with the dark object the same for the bright object? Answer with yes or no. no

Answer 1:

You Answered: 0.8

Correct answer: 80

Correct answer: 80.0

Answer 2:

You Answered: no

Correct answer: yes

Correct answer: Yes

Correct answer: YES

Answer: If the Reflected radiation of the dark is 10, the incoming radiation to the dark is 10/0.1 = 100. That is the same incoming radiation that arrives to the bright object. So, the reflected radiation at BOA is 0.8*100 = 80

0 / 0.4 pts

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Question 7

0 / 0.4 pts

The IFOV of a thermal camera of a DJI drone is 2.519 milliradians (0.002519 radians). You need a ground sampling distance of 5 cm or less. What is the maximum allowed flying height?

Correct answer

- Around 20 m

You Answered

- Around 2000m
- Around 30 m
- Around 2 m
- Around 50 m

Rationale: GSD= IFOV (rad) . H. H= GSD/IFOV = 5 / 0.002519= 1984 cm (about 20 m)

Question 8

0.1 / 0.4 pts

You are in the Netherlands. You are requested to give an expert opinion on the best setup to detect heat leakage in the roofs of houses in Enschede.

Choose one correct answer from the following lists. There is one valid option per group.

You use a NIR camera

You fly during Night - just after sunset

You fly in [Select]

I case you can take images during rainy moments, do you think that these images are better to detect heat leakage? [Select]

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Question 8

0.1 / 0.4 pts

You are in the Netherlands. You are requested to give an expert opinion on the best setup to detect heat leakage in the roofs of houses in Enschede.

Choose one correct answer from the following lists. There is one valid option per group.

You use a NIR camera

You fly during Night - just after sunset

You fly in [Select]

I case you can take images during rainy moments, do you think that these images are better to detect heat leakage? [Select]

Answer 1:

Correct answer — Panchromatic camera

You Answered — NIR camera

Answer 2:

You Answered — Night - just after sunset

Correct answer — Night - before sunrise

Answer 3:

Correct answer — Winter

You Answered — Summer

Answer 4:

Correct! — It is possible to take images during rainy moments, but they are not better to detect heat leakage

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Correct answer Night - before sunrise

Answer 3:

Correct answer Winter

You Answered Summer

Answer 4:

Correct! It is possible to take images during rainy moments, but they are not better to detect heat leakage

Rationale: A TIR camera measures heat, the others not

During the night it should be easy to detect leakage from roof of houses since the heater is on and the contrast with non-leakage areas is higher.

During cloudy conditions there is much more incoming longwave and consequently more reflected longwave radiation. In case of little leakage this is inconvenient.

In winter is an obvious choice

Water will hamper the heat, so it should not rain.

Question 9

0.4 / 0.4 pts

Below you see two maps with the footprints of locals and tourists in the city centre of Vienna derived from Flickr data. It provides insight into the visiting behaviour of tourists.

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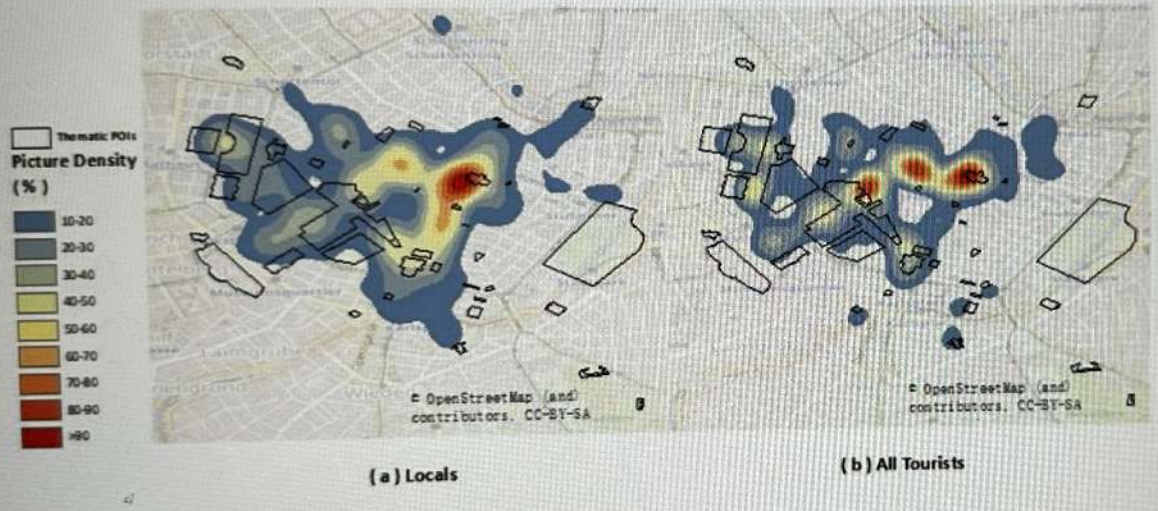
Question 9

0.4 / 0.4 pts

Below you see two maps with the footprints of locals and tourists in the city centre of Vienna derived from Flickr data. It provides insight into the visiting behaviour of tourists.



(a) Locals

(b) All Tourists

Define which one statement is correct in the following list.

- As you can see from the maps, the footprints of tourists show that there are three hotspots with densities higher than 40% and the footprint of the locals are more dispersed.
- As you can see from the maps, the footprints of tourists show that there are three hotspots with densities higher than 40% and the footprint of the locals are less dispersed.

Correct answer

- As you can see from the maps, the footprints of tourists show that there are three hotspots with densities higher than 60% and the footprint of the locals are more dispersed.

You Answered

- As you can see from the maps, the footprints of tourists show that there are three hotspots with densities higher than 60% and the footprint of the locals are more dispersed.

0 / 0.4 pts

Question 10

There are four (4) correct answers. An incorrect answer cancels a correct answer.

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Question 10

0 / 0.4 pts

Define which statements are correct in the following list. There are four (4) correct answers. An incorrect answer cancels a correct answer.

- [ ] The Topology Checker tool in QGIS can be used to identify and automatically correct errors by specifying topology rules.
- [ ] The successive processing steps for automatic digitizing are scanning, map registration, extracting vectors, skeletonizing, data clean-up, and feature forming.
- Correct! [x] A Web Feature Service (WFS) is a web server that provides access to vector (GML) data.
- Correct answer [ ] Semi-automatic on-screen digitizing of a printed map requires lower scan resolutions than manual on-screen digitizing of aerial photographs.
- You Answered [x] A resolution of 300 dpi corresponds to a pixel size of approximately 0.03mm.
- You Answered [x] The shape file actually consists of at least four different files that work together to store your digital vector data.
- Correct answer [ ] In stream mode digitizing vertices are added automatically at distance intervals as the user moves the cursor across the map.
- Correct answer [ ] The tolerance value for cleaning vector data must be smaller than the accuracy of the data to avoid unacceptable displacements.

Question 11

0 / 0.2 pts

Question GRGC1

The following text/information is applicable to the this and the next 2 questions.

In a QGIS project there are 2 raster images. One band 8 NIR of Sentinel-2 (reflectance) and the other is a scanned topographic map. Both need a spatial reference. There is no other source of geographical information. Your final objective is to have the original image Band 8 with coordinates and with reflectance values.

Below you find a series of steps.

1. Geocoding of the topographic map

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Question 11

0 / 0.2 pts

Question GRGC1

The following text/information is applicable to the this and the next 2 questions.

In a QGIS project there are 2 raster images. One band 8 NIR of Sentinel-2 (reflectance) and the other is a scanned topographic map. Both need a spatial reference. There is no other source of geographical information. Your final objective is to have the original image Band 8 with coordinates and with reflectance values.

Below you find a series of steps.

1. Geocoding of the topographic map
2. Select the coordinate system from the grid of the topographic map.
3. Assign the ground control points to the Sentinel-2 image from the topographic map
4. Execute (run) the georeferencing of the topographic map and assess the RMSE
5. Geocoding of the Sentinel-2 image
6. Selection of the transform model for the topographic map
7. Selection of the transform models for the Sentinel-2 image
8. Execute (run) the georeferencing of the Sentinel-2 image and assess the RMSE
9. Test the Sentinel-2 georeference with another data set
10. Assign ground control points to the topographic map

Indicate which 2 steps are not required for the project. First answer test the sentinel-2 , second answer assign the ground c (only the number of the step is required).

You should not use steps twice.

Answer 1:

You Answered: test the sentinel-2 georeference with another data

Correct answer: 1

Correct answer: 5

Answer 2:

You Answered: assign the ground control points to the sentinel-2 image from the topographic map

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5. Geocoding of the Sentinel-2 image
6. Selection of the transform model for the topographic map
7. Selection of the transform models for the Sentinel-2 image
8. Execute (run) the georeferencing of the Sentinel-2 image and assess the RMSE
9. Test the Sentinel-2 georeference with another data set
10. Assign ground control points to the topographic map

Indicate which 2 steps are not required for the project. First answer test the sentinel-2 , second answer assign the ground c (only the number of the step is required).

You should not use steps twice.

Answer 1:

You Answered: test the sentinel-2 georeference with another data

Correct answer: 1

Correct answer: 5

Answer 2:

You Answered: assign the ground control points to the sentinel-2 image from the topographic map

Correct answer: 1

Correct answer: 5

Rationale: Geocoding is not appropriate because it could change the reflectance values and is not necessary since you are only requested to assign coordinates /spatial reference. (1 and 5 are out)

1. This

0.08 / 0.1 pts

Question 12

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Question 12

0.08 / 0.1 pts

Use the text/information from **question GRGC1** to answer this question. You should not use steps twice.

Which is the order of steps for the topographic map?

Correct! Step 1 — 2

You Answered Step 2 — 10

Correct answer 6

You Answered Step 3 — 1

Correct answer 10

Correct! Step 4 — 4

Other Incorrect Match Options:

- 5
- 1
- 8
- 3
- 7
- 9

Question 13

0.05 / 0.1 pts

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Question 13

0.05 / 0.1 pts

Use the text/information from **question GRGC1** to answer this question. You should not use steps twice.

Which is the order of steps for the band 8 image map?

You Answered — Step 1: 3

Correct answer: 7

You Answered — Step 2: 7

Correct answer: 3

You Answered — Step 3: 5

Step 3. You selected 5. The c

Correct answer: 8

You Answered — Step 4: 8

Correct answer: 9

Other Incorrect Match Options:

- 6
- 1
- 5
- 10

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Correct answer 3

You Answered

Step 3 5

Correct answer 8

You Answered

Step 4 8

Correct answer 9

Other Incorrect Match Options:

- 6
- 1
- 5
- 10
- 4
- 2

Question 14

0.2 / 0.4 pts

In a raster map, there is a row of 10 pixels. The "distance tool" in QGIS shows the following distances when going from one side to the other side of the pixels in that row:

10, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8 and 10.9 m

You want the geocoded map to have 10 pixels. What is the size of the geocoded pixel you choose? 10

Is the original map of the 10 pixels georeferenced or not? Yes

Answer 1:

Correct answer 10.45

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Question 14

0.2 / 0.4 pts

In a raster map, there is a row of 10 pixels. The "distance tool" in QGIS shows the following distances when going from one side to the other side of the pixels in that row:

10, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8 and 10.9 m

You want the geocoded map to have 10 pixels. What is the size of the geocoded pixel you choose? 10

Is the original map of the 10 pixels georeferenced or not? Yes

Answer 1:

Correct answer: 10.45

You Answered: 10

Answer 2:

Correct!: Yes

In the geocoded image all the pixels have the same size and to represent the same distance, the pixels must have a length of (10 + 10.1 + 10.2 + 10.3 + 10.4 + 10.5 + 10.6 + 10.7 + 10.8 + 10.9) / 10 = 104.5/10= 10.45 m

Question 15

0 / 0.3 pts

Define which statements are correct in the following list. There are three (3) correct answers. An incorrect answer cancels a correct answer.

Correct answer: ☐ The ellipsoid is a mathematical definition of the shape of the Earth and can be described with two parameters.

Correct answer: ☐ The geoid undulation is the deviation between the Geoid and a particular ellipsoid.

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In the geocoded image all the pixels have the same size and to represent the same distance, the pixels must have a length of (10 + 10.1 + 10.2 + 10.3 + 10.4 + 10.5 + 10.6 + 10.7 + 10.8 + 10.9) / 10 = 104.5/10= 10.45 m

Question 15

0 / 0.3 pts

Define which statements are correct in the following list. There are three (3) correct answers. An incorrect answer cancels a correct answer.

Correct answer — ☐ The ellipsoid is a mathematical definition of the shape of the Earth and can be described with two parameters.

Correct answer — ☐ The geoid undulation is the deviation between the Geoid and a particular ellipsoid.

You Answered — ☑ Re-measuring the ITRS all the time is needed because of the tectonic plate motion and the change in the mean sea level.

☐ The ellipsoid height of a point is the vertical distance of the point in question above the Geoid.

☐ The latitude of a point on the ellipsoid is the angle between the equatorial plane and a parallel containing the point in question. The latitude is zero along the Greenwich meridian.

Correct! — ☑ The definition of a geodetic datum includes (among other things) the reference to a particular ellips

The latitude of a point on the ellipsoid is the angle between the equatorial plane and a para
in question. The latitude is zero along the Greenwich meridian.

Question 16

0.15 / 0.3 pts

If you want to map the amount of melting of the Arctic sea ice cap over time, you would choose a projection with property (select one correct answer) Equivalent

Because the Arctic is a polar region located at the northernmost part of Earth, you would choose projection class (select one correct answer) Conical

Answer 1:

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The latitude of a point on the ellipsoid is the angle between the equatorial plane and a parallel containing the point in question. The latitude is zero along the Greenwich meridian.

Correct! The definition of a geodetic datum includes (among other things) the reference to a particular ellipsoid.

Question 16

0.15 / 0.3 pts

If you want to map the amount of melting of the Arctic sea ice cap over time, you would choose a projection with property (select one correct answer) Equivalent

Because the Arctic is a polar region located at the northernmost part of Earth, you would choose projection class (select one correct answer) Conical

Answer 1:

Correct! Equivalent

Answer 2:

Correct answer Azimuthal

You Answered Conical

Conical.

Question 17

0 / 0.2 pts

For a particular area a data set in the following coordinate system is given: Dutch RD coordinates (horizontal datum: Amersfoort). The data set must be converted into the following coordinate system: Geographic coordinates (WGS84).

The coordinate transformations in the correct sequence are ? Select the one correct answer from the following list.

You Answered A forward map projection, followed by a datum transformation

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Answer 2:

Correct answer — Azimuthal

You Answered — Conical

Question 17

0 / 0.2 pts

For a particular area a data set in the following coordinate system is given: Dutch RD coordinates (horizontal datum: Amersfoort). The data set must be converted into the following coordinate system: Geographic coordinates (WGS84).

The coordinate transformations in the correct sequence are ? Select the one correct answer from the following list.

You Answered — A forward map projection, followed by a datum transformation

- A forward map projection, followed by a datum transformation and an inverse map projection
- An inverse map projection, followed by a datum transformation and a forward map projection
- A datum transformation, followed by a forward map projection

An inverse map projection, followed by a datum transformation and a forwa

Correct answer — An inverse map projection, followed by a datum transformation

Question 18

0.15 / 0.3 pts

Are the following statements about atmospheric correction (AC) true or false?

A relative AC requires at least two images of the same scene [Select]

New Tab

HELP CENTER

Question 18

0.15 / 0.3 pts

Are the following statements about atmospheric correction (AC) true or false?

A relative AC requires at least two images of the same scene [Select]

Relative AC is generally less computationally intensive than absolute AC [Select]

The main effect of an AC in the visible wavelength range is to correct for Rayleigh scattering [Select]

An absolute AC corrects cloudy pixels, whereas a relative AC does not [Select]

To create a time series of images for the study of land use changes, a relative AC is sufficient [Select]

The path radiance detected by a satellite instrument has not been in contact with the target True

Answer 1:

You Answered — True

Correct answer — False

Answer 2:

You Answered — False

Correct answer — True

Answer 3:

Correct! — True

Answer 4:

Correct! — False

New Tab

HELP CENTER

To create a time series of images for the study of land use changes, a relative AC is sufficient

The path radiance detected by a satellite instrument has not been in contact with the target True

Answer 1:

You Answered — True

Correct answer — False

Answer 2:

You Answered — False

Correct answer — True

Answer 3:

Correct! — True

Answer 4:

Correct! — False

Answer 5:

You Answered — False

Correct answer — True

Answer 6:

Correct! — True

0 / 0.45 pts

Question 19

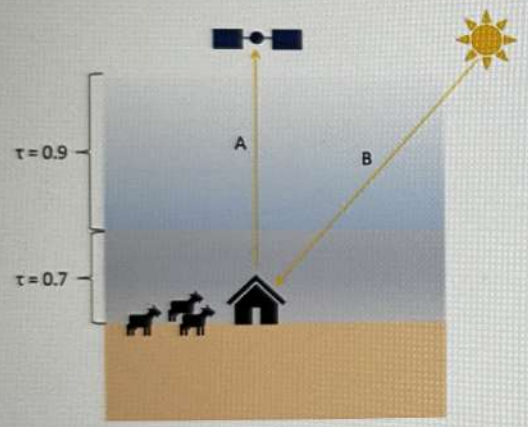
New Tab

HELP CENTER

Question 19

0 / 0.45 pts

Consider the scene of a house in the desert shown schematically in the figure below. There is dust in the lowest layer of the atmosphere. Consider the target to be located at the bottom of the atmosphere (below the lowest atmospheric layer). The required calculations do not need a calculator, use your brains and pen and paper instead. Only fill in the answer/outcome!



The transmission along the path from target to satellite (marked A) is 0.2 . The system expects an answer with two decimals separated by a dot.

The solar zenith angle is 50°. The transmission along the path from Sun to satellite (marked B) is 0.7 . Use: sin(50°) = 0.8, cos(50°) = 0.6, 1/ sin(50°) = 1.3 or 1/cos(50°) = 1.6.

The system expects an answer with two decimals separated by a dot.

The target has a reflectivity of 80%. The radiance detected by the satellite instrument is 0.3 . Assume that irradiance TOA = 1. The system expects an answer with two decimals separated by a dot.

Answer 1:

You Answered 0.2

Correct answer 0.63

Correct answer 0.63

New Tab

HELP CENTER

The solar zenith angle is 50°. The transmission along the path from Sun to satellite (marked B) is 0.7 . Use: sin(50°) = 0.8, cos(50°) = 0.6, 1/ sin(50°) = 1.3 or 1/cos(50°) = 1.6.

The system expects an answer with two decimals separated by a dot.

The target has a reflectivity of 80%. The radiance detected by the satellite instrument is 0.3 . Assume that irradiance TOA = 1. The system expects an answer with two decimals separated by a dot.

Answer 1:

You Answered 0.2

Correct answer 0.63

Correct answer 0,63

Answer 2:

You Answered 0.7

Correct answer 0.38

Correct answer 0,38

Answer 3:

You Answered 0.3

Correct answer 0.19

Correct answer 0,19

0 / 0.15 pts

Question 20

Which property is used to define the height of the atmospheric layers (troposphere, stratosphere, mesosphere, and thermosphere)?

New Tab

HELP CENTER

Question 20

0 / 0.15 pts

Which property is used to define the height of the atmospheric layers (troposphere, stratosphere, mesosphere, and thermosphere)?

You Answered — Density

Correct answer — Temperature

m

nm

Humidity

Pressure

Question 21

0.46 / 0.46 pts

The table below is a relation in a database. The attribute SHAPE is a geometry field. What do the values in this field indicate?

OBJECTID	SHAPE	bus_id	type	name	Avg_speed	SHAPE_Leng
1	Long binary data	1		University	45	635.3132979
2	Long binary data	1		University	45	622.6474018
3	Long binary data	1		University	45	764.943021
4	Long binary data	1		University	45	510.2308983
5	Long binary data	1		University	45	330.6062549
6	Long binary data	1		University	45	452.3183425
7	Long binary data	1		University	45	111.0687939
8	Long binary data	1		University	45	414.553679
9	Long binary data	1		University	45	342.4254634
10	Long binary data	1		University	45	818.8054400
11	Long binary data	1		University	45	394.496849
12	Long binary data	1		University	45	326.4373208
13	Long binary data	1		University	45	444.5811218
14	Long binary data	1		Wesselerbrink	45	562.9847931
15	Long binary data	1		Wesselerbrink	45	272.6411395
				Wesselerbrink	45	596.7719261

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HELP CENTER

Question 21

0.46 / 0.46 pts

The table below is a relation in a database. The attribute SHAPE is a geometry field. What do the values in this field indicate?

OBJECTID	SHAPE	bus_id	type	name	Avg_speed	SHAPE_Leng
1	Long binary data	1		University	45	635.3132979
2	Long binary data	1		University	45	622.6474018
3	Long binary data	1		University	45	764.943021
4	Long binary data	1		University	45	510.2308983
5	Long binary data	1		University	45	330.6062549
6	Long binary data	1		University	45	452.3183425
7	Long binary data	1		University	45	111.0687939
8	Long binary data	1		University	45	414.553679
9	Long binary data	1		University	45	342.4254634
10	Long binary data	1		University	45	818.8054400
11	Long binary data	1		University	45	394.496849
12	Long binary data	1		University	45	326.4373208
13	Long binary data	1		University	45	444.5811218
14	Long binary data	1		Wesselerbrink	45	562.9847931
15	Long binary data	1		Wesselerbrink	45	272.6411395
16	Long binary data	1		Wesselerbrink	45	596.7719261
17	Long binary data	1		Wesselerbrink	45	352.868098
18	Long binary data	1		Wesselerbrink	45	456.0446276
19	Long binary data	1		Wesselerbrink	45	253.280049
20	Long binary data	1		Wesselerbrink	45	294.1762581
21	Long binary data	1		Wesselerbrink	45	357.1857056
22	Long binary data	1		Wesselerbrink	45	292.4581419

- That this is a non-spatial table stored in a spatial database
- That the information to be displayed is missing
- That there are no coordinates associated with the features represented in this table

Correct!

- (●) That this is a spatial table stored in a non-spatial database
- That the field should be transformed into a numeric type
- That the information to be displayed is not available

New Tab

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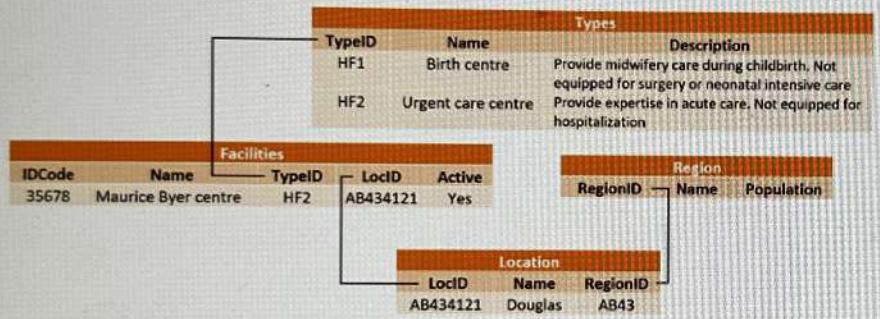
Question 22

0.44 / 0.44 pts

The database healthcare_facilities has the following relations:



Types

TypeID	Name	Description
HF1	Birth centre	Provide midwifery care during childbirth. Not equipped for surgery or neonatal intensive care
HF2	Urgent care centre	Provide expertise in acute care. Not equipped for hospitalization

Facilities

IDCode	Name	TypeID	LocID	Active
35678	Maurice Byer centre	HF2	AB434121	Yes

Region

RegionID	Name	Population

Location

LocID	Name	RegionID
AB434121	Douglas	AB43

Match for each group of items the correct fitting concept.

Correct!	Types, Location	Relation
Correct!	AB434121, Douglas, AB43	Tuple
Correct!	5 attributes, 1 tuple	Relation instance
Correct!	Facilities.TypeID, Location.RegionID	Foreign key

Other Incorrect Match Options:

- Primary key
- Database instance

New Tab

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Question 23

0 / 0.45 pts

Given the following relations:

Students

StudID	Course
B3567	PSG
B3568	PPG
B3569	PPG
B3570	PPG
B3571	MTR
B3572	MTR
B3573	MTR
B3574	MTR

Costs

StudID	CountryID	Pvisa	Loan
B3567	35	Y	13500
B3568	35	Y	12000
B3569	35	N	25000
B3570	35	N	15600
B3571	36	N	15000
B3572	37	N	23400
B3573	37	N	10500
B3574	38	N	11500

You perform the following query:

```
SELECT *
FROM Students as S, Costs as C
WHERE S."StudID" = C."StudID" AND C."Pvisa" = 'Y' AND C."Loan" < 12000
```

Which basic operator(s) has/have been used in this query? Select ONE correct answer from the following list.

- None of the listed options
- Correct answer — Join and tuple selection
- Tuple selection
- You Answered — Tuple selection, join and attribute projection
- Join and attribute projection
- Tuple selection and atribute projection

Question 24

0 / 0.45 pts

Question 24

Given the following relations:

Table_a

	code integer	name character varying (20)
1	1001	Ruvumera
2	1001	Kamenga
3	1001	Kinindo
4	1002	Gikundu
5	1005	Gisyo
6	1006	Musaga
7	1006	Karonda

Table_b

	code [PK] integer	name character varying (20)	pop_2020 integer
1	1001	Mabanda	230000
2	1002	Rumonge	342000
3	1003	Muha	87000

You perform a query using the following join condition a.code = b.code

You obtain the following result:

	name character varying (20)	name character varying (20)	pop_2020 integer
1	Ruvumera	Mabanda	230000
2	Kamenga	Mabanda	230000
3	Kinindo	Mabanda	230000
4	Gikundu	Rumonge	342000
5	[null]	Muha	87000

Which type of join did you perform? Select ONE correct answer from the list below.

- Table_a INNER JOIN Table_b
- Table_a FULL OUTER JOIN Table_b

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4	1002	Gikundu
5	1005	Gisyo
6	1006	Musaga
7	1006	Karonda

You perform a query using the following join condition a.code = b.code

You obtain the following result:

	name character varying (20)	name character varying (20)	pop_2020 integer
1	Ruvumera	Mabanda	230000
2	Kamenga	Mabanda	230000
3	Kinindo	Mabanda	230000
4	Gikundu	Rumonge	342000
5	[null]	Muha	87000

Which type of join did you perform? Select ONE correct answer from the list below.

- Table_a INNER JOIN Table_b
- Table_a FULL OUTER JOIN Table_b
- Table_a TIMES Table_b
- Table_a LEFT JOIN Table_b

You Answered

- None of the listed options

Correct answer

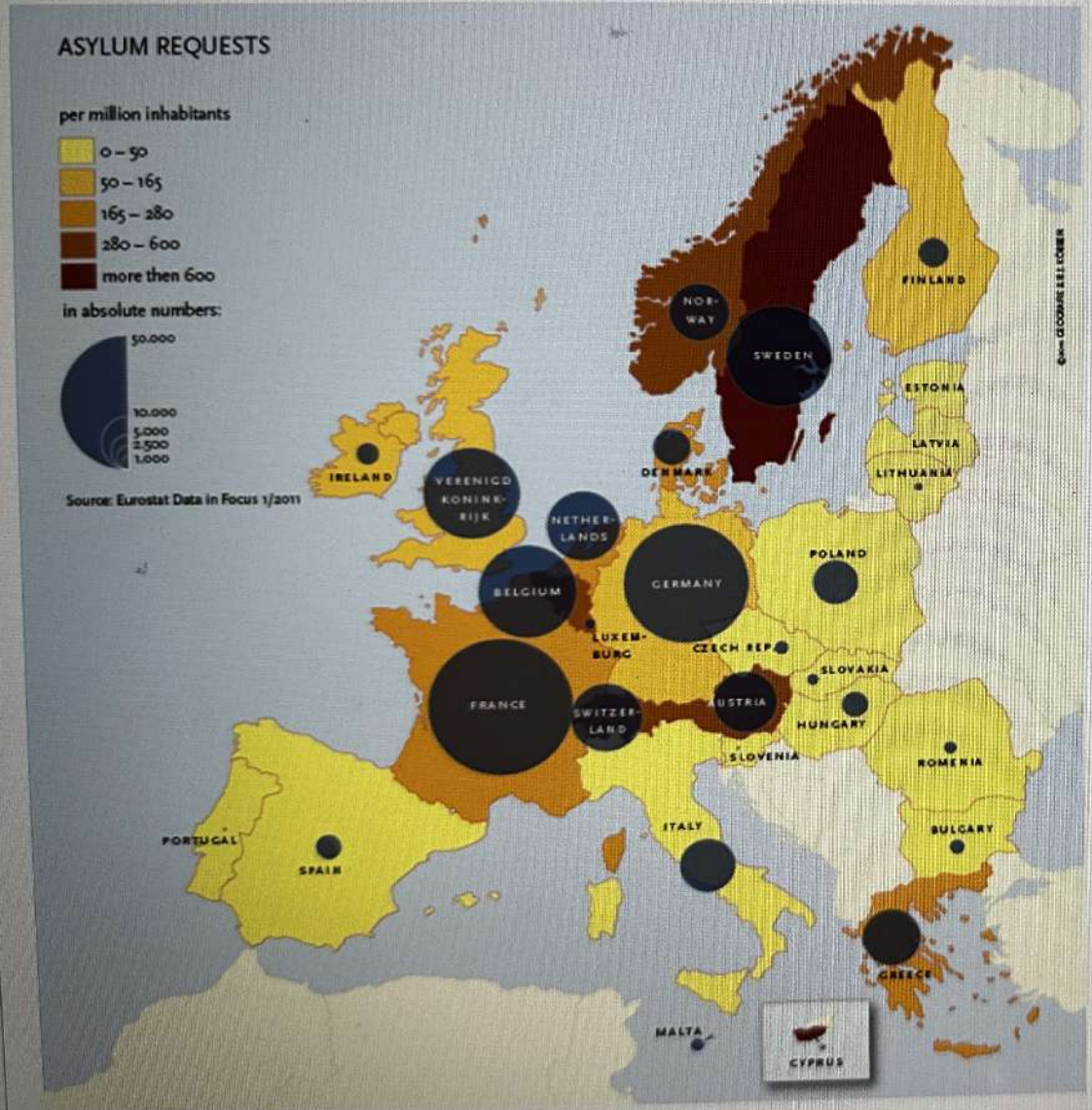
- Table_a RIGHT JOIN Table_b

HELP CENTER

Question 25

0.3 / 0.3 pts

Study the map below. Use your knowledge of cartographic grammar and select the correct answers from the drop-down lists.



The map is a combination of 2 thematic map types:

The first map depicts asylum requests per million inhabitants, using a [Select]

New Tab

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The map is a combination of 2 thematic map types:

The first map depicts asylum requests per million inhabitants, using a [Select]

The second map depicts asylum request in absolute numbers using a [Select]

The combination of two map types is useful, because it allows the user to better understand the story of the data

Answer 1:

Correct! Normal choropleth map

Answer 2:

Correct! Proportional Point map

Answer 3:

Correct! understand the story of the data

Question 26

0.4 / 0.5 pts

Look at the 2 maps below. They are based on the same data but visualized in a different way. Use your knowledge of cartographic grammar and thematic maps to select the correct answers from the drop-down lists.

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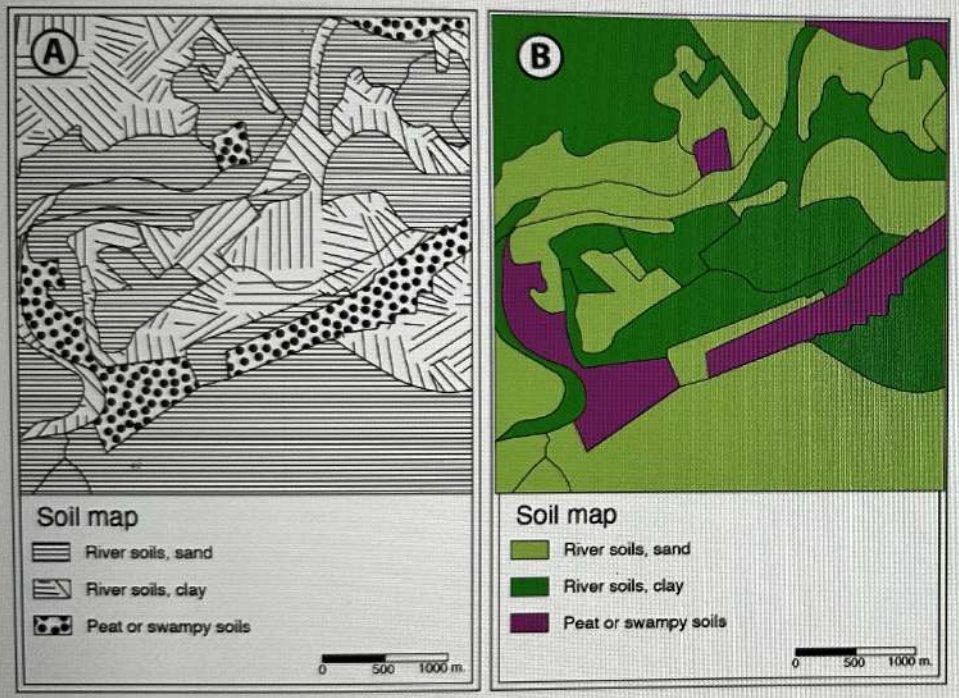
Question 26

0.4 / 0.5 pts

Look at the 2 maps below. They are based on the same data but visualized in a different way. Use your knowledge of cartographic grammar and thematic maps to select the correct answers from the drop-down lists.



The nature of the data used in the maps is Qualitative Nominal

The visual variable chosen for the maps should create the following perception for that measurement scale [Select]

Map A: For showing the data the following visual variable is used [Select]

Map B: For showing the data the following visual variable is used [Select]

The optimal solution to reach the needed perception according to the graphic grammar theory is [Select]

New Tab

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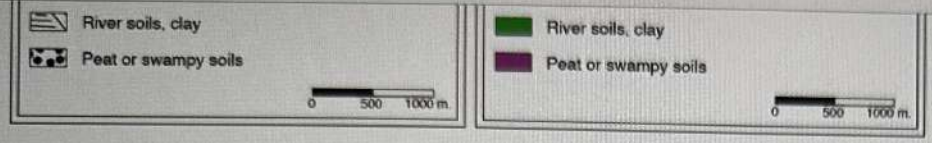

The nature of the data used in the maps is Qualitative Nominal

The visual variable chosen for the maps should create the following perception for that measurement scale [Select]

Map A: For showing the data the following visual variable is used [Select]

Map B: For showing the data the following visual variable is used [Select]

The optimal solution to reach the needed perception according to the graphic grammar theory is [Select]

Answer 1:

Correct! Qualitative Nominal

Answer 2:

Correct! Associative

Answer 3:

Correct answer Texture

You Answered Form

Answer 4:

Correct! Colour

Answer 5:

Correct! Map B

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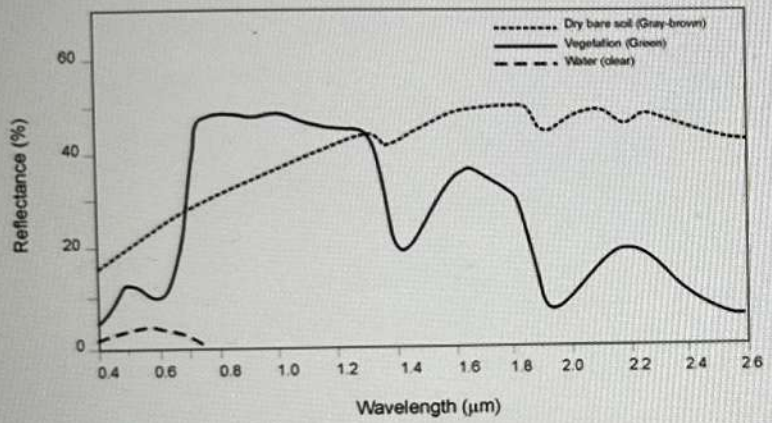
HELP CENTER

Question 27

0 / 0.4 pts

Combine your knowledge of spectral signatures of major objects Water, Green vegetation and Soil, with spectral properties of sensors and visualisation principles to answer the following question.



You obtain an image of the Netherlands from the Sentinel 2 satellite (spectral properties of the sensor are given below). The image covers only water objects, soil and green vegetation and has been converted into reflectance and resampled to a common 10 meter spatial resolution. You decide to select Band 2, Band 11 and Band 8 for a colour composite.

Band	Wavelength (µm)	Bandwidth (µm)	Resolution (m)	Swath width (km)	Revisit time (days)
Band 1 (VIS)	0.443	0.02	60	290	5
Band 2 Blue (VIS)	0.49	0.065	10	290	5
Band 3 Green (VIS)	0.56	0.035	10	290	5
Band 4 Red (VIS)	0.665	0.03	10	290	5
Band 5 (VIS)	0.705	0.015	20	290	5
Band 6 (VIS)	0.74	0.015	20	290	5
Band 7 (VIS)	0.775	0.02	20	290	5
Band 8 (NIR)	0.842	0.115	10	290	5
Band 8A (NIR)	0.865	0.02	20	290	5
Band 9 (NIR)	0.94	0.02	60	290	5
Band 10 (SWIR)	1.375	0.02	60	290	5
Band 11 (SWIR)	1.61	0.09	20	290	5
Band 12 (SWIR)	2.19	0.18	20	290	5

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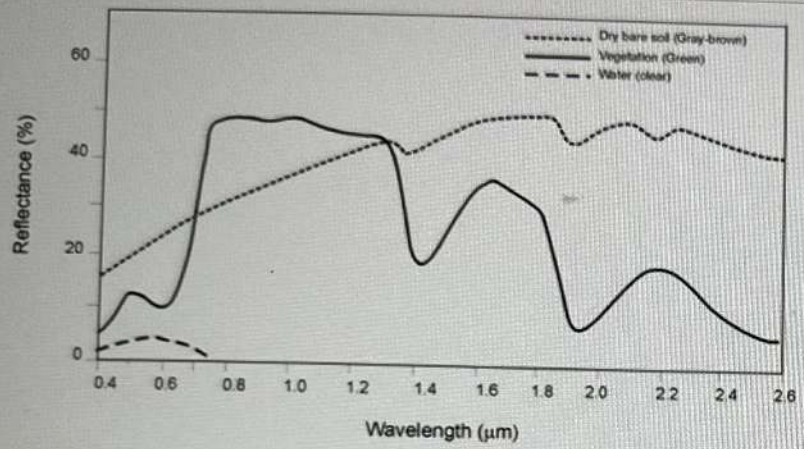

You obtain an image of the Netherlands from the Sentinel 2 satellite (spectral properties of the sensor are given below). The image covers only water objects, soil and green vegetation and has been converted into reflectance and resampled to a common 10 meter spatial resolution. You decide to select Band 2, Band 11 and Band 8 for a colour composite.

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Band 9 (NIR)	0.94	0.02	60	290	5
Band 10 (SWIR)	1.375	0.02	60	290	5
Band 11 (SWIR)	1.61	0.09	20	290	5
Band 12 (SWIR)	2.19	0.18	20	290	5

You would like to show green vegetation in an Orange/Yellow colour. Which Band combination do you use for display in Red, Green and Blue?

- Band 2, Band 8 and Band 11

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Band	Wavelength (µm)	Bandwidth (µm)	Resolution (m)	Swath width (km)	Revisit time (days)
Band 1 (VIS)	0.443	0.02	60	290	5
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Band 11 (SWIR)	1.61	0.09	20	290	5
Band 12 (SWIR)	2.19	0.18	20	290	5

You would like to show green vegetation in an Orange/Yellow colour. Which Band combination do you use for display in Red, Green and Blue?

- Band 2, Band 8 and Band 11
- Band 11, Band 2 and Band 8
- Band 2, Band 11 and Band 8

Correct answer

- Band 8, Band 11 and Band 2

You Answered

- Band 8, Band 2 and Band 11
- Band 11, Band 8 and Band 2

0 / 0.4 pts

Question 28

Use your common knowledge of statistics, visualisation and global contrast enhancement to answer the following question.

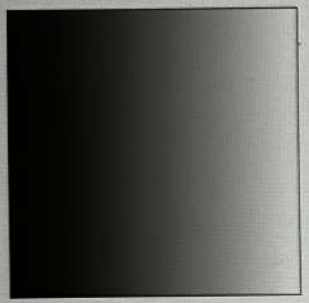
HELP CENTER

Question 28

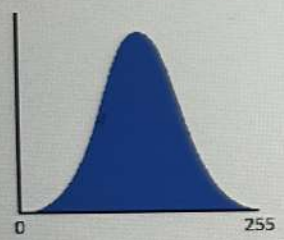
0 / 0.4 pts

Use your common knowledge of statistics, visualisation and global contrast enhancement to answer the following question.

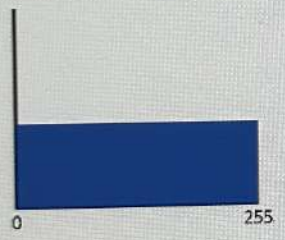
You have the following image (8-bit data type) on screen when you apply no contrast stretch (the black square/box is not part of the image):



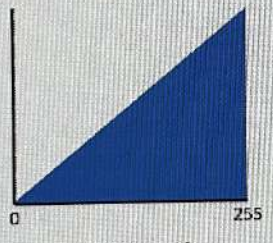
You calculate a histogram and plot it as a graph. The vertical axis represents the frequency.



Histogram 1



Histogram 2



Histogram 3

Which graph do you expect? Histogram 1

You apply a global contrast stretch to obtain the following image:

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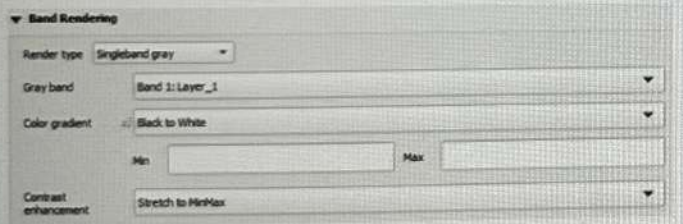
Histogram 1 Histogram 2 Histogram 3

Which graph do you expect? Histogram 1

You apply a global contrast stretch to obtain the following image:

Which minimum and maximum value have you entered for the contrast stretch Minimum = 0 and Maximum = 255 in the QGIS Symbology dialogue:



Answer 1:

Correct answer Histogram 2

You Answered Histogram 1

Answer 2:

You Answered Minimum = 0 and Maximum = 255

Correct answer Minimum = 0 and Maximum = 127