Name of the Student:_____
Max. Marks : 27 Marks **Time : 27 Minutes**

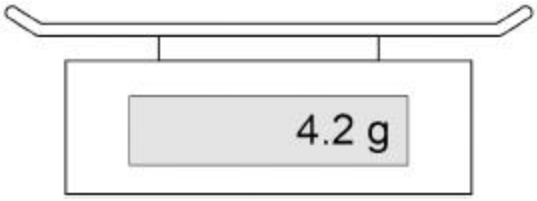
Q1.

A student determined the density of a cube made of bronze.

The student used a balance to measure the mass of the bronze cube.

Figure 1 shows the balance before the cube was added.

Figure 1



(a) What type of error is shown on the balance?

_____

(1)

(b) How could the student get a correct value for the mass of the cube from the balance?

_____

_____

(1)

(c) The student measured the length of the bronze cube using Vernier callipers and then using a micrometer.

Table 1 shows the results.

Table 1

Equipment	**Length in mm**
Vernier callipers	20.1
Micrometer	20.14

Complete the sentence.

The results in **Table 1** show that the Vernier callipers and the micrometer have a different _____.

Downloaded from www.merit-minds.com

(1)

The student wanted to determine the density of a bronze coin.

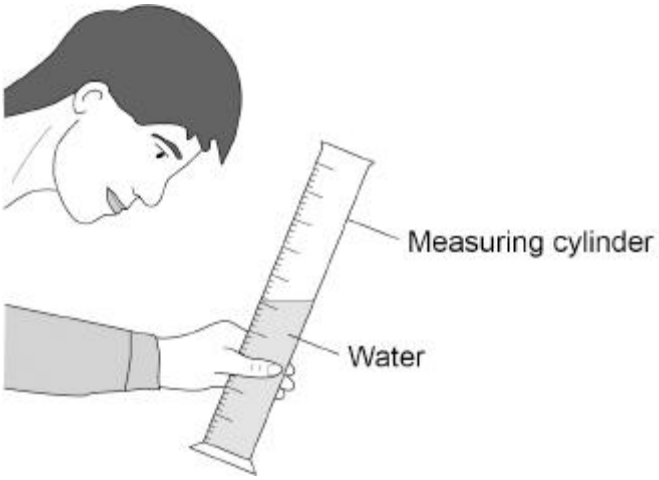
The student had several identical coins.

The volume of each coin was very small.

(d) The student added water to a measuring cylinder.

Figure 2 shows the student reading the volume of water in the measuring cylinder.

Figure 2



Give **two** changes the student should make to increase the accuracy of the volume measurement.

1 _____

_____

2 _____

_____

(2)

(e) Describe how the student could use a displacement method to determine an accurate value for the volume of a single coin.

_____

_____

_____

_____

_____

_____

(3)

(f) Old penny coins were made from a disc of bronze.

New penny coins are made from a disc of a different metal.

Downloaded from www.merit-minds.com

Figure 3 shows a disc of metal.

Figure 3

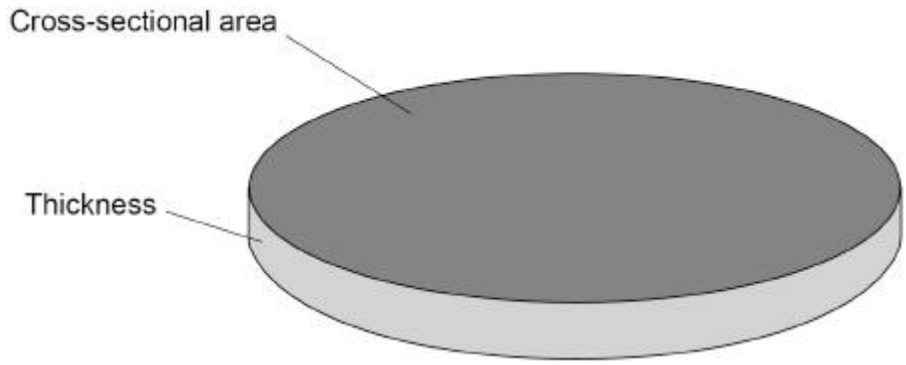


Table 2 shows information about the discs used to make each coin.

Table 2

Disc	Mass in g	Density in g/cm^3	Thickness in cm
Old penny	3.6	8.9	0.16
New penny	3.6	**X**	0.17

The discs used to make the old and the new coins have the **same** cross-sectional area.

Calculate value **X** in **Table 2**.

Give your answer to 2 significant figures.

The volume of a disc can be calculated using the equation:

volume of a disc = cross-sectional area × thickness

Density (2 significant figures) = _____ g/cm^3

(5)

(Total 13 marks)

Downloaded from www.merit-minds.com

Q2.

Ice cream is made by cooling a mixture of liquid ingredients until they freeze.

(a) Which statement describes the motion of the particles in solid ice cream?

Tick (✓) **one** box.

They are stationary. ☐

They move freely. ☐

They vibrate about fixed positions. ☐

(1)

(b) How do the kinetic energy and the potential energy of the particles change as a liquid is cooled and frozen?

Tick (✓) **one** box.

Kinetic energy	**Potential energy**	
Decreases	Decreases	☐
Decreases	Does not change	☐
Does not change	Decreases	☐
Does not change	Does not change	☐

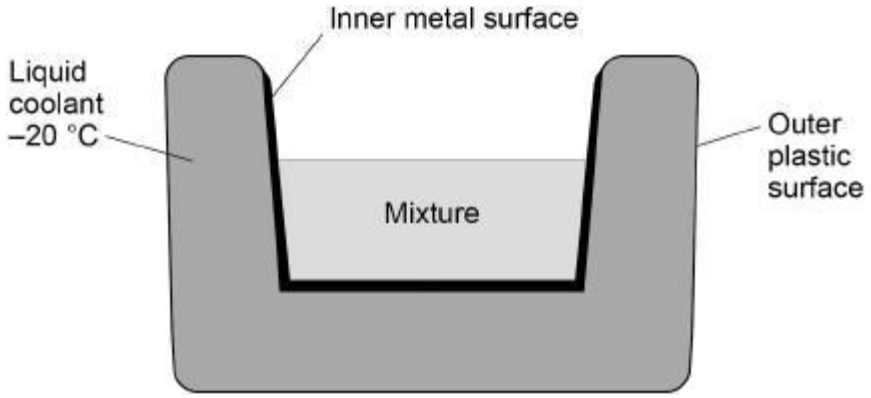
(1)

The diagram below shows a bowl used for making ice cream.

The walls of the bowl contain a liquid coolant.

The bowl is cooled to –20 °C before the mixture is put in the bowl.

The bowl causes the mixture to cool down and freeze.



Downloaded from www.merit-minds.com

(c) Explain why the different thermal conductivities of metal and plastic are important in the design of the bowl.

Metal _____

_____

_____

_____

Plastic _____

_____

_____

_____

(4)

(d) The liquid coolant has a freezing point below –20 °C

Explain **one** other property that the liquid coolant should have.

_____

_____

_____

_____

(2)

(e) The initial temperature of the mixture was +20 °C. The mixture froze at –1.5 °C.

A total of 165 kJ of internal energy was transferred from the mixture to cool and freeze it.

specific heat capacity of the mixture = 3500 J/kg °C

specific latent heat of fusion of the mixture = 255 000 J/kg

Calculate the mass of the mixture.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

_____

_____

Downloaded from www.merit-minds.com

_____

_____

_____

_____

Mass (2 significant figures) = _____ kg

(6)

(Total 14 marks)

Downloaded from www.merit-minds.com