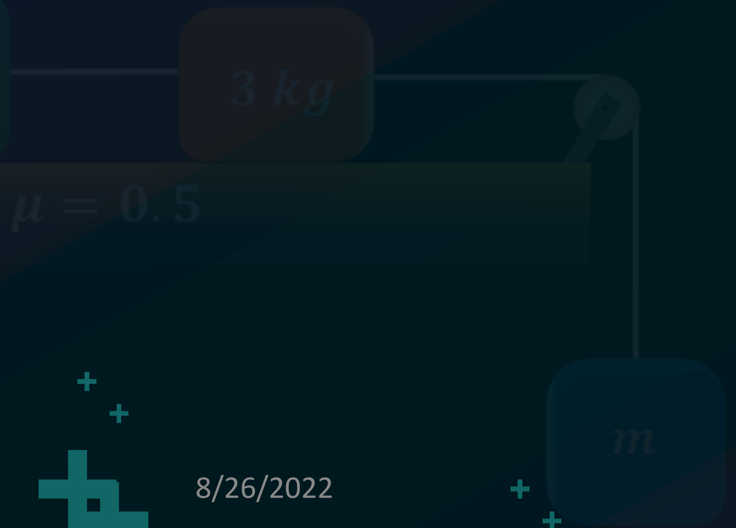
3 kg
μ = 0.5
m

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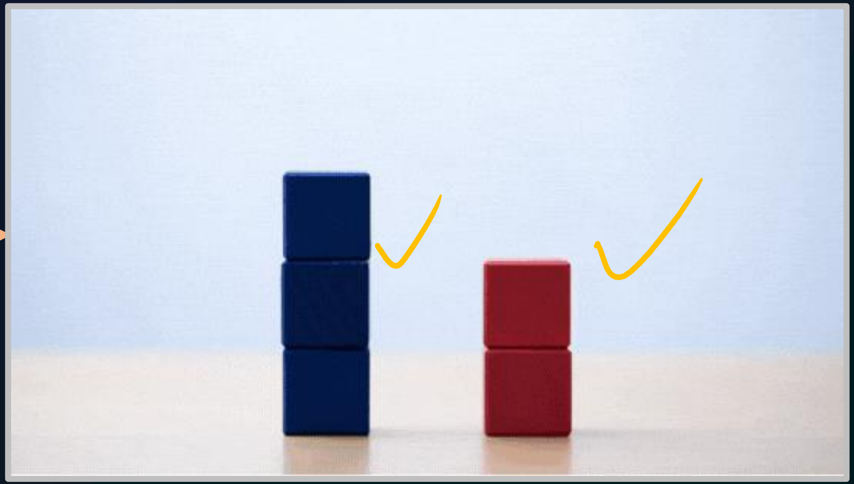
CONTENTS

WHY & AND HOW?

Block over block / Double Block System?



APPLICATION ?

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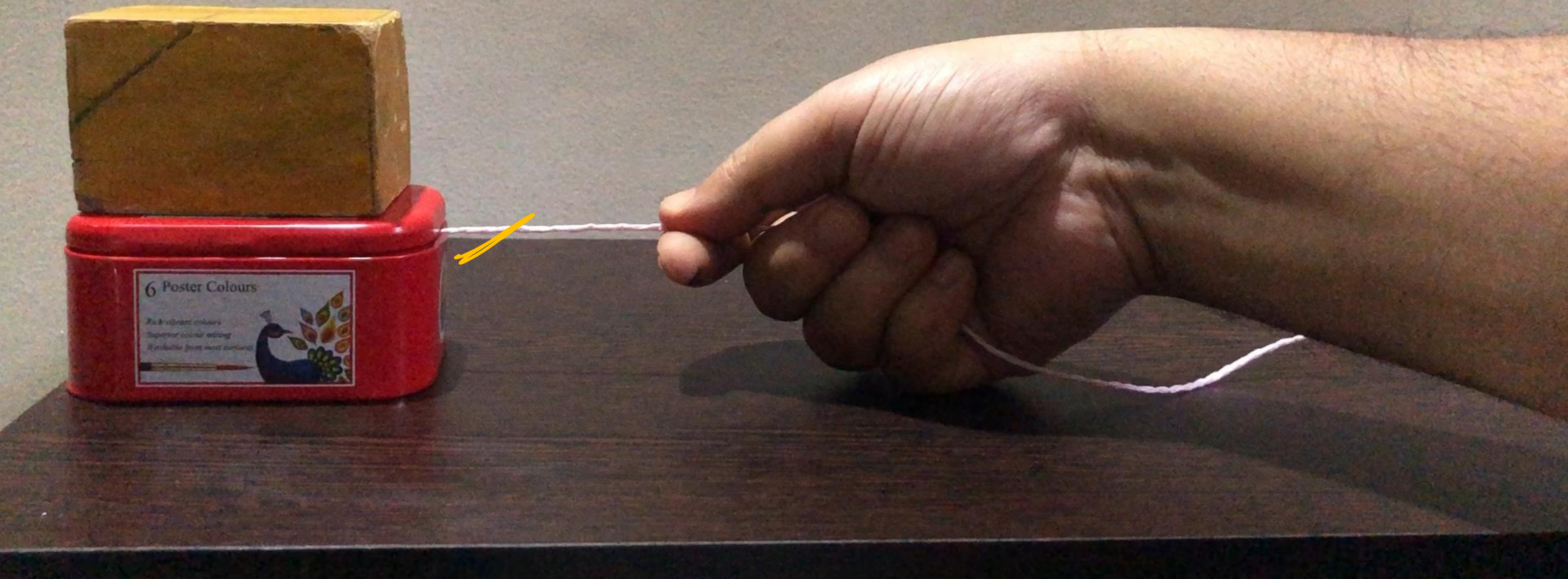
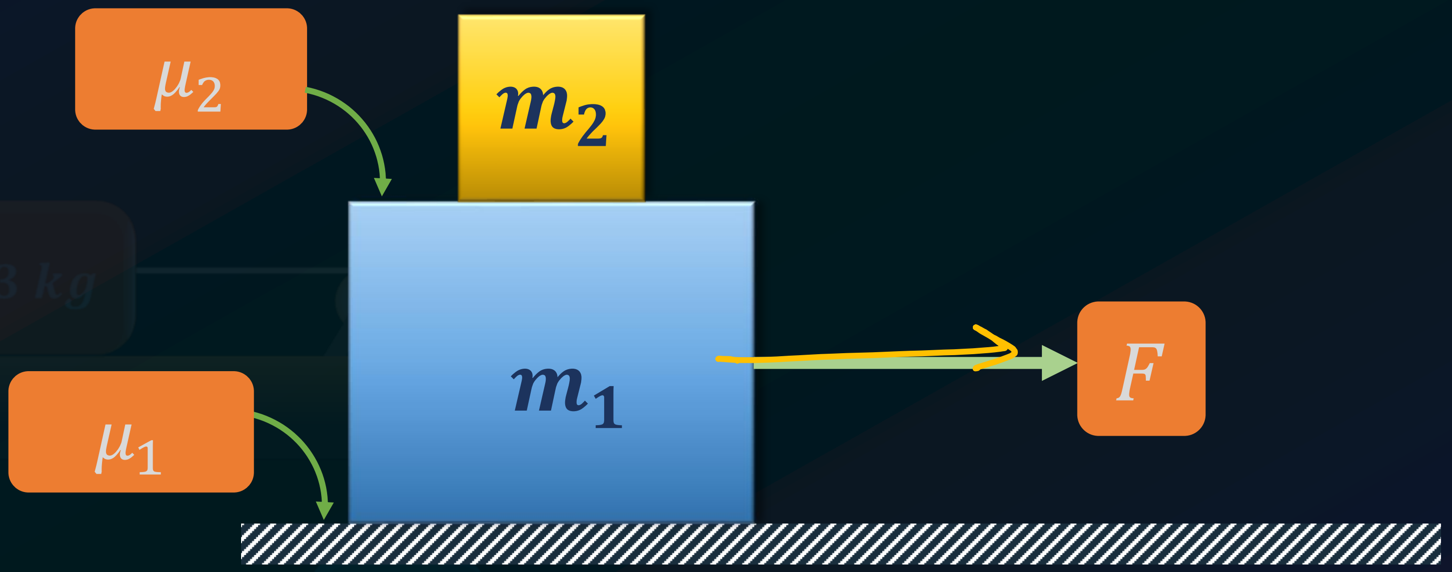
DOUBLE BLOCK SYSTEM

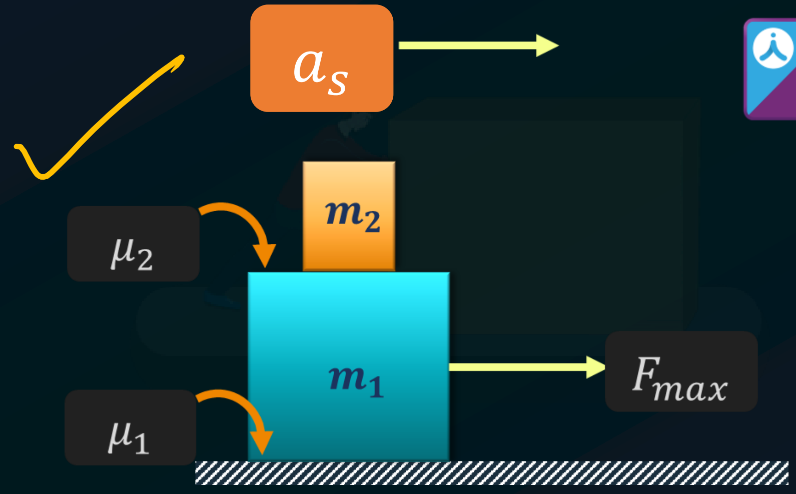


DOUBLE BLOCK SYSTEM

CASE-1: What is the maximum force applied on the block m_1, so that both the blocks move with same acceleration?



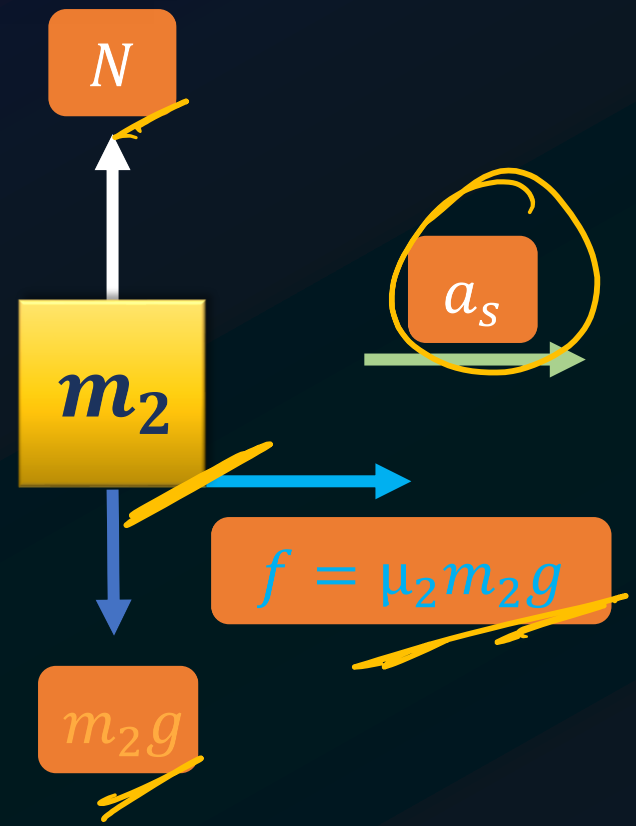
DOUBLE BLOCK SYSTEM



For mass m_2 ,

$$\mu_2 \cancel{m_2} g = \cancel{m_2} a_s$$

$$a_s = \mu_2 g$$

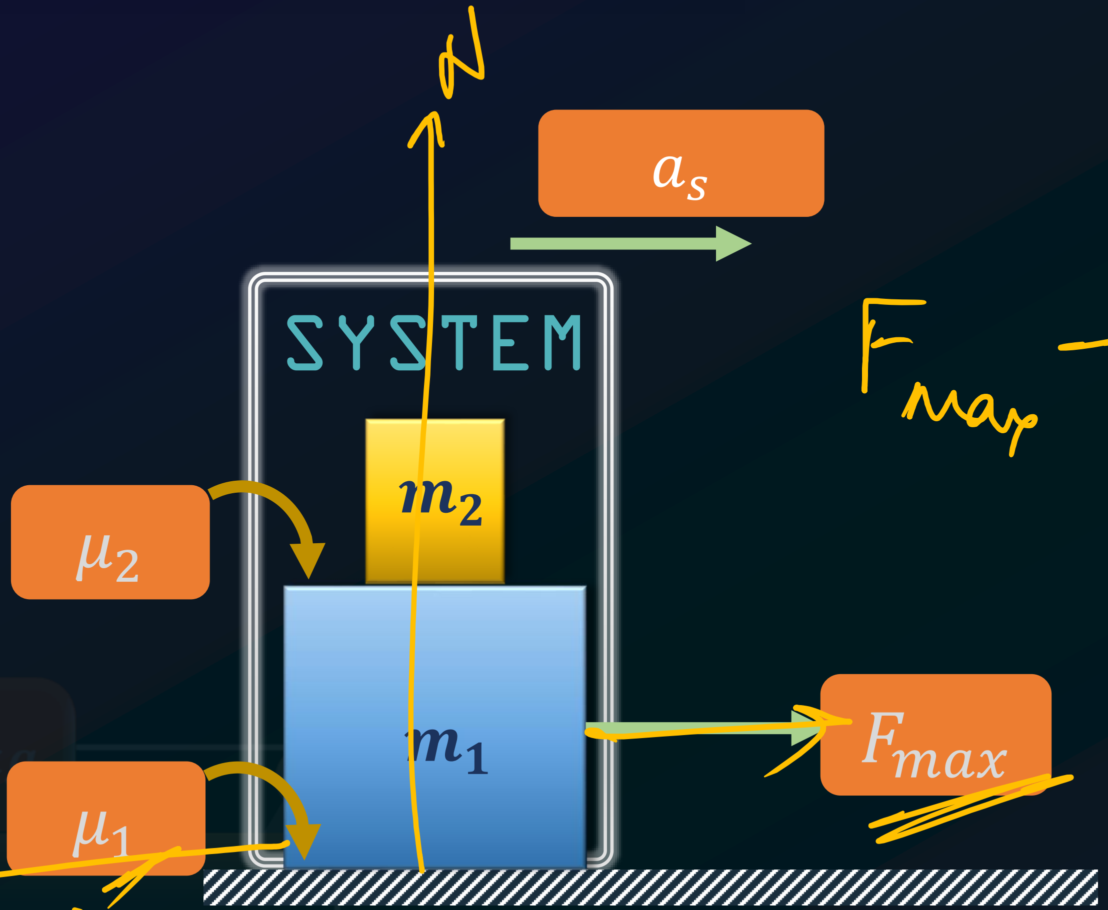


DOUBLE BLOCK SYSTEM

For system $m_1 + m_2$,

$$a_s = \mu_2 g$$

$$F_{max} - \mu_1 (m_1+m_2) g = (m_1+m_2) a_s$$



$\mu_1 (m_1+m_2) g$

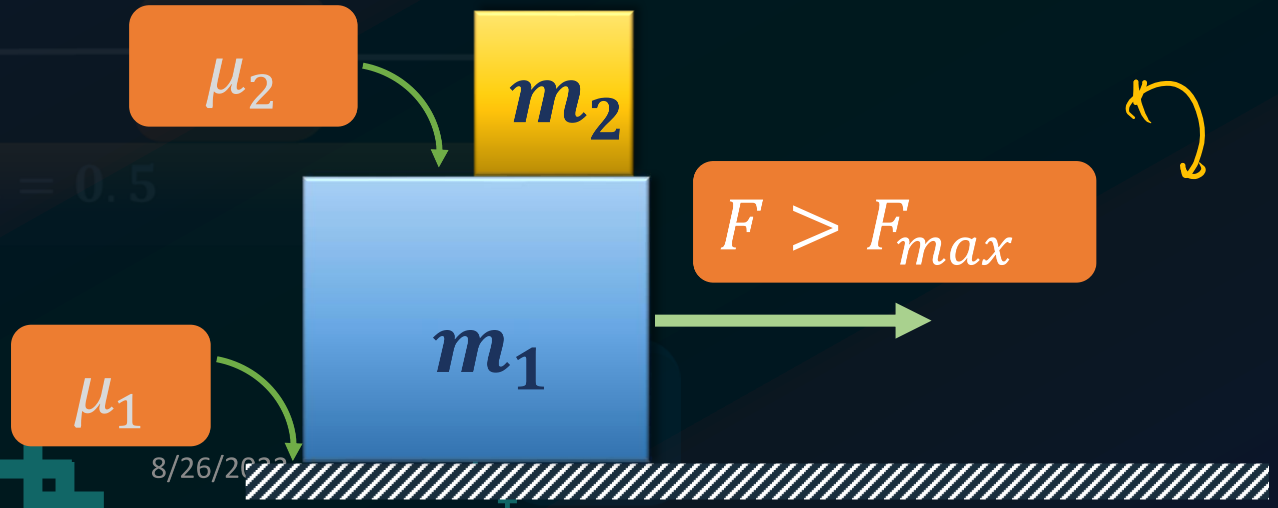
$$\boxed{F_{max} = (m_1 + m_2)(\mu_1 + \mu_2) g}$$

DOUBLE BLOCK SYSTEM

What is the maximum force applied on the block m_1, so that both the blocks move with same acceleration?

$$\boxed{F_{max} = (m_1 + m_2)(\mu_1 + \mu_2)g}$$

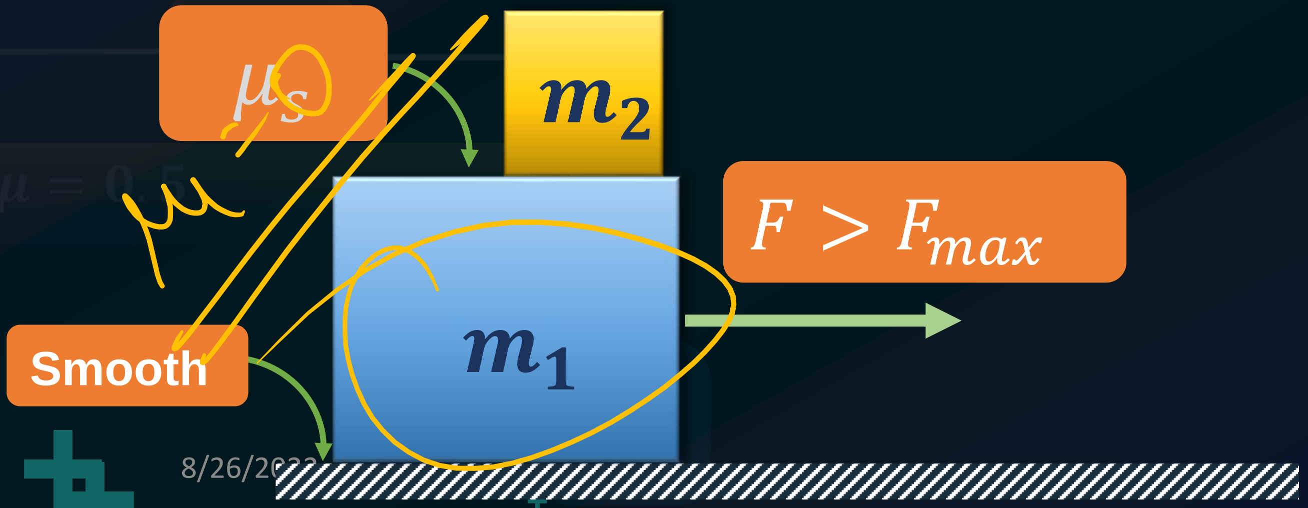
$F > F_{max}$ ⇒ relative motion between the blocks



DOUBLE BLOCK SYSTEM

What is the maximum force applied on the block m_1, so that both the blocks move with same acceleration?

$$\boxed{F_{max} = (m_1 + m_2)\mu_s g}$$



EXAMPLE

For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

a. $108\ N$

b. $48\ N$

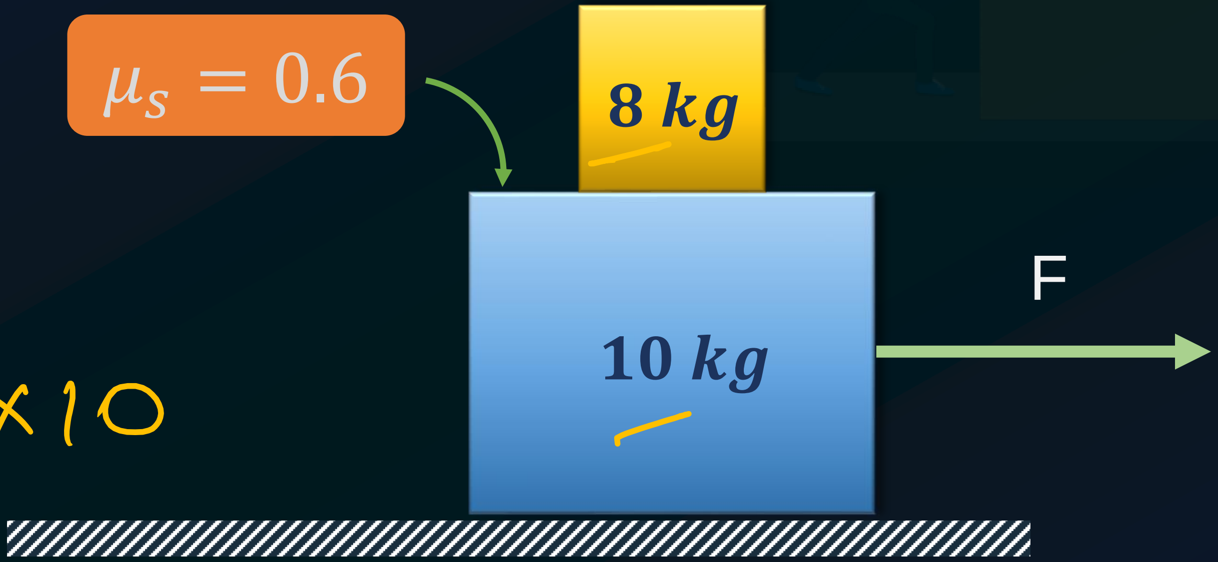
c. $180\ N$

d. $100 N$

SOLUTION

For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

$$F_{max} = (m_1 + m_2)\mu_s g$$



$F_{max} = 18 \times 0.6 \times 10$

$= 108\ N$

$\boxed{108\ N}$

ANSWER

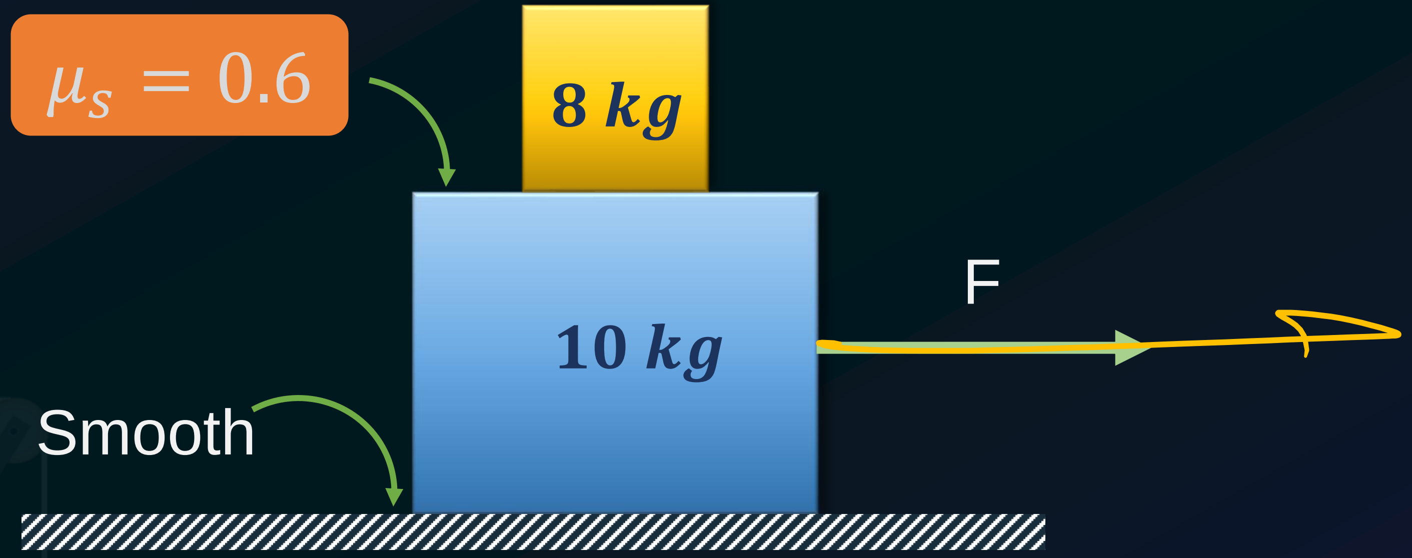
For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

a. 108 N

b. 48 N

c. 180 N

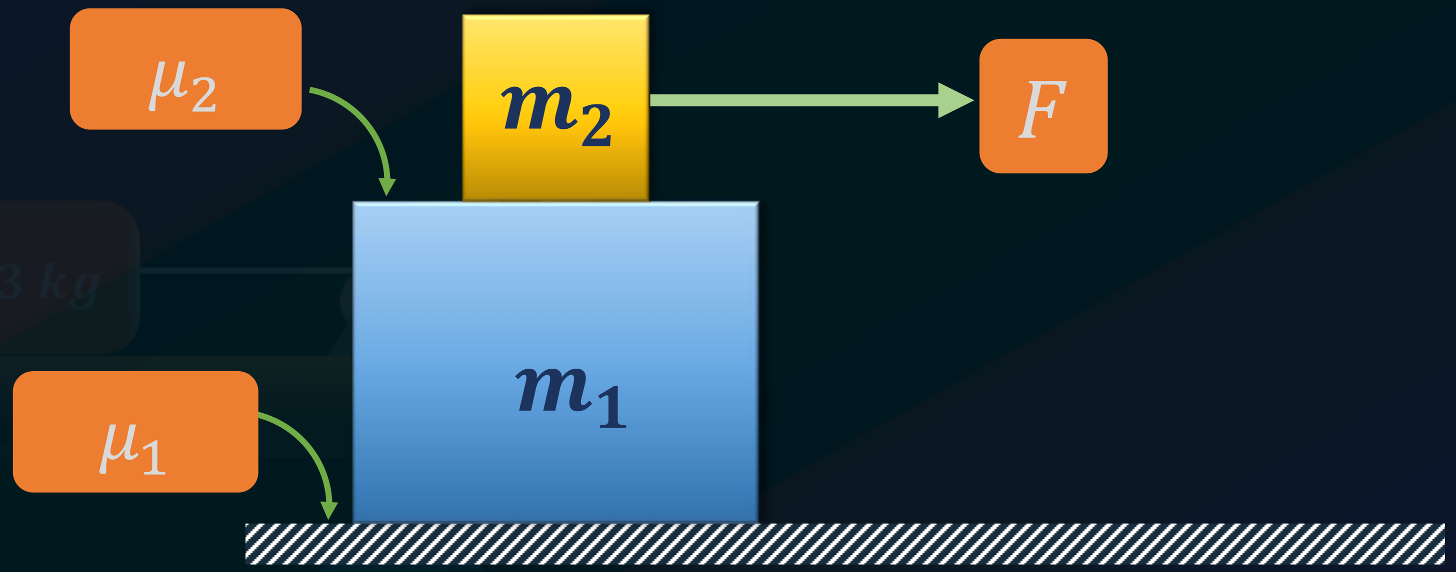
d. 100N



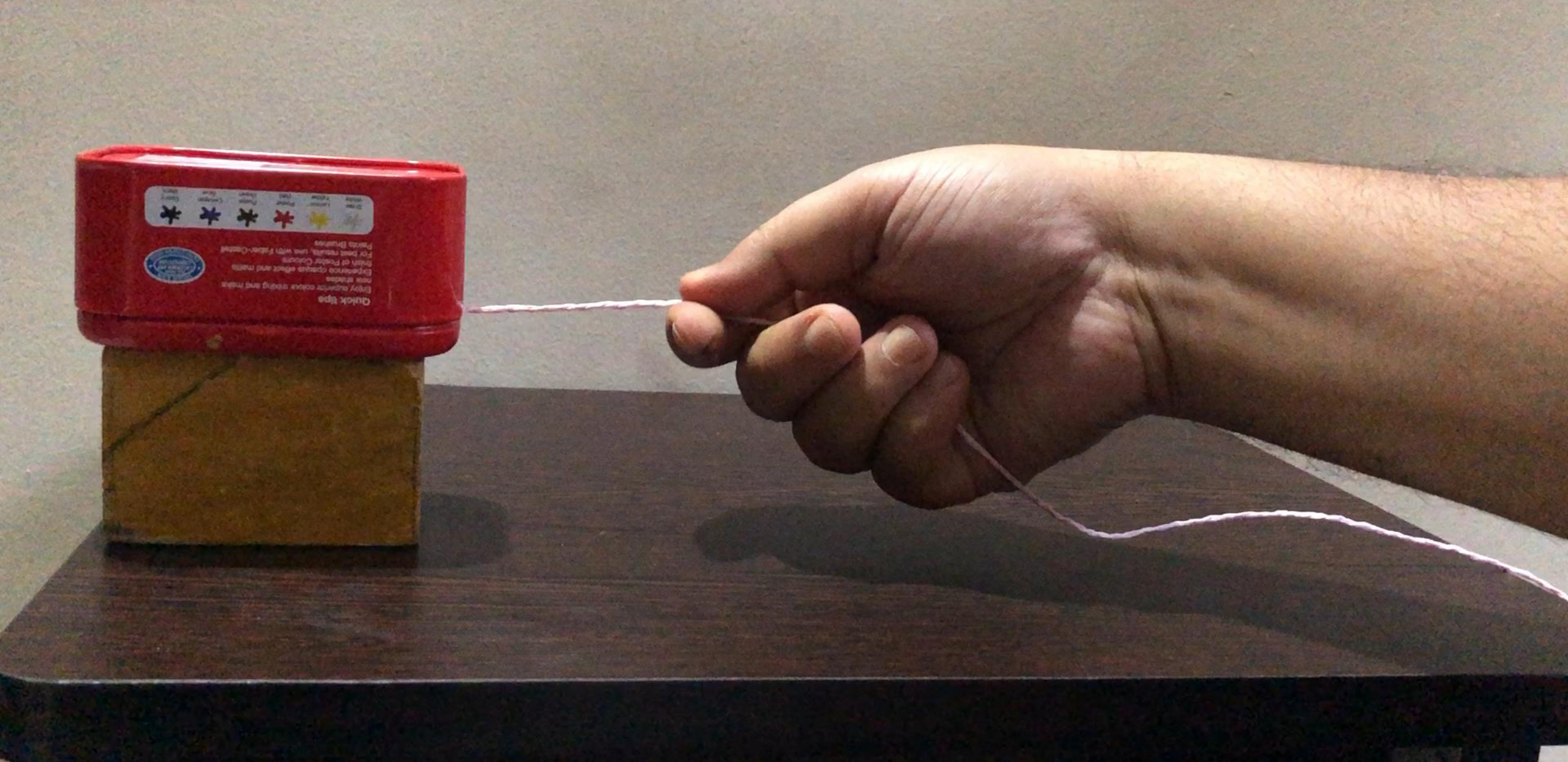
CONTENTS

DOUBLE BLOCK SYSTEM

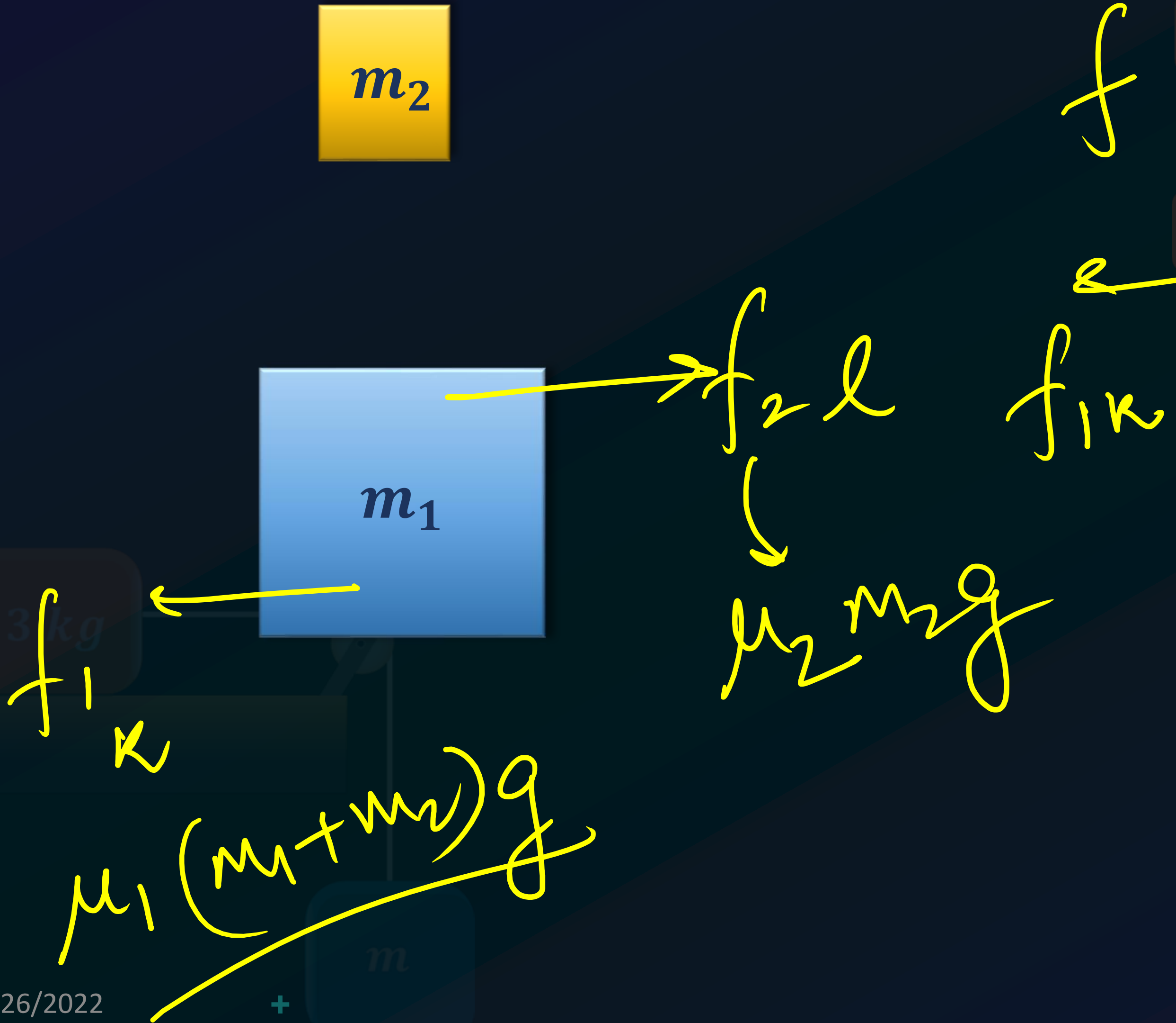
CASE-2: What is the maximum force applied on the block m_2, so that both the blocks move with same acceleration?

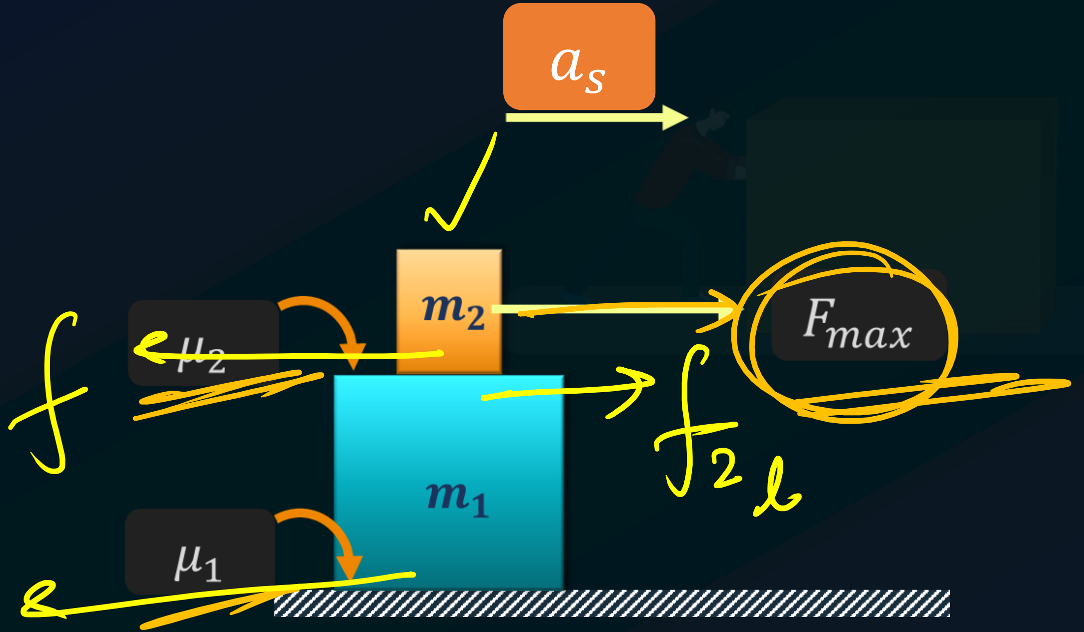


DOUBLE BLOCK SYSTEM

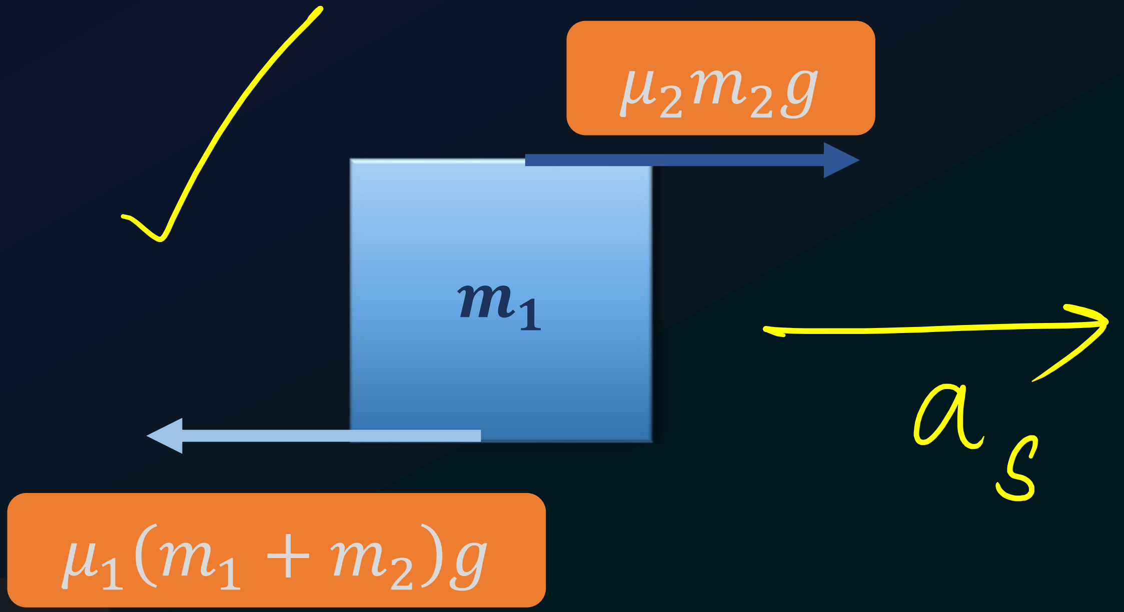


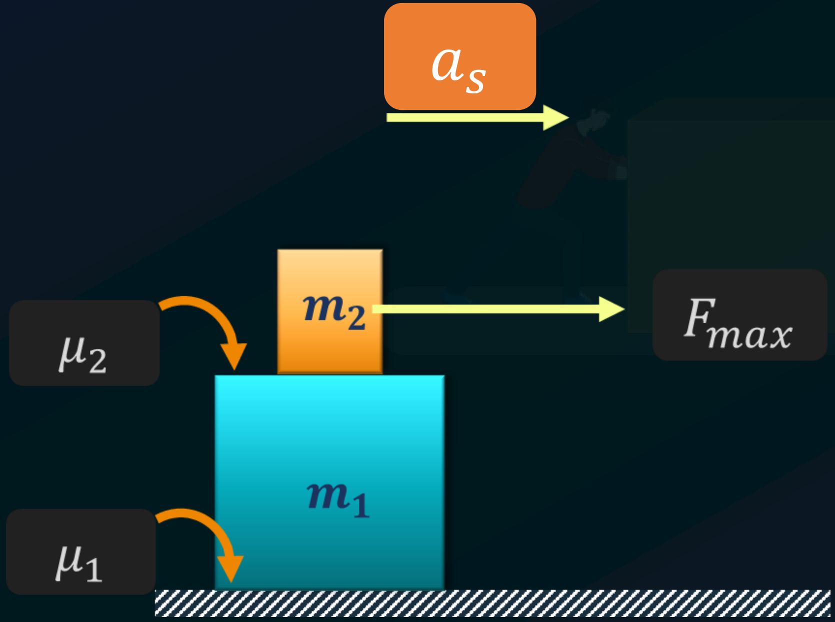
DOUBLE BLOCK SYSTEM





DOUBLE BLOCK SYSTEM



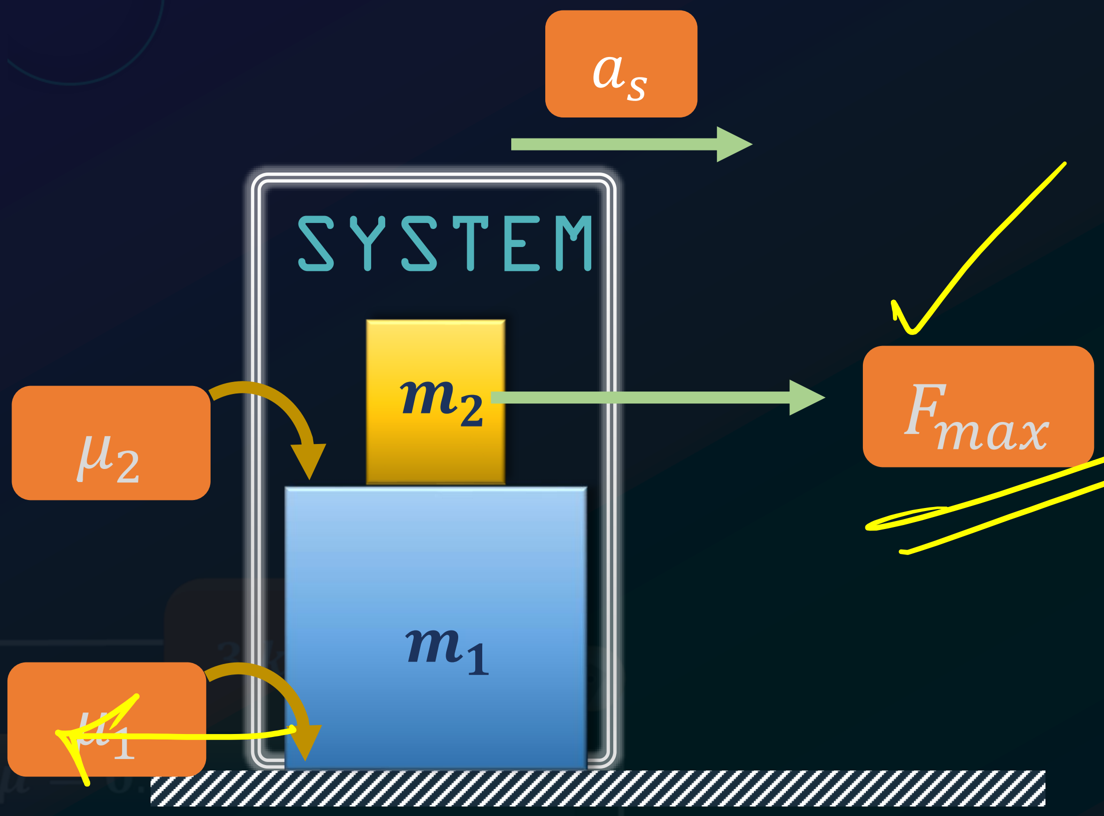


$$\frac{\mu_2 m_2 g - \mu_1 (m_1+m_2) g}{m_1} = a \quad (1)$$

DOUBLE BLOCK SYSTEM

$$a_s = \frac{(\mu_2 - \mu_1)m_2}{m_1}g - \mu_1 g$$

$$F_{max} - \mu_1(m_1+m_2)g = (m_1+m_2)a_s$$



f_k

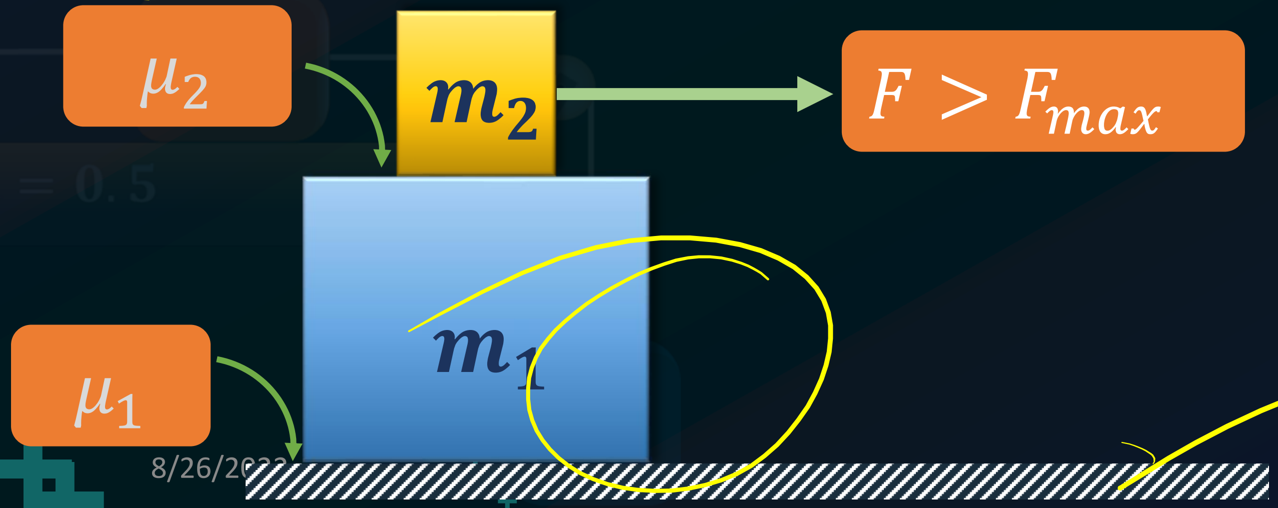
$$\boxed{F_{max} = (\mu_2 - \mu_1)\frac{m_2}{m_1}(m_1 + m_2)g}$$

DOUBLE BLOCK SYSTEM

What is the maximum force applied on the block m_2, so that both the blocks move with same acceleration?

$$F_{max} = (\mu_2 - \mu_1)\frac{m_2}{m_1}(m_1 + m_2)g$$

$F > F_{max} \Rightarrow$ relative motion between the blocks

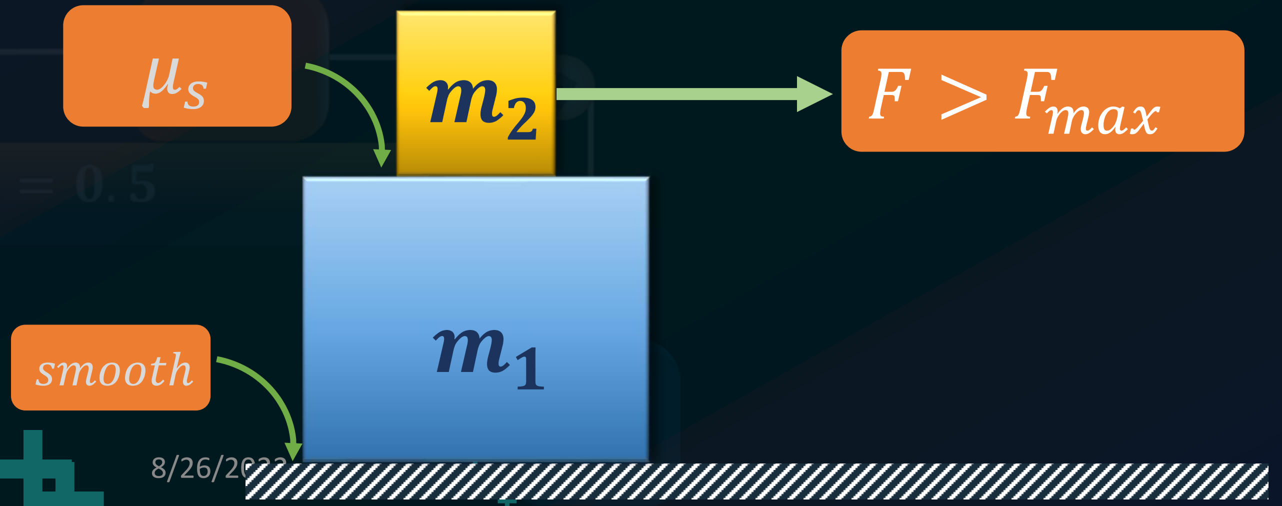


DOUBLE BLOCK SYSTEM

What is the maximum force applied on the block m_2, so that both the blocks move with same acceleration?

$$\boxed{F_{max} = \mu_s \frac{m_2}{m_1}(m_1 + m_2)g}$$

$\mu \to 0$



EXAMPLE

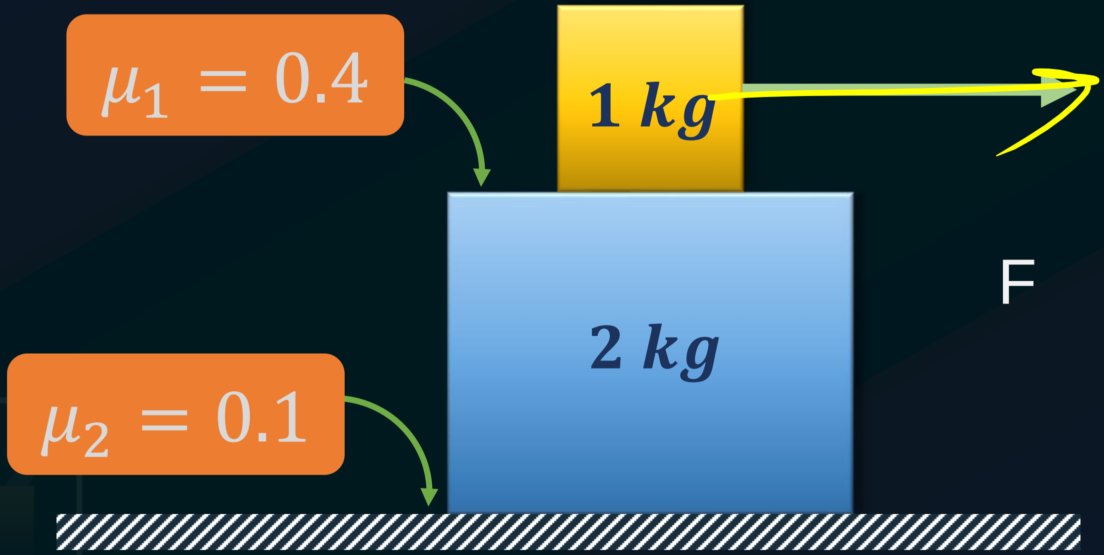
For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

a. $3\ N$

b. $4.5\ N$

c. $6\ N$

d. $3.5\ N$



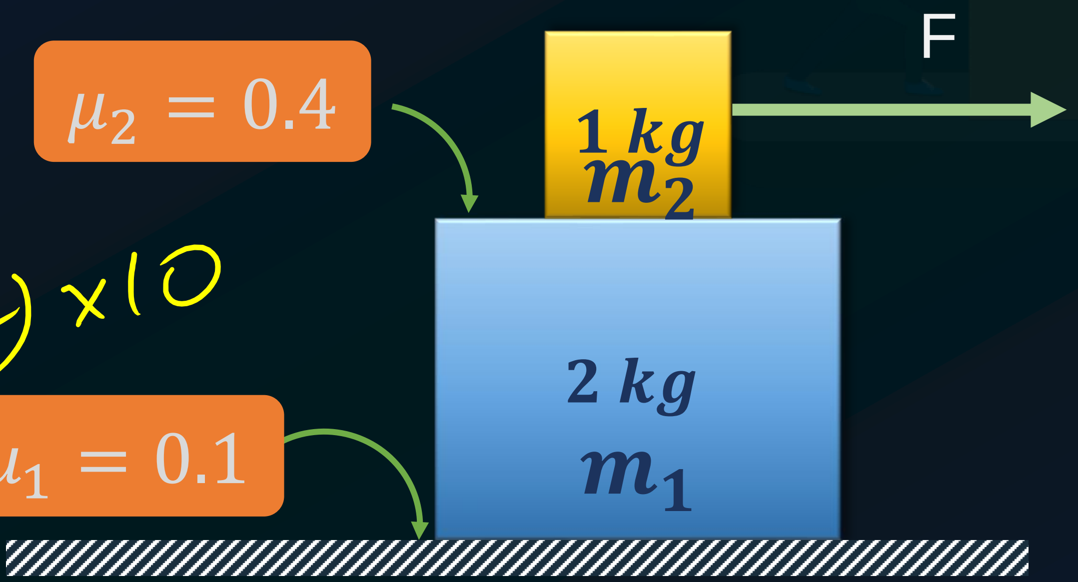
SOLUTION

For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

$$F_{max} = (\mu_2 - \mu_1)\frac{m_2}{m_1}(m_1 + m_2)g$$

$\mu_2 = 0.4$

$\mu_1 = 0.1$



$$= (0.4 - 0.1)\left(\frac{1}{2}\right)(1+2) \times 10$$

$$= 4.5\,N$$

$\boxed{4.5\ N}$

ANSWER

For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

a. $3\ N$

b. $4.5\ N$

c. $6\ N$

d. $3.5\ N$

ANSWER

$$a = \frac{mg - 2\mu mg}{3m} = \left(\frac{1-2\mu}{3}\right)g$$

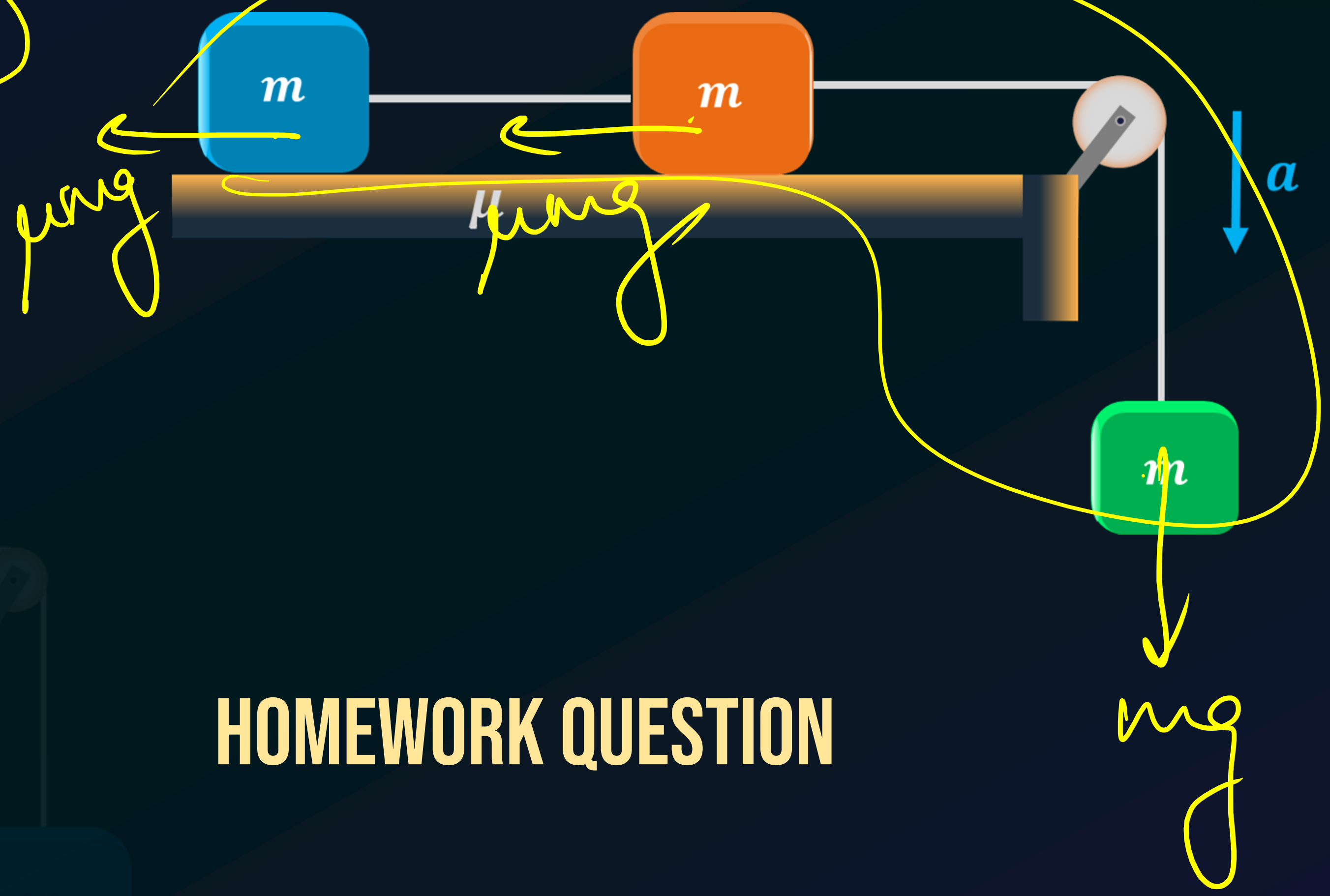
For the given system, evaluate the acceleration of the system.

a. $\frac{g}{3}(1 - 2\mu)$

b. $g(1 - \mu)$

c. $\frac{g}{2}(1 - 3\mu)$

d. $g(1 - 2\mu)$



HOMEWORK QUESTION

EXAMPLE

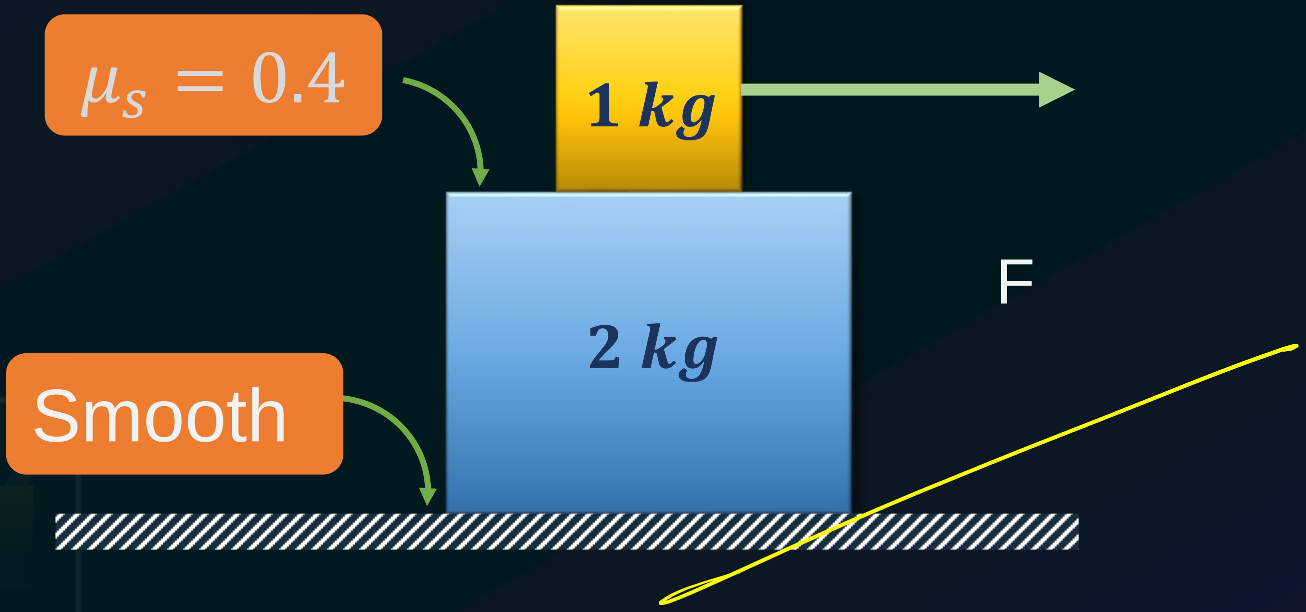
For the double block system given below, what must be the maximum value of F so that the blocks move with same acceleration?

a. $3\ N$

b. $4.5\ N$

c. $6\ N$

d. $3.5\ N$



HOMEWORK QUESTION

12TH CLASS | TUESDAY, THURSDAY
11TH CLASS | MONDAY, WEDNESDAY, FRIDAY

3 PM | 4 PM | 5 PM | 6 PM

VIVEK SIR

CHEMISTRY | 3:00 PM

ANUSHRI MA'AM

PHYSICS | 4:00 PM

SACHIN SIR

ZOOLOGY | 5:00 PM

PANKHURI MA'AM

BOTANY | 5:00, 6:00 PM

PUSHPENDU SIR

ZOOLOGY | 6:00 PM

Aakash + BYJU'S

DROPPERS BATCH

FROM 1st AUGUST

MONDAY AND WEDNESDAY | 1 PM CHEMISTRY, 2 PM BOTANY

TUESDAY AND THURSDAY | 1 PM PHYSICS, 2 PM ZOOLOGY

VIVEK SIR

CHEMISTRY | 1:00 PM

PANKHURI MA'AM

BOTANY | 2:00 PM

ANUSHRI MA'AM

PHYSICS | 1:00 PM

SACHIN SIR

ZOOLOGY | 2:00 PM

FREE FOR 14 DAYS!

Aakash + BYJU'S

~~60 Q in 60 min~~

~~every day~~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