

WORKSHEETS FOR PUPILS

1.1 OBSERVING AND EXAMINING MATTERS

Task 1 – Change of the temperature during evaporation

Wrap the balls of cotton wool around the tips of thermometers. At the beginning the temperature on all the thermometers is the same. How will the temperature you measure on the thermometers change when you gradually soak the ball of the cotton wool into the prepared beakers with water, acetone and ethanol?

I will measure this value on the thermometer:

The ball of cotton wool on the thermometer:	The expected temperature:			I measured:	the course of the process:
	higher	lower	the same		
With water					
with acetone (nail polish remover)					
with ethanol (alcohol)					

Task 2 – The speed of evaporation

Which drop evaporates the fastest?

1– the fastest, 2 – the middle, 3 – the slowest

Drop of	I expect:	I measured:	the course of the process:
water			
acetone (nail polish remover)			
ethanol (alcohol)			

Explain how the measured temperature on each thermometer depends on the speed in which the drop disappeared at.

We observed the process in which a liquid changed to a gas. What is the process, we studied, called?

**Task 3: The speed of evaporation
of common liquids**

Order the liquids that you use in the household daily according to their speeds of evaporation.

1 – the fastest, 2 – the middle, 3 – the slowest...

	I expect (1, 2, 3...):	I observed:	The course of the process:
Oil			
Water			
Alcohol			
Syrup			
Vinegar			

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Task 4 – Actions that influence the speed of evaporation

The speed of evaporation depends on the outer conditions. How do you think the speed of alcohol evaporation will increase and confirm your presumptions? Complete the table.

	I expect		I observed		The course of the process
	YES	NO	YES	NO	
Increase of the surroundings temperature	YES	NO	YES	NO	
Decrease of the surroundings temperature	YES	NO	YES	NO	
Increase of the alcohol temperature	YES	NO	YES	NO	
Decrease of the alcohol temperature	YES	NO	YES	NO	
Extension of evaporating area (spread of the drop)	YES	NO	YES	NO	
Increase of the air flow	YES	NO	YES	NO	
In an closed container	YES	NO	YES	NO	

We encounter evaporation every day. Explain what the fastest way of drying long hair is.

Evaporation happens not only when drying hair but also while drying wet clothes. Explain why a drier speeds up evaporation.

Explain, by using examples, if evaporation occurs under all conditions. (when it is freezing, when it is warm, dry or humid...)

1.2 WATER IS NOT ONLY FOR DRINKING

Task 1 – Melting of ice in the salt mixture

- A) Mix the crushed ice with the table salt in a ratio of 3:1. That means you add 1 unit of weight of table salt to 3 units of weight of ice. How will the temperature of the mixture in the bowl change depending on time?

Time (minutes)	expect to measure this temperature (°C)	Measured temperature (°C)
At mixing ice and table salt		
after 0.5 min		
after 1 min		
after 1.5 min		
after 2 min		
after 2.5 min		
after 3 min		
after 3.5 min		
after 4 min		
after 4.5 min		
after 5 min		

- B) Put a plastic bag into a smaller bowl or a beaker. Pour some juice or water with syrup into the plastic bag and place it in the bowl with an ice and table salt mixture. Wrap the bowl into a tea towel or a rug and leave it to stand on the desk for at least 20 minutes.

What happens to the juice or water with syrup that you left to stand in the bowl with the ice and table salt mixture?

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Where would you use this working procedure?

Explain the observed process.

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Task 2: Melting of ice cubes with different water concentration

Which ice cube will melt the fastest?	
I assume	I observe

Record the time ranges when single ice cubes melted.

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Make a hypothesis which accounts for the observed process.

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Where will you encounter this process in the real-life practice?

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Task 3 – Surface tension

How many objects will I throw in the glass or a beaker with cold water?	
I assume	I observe

What is the shape of the water surface in a beaker or in a glass with cold water?

the shape of the water surface in a glass or beaker before throwing an object/objects in:	
I assume	I observe
the shape of the water surface in a glass or beaker after throwing an object/objects in:	
I assume	I observe

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the shape of the water surface in a glass or beaker after throwing an object/objects in and adding a few drops of a washing up liquid:	
I assume	I observe

What will change if I use warm tap water?

I assume	I observe

Where are these water properties and the surface-active agent used in the real-life practice?

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State other surface-active agents that you know.

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1.3 AIR AROUND US

Task 1: The weight of air

A) Breathing on glass or a mirror

What happens if I breathe on a mirror or a piece of glass?	
I assume	I observe

B) The weight of air

Does the air have any weight?	
I assume	I observe

Why did you use the bicycle pump for blowing up the balloon instead of blowing it up directly with the air from your lungs?

What is the average weight of the air that one balloon contains?

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C) Air pressure

What happens to a marshmallow in the syringe, where the air exerts smaller pressure?	
I assume	I observe

Where the air exerts bigger pressure?	
I assume	I observe

Why do we not feel the weight of the air?

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Task 2: A tea candle

What happens when I place a tea candle on the water surface?	
I assume	I observe

What happens when I cover over the tea candle on the plate with water with a beaker?	
I assume	I observe

What happens to the water surface inside the beaker or the glass when the candle is burning?	
I assume	I observe

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Why did the candle go out?

Think of a way you would use this experiment in the real life practice.

What happens to the candles when the teacher starts pouring the gas that is being prepared into the pneumatic bath?

I assume	I observe

What was the order of the going out candles? Explain why it was so.

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What happens to lime water which the teacher pours the gas, that is being prepared, into?	
I assume	I observe

What happens to lime water, if you exhale the air from your lungs into it?	
I assume	I observe

Which gas did the teacher poured into the pneumatic bath and the beaker with lime water?

What gas does the exhaled air contain?

What are the properties of the gas and where are they used in the real life practice?

1.4 METALS IN OUR LIVES

Task 1: Density of metals

Table 1: Table of metals

Sample Number	Appearance – (colour, sheen)	hardness 1-the softest 3-the hardest	I assume the set metal is:	I determined that the set metal is:
1				
2				
3				

Table 2: Table of ascertained values

Sample Number	m mass of an object (g)	V ₁ Volume of water in the cylinder (ml)	V ₂ Volume of water in the cylinder with an object
1			
2			
3			

Table 3: Calculation table

Sample Number	Volume of an object (ml) $V = V_2 - V_1$	Volume of an object (cm ³) $1\text{ml} = 1\text{ cm}^3$	Density $\left(\frac{\text{g}}{\text{cm}^3}\right)$ $\rho = \frac{m}{V}$	Density $\left(\frac{\text{kg}}{\text{m}^3}\right)$ $1 \frac{\text{g}}{\text{cm}^3} = 1000 \frac{\text{kg}}{\text{m}^3}$
1				
2				
3				

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Think about how the density of a metal relates to its use in the real-life practice.

How would you explain the fact that the densities of metal alloys are in the range between the densities of pure metals?

How would you define which metal has a higher proportion in the alloy of two metals and more?

What is the connection between the hardness of a metal and its density?

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Task 2: Magnetic properties of metals and alloys

metal			
Sample Number	Appearance – colour, sheen	Will be attracted by the magnet YES/NO	Was attracted by the YES/NO
1			
2			
3			

alloy				
Sample Number	Appearance – colour, sheen	Will be attracted by the magnet YES/NO	Was attracted by the YES/NO	Alloy and its composition
4				
5				
6				

How did the composition of the metal alloys show on its magnetic properties?

Where are the magnetic properties of metals and their alloys used in the household?

Task 3: Chemical properties of metals

A) Reaction of metals with hydrochloric acid.

Sample Number	metal	I assume	I observed
1	zinc		
2	iron		
3	copper		
4	aluminium		

Mit einer Schicht ihres Rosts (Oxids) bedeckte Metalle, werden mit Schleifpapier gereinigt und haben nun keine Schicht ihres Rosts (Oxids) mehr. Beobachte was mit den Metallen nun passiert, wenn sie in Salzsäure liegen.

Sample Number	metal	I assume	I observed
5	zinc		
6	iron		
7	copper		
8	aluminium		

Give reasons why copper is used in production of roof covering.

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What is the difference between patina and rust?

How would you prevent corrosion of iron?

Think up a way, how to protect iron (steel) from corrosion, without using a protective colouring.

1.5 LIGHT

Task 1: White and coloured light

Observe the colour spectrum of different luminous sources using the reflection of light on the CD.

source of light	description of the spectrum (observed colours and their order, gaps in the spectrum)
the Sun	
LIGHT BULB	
LED light bulb	
energy saving bulb compact fluorescent lamp	
mobile phone display	
laser pointer	

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Observe the colour spectrum of different luminous sources using a prism (optional).




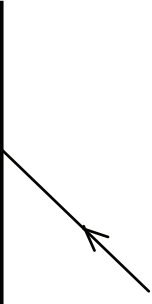
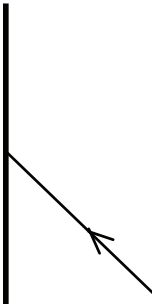
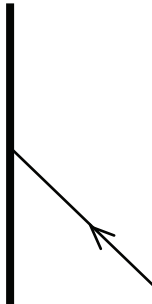
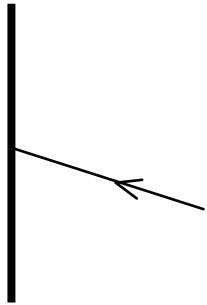
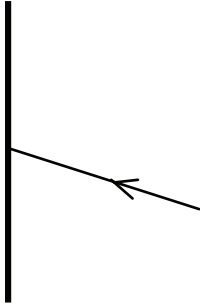
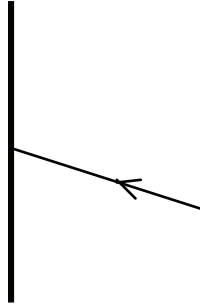
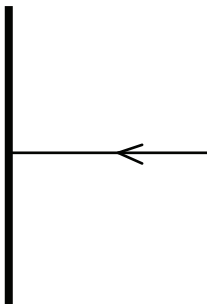
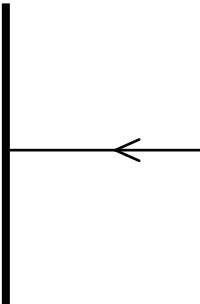
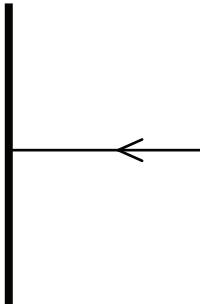
source of light	description of the spectrum (observed colours and their order, gaps in the spectrum)
the Sun	
LIGHT BULB	
LED light bulb	
energy saving bulb compact fluorescent lamp	
mobile phone display	
laser pointer	

Observe the colour spectrum of a rainbow (the sun light passing through raindrops).

source of light	description of the spectrum (observed colours and their order, gaps in the spectrum)
sun (rainbow)	

Task 2: – The law of reflection

Estimate how the light ray will reflect from a mirror. Draw a direction of the reflected ray for all four situations. Then carry out the experiment and draw the real directions of the ray. Based on the findings deduce the general rule for direction of the reflected ray.

Task	estimate of the reflected ray direction	a real image of a reflected ray
		
		
		
		

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Write the general rule for propagation of reflected light.

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Task 3: The energy of light and thermal radiation

3A) Compare the energy radiated by two luminous sources emitting comparable amount of light – an ordinary bulb and a LED light bulb.

Based on your previous experience, estimate, which of the two luminous sources – an ordinary bulb and a LED light bulb will radiate more energy (in the proximity of which source it will increase faster). Write down the estimate.

Carry out the experiment and repeatedly measure the temperature of the black sheet of paper in the proximity of an ordinary light bulb and in the proximity of a LED light bulb.

measure-ment	1	2	3	4	5	6	7	8	9	10
TIME [minutes]										
temperature ordinary light bulb [°C]										
temperature LED light bulb [°C]										

Compare your original estimate with the measured results. Try to explain any potential differences in the estimate and the experiment.

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3B) Compare the energy that is being absorbed by two bodies of different surface colour – black and white.

Estimate, based on your previous experience, which of the two bodies – black or white – will absorb more energy (its temperature will increase faster). Write down the estimate.

Carry out the experiment and repeatedly measure the temperature of the black and the white paper at the same distance from an ordinary light bulb.

measurement	1	2	3	4	5	6	7	8	9	10
TIME [minutes]										
temperature black paper [°C]										
temperature white paper [°C]										

Compare your original estimate with the measured results. Try to explain any potential differences in the estimate and the experiment.

1.6 PHYSICAL QUALITIES (VOLUME, FORCE, TIME, WEIGHT)

Task 1: Measuring of volume

Cut the neck of a transparent PET bottle. Gradually fill it with the water of a known volume (e.g. 100 ml) and record the height of the level.

Measured object (substance)	Measured volume [ml]	What did you have to pay attention to when measuring?
500g of water		
500 g of sand		
500 g of iron		
500 g of wood		

Task 3 – Make a paper sundial

Use the template from the attachment to make the sundial. Carefully cut out the clock, glue it and place it on a horizontal surface in a sunny place. Wait for your watch to show the whole hour. Rotate the sundial so that it shows the same time when the date correction is counted.

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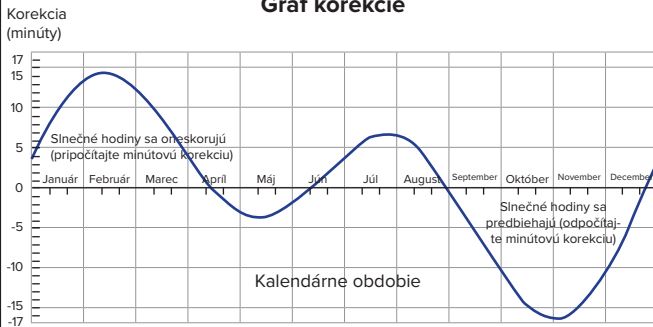
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Vodorovné slnečné hodiny

Graf korekcie



Korekčná tabuľka

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1. – 10.	4	14	12	4	-3	-2	4	6	-2	-12	-16	-9
11. – 20.	7	14	10	1	-4	0	6	4	-5	-15	-15	-5
21. – 31.	12	13	7	-2	-3	2	7	2	-9	-16	-12	1



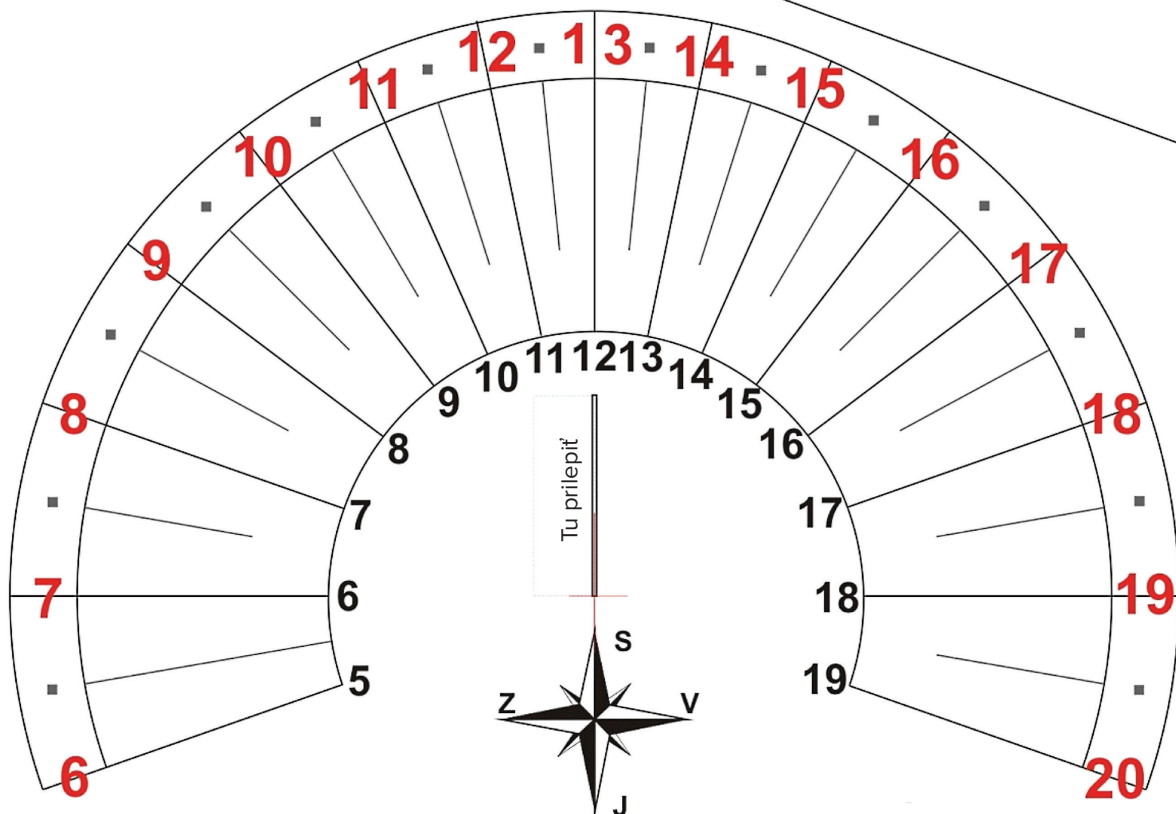
Hodiny s drobnými úpravami prevzaté
<http://www.slunecni-hodiny.webzdarma.cz>

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