

DUTY AREAS AND TASKS	NATIONAL SKILL STANDARD - NIMS
A. SHOP RELATED MATH	
1. Solve basic math problems involving principles of addition, subtraction, division, and multiplication in applied shop related problems	KSAO 2.1
2. Add, subtract, multiply, and divide decimal equivalents and fractions	KSAO 2.1
3. Read and interpret a decimal equivalent chart	KSAO 2.1
4. Use a calculator to solve mathematical problems	KSAO 2.1
5. Calculate and solve problems involving metric dimensions	KSAO 2.1
6. Perform algebraic problems in mathematics class and as required	KSAO 2.3
7. Perform geometric problems in mathematics class and as required	KSAO 2.2
8. Perform trigonometric problems in mathematics class and as required	KSAO 2.4
B. APPLY BLUEPRINT READING AND DRAWING PRINCIPLES	
1. Interpret blueprints and sketches	KSAO 5.1
2. Interpret three-view drawings	KSAO 5.1
3. Interpret arrangement of views	KSAO 5.1
4. Interpret one and two view drawings and auxiliary views	KSAO 5.1
5. Interpret sectional views	KSAO 5.1
6. Interpret radius, cylinders, and arc dimensions	KSAO 5.1
7. Interpret hole and angle dimensions	KSAO 5.1
8. Interpret base line and incremental dimensions	KSAO 5.1
9. Interpret tolerances for fractions and angles	KSAO 5.1
10. Interpret decimal dimension and tolerances	KSAO 5.1
11. Interpret prints using Geometric Dimensioning and Tolerance system	KSAO 5.2, 5.3
12. Name and identify the 13 Types of Lines on Blueprint, and explain their use	KSAO 5.1
C. SAFETY	
1. List and review rules for personal safety	OD 6.1
2. List and review rules for general shop safety	OD 6.1
3. List and review steps in maintaining a clean and orderly shop	OD 6.1

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4. List and review rules for each machine 5. Review Material Safety Data Sheets (MSDS)	OD 6.1 OD 6.1
D. MEASUREMENT AND INSPECTION	
1. Use scales, squares, and other basic inspection tools	OD 2.2 KSAO 6.1
2. Use micrometers, calipers depth mics, height gages	OD 3.1 KSAO 6.1
3. Use gage blocks	KSAO 6.2, 6.3
4. Use planer gage	OD 3.1 KSAO 6.2, 6.3
5. Use dial indicator	OD 3.1 KSAO 6.2, 6.3
6. Use sine bar	OD 3.1 KSAO 6.2, 6.3
7. Use radius gages, go/no go gages, thread pitch gages	OD 3.1 KSAO 6.1
8. Use hardness tester	OD 3.1 KSAO 6.1
9. Use optical comparator	OD 3.1 KSAO 6.1, 6.2
10. Use Roll Pin dimensioning for NIMS Level 1 Grind Project	OD 3.1 KSAO 6.1, 6.2
E. BENCH WORK	
1. Use hand and power hand tools	OD 2.1 KSAO 7.4
2. Use layout tools	OD 2.2, 3.2
3. Make NIMS Level 1 Bench-work Project	OD 2.1
4. Make NIMS Level 1 Layout Project	OD 2.2
F. METALLURGY/HEAT TREATMENT	

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1. Classify metals	OD 1.1, 4.1 KSAO 7.3
2. Define properties of metals	KSAO 7.3
3. Designate and identify metals	OD 3.1 KSAO 7.3
4. Identify quenching media and their application	OD 3.1
5. Identify tempering, annealing, normalizing	KSAO 7.3
6. Identify case hardening	OD 3.1
7. Perform hardness testing	KSAO 7.3
8. Apply principles of strength of materials	OD 3.1
9. Identify and describe the SAE/AISI number systems for steels	KSAO 7.3
10. Identify ferrous metals	OD 3.1
11. Identify non-ferrous metals	KSAO 7.3
12. Identify carbon steels	OD 3.1
13. Identify alloy steels	KSAO 7.3
14. Identify tool steels	OD 3.1
G. VERTICAL AND HORIZONTAL BANDSAWS	
1. Review safety rules	OD 6.1
2. Use vertical and horizontal bandsaws	OD 2.1
3. Use abrasive cutoff saw	OD 2.1
H. DRILLING MACHINES	
1. Review safety rules for drilling machines	OD 6.1
2. Use sensitive drill press	OD 2.6 KSAO 7.1
3. Center Drill	OD 2.8
4. Drill a hole	OD 2.8
5. Ream a hole	OD 2.8

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6. NIMS Level 1 Drill Project	OD 2.8
7. Sharpen drills by hand and with drill sharpener	OD 2.8
I. LATHE OPERATIONS	
1. Lathe safety rules and how to operate	OD 6.1
2. Speeds and feeds	OD 2.3, 2.4
3. Tool grinding: general purpose, threading, cutoff, form tools	OD 2.3, 2.4
4. Straight turning to .001 tolerance	OD 2.3, 2.4, 6.1
5. Facing Operations	OD 2.3, 2.4, 6.1
6. Turn to a shoulder	OD 2.3, 2.4, 6.1
7. Turn taper using compound rest	OD 2.3, 2.4, 6.1
8. Turn taper using taper attachment	OD 2.3, 2.4, 6.1
9. Chase a thread to a Class 2A fit	OD 2.3, 2.4, 6.1
10. Rechase or pick-up thread	OD 2.3, 2.4, 6.1
11. Use threading die	OD 2.8
12. Tap holes	OD 2.8
13. Center drill and drill	OD 2.8
14. Drill deep holes	OD 2.8
15. Ream, counterbore and countersink	OD 2.8
16. Bore through and blend holes	OD 2.8
17. File and polish	OD 2.1
18. Machine grooves and reliefs	OD 2.3, 2.4
19. Machine a radius	OD 2.3, 2.4
20. Cutoff operations	OD 2.3, 2.4
21. Knurling Operations	OD 2.3, 2.4
22. Use three-jaw and four-jaw chucks	OD 2.4
23. Align and use centers	OD 2.3, 2.4
24. Use collets	OD 2.3, 2.4

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25. Machine forms using a form tool	OD 2.3, 2.4
26. Making several pieces by double ending	OD 2.4
27. Leaving grind stock	OD 2.7B
28. Align square piece in four-jaw chuck	OD 2.4
29. NIMS Level 1 Lathe Project	OD 2.3, 2.4
J. OPERATE THE VERTICAL MILL	
1. Mill safety	OD 6.1
2. Checking square and tram of machine	OD 2.6
3. Locating holes and edge finder	OD 2.6
4. Drilling	OD 2.6
5. Reaming	OD 2.6
6. Tapping	OD 2.6
7. Countersink and counterbore operations	OD 2.6
8. Keeping holes in location with grind stock	OD 2.6
9. Drilling deep holes	OD 2.6
10. Drilling blind holes	OD 2.6
11. Drilling into other holes	OD 2.6
12. Drilling to remove stock	OD 2.6
13. Squaring material	OD 2.5 KSAO 7.1
14. Use a quill and vise stop	OD 2.6
15. X Y Z and knee operation	OD 2.6
16. Drawbar and use of end mill holder, collets and drill chuck	OD 2.6
17. Moving with dials and backlash	OD 2.6
18. Working from vise, dividing head, angle plate or table	OD 2.6
19. Planning to do similar operations to save time	OD 1.1
20. Allowing stock to hold onto	OD 1.1

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21. Keep odd shaped pieces square for holding	OD 2.5
22. Tipping the head for angles and radius	OD 2.6
23. Locating and milling slots and keyways	OD 2.6
24. Locating and milling pockets*	OD 2.6
25. Mill angles by turning the vise or tipping the piece (mill angle, flat angle, sine bar)	OD 2.6
26. Using form cutters	OD 2.6
27. Using carbide tooling and Nomenclature system	OD 2.6
28. Using a fly cutter	OD 2.6
29. Cutting a slot by chopping	OD 2.6
30 Boring	OD 2.6
31. Indicating a hole or pin	OD 2.6
32. Climb milling and conventional milling	OD 2.6
33. Machine slots and grooves with saw and Staggetooth Cutters	OD 2.6 KSAO 7.1 KSAO 7.4
34. Use and calculate federate	KSAO 7.1
35. Use power feed controls	KSAO 7.1
36. Selecting R.P.M. and setting	OD 2.6 KSAO 7.1
37. Use a readout	OD 2.6 KSAO 7.1
38. Move ram	OD 2.6
39. NIMS Level 1 Mill Project	OD 2.6
K. GRINDING OPERATIONS (PEDESTAL, SURFACE, JIG, AND CENTERLESS)	
1. Grind off-hand (pedestal grinder)	OD 2.1

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2. Mount the wheels and true them (pedestal grinder)	OD 2.7b
3. Installing the wheel adaptor	OD 2.7b
4. Replace or mount a grinding wheel	OD 2.7b
5. Ring check on wheel	OD 2.7a
6. Use a diamond to dress the wheel	OD 2.7b
7. Make sure the magnetic chuck works	OD 2.7a
8. Removing the work piece from the chuck	OD 2.7a, 2.7b
9. Cleaning a surface grinder	OD 2.7b
10. Grind a surface flat	OD 2.7b KSAO 7.1
11. Grind a form	OD 2.7b
12. Grind angles (sine-bar)	OD 2.7b KSAO 6.2
13. Grind parallel	OD 2.7b KSAO 7.1
14. Grind square with a grinder vise	OD 2.7b
15. Grind square with a angle plate	OD 2.7b KSAO 6.2
16. Grind using a cup wheel	OD 2.7b
17. Grind using the undercut side of a wheel	OD 2.7b
18. Grind a slot	OD 2.7b
19. Grind a relief in a corner	OD 2.7b
20. Plunge grind a flat surface	OD 2.7b
21. Select a wheel	OD 2.7b
22. Grind work by blocking it in place	OD 2.7a, 2.7b
23. Grind thin stock	OD 2.7b
24. Grind the chuck and back rail	OD 2.7b

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25. Using a cut-off wheel	OD 2.7b
26. Grinding non-magnetic material	OD 2.7b
27. Grinding .0001 tolerance	OD 2.7b
28. Grinding chamfers	OD 2.7b
29. Grinding to remove a warp	OD 2.7b
30. Removing grind stock equally	OD 2.7b
31. Use of grind-all fixture	OD 2.7b
32. O.D. Harig grinding fixture	OD 2.7b
33. Checking: parallel, squareness, angles and size with a dial indicator	KSAO 6.3
34. NIMS Level 1 Grinding Project	OD 2.7b
35. Wet Grinding operations using Thompson Grinder	KSAO 7.4, 7.5
36. Operation of Centerless Grinder (Dead-Tru Attachment)	KSAO 7.2
a. Select grinding wheel	KSAO 7.2
b. Select and adjust regulating wheel	KSAO 7.2
c. Mount grinding wheel	KSAO 7.2
d. Dress/true grinding wheel	KSAO 7.2
e. Align workguide	KSAO 7.2
f. Grind a straight cylindrical surface (O.D.)	KSAO 7.4
37. Operation of Jig Grinder	KSAO 7.4
a. Set up work-piece	KSAO 7.4
b. Aligning work with travel	KSAO 7.4
c. Inclining work at an angle	KSAO 7.2
d. Rotating work in horizontal plane	KSAO 7.2
e. Pick up work-pieces	KSAO 7.2
f. Use edge finder and indicator	KSAO 7.2
g. Size holes	KSAO 6.2
h. Measure hole size	KSAO 6.2

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i. Use a work holding device	KSAO 7.2
L. JIG BORER	
1. Set up and operate a Jig bore	KSAO 7.4
2. Set up work-piece	KSAO 7.4
3. Align work with travel	KSAO 7.4
4. Incline work at an angle	KSAO 7.4
5. Rotate work in horizontal plane	KSAO 7.4
6. Pick-up reference edge	KSAO 7.2
7. Locate hole and use spot or center drill	KSAO 7.2
8. Drill, ream, and bore	KSAO 7.1
M. ELECTRICAL DISCHARGE MACHINE (E.D.M.)	
1. Operate E.D.M.	KSAO 7.4
2. Identify operation controls	KSAO 7.4
3. Set-up power supply	KSAO 7.4
4. Select type of electrode material	KSAO 7.4
5. Produce machine electrode	KSAO 7.4
6. Set-up work-piece	KSAO 7.4
7. Erode work-piece	KSAO 7.4
N. COMPUTER NUMERICAL CONTROL - MILL	
1. Operate and program computer numerical control systems	OD 2.9, 2.10
2. Choose correct spindle speed and feed rate	OD 2.9, 2.10 OD 2.11
3. Use canned function and conversational menus	OD 2.9, 2.10 OD 2.11
4. Use absolute and incremental systems	OD 2.9, 2.10 OD 2.11
5. Draw and generate tool paths using CAD/CAM software (Millwrite, Offline, Mastercam)	OD 2.9

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6. Engrave and machine parts	OD 2.9
O. COMPUTER NUMERICAL CONTROL - LATHE	
1. Operate and program computer numerical control systems	OD 2.9
2. Choose correct spindle speed and feed rate	OD 2.9
3. Use canned function and conversational menus	OD 2.9
4. Use absolute and incremental systems	OD 2.9
5. Draw and generate tool paths using CAD/CAM software (Offline and Mastercam)	OD 2.9
6. Engrave and machine parts	OD 2.9
P. PREVENTATIVE MACHINE MAINTENANCE	
1. Inspect machines	OD 5.2 KSAO 7.4
2. Lubricate machines daily	OD 5.2 KSAO 7.5
3. Repair or replace damaged or broken parts as required	OD 5.1
Q. HUMAN RELATIONS - SELF-ESTEEM - EMPLOYABILITY	
1. Demonstrate pride in workmanship	KSAO 4.2
2. Identify personal values	KSAO 4.2
3. Display a realistic self-image	KSAO 4.2
4. Display ethical/moral character	KSAO 4.2
5. Demonstrate social etiquette	KSAO 4.1
6. Identify personal goals	KSAO 4.2
7. Develop a strategy(s) for goal attainment	KSAO 4.1
8. Handle stressful situations	KSAO 4.1
9. Contribute to a team effort	KSAO 4.1
10. Acknowledge feelings and property of others and interact with personnel	KSAO 4.1
11. Manage time	KSAO 4.2
12. Select and wear clothing applicable to your job.	KSAO 4.2

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13. Demonstrate personal hygiene	KSAO 4.2
14. Convey verbal messages	KSAO 1.3
15. Listen to and receive messages	KSAO 1.4
16. Write communications	KSAO 1.2
17. Prepare resume	KSAO 1.2
18. Prepare a letter of application	KSAO 1.2
19. Prepare for the interview	KSAO 4.1
20. Conduct job interview follow-up	KSAO 4.1
21. Maintain awareness of job progression and opportunities	KSAO 4.1
22. Maintain familiarity with personnel policies	KSAO 4.1
23. Maintain awareness of current technological advances	KSAO 4.1
24. Develop speaking and interpersonal skills through participation in student tours, Open House, and Skills-USA VICA	KSAO 1.3, 4.1
25. Participate in CO-OP Program as skills and placement opportunities permit	KSAO 4.1