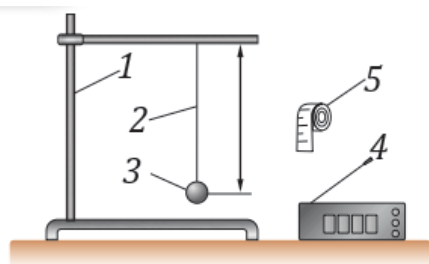




LABORATORIYA ISHI: MATEMATIK MAYATNIK YORDAMIDA ERKIN TUSHISH TEZLANISHINI ANIQLASH

Ishning maqsadi: erkin tushish tezlanishini matematik mayatnik yordamida aniqlash usulini o'rganish.

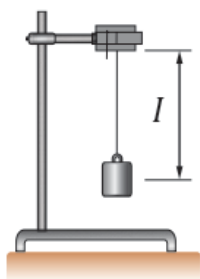
Kerakli asbob-uskunalar: laboratoriya universal shtativi; cho'zilmas ip; sharcha; sekundomer; o'lchov lentasi (2.10-rasm).



2.10-rasm

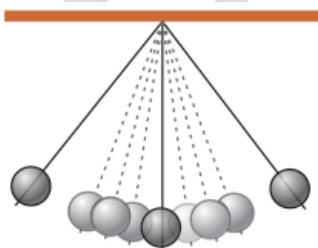
Ishni bajarish tartibi

1. Shtativga ipni imkon boricha uzunroq holda mahkamlang.
2. Ipning uzunligini o'lchov lentasi yordamida o'lchang. Bunda shar radiusi mayatnik ipining uzunligidan juda kichik bo'lgani uchun uni hisobga olmasak ham bo'ladi (2.11-rasm).



2.11-rasm

3. Sharchani muvozanat vaziyatidan uncha katta bo'lmagan ($6^\circ-8^\circ$) burchakka og'dirib, qo'yib yuboring va shu onda sekundomerni ham ishga tushiring (2.12-rasm).



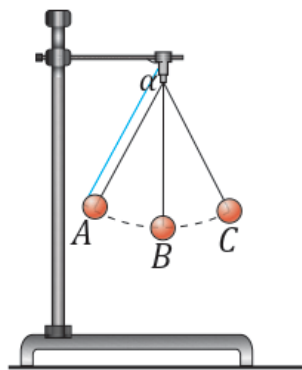
2.12-rasm

4. Matematik mayatnikning oldindan aniq belgilangan (masalan, 20 marta) tebranishlar sonining to'liq tebranishi uchun ketgan vaqtni yozib oling.
5. $T = t/N$ formuladan tebranish davrini toping.



6. $g = \frac{4\pi^2}{T^2} l$ formulaga ko'ra erkin tushish tezlanishining son qiymatini toping.

7. Mayatnik ipining uzunligini o'zgartirmagan holda tebranishlar sonini $N_2=30$ va $N_3=40$ taga yetkazib tajribani takrorlang (2.13-rasm).



2.13-rasm

8. Olingan natijalar yordamida erkin tushish tezlanishi son qiymatlarini aniqlang.

9. Olingan natijalar asosida jadvalni to'ldiring.

10. Absolyut va nisbiy xatoliklarni toping.

1-TAJRIBA: [jami: 3 ball]

$l_1 =$ _____ (m) [0,5 ball]

$N_1 = 20$ marta

$t_1 =$ _____ (s) [0,5 ball]

$g_1 =$ _____ (m/s^2) [2 ball]

2-TAJRIBA: [jami: 3 ball]

$l_2 =$ _____ (m) [0,5 ball]

$N_2 = 30$ marta

$t_2 =$ _____ (s) [0,5 ball]

$g_2 =$ _____ (m/s^2) [2 ball]



3-TAJRIBA: [jami: 3 ball]

$l_3 =$ _____ (m) [0,5 ball]

$N_3 = 40$ marta

$t_3 =$ _____ (s) [0,5 ball]

$g_3 =$ _____ (m/s^2) [2 ball]

Olingan natijalar bilan ishlash

O'rtacha erkin tushish tezlanishini aniqlash: $g_{o'rt} = \frac{g_1 + g_2 + g_3}{3}$

$g_{o'rt} =$ _____ (m/s^2) [2 ball]

Absolyut xatolikni aniqlash: $\Delta g = |g_{o'rt} - g_n|$

$\Delta g_1 =$ _____ (m/s^2) [0,5 ball]

$\Delta g_1 =$ _____ (m/s^2) [0,5 ball]

$\Delta g_1 =$ _____ (m/s^2) [0,5 ball]

O'rtacha nisbiy xatolikni aniqlash: $\Delta g_{o'rt} = \frac{\Delta g_1 + \Delta g_2 + \Delta g_3}{3}$

$\Delta g_{o'rt} =$ _____ (m/s^2) [2 ball]

Nisbiy xatolikni aniqlash: $\varepsilon = \frac{\Delta g_{o'rt}}{g_{o'rt}} \cdot 100 \%$



$\varepsilon =$ _____ (%) [1 ball]

l_{ip} (m)	N , (marta)	t , (s)	g , (m/s ²)	$\bar{g}_{o'rt}$ (m/s ²)	Δg , (m/s ²)	$\Delta \bar{g}_{o'rt}$, (m/s ²)	$\varepsilon = \frac{\Delta \bar{g}}{\bar{g}_{o'rt}} 100\%$
	20						
	30						
	40						

Xulosalovchi topshiriqlar

1. Matematik mayatnikning tebranish davri nimalarga bog'liq? [1,5 ball]

- ☐ mayatnik massasiga;
- ☐ tebranish amplitudasiga;
- ☐ erkin tushish tezlanishiga;
- ☐ mayatnik uzunligiga.

2. Matematik mayatnik tebranish davri 0,4 s ga teng. Qirrasining uzunligi matematik mayatnik ipining uzunligiga teng bo'lgan kubning zichligini toping (g/cm³). Kub massasi 32 g. $\pi^2 = g = 10 \text{ m/s}^2$. (berilganlarni to'g'ri yoza olsa 0,5 ball, masalani yechish uchun formulalarini to'g'ri qo'llay olsa 2 ball, so'ralgan kattalikni topsa 3 ball.) [3 ball].