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MUHAMMAD AL-XORAZMIY NOMIDAGI AXBOROT TEXNOLOGIYALARIGA IXTISOSLASHTIRILGAN MAKTAB

Ibrohim Fayziyev

Fizikadan masalalar va ularning izohli yechim

Mavzu: Bir necha kuch ta’sirida harakat

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

Toshkent 2021-yil

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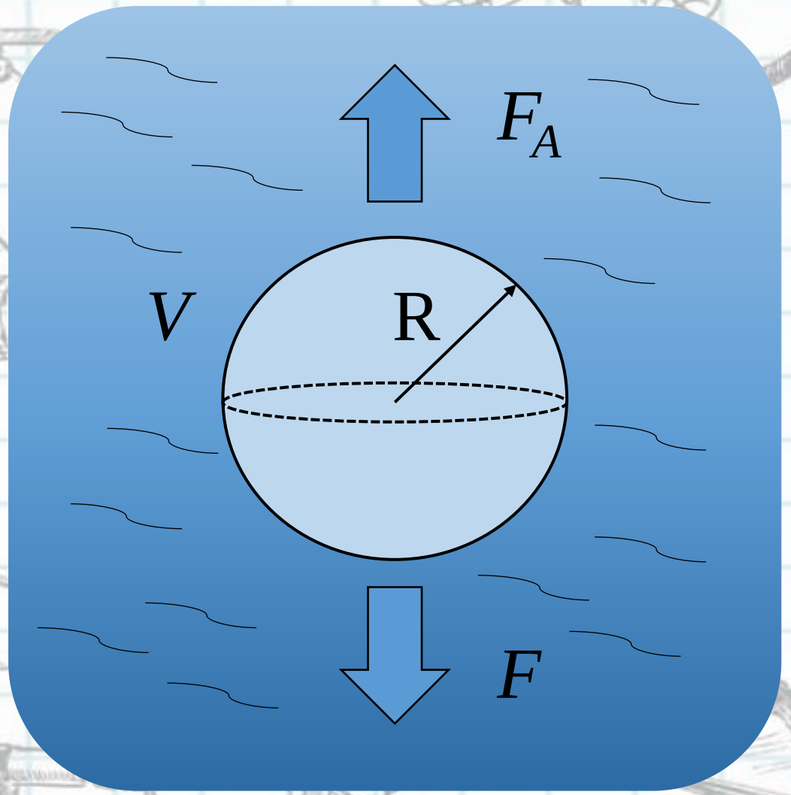
Ibrohim Fayziyev

Haimi 2 cm^3 bo‘lgan havo pufagi o‘zgarmas tezlik bilan ko‘l tubidan ko‘tarilyapti. Suvning qarshilik kuchi qanday (N)?



Berilgan:	**Yechilishi:**
$V = 2\ cm^3$ $\rho_0 = 10^3\ kg/m^3$ **F=?**	*Og'irlik kuchini hisobga olmasak, qarshilik kuchi* (F) *Arximed kuchiga* (F_A) *teng bo'lib qoladi:* $F = F_A = \rho_0 V g = 10^3 \cdot 2 \cdot 10^{-6} \cdot 10 = 0.02\ N$

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Hajmi 0,5 m^3 bo‘lgan vaznsiz shar 0,4 m^3 hajmli yukni ko‘l tubidan yuqoriga tezlanishsiz ko‘tarayotgan bo‘lsa, yukning massasi qanday (kg)?

Berilgan:

$V_{sh} = 0.5\ m^3$

$V_y = 0.4\ m^3$

$g = 10\ v/s^2$

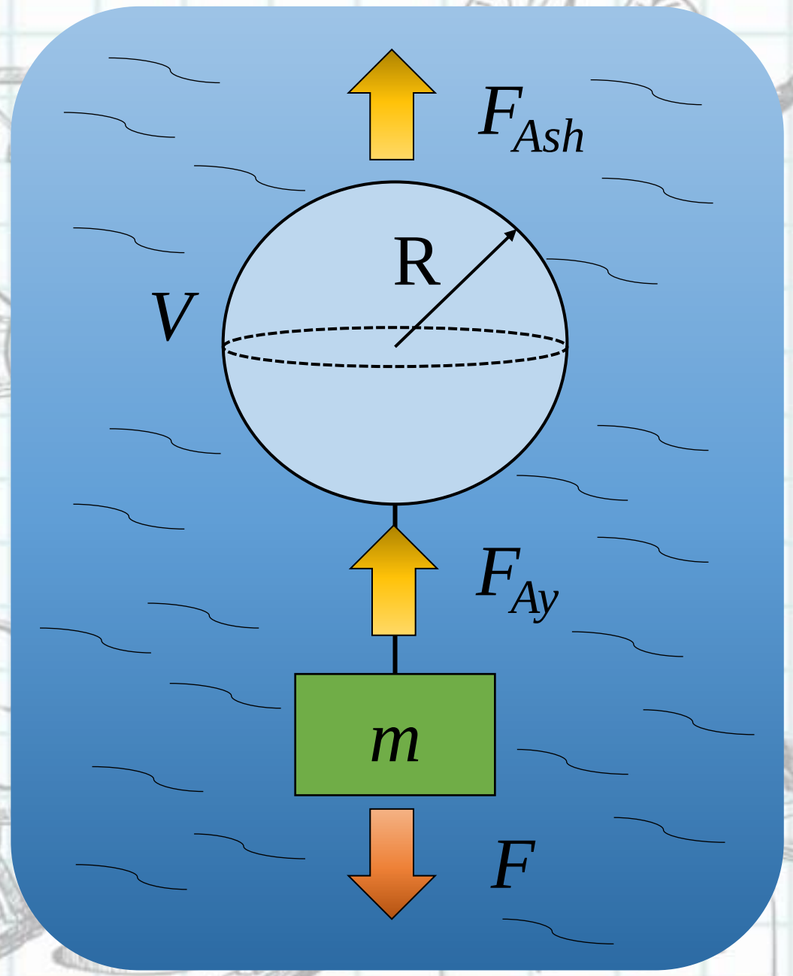
m=?

Yechilishi:

Bu shart bo'yicha pufakka va jismga ta'sir qiluvchi Arximed kuchi jismning og'irlik kuchiga teng bo'lishi ker*ak.*

$$\begin{cases} F_A - mg = ma = 0 \\ F_A = mg \end{cases} \Rightarrow \rho_0(v_0 + v)g = mg$$

$$m = \rho_0(v_0 + v) = 10^3(0.5 + 0.4) = 900kg$$



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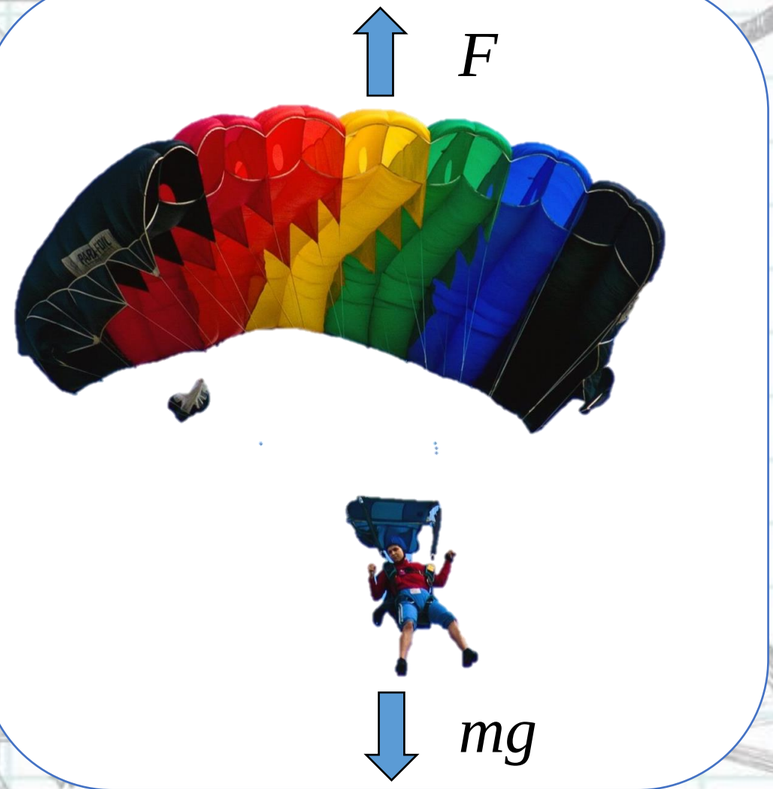
Ibrohim Fayziyev

Massasi 80 kg bo‘lgan parashutchi o‘zgarmas tezlik bilan tushmoqda. Unga ta’sir qilayotgan qarshilik kuchi qanday (N).



Berilgan:	**Yechilishi:**
$m = 80\ kg$ $g = 10\ m/s^2$ **F=?**	*Parashutchi tekis tushayotganligi uchun* $a = 0$ *bo'ladi.* $mg = F = ma = 0$ $F = mg = 80 \cdot 10 = 800\ N$

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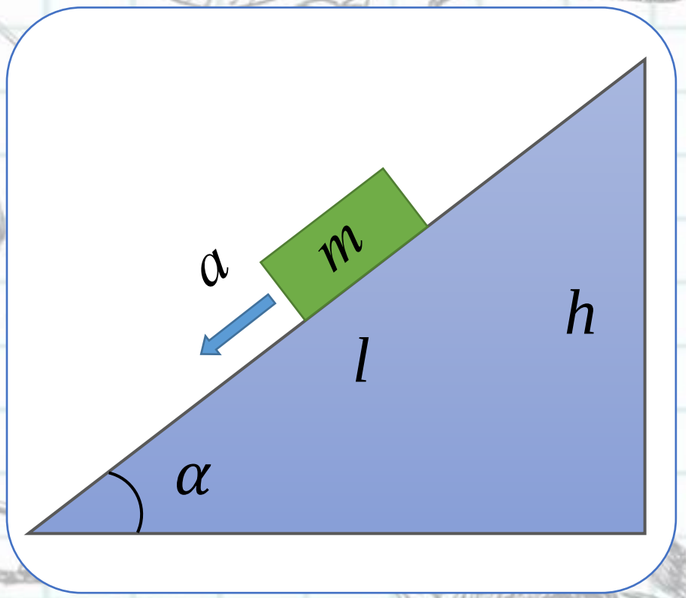
Ibrohim Fayziyev

Qiya tekislikning uzunligi 200 cm, balandligi esa 20 cm. Ishqalanish bo‘lmaganda, jism qiya tekislikda qanday tezlanish bilan sirpanadi (m/s^2)?



Berilgan:	**Yechilishi:**
$l = 200\ cm$ $h = 20\ cm$ $\mu = 0$ $a = ?$	*Qiya tekislikda jismning tezlanishi*: $\mu = 0$ $a = g(\sin\alpha - \mu\cos\alpha);\ \sin\alpha = \frac{h}{l} = \frac{20}{200} = 0.1$ $a = g\sin\alpha = 10 \cdot 0{,}1 = 1\ m/s^2$

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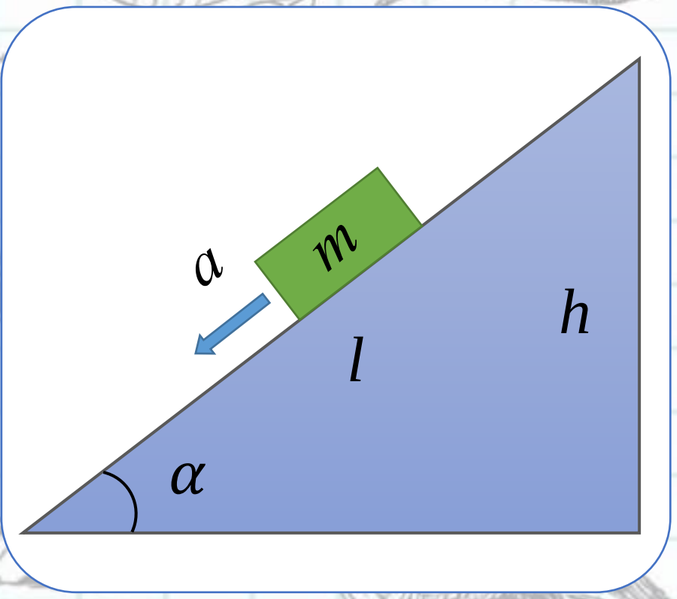
Ibrohim Fayziyev

Chana uzunligi 10 m bo‘lgan tepalikdan 2 s ichida ishqalanishsiz sirpanib tushdi. Tepalikning qiyalik burchagini toping.



Berilgan:

$l = 10\ m$

$t = 2\ s$

$\mu = 0$

$\alpha = ?$

Yechilishi:

Qiya tekislikda ishqalanishsiz sirpanib tushgan jismning tezlanishi:

$a = g\sin\alpha$

Boshlang'ich tezliksiz tekis tezlanuvchan harakatda bosib o'tilgan yo'l fo'rmulasi:

$$l = \frac{at^2}{2} = \frac{g\sin\alpha t^2}{2} \quad \Rightarrow \quad \sin\alpha = \frac{2l}{gt^2} = \frac{2\cdot 10}{10\cdot 4} = \frac{1}{2}$$

$$\sin\alpha = \frac{1}{2} \quad \Rightarrow \quad \alpha = 30^0$$

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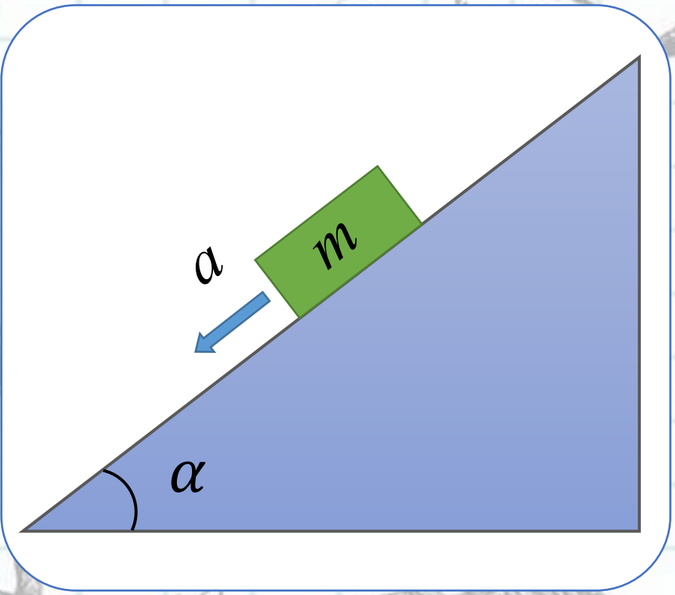
Ibrohim Fayziyev

Qiyalik burchagi 45° bo‘lgan qiya tekislikdan ishqalanishsiz sirpanib tushayotgan jism qanday tezlanish bilan harakat qiladi (m/s^2)?



Berilgan:

$\alpha = 45°$

$g = 10\ m/s^2$

$a = ?$

Yechilishi:

Qiya tekislikdan sirpanib tushayotgan jismning tezlanishi formulasi $a = g(\sin\alpha - \mu\cos\alpha)$

$\mu = 0$ *bo'lsa,* $a = g\sin\alpha$ *bo'ladi.*

$$a = 10 \cdot \frac{\sqrt{2}}{2} = 5\sqrt{2} m/s^2$$

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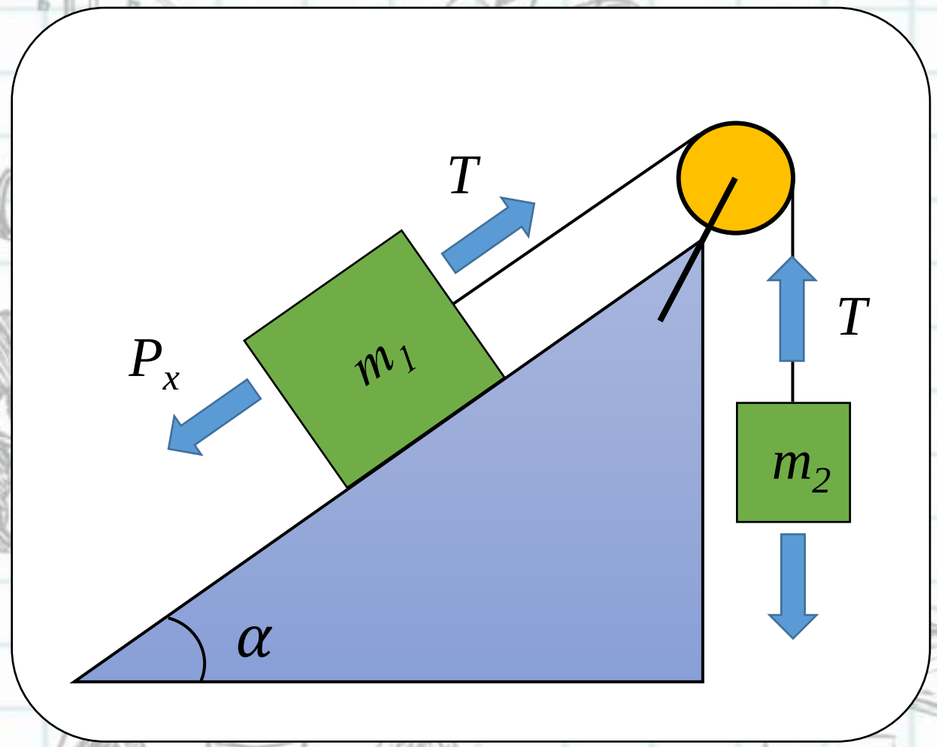
$m_1 = 10\ kg$, $m_2 = 15\ kg$ massali yuklar qo‘zg‘almas vaznsiz blok orqali rasmdagidek ipga bog‘langan. Sistemaning tezlanishini toping (m/s^2). Ishqalanishni hisobga olmang.



Berilgan:

$m_1 = 10\ kg$

$m_2 = 15\ kg$

$\mu = 0$

$a = ?$

Yechilishi:

Har bir jismga ta'sir qiluvchi kuchlarni Nyutonning 2 – qonuniga asosan yozamiz.

$P_x = m_2 g \sin\alpha$

$$\begin{cases} m_2 g - T = m_2 a \\ T - m_1 g \sin\alpha = m_1 a \end{cases} \Rightarrow m_2 g - m_1 \sin\alpha = (m_1 + m_2)a$$

$$a = \frac{(m_2 - m_1 \sin\alpha)g}{m_1 + m_2} = \frac{(15 - 10 \cdot \frac{1}{2}) \cdot 10}{10 + 15} = \frac{100}{25} = 4\ m/s^2$$

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MUHAMMAD AL-XORAZMIY NOMIDAGI AXBOROT TEXNOLOGIYALARIGA IXTISOSLASHTIRILGAN MAKTAB

Ibrohim Fayziyev

Jismning og‘irlik kuchi havoning o‘rtacha qarshilik kuchiga teng bo‘lganda, jism 30 m balandlikdan necha sekundda tushadi? Jismning erga urilish vaqtidagi tezligi 10 m/s.

Berilgan:	**Yechilishi:**
$P = F_2$ $h = 30\ m$ $v = 10\ m/s$ **t=?**	*Og'irlik kuchi qarshilik kuchiga teng bo'lganda jism tekis harakat qiladi.* *Tekis harakatdagi yo'l fo'rmulasidan* **t** *ni topamiz.* $h = \vartheta t \Rightarrow t = \frac{h}{\vartheta} = \frac{30}{10} = 3\ s$

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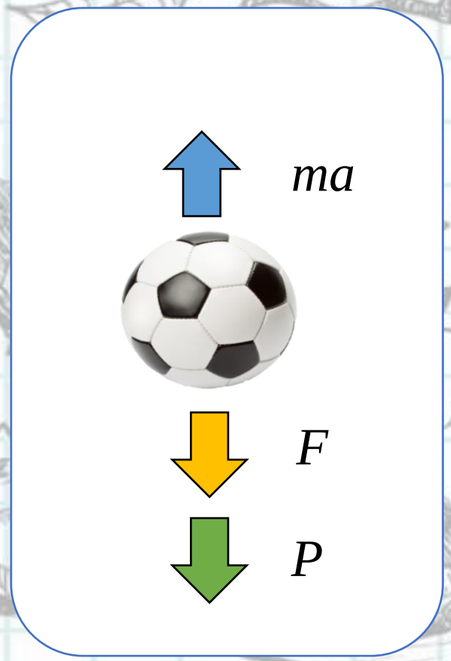
Ibrohim Fayziyev

Yuqoriga tik otilgan jismning tezlanishi ***1,2g*** ga teng bo‘lsa, jismga ta’sir etayotgan havoning qarshilik kuchining og‘irlik kuchiga nisbati qanday bo‘ladi?



Berilgan:	**Yechilishi:**
$a = 1{,}2g$ $\frac{F}{P} = ?$	$\begin{cases} P + F = ma \\ P + F = \frac{P}{g}a \end{cases} \Rightarrow F = P(\frac{a}{g} - 1)$ $\frac{F}{P} = \frac{a}{g} - 1 = \frac{1{,}2g}{g} - 1 = 0{,}2$

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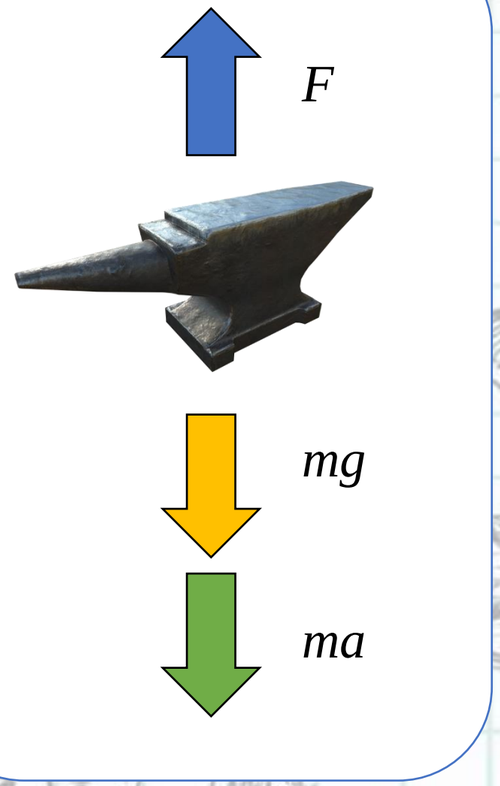
MUHAMMAD AL-XORAZMIY NOMIDAGI AXBOROT TEXNOLOGIYALARIGA IXTISOSLASHTIRILGAN MAKTAB

Ibrohim Fayziyev

Massasi 3 kg bo‘lgan jism 8 m/s^2 tezlanish bilan tik tushayotgan bo‘lsa, havoning qarshilik kuchi qanday (N)?

Berilgan:	**Yechilishi:**
$m = 3\ kg$ $a = 8\ m/s^2$ ***F*=?**	$mg - F = ma$ $F = m(g - a)$ $F = 3(10 - 8) = 6\ N.$



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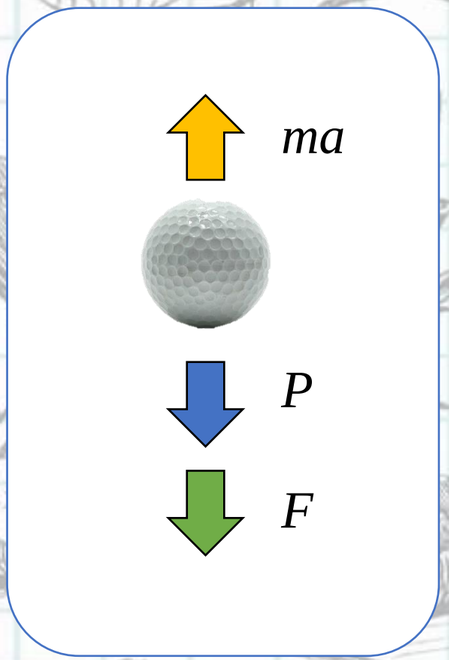
MUHAMMAD AL-XORAZMIY NOMIDAGI AXBOROT TEXNOLOGIYALARIGA IXTISOSLASHTIRILGAN MAKTAB

Ibrohim Fayziyev

Yuqoriga tik otilgan 80 g massali jismga havoning 0,8 N qarshilik kuchi ta’sir etayotgan bo‘lsa, jismning tezlanish moduli necha m/s^2 ga teng?



Berilgan:	**Yechilishi:**
$m = 80\ g$ $F = 0.8\ N$ $a = ?$	$P + F = ma$ $mg + F = ma$ $a = g + \frac{F}{m} = 10 + \frac{0,8}{0,08} = 20 \quad m/s^2$

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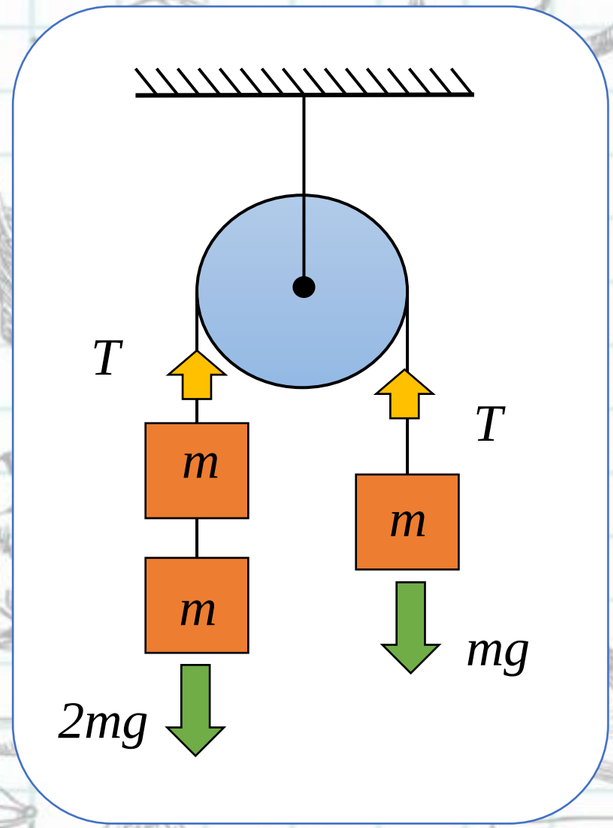
MUHAMMAD AL-XORAZMIY NOMIDAGI AXBOROT TEXNOLOGIYALARIGA IXTISOSLASHTIRILGAN MAKTAB

Ibrohim Fayziyev

Blokka rasmdagidek osilgan va massalari bir xil bo‘lgan 3 ta yuk qanday (m/s^2) tezlanish bilan harakatlanadi? Ishqalanish hisobga olinmasin.



Berilgan:

$m_1 = 2m$

$m_2 = m$

$a = ?$

Yechilishi:

$T - mg = ma$

$2mg - T = 2ma$

$2mg - mg = 3ma$

$mg = 3ma$

$a = \frac{g}{3} = 3{,}3 \ \frac{m}{s^2}$

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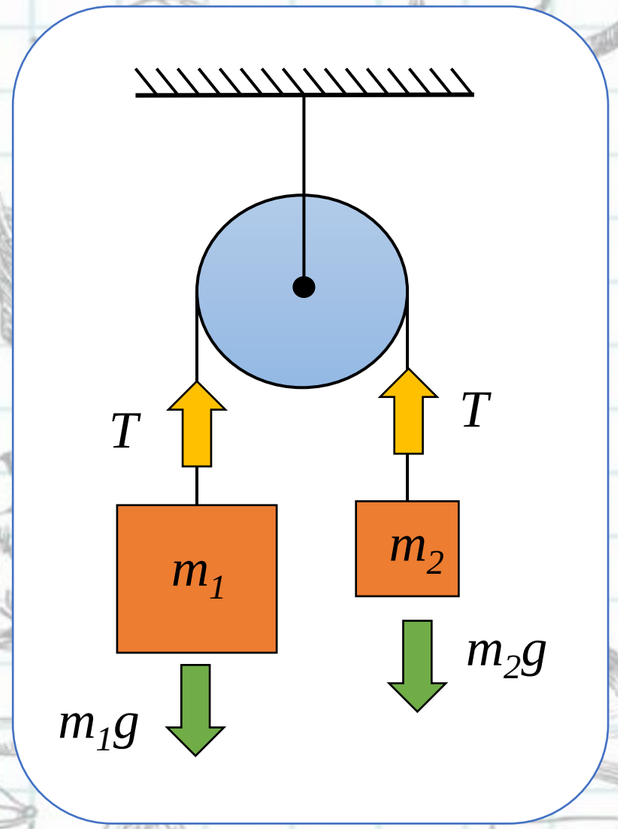
Vaznsiz qo‘g‘almas blok orqali o‘tkazilgan chilvirga massalari 6 va 4 kg bo‘lgan yuklar osilgan. Ular qanday (m/s^2) tezlanish bilan harakatlanadilar? g=10 m/s^2.



Berilgan:

$m_1 = 6\ kg$

$m_2 = 4\ kg$

$g = 10\ m/s^2$

$a = ?$

Yechilishi:

Jismlarning tezlanishini topish uchun har bir jismga ta'sir qilayotgan kuchlar uchun Nyutonning 2 – qonunini yozamiz.

$$\begin{cases} m_1 g - T = m_1 a \\ T - m_2 g = m_2 a \end{cases} \Rightarrow (m_1 - m_2)g = (m_1 + m_2)a \Rightarrow$$

$$\Rightarrow a = \frac{(m_1 - m_2)}{m_1 + m_2} g = \frac{(6-4)\cdot 10}{6+4} = 2\ \frac{m}{s^2}$$

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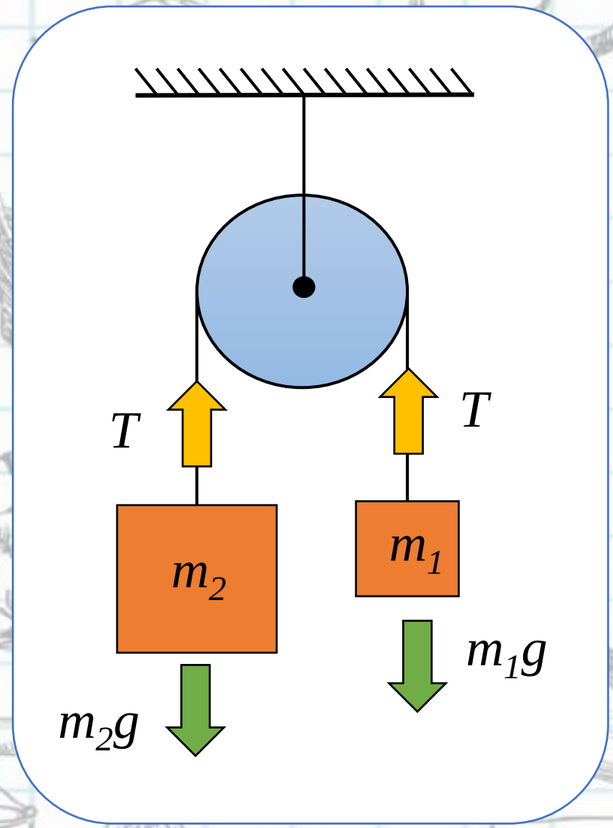
Massalari m_1 va m_2 bo‘lgan ikki jism qo‘zg‘almas blok orqali o‘tgan vaznsiz va cho‘zilmaydigan ip bilan o‘zaro bog‘langan. Ularning tezlanishlari qanday ifoda bilan aniqlanadi?



Berilgan:

$m_1,\ m_2$

g

$a = ?$

Yechilishi:

Har bir jismga ta'sir qilayotgan kuchlar bo'yicha Nyutonning $2-$ *qonuni ifodasini yozamiz. Shartli ravishda* $m_2 > m_1$ *deb olamiz.*

$$\begin{cases} m_2 g - T = m_2 a \\ T - m_1 g = m_1 a \end{cases} \Rightarrow (m_2 - m_1)g = (m_2 + m_1)a$$

$$a = \frac{m_2 - m_1}{m_2 + m_1} = g$$

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Qo‘zg‘almas blokka ilingan chilvirning ikki uchiga M va m massali yuklar osilgan. M/m nisbat qanday bo‘lganida yuklarning harakat tezlanishi erkin tushish tezlanishidan katta bo‘ladi? Chilvirning cho‘zilishi hisobga olinmasin.

Berilgan:

M, m

$a > g$

$\frac{M}{m} = ?$

Yechilishi:

$Mg - T = Ma$

$T - mg = ma$

$(M - m)g = (M + m)a$

$(\frac{M}{m} - 1)g = (\frac{M}{m} + 1)a$

$a = \frac{\frac{M}{m} - 1}{\frac{M}{m} + 1} g \Rightarrow a > g \quad \frac{a}{g} > 1$

Matimatik ifoda sifatida qarab masalani yechamiz.

$\frac{a}{g} = \frac{\frac{M}{m} - 1}{\frac{M}{m} + 1} > 1$

$\frac{M}{m} - 1 > \frac{M}{m} + 1$

$-1 > +1$ *bu ifoda to'g'ri emas.*