

## LESSON PLAN

### ПЛАН УРОКА




<b>Предмет</b>	Физика
<b>Учитель</b>	Бекешова Л.Д.
<b>Школа, класс</b>	г. Актау, НИШ ХБН, 11 класс
<b>Тема урока</b>	Lenses. Creation of images in thin lenses




[www.bilimland.kz](http://www.bilimland.kz)

<b>Learning:</b>	<b>Be able to:</b> <ul style="list-style-type: none"><li>• describe the relationship between the focal length of a lens, the radius of curvature of the spherical surfaces and the relative refractive index of the lens;</li><li>• to construct the path of rays in a thin lens and to give the characteristics of the received image</li><li>• solve problems by using the formulas</li></ul>
<b>Lesson objectives:</b>	<b>Be able to:</b> <ul style="list-style-type: none"><li>• Describe characteristics of the images received in lenses</li><li>• Construct the path of rays in a thin lens and to give the characteristics of the received image</li><li>• Prove the received types of images on the basis of a relative positioning of lenses and the subject</li></ul>
<b>Success criteria:</b>	<ul style="list-style-type: none"><li>• Describe characteristics of the images received in lenses</li><li>• Construct the path of rays in a thin lens</li><li>• Give the characteristics of the received image</li><li>• Prove the received types of images on the basis of a relative positioning of lenses and the subject</li></ul>

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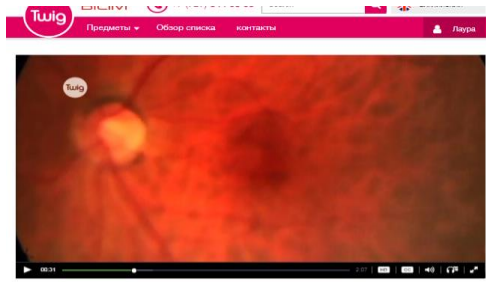
<b>Language objectives:</b>	<p><u>Subject-specific vocabulary &amp; terminology:</u>  <b>Students will use the following terms-</b></p> <ul style="list-style-type: none"> <li>• Lenses</li> <li>• Focal length</li> <li>• Radius of curvature</li> <li>• Spherical surfaces</li> <li>• The received image</li> </ul>
<b>Values instilled at the lesson:</b>	<b>Global citizenship, critical thinking, real life application.</b>
<b>Cross-curricular links:</b>	<b>English, Mathematics (use of formula and graphs</b>
<b>ICT skills:</b>	<p><i>Using PPT, Bilimland.kz , twig-bilim.kz, itest.kz</i></p> <div style="display: flex; justify-content: space-around; align-items: center;">    </div>
<b>Previous learning:</b>	<ul style="list-style-type: none"> <li>• Learners are familiar with the key concepts of optics from Grades 8 as phenomenon of light refraction and graphical representation of the path of rays</li> <li>• They know how to do use mirrors and lenses</li> </ul>

### Course of the lesson

Planned stages of the lesson	Planned activities at the lesson	Resources
Beginning 5 min	<p>The teacher welcome students for the lesson.            To checking homework.</p> <p>Activity blinding: students come to the Board and they have to find their own tables by closing their eyes. Then the teacher asks the students how difficult it is to move, closing eyes, and seeing nothing. Students suggest a topic</p> <p>Teacher to introduce the lesson, states the expectations and the lesson objectives.</p>	PPT
<u>Middle</u> 3 min	<p><b><u>Brainstorming.</u></b> To watch a video “How we see” in <a href="https://twig-bilim.kz">twig-bilim.kz</a>.</p> <p>And answer the question “How we can see environment?”</p> <div style="text-align: center;">  </div>	<a href="https://twig-bilim.kz/en/film/how-we-see-part-2-brain">https://twig-bilim.kz/en/film/how-we-see-part-2-brain</a>

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2 min



Как мы видим часть 2: мозг

**Work in pairs.** Watching videos and answer the teacher's questions, then completing [bilimland's](https://bilimland.kz) tasks.

**Lenses**  
Lesson content 1 / 16

In this lesson you will learn to:

- explain the division of lenses;
- describe the properties of the images obtained by means of lenses and make appropriate drawings;
- calculate the enlargement and the optical power of a lens;
- define focal point and focal length;
- calculate the image distance and the size of an image when the size of the object and its distance are given;
- use the lens formula.

You should already know:

- which images are referred to as real and which as virtual;
- the phenomenon of light refraction;

**Contents**

- Types of lenses
- The structure of a lens
- Converging and diverging lenses
- Focusing of rays
- Images in lenses
- Images formed by a diverging lens
  - Converging lens,  $v > 2f$
  - Converging lens,  $f < v < 2f$
  - Converging lens,  $v = f$
- Lens equation and magnification
- Focal length and the shape of a lens
- Optical power
- The power of lenses
- The defects of lenses
- Lesson report

5 min

1) With watching the video answer the question: What is the structure of the lens? and perform tasks: Activity-1.2, at page-3

2) Watching the video : Converging and Diverging Lenses

Play with simulation to know types of lens and do the task at page-4, Activity-1.

**Simulation**

Lenses can be either converging or diverging. Click on a lens and observe the path of the rays through it. Sometimes a biconvex lens can be a diverging one and a biconcave lens can be a converging one. It depends on the refractive indices of the lens and the medium in which the lens is placed.

converging lenses  
diverging lenses  
biconvex

3) To read: Focusing of rays. Glass bottles. And play with simulation “Check how the position of a focal point” at page-5.

4) To watch short videos: “**Images in lenses**” and play

<https://bilimland.kz/en/courses/physics-en/optics/lesson/lens>

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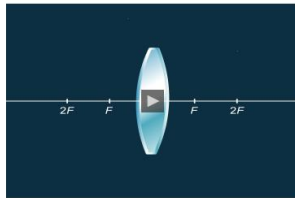
5 min

with simulation “Find out how the object-lens distance affects the type of image.” and ask to question: What type of an image is formed by a diverging lens? at page-6.

5) To watch a video “Images Formed by a Diverging Lenses” and do the tasks: Activity-1.2.3 at page-7.

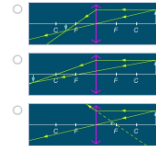
6) To watch a video “Converging Lens” and do the tasks: Activity-1.2. at page-8.

An image formed by a converging lens



Activity 1

Indicate the illustration in which the path of the rays is drawn correctly:



2 min

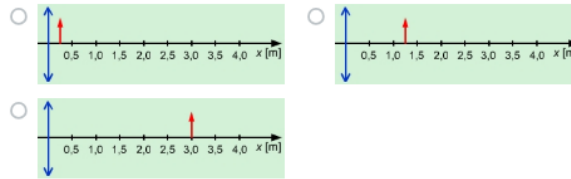
7) To watch a video “Converging Lens” and do the tasks: Activity-1.2.3 and play with simulation at page-9.

8) To learn the table “Properties of images” and do the task: Activity-1 at page-10.

9) To learn by heart “Lens equation and magnification formula” and watch a video about it. To do the task: Activity-1.2 at page-11

Activity 1

Using a lens of focal length  $f = 1\text{ m}$ , we want to obtain a four-fold magnification. At what distance from the lens should the object be placed? Mark the correct illustration.



Activity 2

Using a lens with a focal length  $f$ , we can obtain an image of magnification  $M$ . By applying the lens formula and the formula for magnification, the distance between the object and the lens may be derived from which of the following relationships? Mark the correct one.

$x = \frac{M+1}{Mf}$   
   $y = \frac{M+1}{M} f$   
   $x = \frac{M+1}{M} f$

3 min

10) To learn by heart “The focal length and the shape of a lens formula” and watch a video about it. Play with simulation, and do the task: Activity-1. at page-12

11) To read about “the power of lenses” and do the Activity task-1 at page 13

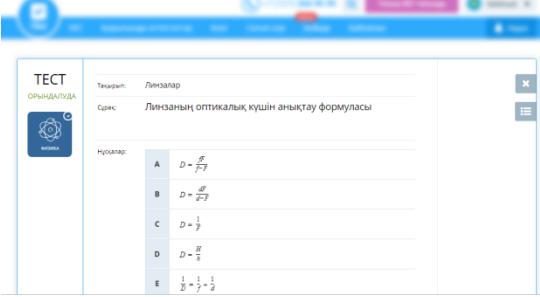

12) To read about “the power of lenses”, play with simulation, and do the task: Activity-1. at page-14

13) To read and watch a video about “The defects of lenses and Augustin Jean Fresnel” Activity-1. at page-15

14) Lesson report. Students get results and write their

<https://bilimland.kz/en/courses/physics-en/optics/lesson/lens>

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10 min	<p>results on a self-assessment sheet.</p> <p><b><u>Students to attempt questions. Individual work by itest.kz</u></b></p>	<p><a href="https://itest.kz/ru/ent/fizika">https://itest.kz/ru/ent/fizika</a></p>
2 min	<div style="display: flex; align-items: center; justify-content: center;">   </div> <p>Students get results and write their results on a self-assessment sheet.</p> <p><b><u>The teacher sums up the lesson and gives feedback to students</u></b></p>	
End 3 min	<p><b><i>At the end of the lesson, learners reflect on their learning:</i></b></p> <ul style="list-style-type: none"> <li>- <b><i>What has been learned</i></b></li> <li>- <b><i>What remained unclear</i></b></li> <li>- <b><i>What is necessary to work on</i></b></li> </ul> <p><b><i>Home work</i></b> <b><i>To solve problems worksheet-1</i></b></p>	Reflection worksheet-1

Differentiation – how do you plan to give more support? How do you plan to challenge the more able learners?	Assessment – how are you planning to check students' learning?	Health and safety regulations
<p>Most learners should be able to recall the main aspects of the specified areas.</p> <p>Some learners</p>	<p>In the beginning of the lesson:</p> <p>Oral feedback</p> <p>Differentiated feedback</p> <p>Differentiated</p>	<p>Students to place their bags in designated areas to avoid minor accidents.</p> <p>During the work with the different materials (pen, pencil, spring, sharp objects) students must follow SAFETY RULES in the physics</p>

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<p>will not be able to attempt all the questions. In this case teacher gives a differentiated scaffolding.</p> <p>A weak student can ask questions from their peers. A gifted student can answer to the questions</p> <p>Learners, who are able to finish worksheet 1, will be given extra worksheet 2.</p>	<p>scaffolding</p> <p>A teacher gives them Differentiated feedback</p> <p>In the middle:</p> <p>Teacher comments on students worksheet1 and gives feedback if someone needs a help teacher gives a differentiated scaffolding</p> <p>At the end of the lesson:</p> <p>Learners reflect on their learning: Students have to answer one of above questions in brief. If student prefers to write, they can use different stickers</p> <p>Self assessment</p> <p>Students have to assess their own work</p>	<p>lab.</p> <p>During the break time the lab assistant have to ventilate the classroom.</p>
<p><b>Use the space below to reflect on your lesson. Answer the most relevant questions from the box on the left about your lesson.</b></p>		

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lesson objectives/learning objectives realistic? Did all learners achieve the LO?  
If not, why?  
Did my planned differentiation work well?  
Did I stick to timings?  
What changes did I make from my plan and why?

**Summary evaluation**

**What two things went really well (consider both teaching and learning)?**

**1:**

**2:**

**What two things would have improved the lesson (consider both teaching and learning)?**

**1:**

**2:**

**what have I learned from this lesson about the class or achievements/difficulties of individuals that will inform my next lessons**