IED 1.6 Student Packet

Measurement, Precision & Tolerances | 8.5 x 11 student work packet

Name: _____ **Period:** _____ **Date:** _____

DAY 1 - MEASUREMENT & PRECISION PRACTICE

Goal: Select the correct measuring tool, measure real features carefully, and record values with realistic precision.

Feature / Station	Tool Used	Tool Resolution	Measurement 1	Measurement 2	Measurement 3
Overall length					
Overall width/depth					
Overall height/thickness					
Hole diameter					
Small/thin feature					
Instructor-selected feature					

REPEATABILITY CHECK

Choose one feature above. Calculate the range of your repeated measurements.

Chosen feature	Smallest measurement	Largest measurement	Range

MEASUREMENT QUALITY REFLECTION

1. Which tool gave you the most confidence, and why?

_____

_____

2. What caused variation between repeated measurements?

_____

_____

3. Why is it not always useful to report too many decimal places?

_____

_____

HOW TO INSPECT A TOLERANCED DIMENSION

Step	What to do
1. Read the drawing	Identify the nominal dimension and tolerance. Example: 1.500 +/- .020
2. Calculate limits	Lower limit = nominal - tolerance. Upper limit = nominal + tolerance.
3. Measure the part	Use the correct tool and record the actual manufactured dimension.
4. Decide	A feature passes only if the measurement is within the inclusive limits.

WORKED EXAMPLE

Drawing requirement: 0.500 +/- .005 in. Lower limit = 0.495 in. Upper limit = 0.505 in. A measured value of 0.507 in would FAIL because it is above the upper limit.

WARM-UP LIMIT CALCULATIONS

Drawing requirement	Lower limit	Upper limit	Would 0.512 pass?
0.500 +/- .010			
1.000 +/- .020			
0.090 +/- .005			
1.500 +/- .020			

INSPECTION RULES FOR TODAY

1. Use the engineering drawing, not what the part looks like.
2. Record actual measured values with units.
3. Calculate limits before deciding pass or fail.
4. If a single required feature fails, the whole part is rejected.
5. Be ready to explain which feature caused rejection and why it matters.

PART A - THROUGH HOLE BLOCK

Feature to inspect	Drawing requirement	Lower limit	Upper limit	Actual	P/F
Overall length	1.600 +/- .020				
Overall height	1.000 +/- .020				
Overall depth	1.000 +/- .020				
Hole diameter	Ø0.500 +/- .005				
Hole X location	0.800 +/- .010				
Hole Y location	0.500 +/- .010				

Part A disposition: ☐ ACCEPT ☐ REJECT If rejected, cause: _____

PART B - TWO LEVEL STAIR BLOCK

Feature to inspect	Drawing requirement	Lower limit	Upper limit	Actual	P/F
Overall length	1.500 +/- .020				
Overall depth	1.000 +/- .020				
Overall height	0.750 +/- .020				
First step run	0.500 +/- .010				
Second step run/location	1.000 +/- .010				
First step height	0.250 +/- .010				
Second step height	0.500 +/- .010				

Part B disposition: ☐ ACCEPT ☐ REJECT If rejected, cause: _____

PART C - SLOTTED BRACKET

Feature to inspect	Drawing requirement	Lower limit	Upper limit	Actual	P/F
Overall length/width	1.500 +/- .020				
Overall height	1.500 +/- .020				
Overall depth	1.500 +/- .020				
Hole diameter	Ø0.400 +/- .005				
Hole X location	0.400 +/- .010				
Hole Y location	0.400 +/- .010				
Slot width	0.500 +/- .010				
Slot location/offset	1.000 +/- .010				
Wall/web thickness	0.090 +/- .005				

Part C disposition: ☐ ACCEPT ☐ REJECT If rejected, cause: _____

ENGINEERING ANALYSIS

1. Which inspected feature had the tightest tolerance? Why might that feature need tighter control?

_____

_____

2. Choose one failed or nearly failed feature. What problem could it cause in an assembly?

_____

_____

3. Explain why engineers use tolerances instead of only writing nominal dimensions on a drawing.

_____

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