

Mechanical design test: Kinematics

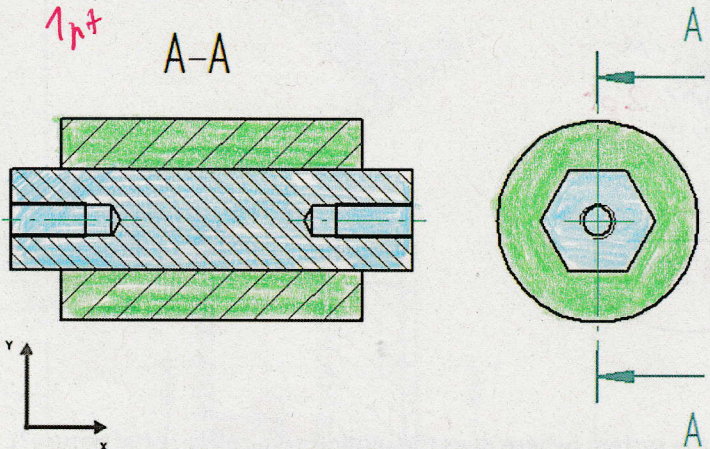
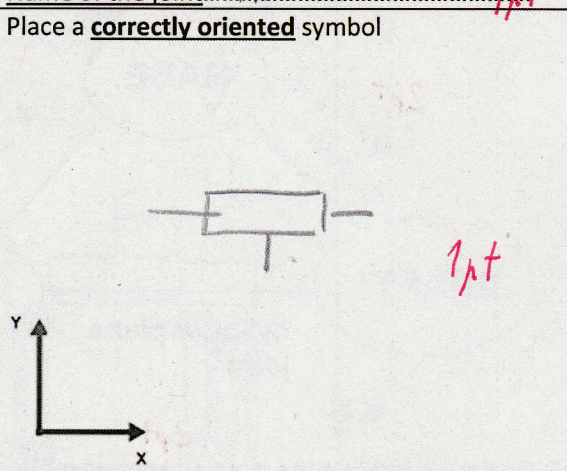
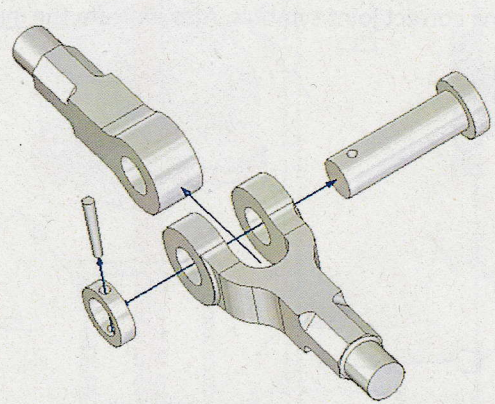
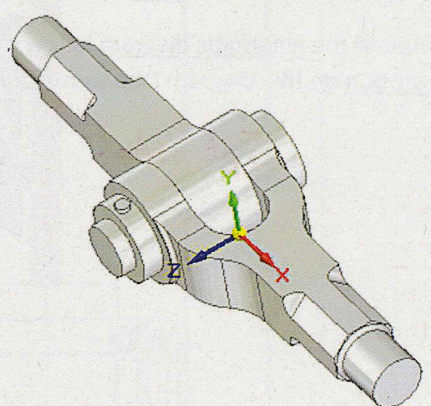
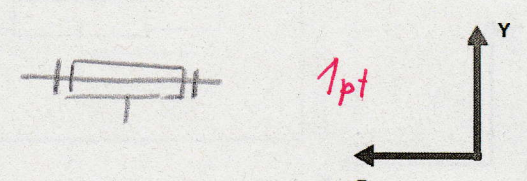
Name:

Duration: 30min, no documents authorized

Parts 1 and 2 are independent.

Part 1 – Identification of standalone joints

Below are two different joints taken from some larger mechanism. Fill-in the names of these joints with a correctly oriented kinematic symbol.

<p>Q1: Colour-in the two groups of parts of the joint below</p>  <p>1pt</p>	<p>Name of the joint.... <u>PRISMATIC</u> 1pt</p> <p>Place a correctly oriented symbol</p>  <p>1pt</p>
<p>Q2:</p> 	
<p>Name of the joint:</p> <p><u>REVOLUTE</u> 1pt</p>	<p>Provide its oriented symbol:</p>  <p>1pt</p>

Part 2 – Scotch Yoke

A scotch yoke mechanism transforms a revolute motion into reciprocating translation. Here, it is used to drive a double action pump (see page 3).

It is composed of three groups of parts coloured as follows:

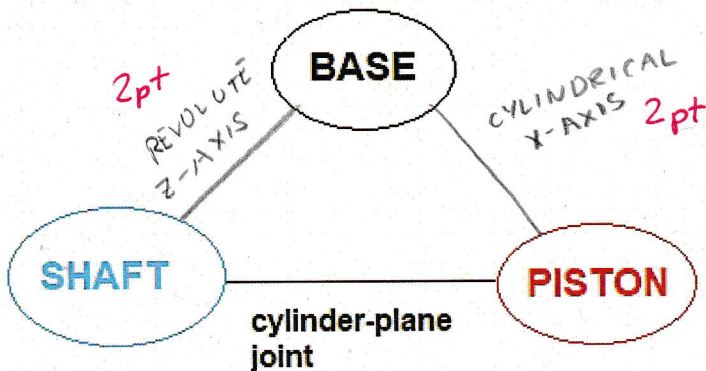
WHITE – BASE

BLUE – SHAFT

RED – PISTON

Q4. Complete the bubble diagram of joints below (name and orientation)

2+2



Q5. On Page 3, indicate the input and output motion of the system (where does the motion takes place, what nature?).

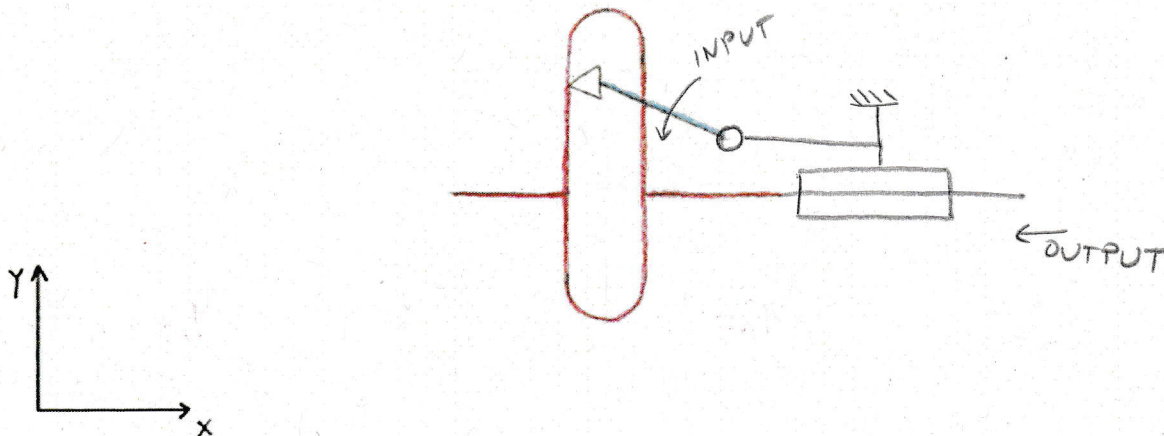
2pt

Q6. On Page 3, colour-in the shaft (blue) and piston (red) groups of parts in cross sections A-A and B-B.

3 coloured blocks = 3pt

Q7. Complete the kinematic diagram below of the system by using correct joint symbols. Also indicate the input and output motion on this diagram (the same as in Q5).

5pt total



1pt

Q8. On Page 3 below, mark the extreme left position of the point P (in cross-section A-A) during operation.

NB: Cross-sections B-B and C-C are not aligned with their respective cutting planes.

