Instruments and Equipment for Tooth Preparation

By

Dr Mona Hafez

Operative instruments

-Attached to handpiece
-Mostly for cutting by burs
-Finishing and polishing burs

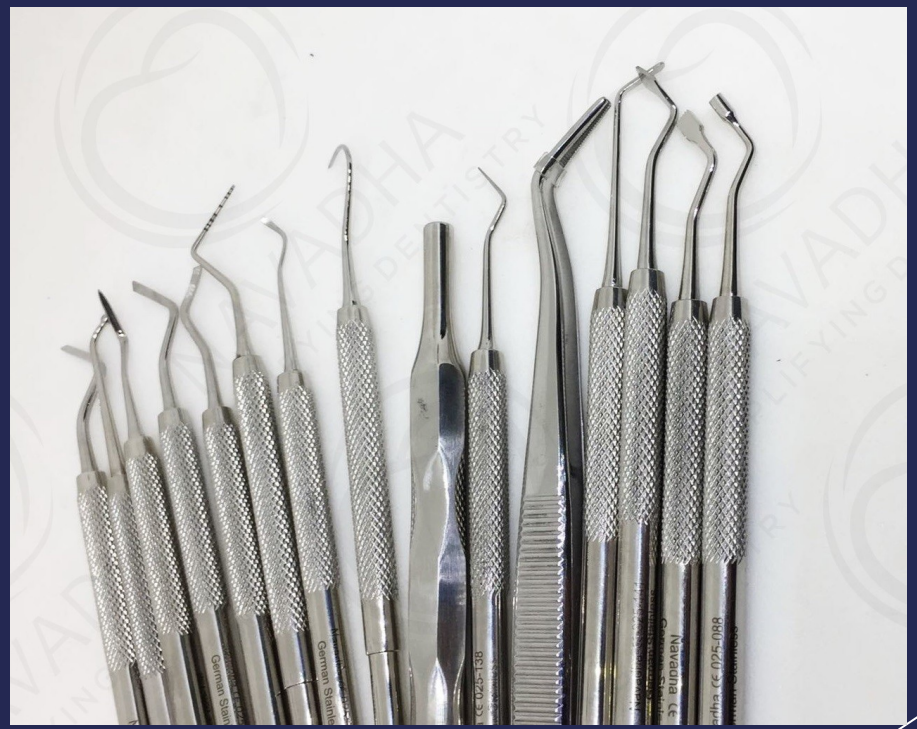
Hand instruments

- Cutting
  - Cutting hard tissue (enamel and dentin)
- Non cutting
  - Mirror
  - Tweezer
  - Amalgam carrier

Rotary instruments

- Power cutting hand pieces
- Rotary cutting instruments

Hand instruments

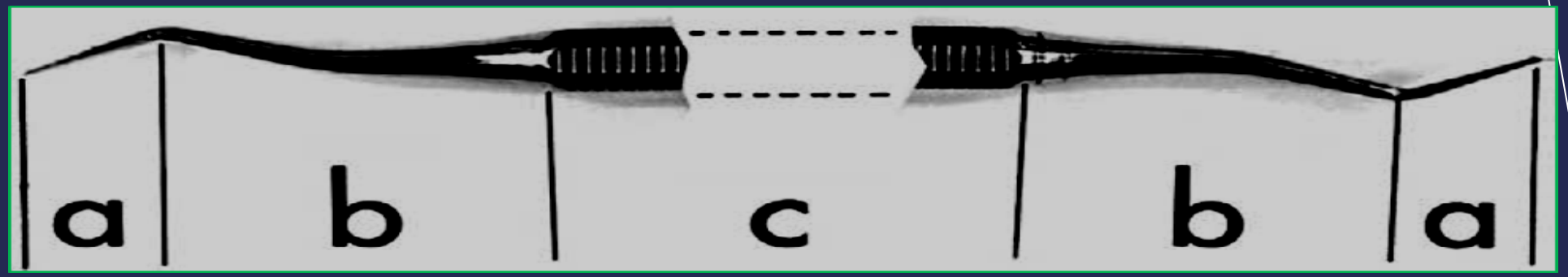


Instrument Design

cutting → blade

non-cutting → nib/working surface/face

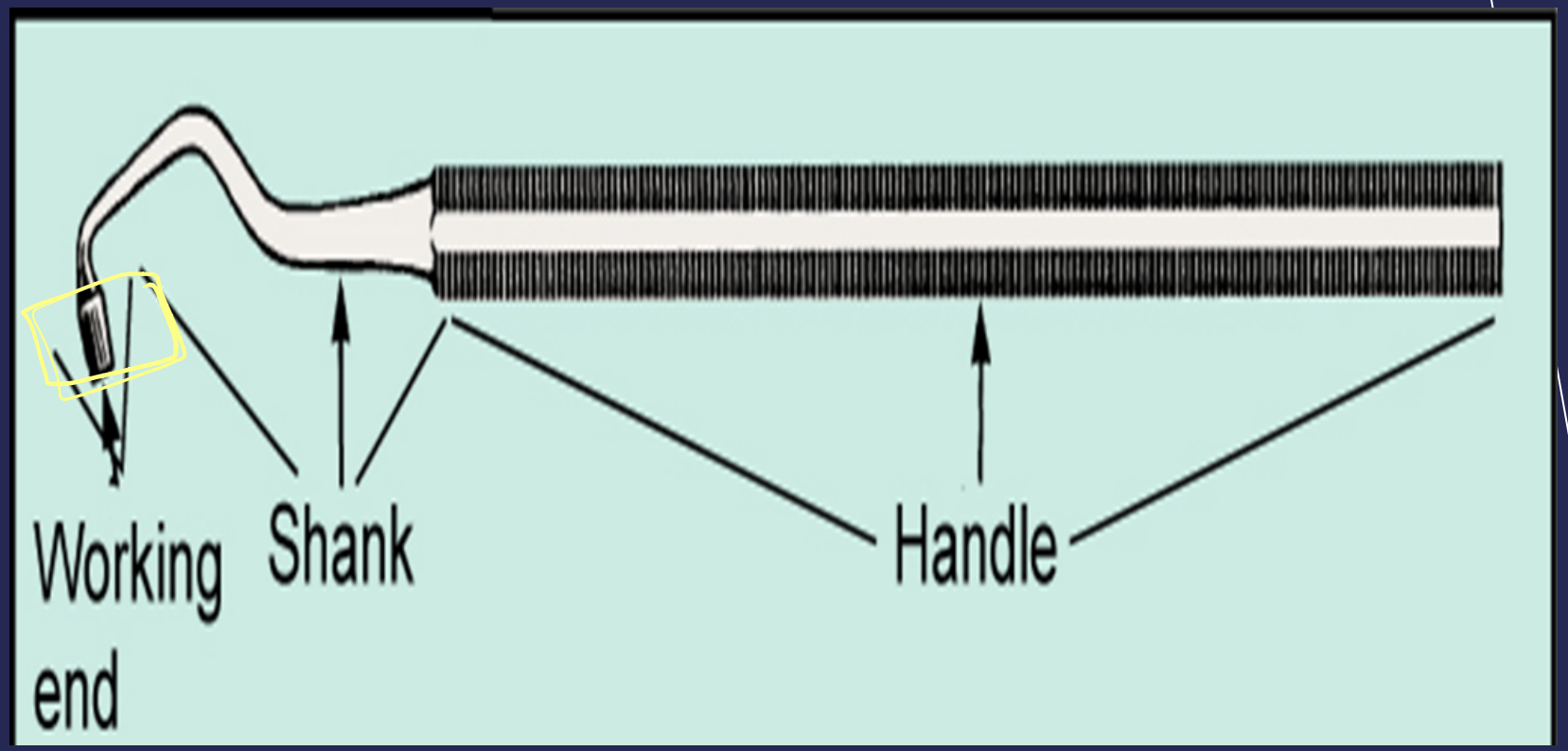
- Most hand instruments, regardless of use, are composed of three parts: handle, shank, and blade. For many non-cutting instruments, the part corresponding to the blade is termed nib. The end of the nib, or working surface, is known as face.



Double-ended instrument illustrating three component parts of hand instruments: blade (a), shank (b), and handle (c).

Condenser

Amalgam



WORKING END OF INSTRUMENT

The blade or nib is the working end of the instrument and is connected to the handle by the shank. Some instruments have a blade on both ends of the handle and are known as double-ended instruments. The blades are of many designs and sizes, depending on their functions

1 handle
2 shanks
2 working surfaces

Portion of the instrument where the operator grasps.

Handles

Handles are available in various sizes and shapes. Early hand instruments had handles of quite large diameter and were grasped in the palm of the hand. A large, heavy handle is not always conducive to delicate manipulation

Today's handles are smaller in size, smoother, serrated, light in weight and maybe shaped in a way that accommodate the grasp and fingers of the hand

Part of the instrument that attaches the working end to the handle.

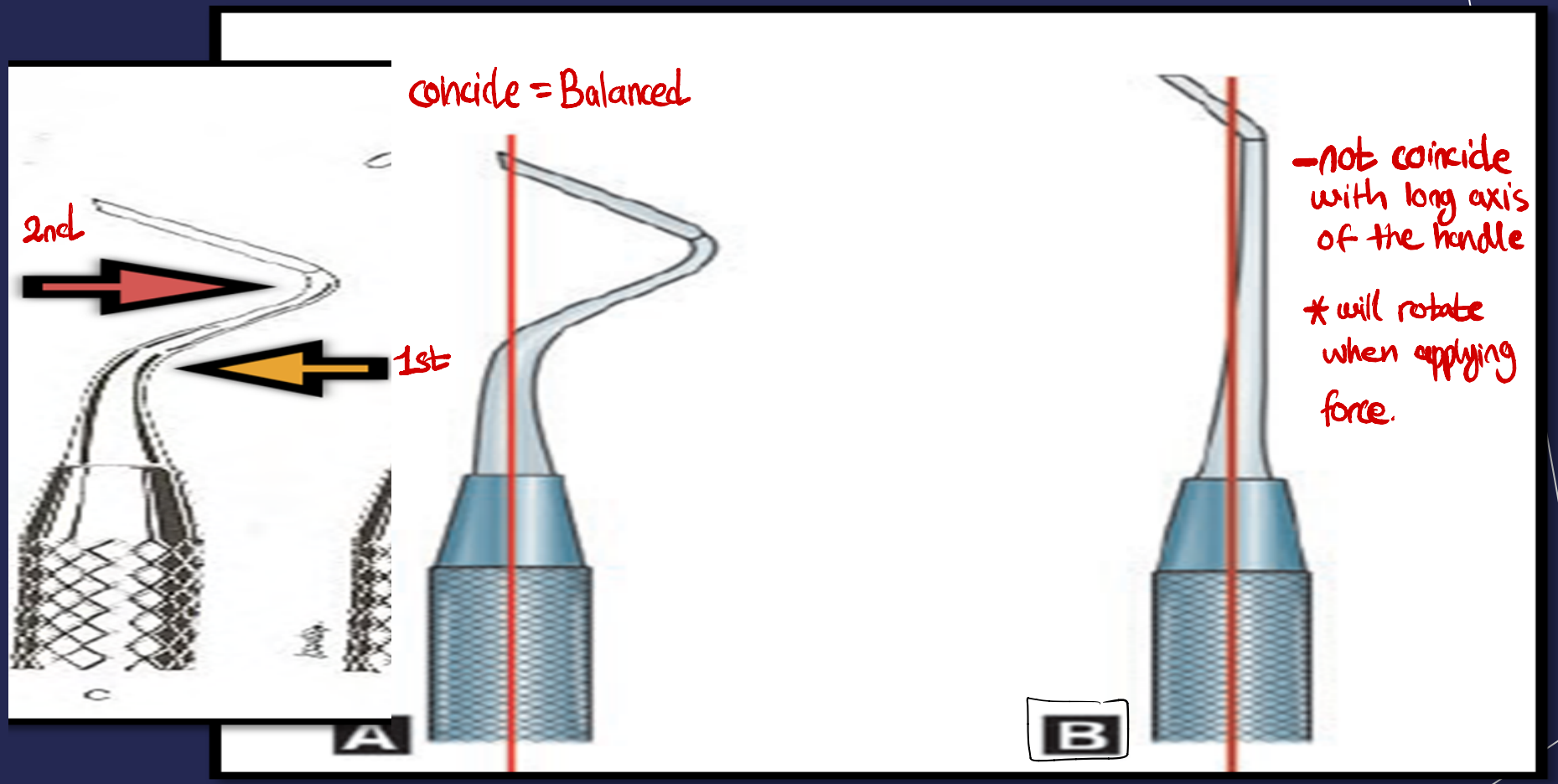
Shank of hand instrument

Shanks serve to connect the handles to the working ends of the instruments. They are normally smooth, round, and tapered. Shanks often have one or more bends to avoid the instrument having a tendency to twist in use when force is applied. Hand instruments must be balanced and sharp.

opposite to the handle.

To prevent it of rotation while doing its function

Balance allows for the concentration of force onto the blade without **causing rotation** of the instrument in the operator's grasp.
This accomplished by **designing the angles** of the shank so that the cutting edge of the blade lies within the diameter of the handle and nearly coincides with the axis of the handle.



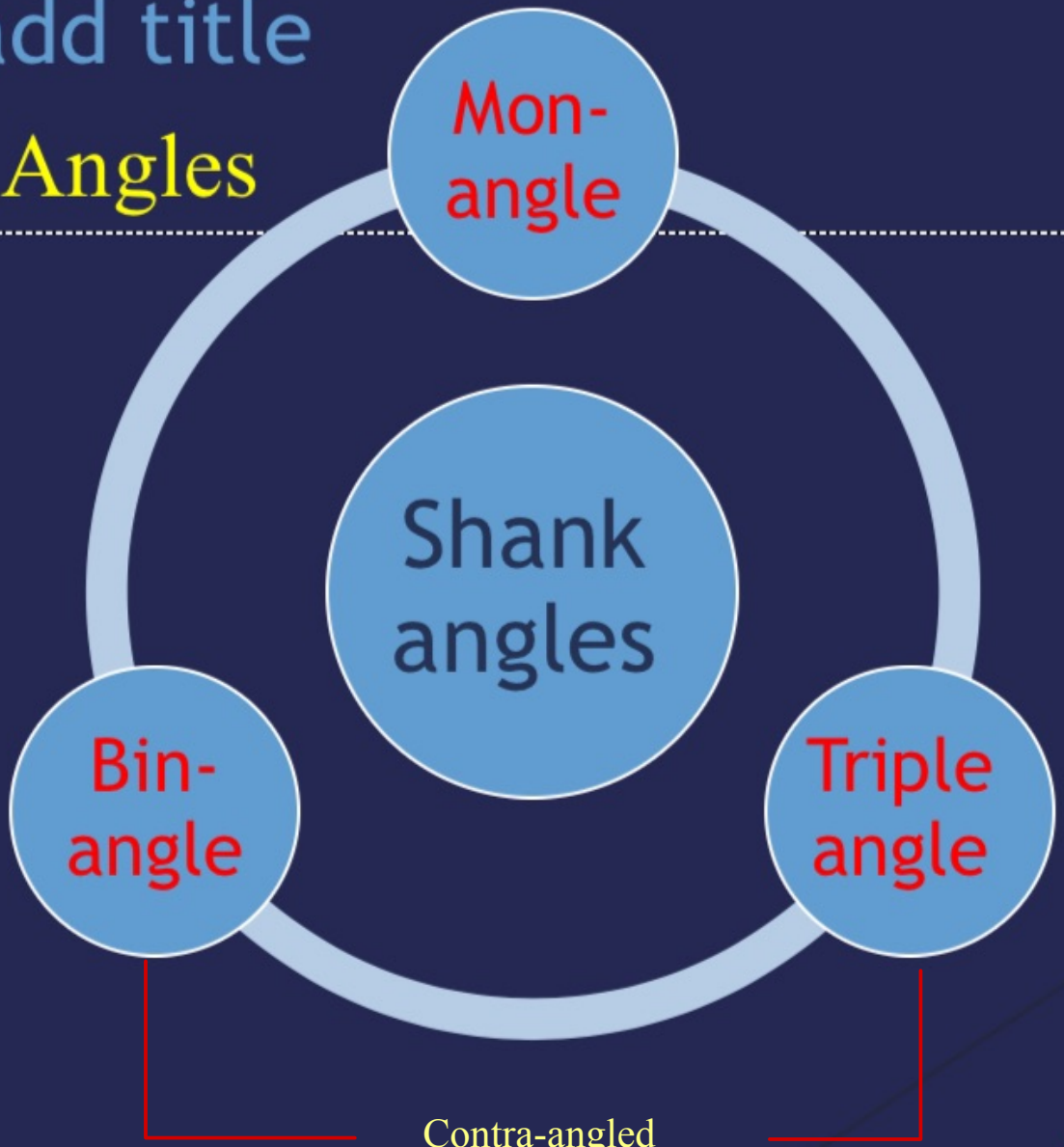
The balanced hand instrument: A, contra-angled, B, mon-angled.

Gentle function

The double angles bring the blade to be at the level of the long axis of the handle to be balanced while in function

Double tap to add title

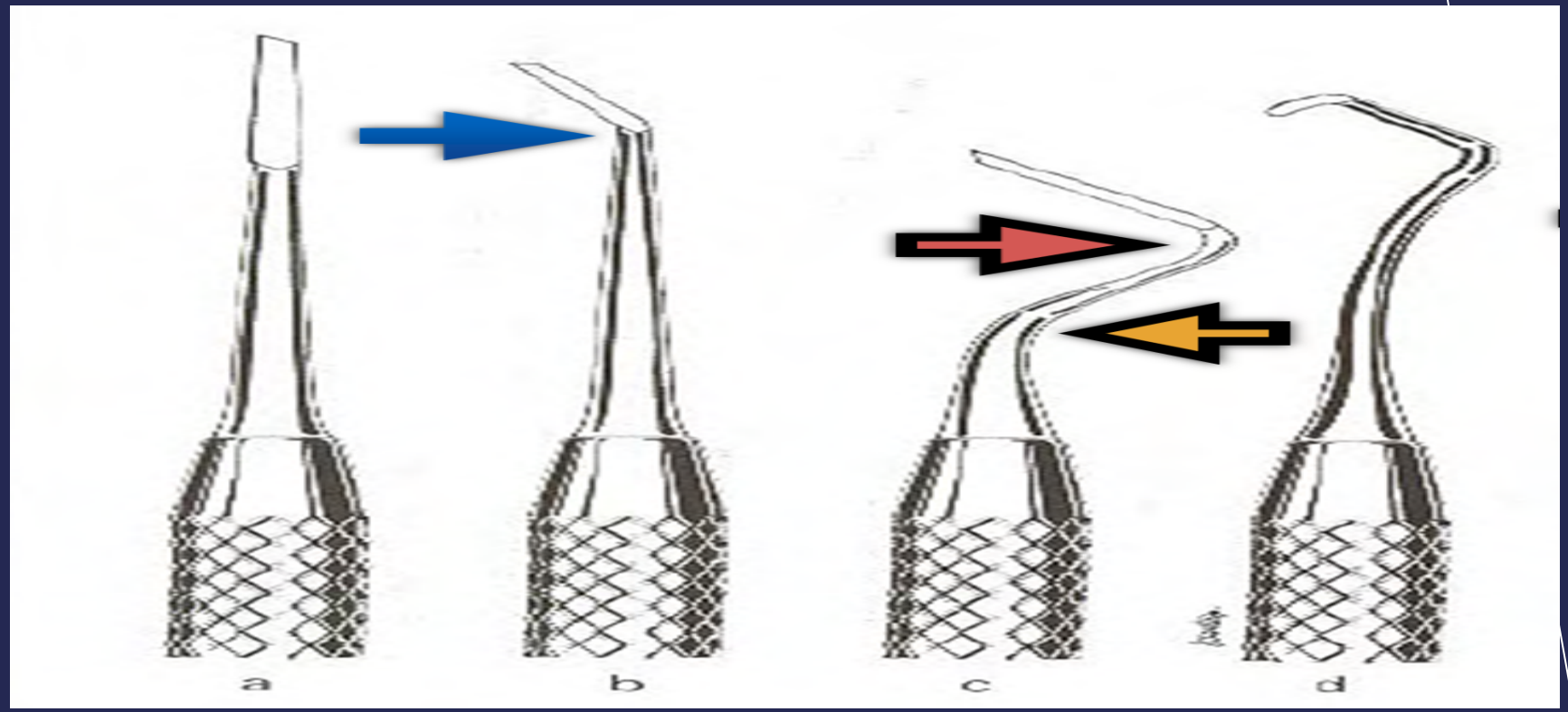
Instrument Shank Angles



Instruments with small, short blades may be easily designed in mon-angle form while confining the cutting edge within the required limit. No need for high forces to be balanced

Instruments with longer blades or more complex orientations may require two or three angles in the shank to bring the cutting edge close to the long axis of the handle. Such shanks are termed contra-angled.

These instrument work hard



Like chisel

Instruments classified by the number of angles in the shank: a, straight, b, mon-angle, c, bin-angle (contra-angled), d, triple-angle (contra-angled).

chisel with short blade

Hand Cutting Instrument Formulas

Cutting instruments have formulas describing the dimensions and angles of the working end. These are placed on the handle using a code of three or four numbers separated by dashes or spaces (e.g., 10–8.5–8–14).

- Three- number formula: describes instruments in which cutting edge is at right angle to blade's long axis.

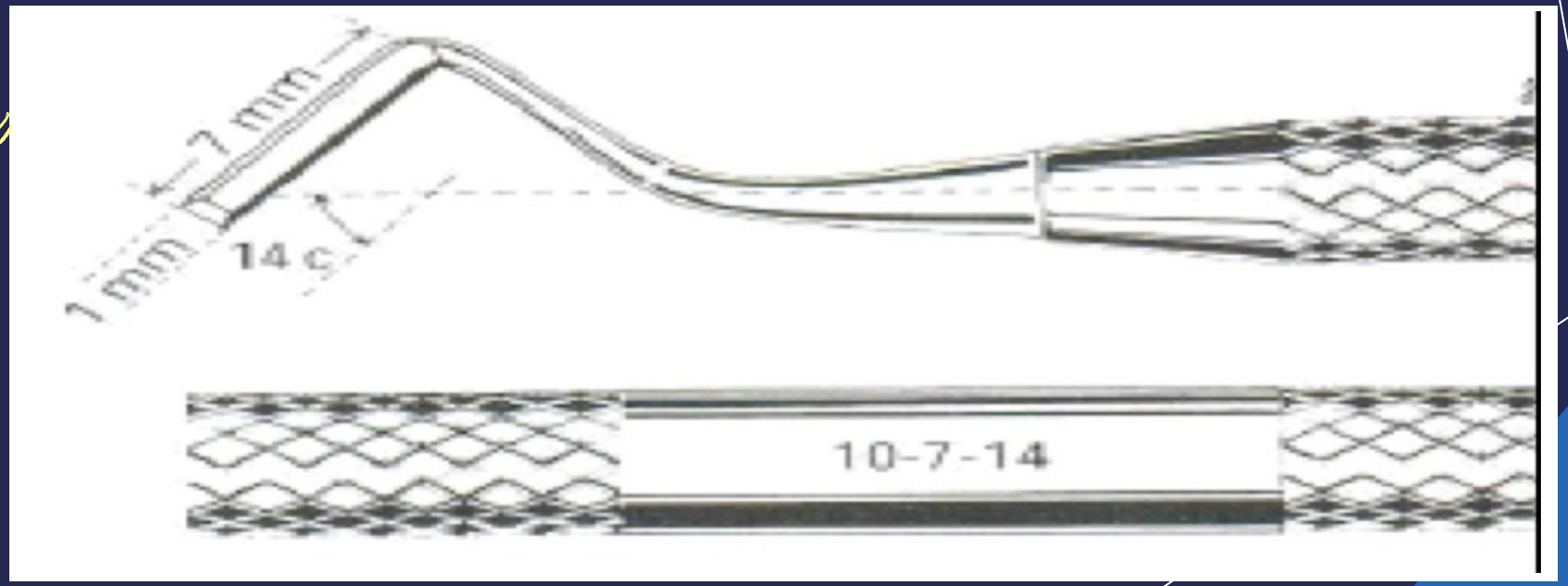
The first number indicates the width of the blade or primary cutting edge in tenths of a millimeter.

The second number

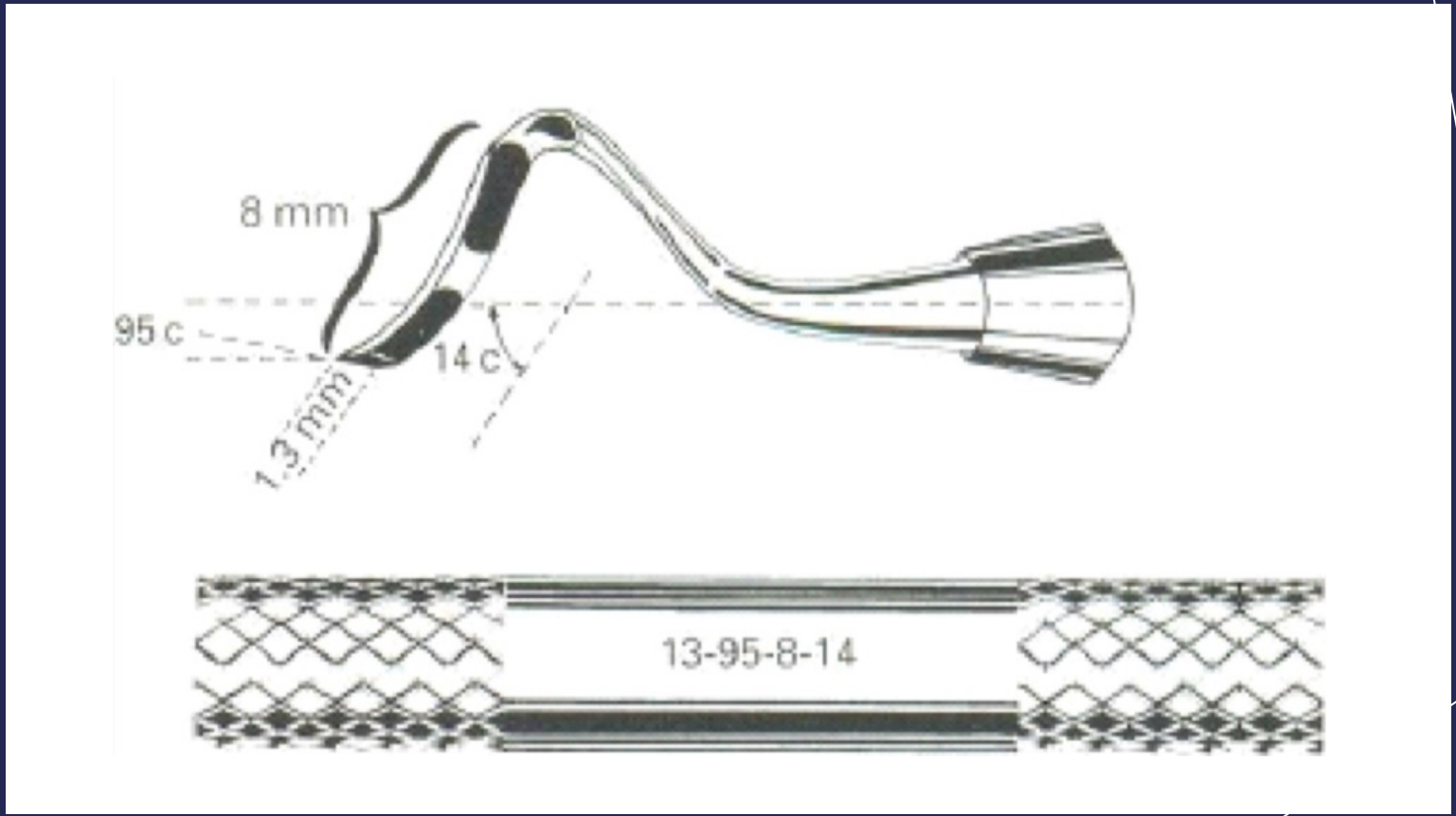
indicates the blade length in millimeters (e.g., 8 = 8 mm).

The third number

indicates the blade angle, relative to the long axis of the handle in clockwise centigrade.



- Four- number formula: describes instruments in which cutting edge is not at right angle to blade's long axis (e.g., 13-95-8-14).

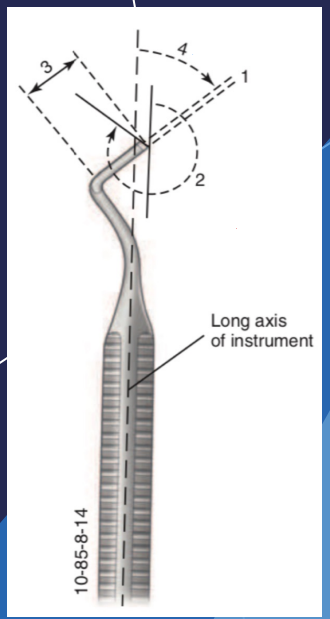


The first number indicates the width of the blade in tenths of millimeter

The second number indicates the primary cutting edge angle, measured from a line parallel to the long axis of the instrument handle in clockwise centigrade.

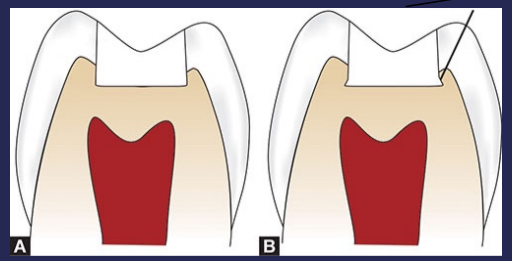
The third number indicates the blade length in millimeters (8 = 8 mm).

The fourth number indicates the blade angle (14



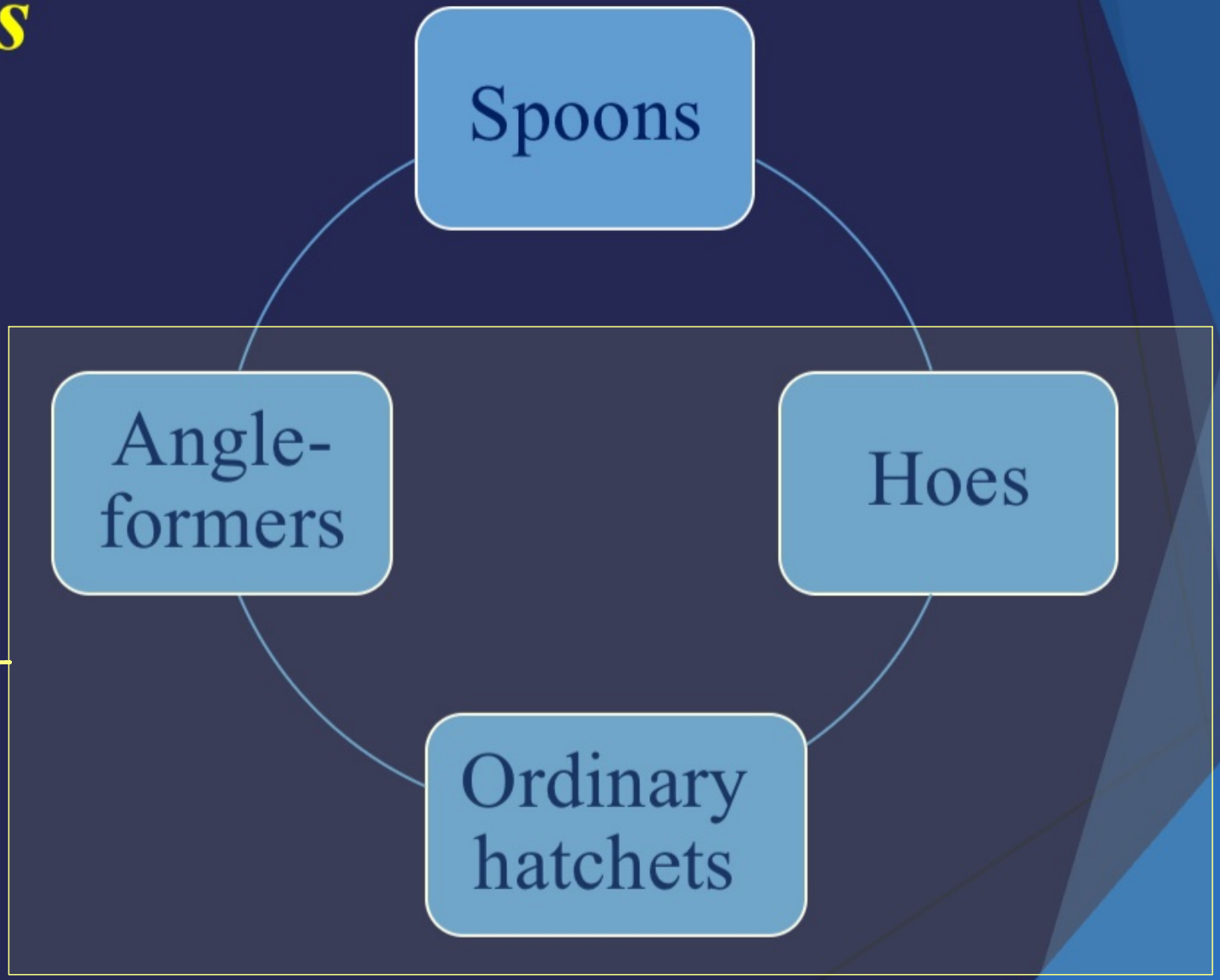
Hand cutting Instrument classification

Hand cutting instrument



- Excavators → Mainly for caries removal
- Chisels → Mainly used to cut tooth structure (Enamel + Dentin)
- Chisels → Mainly for cavity preparation, cleaving and scraping
- Other cutting instruments → Mainly to cut restorative materials (composite + Amalgam ....)

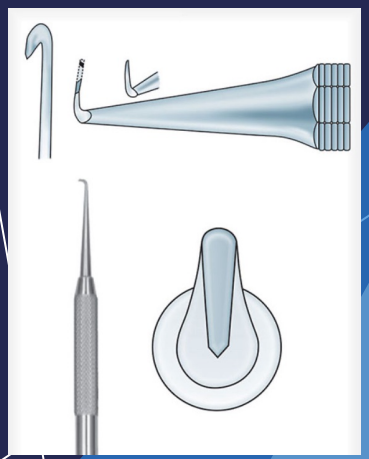
A. Excavators

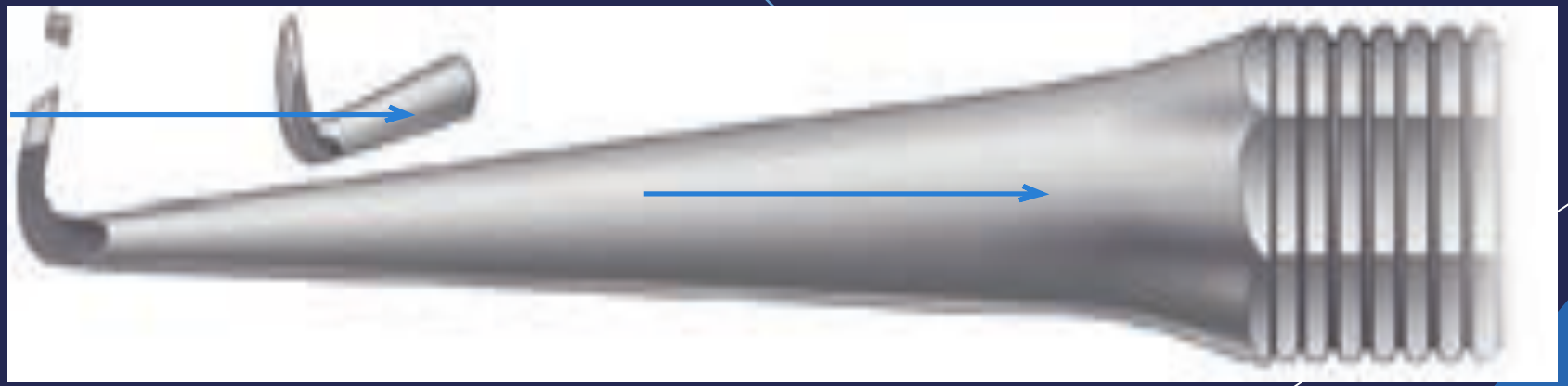


Old complicated instrument ←

(1) Ordinary hatchets

An ordinary hatchet excavator are used primarily on anterior teeth for preparing retentive areas and sharpening internal line angles, particularly in preparations for direct gold restorations.



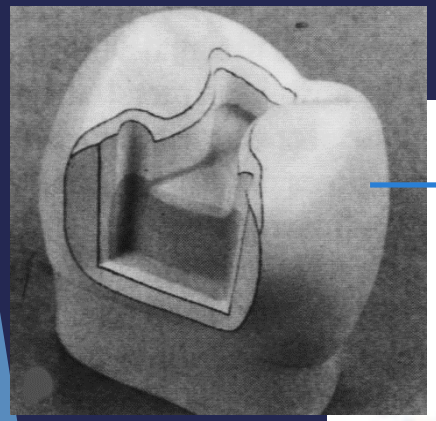


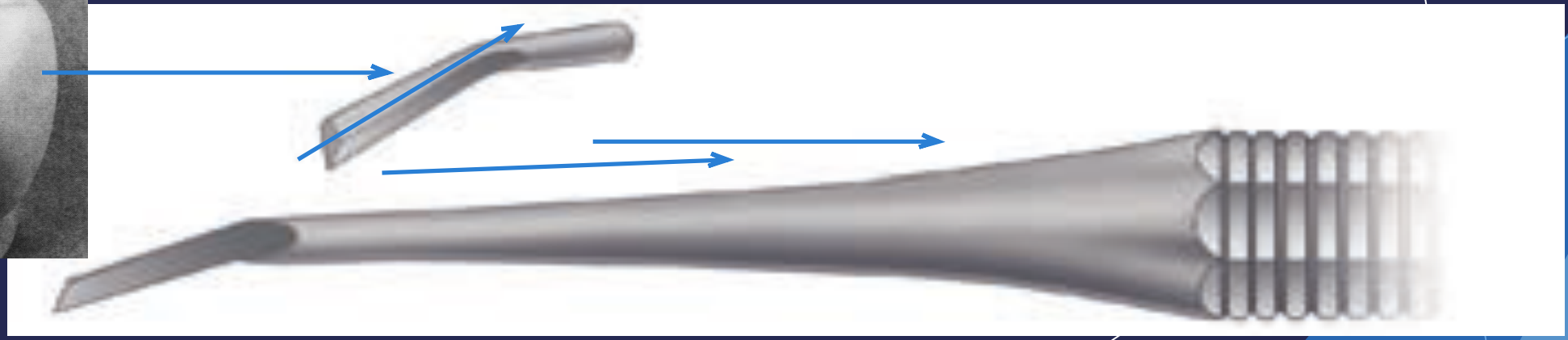
(2) Hoes

This type of instrument is used for planning tooth preparation walls and for forming line angles. It is commonly used in Class III and V preparations for direct gold restorations.

(3) Angle-formers

It is used for sharpening line angles and creating retentive features in dentin in preparation for gold restorations.





(4) Spoons

Waxing.

They are used for removing caries and carving amalgam or direct wax patterns.

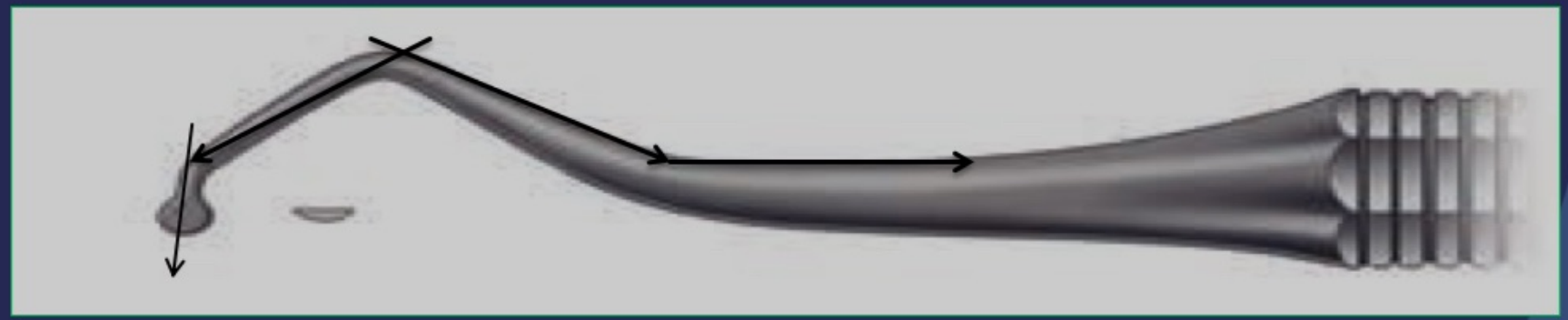
The blades are slightly curved, and the cutting edges are either circular or claw-like. The circular edge is known as a discoid, whereas the claw-like blade is termed cleoid.

The shanks may be bin-angled or triple-angled to facilitate accessibility.

Discoid

Cleoid

Bin-angle spoon excavator



Triple-angle spoon excavator

* The increase in angles give us more accessability with blanced grasp.

Discoid blade excavator

For Amalgam carving

Cleoid blade excavator

B. Chisels

(1) Straight slightly curved, or bin-angle

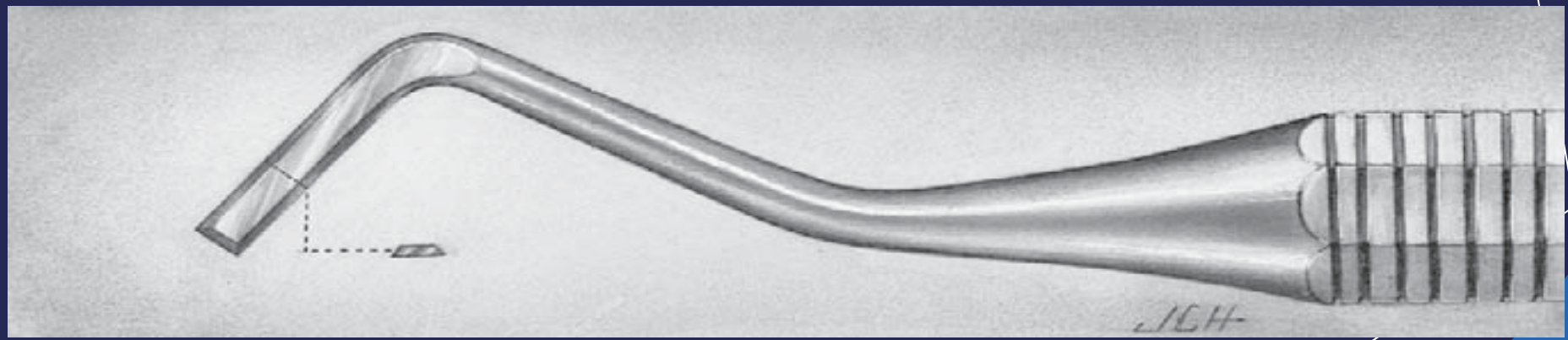
(2) Enamel hatchet

(3) Gingival margin trimmers

(1) Straight slightly curved, or bin-angle

(2) Enamel hatchet

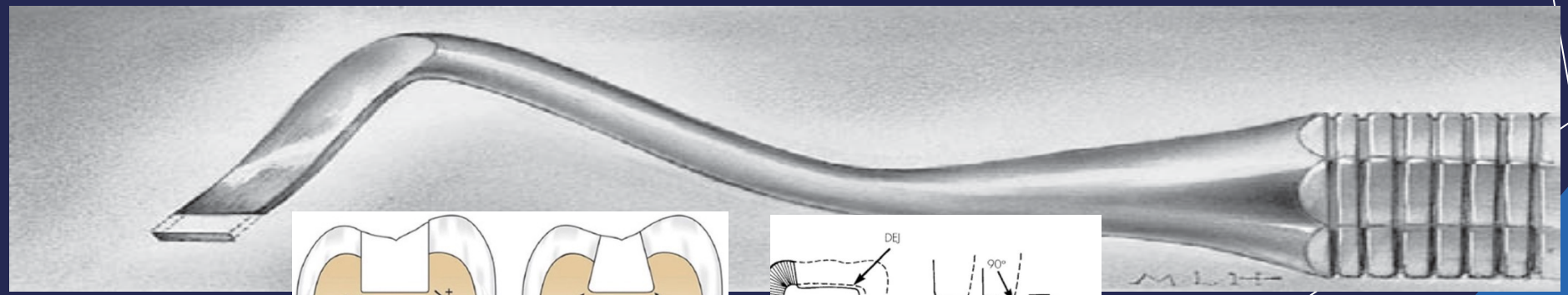
The It is used for cutting enamel.

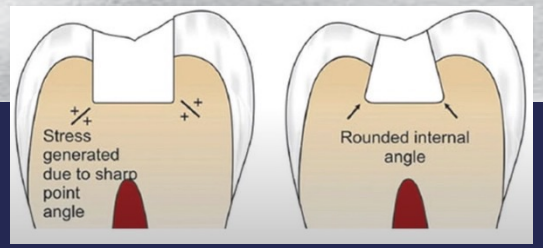


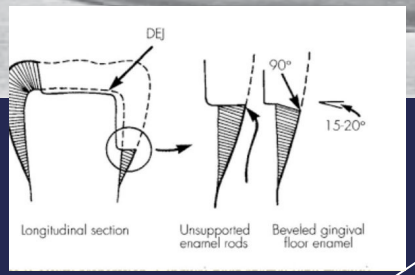
important / used mainly in the proximal box of class II cavity

(3) Gingival margin trimmers

The gingival margin trimmer is designed to produce a proper bevel on gingival enamel margins of proximo-occlusal preparations. Among other uses for these instruments is the rounding or beveling of the axiopulpal line angle of two surface preparations







C. Other Cutting Instruments

Other hand cutting instruments such as the knife, file, and discoid–cleoid instrument are used for trimming restorative material rather than for cutting tooth structure.

1. Knives,

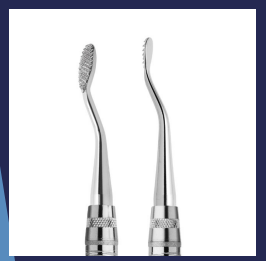
known as finishing knives, amalgam knives, or gold knives, are designed with a thin, knife-like blade that is made in various sizes and shapes. Knives are used for trimming excess restorative material

class 5 restoration

2. Files

can be used to trim excess restorative material. They are particularly useful at gingival margins. The blades of the file are extremely thin, and the teeth of the instrument on the cutting surfaces are short and designed to make the file a push instrument or a pull instrument

serrations



Bone file

3. The discoid-cleoid instrument

used principally for carving occlusal anatomy in unset amalgam restorations. It also may be used to trim or burnish inlay–onlay margins. The working ends of this instrument are larger than the discoid or cleoid end of an excavator

Questions

Define:

Balance and sharpness of hand instruments

Blade of hand instruments

Shank of hand instruments

Write on the following:

Shank of hand cutting instruments

Excavators

Hand instruments formulas