

Name _____ Class 5MMA Date _____

Hardness

✓ Answer the following questions:

1. What is hardness?

2. What different measurements of hardness are there?

3. What is hardness dependent on?

4. Why is it important to test the hardness of materials?

5. How can you measure hardness?

✓ Complete the following sentences with the right word:

The **Vickers** hardness test indenter is a _____ with an inclination of 136° . The load is normally applied for _____ seconds and then removed. The diagonals are measured with a _____ or measuring device capable of determining the length of the indentation diagonals.

The **Brinell** test is a simple indentation test involving a _____ indenter. It can serve to determine the hardness of a _____ range of materials.

Hardness is determined as a Brinell hardness number (BH, BHN or HB). The _____ applied is limited to 10–15 seconds. This is length of time necessary to ensure that the plastic deformation of the material is finished. The recovered indentation is measured in _____. After removal of the load, the _____ of the round indentation is measured under the microscope.

Rockwell hardness numbers are based on the difference of indenter depths from _____ load applications. Initially, a _____ load is applied, which serves as a starting position. Then a _____ load is applied for a certain period of time, which increases the penetration _____. After a specified dwell time for the major load, the major load is removed, but the minor load is still maintained.

The majority of applications for testing steel are covered by the Rockwell C and B _____. For example, a diamond _____ indenter is used for Rockwell scale C (HRC scale values 20–

90) and a _____ indenter for scale B (HRB, scale values 20–100). The hardness of _____ materials is read on the "B" scale while the hardness of _____ materials, hard cast iron and many steel alloys, is read on the "C" scale

✓ **Write a short paragraph on the history of Hardness testing:**

✓ **Underline the right answer:**

- 1) What is the original hardness test called?
Mohs test Brinell test Vickers test
- 2) Which hardness test uses a diamond indenter in the shape of a pyramid?
Brinell Test Rockwell Test Vickers Test
- 3) Which hardness testing machine produces a hardness value measured is an HV value
Vickers Test Rockwell Test Brinell Test
- 4) A material that absorbs impact (sudden forces or shocks such as hammer blows)
Toughness Malleability Stiffness Plasticity
- 5) The ability to be drawn out into a thin wire or threads.
Plasticity Brittleness Ductility Elasticity
- 6) Shiny, hard, heavy, cold to the touch.
Plastics Metals Ceramics
- 7) A measure of how easily a material can be scratched or indented.
Durability Toughness Hardness Strength
- 8) The ability to withstand environmental attack and decay.
Fusibility Corrosion resistance Density Stability
- 9) The ability to plastically deform and shape a material by forging, rolling or by any other method of applying pressure. Being easy to beat into a thin sheet is the literal meaning
Malleability Strength Ductility Plasticity
- 10) The ability of a material to return to its original form after a load has been applied and removed
Toughness Plasticity Elasticity Tensile strength
- 11) How well a material conducts heat.
Electrical conductivity Fusibility Thermal conductivity Density