| **OrientationCompass with solid fill** | **QR audio** |
| --- | --- |

Through the preceding activities, some questions arose regarding the Roman coin…

1. What is the Roman coin made of? What are the properties of this material?

2. From which region did the Roman coin denarius originate?

3. What information can we get by using archaeometric methods?

4. What information can we gather about the authenticity of the Roman coin?

5. Where else can we find similar coins?

*Discuss the above questions in the classroom as a whole*

**How can we answer these questions?**

**Record the results of the discussion**

|  |
| --- |

| *Record the views heard with a short video or audio recording  Name it “1.a Problems and Solutions”* | | *QR audio* |
| --- | --- | --- |
| **Conceptualization Questions outline** | **QR audio** | | |

*Discuss as a whole class.*

**How can we see item details?**

*Note or draw tools we can use  
to see details of an object*

| Instruments / Devices | Select |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

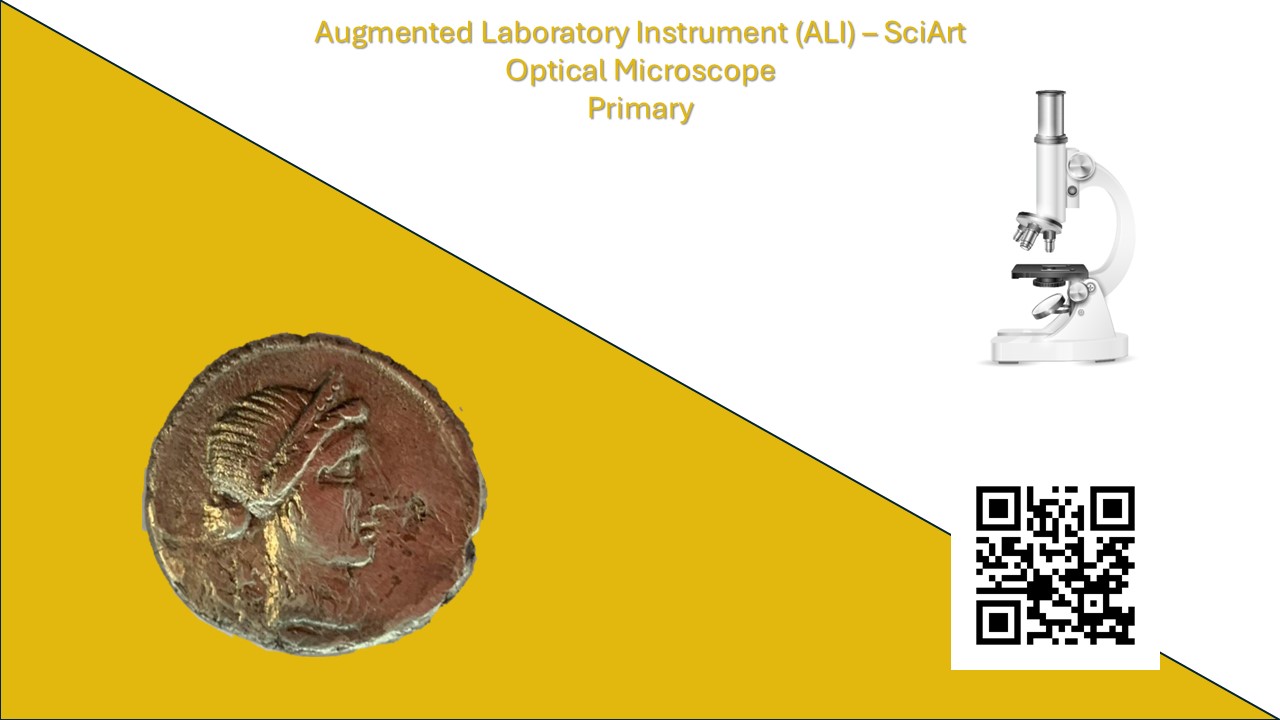
|  |
| --- |

*Discuss as a whole class about the instrument that can give us the best results and choose it from the table above.*

| *Record the views heard  with a short video or audio recording.*  *Name it “1.b Conceptualization”* | | *QR audio* |
| --- | --- | --- |
| **Research Research with solid fill** | **QR audio** | |

Use your mobile devices (tablets, mobile phones, etc.) and scan the QR below.

Watch the video and download the results for your chosen device for Roman coin by clicking on the **"Results"** button.

****

***Discuss with the whole class the results of this particular device***

* In the first point of interest, we observe the Roman coin in terms of the material it is made of. Can you describe what the Optical Microscope shows?
* In the second point of interest, we observe traces of colour on the other side of the coin. Can you describe how they appear in the optical microscope?

| *Discuss and record what the device does with a short video or audio recording.*  *Why do we use it and what results does it give us?  Name it “1.c Research”* | *QR audio* |
| --- | --- |
| **Conclusion Thought outline** | **QR audio** |

* **Why do we see three different images for the same point of interest? Can you sort them from lowest to highest magnification?**
* **Do you observe anything different in the images of the different areas of the object we focused on?**

*Write down your observations or draw the pictures below with arrows for the points of special interest.*

|  |
| --- |

| *Record your answers in three different short videos or audio recordings*  *Name them "1.d Conclusion A", "1.d Conclusion B"* | | *QR audio* |
| --- | --- | --- |
| **Conceptualization Questions outline** | **QR audio** | | |

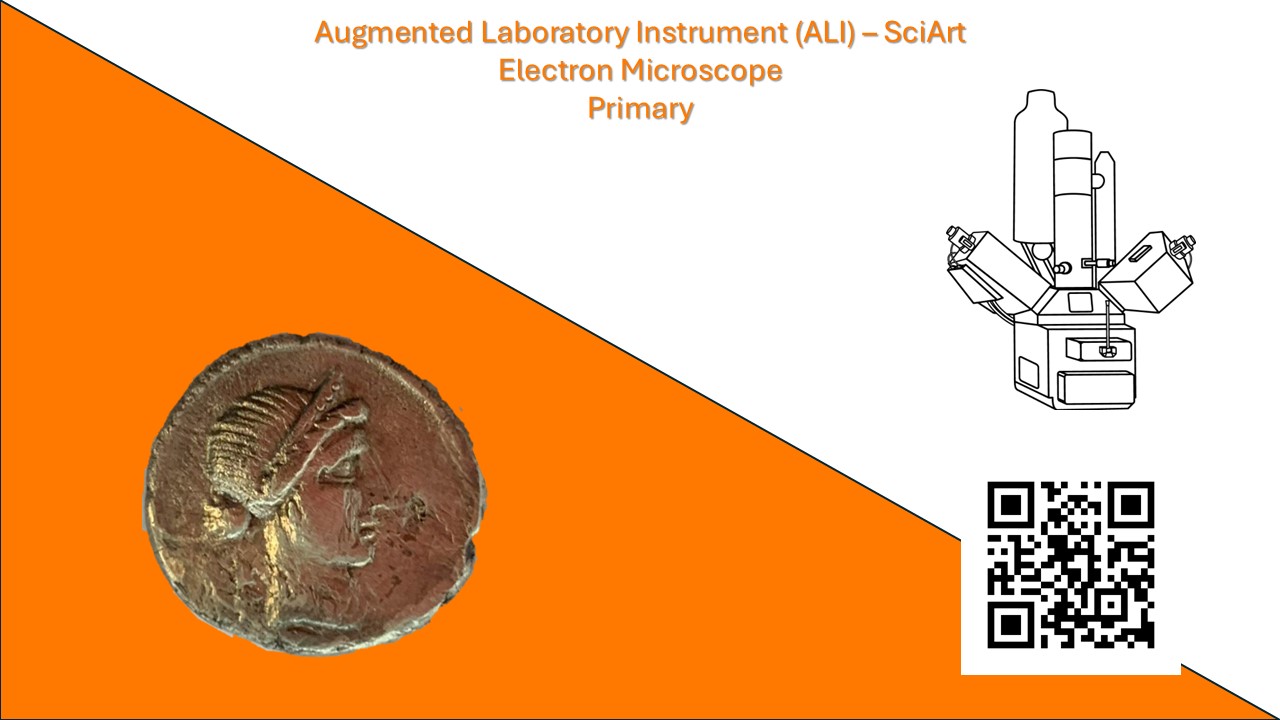
*Discuss as a whole class.*

**What do we need to do to get more information  
about the points of interest?**

| *Record the views heard  with a short video or audio recording.*  *Name it “2.b Conceptualization”* | | *QR audio* |
| --- | --- | --- |
| **Research Research with solid fill** | **QR audio** | | |

Use your mobile devices (tablets, mobile phones, etc.) and scan the QR below.

Watch the video and download the results for the Roman coin by clicking on the **"Results"** button.

****

***Discuss the results of this device in the classroom***

* In the first point of interest, for the coin material, what do you observe in the SEM image? Can you describe its morphology?
* In the second area of interest, for the traces we spotted on the relief of the coin, what do you observe in the SEM image? Can you describe how the color traces are depicted?

| *Describe how the device works and what we use it for*  *with a short video or audio recording.*  *Name it “1.c Research”* | | *QR audio* |
| --- | --- | --- |
| **Conclusion Thought outline** | **QR audio** | | |

* **Which one of the two different points of interest, scanned with the SEM method, has the highest magnification? How can we find it?**

* **Why do we get black and white images?**
* **What do we observe in the images? What might they mean for our object? Can we conclude the components in the points of interest (coin material and traces of colour)?**

| *Record your answers in three different short videos or audio recordings*  *Name them "2.d Conclusion A", "2.d Conclusion B", "2.d Conclusion C"* | | *QR audio* |
| --- | --- | --- |
| **Conceptualization Questions outline** | **QR audio** | |

*Discuss as a whole class.*

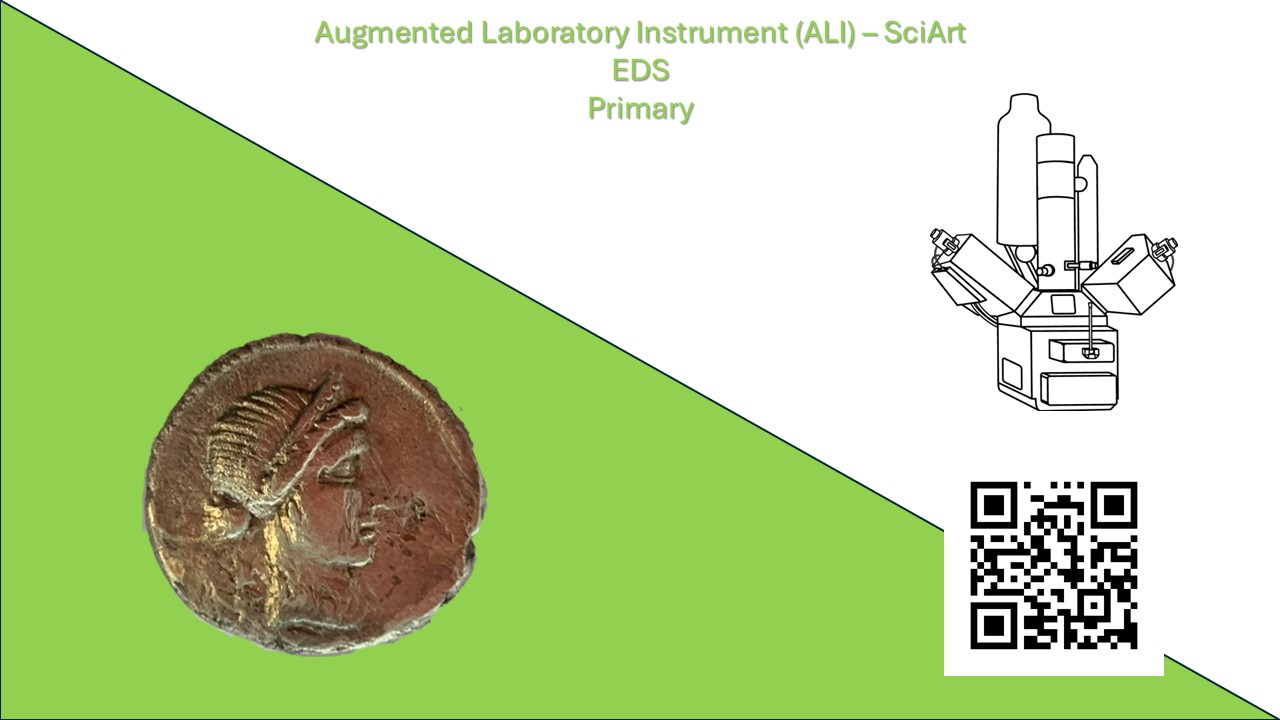
**What do we need to do to find the components   
of the points of interest of the artifact we are studying?**

**What should we recognize?**

| *Record the views heard  with a short video or audio recording.*  *Name it “1.b Conceptualization”* | | *QR audio* |
| --- | --- | --- |
| **Research Research with solid fill** | **QR audio** | | |

Use your mobile devices (tablets, mobile phones, etc.) and scan the QR below.

Watch the video and download the results of the Roman coin method by clicking on the **"Results"** button.

****

***Study in your group and then discuss with the whole class   
the results of this particular method***

* In the first point of interest, for the coin material, what do you observe in the EDS spectrum? What elements does it consist of and in what proportion?
* In the second point of interest, from the sample taken from the colour layer, what do you observe in the EDS spectrum? What elements does it consist of?

| *Discuss and record how the method works*  *with a short video or audio recording.*  *What results did it give us? What else did we have to do?*  *Name it “3.c Research”* | | *QR audio* |
| --- | --- | --- |
| **Conclusion Thought outline** | **QR audio** | | |

Write down your conclusions about the elements identified in the two points of interest in the table below.

| **Points of interest** | **Compounds** |
| --- | --- |
| Coin material |  |
| Traces of colour found on the coin |  |

| *Record your answers in a short video or audio recording*  *Explain how you got there.*  *Name them "3.d Conclusion"* | | *QR audio* |
| --- | --- | --- |
| **Conceptualization Questions outline** | **QR audio** | | |

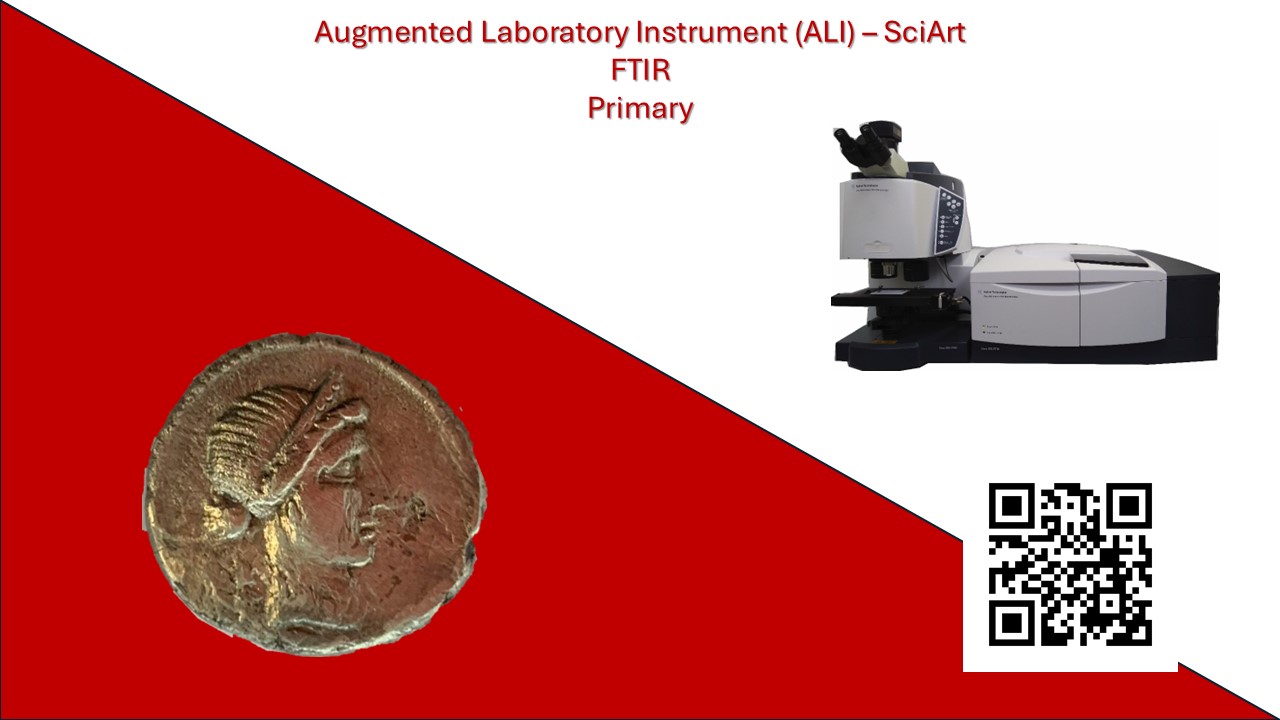
*Discuss as a whole class.*

**What information will we get if we use the FTIR method to the two points of interest?**

| *Record the views heard  with a short video or audio recording.*  *Name it “4.b Conceptualization”* | | *QR audio* |
| --- | --- | --- |
| **Research Research with solid fill** | **QR audio** | | |

Use your mobile devices (tablets, mobile phones, etc.) and scan the QR below.

Watch the video and download the results of the Roman coin method by clicking on the **"Results"** button.

****

***Discuss the results of this method with the whole class***

* In the first point of interest, for the coin material, what do you observe in the FTIR spectrum? Does it give results?
* In the second point of interest, the sample taken from the colour traces, what do you observe in the FTIR spectrum? What is the material identified?

| *Discuss and record how the method works  with a short video or audio recording. What results did it give us?*  *Name it “4.c Research”* | | *QR audio* |
| --- | --- | --- |
| **Conclusion Thought outline** | **QR audio** | | |

* **Does the FTIR method give results for all materials? If not, list in the table for which materials it did not give results.**

|  |
| --- |

* **Does the FTIR method give results for colour traces? If so, write down in the table which material was identified.**

|  |
| --- |

| *Record your answers  in a short video or audio recording.*  *Explain how you got there.*  *Name them "4.d Conclusion"* | | *QR audio* |
| --- | --- | --- |
| **Conceptualization Questions outline** | **QR audio** | | |

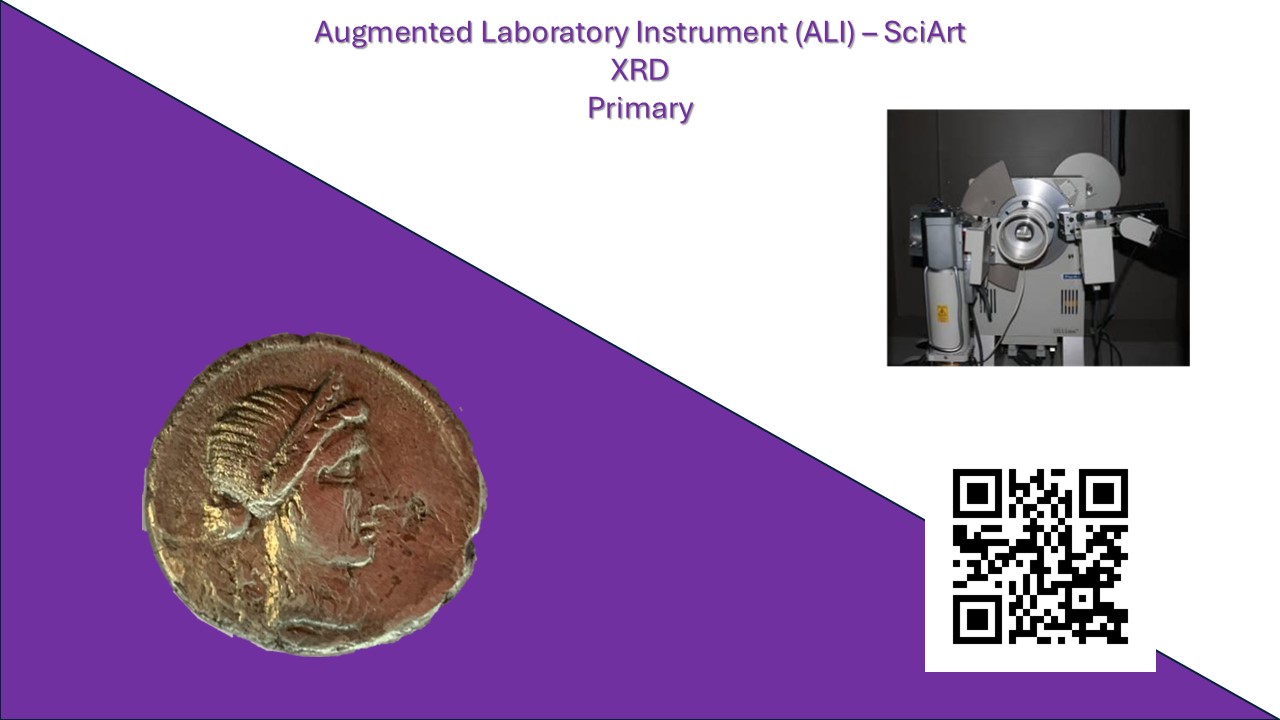
*Discuss as a whole class.*

**What might the inability to identify a chemical compound by FTIR method mean for some materials?**

| *Record the views heard  with a short video or audio recording.*  *Name it “5.b Conceptualization”* | | *QR audio* |
| --- | --- | --- |
| **Research Research with solid fill** | **QR audio** | | |

Use your mobile devices (tablets, mobile phones, etc.) and scan the QR below.

Watch the video and download the results of the Roman coin method by clicking on the **"Results"** button.

****

***Discuss the results of this method with the whole class***

| *Discuss and record how the method works  with a short video or audio recording.*  *What results did it give us?*  *Name it “4.c Research”* | | *QR audio* |
| --- | --- | --- |
| **Conclusion Thought outline** | **QR audio** | | |

* **Write down the material/chemical compound you have identified using the XRD method.**

| **Points of interest** | **Chemical Compounds** |
| --- | --- |
| Material of the coin |  |
| Traces of colour on the coin |  |

| *Record your answers  in a short video or audio recording.*  *Explain how you got there.*  *Name them "4.d Conclusion"Name them "4.d Conclusion"* | *QR audio* |
| --- | --- |

**Back to the initial questions...**

1. What is the Roman coin made of? What are the properties of this material?

2. From which region did the Roman coin denarius originate?

3. What information can we get by using archaeometric methods?

4. What information can we gather about the authenticity of the Roman coin?

5. Where else can we find similar coins?

| **Conceptualization Questions outline** | **QR audio** |
| --- | --- |

*Discuss as a whole class.*

**How can we use the conclusions drawn from archaeometric methods to answer the initial questions?**

*Please provide questions that you can ask an AI machine. The answers it gives you, combined with the results you already have, will help address the initial questions*

|  |
| --- |

| *Record the questions you will ask on ChatGPT with a short video or audio recording.*  *Name it “6.b Conceptualization”* | *QR audio* |
| --- | --- |
| **Research Research with solid fill** | **QR audio** |

Use ChatGPT to get information on the above questions. Write down the information you need to answer the questions.

| **Question** | **ChatGPT answer key points** |
| --- | --- |
| What is Tyrian purple? |  |
| What are the properties of Silver? Where is it used? |  |
| In Roman times were silver coins common? |  |
| From which region did the Roman denarius coin originate? |  |

*Discuss in class the answers  
to the specific questions you posed in ChatGPT*

| *Note the main points of the answers for each question.  Did it help you find the answer?  How?*  *Name it “4.c Research”* | | *QR audio* |
| --- | --- | --- |
| **Conclusion Thought outline** | **QR audio** | | |

*Record the answers to the initial questions of the investigation.*

| **1. What is the Roman coin made of? What are the properties of this material?** |
| --- |
|  |
| **2. From which region did the Roman coin denarius originate?** |
|  |
| **3. What information can we get by using archaeometric methods?** |
|  |
| **4. What information can we gather about the authenticity of the Roman coin?** |
|  |
| **5. Where else can we find similar coins?** |
|  |

|  | *QR audio* |
| --- | --- |

**Create a video of your answer to each   
interview question.**

**One of you will ask the question**

**and the other person will answer!!!!**

*Name the videos "Final Answer 1", "Final Answer 2", etc.*