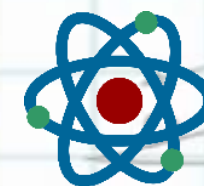




IT-Fizika



Ibrohim Fayziyev

FIZIKA – ixtisoslashtirilgan maktablar uchun 9-sinf

Mavzu: Jism og'irligi. Yuklama va vazinsizlik

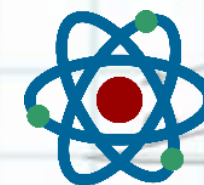
Masalalarni yechilish tartibini va to'liq izohli yechimini You Tube dagi **IT-Fizika** kanalida ko'rishingiz mumkin.

Toshkent 2021-yil



IT-Fizika

MUHAMMAD AL-XORAZMIY NOMIDAGI
AXBOROT TEXNOLOGIYALARIGA
IXTISOSLASHTIRILGAN MAKTAB



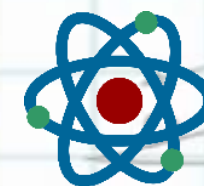
Ibrohim Fayziyev

*Jism og'irligi deb – jismni yerga tortilishi tufayli osmag yoki tayanchga ta'sir kuchiga aytiladi. Jism og'irligi **P** harfi bilan belgilanib, o'lchov birligi **1 N** (Nyuton) hisoblanadi. Jism og'irlik hisoblash formulasi. **$P = mg$***





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$$+a$$

$$\mathcal{I} = \text{const}$$

$$-a$$

$$P = m(g \pm a)$$

$$P = mg$$

$$P = m(g \mp a)$$



$$+a$$

$$\mathcal{I} = \text{const}$$

$$-a$$

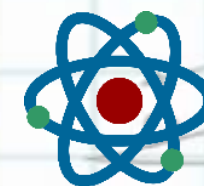
Jism og'irligi uning tezlanishiga bog'liq. Tezlanishning yo'nalishi va son qiymatiga qarab jism og'irligi tinch turgan holatiga nisbatan ortish hamda kamayishi mumkin.

Lift yuqoriga tezlanish bilan harakatlanganda og'irlik ortadi, yuqoriga sekilanish bilan harakatlanganda og'irlik kamayadi.

Lift pastga tezlanish bilan harakatlanganda og'irlik kamayadi, pastga sekilanish bilan harakatlanganda jism og'irligi ortadi.



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$+a$

$\mathcal{I} = \text{const}$

$-a$

$$P = m(g \pm a)$$

$$P = mg$$

$$P = m(g \mp a)$$

$+a$

$\mathcal{I} = \text{const}$

$-a$

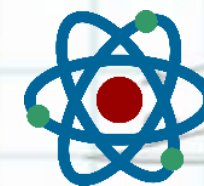
Jism og'irligi uning tezlanishiga bog'liq. Jism og'irligini uning tinchlikdagi og'irligiga nisbatan ortib ketishiga yuklanish deb ataladi. Yuklanish n harfi bilan belgilanadi va birliksiz kattalik hisoblanadi. Formulasi quyidagicha.

$$n = \frac{P}{mg} = 1 + \frac{a}{g}$$

Vazinsizlik deb – jismning og'irligi nolga teng bo'ladigan holatga aytiladi. Erkin tushayotgan jismning og'irligi nolga teng bo'ladi.



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Jism og'irligi vertikal tekslikda sodir bo'layotgan istalgan turdagi aylanama harakatda o'zgaradi. Trayektoriyaning turli nuqtalarida jismning og'irligi turlicha bo'ladi.

“O'lik sirtmoq”, “Nestrv halqasi” va amerikanacha atraksionlarda trayektoriyaning eng yuqori nuqtasida og'rilik P_{yu} kuchi kamayadi. Trayektoriyaning eng pastki nuqtasida esa og'irlik P_{qu} aksincha yuklama kuzatiladi, ya'ni jism vazni ortadi.

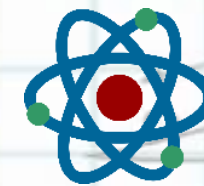
Bu holat markazdan qochma kuch hisobiga paydo bo'ladi

$$P_{yu} = m(g - a) = m\left(g - \frac{g^2}{R}\right)$$

$$P_{qu} = m(g + a) = m\left(g + \frac{g^2}{R}\right)$$



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Jism og'irligi o'zgarishi qavariq va botiq ko'priklarda ham kuztiladi.

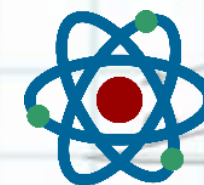
Demak avtomashina qavariq ko'prikda harakatlanganda uning og'irligi kamayadi bunga sabab markazdan qochma kuch.

Avtomashina botiq tuneldan harakatlanganda yuklanish kuzatiladi. Bunga ham markazdan qochma kuch.

$$P_{yu} = m(g - a) = m(g - \frac{g^2}{R}); \quad P_{qu} = m(g + a) = m(g + \frac{g^2}{R})$$



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Lift yuqoriga ko'tarilmoqda. Uning 3 m/s^2 ga teng tezlanishi pastga yo'nalgan. Liftda 70 kg massali odam bor. Uning vazni (og'irligi) qanday (N)?

Berilgan:

$$a = 3 \text{ m/s}^2$$

$$m = 70 \text{ kg}$$

$$N = ?$$

Yechilishi:

Kuchlarning y o'qidagi proyeksiyasini yozamiz.

$$\vec{N} + \vec{mg}_y = m\vec{a}_y$$

$$N - mg = -ma$$

$$N = m(g - a)$$

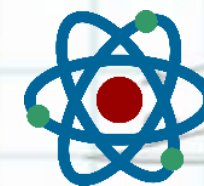
$$N = 70(10 - 1) = 490 \text{ N}$$



$$a = 3 \text{ m/s}^2$$



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0,4 g tezlanish bilan yuqoridan tik tushirilayotgan m massali jismning og'irligi (vazni) qanday?

Berilgan:

$$a = 0,4g$$

m

$$T = ?$$

Yechilishi:

Nyutonning 2 – qonuniga asosan kuchlarni yozamiz.

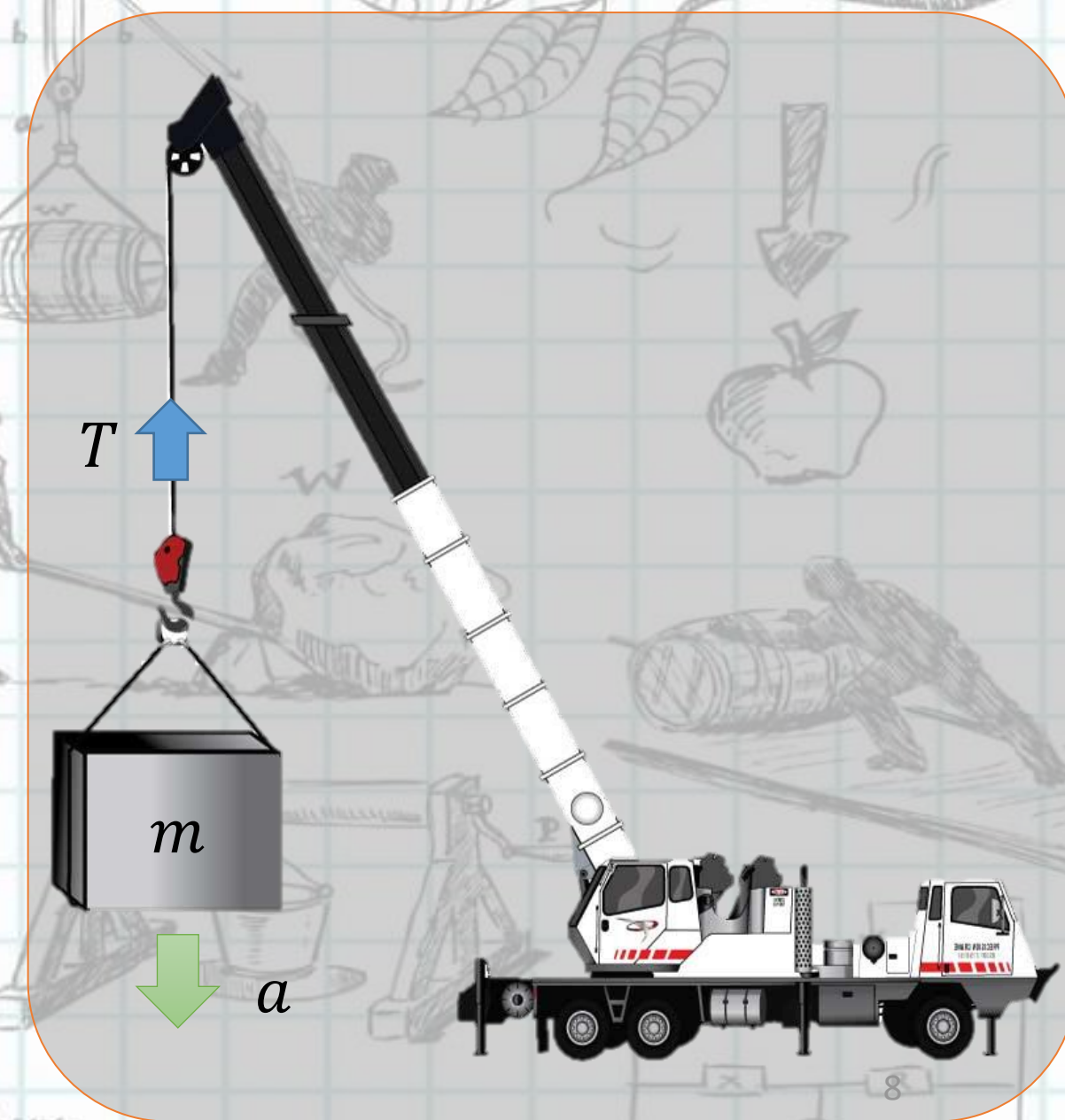
Bunda ipning taranglik kuchi jismning og'irligini ifodalaydi.

$$T + mg_y = ma_y$$

$$T + mg = -ma$$

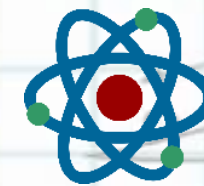
$$T = m(g - a) = m(g - 0,4g) = 0,6mg$$

$$T = 0,6mg$$





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Suv quyilgan chelak yuqoriga 2 m/s^2 tezlanish bilan ko'tarilmoqda. Agar chelakdagi suv ustunining balandligi 30 cm bo'lsa, suvning chelak tubiga bosimi qanday (kPa) bo'ladi?

Berilgan:

$$a = 2 \text{ m/s}^2$$

$$h = 30 \text{ cm} = 0,3 \text{ m}$$

$$P = ?$$

Yechilishi:

Bunda suvning og'irligi ortadi.

$$N + mg_y = ma_y$$

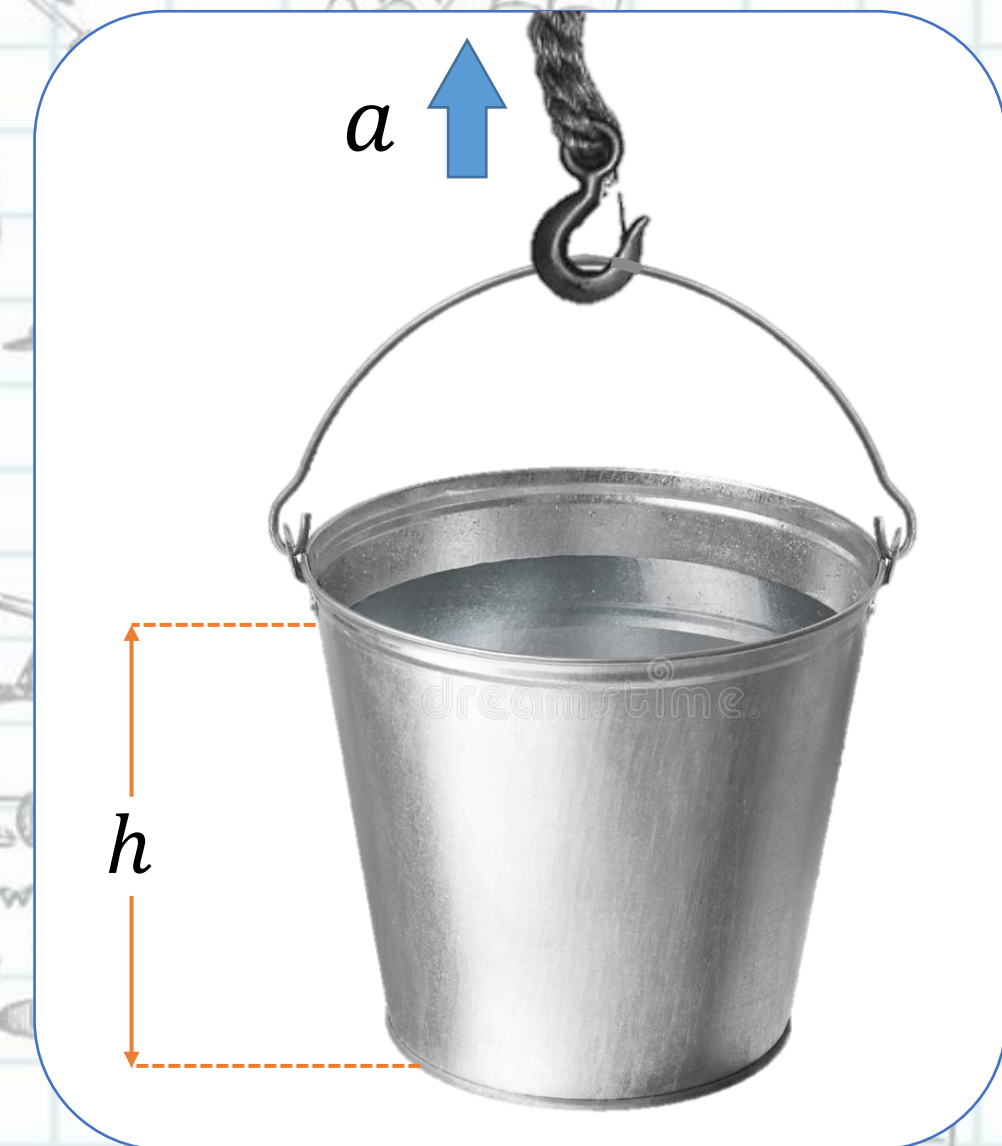
$$N + mg = ma$$

$$N = m(g + a)$$

Bosimni yozamiz:

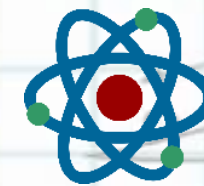
$$P = \frac{N}{S} = \frac{m(g + a)}{S} = \frac{\rho \cdot V(g + a)}{S} = \frac{\rho \cdot S \cdot h(g + a)}{S}$$

$$P = \rho(g + a)h = 10^3 \cdot 12 \cdot 0,3 = 3,6 \text{ kPa}$$





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Massasi 1 t bo'lgan lift tekis tezlanuvchan harakat qilib, 10 s da 20 m masofaga tushdi. Lift kabinasini ko'taruvchi arqonning taranglik kuchi qanday (kN)? ($g = 10 \text{ m/s}^2$.)

Berilgan:

$$t = 10 \text{ s}$$

$$m = 1 \text{ t} = 1000 \text{ kg}$$

$$S = 20 \text{ m}$$

$$T = ?$$

Yechilishi:

Kuchlarning y o'qqa proyeksiyasini yozamiz.

$$\begin{matrix} \text{---} & \text{---} & \text{---} \\ T_y + mg_y = ma_y \end{matrix} \Rightarrow T - mg = -ma$$

$$T = m(g - a)$$

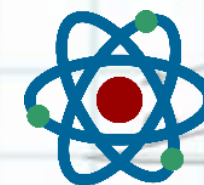
Tezlanishni tekis tezlanuvchan harakatda yo'l formulasidan topamiz. ($s_0 = 0$)

$$s = s_0 t + \frac{at^2}{2} = \frac{at^2}{2} \Rightarrow a = \frac{2s}{t^2}; T = m \left(g - \frac{2s}{t^2} \right) = 10^3 \cdot \left(10 - \frac{2 \cdot 20}{100} \right) = 9,6 \text{ kN}$$





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Avtomobil egrilik radiusi 150 m bo'lgan qavariq ko'prikdan 30 m/s tezlikda o'tayotganda, naydovchining og'irligi (vazni) ko'prikning eng yuqori nuqtasida necha marta kamayadi?

Berilgan:

$$v = 30 \text{ m/s}$$

$$R = 150 \text{ m}$$

$$\frac{P}{N} = ?$$

Yechilishi:

Avtomobilning yer o'rtasidagi vazni. $P = mg$

Qavariq ko'prikdagi vaznivaznini topamiz.

$$\vec{N} + m\vec{g}_y = m\vec{a}_{m.i.y} \quad a_{m.i.} = \frac{v^2}{R}$$

$$N - mg = -m\frac{v^2}{R} \Rightarrow N = m\left(g - \frac{v^2}{R}\right)$$

$$\frac{P}{N} = \frac{mg}{m\left(g - \frac{v^2}{R}\right)} = \frac{g}{g - \frac{v^2}{R}} = 2.5 \text{ marta}$$

