Question 1

Solve, giving your answers in surd form:

$$5(x+4)^2 = \frac{7}{2}$$

Question 2

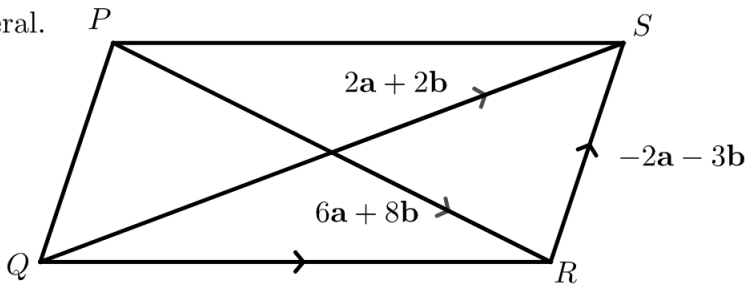
$PQRS$ is a quadrilateral.

$\overrightarrow{RS} = -2\mathbf{a} - 3\mathbf{b}$

$\overrightarrow{QS} = 2\mathbf{a} + 2\mathbf{b}$

$\overrightarrow{PR} = 6\mathbf{a} + 8\mathbf{b}$

Show that $PQRS$ is a parallelogram.



Question 1

Solve, giving your answers in surd form:

$5(x+4)^2 = \frac{7}{2}$

$(x+4)^2 = \frac{7}{10}$

$x+4 = \pm\frac{\sqrt{7}}{\sqrt{10}}$

$= \pm\frac{\sqrt{70}}{10}$

$x = -4+\frac{\sqrt{70}}{10}$, $x = -4-\frac{\sqrt{70}}{10}$

Question 2

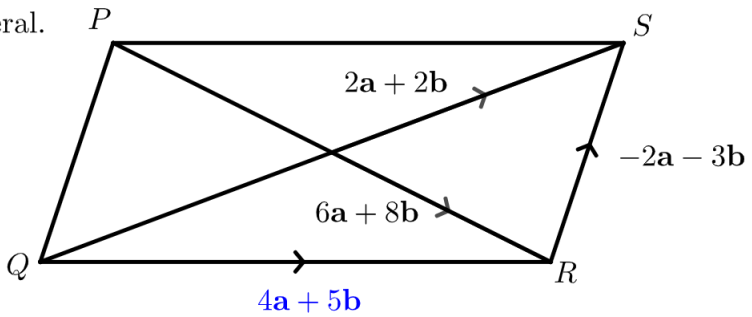
$PQRS$ is a quadrilateral.

$\overrightarrow{RS} = -2\mathbf{a} - 3\mathbf{b}$

$\overrightarrow{QS} = 2\mathbf{a} + 2\mathbf{b}$

$\overrightarrow{PR} = 6\mathbf{a} + 8\mathbf{b}$

Show that $PQRS$ is a parallelogram.



First note that $\overrightarrow{QR} = \overrightarrow{QS} + \overrightarrow{SR} = \overrightarrow{QS} + \left(-\overrightarrow{RS}\right) = (2\mathbf{a}+2\mathbf{b}) + (2\mathbf{a}+3\mathbf{b}) = 4\mathbf{a}+5\mathbf{b}$

To show that $PQRS$ is a parallelogram, it is sufficient to show that $\overrightarrow{PS} = \overrightarrow{QR}$ and that $\overrightarrow{QP} = \overrightarrow{RS}$:

$\overrightarrow{PS} = \overrightarrow{PR} + \overrightarrow{RS} = (6\mathbf{a}+8\mathbf{b}) + (-2\mathbf{a}-3\mathbf{b}) = 4\mathbf{a}+5\mathbf{b} = \overrightarrow{QR}$, as required, and

$\overrightarrow{QP} = \overrightarrow{QR} + \overrightarrow{RP} = \overrightarrow{QR} + \left(-\overrightarrow{PR}\right) = (4\mathbf{a}+5\mathbf{b}) + (-6\mathbf{a}-8\mathbf{b}) = -2\mathbf{a}-3\mathbf{b} = \overrightarrow{RS}$,

as required.