



(ENG) Proportion is Key

Introduction

Step 1 - Motivational Stage

Step 2 - Investigational Stage

Step 3 - Consolidation Stage

Introduction



#Online activity #In-class activity #Artwork #Paintings

The pupils revise percentage calculations with the help of art: they learn a real paint recipe, get an insight into a design colour palette and how the proportions of the human body were calculated.

Learning Objectives

- ☐ Summarize paint recipes, guidelines of a traditional colour palette and the developments of body proportions in art
- ☐ Solve examples in percentage calculations
- ☐ Present different ratios in decimals and fractions

ACTIVITY DETAILS

Activity Details

Connection of the activity with Art —

Fractions and ratios in paint recipes, in colour palette and the depicted human body



Link to local, national School Curriculum —

Percentage/Calculation with p%



Equipment required —

- colour pencils,
- black marker,
- a compass,
- a ruler



Duration of activity —

45 minutes



Sources

Work sheet 1: Measurements of Mondrian's Composition with Red, Blue, and Yellow, 2022, courtesy of the National Gallery of Slovenia

Sources

<https://www.paintingandartists.com/oil-paint-recipe>

Photo credits:

Pic. 1:

Jan van Eyck (before 1390–1441)

The Arnolfini Portrait, 1434

oil, oak panel, 82.2 x 60 cm

National Gallery, London

public domain

Pic. 2:

Janez Šubic (1850–1889)

Two Studies of Drapery and of a Hand, (after 1850)

graphite, paper, 425 x 295 mm

© National Gallery of Slovenia

Pic. 3

Piet Mondrian

Composition with Red, Blue, and Yellow, 1930

oil, canvas, 46 x 46 cm

Kunsthaus Zürich

public domain

Step 1 - Motivational Stage



Ask the pupils:



"If you need 100 grams of flour, 300 ml of milk and 2 eggs to make 12 pancakes, how much ingredients do you need to make 18 pancakes? And how much to make 5? How would you make this calculation?"

The pupils find out that if the recipe for 12 pancakes represents the base of 100 percent, then one needs 150% of ingredients to make 18 pancakes and $\frac{5}{12}$ or c. 42% to make 5.

Recipes are about proportion and they can be of various kinds: cement has a recipe, as do different chemicals and even art - where the fixed relations between different objects, body proportions and colours are called canon (from Ancient Greek kanon, which meant standard or measuring rod).

In today's lesson pupils will get to know four such proportions and use them to make percentage and ratio calculations.

Step 2 - Investigational Stage



STUDENTS' TASKS

1

Task 1

Making paint

To make paint one needs special ingredients and equipment, but the basis is always the recipe. The base recipe for paint binder (the “glue” that holds pigments together) is:

- 100 cm³ of Damar varnish (a solution of resin and turpentine – a mildly toxic oil)
- 50 cm³ of linseed oil (used for centuries in art, but also in cooking)
- 5 cm³ of Venice Turpentine (oil extracted from pine trees, but also larch)
- 1 g of beeswax dissolved in turpentine

To make paint, one needs to add pigments (these give colour to the paint), but due to their chemical and other properties, they need different amounts of linseed oil.

To make zinc white, you need only 30% of the base amount of linseed oil; to make ultramarine blue, 40%; and to make Naples yellow, 15%.

Calculate the amount of linseed oil you need for every pigment and the ratio between the amount of varnish and the linseed oil for each colour.



Jan van Eyck, The Arnolfini Portrait, National Gallery, London

Oil paint was an important innovation in the development of Western painting. One of the first and most successful works that made use of its longer drying time, translucency and layering was The Arnolfini Portrait of Jan van Eyck in 1434

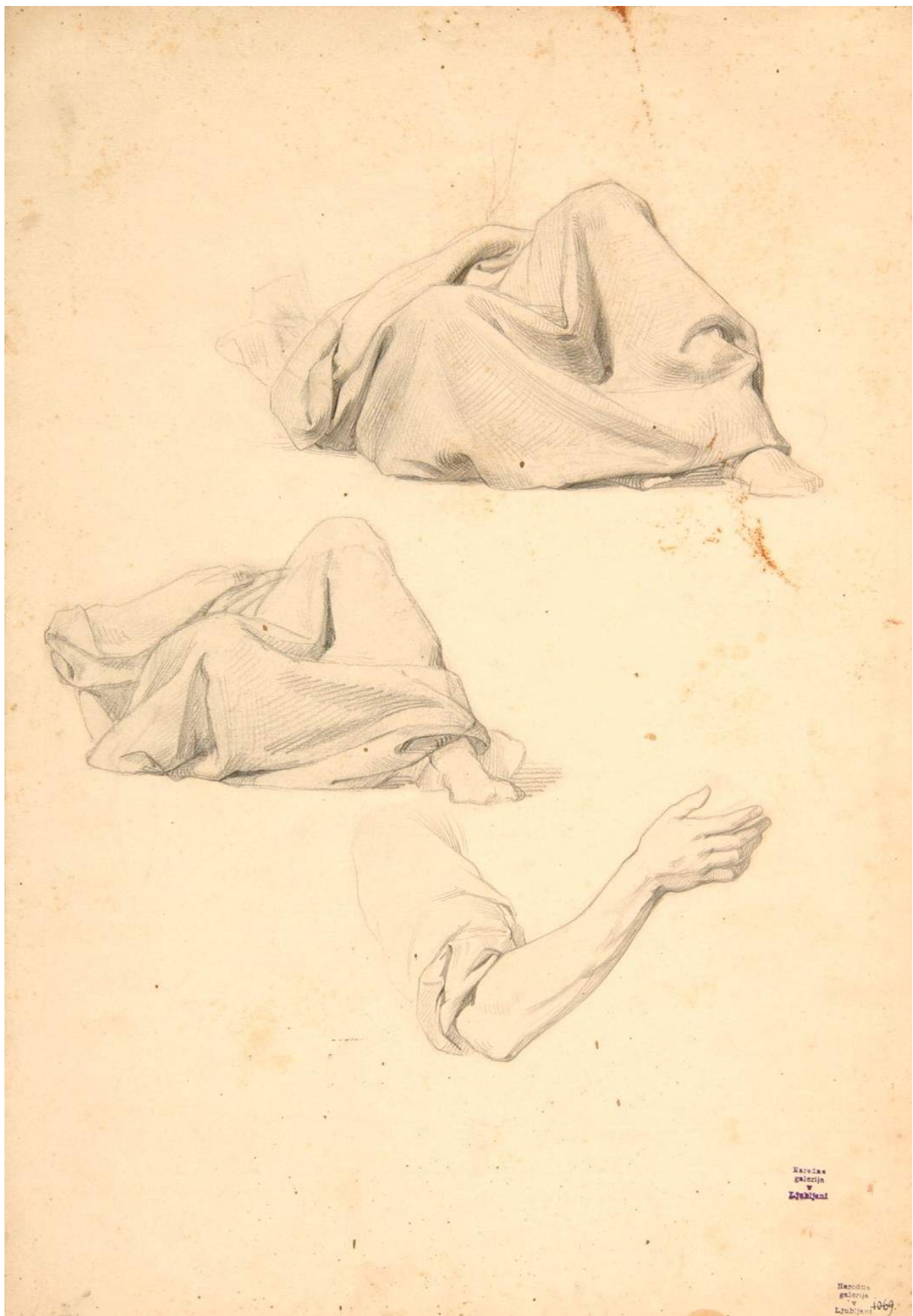
Task 2

Proportions of the human body

The proportions of the human body in art were subject to various changes. In Ancient Greece, the proportions and ratios derived from the height of the head; the whole body was either 7 or 8 heads high, and so on for other body parts.

Some of the ratios went like this:

- a body: 8 heads
- a leg: 4 heads
- an arm: 3.5 heads
- the trunk of the body: 3 heads
- width of the shoulders: twice the height of a head



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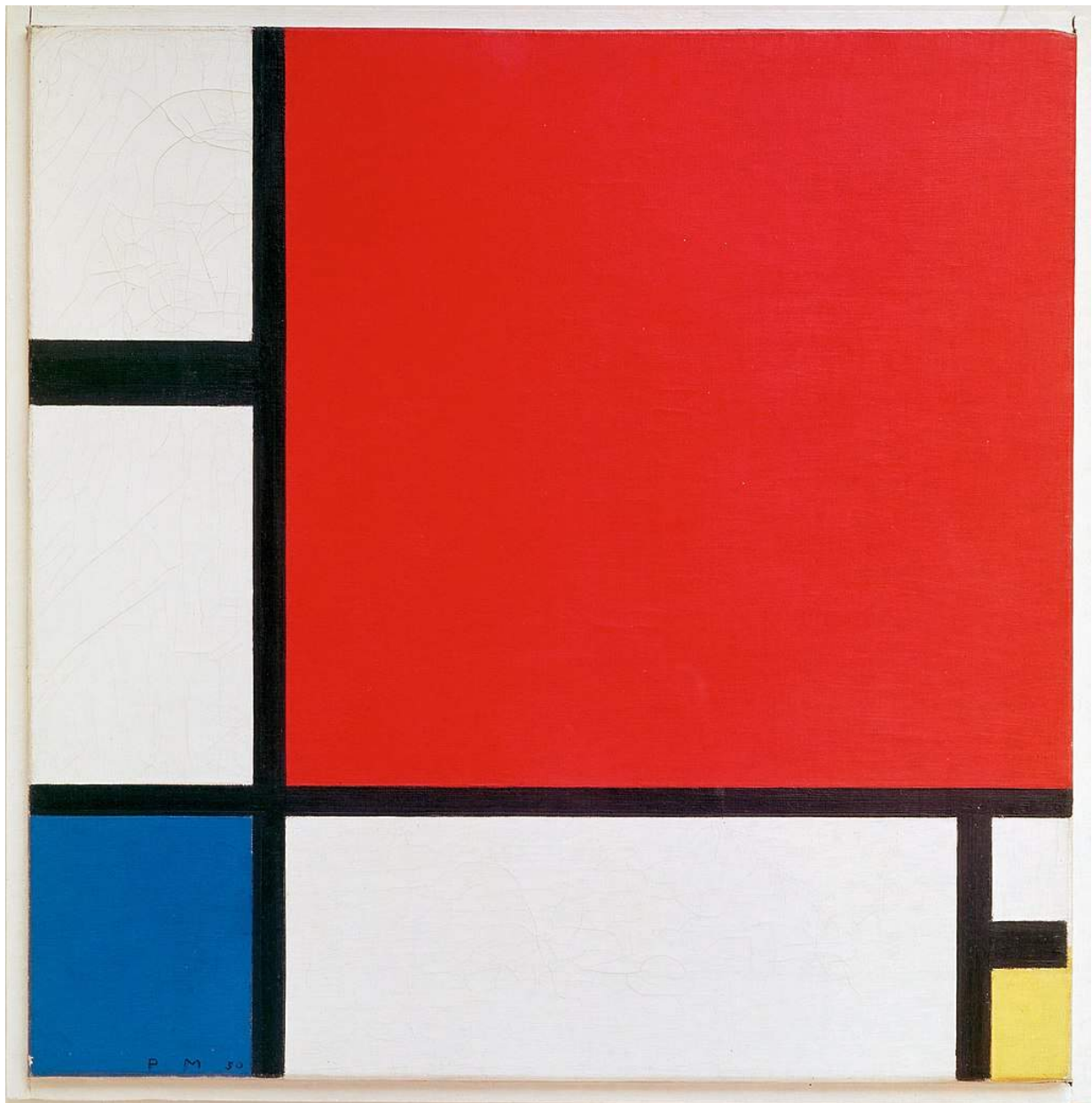
Now, one might think these are the only proportions one need to know, but this is not true; art pupils often drew only parts of the body, meaning they had to pay attention to ratios and proportions between different body parts.

Make a table with proportions between different body parts, expressed in fractions and approximate percentages.

	BODY	LEG	ARM	TRUNK	SHOULDERS
BODY	1	1/2	7/16	3/8	1/4
LEG	2	1	7/8	3/4	1/2
ARM	16/7	1 * 1/7	1	6/7	4/7
TRUNK	2 * 2/3	1 * 1/3	1 * 1/6	1	2/3
SHOULDERS	4	2	1 * 3/4	1 * 1/2	1

Task 3

Paint and proportions come together in colour ratios that are present in the visual arts, especially in design. Piet Mondrian belonged to an art group called De Stijl, which integrated painting, sculpture and design. Their works are strict, abstract, very often asymmetrical, but, nevertheless, proportional.



Piet Mondrian, Composition with Red, Blue, and Yellow, 1930, Kunsthhaus Zürich

Look at his Composition with Red, Blue, and Yellow and use the worksheet to first calculate the surfaces of each quadrilateral and then calculate the ratios between different surfaces. From the given measurements you will be able to calculate the red surface, the blue and yellow ones and the white ones. How will you find out the surface of the black borders?

Let your pupils calculate the ratios of the combinations below.

- (red + black) : whole = 63.97 : 100
- white : whole = 30.1 : 100
- (blue + yellow) : whole = 5.9 : 100

Then you explain: designers often follow the 60-30-10 rule; this means that the dominant colour takes c. 60% of the surface, the secondary colour c. 30% and the accent colour c. 10%. This is a general rule, we saw how Mondrian played with it, but nevertheless more or less followed it. You can use this rule in your everyday life as well - with your clothes, when decorating your room or, hopefully, working on an art project.

Step 3 - Consolidation Stage



Use the downloadable resource to evaluate your pupils.



Measurments.pdf

405.8 KB



Worksheet 1: Measurements of Mondrian's Composition with Red, Blue, and Yellow, 2022, courtesy of the National Gallery of Slovenia

End of the activity

EXIT