MN213

MACHINERY'S HANDBOOK

Grand Rapids
Community
College

STUDENT STUDY MANUAL FOR
CHALLENGE EXAMINATION

Department: **Apprenticeship Training**
Course Title: **MN-213 Machinery's Handbook**

A.   Course Description

Industrial workers learn to use the handbook to solve problems involving square roots, circle formulas, tapers, threads, oils, coolants, and steel fabrication.

B.   Student Performance Objectives

1. Given a test on powers, roots, and reciprocals of numbers, the student will solve the problems with an accuracy of 90%.

2. Given a test on the area, radius, diameter, and circumference of a circle, the student will solve the problems with 90% accuracy.

3. Given a test on the chordal dimensions and segments of a circle, the student will solve the problems with 90% accuracy.

4. Given a test on spheres and spherical segments, the student will solve the problems with accuracy of 90%.

5. Given a test on formulas, the student will solve the problem by transposing numbers with 90% accuracy.

6. Given a test on areas and volumes of geometric figures, the student will solve the problems with 90% accuracy.

7. Given a test on angles and functions of angles, the student, using a trigonometric function table, will solve the problems with 90% accuracy.

8. Given a test involving the solution of right triangles and oblique triangles, the student, using trigonometric tables and formulas, will solve the problems with accuracy of 85%.

9. Given a test on taper per inch and foot, the student will solve the problems with 85% accuracy.

10. Given a test on machine parts, the student will give allowance and tolerance for each part with 90% accuracy.

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11. Given a test on screw thread, the student will identify screw threads with 90% accuracy.

12. Given a test on cutting speeds and feeds for machining of metal, the student will solve the problems with accuracy of 90%.

C. Testing Conditions/Recommended Materials
1. Machinery's Handbook, 27th edition
2. Calculator
3. Machinery's Handbook Guide

D. Test Norm Levels

	Points Per Problem	Total Points Needed
25 Questions	4	72

E. Test Format and Procedures
The test is to be completed within a three-hour period. Multiple choice format. Because the test is an open-book format, it is not necessary to memorize any of the formulas or calculations. However, because time is limited, you should have a good understanding of where material is located in the Handbook and how to apply the formulas.

1. Using a Cutting Speed of 80 SFM, what is the correct RPM (revolutions per minute) to turn a shaft on a lathe that measures 2.5 inches in diameter?

2. What is the correct RPM and IPM (inches per minute) for a 4 flute, ½ diameter end mill using a Cutting Speed of 200 SFM, and a chip load of .004 per tooth?

3. What is the correct tap drill for ¼-20 NC tapped hole?

4. What is the correct clearance drill for a 3/8 SHCS (normal fit)?

5. What diameter is a "Q" drill?

6. What is the diameter of a circle with an area of 33.18307 in² ?

7. What is the TPI (taper per inch) of a 12 inch long shaft that measures .625 at one end and 1.350 at the other end?
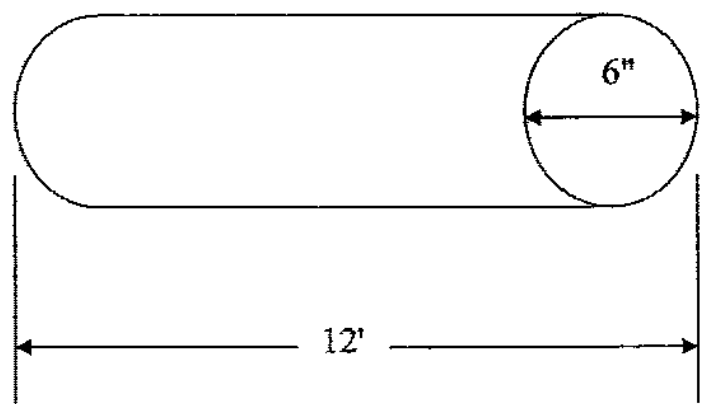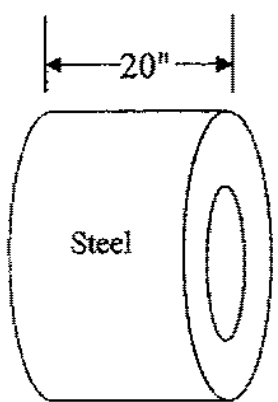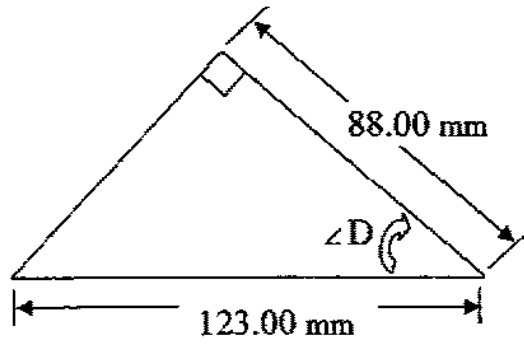
10"

12"

Area = _____

18 cm

Area = _____

4 cm

2.5 cm

5 cm

Volume = _____

6"

12'

Volume = _____

20"

Steel
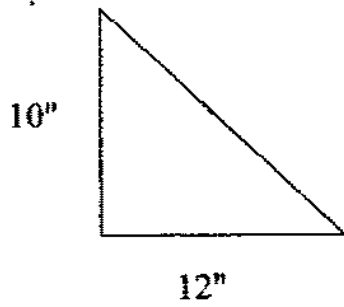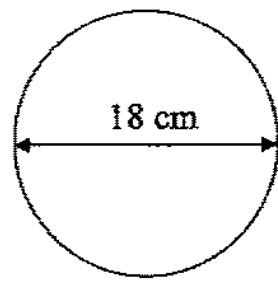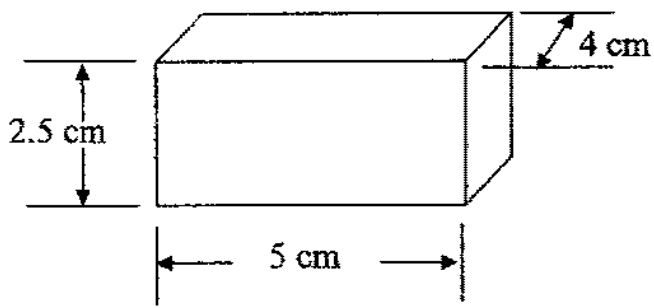
O.D.= 4.5'

I.D. = 18"

Volume = _____

Weight (lbs) = _____

Right Angle Trigonometry

88.00 mm

∠D

123.00 mm

Determine ∠D _____

Law of Sines

88°

b.

21.15°

25.20 mm
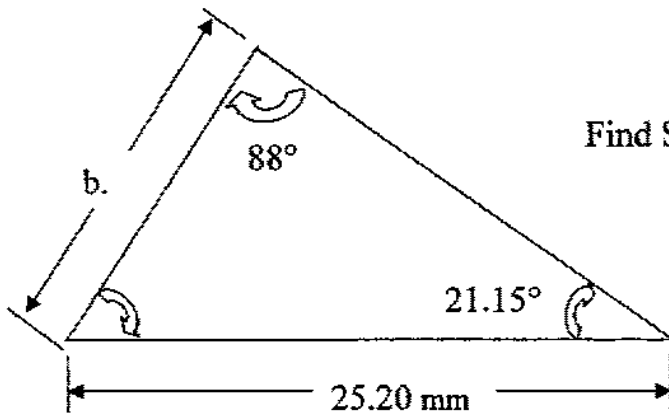
Find Side b _____

Handbook Questions – Answers

1. 128 RPM (± depending on formula used)

2. 1600 RPM (± depending on formula used)
   25.6 IMP (± depending on calculated RPM)

3. #7 drill

4. 13/32 drill

5. .332 inch diameter

6. 6.5 inch diameter

7. .0604 inches

8. Area of triangle = 60 in^2

9. Area of circle = 254.469 cm^2

10. Volume of rectangle = 50 cm^3

11. Volume of cylinder = 4071.5 in^3 or 2.36 ft^3

12. Volume of coil = 40,715 in^3 or 23.6 ft^3
    Weight of coil = 11,563.07 lbs (± depending on variable used for weight per unit)

13. Angle D = 44.320° or 44° 19' 13"

14. Side b = 9.098 mm