



**BJNP**

*Learning with the Speed of Mumbai and the Tradition of Kota*



**Max. Marks: 200**

**Date: 29.08.2022**

**JB 3 MR BATCH  
PHYSICS : PART TEST  
Topic: Projectile Motion**

- When air resistance is taken into account while dealing with the motion of the projectile which of the following properties of the projectile, shows an incorrect?
  - range
  - maximum height
  - speed at which it strikes the ground
  - the angle at which the projectile strikes the ground
- Two projectiles are fired from the same point with the same speed at angles of projection  $60^\circ$  and  $30^\circ$  respectively. Which one of the following is true?
  - Their range will be the same
  - Their maximum height will be the same
  - Their velocity at the highest point will be the same
  - Their time of flight will be the same
- Galileo writes that for angles of projection of a projectile at angles  $(45^\circ + \theta)$  and  $(45^\circ - \theta)$ , the horizontal ranges described by the projectile are in the ratio of (if  $\theta \leq 45^\circ$ )
  - 2 : 1
  - 1 : 2
  - 1 : 1
  - 2 : 3
- A cricket ball is thrown at a speed of  $30 \text{ ms}^{-1}$  in a direction  $30^\circ$  above the horizontal. The time taken by the ball to return to the same level is (Take  $g = 10 \text{ ms}^{-2}$ )
  - 2 s
  - 3 s
  - 4 s
  - 5 s

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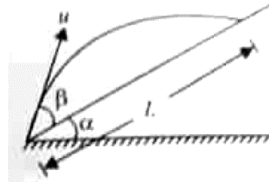
5. In the question number 62, the distance from the thrower to the point where the ball returns to the same level is  
(a) 58 m (b) 68 m (c) 78 m (d) 88 m
6. In the question number 62, the maximum height attained by the ball is  
(a) 11.25 m (b) 48.2 m (c) 23.5 m (d) 68 m
7. A cricketer can throw a ball to a maximum horizontal distance of 100 m. With the same speed how much high above the ground can the cricketer throw the same ball?  
(a) 50 m (b) 100 m (c) 150 m (d) 200 m
8. An aeroplane flying horizontally with a speed of  $360 \text{ km h}^{-1}$  releases a bomb at a height of 490 m from the ground. If  $g = 9.8 \text{ ms}^{-2}$ , it will strike the ground at  
(a) 10 km (b) 100 km (c) 1 km (d) 16 km
9. A ball is thrown from the top of a tower with an initial velocity of  $10 \text{ ms}^{-1}$  at an angle of  $30^\circ$  with the horizontal. If it hits the ground at a distance of 17.3 from the base of the tower, the height of the tower is (Take  $g = 10 \text{ ms}^{-2}$ )  
(a) 5 m (b) 20 m (c) 15 m (d) 10 m
10. The speed of a projectile at its maximum height is  $\frac{\sqrt{3}}{2}$  times its initial speed. If the range of the projectile is P times the maximum height attained by it, then P equals  
(a)  $\frac{4}{3}$  (b)  $2\sqrt{3}$  (c)  $4\sqrt{3}$  (d)  $\frac{3}{4}$
11. Four bodies A, B, C and D are projected with equal speeds having angles of projection  $15^\circ$ ,  $30^\circ$ ,  $45^\circ$  and  $60^\circ$  with the horizontal respectively. The body having the shortest range is  
(a) A (b) B (c) C (d) D

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12. A particle is projected in air at an angle  $\beta$  to a surface which itself is inclined at an angle  $\alpha$  to the horizontal. Then distance  $L$  is equal to



- (a)  $\frac{2u^2 \sin \alpha \cos(\alpha + \beta)}{g \cos^2 \alpha}$       (b)  $\frac{2u^2 \sin \beta \cos(\alpha + \beta)}{g \cos^2 \beta}$
- (c)  $\frac{2u^2 \sin \beta \cos(\alpha + \beta)}{g \cos^2 \alpha}$       (d)  $\frac{2u^2 \sin \alpha \cos(\alpha + \beta)}{g \cos^2 \beta}$
13. A player kicks a ball at a speed of  $20 \text{ ms}^{-1}$  so that its horizontal range is maximum. Another player 24 m away in the direction of kick starts running in the same direction at the same instant of hit. If he has to catch the ball just before it reaches the ground, he should run with a velocity equal to (Take  $g = 10 \text{ ms}^{-2}$ )
- (a)  $2\sqrt{2} \text{ ms}^{-1}$       (b)  $4\sqrt{2} \text{ ms}^{-1}$       (c)  $6\sqrt{2} \text{ ms}^{-1}$       (d)  $10\sqrt{2} \text{ ms}^{-1}$
14. A projectile is projected with initial velocity  $(6\hat{i} + 8\hat{j}) \text{ m/s}$ . If  $g = 10 \text{ m/s}^2$ , then the horizontal range is
- (a) 9.6 m      (b) 4.8 m      (c) 19.2 m      (d) 2.4 m
15. A ball is thrown from a point with a speed  $V$  at an angle  $\theta$  with the horizontal. From the same point and at the same instant, a person starts running with a constant speed  $\frac{V}{2}$  to catch the ball. Will the person be able to catch the ball? If yes, what should be the angle of projection?
- (a) Yes,  $60^\circ$       (b) Yes,  $30^\circ$       (c) Yes,  $45^\circ$       (d) No

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16. The equation of motion of a projectile is  $y = ax - bx^2$ , where  $a$  and  $b$  are constants of motion. Match the quantities in Column I with the relations in Column II.

	Column I		Column II
(A)	The initial velocity of projection	(p)	$\frac{a}{b}$
(B)	The horizontal range of projectile	(q)	$\sqrt{\frac{2a}{bg}}$
(C)	The maximum vertical height attained by projectile	(r)	$\frac{a^2}{4b}$
(D)	The time of flight of projectile	(s)	$\sqrt{\frac{g(1+a^2)}{2b}}$

- (a) A – p, B – q, C – r, D – s                      (b) A – s, B – p, C – q, D – r  
(c) A – s, B – p, C – r, D – q                      (d) A – p, B – s, C – r, D – q
17. Two balls are projected making angles of  $30^\circ$  and  $45^\circ$  respectively with the horizontal. If both of them have the same velocity at the highest points of their paths, then the ratio of their horizontal ranges is  
(a) 1 : 3                      (b)  $1 : \sqrt{3}$                       (c)  $\sqrt{3} : \sqrt{2}$                       (d) 3 : 1
18. For a body projected at angle of  $45^\circ$  to the horizontal, the horizontal range (R) and maximum height (H) are related as  
(a)  $R = 16H$                       (b)  $R = 8H$                       (c)  $R = 4H$                       (d)  $R = 2H$
19. Two stones projected with the same velocity but with different angles of projection with the horizontal, have the same horizontal range. If the angle of projection of one is  $60^\circ$  and the maximum height reached by it is 120 m. What is the maximum height reached by the other?  
(a) 360 m                      (b) 120 m                      (c) 200 m                      (d) 40 m

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20. A boy playing on the roof of a 10 m high building throws a ball with a speed of 10 m/s at an angle of  $30^\circ$  with the horizontal. How far from the throwing point will the ball be at the height of 10 m from the ground? [ $g = 10 \text{ m/s}^2$ ]
- (a) 8.66 m                      (b) 2.60 m                      (c) 4.33 m                      (d) 5.20 m
21. A body is projected at such an angle that the horizontal range is three times the greatest height. What is the angle of projection?
- (a)  $28^\circ 8'$                       (b)  $33^\circ 7'$                       (c)  $42^\circ 8'$                       (d)  $53^\circ 8'$
22. For a projectile, (horizontal range)<sup>2</sup> is 48 times of (maximum height)<sup>2</sup>. What is the angle of projection?
- (a)  $60^\circ$                       (b)  $30^\circ$                       (c)  $45^\circ$                       (d)  $75^\circ$
23. A stone is projected vertically upwards with a speed  $v$ . Another stone of the same mass is projected at an angle of  $60^\circ$  with the vertical with the same speed ( $v$ ). What is the ratio of their potential energies at the highest points of their journey?
- (a) 4 : 1                      (b) 3 : 2                      (c) 2 : 1                      (d) 1 : 1
24. A ball is thrown from a point with the same speed  $u$ , at different angles with the horizontal. It has the same range for two angles of projection. If  $h_1$  and  $h_2$  are the maximum heights attained in the two cases, then the value of  $h_1 + h_2$  will be
- (a)  $\frac{2u^2}{4g}$                       (b)  $\frac{u^2}{2g}$                       (c)  $\frac{2u^2}{g}$                       (d)  $\frac{u^2}{g}$
25.  $v_x$  and  $v_y$  are the horizontal and vertical components of velocity of a projectile, projected at angle  $\theta$ , with the horizontal. Its time of flight is decided by
- (a)  $v_x$                       (b)  $v_y$                       (c)  $v_x^2 + v_y^2$                       (d)  $\sqrt{v_x^2 + v_y^2}$

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**JB 3 MR BATCH  
CHEMISTRY : PART TEST  
Topic: S-Block (Group 1)**

Read the assertion and reason carefully to mark the correct option out of the options given below:

- (a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
- (b) If both assertion and reason are true but reason is not the correct explanation of the assertion
- (c) If assertion is true but reason is false.
- (d) If the assertion and reason both are false
- (e) If assertion is false but reason is true.

26. Assertion: The alkali metals can form ionic hydrides which contains the hydride ion.

Reason: The alkali metals have low electronegativity, their hydrides conduct electricity when fused and liberate hydrogen at the anode.

27. Which is most basic in character

- (a) RbOH                      (b) KOH                      (c) NaOH                      (d) LiOH

28. Which of the following has density greater than water

- (a) Li                      (b) Na                      (c) K                      (d) Rb

29. Which alkali metal is most metallic in character

- (a) K                      (b) Cs                      (c) Na                      (d) Li

30. Which of the following reacts with water with high rate

- (a) Li                      (b) K                      (c) Na                      (d) Rb

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31. Which one of the alkali metals, forms only, the normal oxide,  $M_2O$  on heating in air
- (a) Rb                                      (b) K                                      (c) Li                                      (d) Na
32. Characteristic feature of alkali metals is
- (a) Good conductor of heat and electricity                                      (b) High melting points  
(c) Low oxidation potentials                                      (d) High ionization potentials
33. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?
- (a) K                                      (b) Rb                                      (c) Li                                      (d) Na
34. Which one of the alkali metals, forms only, the normal oxide,  $M_2O$  on heating in air?
- (a) Rb                                      (b) K                                      (c) Li                                      (d) Na
35. The ease of adsorption of the hydrated alkali metal ions on an ion-exchange resins follows the order
- (a)  $Li^+ < K^+ < Na^+ < Rb^+$                                       (b)  $Rb^+ < K^+ < Na^+ < Li^+$   
(c)  $K^+ < Na^+ < Rb^+ < Li^+$                                       (d)  $Na^+ < Li^+ < K^+ < Rb^+$
36. The sequence of ionic mobility in aqueous solution is
- (a)  $Rb^+ > K^+ > Cs^+ > Na^+$                                       (b)  $Na^+ > K^+ > Rb^+ > Cs^+$   
(c)  $K^+ > Na^+ > Rb^+ > Cs^+$                                       (d)  $Cs^+ > Rb^+ > K^+ > Na^+$
37. When a substance (A) reacts with water it produces a combustible gas (B) and a solution of substance (C) in water. When another substance (D) reacts with this solution of (C), it also produces the same gas (B) on warming but (D) can produce gas (B) on reaction with dilute sulphuric acid at room temperature. Substance (A) impart a deep golden yellow colour to a smokeless flame of Bunsen burner. Then (A), (B), (C) and (D) respectively are
- (a) Ca,  $H_2$ ,  $Ca(OH)_2$ , Sn                                      (b) K,  $H_2$ , KOH, Al  
(c) Na,  $H_2$ , NaOH, Zn                                      (d)  $CaC_2$ ,  $C_2H_2$ ,  $Ca(OH)_2$ , Fe

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**Space for Rough Work**



38. Electronic configuration of calcium atom may be written as  
(a)  $[\text{Ne}]4p^2$                       (b)  $[\text{Ar}]4s^2$                       (c)  $[\text{Ne}]4s^2$                       (d)  $[\text{Ar}]4p^2$
39. Compared with the alkaline earth metals, the alkali metals exhibit  
(a) smaller ionic radii                      (b) highest boiling points  
(c) greater hardness                      (d) lower ionization energies
40. Which of the following atoms will have the smallest size?  
(a) Mg                      (b) Na                      (c) Be                      (d) Li
41. Which one of the following properties of alkali metal increases in magnitude as the atomic number rises?  
(a) Ionic radius                      (b) Melting point  
(c) Electronegativity                      (d) First ionization energy
42. In the case of alkali metals, the covalent character decreases in the order  
(a)  $\text{MF} > \text{MCl} > \text{MBr} > \text{MI}$                       (b)  $\text{MF} > \text{MCl} > \text{MI} > \text{MBr}$   
(c)  $\text{MI} > \text{MBr} > \text{MCl} > \text{MF}$                       (d)  $\text{MCl} > \text{MI} > \text{MBr} > \text{MF}$
43. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?  
(a) Na                      (b) K                      (c) Rb                      (d) Li
44. Which of the following is an amphoteric hydroxide?  
(a)  $\text{Ca}(\text{OH})_2$                       (b)  $\text{Mg}(\text{OH})_2$                       (c)  $\text{Be}(\text{OH})_2$                       (d)  $\text{Sr}(\text{OH})_2$
45. Sodium metal cannot be stored under  
(a) Benzene                      (b) Kerosene                      (c) Alcohol                      (d) Toluene

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46. Which one of the following is the most electropositive element?  
(a) Calcium                      (b) Chlorine                      (c) Potassium                      (d) Carbon
47. Sodium cannot be extracted by the electrolysis of brine solution because:  
(a) sodium liberated reacts with water to produce  $\text{NaOH} + \text{H}_2$   
(b) sodium is more electropositive than hydrogen, so,  $\text{H}_2$  is liberated at cathode and not sodium  
(c) electrolysis cannot take place with brine solution  
(d) None of the above
48. The metal which does not react with atmospheric nitrogen is:  
(a) Li                                  (b) K                                  (c) Ca                                  (d) Mg
49. Which of the following shows maximum solubility in  $\text{Liq NH}_3$ ?  
(a) Li                                  (b) Na                                  (c) K                                  (d) Fe
50. The hydration energy of  $\text{Mg}^{++}$  is larger than that of:  
(a)  $\text{Al}^{+3}$                               (b)  $\text{Na}^+$                               (c)  $\text{Be}^{++}$                               (d)  $\text{Mg}^{+3}$

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**JB 3 MR BATCH**  
**PHYSICS : PART TEST ANSWER KEY**  
**Topic: Projectile Motion**

1.	(d)	2.	(a)	3.	(c)	4.	(b)	5.	(c)
6.	(a)	7.	(a)	8.	(c)	9.	(d)	10.	(c)
11.	(a)	12.	(c)	13.	(b)	14.	(a)	15.	(a)
16.	(c)	17.	(b)	18.	(c)	19.	(d)	20.	(a)
21.	(d)	22.	(b)	23.	(a)	24.	(b)	25.	(b)

Date: 29.08.2022

**JB 3 MR BATCH**  
**CHEMISTRY : PART TEST ANSWER KEY**  
**Topic: S-Block (Group 1)**

26.	(a)	27.	(a)	28.	(d)	29.	(b)	30.	(d)
31.	(c)	32.	(a)	33.	(c)	34.	(c)	35.	(c)
36.	(d)	37.	(c)	38.	(b)	39.	(b)	40.	(c)
41.	(a)	42.	(c)	43.	(d)	44.	(c)	45.	(c)
46.	(c)	47.	(b)	48.	(b)	49.	(a)	50.	(b)