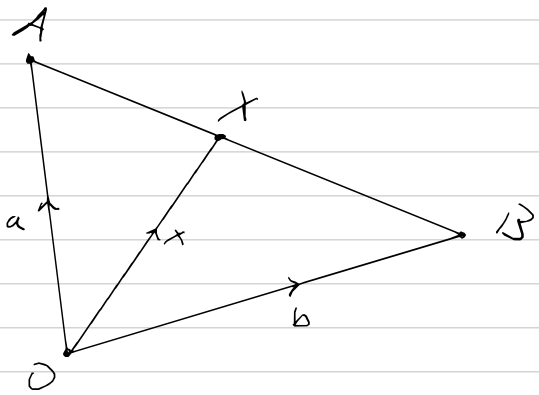

Find the position vector $\vec{x}$ of the point X that divides AB with ratio $\lambda:\mu$ (so $AX/XB = \lambda/\mu$).

Answer: We have

$$\vec{x} = \vec{a} + \overrightarrow{AX}$$

$$= \vec{a} + \left(\frac{\lambda}{\lambda+\mu}\right)\overrightarrow{AB}$$

$$= \vec{a} + \left(\frac{\lambda}{\lambda+\mu}\right)(\overrightarrow{AO} + \overrightarrow{OB})$$

$$= \vec{a} + \left(\frac{\lambda}{\lambda+\mu}\right)(-\vec{a} + \vec{b})$$

$$= \vec{a} + \frac{\lambda\vec{b} - \lambda\vec{a}}{\lambda+\mu}$$

$$= \frac{\lambda\vec{a} + \mu\vec{a} + \lambda\vec{b} - \lambda\vec{a}}{\lambda+\mu} = \frac{\mu\vec{a} + \lambda\vec{b}}{\lambda+\mu}$$

Example 1.3