DESIGN PLAN AND TECHNICAL DIAGRAM OF A PAPER PUNCH

STUDENT BOOK	Chapter 11, page 356
TOOLBOX	Pages 75–79

GOAL

Study the utility, function and operation of a paper punch in order to complete a design plan and a technical diagram.

MATERIALS

- paper punch

WHAT IS THE TECHNICAL OBJECT USED FOR?

1. What is the function of a paper punch?

_____

_____

2. Name at least three constraints that might have been entered in the specifications for designing this object.

_____

_____

_____

_____

HOW DOES THE TECHNICAL OBJECT WORK?

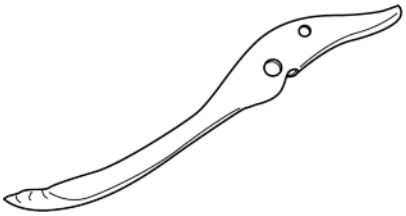
3. Locate the following parts on the paper punch. Check the appropriate box once you find each part.

Spring ☐

Punch blade ☐

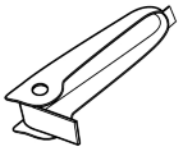
Fulcrum ☐

Lower lever ☐



Upper lever ☐

Paper guide ☐



Chad reservoir ☐

Name: _____ Group: _____ Date: _____

4. Name the two parts on which force must be exerted in order to operate the paper punch.

_____

_____

5. What symbol would you use to represent the force necessary to operate the paper punch? Circle the appropriate symbol.

a)

b)

c)

d)

6. The spring used in the design of the paper punch is a helical torsion spring since it causes the levers to return to their original position thanks to rotational motion. Of the following symbols, circle the one that represents a helical torsion spring.

a)

c)

b)

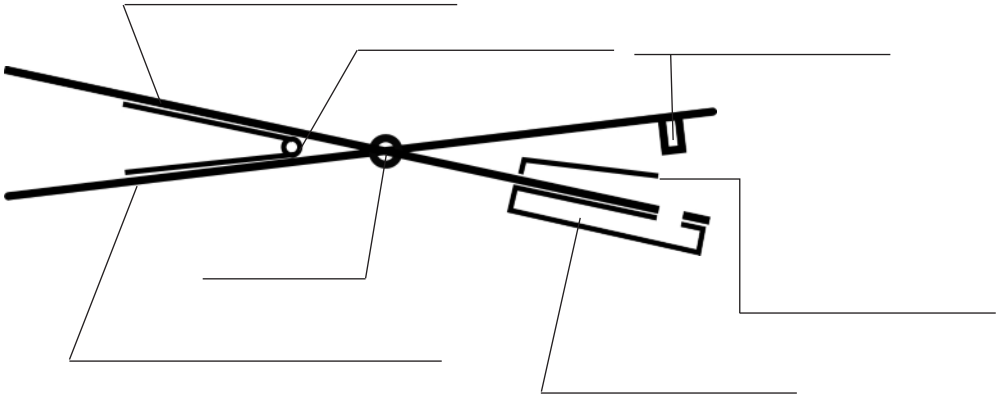
d)

7. For each of the parts shown in the table below, indicate:
   - the type of motion (translational, rotational or helical) involved
   - whether the motion described is unidirectional or bidirectional
   - the symbol that represents the type of motion involved

Part	Type of motion	Unidirectional or bidirectional motion?	Symbol
Upper lever			
Lower lever			

Name: _____ Group: _____ Date: _____

8. With the help of the answers you gave to Questions 3–7, complete the design plan for the paper punch. On it you should provide:
- the points where force must be exerted
- the motion of the paper punch levers
- the names of the various parts illustrated



HOW IS THE TECHNICAL OBJECT PUT TOGETHER?

9. Circle the type of material used to manufacture the paper punch.

a) Wood

b) Modified wood

c) Metal or alloy

d) Other material

10. Observe the motion of the upper and lower levers around the fulcrum.

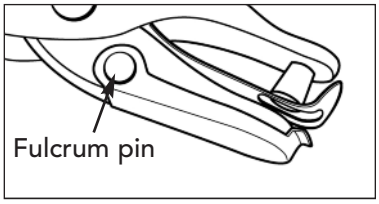
a) What type of guide does the fulcrum provide for the two levers?

_____

b) What symbol is used to represent this form of guiding control?

11. The illustration at right shows a fulcrum pin, the part linking the chad reservoir to the upper lever. Pull on the end of the reservoir to separate it from the upper arm. From your observations, what type of guide is provided by the fulcrum pin?

_____



Name: _____ Group: _____ Date: _____

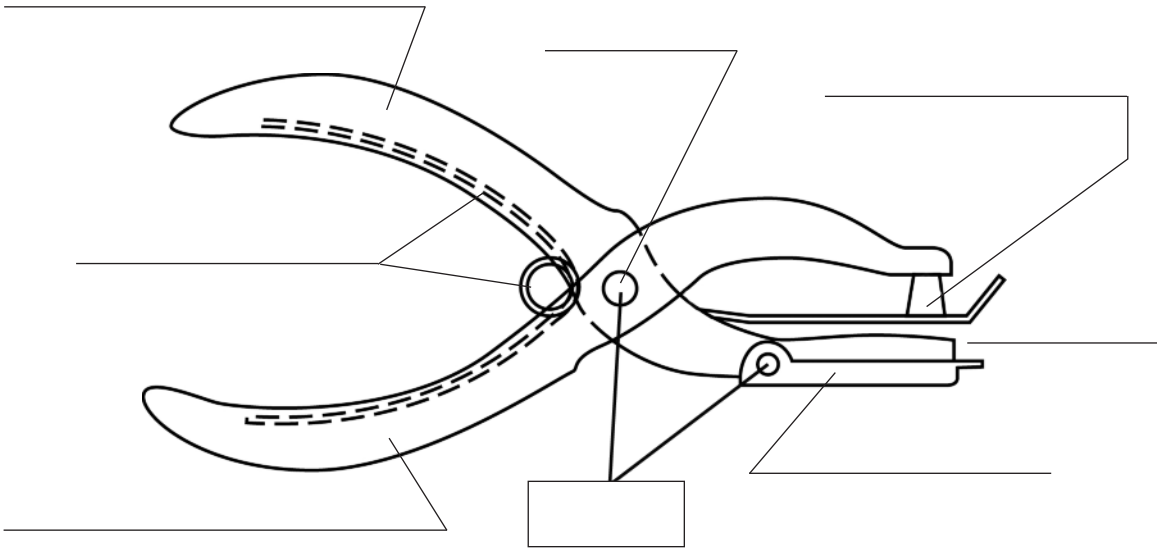
12. Refer to the links below. For each one, state whether it is a complete link (no motion possible between parts) or a partial link (motion is possible between parts).

a) The link between the lower lever and the punch blade. (The latter is set into the lower lever.) _____

b) The link between the paper guide and the upper lever. (A rivet links these two parts.) _____

13. What symbol illustrates a complete link in a diagram?

14. With the help of the answers you gave to Questions 9–13, complete the technical diagram for the paper punch. On it you should provide:
- the materials used in manufacturing it
- the names of the various parts shown
- the type of guide provided by certain parts (in the box pointing to the parts)
- the symbol for a complete link (where appropriate)



Type of material: _____