## Butler, Brown, Stephenson \& Speakman, Animal Physiology Solutions to numerical exercises

## Chapter 14

## Question 14.5

(a) $R=\frac{4}{22}=\mathbf{0 . 1 8} \mathbf{~ k P a ~ L}^{-1} \mathbf{~ m i n}^{-1}$
(b) $R=\frac{4.75}{50}=\mathbf{0 . 0 9} \mathbf{~ k P a ~ L}{ }^{-1} \mathbf{~ m i n}^{-1}$. Therefore, there is vasodilation in the systemic circulation during exercise

## Question 14.6

(a) Total resistance $\left(\boldsymbol{R}_{\text {tot }}\right)=5+2.5+2+3.3+5+2.5=\mathbf{2 0 . 3} \mathbf{~ k P a ~ L}{ }^{-1} \mathbf{~ m i n}^{-1}$
(b) $\frac{1}{R_{\mathrm{ww}}}=\frac{1}{5}+\frac{1}{2.5}+\frac{1}{2}+\frac{1}{3.3}+\frac{1}{5}+\frac{1}{2.5}=0.2+0.4+0.5+0.3+0.2+0.4=2$

Therefore, $\boldsymbol{R}_{\text {tot }}=\frac{1}{2}=0.5 \mathrm{kPa} \mathrm{mL}^{-1} \mathrm{~min}^{-1}$

Question 14.10

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Rate of movement of
fluid across the capillaries
(mL min
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Difference in hydrostatic pressure between capillaries and interstitial fluid (kPa)

Difference in colloid osmotic pressure between the capillaries and interstitial fluid (kPa)

So, the filtration pressure across the walls of the capillaries between the fluid in the capillaries and the interstitial fluid is:
$\left(P_{\mathrm{c}}-P_{\mathrm{i}}\right)-\sigma\left(\pi_{\mathrm{c}}-\pi_{\mathrm{i}}\right)$
$=(1.0+0.3)-0.845(3.3-2.1)$
$=1.3-1.02=0.28 \mathrm{kPa}$.

As the pressure is higher on the inside of the capillaries, fluid flows from the capillaries to the interstitial tissue.

