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JEE Main & Advanced, NSEP, INPhO, IPhO

Physics DPP

DPP-3 NLM: Newton's 1st and 3rd Law

By Physicsaholics Team

Q) A boy sitting on the top most berth in the compartment of a train which is just going to stop on a railway station, drops an apple aiming at the open hand of his brother situated vertically below his hands at a distance of about 2m. The apple will fall -

- (a) in the hand of his brother
- (b) Slightly away from the hands of his brother in the direction of motion of the train
- (c) Slightly away from the hands of his brother in the direction opposite to the direction of motion of the train
- (d) none of the above

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Ans. b

Since train is retarding, boy & his brother are also retarding but when apple starts falling it will move with constant horizontal velocity due to inertia.

\Rightarrow apple will fall slightly forward, in the direction of motion of train.

(Q)

STATEMENT-1

A cloth covers a table. Some dishes are kept on it. The cloth can be pulled out without dislodging the dishes from the table.

STATEMENT-2

For every action there is an equal and opposite reaction.

- (a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1
- (b) Statement-1 is True, Statement-2 is True; Statement-2 is not a correct explanation for Statement-1
- (c) Statement-1 is True, Statement-2 is False
- (d) Statement-1 is True, Statement-2 is True

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Ans. b

If we pull table cloth very rapidly dishes will not dislodge from table. This will happen due to inertia of dishes.

\Rightarrow Statement 1 is true.

Statement 2 is Newton's third law so it is also true, but not correct explanation of statement 1.

ANS(B)

Q) A block is resting on ground. Two forces normal by ground and its weight acting on it.

(A) Are weight & normal by ground equal in magnitude and opposite in direction?

(B) Are weight & normal by ground action-reaction pair?

(a) Yes

(b) No

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Ans. (A) a, (B) b

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Q) Can a sailing boat be propelled by air blown at the sails from a fan attached to the boat?

(a) yes

(b) no

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Ans. b

taking fan, sails, boat
& air b/w them

in a single
system. net external
force on system = 0

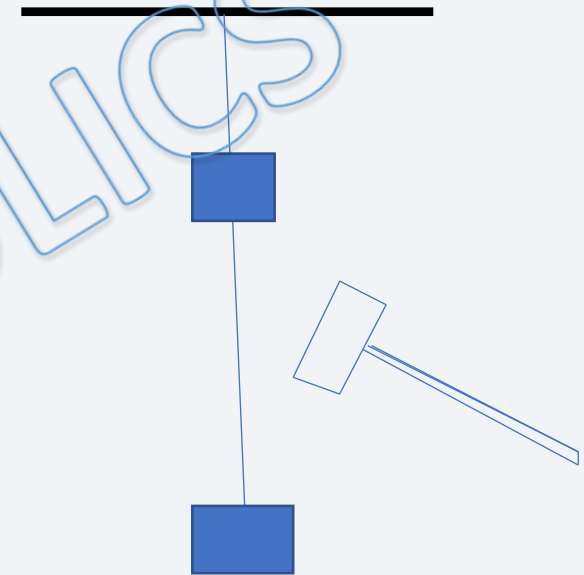
\Rightarrow boat can't be propelled by
this method.



Q) Two identical blocks are hanging with the help of two identical strings as shown in figure. Lower block is strongly hitted by a hammer . Which string is likely to break first ?

(a) lower

(b) upper



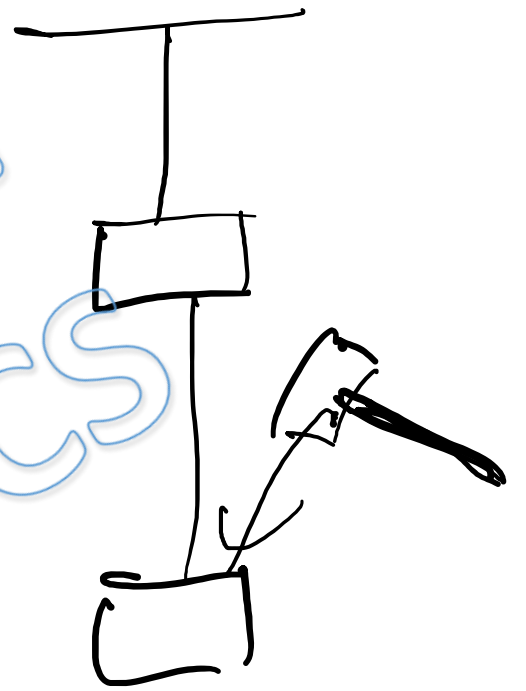
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Ans. a

On hitting lower block
with hammer lower block
tries to move down but
upper block does not want
to change its position due
to its inertia

\Rightarrow lower string will break first.



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Q) In a south Indian movie scene hero punches in the stomach of a villain due to which villain flies off and falls 200 meter away. Is it practically possible ?

(a) yes

(b) no

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Ans. b

In case of such a strong hitting punch will behave like a bullet and hand will go across the stomach.

So flying off 200 meter is not possible

Q) When a bullet hits a glass window, it makes a small hole in window .when a stone hits a glass window ,it may break the window but cant make hole in it . Why ?

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Velocity of bullet is very much higher than that of stone. bullet will come in contact with small portion of window & Rest portion of window remains at rest due to its inertia.

Velocity of stone is small, it comes in contact with window for long time interval. In such a long time stone may vibrate the window & window may break.

Q) Which of the following statement(s) is/are true

- (a) Action and reaction forces always acts in just opposite direction
- (b) Action and reaction must belong to same fundamental force
- (c) Action and reaction may act on same particle
- (d) None of these

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Ans. a, b

Same direction of action & reaction will be violation of law of Conservation of momentum. (a) is correct.

Action & reaction must belong to same fundamental force. (b) is correct.

Action is force by one particle on second & reaction is force by 2nd on first.

So (c) is wrong

a, b

Q) If action and reaction are equal and opposite to each other then how can a man move a box on a floor?

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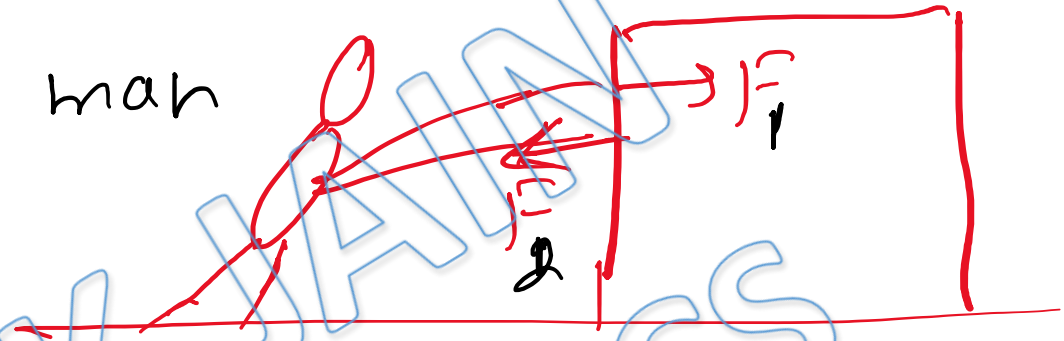
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$F_1 \rightarrow$ force by man on block

$F_2 \rightarrow$ " " block on man

$$F_1 = F_2$$



motion of a system depends on external forces only.

External force on block is F_1 (not F_2).
 F_1 will move the block. motion of block does not depend on F_2 .

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