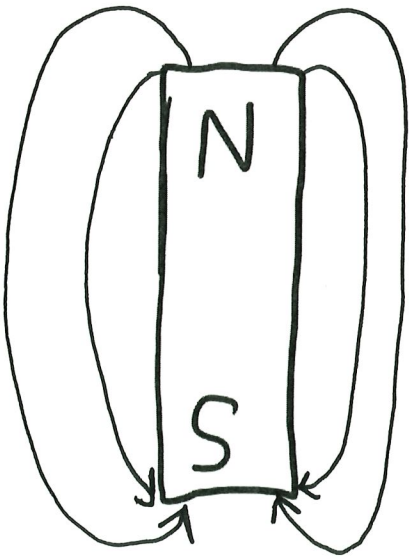
Magnetic Fields Practice

Name:_____

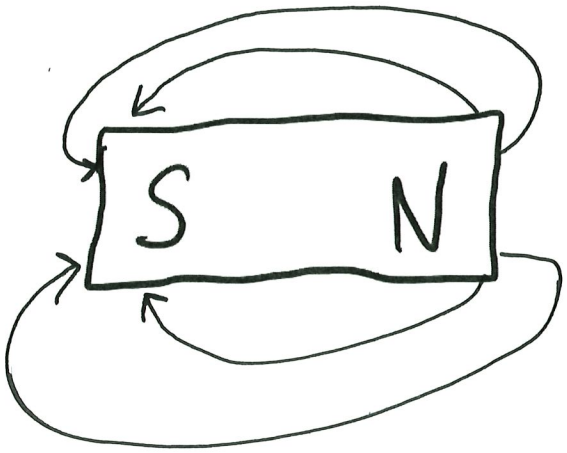
1. Sketch the electric field lines surrounding each of the following magnets

a.



Field lines go from North to South

b.



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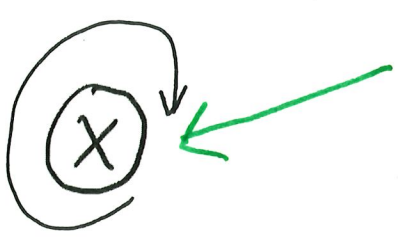
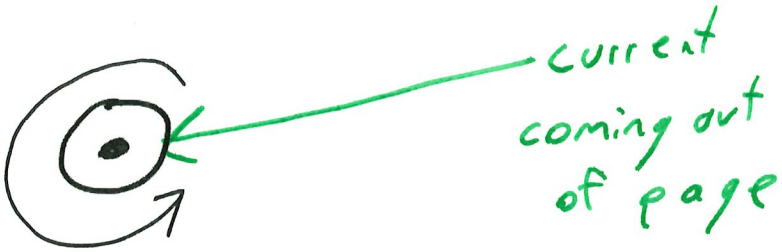
2. Sketch the magnetic field surrounding each of the following current carrying wires. The direction shown is the conventional current.

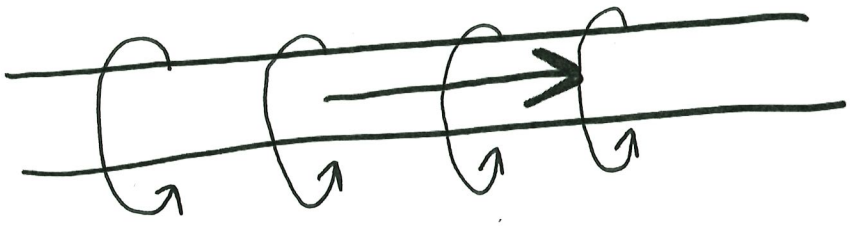
a.



b.



c.



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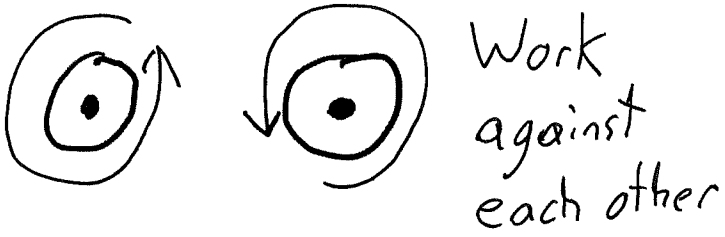
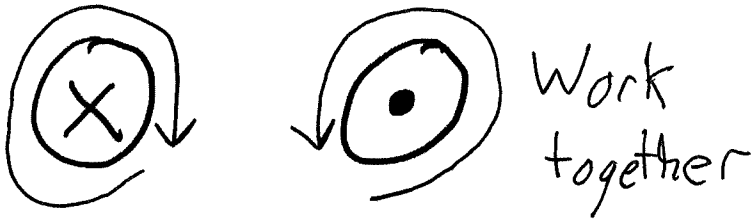
3. Sketch the magnetic field surrounding each wire, do the magnetic fields work against each other or work together?

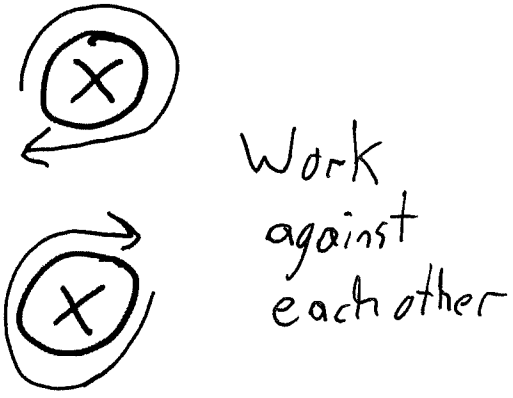
a.



b.



c.



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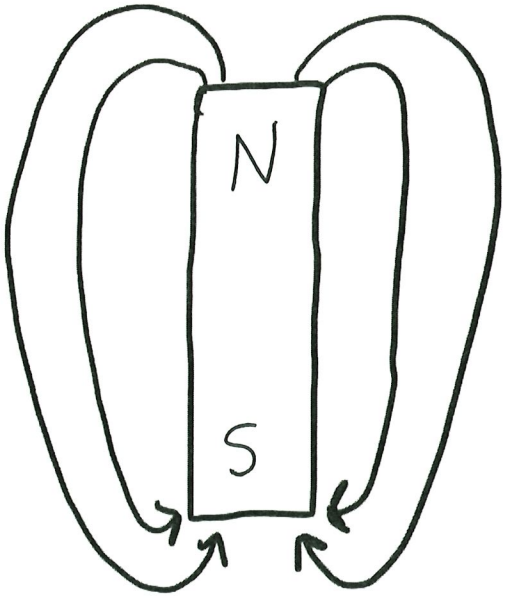
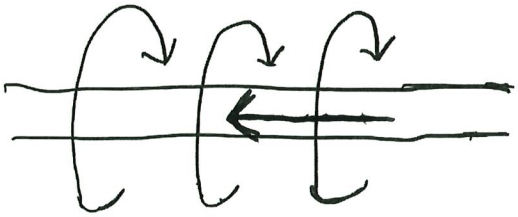
4. Determine which side of the bar magnet is positive and which is positive given the diagram below:

Field lines go from North to South

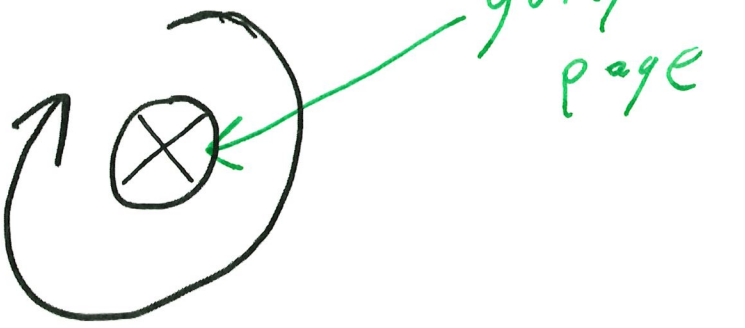


5. Determine the direction of conventional current given the magnetic field surrounding each of the following wires:

a.



b.



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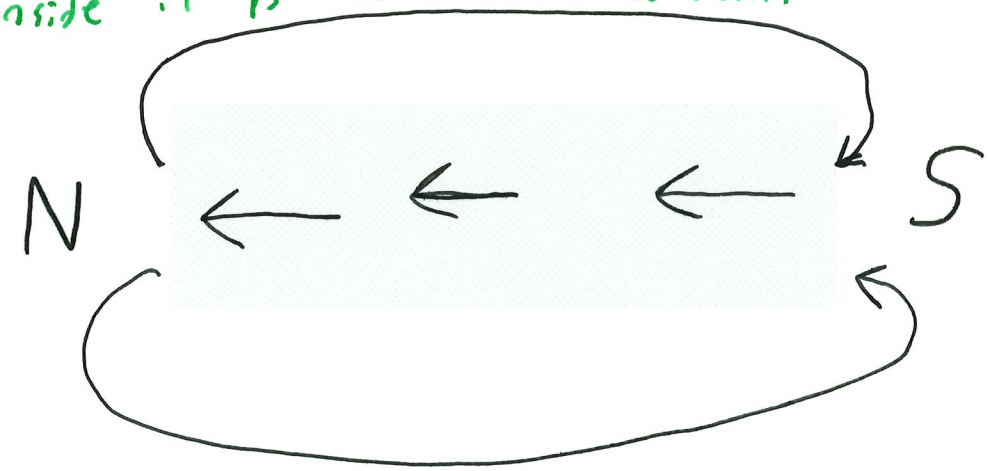
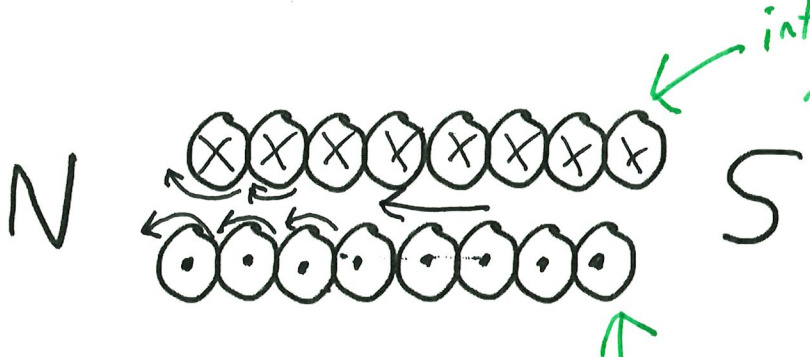
6. Draw the direction of the magnetic field inside and outside of the solenoid shown.

Outside it is like a bar magnet
Inside it is from South to North



7. A solenoid has a north and south pole as shown. Label the direction current is flowing through each loop of the solenoid.



into page so magnetic field is clockwise

These come out of page so magnetic field is counter clockwise

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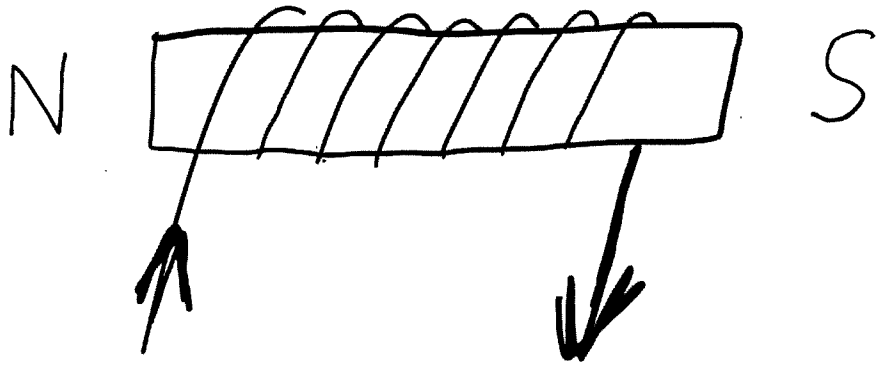
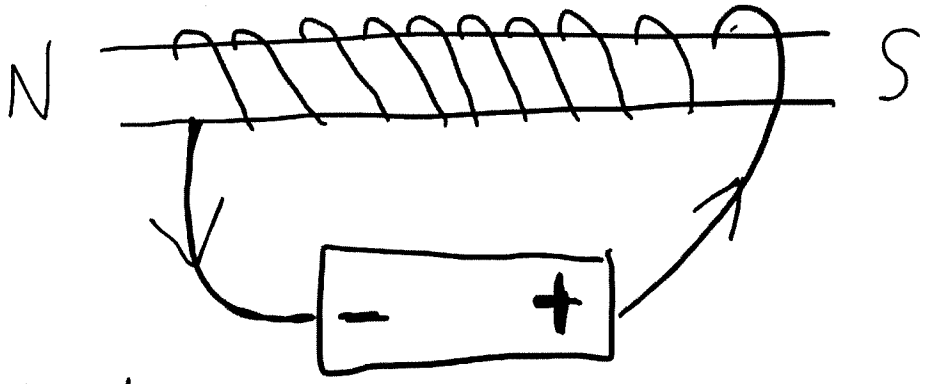
8. Determine the North and South poles of the solenoid shown. The conventional current is shown.



9. Determine the North and South poles of the solenoid shown



Conventional Current goes from + to −

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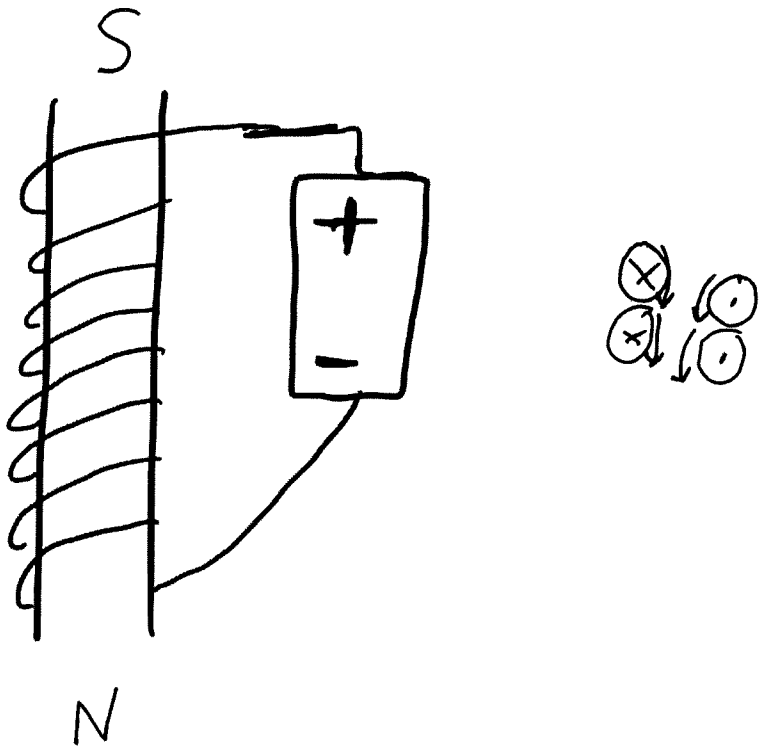
10. Determine the North and South Poles of the solenoid shown:



11. A hollow solenoid is 0.22 metres long and consists of 50 loops of wire. What is the strength of the magnetic field inside the solenoid when:

$n = \frac{50 \text{ loops}}{0.22 \text{ m}} = 227.27 \frac{\text{loops}}{\text{m}}$

a. Current of 0.200 amps flows through the wire

$B = \mu_0 I n = (4\pi \times 10^{-7})(0.200)(227.27)$
$= 5.7 \times 10^{-5} \text{ T}$

b. Current of 1.2 amps flows through the wire:

$B = (4\pi \times 10^{-7})(1.2)(227.27) = 3.4 \times 10^{-4} \text{ T}$

c. Current of 5.2 amps flows through the wire:

$B = (4\pi \times 10^{-7})(5.2)(227.27) = 1.5 \times 10^{-3} \text{ T}$

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12. A hollow solenoid is 0.52 metres long and has 2.5 amps of current flowing through it. What is the strength of the magnetic field inside the solenoid if

d. There are 650 loops

$$B = \mu_0 I \frac{N}{\ell} = (4\pi \times 10^{-7})(2.5)\left(\frac{650}{0.52}\right) = 0.0039\,T$$

e. There are 1250 loops

$$0.0076\,T$$

f. There are 2500 loops

$$0.015\,T$$

13. A hollow solenoid is 0.12 metres long, and inside it there is a magnetic field of strength 0.034T.

g. How many loops of wire are there if the current is 1.23 A?

$$B = \mu_0 I \frac{N}{\ell} \rightarrow N = \frac{B \times \ell}{\mu_0 I} = \frac{0.034 \times 0.12}{(4\pi \times 10^{-7}) \times 1.23} = 2640$$

h. How much current is there if there are 505 loops?

$$B = \mu_0 I \frac{N}{\ell} \rightarrow I = \frac{B\ell}{\mu_0 N}$$

$$= \frac{0.034 \times 0.12}{(4\pi \times 10^{-7})(505)}$$

$$= 6.4\,A$$