Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

- the dye is **pure** (one substance)

2.2

- to make the **colourless** spots **visible**

2.3

- pencil does **not dissolve** in the solvent / ink would **run** and mix with the spots

2.4

- otherwise the spots would **dissolve into the solvent** in the beaker

2.5

- $2.7 \div 9.0$
- $= 0.30$

2.6

- stops the **solvent evaporating**

2.7

- the **solvent front**

3.1

C

3.2

B

- it gives only **one** spot

3.3

(a)

- **P and R**
- X's spots are at the **same heights** (same R_f) as P and R

(b) $6.2 \div 8.0 = 0.78$

(c) **R** (it moved furthest)

3.4

(a) **alanine** and **leucine**

(b)

- known: $R_f = 0.70$, solvent front = 7.5 cm
- rule: $R_f = \dfrac{\text{distance moved by spot}}{\text{distance moved by solvent}}$, so distance = $R_f \times$ solvent distance
- distance = $0.70 \times 7.5 =$ **5.3** cm

(c) amino acids on the **skin** would be picked up and show as extra spots

3.5

(a)

- $R_f = \dfrac{3.0}{6.0} = 0.50$
- dye **B**

(b) R_f depends on the **solvent** (solubility differs in different solvents)

(c) use a **different solvent**, in which their R_f values differ more

3.6

(a) Any two mistakes with reasons:

- the line is in **ink**: it **dissolves** and runs, mixing with the spots
- the line is **below the solvent**: the inks **dissolve into** the solvent
- **no lid**: the solvent evaporates

(b)

- draw a **pencil** baseline and put small spots of each ink on it
- stand the paper in solvent **below the baseline**, with a **lid**
- remove when the solvent is near the top; **mark the solvent front** and dry

(c)

- both have $R_f = 0.45$
- the dye in ink 1 is **probably the same** as the pen's dye

(d)

- that dye is **insoluble** in the solvent
- use a **different solvent**