## Question 9

$R$ is a radar station located 120 km north of a port $P$.
The circle $c$, centred at $R$ and with radius 100 km shows the detection range of the radar. When a ship enters the circle it will be detected by the radar station at $R$.
Figure 1 shows a ship leaving port $P$ and sailing in the direction north $30^{\circ}$ east.
The ship enters the circle $c$ at $S$ and exits at $T$. At $Q$, the ship is closest to $R$ and $|\angle P Q R|=90^{\circ}$.
(a) The triangle $P Q R$ taken from Figure 1 is shown in Figure 2. Find $|Q R|$, the length of $[Q R]$.

Figure 1


(b) The triangle $Q R S$ taken from Figure 1 is shown in Figure 3. Use your answer from part (a) to find $|Q S|$.


Figure 3


