

9th Class Physics - Chapter 1

Exercise - Numerical Response Questions

1. Write the following numbers in scientific notation.

(a) $1234 \text{ m} = 1.234 \times 10^3 \text{ m}$

Answer: $1.234 \times 10^3 \text{ m}$

(b) $0.000023 \text{ s} = 2.3 \times 10^{-5} \text{ s}$

Answer: $2.3 \times 10^{-5} \text{ s}$

(c) $469.3 \times 10^5 \text{ m} = 4.693 \times 10^2 \times 10^5 \text{ m} = 4.693 \times 10^7 \text{ m}$

Answer: $4.693 \times 10^7 \text{ m}$

(d) $0.00985 \times 10^7 \text{ s} = 9.85 \times 10^{-3} \times 10^7 \text{ s} = 9.85 \times 10^4 \text{ s}$

Answer: $9.85 \times 10^4 \text{ s}$

2. Express the following measurements using prefixes.

(a) $27.5 \times 10^{-10} \text{ m} = 2.75 \times 10^{-9} \text{ m}$

Since $1 \text{ nm} = 10^{-9} \text{ m}$,

Answer: 2.75 nm

(b) $0.00023 \times 10^{-2} \text{ s} = 2.3 \times 10^{-6} \text{ s}$

Since $1 \mu\text{s} = 10^{-6} \text{ s}$,

Answer: $2.3 \mu\text{s}$

3. A boy has age of 15 years 2 months and 10 days. Convert his age into seconds, milliseconds and megaseconds.

Taking 1 year = 365 days and 1 month = 30 days:

Total days = $(15 \times 365) + (2 \times 30) + 10 = 5545 \text{ days}$

(a) Seconds:

$1 \text{ day} = 24 \times 60 \times 60 = 86400 \text{ s}$

$5545 \times 86400 = 479088000 \text{ s}$

Answer: $4.79088 \times 10^8 \text{ s}$

(b) Milliseconds:

$1 \text{ s} = 10^3 \text{ ms}$

$4.79088 \times 10^8 \times 10^3 = 4.79088 \times 10^{11} \text{ ms}$

Answer: $4.79088 \times 10^{11} \text{ ms}$

(c) Megaseconds:

$1 \text{ Ms} = 10^6 \text{ s}$

$(4.79088 \times 10^8) / 10^6 = 479.088 \text{ Ms}$

Answer: 479.088 Ms

4. How many kilometres are there in 25 micrometres?

$$25 \mu\text{m} = 25 \times 10^{-6} \text{ m}$$

$$1 \text{ m} = 10^{-3} \text{ km}$$

$$25 \times 10^{-6} \times 10^{-3} = 25 \times 10^{-9} \text{ km} = 2.5 \times 10^{-8} \text{ km}$$

Answer: $2.5 \times 10^{-8} \text{ km}$

5. What is pitch and least count of:

(a) Vernier calipers:

Smallest main-scale division = 1 mm

Total vernier divisions = 20

Least count = $1 \text{ mm} / 20 = 0.05 \text{ mm}$

Answer: Least count = 0.05 mm

Note: Pitch is not normally defined for vernier calipers.

(b) Screw gauge:

Pitch = 0.5 mm

Number of circular-scale divisions = 50

Least count = Pitch / Number of circular-scale divisions

Least count = $0.5 / 50 = 0.01 \text{ mm}$

Answer: Pitch = 0.5 mm; Least count = 0.01 mm

6. Look at the measurement of vernier calipers.

(a) Main-scale reading:

MSR = 2.4 cm

(b) Coinciding division:

6th vernier division coincides.

Least count = 0.01 cm

(c) Total reading:

Total reading = MSR + (coinciding division $\times$ least count)

= $2.4 + (6 \times 0.01)$

= 2.46 cm

Answer: 2.46 cm

7. Look at the figure of screw gauge.

(a) Main-scale reading:

MSR = 6.5 mm

(b) Coinciding division of circular scale:

Coinciding division = 45

Least count = 0.01 mm

Circular-scale reading = $45 \times 0.01 = 0.45 \text{ mm}$

(c) Total diameter of the ball:

Total reading = MSR + circular-scale reading

$$= 6.5 + 0.45$$

$$= 6.95 \text{ mm}$$

Answer: 6.95 mm