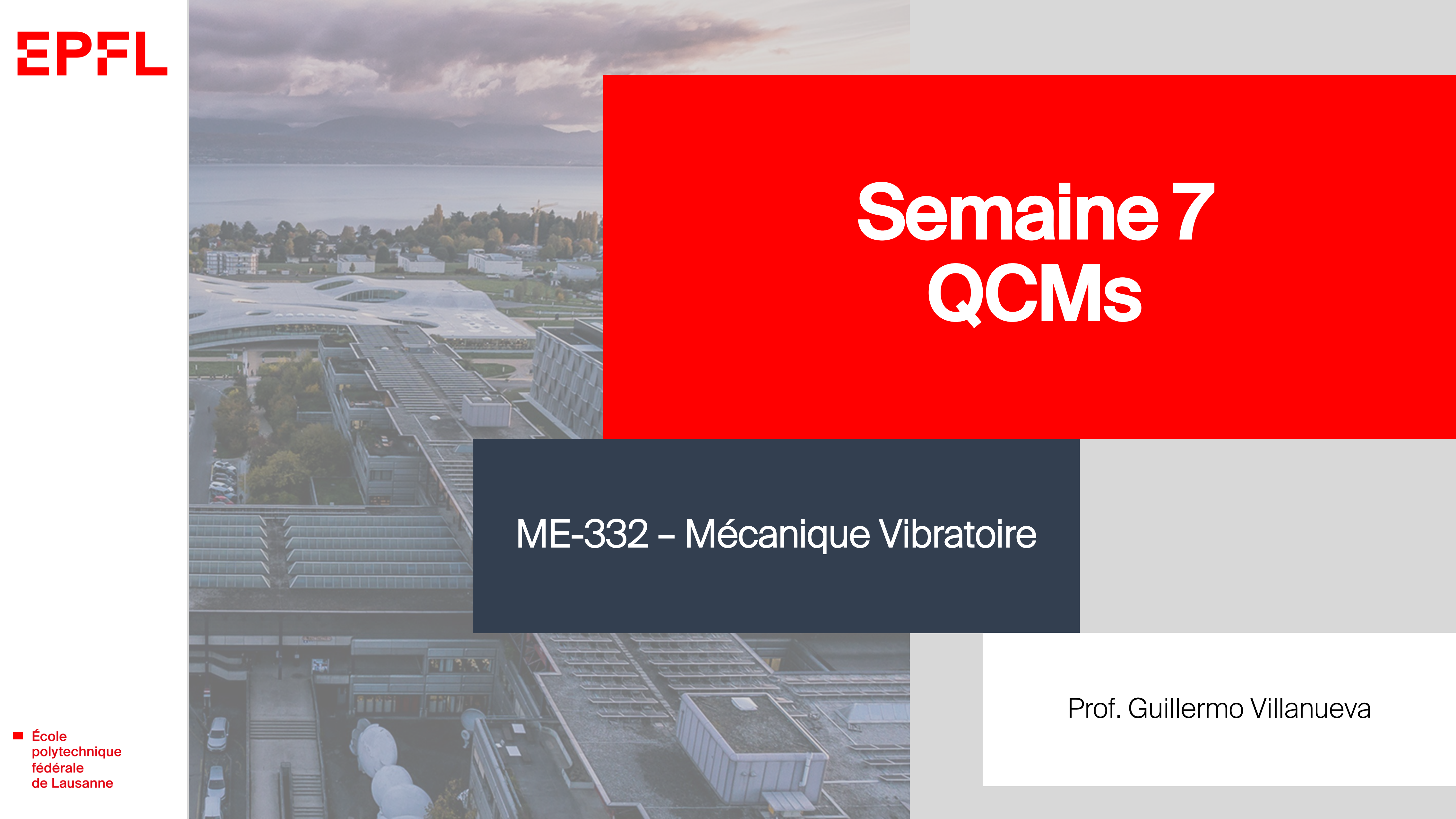


The background of the slide is a photograph of the EPFL campus in Lausanne, Switzerland. It shows modern buildings, a large lake, and mountains in the distance under a cloudy sky. A large red rectangle is overlaid on the right side of the image, and a dark blue rectangle is overlaid in the lower center.

Semaine 7 QCMs

ME-332 – Mécanique Vibratoire

Prof. Guillermo Villanueva

EPFL Before we start... let's connect!

- Smartphones
 - iPhone
 - Android
- } Download and install the app “*PointSolutions*”



- Computers (or Windows Phones)
 - Go to www.responseware.eu
- Choose **EUROPE Server** (if asked)
- Join session – **ME332**
- When asked – do not input your name. Enter as anonymous.

EPFL

Plan du cours

Mécanique Vibratoire - SGM Ba5 - G. Villanueva

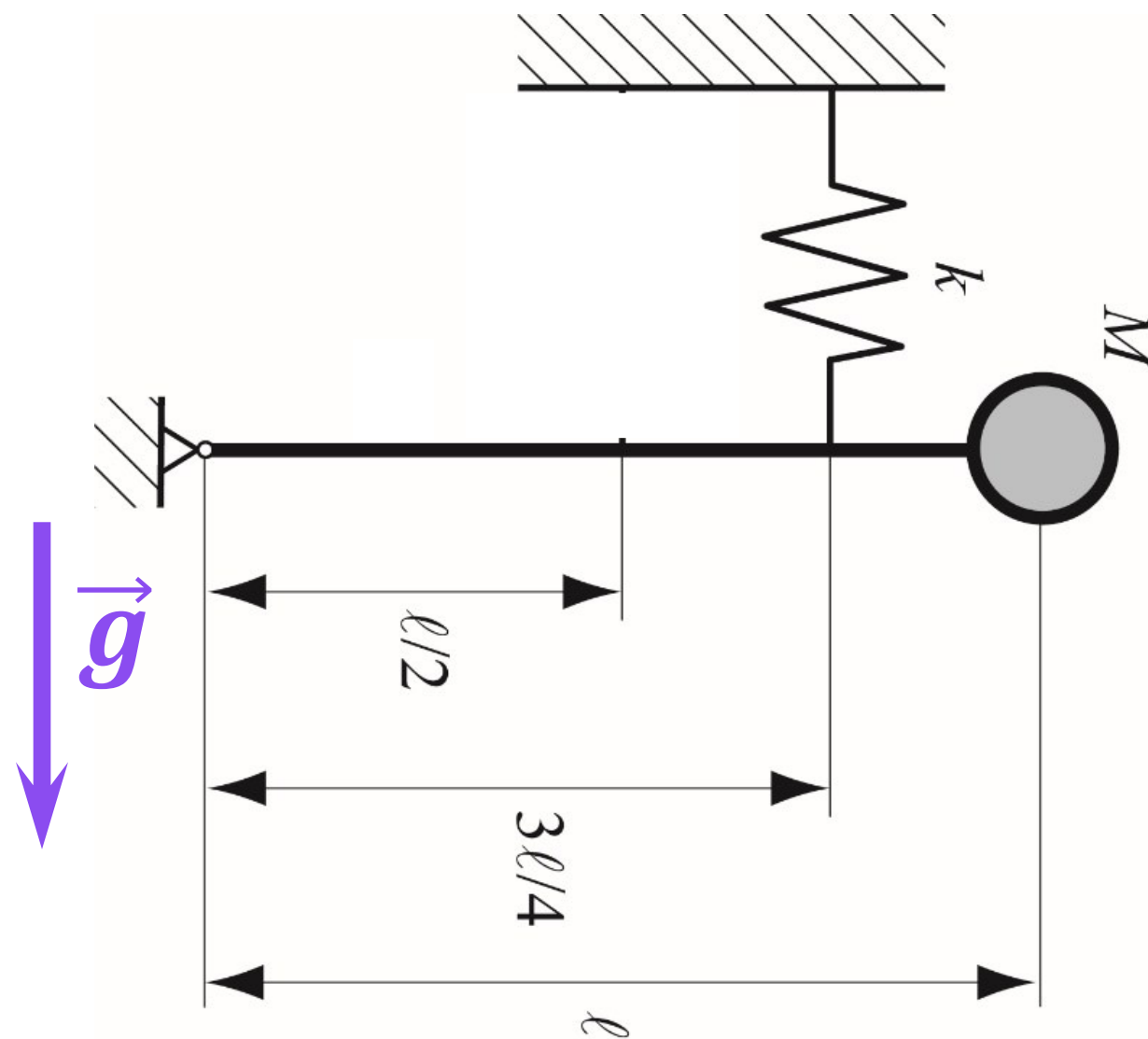
Week	Jours	Partie du cours	Exercices	Homework
1	09.09//11.09	Intro et oscillateur 1D libre conservatif	Série 1	Leçon 1.1&1.2
2	18.09	Oscillateur 1D libre dissipatif	Série 2	Leçon 2.1&2.2
3	23.09//25.09	Régime permanent harmonique (complexe)	Série 3	Leçon 3.1&3.2
4	30.09//02.10	Régime permanent périodique (série de Fourier)	Série 4	Leçon 4.1&4.2
5	07.10//09.10	Régime forcé général (transf. Laplace ou Fourier)	Série 5	Leçon 5.1&5.2
6	14.10//16.10	Systèmes à 2 DDL conservatifs	Série 6	Leçon 6.1&6.2
BREAK!!!				
7	28.10//30.10	Récapitulatif // séance de QCMs	MIDTERM	
8	04.11//06.11	Systèmes à 2DDL dissipatifs, osc. de Frahm	Série 7	Leçon 7.1&7.2
9	11.11//13.11	Systèmes à n DDL, conservatif	Série 8a	Leçon 8.1&8.2
10	18.11//20.11	Systèmes à n DDL, conservatif	Série 8b	
11	25.11//27.11	Systèmes à n DDL, dissipatif	Série 9	Leçon 9.1&9.2
12	02.12//04.12	Systèmes à n DDL, forcé	Série 10	Leçon 10.1&10.2
13	09.12//11.12	Systèmes continus: barres & poutres	Série 11	Leçon 11.1&11.2
14	16.12//18.12	Récapitulatif // séance de QCMs		

EPFL MidTerm Exam

- Date: 30 Octobre (2024)
 - **Heure: 13h30 – 15h00 (1h30)**
 - **Doors open at 13h20**
 - Salles: PO-01, SG 0211, AAC 1 37
 - Contenu: Semaines 1-6
 - Formulaire:
 - Une page A4 «recto»
 - Imprimer le formulaire dans Moodle
 - Annoter, préparer le votre, à la main, numérique...
 - Pas oublier:
 - Stylo (Ni rouge ni vert)
 - Calculatrice (standard – pas pour matrices)
 - EPFL ID – Camipro
- Exam:
 - 1 question courte
 - 2 problèmes
 - 30% de la note finale
 - SAC dit:
 - Obligatoire et présentiel
 - Séance de «révision»:
 - Lundi 28 Octobre à 8h15
 - CE 1 2

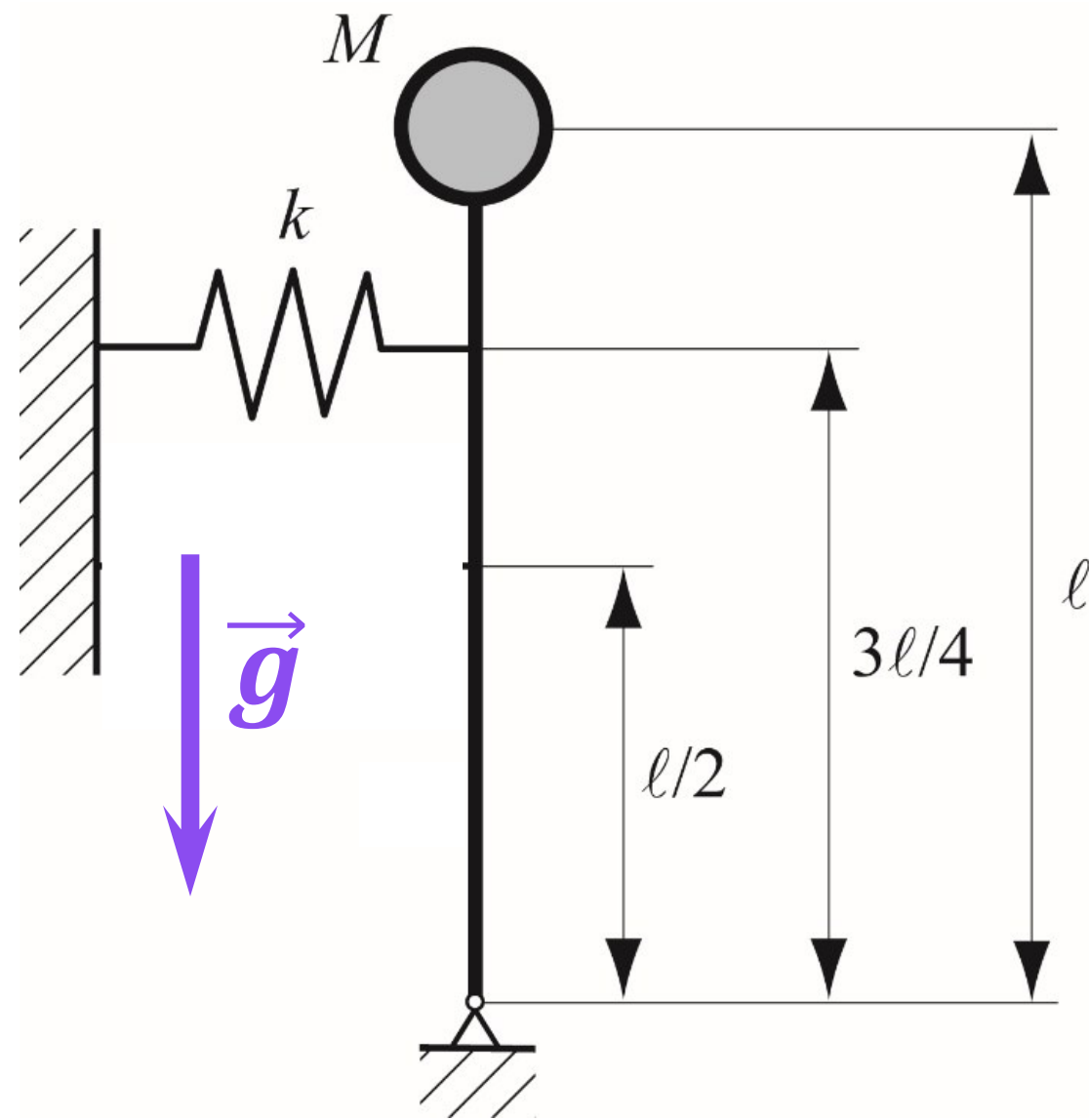
EPFL Fréquence ω_0 ?

- A. $\omega_0 = \sqrt{k/M}$
- B. $\omega_0 = 3/4\sqrt{k/M}$
- C. $\omega_0 = \sqrt{9/16 k/M + g/L}$
- D. $\omega_0 = \sqrt{9/16 k/M - g/L}$



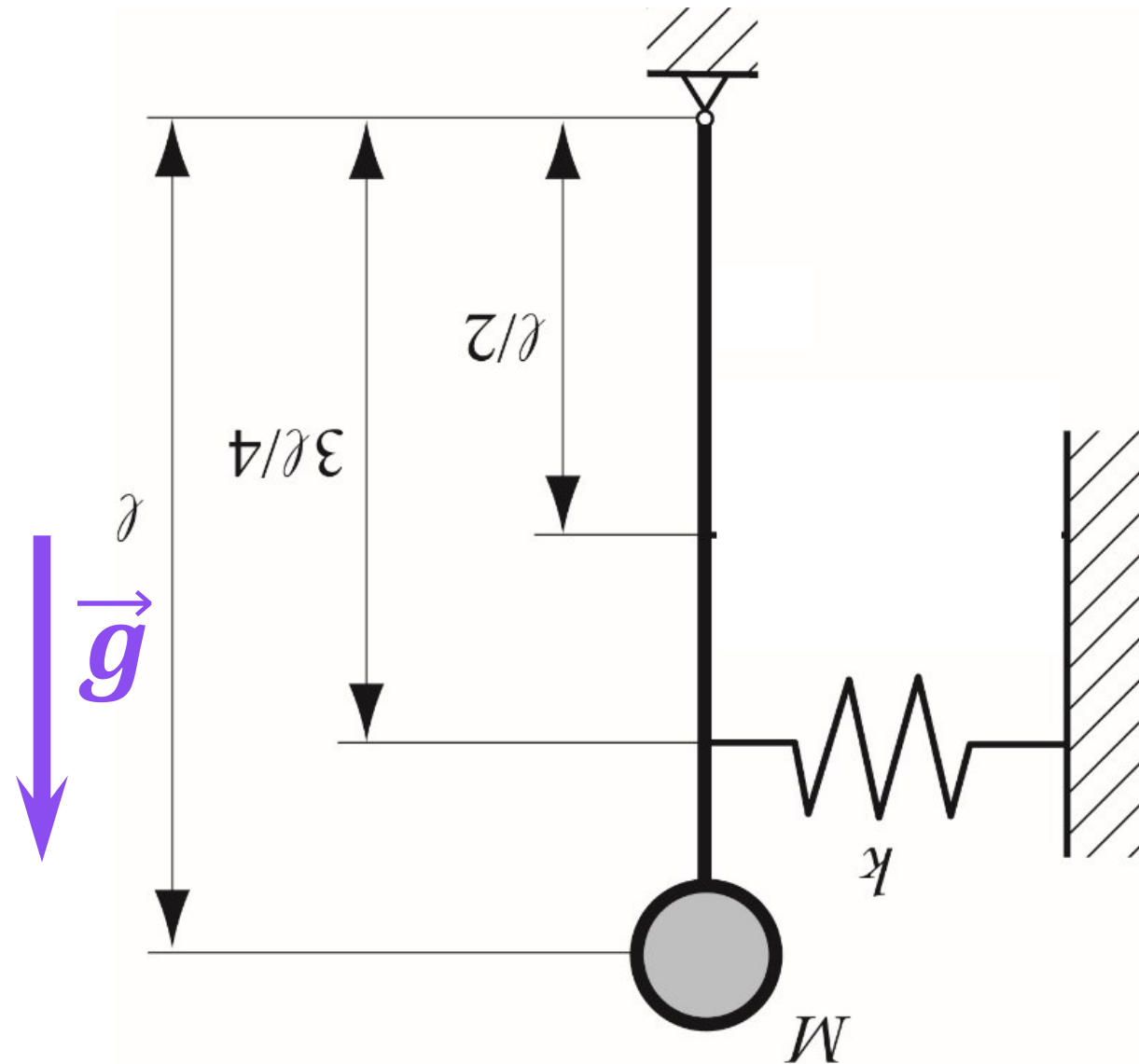
EPFL Fréquence ω_0 ?

- A. $\omega_0 = \sqrt{k/M}$
- B. $\omega_0 = 3/4\sqrt{k/M}$
- C. $\omega_0 = \sqrt{9/16 k/M + g/L}$
- D. $\omega_0 = \sqrt{9/16 k/M - g/L}$



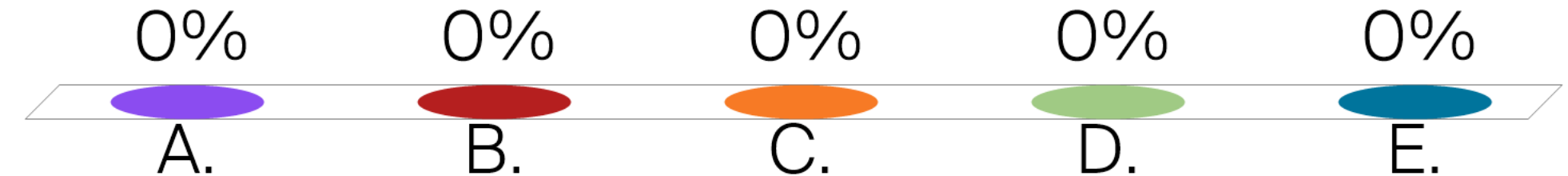
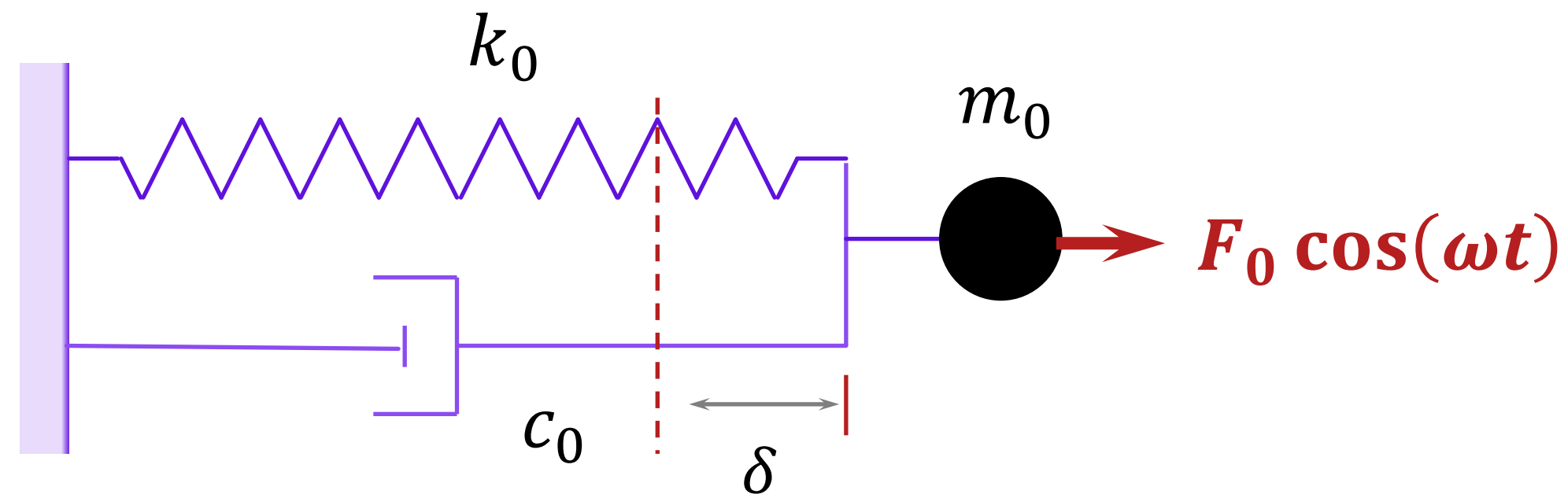
EPFL Fréquence ω_0 ?

- A. $\omega_0 = \sqrt{k/M}$
- B. $\omega_0 = 3/4\sqrt{k/M}$
- C. $\omega_0 = \sqrt{9/16 k/M + g/L}$
- D. $\omega_0 = \sqrt{9/16 k/M - g/L}$



EPFL Régime permanent – Maximum Amplitude

- A. δ
- B. $\omega_2 = \omega_0 \sqrt{1 - 2\eta^2}$
- C. F_0/k
- D. $\frac{F_0/k}{2\eta\sqrt{1-\eta^2}}$
- E. On ne peut pas savoir



$$X_1, \text{ si } \omega = \sqrt{\frac{k_0}{m_0}}, \eta = 0.01?$$

A. $100 \frac{F}{k_0}$

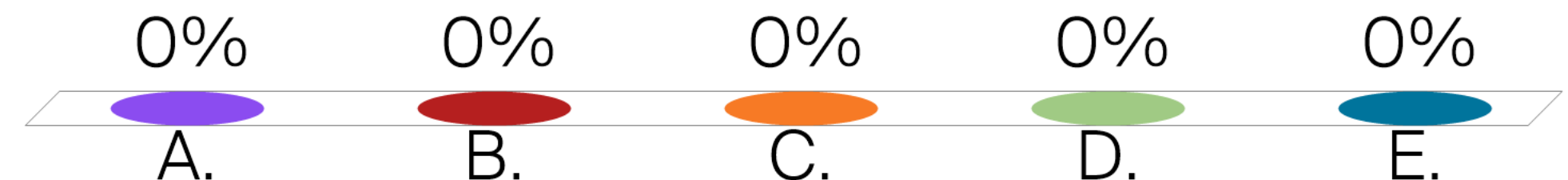
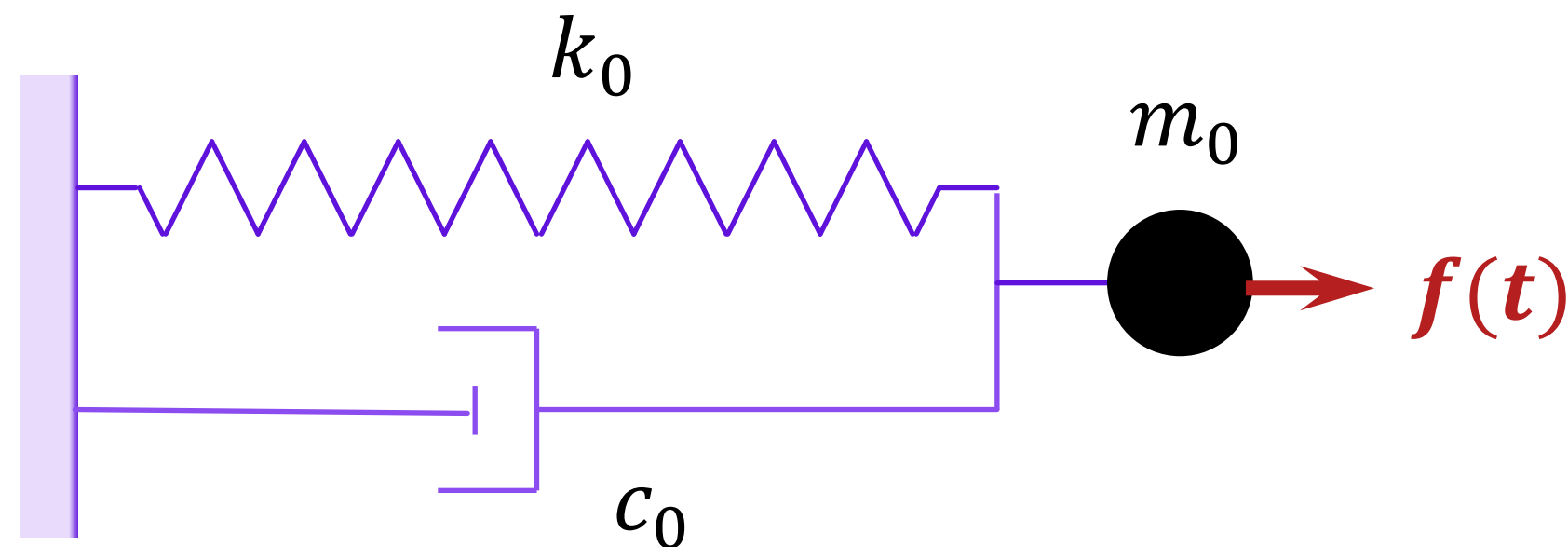
B. $50 \frac{F}{k_0}$

C. $0.01 \frac{F}{k_0}$

D. 0

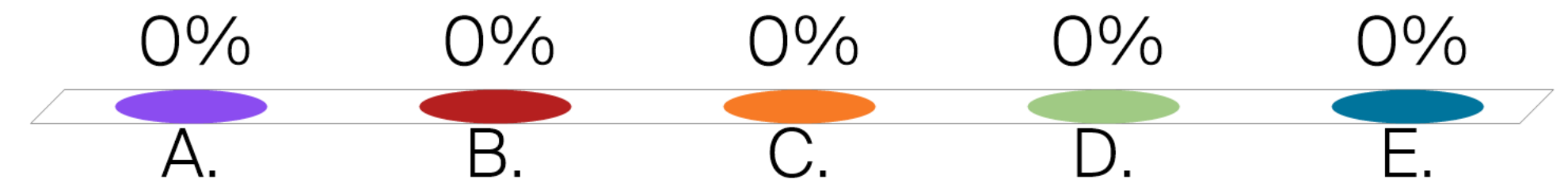
E. Aucune réponse dessus

$$f(t) = F \cos(\omega t) (1 + \cos(\omega t))$$



EPFL Regime permanent harmonique, pour quelle valeur de η on a $\varphi = 45^\circ$?

- A. $\eta = 0$
- B. $\eta = 1 - \beta^2$
- C. $\eta = \frac{1 - \beta^2}{2\beta}$
- D. $\eta = 1 - \frac{\beta}{2}$
- E. Impossible

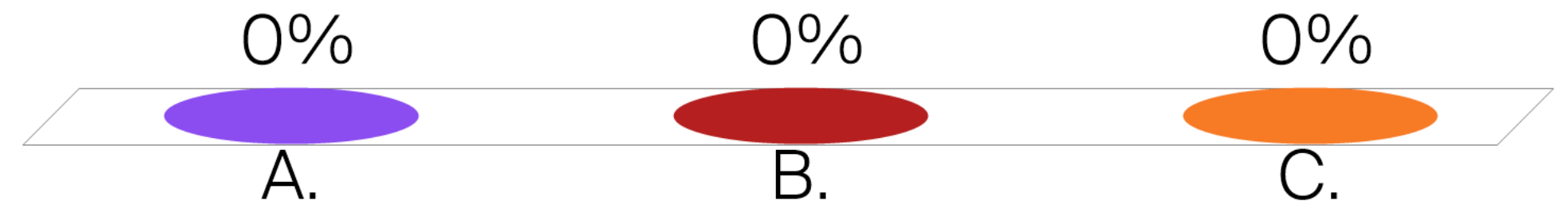
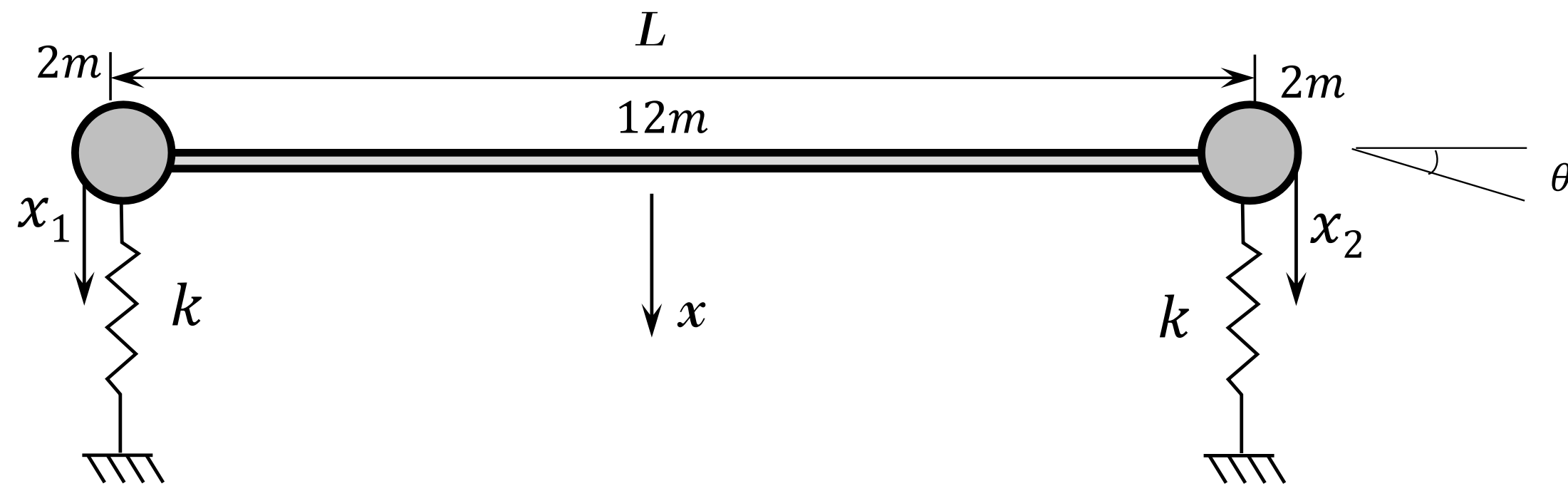


EPFL Energie Potentielle

A. $V = \frac{1}{2} k x_1^2 + \frac{1}{2} k x_2^2$

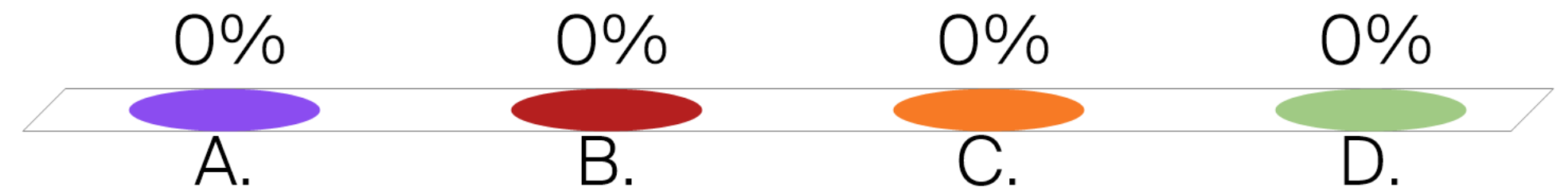
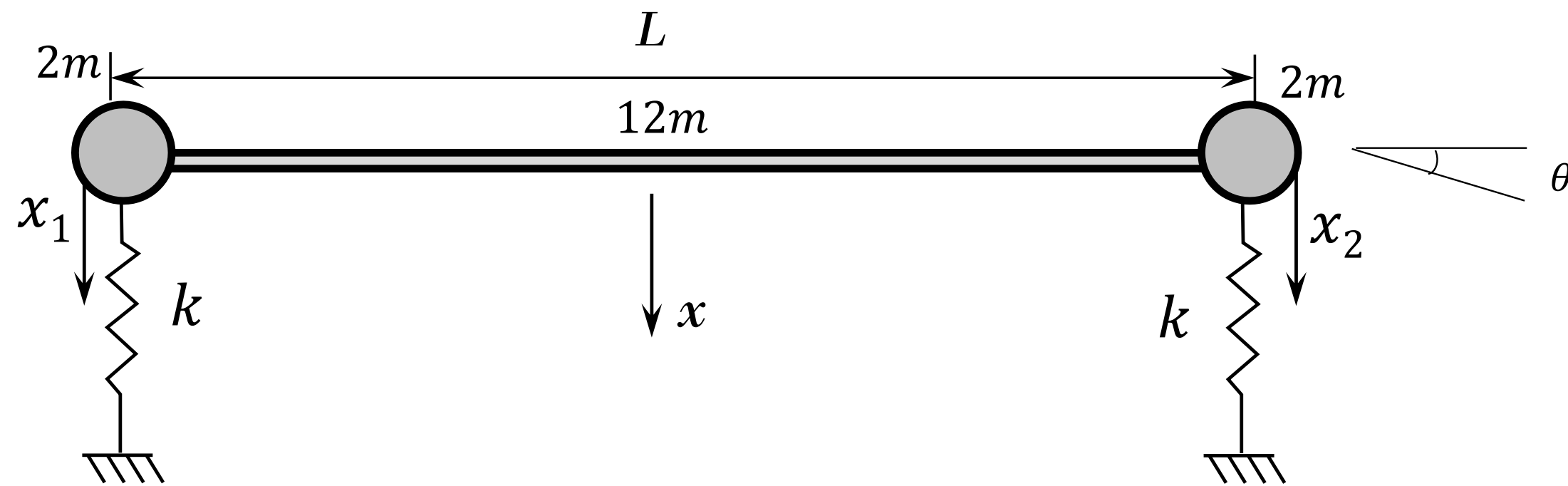
B. $V = k x_1^2 + k x_2^2$

C. $V = 2k x_1^2 + 2k x_2^2$



EPFL Energie cinétique

- A. $T = 3m\dot{x}_1^2 + 3m\dot{x}_2^2 + 2m\dot{x}_1\dot{x}_2$
- B. $T = 6m\dot{x}_1^2 + 6m\dot{x}_2^2 + 2m\dot{x}_1\dot{x}_2$
- C. $T = 2m\dot{x}_1^2 + 2m\dot{x}_2^2 + 4m\dot{x}_1\dot{x}_2$
- D. $T = 4m\dot{x}_1^2 + 4m\dot{x}_2^2 - 2m\dot{x}_1\dot{x}_2$



EPFL Calculer le premier harmonique de F: F_1, ψ_1 ?

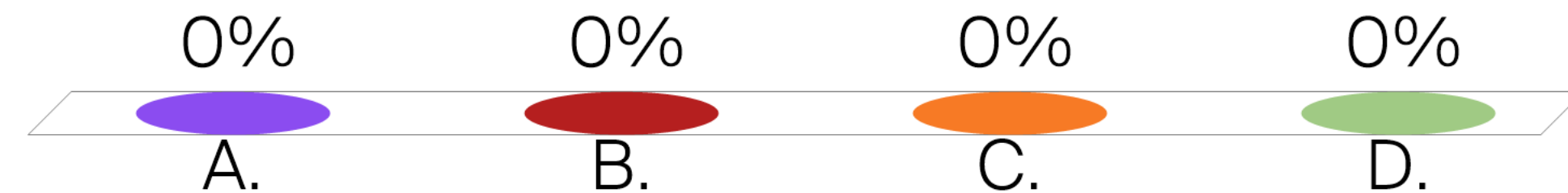
A. $F_1 = 1/2; \psi_1 = 0$

B. $F_1 = F/2; \psi_1 = \pi$

C. $F_1 = 1/2; \psi_1 = \pi$

D. $F_1 = F/2; \psi_1 = 0$

$$f(t) = \begin{cases} F \cos(\omega t) & \text{si } -\frac{T}{4} + nT < t < \frac{T}{4} + nT \\ 0 & \text{si } \frac{T}{4} + nT < t < \frac{3T}{4} + nT \end{cases} ; \text{ avec } n = 0, 1, 2, 3 \dots$$



EPFL Calculer le deuxième harmonique de F: F_2, ψ_2 ?

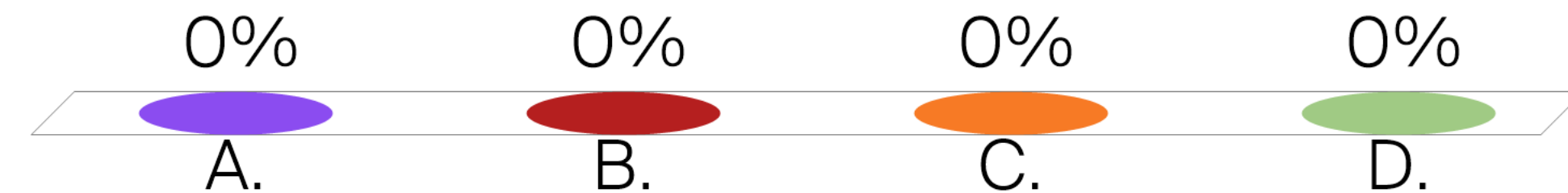
A. $F_2 = 2F/3\pi; \psi_2 = 0$

B. $F_2 = 2F/3\pi; \psi_2 = \pi$

C. $F_2 = 2F; \psi_2 = \pi$

D. $F_2 = \pi F; \psi_2 = 0$

$$f(t) = \begin{cases} F \cos(\omega t) & \text{si } -\frac{T}{4} + nT < t < \frac{T}{4} + nT \\ 0 & \text{si } \frac{T}{4} + nT < t < \frac{3T}{4} + nT \end{cases} ; \text{avec } n = 0, 1, 2, 3 \dots$$



EPFL Si $\beta = 0.5$, pour quel η on trouve que $|X_1| = |X_2|$?

- A. $\eta = 0.1628$
- B. $\eta = 0.0265$
- C. $\eta = 0.5$
- D. Impossible

$$f(t) = \begin{cases} F \cos(\omega t) & \text{si } -\frac{T}{4} + nT < t < \frac{T}{4} + nT \\ 0 & \text{si } \frac{T}{4} + nT < t < \frac{3T}{4} + nT \end{cases} ; n = 0, 1, 2, 3 \dots$$

