FIELD OF STUDY: CONSTRUCTION

Responsible Partner: HORIZONT PROCONSULT

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1. GENERAL CONSTRUCTION

Description: Building: bracing, scaffolding, and temporary structures. Dig trenches, backfill holes, or compact earth to prepare for construction. Operate or tend equipment and machines used in construction. Follow construction plans and instructions from supervisors or more experienced workers.

1.1. Theoretical competences

Knowledge of construction material parameters, construction site elements, construction standards, Understanding of construction drawings.

1. The following shall be deemed to be the commencement of construction in accordance with the issued construction documents:

The day of drawing up the protocol for opening of the construction site and determination of the construction line and level	X
The date of the building permit;	
The date of signature of the contract between the contractor and the contracting authority;	
The date of the protocol of handover and acceptance of the approved project.	
I don't know	

2. Name three types of roofing materials commonly used in construction.

Concrete, wood, and vinyl	
Steel, plastic, and rubber	
Asphalt shingles, metal roofing, and clay tiles	X
Glass, aluminum, and copper	
I don't know	

3. What is the purpose of a load-bearing wall?

To provide insulation	
To provide ventilation	
To support the weight of the building above it and distribute that weight evenly to the foundation below	X
To provide additional living space	
I don't know	

4. What is the difference between concrete and cement?

Concrete is a binding agent used to make cement	
Cement is a mixture of concrete and water	
Cement is a binding agent used to make concrete	X
Concrete and cement are the same thing	
I don't know	

5. What is the process of waterproofing in construction?

Applying a waterproof coating to a surface to prevent water from penetrating it	X
Installing drainage systems to direct water away from the building	
Building a barrier around the building to keep water out	
None of the above	
I don't know	

1.2. Practical skills

Able to calculate surfaces and materials requirements, follows and regulates the processes of installing, repairing, knows how to use proper materials. Technical skills: stonework, tiling, surveying, metalwork, plumbing, electrical wiring, painting, etc. for the specific area of specialization

1. Which answer is incorrect regarding the use of an on-site concrete center (mobile concrete unit)?

It can be created and used in a remote area that is regulated.	
It can be created and used in a busy urban environment where concrete mix deliveries create problems for normal vehicle traffic in the vicinity of the site.	
It is always necessary to have it when the construction is in a remote area, a permit is not needed	X
It can be created if the construction site is located on a sloped terrain where it is difficult to transport the concrete mix to the pouring location.	
I don't know	

2. Which of the following statements is TRUE regarding the properties of building soil and construction:

The type of foundation (construction base) does not depend on the properties of the building soil	
The choice of earthmoving equipment always depends on the properties of the building soil	
The properties of the building soil have no effect on the type of building that can be constructed	
The properties of the building soil determine the type of foundation (construction base)	X
I don't know	

3. Calculate the amount of latex required to paint a wall if the clear height is 3m, the width is 5m and the paint consumption rate is 200g/m².
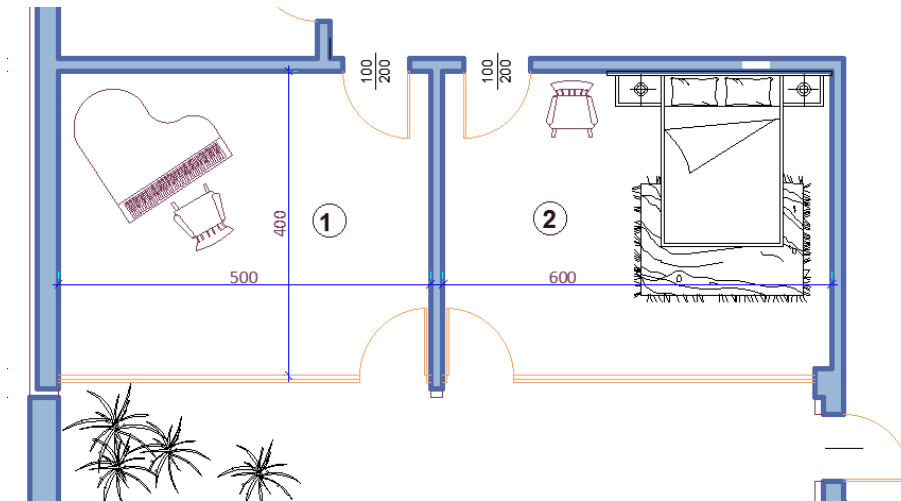
2 kg	
1 kg	
3 kg	x
4 kg	
I don't know	

4. How do you properly mix concrete?

Add water until the mixture is soupy	
Mix the cement and water in a 1:1 ratio	
Add water gradually and mix until the concrete is smooth and workable	X
Mix the concrete with a shovel until it is well combined	
I don't know	

5. Which of the following is the most common material used for sewer pipes in a building's sewage system?

Concrete	
PVC	X
Clay	

Cast iron	
I don't know	

1.3. IT skills

Knows how to read technical drawings and projects created with the use of computer programs. Is able to use computer application programs to estimate the cost of construction work.

1. Which of the following software programs cannot be used for 3D modeling in construction?

AutoCAD	
Adobe Photoshop	X
SketchUp	
Autodesk Revit	
I don't know	

2. Which software can be used for cost estimating in construction?

Bluebeam Revu	X
Autodesk Revit	
Slack	
Microsoft Project	
I don't know	

3. Which software can be used for project management in construction?

Microsoft Project	X
Adobe Illustrator	

QuickBooks	
Google Drive	
I don't know	

4. Which software can be used for scheduling in construction?

Adobe InDesign	
Primavera P6	X
Zoom	
Microsoft Teams	
I don't know	

5. Which software can be used for construction document management?

OneDrive	
Basecamp	
PlanGrid	X
Adobe After Effects	
I don't know	

2. GEODESY

Geodesy engineering is an integral part of complex projects, which involve data collection within framework of underground structures construction, landslides mapping, measuring and calculating the accurate position of objects.

2.1. Theoretical competences

Knowledge of surveying networks, photographs, coordinate systems and calculations, tracing, etc. Knowledge of execution technology and work organization.

1. Which one of the following conditions is NOT required when selecting working points:

Points to be selected on stable terrain, property boundaries, along roads, etc	
Have visibility to adjacent work points	
To have maximum visibility of the adjacent surroundings to enable a greater number of details to be captured from each operating point	
To be in the shade	X
I don't know	

2. The necessary tools for geometric levelling are:

Spirit level, tripod, level staff	X
Total station, tripod, prism	
GNSS receiver	
Compass, ruler, protractor	
I don't know	

3. Describe the sequence of work in horizontal alignment of a theodolite with an optical plumb bob.
   1. *Horizontalize the barrel with lifting screws.*
   2. *Horizontalize the round libel of the theodolite with the legs of the tripod.*
   3. *Center the theodolite on the point with the optical plumb.*

1,2,3	
3,2,1	X
2,3,1	

2,1,3	
I don't know	

4. Which answer is NOT part of the requirements that must be met for geometric leveling between two points.

The spirit level shall be placed at equal distances from the points.	
Measurements to be taken at two positions of the sight tube.	X
Do not make a report smaller than 0.300m.	
The distances to the lats should not be too large (up to 60m).	
I don't know	

5. Which of the following is typically included in a survey map of a building?

The names of the surveyors who conducted the survey	
The location of the nearest fire hydrant to the building	
The dimensions of the building's interior rooms	
The location of reference points with their corresponding elevation and the dimensions of the building's exterior walls	x
I don't know	

2.2. Practical skills

Knowledge on using data science, skills for laying a working geodesic base, making various types of measurements, working with specific instruments, drawing sketches and modelling tools to handle the complexities of building data

1. How can you route a given elevation of ±0.00 (elevation "zero") - which is the elevation of the first or ground floor - based on the elevation of the starting benchmark?

Subtract the given elevation from the elevation of the starting benchmark	
Multiply the given elevation by the elevation of the starting benchmark.	
Add the given elevation to the elevation of the starting benchmark.	
Divide the given elevation by the elevation of the starting benchmark.	X
I don't know	

2. What measurements should the operator take when orienting the station for a polar plot? Which one is incorrect?

Measure the horizontal directions and vertical angles	
Measure the distances at two positions of the sight tube while aiming successively at the two adjacent operating points.	
Measure the instrument and signal height.	
Check the connection with the satellites.	X
I don't know	

3. **It is given that:** Point18 with its coordinates:

Y18 = 8,604,567.22; X18 = 4,728,764.32;
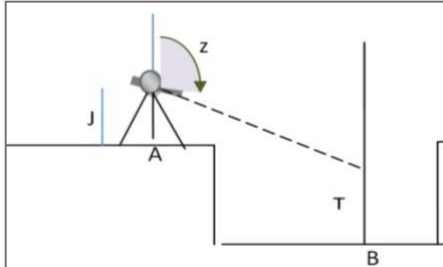
The pointing angle□18,19 =375.3900; Distance

S18,19 =168.42.

Calculate the coordinates of point 19

Y19 = 8 604 503,72 X19 = 4 728 920,31	X
Y19= 9 604 503,72 X19= 5 728 920,31	
Y19= 7 604 503,72 X19= 3 728 920,31	
Y19= 8 604 503,72 X19= 3 728 920,31	

4. In checking the trench bottom level, the elevation of item A (H_A) was given and the following measurements were taken:

- **Zenith angle from point A to point B - z_{AB}**
- Horizontal distance - S_{AB}
- **Height of the tool at point A - I**
- Signal height at point B - T

Choose the correct formula by which the elevation of item C is to be determined

HB = H +SAAB .cotgzAB + I - T	X
HB = H +SAAB . sinzAB + I - T	
HB = H +SAAB . tgzAB + I + T	
HB = H +SAAB .cotgzAB - I +T	
I don't know	

5. What is used in geodetic coordinate calculations?

Newton's formulae	
Gauss's theorem of gravitational field	
First and second geodetic problem	X
Einstein's law of relativity	
I don't know	

2.3. IT skills

Ability to use a computer application program for working and creating drawings such as CAD: enables the development, modification, and optimization of the design process. The CAD softwares are the most commonly used in the construction insustry and have different variations depending on the specific field e.g. ARCHICAD, MCAD, CADIS, TPLAN

1. With which settings can the angle units be changed in AutoCAD to input angles in grads while creating a survey drawing?

From the Dimension panel, select Angular.	
From the Format panel, select Units and change the unit of angles to Deg/Min/Sec.	
From the Format panel, select Units and change the unit of angles from decimal degrees to grads.	X
From the Draw panel, select Grades.	
I don't know	

2. Which commands in AutoCAD can be used to determine the coordinates of a point?

LIST and MEASURE	
ID and LENGTHEN	
ALIGN and LENGTHEN	
LIST and ID	X
I don't know	

3. When entering coordinates in AutoCAD, which one do you type first?

Y	X
X	

Both X and Y simultaneously	
There is no specific order	
I don't know	

4. Which command in AutoCAD can we use to stroke the trench and embankment when drawing an earthwork cartogram?

HATCH	X
TRIM	
EXTEND	
OFFSET	
I don't know	

5. Which of the following statements is true about the AREA command in AutoCAD?

It is used to create objects in AutoCAD	
It is used to modify the appearance of objects in AutoCAD	
It is used to determine the area of an object in AutoCAD	X
It is used to apply materials to objects in AutoCAD	
I don't know	

3.   ARCHITECTURE/ DESIGN

Architectural design is a discipline that focuses on covering and meeting the needs and demands, to create living spaces, using certain tools and especially, creativity. Therefore, the aim is to combine the technological and the aesthetic, despite the general belief that architecture is only a technological task.

3.1. Theoretical competences

Defines the nature of geometric and projection drawing, names the tools and methods required for measurement, knows building elements describes their purpose, lists the types of building construction products and describes conditions and procedures, knowledge of new trends in design, knowledge on structures and installations

1. Indicate the correct statement.

The section includes the elements falling in the secant plane and those visible behind it	
The section includes only elements in view	
Section includes only the elements falling in the secant plane	X
"Section" and "Incision" are terms of equal meaning.	
I don't know	

2. Identify the type of projection in which the body is depicted.

Isometric axonometry	X
Dimetric axonometry	
Trimetric axonometry	
None of the above	
I don't know	

3. The main structural elements of beamless structures are:

Girders and concrete slabs	

Reinforced concrete slabs and columns	X
Columns and beams	
Girders and beams	
I don't know	

4. Choose the correct sequence that represent the transfer of loads from one element to another

BEAM-> COLUMNS-> FUNDAMENTAL	X
FUNDAMENTALS->COLUMNS-> BEAM	
COLUMNS->BEAM->FUNDAMENTALS	
BEAM-> FUNDAMENTALS-> COLUMNS	
I don't know	

5. Fill in the gap: The layouts and vertical sections are drawings from the ……….. part of the investment project.

|	
"Architectural"	X
"Design"	
"Geodesy"	
"Accountancy"	
I don't know	

3.2. Practical skills

Knows how to draw a sketch, work with tools, apply measurement methods, draw existing building site graphically to scale from a hand sketch

1. When drawing a sketch of a room in plan, which of the following should be considered when choosing a scale?

The location of windows and doors	
The type of flooring material to be installed	
The height of the ceiling	
The overall size of the room.	X
I don't know	

2. When plotting the orthogonal projections of a body at 1:10 scale, as in the graphic bellow, which of the following statements is true?
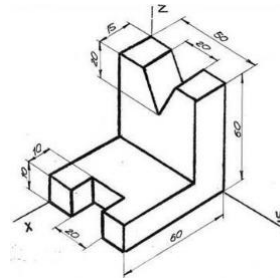

The scale of the projection should be reduced by a factor of 10.	
The scale of the projection should be increased by a factor of 10.	X
The scale of the projection should remain the same.	
The scale of the projection should be reduced by a factor of 100.	
I don't know	

3. Write down the scale at which a figure is drawn if the dimensions of the scaled image are twice the actual dimensions.

M 2:1	X
M3:4	
M1:2	
M1:4	
I don't know	

4. Apply the dimensions according to the rules in the construction drawing from hand sketch at a scale of 1:50. Choose the exact dimensions in cm that must be drawn for given 600 cm, as shown in the sketch bellow
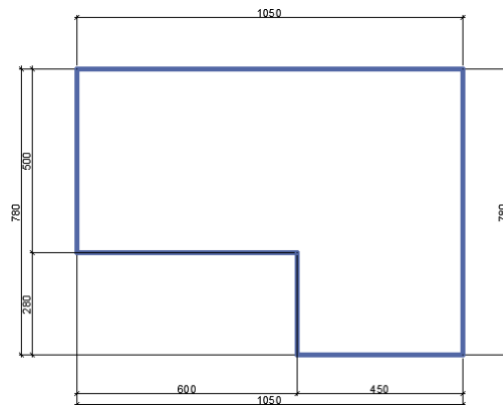
| 14	
20	
9	
12	X
I don't know	

5. The section is drawn at M1:50 and is 5 cm. What is the length of the segment in M1:25?

10 cm	X
15 cm	
25 cm	
250 cm	
I don't know	

3.3. IT skills

Know how to use programs such as: Revit, Bluebeam, BIM360, AutoCAD , Photoshop and Microsoft Suite and similar. Ability to use BIM to analyse potential design solutions for building services clashes Ability to create presentation drawings with perspectives using REVIT.

1. What is the name of the given graphic object in Auto CAD if it is an indivisible object.
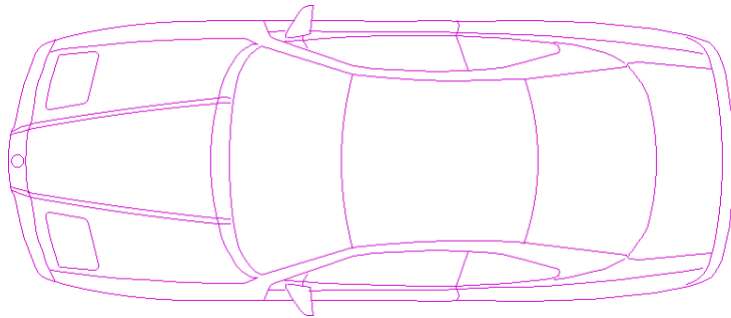
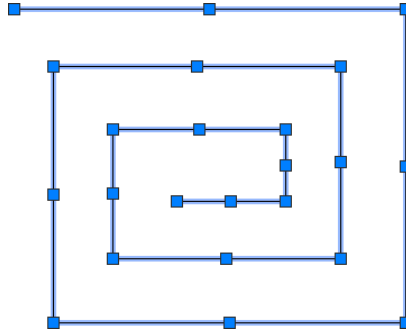| EXTERNAL REFERENCE	
HATCH	
BLOCK	X
TABLE	
I don't know	

2. Which Auto CAD command was used to draw the geometric object?

POLIGON	
POLYLINE	X
RECTANGLE	

BLOCK	
I don't know	

3. What are the blue boxes called that appear when an object is selected in Auto CAD called?

POINTS	
RENGERS	
MANUAL MANIPULATORS	X
BOXES	
I don't know	

4. Which AutoCAD function allows you to create precise drawings using geometric shapes and dimensions?

Sketch	
Draft	
Draw	X
Design	
I don't know	

5. Choose the correct sequence of building a rectangle in Auto CAD , if its dimensions are 100 cm (horizontal) and 70 cm (vertical).

RECTANGLE command is run**;** Specify a point (with coordinates or arbitrary) to be one of the vertices of the rectangle; Diagonal Opposite top is introduced in relative, Cartesian coordinates - **@ 100,70**	X
Command LINE in **ORTHOMODE:** Set the length of the line in the horizontal direction to be 100; Change the vertical direction and set the length to be 70.	
POLYLINE command is run; Enter 4 points whit the specified dimensions of 70 and 100 ; Select the polyline and use the PEDIT command to convert it to a rectangle.	
CIRCLE command is run; Specify the center point of the circle; Set the radius to be half of the horizontal dimension- 50 cm; Use the TRIM command to remove the top and bottom portions of the circle to form a rectangle.	
I don't know	

4. SEWERAGE AND ELECTRICAL SYSTEM CONSTRUCTION

Sewerage system installation: Includes the knowledge and skills related to the organization construction, control and operation of water supply and sewerage systems in small settlements and networks in buildings. Electrical system installation handles both low and high voltage equipment and connections such as lighting systems, standby power generating plants, power distribution systems, and other power devices.

4.1. Theoretical competences

Knowledge on water supplies systems/ lightning systems terminology, safety measures, requirements and conditions when installing

1. What is the purpose of a sanitary sewer?

To collect and transport stormwater runoff	
To distribute potable water to buildings	
To collect and transport wastewater from buildings	X
To supply electricity to buildings	
I don't know	

2. Which type of electrical wiring is commonly used for residential wiring?

Fiber optic cable	
Coaxial cable	
Non-metallic (NM) cable	X
Shielded twisted pair (STP) cable	
I don't know	

3. Which type of sewer pipe is most commonly used for building sewer systems?

PVC (polyvinyl chloride) pipe	X
Copper pipe	
Galvanized steel pipe	
Cast iron pipe	
I don't know	

4. What does a surge protector do?

Regulates the voltage of an electrical circuit	
Prevents electrical devices from overheating	
Protects against sudden spikes in electrical voltage	X
Controls the flow of electricity	
I don't know	

5. What is the purpose of a cleanout in a sewer system?

To provide a point of access for inspecting and cleaning the sewer line	X
To remove odors from the sewer line	
To regulate the flow of wastewater in the sewer line	
To prevent debris from entering the sewer line	
I don't know	

4.2 Practical skills

Knows how to design and install particular hydro or electrical system when constructing a building. Knowledge on the materials that can be used, measurements, processes, etc.

1. What is the recommended method for joining PVC sewer pipes?

Using adhesive cement	
Using mechanical couplings	X
Using threaded fittings	
Using compression fittings	
I don't know	

2. Which tool is typically used to strip electrical wires?

Pliers	
Screwdriver	
Wire stripper	X
Hammer	
I don't know	

3. When installing electrical outlets, what is the standard height from the floor?

18 inches	X
24 inches	
36 inches	
48 inches	
I don't know	

4. What is the purpose of a ground fault circuit interrupter (GFCI)?

To prevent electrical overloads	
To prevent fires	

To prevent electrocution	X
To prevent short circuits	
I don't know	

5. When installing a sewerage system, what is the recommended slope for drain pipes?

2% (2 cm per meter)	X
1% (1 cm per meter)	
0.5% (0.5 cm per meter)	
0.25% (0.25 cm per meter)	
I don't know	

4.3. IT skills

Ability to use basic construction softwares and cost estimating softwares.

1. What is the purpose of a hydraulic calculation software when designing a building's water supply system?

To design the building's HVAC system	
To determine the building's structural integrity	
To determine pipe sizes, flow rates, and pressure requirements	X
To calculate the building's energy consumption	
I don't know	

2. Which software can be used for collaboration and communication in construction?

Trello	

Procore	X
Evernote	
Adobe Dreamweaver	
I don't know	

3. What is the purpose of a Programmable Logic Controller (PLC) in an electrical system?

To control and automate machinery and processes	X
To provide backup power in case of a blackout	
To regulate the building's temperature	
To monitor the building's water usage	
I don't know	

4. What is the purpose of a Building Management System (BMS)?

To design the building's structure	
To monitor the building's security system	
To regulate the building's water temperature	
To monitor and control a building's mechanical and electrical systems for energy efficiency and occupant comfort.	X
I don't know	

5. Which of the following is not a feature of Building Information Modeling (BIM) software?

Collaboration tools for project stakeholders	
Cost estimation and budget tracking	
3D visualization of building components	
Real-time monitoring of energy consumption	X

I don't know	