

1. (1) Given, $X = \frac{ab^2}{c^3}$
 $\therefore \frac{\Delta X}{X} \times 100 = \pm \left(\frac{\Delta a}{a} + \frac{2\Delta b}{b} + \frac{3\Delta c}{c} \right) \times 100$
 $= \pm (1\% + 2 \times 3\% + 3 \times 2\%) = \pm 13\%$

2. (1) Velocity = Slope

3. (1) $F = \mu N = \mu mg$

4. (4)

Taking component of forces

$$R \cos \theta = Mg$$

$$\text{or } R \cos 60^\circ = Mg$$

$$\text{and } R \sin 60^\circ = T$$

By eqs. (i) and (ii), we get

$$\therefore \tan 60^\circ = \frac{T}{Mg}$$

$$\text{or } T = Mg \tan 60^\circ$$

$$\text{or } T = 60 \times g \times \sqrt{3} = 103.9 \text{ gN.}$$

5. (4) $K = \frac{F}{x}$

6. (4) 7. (4) 8. (4)

9. (1) 10. (1) 11. (1)

12. (3) 13. (2) 14. (3)

15. (4) 16. (1)

17. (2)

$$\begin{aligned} \text{Given } z &= (3\sqrt{7} + 4i)^2 (3\sqrt{7} - 4i)^3 \\ &= \left\{ (3\sqrt{7} + 4i)(3\sqrt{7} - 4i) \right\}^2 (3\sqrt{7} - 4i) \\ &= (63 + 16)^2 (3\sqrt{7} - 4i) = (79)^2 (3\sqrt{7} - 4i) \end{aligned}$$

$$\text{Hence } \text{Re}(z) = (79)^2 (3\sqrt{7})$$

18. (3)

Since $y = 1 + |x| \geq 1 \forall x \in \mathbf{R}$, therefore, graph of the given function must lie on or above the line $y = 1$. Hence only (c) option is correct

19. (4)

$$\text{Here, } f(2) = \frac{2 \times 2 + 1}{3 \times 2 - 2} = \frac{5}{4}$$

and hence $(f \circ f)(2) = f(f(2))$

$$= f\left(\frac{5}{4}\right) = \frac{2 \times \frac{5}{4} + 1}{3 \times \frac{5}{4} - 2}$$

20. (1)

$$n(A) = n(A - B) + n(A \cap B) \text{ implies}$$

$$115 = 47 + n(A \cap B)$$

$$\therefore n(A \cap B) = 115 - 47 = 68$$

$$\therefore n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$= 115 + 326 - 68 = 373$$

21. (4)

22. (1)

$$\arg(z) < 0 \text{ (given)} \therefore \arg(z)$$

$$\text{Then } \arg(-z) = (\pi - \theta)$$

$$\arg(-z) - \arg(z) = (\pi - \theta) - (-\theta) = \pi$$

23. (3)

We can arrange the letters HAAA is $\frac{4!}{3!} = 4$ ways

We can arrange C and N is $5P_2 = 20$ ways

\therefore Required arrangement is $4 \times 20 = 80$

24. (3)

$$x^2 - 8x + 17 = (x - 4)^2 + 1 \geq 1$$

$$\text{Min value} = 1$$

25. (4)