



Attempt questions first; check the separate key afterward. Show all working. Draw accurate figures where required.

A. Very short answers - 1 mark each

1. State the SI unit of force.
2. Express 1 N using basic SI units.
3. Can balanced forces act on a moving body?
4. Explain the distinction between zero force and zero velocity.
5. Name the tendency to resist change in motion.
6. Which has greater inertia: a bicycle or a loaded truck?
7. Find force needed for 2 kg to accelerate at 3 m/s^2 .
8. Find acceleration of 5 kg under net force 20 N.

B. Short answers / practice - 2 marks each

9. A body has mass 4 kg and velocity 5 m/s. Find momentum.
10. If velocity reverses to -5 m/s , find change in momentum.
11. A 10 N force acts for 3 s. Find impulse.
12. If a 2 kg body initially at rest receives this impulse, find final speed.
13. State Newton's third law.
14. Do action and reaction cancel on one body?
15. A 1200 kg car slows from 20 to 10 m/s in 5 s. Find net force.
16. Explain the meaning of the negative sign.
17. What force pair explains recoil of a gun?
18. Derive recoil speed using momentum conservation.

19. A 2 kg trolley at 3 m/s sticks to a stationary 1 kg trolley. Find common speed.

20. State the condition needed to use momentum conservation.

C. Application / reasoning - 3 marks each

21. Is friction a contact force?

22. Explain how friction can aid walking but resist sliding.

23. Two forces 12 N and 5 N act along the same line oppositely. Find resultant.

24. Find resultant when they act in the same direction.

25. A 60 kg person has weight 600 N. Find g .

26. Distinguish mass and weight.

27. A 1500 kg car accelerates at 2 m/s^2 . Find net force.

28. A 0.2 kg ball changes velocity from 10 to -5 m/s . Find momentum change.

29. Explain why seat belts reduce injury risk during sudden braking.

30. A 4 kg object has momentum 28 kg m/s. Find its speed.

31. A 3 kg trolley at 4 m/s couples to a stationary 1 kg trolley. Find their common speed.

D. Extended practice - 5 marks per pair

32. A 0.15 kg ball moving 20 m/s is stopped in 0.05 s. Find average force magnitude.

33. Explain why moving hands backward while catching reduces force.

34. Does a rocket require air to push against for propulsion?

35. Explain rocket propulsion using Newton's third law and momentum conservation.

ANSWER KEY - Numerical / closed questions

1) Newton. 2) 1 kg m/s^2 . 3) Yes. 5) Inertia. 6) Loaded truck. 7) 6 N. 8) 4 m/s^2 . 9) 20 kg m/s. 10) -40 kg m/s . 11) 30 N s. 12) 15 m/s. 14) No; they act on different bodies. 15) -2400 N . 16) Opposite chosen positive motion direction. 17) Forces between gun and bullet. 19) 2 m/s. 20) Negligible net external impulse. 21) Yes. 23) 7 N toward 12 N force. 24) 17 N. 25) 10 m/s^2 . 27) 3000 N. 28) -3 kg m/s . 30) 7 m/s. 31) 3 m/s. 32) 60 N. 34) No.