

Max Marks: 200

Date: 05.09.2022

JB 1 MR BATCH PHYSICS : PART TEST Topic: Newton laws of motion

- 1. A particle is moving in a circle with a uniform speed. Which one of the following quantity/quantities does/do not change?
 - (a) velocity (b) kinetic energy (c) displacement (d) acceleration
- A man goes up in a uniformly accelerating lift. He returns downward with the lift accelerating at the same rate. The ratio of apparent weights in the two cases is 2 : 1. The acceleration of the lift is
 (a) g/3
 (b) g/4
 (c) g/5
 (d) g/6
- 3. For the system shown in the figure, the pulleys are light and frictionless. The tension in the string will be



4. Which of the following sets of concurrent forces may be in equilibrium

(a) $F_1 = 3N, F_2 = 5N, F_3 = 9N$ (b) $F_1 = 3N, F_2 = 5N, F_3 = 1N$

- (c) $F_1 = 3N, F_2 = 5N, F_3 = 15N$ (d) $F_1 = 3N, F_2 = 5N, F_3 = 6N$
- 5. A particle of mass 'm' moving with a velocity \vec{v} strikes a horizontal surface at angle θ with the vertical and rebounds with the same magnitude and at the same angle with the vertical. The magnitude of change in momentum is
 - (a) $2 \operatorname{mv} \cos \theta$ (b) $2 \operatorname{mv} \sin \theta$ (c) $2 \operatorname{mv}$ (d) 0



6. Two blocks of masses 2 kg and 1 kg are in contact with each other on a horizontal frictionless table. When a horizontal force of 3.0 N is applied to the block of mass 2 kg, the value of the force of contact between the two blocks is:



- 7. A force vector applied on a mass is represented as $\vec{F} = 6\hat{i} 8\hat{j} + 10\hat{k}$ and accelerate with 1 m/s². What will be the mass of the body
 - (a) $10\sqrt{2}kg$ (b) $2\sqrt{10}kg$ (c) 10 kg (d) 20 kg
- A cricket ball of mass 250 g collides with a bat with velocity 10 m/s and returns with the same velocity within 0.01 second. The force acted on bat is
 - (a) 25 N (b) 50 N (c) 250 N (d) 500 N
- 9. The average force necessary to stop a bullet of mass 20 g moving with a speed of 250 m/s, as it penetrates into the wood for a distance of 12 cm is
 - (a) 2.2×10^3 N (b) 3.2×10^3 N (c) 4.2×10^3 N (d) 5.2×10^3 N
- 10. A body of weight 2kg is suspended as shown in the figure. The tension 1T in the horizontal string (in kg wt) is





- 11. A person is standing in an elevator. In which situation he finds his weight less than actual when
 - (a) The elevator moves upward with constant acceleration
 - (b) The elevator moves downward with constant acceleration.
 - (c) The elevator moves upward with uniform velocity
 - (d) The elevator moves downward with uniform velocity
- 12. The ratio of the weight of a man in a stationary lift and when it is moving downward with uniform acceleration 'a' is 3 : 2. The value of 'a' is (g-Acceleration due to gravity of the earth)
 - (a) $\frac{3}{2}g$ (b) $\frac{g}{3}$ (c) $\frac{2}{3}g$ (d) g
- 13. The adjacent figure is the part of a horizontally stretched net. section AB is stretched with a force of 10 N. The tension in the sections BC and BF are





16. A block A of mass 7 kg is placed on a frictionless table. A thread tied to it passes over a frictionless pulley and carries a body B of mass 3 kg at the other end. The acceleration of the system is (given $g = 10 \text{ ms}^{-2}$)



17. Three blocks of masses 2 kg, 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force F = 10 N, then tension $T_1 =$



- 18. A player caught a cricket ball of mass 150 gm moving at the rate of 20 m/sec. if the catching process be completed in 0.1 sec the force of the blow exerted by the ball on the hands of player is
 - (a) 0.3 N (b) 30 N (c) 300 N (d) 3000 N
- 19. Two forces with equal magnitudes F act on a body and the magnitude of the resultant force is F/3. The angle between the two forces is
 - (a) $\cos^{-1}\left(-\frac{17}{18}\right)$ (b) $\cos^{-1}\left(-\frac{1}{3}\right)$ (c) $\cos^{-1}\left(\frac{2}{3}\right)$ (d) $\cos^{-1}\left(\frac{8}{9}\right)$



20. Find the magnitude of the horizontal force F required to keep the block of mass m stationary on the smooth inclined plane as shown in the figure.



21. With what minimum acceleration can a fire-man slide down a rope whose breaking strength is (2/3)rd of his weight

(a)
$$\frac{2g}{3}$$
 (b) g (c) $\frac{g}{3}$ (d) zero

22. A solid sphere of mass 2 kg is resting inside a cube as shown in the figure. The cube is moving with a velocity $\vec{v} = (5t\hat{i} + 2t\hat{j})$ m/s. Here t is the time in second. All surfaces are smooth. The sphere is at rest with respect to the cube. What is the total force exerted by the sphere on the cube. (Take g = 10 m/s²)



23. Starting from rest, the time taken by a body sliding down on a rough inclined plane at 45° with the horizontal is twice the time taken to travel on a smooth plane of the same inclination and same distance. Then, the coefficient of kinetic friction is

(a) 0.25 (b) 0.33 (c) 0.50 (d) 0.75



- 24. Consider a car moving on a straight road with a speed of 100 m/s. The distance at which a car can be stopped is: $(\mu_k = 0.5)$
 - (a) 800 m (b) 1000 m (c) 100 m (d) 400 m
- 25. A bock rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.8. If the friction force on the block is 10 N, the mass of the block (in kg) is: (taken $g = 10 \text{ m/s}^2$)
 - (a) 2.0 (b) 4.0 (c) 1.6 (d) 2.5



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JB 1 MR BATCH MATHEMATICS : PART TEST Topic: AP and GP

				Space for Ro	ugh Wo	rk				
	(a)	1260 m	(b)	600 m	(c)	1080 m	(d)	None of these		
31.	After striking the floor, a certain ball rebounds (4/5)th of height from which it has fallen. Then the total distance that it travels before coming to rest, if it is gently dropped from a height of 120 m is									
	(a)	6	(b)	4	(c)	5	(d)	None of these		
30.	The national terms	umber of terms com is	mon bet	ween the series $1 + 2$	+ 4 + 8	+ to 100 terms ar	nd 1 + 4	+7+10+ to 100		
	(a)	12	(b)	14	(c)	18	(d)	None of these		
29.	The fi intege	rst term of an infini rs. Then which of th	te geom e follow	etric series is 21. Thing is not the possible	ie secono e value o	d term and the sum of the second term	of the ser	ies are both positive		
	(a)	8	(b)	9	(c)	10	(d)	11		
	$S - S_1$	$n < \frac{1}{1000}$, then the l	least valı	ue of n is						
28.	If S	denotes the sum to	o infinit	y and S_n the sum	of n ter	ms of the series 1	$+\frac{1}{2}+\frac{1}{4}$	$+\frac{1}{8}+$, such that		
	(a)	$\log_b a = \log_a C$	(b)	$\log_{c} b = \log_{a} c$	(c)	$\log_b a = \log_c b$	(d)	None of these		
27.	If x, y	, z are in G.P. and a ^x	$c = b^y = c$	e ^z , then						
	(a)	256	(b)	255	(c)	254	(d)	None of these		
26.	If (1 +	$(1 + x^2)(1 + x^4)$.	$(1 + x^2)$	$^{128} = \sum_{r=0}^{n} x^r$, then n is	equal to					



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32. The sum of an infinite G.P. is 57 and the sum of their cubes is 9747, then the common ratio of the G.P. is (a) 1/3(b) 2/31/6 (d) None of these (c) If $a^2 + b^2$, ab + bc and $b^2 + c^2$ are in G.P., then a, b, c are in 33. A.P. (b) G.P. H.P. (d) (a) (c) None of these Consider the ten numbers ar, ar², ar³, ..., ar¹⁰. If their sum is 18 and the sum of their reciprocals is 6, then the 34. product of these ten numbers is 81 243 (c) 343 (d) (a) (b) 324 Let $a = 111 \dots 1$ (55 digits), $b = 1 + 10 + 10^2 + \dots + 10^4$, $c = 1 + 10^5 + 10^{10} + 10^{15} + \dots + 10^{50}$, then 35. (a) a = b + c(b) a = bc(c) b = ac(d) c = abThe sum of 20 terms of a series of which every even term is 2 times the term before it, and every odd term is 3 36. times the term before it, the first term being unity is $\left(\frac{2}{7}\right)(6^{10}-1)$ (b) $\left(\frac{3}{7}\right)(6^{10}-1)$ (c) $\left(\frac{3}{5}\right)(6^{10}-1)$ (d) None of these (a)

37. In a G.P. the first, third and fifth terms may be considered as the first, fourth and sixteenth terms of an A.P. Then the fourth term of the A.P., knowing that its first term is 5, is

- (a) 10 (b) 12 (c) 16 (d) 20
- 38. If the pth, qth and rth terms of an A.P. are in G.P., then the common ratio of the G.P. is

(a)
$$\frac{pr}{q^2}$$
 (b) $\frac{r}{p}$ (c) $\frac{q+r}{p+q}$ (d) $\frac{q-r}{p-q}$





- 39. The sum of an infinite geometric series is 162 and the sum of its first n terms is 160. If the inverse of its common ratio is an integer, then which of the following is not a possible first term?
 - (a) 108 (b) 144 (c) 160 (d) None of these

40. Concentric circles of radii 1, 2, 3, ..., 100 cm are drawn. The interior of the smallest circle is coloured red and the angular regions are coloured alternately green and red, so that no two adjacenet regions are of the same colour. Then, the total area of the green regions in sq. cm is equal to

(a) 1000π (b) 5050π (c) 4950π (d) 5151π

41. If x, 2y, 3z are in A.P., where the distinct numbers x, y, z are in G.P., then the common ratio of the G.P. is

- (a) 3 (b) $\frac{1}{3}$ (c) 2 (d) $\frac{1}{2}$
- 42. If S_p denotes the sum of the series $1 + r^p + r^{2p} + ...$ to ∞ , and s_p the sum of the series $1 r^p + r^{2p} r^{3p} + ...$ to ∞ , |r| < 1, then $S_p + s_p$ in terms of S_{2p} is
 - (a) $2S_{2p}$ (b) 0 (c) $\frac{1}{2}S_{2p}$ (d) $-\frac{1}{2}S_{2p}$

43.	If a, b,	c are in A.P., then	$\frac{a}{bc}, \frac{1}{c}, \frac{2}{bc}$	will be in				
	(a)	A.P.	(b)	G.P.	(c)	H.P.	(d)	None of these

44. The sum of three numbers in G.P. is 14. If one is added to the first and second numbers and 1 is subtracted from the third, the new numbers are in A.P. The smallest of them is

	(a)	2	(b)	4	(c)	6	(d)	10
45.	If a, b a	and c are in A.P. and	d b − a, c	– b and a are in G.P.	, then a	: b : c is		
	(a)	1:2:3	(b)	1:3:5	(c)	2:3:4	(d)	1:2:4



- 46. In a sequence of (4n + 1) terms, the first (2n + 1) terms are in A.P. whose common difference is 2, and the last (2n + 1) terms are in G.P. whose common ratio is 0.5. If the middle terms of the A.P. and G.P. are equal, then the middle term of the sequence is
 - (a) $\frac{n \cdot 2^{n+1}}{2^n 1}$ (b) $\frac{n \cdot 2^{n+1}}{2^{2n} 1}$ (c) $n \cdot 2^n$ (d) None of these
- 47. The coefficient of x^{49} in the product $(x 1)(x 3) \dots (x 99)$ is (a) -99^2 (b) 1 (c) -2500 (d) None of these

48. Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is $\frac{3}{4}$, then:

- (a) $a = \frac{4}{7}, r = \frac{3}{7}$ (b) $a = 2, r = \frac{3}{8}$ (c) $a = \frac{3}{2}, r = \frac{1}{2}$ (d) $a = 3, r = \frac{1}{4}$
- 49. If the sum of the first 2n terms of the A.P. 2, 5, 8, ..., is equal to the sum of the first n terms of the A.P. 57, 59, 61, ..., then n equals:
 - (a) 10 (b) 12 (c) 11 (d) 13

50. If 1, $\log_3 \sqrt{(3^{1-x} + 2)} \log_3 (4.3^x - 1)$ are in A.P., then x equals

(a) $\log_3 4$ (b) $1 - \log_3 4$ (c) $1 - \log_4 3$ (d) $\log_3 4$



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

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JB 1 MR BATCH MATHEMATICS : PART TEST ANSWER KEY Topic: AP and GP

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