Instruction Sheet	Learning Guide #10

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Obtaining and conforming work instructions and job requirements
- Identification of object or component to be measured and interpretation of specification according to the appropriate geometric shape
- Consistency of measuring tools and instruments with the requirements of the job
- Alternative tool selection without sacrificing cost and quality of work
- Checking serviceability of selected tools

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to —

- Obtain tasks as per work instructions and job requirements.
- Check if the component to be measured is identified, specifications realized and interpreted according to the appropriate geometric shape.
- Select measuring tools and instruments with the requirements of the job.
- Select Alternative measuring tools.
- Check and any faults rectify (or report) serviceability of measuring tools.

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 17.
3. Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask your teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 1" in page 5

5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Instruction #3.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the "Information Sheet 2". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the "Self-check 2" in page 11.
10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. If you earned a satisfactory evaluation proceed to "Information Sheet 3,4 & 5". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Instruction #8.
12. Read the information written in the "Information Sheets 3, 4 and 5". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
13. Accomplish the "Self-check 3, 4 & 5" in page 16,19 & 25 respectively.
14. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 3, 4 & 5).
15. If you earned a satisfactory evaluation proceed to "Operation Sheet 1 & 4" in page 27 & 28_. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Instruction #11.
16. Read the "Operation Sheet 1 & 4" and try to understand the procedures discussed.

17. Go to your teacher if you need clarification or you want answers to your questions or you need assistance in understanding a particular step or procedure.

Information Sheet-1	**Obtaining and conforming work instructions and job requirement.**

Job requirement

Job requirements are a document that outlines what the expectation of the job is and also the minimum requirements for an individual to meet.

- ✓ A job description clarifies work functions and helping the people's responsibilities of the position to understand their jobs.
- ✓ They clearly identify and spell out the responsibilities of a specific job. It also includes information about working conditions, tools & equipment used, and knowledge and skills needed.
- ✓ The duty statements should focus on primary, current, normal, daily duties and responsibilities.
- ✓ Each duty statement should be understand, identifiable aspect of the work assignment, described in one to three sentences, and should be outcome-based, and allowing for alternate means of performing the duty.
- ✓ Duty statements typically contain three parts: 1) the Verb, the Object, and a Purpose. Examples of these parts of duty statements are shown below:

Verb	**Object**	**Purpose**
Cleans	Work area (tables and surroundings)	To create good working environment (daily, or as needed)
Collects	Tools & instrument (ruler, tape measurement, setsquare, compass, divider, thickness gauge, and calculator)	To prepare for work
Checks	The serviceability of tools & instruments	To take an accurate measurement and to perform the calculation
Reads	The servicing measuring instrument instruction (if you are asking servicing the measuring instrument)	To keep the life of the instruments
	The learning instruction	To fulfill the entire necessary requirement

Rules	Don't take any action on the instrument if it needs an experiment	To avoid unexpected failures of the instrument
Uses	measuring tools properly	To keep the safety of the tools
Documents	Daily practical work which is geometrical shape made as an exercise.	Important for further exercise & also used for the future.
Exercises	Home exercise what you made in the class	To upgrade knowledge & skill
Assignments	Home & class assignments (check list)	To be sure whether understand the lessons or not.

Work instructions are step-by-step instructions for the accomplishment of a task by one person and are engaged in the department or unit where the work is performed.

The difference b/n job description & work instruction

- ✓ Job Description is a document that outlines what the expectations of the job are and also the minimum requirements for an individual to meet.
- ✓ The Work Instruction on the other hand, will identify the steps and provide detailed information on meeting the requirements of the Job Description.

Here is one example of work instruction to servicing ruler (it is taking from operation sheet 4)

Before taking any measurements check the serviceability of metric ruler. Steps to servicing the ruler:

1. By use a neat soft sponge, soft cloth or soft fiber brush cleaning metric ruler with cloth soaked in warm water.
2. Dry it with a soft towel or soft cloth to prevent spots caused by minerals in the water.

3. Wipe in the direction of any polish lines.
4. On tougher jobs, you can add a mild detergent to the water without damaging the surface, but always rinse it thoroughly with warm water.

Self-Check 1	**Written Test**

Name: _____Date _____

Time started: _____ Time finished: _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is job requirement (description)? (3 points)
2. Prepare work instruction for taking any measurement? (5 points)
3. What is the difference between job description & work instruction? Explain by giving one practical example (2points)

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Test I. Short Answer Questions

1. _____

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_____

2. _____

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3. _____

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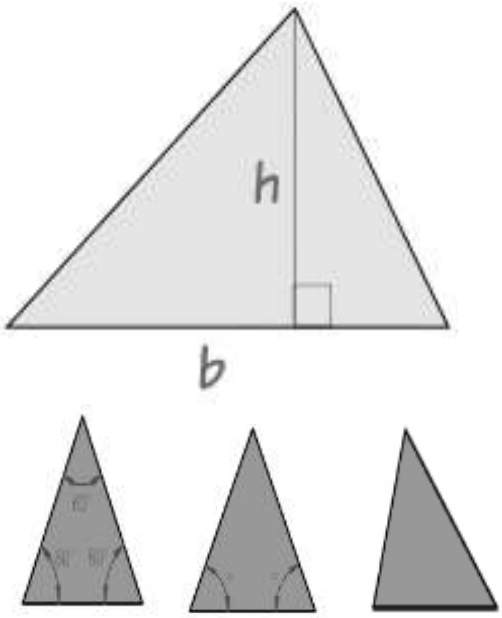
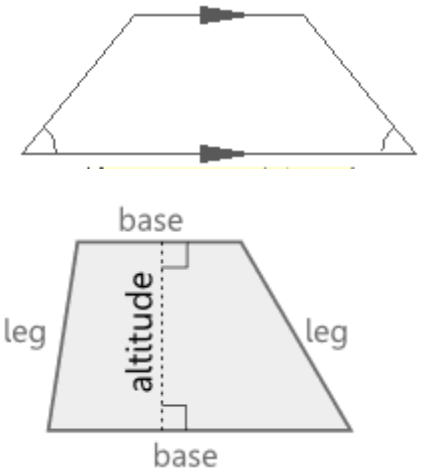
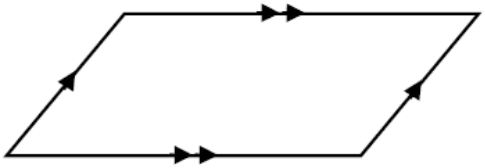
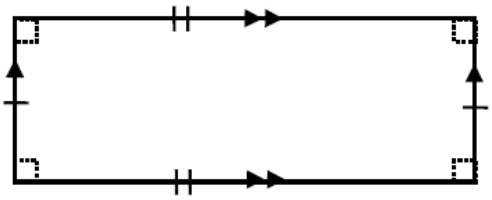
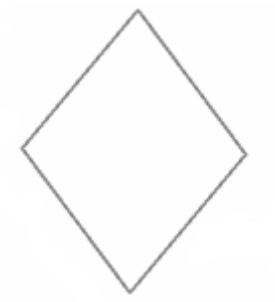
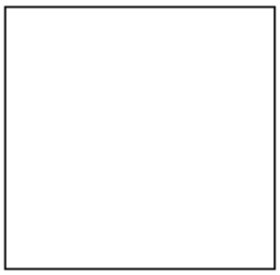
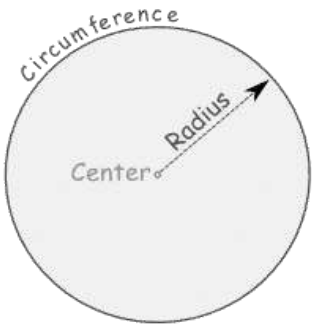
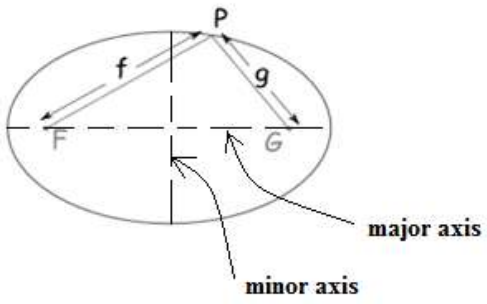
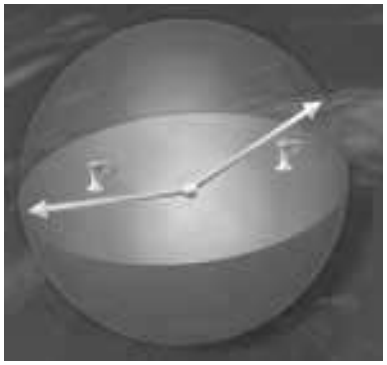
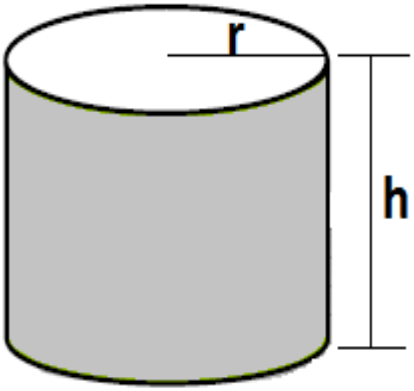
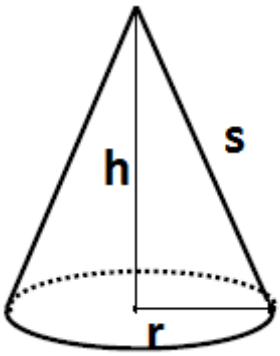
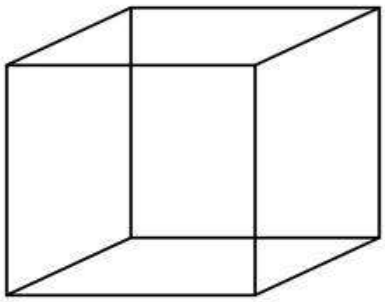
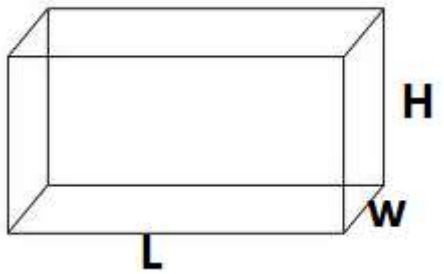
Information Sheet 2	**Identification of object or component to be measured**

Name	**Shape**	**Details**
Triangle		- A triangle has three sides and three angles - The three angles always add to 180° - There are three special names given to triangles that tell how many sides (or angles) are equal. - Equilateral Triangle Three equal sides Three equal angles, always 60° - Isosceles Triangle Two equal sides Two equal angles - Scalene Triangle No equal sides No equal angles

Trapezium		- Trapezium is a quadrilateral with NO parallel sides. - A pair of parallel sides - Isosceles trapezoid when the sides that aren't parallel are equal in length and both angles coming from a parallel side are equal. - The parallel sides are the "bases" - The other two sides are the "legs" - The distance (at right angles) from one base to the other is called the "altitude"
Parallelogram		- A parallelogram's opposite sides are parallel and equal in length. - Also opposite angles are equal
Rectangle		- Rectangle is a four-sided shape where every angle is a right angle (90°). - Also opposite sides are parallel and of equal length. - Rectangle is a parallelogram
Rhombus		- Rhombus is a four sided shape where all sides have equal length. - Also opposite sides are parallel and opposite angles are equal. - The diagonals of a rhombus bisect each other at right angles. - Rhombus is a parallelogram

Square		- square has equal sides and every angle is a right angle (90°) - Also opposite sides are parallel. - A square also fits the definition of a rectangle (all angles are 90°), and a rhombus (all sides are equal length).
Circle		- All points are having equal distance from the center. - The Radius is the distance from the center to the edge. - The Diameter starts at one side of the circle, goes through the center and ends on the other side. - The Circumference is the distance around the edge of the circle.
Ellipse		- An ellipse is the set of all points on a plane whose distance from two fixed points F and G add up to a constant (f+g is always constant). - An ellipse usually looks like a squashed circle. - The Major Axis is the longest diameter. It goes from one side of the ellipse, through the center, to the other side, at the widest part of the ellipse. - The Minor Axis is the shortest diameter (at the narrowest part of the ellipse).

Sphere		- All points on the surface are the same distance from the center - It is perfectly symmetrical - It has no edges or vertices (corners) - R = radius of the sphere
Cylinder		- It has a flat base and a flat top - The base is the same as the top, and also in-between it has one curved side (surface). - H = height - R = radius of the base & top circle
Conical		- It has a flat base - It has one curved side - H = height , S = slant height, & R= radius - The pointy end of a cone is called the vertex or apex - The flat part is the base - An object shaped like a cone is said to be conical
Cube		- It has 6 Faces - Each face has 4 edges, and is actually a square - It has 12 Edges - It has 8 Vertices (corner points) - and at each vertex 3 edges meet

Cuboid		- A cuboid is a 3 dimensional shape - There are 3 different measurements: Height, Width, and Length - It has six flat faces and all angles are right angles. - All of its faces are rectangles.

Self-Check 2	**Written Test**

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions*:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

1. What is the difference between circle & ellipse? (5pts)
2. What is conical means? (2pts)
3. Justify that how could be the faces of cuboid rectangle? (6pts)
4. Rhombuses are a square? Yes or no? Justify (3pts)
5. Give examples for sphere & cylinder from the real world? (4pts)

Note: **Satisfactory rating – 15-18 points** **Unsatisfactory - below 15 points**

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1) _____

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2) _____

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3) _____

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4) _____

_____

5) _____

_____

6) _____

_____

Information Sheet 3	**Consistency of measuring tools and instruments with the requirements of the job**

Definition of consistency

Consistency describes the degree to which a semi-fluid or semi-solid material resists deformation by an applied force. The deformation behavior of a material depends on the material's inner structure.

Consistency of measuring tools & instrument

It is defined as the quality of achieving a level of performance which does not vary greatly in quality over time.

Consistency/precision

In measurement of a set, **accuracy** refers to closeness of the measured value to a standard or known value.

precision refers to the closeness of two or more measurements to each other.

1. The consistency of a measuring instrument is its ability to register the same reading when a measurement is repeated.

It shows us how close the measured values are to each other.

High Consistency/Precision

2. A set of readings from identical instruments will have a small relative deviation or no deviation from the mean value.

High consistency => Small deviation from the mean value

Example Big deviation: 54kg, 56kg, 57kg

Small deviation: 54kg, 54kg, 55kg = Precise

A deviation is the difference between a measured value and its mean value or the average value.

Example, assume that the average reading of diameter = 3.24 cm & one of the reading = 3.26 cm

Then, Deviation = 3.26 – 3.24

= 0.02 cm

Relative deviation is defined by the formula below

$$\text{Relative deviation} = \frac{\text{Average deviation}}{\text{Average value}} \times 100\%$$

Example, The diameter of an O-ring was measured 5 times using vernier caliper. The results are 3.14 cm, 3.15 cm; 3.12 cm, 3.09 cm and 3.05 cm. calculate the relative deviation.

$$\text{Average diameter (value)} = \frac{3.14 + 3.15 + 3.12 + 3.09 + 3.05}{5}$$

$$= \underline{3.11 \text{ cm}}$$

Diameter / cm	Deviation / cm
3.14	3.14 – 3.11 = 0.03cm
3.15	3.15 – 3.11 = 0.04cm
3.12	3.12 – 3.11 = 0.01cm
3.09	3.09 – 3.11 =/-0.02/ = 0.02cm
3.05	3.05 – 3.11 = /-0.06/ = 0.06cm

$$\text{Average (mean) deviation} = \frac{0.03 + 0.04 + 0.01 + 0.02 + 0.06}{5}$$

$$= 0.03$$

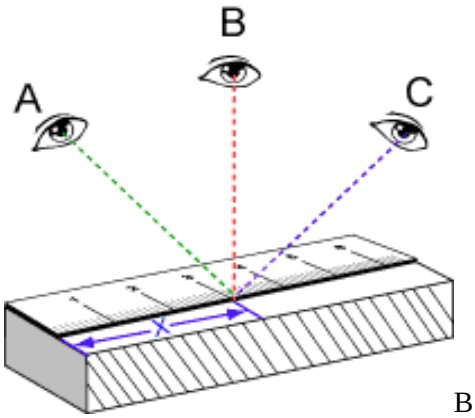
Then, relative deviation = $\underline{\text{Average (mean) deviation}}$

Average diameter (value)

= 0.03/3.11 x 100%

= 0.96%

3. The consistency of a measuring instrument can be improved by:
   a. eliminating parallax errors during measurement



B is the correct position of the eye

   b. Exercising greater care and effort when taking readings.

   c. Using an instrument which is not defective.

Consistency/precision & uncertainty

Quantitative observations (measurements and estimates) are made with a degree of precision that is represented by the value of the measurement and its relative uncertainty. For example, suppose we want to measure the length of an object using a ruler marked with tenth of a centimeter divisions. We could record the measurement using digits for the whole centimeter, a digit for the last tenth mark that the object extended beyond, and one more digit representing our estimate, to the nearest tenth of a division (i.e. hundredth of a centimeter), of where our object ends. We might measure a credit card as having a width of 5.35 centimeters, for example, where the '5' represents our best guess of where the credit card ends between the 5.3 and 5.4 centimeters marks. Other measurers using the same ruler might record 5.34 or 5.36 centimeters as the width.

Many measuring devices in current use have digital displays instead of scales and pointers. The only difference is that the estimate of the last digit is done by the electronic circuitry rather than the operator. We can still assume that a digital readout is uncertain by ±1 in the last digit.

Precision is represented by the number of significant figures in the value, and uncertainty is assumed to be ±1 in the last significant figure, the digit that represents the estimate to the nearest tenth of a division between the graduations on our measuring device.

What is uncertainty of measurement?

The uncertainty of a measurement tells us something about its quality.

Uncertainty of measurement is the doubt that exists about the result of any measurement. You might think that well-made rulers, clocks and thermometers should be trustworthy, and give the right answers. But for every measurement - even the most careful - there is always a margin of doubt. In everyday speech, this might be expressed as 'give or take' ... e.g. a stick might be two meters long 'give or take a centimeter'.

Expressing uncertainty of measurement

Since there is always a margin of doubt about any measurement, we need to ask 'How big is the margin?' and 'How bad is the doubt?' Thus, two numbers are really needed in order to quantify an uncertainty. One is the width of the margin, or interval. The other is a confidence level, and states how sure we are that the 'true value' is within that margin.

For example:

We might say that the length of a certain stick measures 20 centimeters plus or minus 1 centimeter, at the 95 percent confidence level. This result could be written:

20 cm ±1 cm, at a level of confidence of 95%

The statement says that we are 95 percent sure that the stick is between 19 centimeters and 21 centimeters long.

Error versus uncertainty

It is important not to confuse the terms 'error' and 'uncertainty'.

Error is the difference between the measured value and the 'true value' of the thing being measured.

Uncertainty is a quantification of the doubt about the measurement result

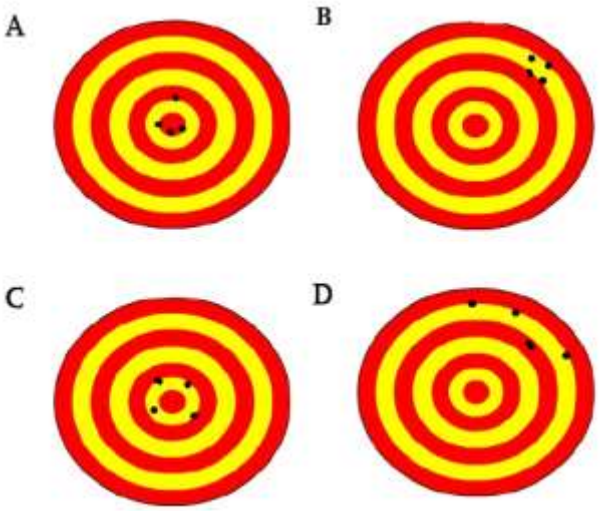
Self-Check 3	**Written Test**

Name: _____ Date: _____

Time started: _____ Time finished: _____

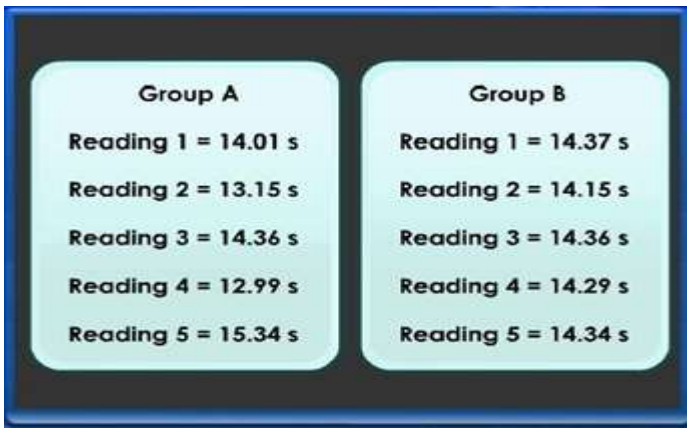
Instructions: Perform the following tasks. Write your answers in the answer sheet provided:

1. Which of the following picture show us consistent? (3 points)



2. The lining length measured by two different group with identical instrument, the measurement result in group one 4.08, 4.09, 4.12, 4.05 and 4.07 & in group two 4.04, 4.08, 4.15, 4.06 and 4.13, which group having higher consistency of measurement. (10 points)

3. From the information given, which of the following statement is true? (5 points)



   a) The readings in group A is more consistence

   b) The readings in group B is more consistence

c) The readings of both group A & B are more consistence

d) The readings of both group A & B are not more consistence

4. What is consistency of measuring tools? (2points)

Note: **Satisfactory rating - 25 points** **Unsatisfactory - below 25 points**

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

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2. _____

_____

3. _____

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4. _____

Information Sheet 4	**Alternative tool selection without sacrificing cost and quality of work**

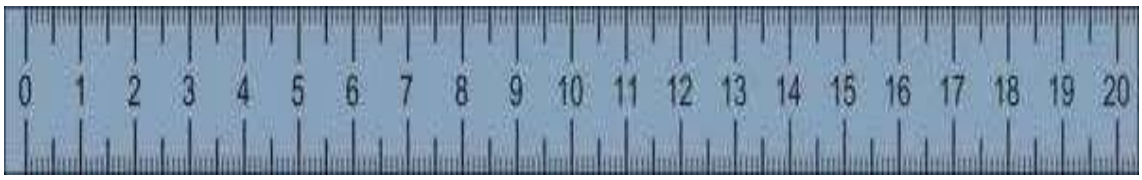
Alternative tools selection process

- ✓ First identify the different types of measuring tools.
- ✓ Second describe the uses of different types of measuring tools
- ✓ Selecting an appropriate tool used for leather garment activities

- Identifying, describing & use of the different types of measuring tools

Basic measuring tools

1.3.1 RULLER:



Used to measure small objects of the length like the length of leather, lining, and reinforcement.

graduated in centimeters & millimeters

A ruler is a straight edge used for imprecise measurements. You lay the ruler next to an object and then using your eyes you must judge the closest measurement.

Degree of accuracy of approximately ± 0.5 mm

1.3.2 MEASURING TAPE:

Flexible form of ruler used to take human body measurement.

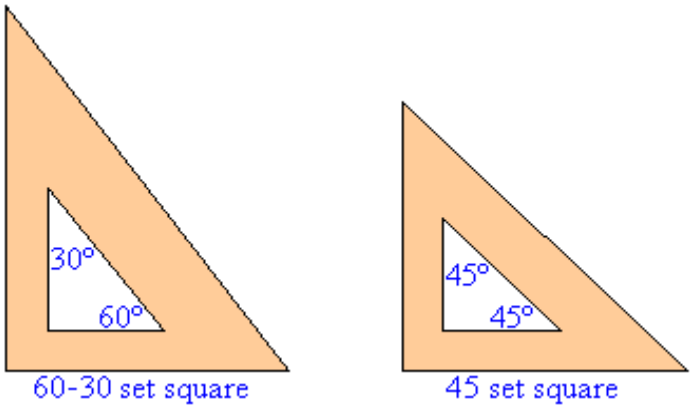
- It consists of a ribbon of cloth, plastic, fiber glass, or metal strip with linear-measurement markings

- The tape measure can be marked with US or English measurements (feet and inches), metric measurements (meters and parts of meters: centimeters, millimeters, etc.) or both shared on the same tape.

1.3.3 TRY SQUARE

A try square is a woodworking or a metal working tool used for marking and measuring a piece of wood. The *square* refers to the tool's primary use of measuring the accuracy of a right angle (90 degrees); to *try* a surface is to check its straightness or correspondence to an adjoining surface. A piece of wood that is rectangular, flat, and has all edges (faces, sides, and ends) 90 degrees is called four square. A board is often milled four square in preparation for using it in building furniture.

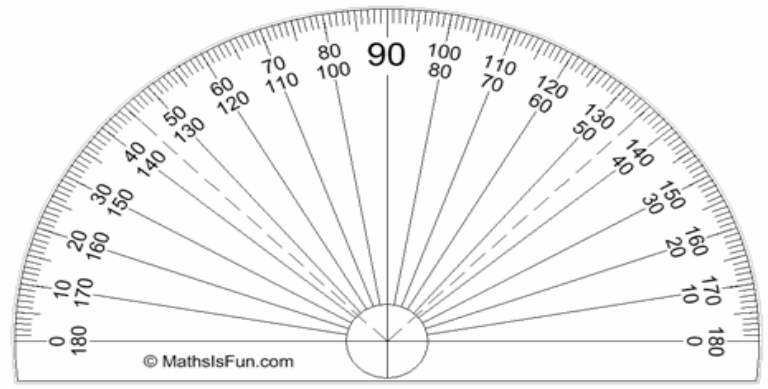
SET SQUARE:



There are two types of Set Squares and they are named according to the angles present on each (60 -30 and 45 degree).

Used for drawing parallel lines and perpendicular lines.

1.3.4 PROTRACTOR:



A half circle protractor marked in degrees (180°).

A protractor is a square, circular or semicircular tool, typically made of transparent plastic, for measuring angles. Most protractors measure angles in degrees. Radian-scale protractors measure angles in radians.

Some protractors are simple half-discs. More advanced protractors, such as the bevel protractor, have one or two swinging arms, which can be used to help measure the angle.

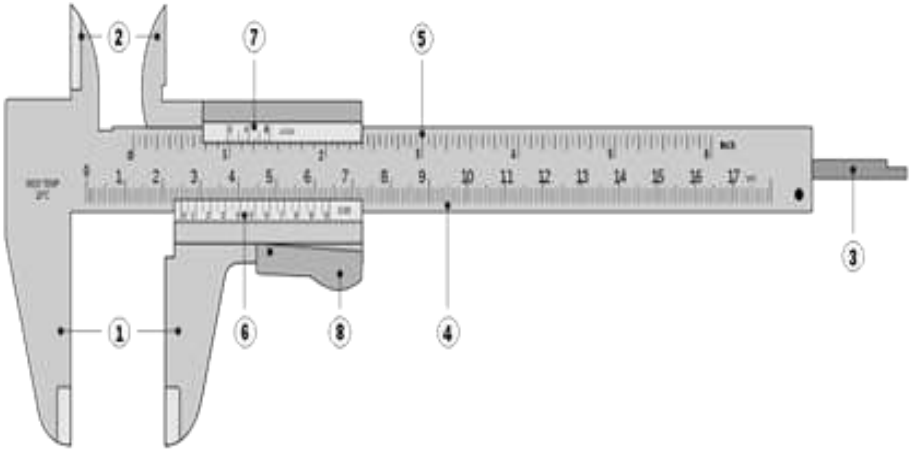
DRAWING COMPASS:

An instrument with two arms, one sharp and one with a pencil. Used for making circles or arcs. They can also be used as a tool to measure distances, in particular on maps.

DIVIDER:

An instrument consisting of two straight adjustable legs hinged together and ending in sharp. Used for measuring, transferring, and dividing lines into equal segments.

1.3.5 VERNIER CALIPER:



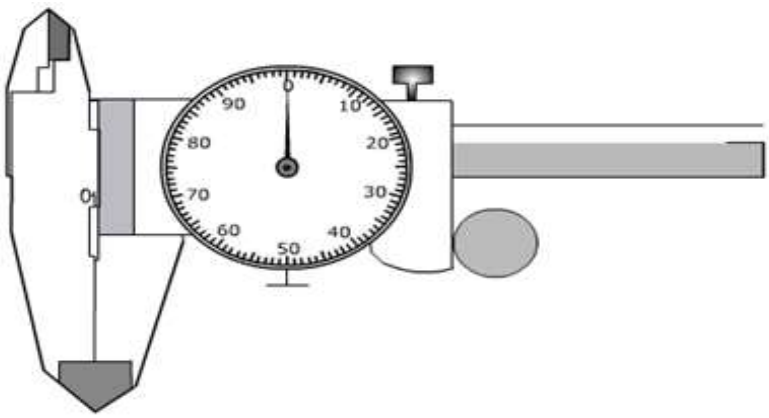
Veneer calipers have a set of inside jaws, outside jaws and a tail.

Used to measure the distance between two symmetrically opposing sides, and also uses precise slide movement for inside, outside, diameter of accessories measurements.

The veneer scales may include both metric and inch measurements on the upper and lower part of the scale.

A caliper is a much more precise instrument than metric ruler. Two edges of the caliper contact the item similar to a clamp, and then you read the measurement off of a dial or gauge. Degree of accuracy 0.01cm.

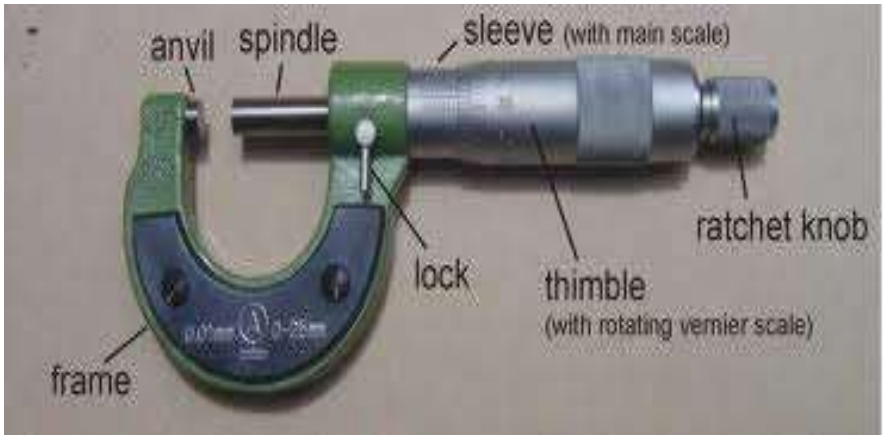
DIAL VERNEER CALIPER:



A measuring instrument with a contact point attached to a spindle and gears that moves a pointer on the dial. Dial indicators have graduations that are available for reading different measurement values.

Used to measure the distance between two symmetrically opposing sides, and also uses precise slide movement for inside, outside, depth or step measurements.

MICROWMETER SCREW:

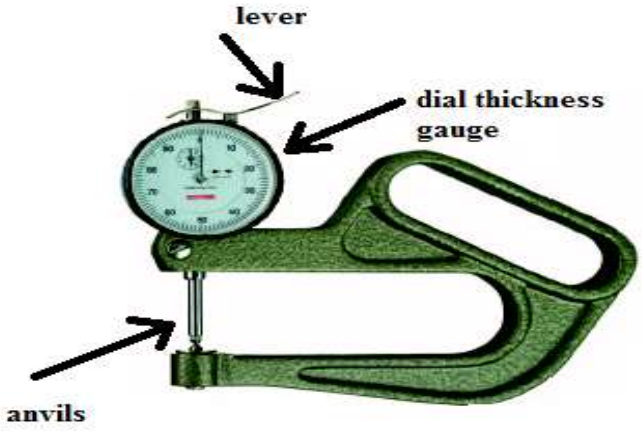


The micrometer screw gauge is used to measure even smaller dimensions than the veneers calipers.

The micrometer screw gauge also uses an auxiliary scale (measuring hundredths of a millimeter) which is marked on a rotary thimble.

The rotating thimble is subdivided into 50 equal divisions. The thimble passes through a frame that carries a millimeter scale graduated to 0.5 mm(two full turns are

LEATHER THICKNESS GAUGE:



Dial Thickness Gauge -- -An instrument attaches to the dial indicators.

-Used for measurement of relatively soft materials such as foam, elastics, leather, plastics and other compressible fabrics.

Testing Accuracy: 0.01mm and Testing Range: 0.01-10mm.

DIGITAL THICKNESS GUAGE:

-An instrument attaches to the electronic measuring reading tools.

-Used to measure the thickness of plastic film, rubber, leather, paper, and textile.

1.3.6 CALCULATOR:

It is able to perform all basic mathematical operations, evaluate standard functions and plot graphics. It is even possible to write small programs using functions and conditional operator.

Self-Check 4	**Written Test**

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

1. The main difference b/n ruler & tape measurement? (5 point)
2. Which measuring tool appropriate to measure the thickness of the leather? (5 point)
3. Three students were asked to measure the outside diameter of a piping in the laboratory. The actual diameter of the piping is 2.75cm. Each of them measured the diameter three times at three different places on the piping. Their measurements are shown below: (10 points)

Students	Diameter/cm		
Student 1	2.69	2.67	2.68
Student 2	2.83	2.91	2.85
Student 3	2.74	2.76	2.75

   a. What instrument was used to measure the outside diameter of the piping?

      I. Vernier caliper

      II. Micrometer screw

III. Measuring tape

b. What instrument should be used to get more accurate measurement?

4.Differnce between Vernier caliper and micrometer screw?

Note: **Satisfactory rating - 25 points** **Unsatisfactory - below 25 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

2. _____

_____

3. _____

_____

Information Sheet 5	**Checking serviceability of selected tools**

what is checking or inspection?

inspection is careful examination, checkup, look over, observing the tool for cracks or other damage.

Types of Hand Tools

The most common hand tools being used today.

- Measuring Tools
- Long tapes, tape rules etc…
- Finishing Tools
- Hammers (sledge, soft face, specialty, nail, framing), chisels (including wood), punches, pry and claw bars
- Layout Tools
- Levels, squares, chalk line reels and chalk, accessories and marking
- Fastening Tools
- Pliers, screwdrivers, wrenches, nut drivers and ratchets, riveters.
- Cutting Tools
- Knife blades, knives, planes, saw blades, hacksaws, accessories, snips and saws

Hand tools inspection processes

1 pre-production inspection

The purpose of this inspection is to verify that all of the needed tools for hand tools production are free from any damage.

2. Raw material inspection

The purpose of this inspection is thoroughly inspect and verify that all of the needed material for molding, cooling and good order to ensure all the material to be used free from damage prior to initiating the production process.

3 Assembly inspection

This inspection process verifies that all of the specification under the assembly queen meet the initial requirement in order for it to be considered in the next production queue.

4.Coating Inspection

This inspection process is to verify that all of the hand tools that require metal coating are properly coated.

5.VISUAL INSPECTION

The purpose of this inspection process is to thoroughly inspect all of the hand tools, regardless of the type, for any visible damages, dents, cracks, chips, or any known production anomalies to ensure that all of the hand tools on the queue are ready for the next set of inspection processes. Should there be any items that show poor craftsmanship and functionality, these will be labeled “DEFECTIVE” and should be reconfigured to pass the quality control and safety guidelines.

Defective list:

- Deformations (For steel-based tools)
- Visual Damage
- Loose components
- pre-production anomalies

WEIGHT AND MEASUREMENT INSPECTION

The purpose of this inspection process is to accurately measure the different hand tools under the same category to ensure that all of the tools are uniform in height, weight, size and diameter. This process is important to assure the right number of components used under the same queue is in check.

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HANDS ON/QUALITY CONTROL INSPECTION

The purpose of this inspection process is to thoroughly test and inspect the behaviors of the different hand tools when being used to raise awareness of how certain items can break and cause unwanted accidents. Each hand tool will be inspected and tested using different sets of tests that would fit the hand tool on the current queue.

Servicing equipment or tools is an element of preventing maintenance.

preventing maintenance is the care and servicing by personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.

Meaning of servicing

Servicing is cleaning, lubrication, charging of tools, machines and materials periodically to prevent the occurrences of incident failures.

Self-Check 5	**Written Test**

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions*:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. Write your answers in the sheet provided in the next page.

1. what are the basic procedures you have to follow in inspection of hand tools before servicing the tools**?**

2. What we mean servicing is an element of preventive maintenance. (7 points)
3. Define the word cleaning, lubricating, charging, & preservation of tools & instrument (3 points)

Note: **Satisfactory rating - 25 points** **Unsatisfactory - below 25 points**

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

_____

_____

_____

2. _____

_____

_____

3. _____

_____

Operation Sheet 1	**Procedures to cleaning the work area**

Prepare cloth, soap, water & dust bean.

Steps to clean the surrounding work environment:

1. Avoid dusts and unwanted papers & materials and Put it under the dust bean.
2. Mix water and soap.
3. Soak the cloth with the mixing water and soap.
4. Wash the table by the cloth.
5. Dry it with neat cloth.

Operation Sheet 4	**Procedures in serviceability of tools**

1. Procedures in serviceability of stainless steel ruler, tracing wheel, compass and divider

Prepare clean soft sponge soft cloth or soft fiber brush, clean water, soap or mild cleaner, warm water, mild detergent and mild cleaner.

1. By use a clean soft sponge, soft cloth or soft fiber brush cleaning it with cloth soaked in warm water.

2. Dry it with a soft towel or soft cloth to prevent spots caused by minerals in the water.


Or


3. Wipe in the direction of any polish lines.

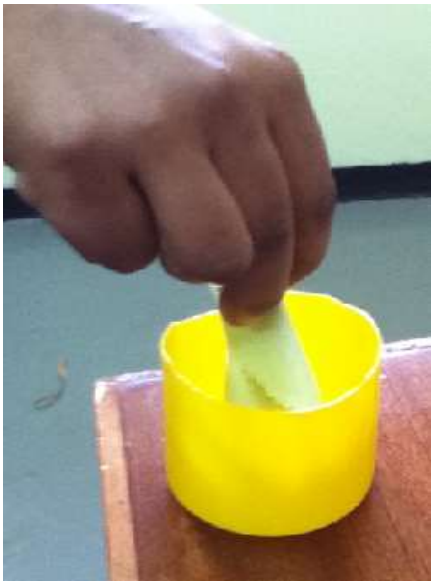
4. On tougher jobs, you can add a mild detergent to the water without damaging the surface, but always clean it thoroughly with warm water.

2. Procedures in serviceability of set square & protractor

You Will Need Mild detergent, Spray plastic Cleaner, Sponge (double sided sponges with a soft side and a scrubber side work well), Pot, Water, Nylon bristled brush or vegetable brush, Mild glass cleaner, Soft cloths and Soft Paper Towels.

- Begin by mixing a small amount of the detergent with water in the vessel. If you are not cleaning your sink, you could also mix it there for easy access.

- Dampen a soft cloth in the detergent water and wipe to remove dirt and grime from the plastic surfaces. You will want to work from top to bottom.


&


- Spray the area with plastic cleaner.

- Use the sponge to brush at any stubborn areas. The rough side of the sponge can scratch a smooth plastic finish if too much pressure is applied, so use it carefully.

- Wipe away any remaining cleaner with a clean cloth.

- Dry with a soft cloth.

- Buff with a soft paper towel to return shine.

Note: - If the plastic has a glossy finish and there are streaks left from the cleaning solution, spray with mild glass cleaner and wipe away with a soft cloth.

4. Procedures in serviceability of dial/digital thickness gauge

- total disassembly
- Cleaning of all parts with appropriate cleaners (organic, nonpolluting cleaners such as Trader Joe's "Next to Godliness.")

- inspection of all parts under high magnification
- repair or replacement of all worn or damaged parts (those parts which are necessary for the full functioning of the gage)
- lapping and/or grinding of caliper jaws and micrometer faces to bring them to specs
- lubrication with appropriate lubricants
- reassembly
- inspection for functionality

- calibration using equipment and standards certified traceable to NIST
- your satisfaction is guaranteed upon return of gage or we'll issue credit, refund or rework as per your instructions

References

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