48. The direction of motion (the direction of the barge's acceleration) is $+\hat{\mathrm{i}}$, and $+\hat{\mathrm{j}}$ is chosen so that the pull $\vec{F}_{\mathrm{h}}$ from the horse is in the first quadrant. The components of the unknown force of the water are denoted simply F_x and F_y.

(a) Newton's second law applied to the barge, in the x and y directions, leads to

$$\begin{aligned}(7900\,\mathrm{N})\cos 18^\circ + F_x &= ma \\ (7900\,\mathrm{N})\sin 18^\circ + F_y &= 0\end{aligned}$$

respectively. Plugging in $a = 0.12$ m/s^2 and $m = 9500$ kg, we obtain $F_x = 6.4 \times 10^3$ N and $F_y = -2.4 \times 10^3$ N. The magnitude of the force of the water is therefore

$$F_{\mathrm{water}} = \sqrt{F_x^2 + F_y^2} = 6.8 \times 10^3 \text{ N}\ .$$

(b) Its angle measured from $+\hat{\mathrm{i}}$ is either

$$\tan^{-1}\left(\frac{F_y}{F_x}\right) = -21^\circ \quad \text{or} \quad 159^\circ.$$

The signs of the components indicate the former is correct, so $\vec{F}_{\mathrm{water}}$ is at 21° measured clockwise from the line of motion.