Q1.(2018)

a)

- part fill a measuring cylinder with water
- measure initial volume
- place object in water
- measure final volume
- volume of object = final volume – initial volume

- fill a displacement / eureka can with water
- water level with spout
- place object in water
- collect displaced water
- measuring cylinder used to determine volume of displaced water

b)

$$\text{density} = \frac{48.6}{18.0}$$

$$\text{density} = 2.70 \text{ (g/cm}^3\text{)}$$

c)

limestone

d)

eye position when using
measuring cylinder
or
water level in can (at start) not
at level of spout
or
not all water displaced by stone
is collected in container

e)

volume would be lower / higher

Q2.(2020)

a)

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

or

$$\rho = \frac{m}{V}$$

b)

$$998 = \frac{\text{m}}{6\ 500\ 000}$$

$$\text{m} = 998 \times 6\ 500\ 000$$

$$\text{m} = 6\ 487\ 000\ 000$$

$$\text{m} = 6.487 \times 10^{9}\ \text{(kg)}$$

c)

energy transferred = power × time

or

$E = Pt$

d)

t = 18 000 (s)

or

t = 5 × 60 × 60

$$E = 1.5 \times 10^{9} \times 18\ 000$$

$$E = 2.7 \times 10^{13}\ \text{(J)}$$

Q3.(2021)

a)

- use a eureka/displacement can
- fill the eureka/displacement can with water
- fill the eureka/displacement can up to the spout
- place lime in eureka/displacement can
- collect water that overflows
- use a measuring cylinder to measure volume of water

OR

- use a measuring cylinder
- part fill the measuring cylinder with water
- measure the initial volume of water
- place lime in measuring cylinder
- record new volume of water
- volume of lime = new volume – initial volume

b)

$$\text{mean} = \frac{(2.1+2.1+2.4)}{3}$$

$$\text{mean} = 2.2 \text{ (cm}^3\text{)}$$

c)

allows anomalous results to be identified and ignored

reduces the effect of random errors when using the equipment

d)

$$\text{density} = \frac{84}{120}$$

$$\text{density} = 0.70 \text{ (g/cm}^3\text{)}$$

Q4.(2022)

a)

- measure mass using a balance / scales

- part fill a measuring cylinder with water and measure initial volume
- place rock in water and measure final volume
- volume of rock = final volume − initial volume

- fill a displacement / eureka can with water level with spout
- place rock in water and collect displaced water
- measuring cylinder used to determine volume of displaced water
- volume of rock = volume of displaced water

- use mass and volume to calculate density
- use of: density = $\frac{\text{mass}}{\text{volume}}$

b)

maximum density = 2.65 (g/cm^3)

minimum density = 2.45 (g/cm^3)

c)

chalk or flint

d)

a mean can be calculated

which reduces the effect of random errors

Q5.(2024)

a)

0.0 to 10.0 cm^3

b)

the measured volume would be larger

c)

$0.4\ (cm^3)$

d)

the results are repeatable

e)

subtract 0.02 from the measurement

f)

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

or

$$\rho = \frac{m}{V}$$

g)

$$22 = \frac{m}{0.3}$$

$$m = 22 \times 0.3$$

$$m = 6.6\ (g)$$