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CONSTRAINED MOTION & N.L.M.

## EXERCISE

## CONSTRAINED MOTION, N.L.M

Q.1 Two masses A and B are connected with two an inextensible string to write constraint relation between  $v_A \& v_B$ 



- Student A :  $v_A \cos \theta = v_B$ Student B :  $v_B \cos \theta = v_A$ (A) A is correct, B is wrong (B) B is correct, A is wrong (C) both are correct (D) both are wrong
- Q.2 Find velocity of ring B ( $v_B$ ) at the instant shown. The string is taut and inextensible :





Q.3 Find the relation between  $a_1$ ,  $a_2$ ,  $a_3$ .





Q.4 Find the velocity of the hanging block if the velocities of the free ends of the rope are as indicated in the figure.



Q.5 In the figure shown the velocity of different blocks is shown. The velocity of C is



- Q.6 An unbalanced force acts on a body. Then the body :
  - (A) must remain at rest
  - (B) must move with uniform velocity
  - (C) must be accelerated
  - (D) must move along a circle
- Q.7 A force of a given magnitude acts on a body. The acceleration of the body depends on the:
  - (A) mass of the body
  - (B) volume of the body
  - (C) density of the body
  - (D) shape of the body
- Q.8 A force produces an acceleration of 0.5 m/s<sup>2</sup> in a body of mass 3.0 kg. If the same force acts on a body of mass 1.5 kg the acceleration produced in it is:

(A) 3.0 m/s <sup>2</sup>	(B) 1.0 m/s <sup>2</sup>
(C) 5.0 m/s <sup>2</sup>	(D) 7 m/s <sup>2</sup>

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When a horse pulls a cart, the force needed 0.17 Q.9 A force produces an acceleration of 5.0 cm/s<sup>2</sup> to move the horse in forward direction is the when it acts on a body of mass 20 g. The force exerted by : force in Newton is: (A) The cart on the horse (A) 2 x 10<sup>-3</sup> N (B) 4 x 10<sup>-3</sup> N (B) The ground on the horse (C) 1.0 x 10<sup>-3</sup> N (D) 5 x 10<sup>-3</sup> N (C) The ground on the cart (D) The horse on the ground Q.10 A force produces an acceleration of 2.0 m/s<sup>2</sup> Q.18 Two blocks, each of mass M, are connected in a body 'A' and 5.0 m/s<sup>2</sup> in another body 'B'. by a massless string, which passes over a The ratio of the mass of 'A' to the mass of 'B' smooth massless pulley. Fore  $\vec{F}$  act on the is: blocks as shown. The tension in the string is : (A) 2 : 5 (B) 3 : 5 (C) 5 : 5 (D) 4 : 5 Q.11 A force of 1.0 N acts on a body of mass 10 kg. The body covers 100 cm in 4 seconds moving along a straight line. The initial velocity is: (A) 2 cm/s (B) 4 cm/s (C) 6 cm/s (D) 5 cm/s (A) Mg (B) 2 Mg (C) Mg + F (D) none of these Q.12 A 60 kg man pushes a 40 kg man by a force of 60 N. Then the 40 kg man has pushed the 0.19 Forces of action and reaction act : other man with a force of: (A) one after the other on same body (A) 40 N (B) 0 (B) simultaneously on same body (C) 60 N (D) 20 N (C) one after the other on different bodies (D) simultaneously on different bodies Q.13 When a horse pulls a cart, the force that helps the cart to move forward is the force exerted Q.20 Three identical blocks each of mass M are along by : a frictionless table and a force F is acting as shown. Which of the following statements is (A) the cart on the horse false? (B) the ground on the horse (C) the ground on the cart В С А (D) the horse on the ground (A) The net vertical force on block A is zero Q.14 A driver accelerates his car first at the rate (B) The net force on block A is F/3 (C) The acceleration of block C is F/3M of 2.4 m/s<sup>2</sup> and then at rate of 1.6 m/s<sup>2</sup>. (D) The force of interaction between A and B is The ratio of the two forces exerted by the 2F/3 engine in the two cases will be-(A) 1 : 2 (B) 2 : 1 ANSWER KEY (C) 2 : 3 (D)3 : 2 2. 1. А D 3. В 4. А Q.15 An object will continue to accelerate until, the resultant force on it-5. В С 7. А В 6. 8. (B) increases (A) decreases (D) none of these (C) becomes zero 9. С 10. С 11. D 12. С Q.16 When an object undergoes acceleration

13.

17.

С

D

14.

18.

D

А

15.

19.

С

В

16.

20. C

С

- (A) its speed always increases
- (B) its velocity always increases
- (C) a force always acts on it
- (D) the force may be zero