A solid conducting pipe of radius $R$ m carries a 48 A current parallel to the pipe axis, distributed uniformly throughout the pipe material. The current is going into the page. Use Ampere’s Law to find the magnetic field 2 m from the axis of symmetry.

1. Draw the path for your integration. 
   
2. Pick a direction for integration $ds$, a direction for B. For your choice, what is the direction for positive current?

3. What is $I_{enclosed}$?

4. Evaluate the path integral and find B.

5. What is the direction of B at the point X?

$$\oint B \cdot ds = \mu_0 I_{enclosed}$$

$$\oint B \cos 0^\circ \, ds = 12 \mu_0$$

$$B = \frac{12 \mu_0}{4 \pi} = 3 \frac{\mu_0}{\pi} \ T$$

$B$ is positive, $\Rightarrow$ direction on picture is correct.