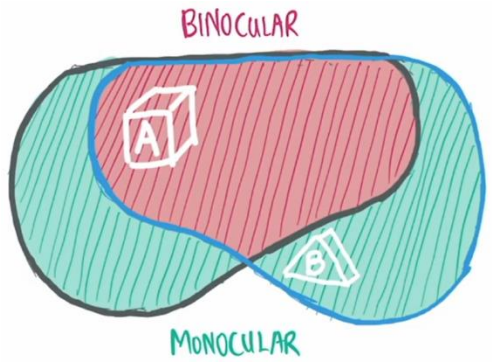
CSD3120 – Introduction to Virtual Reality Formative Quiz 1

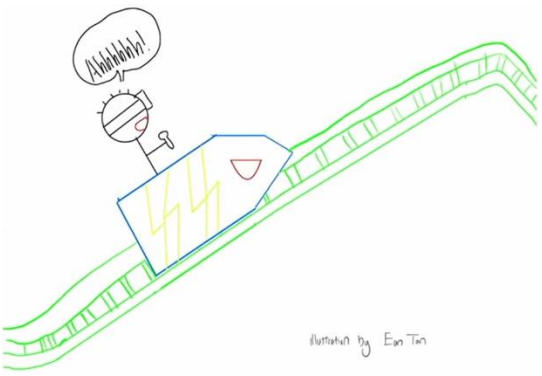
Question 1 (1 point)



Compared to object B, why is object A easier for the user to reach out and grab with his/her hands?

- Humans have a better sense of depth using binoculars
- The resolution is higher in the binocular FOV
- Humans see things more clearly near the top of the FOV
- The binocular FOV is larger
- Humans have a better sense of depth in the binocular FOV

Question 2 (1 point)



In a VR user study, this was an account from a participant: “My eyes feel very tired after a while during the VR rollercoaster experience”

Which dimension of cybersickness is this?

- Nausea
- Oculomotor
- Disorientation
- Involvement
- Realness

Question 3 (1 point)

In the IPA, you are supposed to extend XRAuthor. Now Songjia decides to change his canvas id in the index.html file of XRAuthor project.

Which file should you amend in your IPA project to retain the connection between your extension and XRAuthor?

- index.ts
- app.ts
- webpack.config.js
- tsconfig.json
- package.json
- None of the answers are correct

Question 4 (1 point)

In your WebXR typescript-based app bundled with webpack, you want to enable a new “npm run commit” command to run on the command line in your app directory. When run, this new command will build and commit+push latest changes to GitHub.

Name the file in your project directory you should amend to make this happen.

package.json

Question 5 (1 point)

Which of the following is/are characteristic experiential dimensions of flow known in current research literature?

- ▪ Sense of Control
- ☐ Realness
- ▪ Loss of self-consciousness
- ▪ Warped sense of time
- ▪ Effortlessness

Question 6 (1 point)

You are tasked to build a VR game where users can roam freely in a vast open world. The distances between points of interest in the game is rather large, around 10-20 kilometres. Cybersickness is an important concern and augmentation of movement speeds is known to induce more symptoms.

What locomotion technique is best suited for this use case?

- ○ walking-in-place (WIP) with KatVR 360 slidemill
- ○ walking-in-place (WIP) with HTC Vive HMD and trackers
- • teleportation
- ○ tracking real/ movement in physical space
- ○ joystick-based

Question 7 (1 point)

```
1   async createScene() {
2       const scene = new Scene(this.engine);
3
4       // create arc camera to do simple rotate inspections
5       const camera = new ArcRotateCamera("arcCamera", -Math.PI / 2, Math.PI / 2, 5, Vector3.Zero(), scene);
6       camera.attachControl(this.canvas, true);
7
8       // create blue-ish HemisphericLight
9       const light = new HemisphericLight("hemLite", new Vector3(-1, 1, 0), scene);
10      light.intensity = 0.9;
11      light.diffuse = new Color3(0.6, 0.6, 1);
12
13      // load a 3d model from a file
14      let model: Mesh;
15      SceneLoader
16          .ImportMeshAsync('', 'assets/models/', 'H2O.glb', scene)
17          .then(
18              result => {
19                  model = result.meshes[0] as Mesh;
20              });
21
22      // shift the model a little
23      model.position.y = 1;
24
25      // create the XR-related stuff
26      await scene.createDefaultXRExperienceAsync({
27          uiOptions: {
28              sessionMode: 'immersive-vr'
29          },
30      });
```

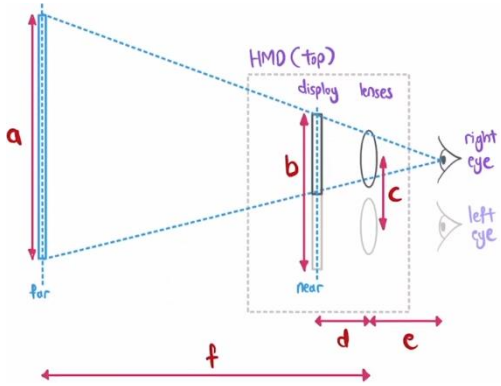
This code has a runtime error due to one offending line, which line needs to be removed for it to work?
(refer to the line numbers on the left gutter of the code snippet)

Hint: it is a runtime error with nothing to do with syntax, and all class and function names are correct.

23

Question 8 (1 point)

In the schematic HMD diagram, where is the IPD?



- ○ a
- ○ b
- • c
- ○ d
- ○ e
- ○ f

Question 9 (1 point)

What is the API class in BabylonJS that will allow you to easily use 360 videos as the skybox?

Write the exact name of the class without additional spacing, and don't prepend with the "BABYLON." namespace.

VideoDome

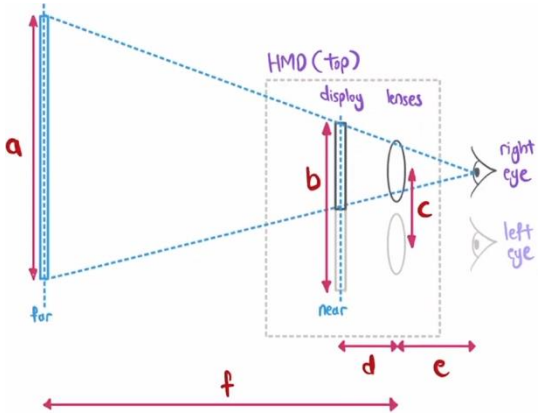
Question 10 (1 point)

Which of the following is/are symptoms of cybersickness well-known in current research literature?

- ☐ Warped sense of time
- ☐ Loss of self-consciousness
- ▪ Eyestrain
- ▪ Blurred vision
- ▪ Giddiness

Question 11 (1 point)

In the schematic HMD diagram, which value(s) will be changed if c was changed?



- • a
- ○ b
- ○ c
- ○ d
- ○ e
- ○ f

Question 12 (1 point)

A profitable real estate company wants you to build a virtual house tour application that aims to allow users to virtually view a house to make purchase decisions. Users can be anyone looking to buy houses and you are expecting them to use your application in their own time on their own devices. The company wants to avoid paying any license fees for development or maintenance. Which tool is most suitable for you to base your development on?

- ○ OpenXR SDK in C++
- ○ CoSpaces
- ○ Blender
- • BabylonJS
- ○ Unity

Question 13 (1 point)

In the Google Cardboard HMD, you want to expand the vertical FOV.

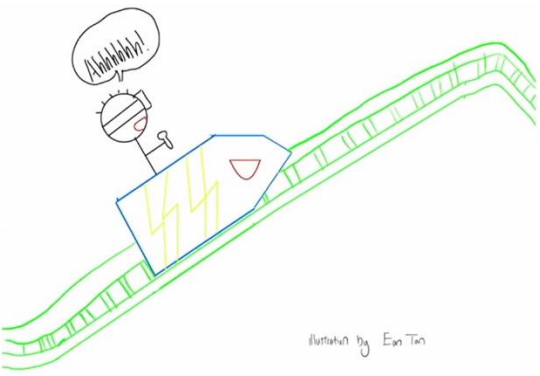
What dimension(s) can you change to achieve this?

- ▪ Distance between the lenses and the physical display
- ☐ IPD between the lenses
- ☐ Width of the physical display
- ▪ Focal length of the lenses
- ▪ Eye relief
- ▪ Height of the physical display

Question 14 (1 point)

In a VR user study, this was an account from a participant: "I could feel my palms and feet sweating when the rollercoaster started the large descent. It felt like I was on a real/ rollercoaster. It was fun!"

What is the type of experience being described by the participant here?



- • Presence
- ○ Flow
- ○ Cybersickness
- ○ None of the answers are correct

Question 15 (1 point)

Your UX team aims to improve feelings of involvement, realness and reduce feelings of disorientation and nausea. They will run user studies before and after some key features changes are made to your existing VR application.

What is/are the possible famous validated questionnaires to use in the user studies, pertinent to the aims above, to aid in design decisions for your UX team?

- ▪ Virtual Reality Sickness Questionnaire (VRSQ)
- ☐ System Usability Scale (SUS)
- ▪ Simulator Sickness Questionnaire (SSQ)
- ☐ Flow State Scale (FSS)
- ▪ Igroup Presence Questionnaire (IPQ)

Question 16 (1 point)

What sort of affordance occurs when you strap on Vive trackers on the hands and feet for an experienced VR user in a VR commuting simulator application with walking as the main interaction?

- The user will reach out for a Vive controller to use the thumbstick to navigate in the virtual environment
- The user will only consciously lift the legs in a natural fashion to navigate in the virtual environment
- The user will consciously use both the hands and feet in his/her own way to navigate in the virtual environment
- The user will only consciously use the hands in his/her own way to navigate in the virtual environment
- The user will only consciously swing the hands in a natural fashion to navigate in the virtual environment
- The user will only consciously use the feet in his/her own way to navigate in the virtual environment
- The user will perform a natural walking action with the whole body to navigate in the virtual environment

---

Question 17 (1 point)

In the Google Cardboard HMD, you want to make the generated virtual image look like it's further away.

What dimension(s) can you change to achieve this?

- ☐ Eye relief
- ☐ Height of the physical display
- ☐ Width of the physical display
- ▪ Focal length of the lenses
- ▪ Distance between the lenses and the physical display
- ☐ IPD between the lenses

Question 18 (1 point)

In the VR game Land's End, what form of interaction authenticity is the eye-gaze point-and-click mechanic?

- ☐ Natural interaction
- ☐ Artificial magical interaction
- ▪ Artificial augmented natural interaction

Question 19 (1 point)

What is a valid property of the view frustum generated by typical HMDs?

- Volume is both vertically and horizontally symmetric
- Volume is both vertically and horizontally asymmetric
- Volume is horizontally asymmetric only
- Volume is vertically asymmetric only

Question 20 (1 point)

In the VR game Land's End, what interaction mechanics were implemented?

- ▪ hand gestures
- ▪ viewpoint control
- ☐ body (excluding hands) gestures

CSD3120 – Introduction to Virtual Reality Menti Quiz 1

Question 1

VR was invented in the 21st Century (2001 – 2100)

- ○ True
- • False

Question 2

What is the common public perception of the difference between AR and MR?

- ○ They are the same
- ○ AR refers to blending virtual objects onto the real-world
- • Virtual entities in MR can interact with real-world objects

---

Question 3

Which of the following describes immersion from a systems perspective?

- ▪ Wide FOV
- ☐ Higher spatial presence
- ☐ Higher place illusion
- ▪ 8K Resolution display
- ☐ Lower cybersickness
- ▪ 6-DOF inside-out tracking

Question 4

Which of the following describes immersion from an experiential perspective?

- ☐ Wide FOV
- ▪ Higher spatial presence
- ▪ Higher place illusion
- ☐ 8K Resolution display
- ▪ Lower cybersickness
- ☐ 6-DOF inside-out tracking

Question 5

What experiential constructs were analysed in the user study in the paper on "Exploring Gameplay Experiences on the Oculus Rift"?

- ▪ Flow
- ☐ Presence
- ☐ Place illusion
- ☐ Plausibility illusion
- ▪ Cybersickness

CSD3120 – Introduction to Virtual Reality Menti Quiz 1

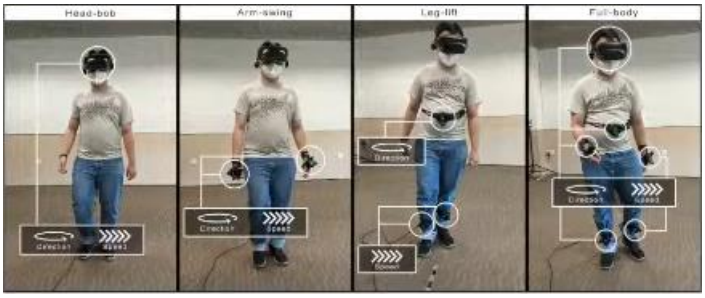
Question 6

What quantitative data was analysed in the user study in the paper on “Exploring Gameplay Experiences on the Oculus Rift”?

- ▪ Flow
- ☐ Presence
- ☐ Cybersickness
- ▪ Physiological measures
- ☐ User behaviours

Question 7

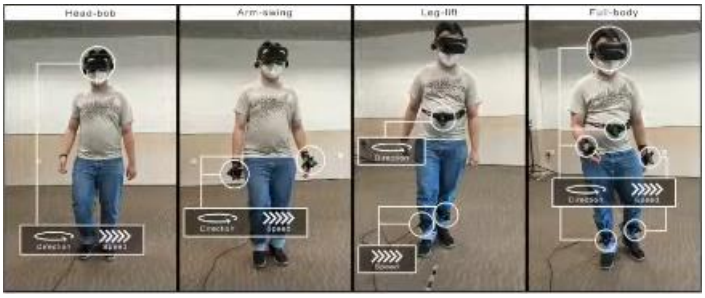
What quantitative data was analysed in the user study in the paper on “Understanding User Experiences Across VR Walking-in-place Locomotion Methods”?



- ▪ Flow
- ▪ Presence
- ▪ Cybersickness
- ☐ Physiological responses
- ☐ User behaviours

Question 8

What qualitative data was analysed in the user study in the paper on “Understanding User Experiences Across VR Walking-in-place Locomotion Methods”?



- ▪ Flow
- ▪ Presence
- ▪ Cybersickness
- ☐ Physiological responses
- ▪ User behaviours

Question 9

What is the best type of data to answer this research question?
“Is the VR version more immersive than the desktop version of myApp?”

- ○ Observations
- ○ Think-aloud during the experience
- • Questionnaires
- ○ Post-experience interviews
- ○ Physiological sensing
- ○ Telemetry

CSD3120 – Introduction to Virtual Reality Menti Quiz 1

Question 10

What is the best type of data to answer this research question?
"What user experience does the VR classroom intervention afford during the class?"

- Observations
- Think-aloud during the experience
- Questionnaires
- Post-experience interviews
- Physiological sensing
- Telemetry

Question 11

Which of the following is NOT a symptom of cybersickness?

- Blurred vision
- Eyestrain
- Giddiness
- Loss of self-conscious
- Vertigo

CSD3120 – Introduction to Virtual Reality Menti Quiz 2

Question 1

"This one feels dizzier than the previous one." – What dimension of cybersickness is this?

- Disorientation
- Nausea
- Oculomotor
- Involvement
- Realness

Question 2

"I find it very hard to focus on anything in the scene." – What dimension of cybersickness is this?

- Disorientation
- Nausea
- Oculomotor
- Involvement
- Realness

Question 3

Which questionnaire should I use when I need to use the results to inform v2.0 development of my VR?

- ☐ SSQ
- ▪ CSQ
- ▪ VRSQ

Question 4

Which questionnaire should I use when I need to compare my results with a pool of prior research studies from others?

- ▪ SSQ
- ☐ CSQ
- ☐ VRSQ

Question 5

What is the type of experience being described here? "I was surprised that 30 minutes already passed after I took off the headset. I thought I only played the game for 5 minutes."

- Presence
- Flow
- Cybersickness

Question 6

What is the type of experience being described here? "My head knocked into the (real) wall as I tried to dodge the (virtual) ball coming towards me. My mum was actually telling me how close I got to the wall but I was totally unaware that she was talking."

- Presence
- Flow
- Cybersickness

Question 7

What is the type of experience being described here? “My friends were telling me how stupid I looked when I was playing the VR game. When I was in the game, I wasn’t aware of how I looked, I just wanted to conquer the challenges in there.”

- Presence
- **Flow**
- Cybersickness

Question 8

What is the main affordance on a haptic glove for an experienced VR user?

- **Reach out to touch things in the virtual environment**
- Pick up the VR controller to interact with the virtual environment
- Wave hand in the air
- Hug another character in the virtual environment

Question 9

Which design provides the right affordance for a door that is meant to be pushed

- Door with a large handle
- Door with a small handle
- **Door with no handle and a flat metal plate**
- Door with a twist knob
- Door with a large sign that says “PUSH”

CSD3120 – Introduction to Virtual Reality Quiz 3

Question 1 (1 point)
Rank the tools from the most accessible (**for developers without coding experience to use**) to the least.

1	CoSpaces
4	OpenXR with C++
3	Unity
2	BabylonJS

Question 2 (1 point)
You need to implement a cross-platform VR experience and you want to focus on **implementing VR components with the same code-base** across Meta's Quest HMDs, HTC's Vive HMDs, Google Cardboard. You hope to align it to an open standard so that there is a vibrant developer ecosystem and that the underlying tooling will be constantly improved. What standard should you be targeting?

- ○ Vulkan
- ○ OpenCL
- • **OpenXR**
- ○ WebXR
- ○ OpenGL
- ○ WebGL

Question 3 (1 point)
You are building a VR application that includes a novel immersive experience that is not commonly seen in current VR applications. You are part of a research lab that has some funding to obtain resources deemed necessary for development. Which tool(s) is **can be likely be used** for you to base your development on?

- ▪ BabylonJS
- ▪ OpenXR SDK in C++
- ▪ Unity
- ☐ CoSpaces
- ☐ Blender

Question 4 (1 point)
You are engaged by a mining company to build a VR system for training your own miners to operate a coal mine. They have funds to purchase any necessary hardware you propose that is suitable and within reasonable budget. They need the working system delivered within a short 8 months' time. Which tool is **most suitable** for you to base your development on?

- • Unity
- ○ OpenXR SDK in C++
- ○ CoSpaces
- ○ Blender
- ○ BabylonJS

Question 5 (1 point)
You need to implement a web-based VR experience and you want to focus on implementing the VR components. You hope to align it to an open standard so that there is a vibrant developer ecosystem and that the underlying tooling will be constantly improved. What standard should you be targeting?

- ○ OpenGL
- ○ WebGL
- ○ Vulkan
- ○ OpenCL
- • WebXR
- ○ OpenXR

Question 6 (1 point)
What is the main reason for choosing a WebXR-based development stack?

- ○ It provides the best immersion
- ○ Most immersive applications are built with it
- • It is open-source and allows us to build accessible cross-platform XR experiences
- ○ It is a robust API and with minimal bugs/issues

Question 7 (1 point)
You need to implement a cross-platform VR experience and you want to have **fine-grained control of GPU resources** when rendering. You hope to align it to an open standard so that there is a vibrant developer ecosystem and that the underlying tooling will be constantly improved. What standard should you be targeting?

- ○ OpenGL
- ○ WebGL
- ○ WebXR
- ○ OpenXR
- • Vulkan
- ○ OpenCL

Question 8 (1 point)
In your project directory containing your WebXR transcript-based app bundled with webpack, you changed the **index.ts** (entry point to your main app logic) to **hello.ts** and you see a new "Module not found" error and your web app does not show in your browser anymore. Name the configuration file you should amend to resolve this error.

webpack.config.js

Question 9 (1 point)
You are building your own metaverse application, an immersive social network that aims to allow as many users as possible to participate in, using different platforms and devices. You have limited funds as an individual of course and aim to spend as little as possible on development. Which tool is **most suitable** for you to base your development on?

- ○ CoSpaces
- ○ Unity
- ○ Blender
- ○ OpenXR SDK in C++
- • BabylonJS

CSD3120 – Introduction to Virtual Reality Menti Quiz 4

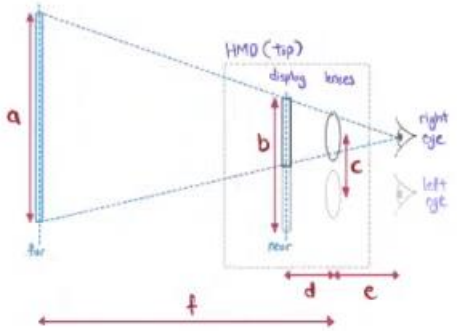
Question 1

What is the main difference between the hardware in a modern smartphone and a HMD?

- Display
- Magnifier lens
- CPU
- GPU
- Cameras
- Motion Sensors

Question 2

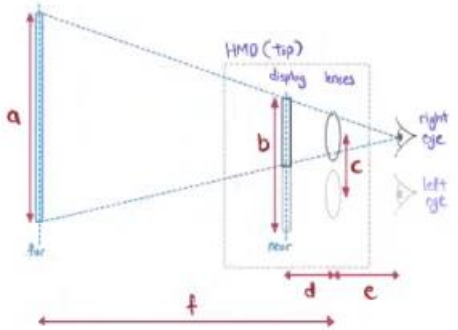
In the schematic HMD diagram, where is the "eye relief"?



- a
- b
- c
- d
- e
- f

Question 3

In the schematic HMD diagram, where is the width of the virtual image?



- a
- b
- c
- d
- e
- f

Question 4

In HMDs, what effect will changing the focal point of the lends have?

- Height of the HMD display
- Depth of the HMD display
- Depth of the view frustrum's near plane
- Depth of the virtual image generated

Question 5

The perspective matrix for rendering in HMDs is the same for both eyes.

- True
- False

Question 6

The view matrix for rendering in HMDs is the same for both eyes.

- True
- False

Question 7

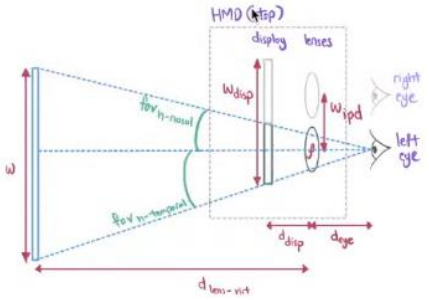
What is a valid property of the view frustum generated by typical HMDs?

- Volume is vertically symmetric only
- Volume is horizontally symmetric only
- Volume is both vertically and horizontally symmetric
- There is no symmetry in the volume

Question 8

What is a result of reducing the eye relief?

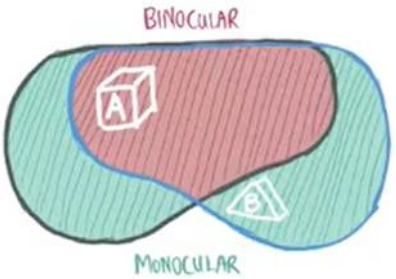
- Increased distance between lens to virtual image
- Decreased distance between lens to virtual image
- Increased FOV
- Decreased FOV



Question 9

Which object is easier for the user to reach out and grab with his/her hands?

- A
- B
- Both are the same

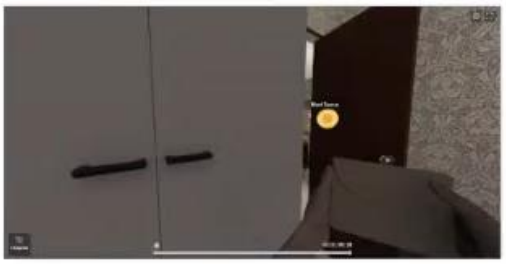


Question 10

Which software component is the least important in the XR application described?

- Rendering
- Physics
- Input Handler
- Audio

We built a Web VR application for caregivers to empathise with patients suffering from dementia. The experience is primarily audio-visual with the main interaction being navigating around a house. The main content is based on 360 video capture.



Question 11

What is the top reason for using ECS over straightforward OOP in your app architecture.

- There are lots of different virtual objects created at runtime
- All virtual objects can be constructed when the app starts
- Different virtual entities have vastly different features
- ECS has much better performance
- The features in each entity need to constantly share information

CSD3120 – Introduction to Virtual Reality Menti Quiz 5

Question 1

You are tasked to build a VR application to provide a virtual tour of an art gallery. The goal is to provide potential bidders with a sense of scale and depth close to viewing the real thing. What is the optimal approach for creating the virtual environment?

- Model-based
- Image-based

Question 2

You are tasked to build a VR application for caregivers to empathise with patients suffering from dementia. The experience is intended to be primarily audio-visual with the main interaction being navigating around a house. Realism should be the focus of the immersion. What is the optimal approach for creating the virtual environment?

- Model-based
- Image-based

Question 3

You are tasted to build a VR application to teach physics in a classroom. Kids will be able to throw virtual balls to hit cans placed at different distances and heights. Plausible interactions should be the main focus of the immersion. What is the optimal approach for creating the virtual environment?

- Model-based
- Image-based

Question 4

Why do we need the following code?

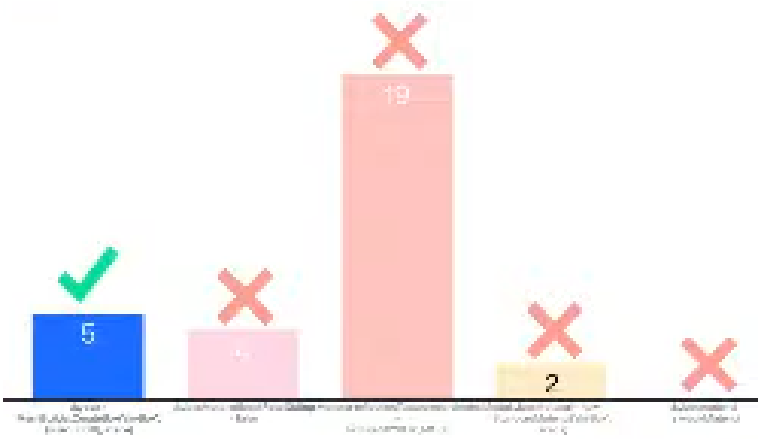
```
// this is usually done for skybox materials
skyboxMaterial.backfaceCulling = false;
```

- User is outside the skybox mesh viewing the back face of the textures
- User is inside the skybox mesh viewing the back face of the textures
- Skybox is a cube that is meant to be visible from all sides
- Removing backface culling is a graphics programming good practice

---

Question 5

Which line of code makes the skybox feel like it is surrounding the user?



Question 6

What will the following code do?

```
btn.onPointerUpObservable.add(evtData() => {
  alert('Btn up at:\n x: ' + evtData.x + ' y: ' + evtData.y);
});
```

- After "click" is released on Btn, show location of pointer
- After "click" down on Btn, show location of pointer
- After "click" is released on Btn, show location of Btn
- After "click" down on Btn, show location of Btn
- Compile error

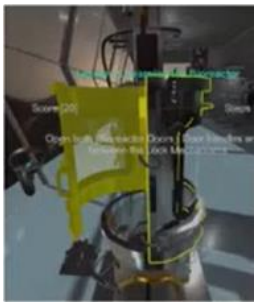
CSD3120 – Introduction to Virtual Reality Menti Quiz 6

Question 1

Which interaction mechanic is commonly deemed to be the most important in immersive AR, VR and MR experiences?

- Viewpoint control
- Hand gestures
- Body (excluding hands) gestures
- All mechanics are equally important

Question 2



In the VR Bioreactor Training system, what interaction mechanics were implemented?

- ▪ Viewpoint control
- ▪ Hand gestures
- ☐ Body (excluding hands) gestures
- ☐ All of the above

Question 3

In the VR Bioreactor Training system, is viewpoint control a passive or active interaction mechanic?

- Passive
- Active

Question 4

In the VR Bioreactor Training system, are hand gestures a passive or active interaction mechanic?

- Passive
- Active

Question 5

In the 360 Video Lecture, what interaction mechanics were implemented?

- ▪ Viewpoint control
- ▪ Hand gestures
- ☐ Body (excluding hands) gestures
- ☐ All of the above

Question 6

In the 360 Video Lecture, is viewpoint control a passive or active interaction mechanic?

- Passive
- Active

CSD3120 – Introduction to Virtual Reality Menti Quiz 6

Question 7

In the 360 Video Lecture, what form of interaction authenticity is the eye-gaze point-and-click mechanic?

- Natural interaction
- Artificial magical interaction
- Artificial augmented natural interaction

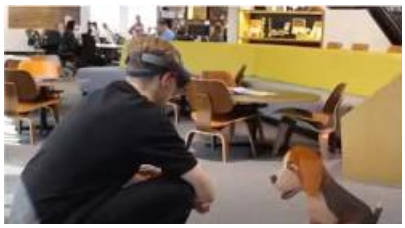
Question 8

You are tasked to build a VR application to allow kids to learn physics in a classroom. Kids will be able to throw virtual balls to hit cans placed at different distances and heights. What form of interaction authenticity is optimal for this use case?

- Natural interaction
- Artificial magical interaction
- Artificial augmented natural interaction

Question 9

You are tasked to build an MR application for people to practice taking care of a virtual pet dog in their house, to aid them with the decision of actually getting a real pet dog in the future. What form of interaction authenticity is optimal for this use case?



- Natural interaction
- Artificial magical interaction
- Artificial augmented natural interaction

Question 10

You are tasked to build a VR training system to train aircraft maintenance engineers to repair various aircraft parts on a virtual plane. If we are aiming for maximum immersion with natural interactions around a life-sized virtual aircraft, what device is optimal for this use case?

- Desktop
- Google Cardboard
- Meta Quest 2 (wireless)
- HTC Vive Pro (wired)
- Microsoft HoloLens

Question 11

You are tasked to build a VR cycling game that can be played on a real bike on a stationary trainer, that places you on equal standing against elite cycling professionals in a virtual Tour de France. If we are aiming for maximum immersion with augmented natural interactions, what device is optimal for this use case?

- Desktop
- Google Cardboard
- Meta Quest 2 (wireless)
- HTC Vice Pro (wired)
- Microsoft HoloLens

CSD3120 – Introduction to Virtual Reality Menti Quiz 6

Question 12

You are tasked to build a VR virtual sightseeing experience for hotel guests and the client wants to obtain feedback after each virtual trips. The client can only provide the user with Google Cardboards. What form of GUI implementation is best suited for this use case?

- GUI on a virtual paper (using a virtual pen)
- **GUI on a 3D plane anchored in virtual world locations**
- Real-world quiz on real paper (take off the HMD when interacting)

Question 14

You are tasked to build a VR game for persons on wheelchairs to explore famous mountains in the world. What locomotion technique is best suited for this use case?

- **Teleportation**
- Joystick-based
- Walking-in-place (WIP) with KatVR 360 slidemill
- Walking-in-place (WIP) with HTC Vive and HMD trackers
- Tracking real movement in physical space

Question 15

You are tasked to build a VR escape room experience targeted at able-bodied users. Naturally, an escape room experience aims to provide maximum immersion from all aspects. What locomotion technique is best suited for this use case?

- Teleportation
- Joystick-based
- Walking-in-place (WIP) with KatVR 360 slidemill
- Walking-in-place (WIP) with HTC Vive and HMD trackers
- **Tracking real movement in physical space**