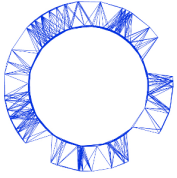


Theory



IPhO 2018
Lisbon, Portugal

A3-1

English (Official)

Physics of Live Systems (10 points)

Part A. The physics of blood flow (4.5 points)

A.1 (1.3 pt)

$$Q_i =$$

A.2 (0.5 pt)

$$Q_0 =$$

A.3 (2.0 pt)

$$P_{\text{out}} =$$

Condition:

A.4 (0.7 pt)

Maximum $h =$

Part B. Tumour growth (5.5 points)

B.1 (1.0 pt)

$$v =$$

B.2 (1.7 pt)

Temperature:

B.3 (0.5 pt)

$$\mathcal{P}_{\text{min}} =$$

B.4 (2.3 pt)

$$\frac{\delta Q_{N-1}}{Q_{N-1}} \approx$$