



TERM2 – WEEK 2		Differentiated Worksheet	Subject:	Physics
Student's Name:			Class:	
Grade:	12		Date:	
Lesson Title:	Understanding magnetism		Mark:	

Learning Outcome

Chapter 24: Magnetic Fields

Section 24.1: Understanding Magnetism

1. Which of the following is not a magnetic material?

- A. Steel
- B. Cobalt
- C. Nickel
- D. Silver

2. What happens if you cut a magnet in half?

- A. It becomes demagnetized
- B. You get monopoles
- C. You get two magnets
- D. You get a separate south pole and a separate north pole

3. A south pole of a magnet will _____ south pole of another magnet.

- A. attract
- B. ignore
- C. destroy
- D. repel

4. Magnetic domains are _____ in a magnet.

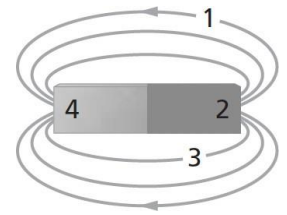
- A. scattered
- B. aligned
- C. misaligned
- D. random

5. In an induced magnet, the _____ are aligned.

- A. electric currents
- B. magnetic domains
- C. electrons
- D. Iron filings

Questions 6 and 7 (DOK1)

The figure below shows the magnetic field around a bar magnet.



6. Where is the north pole?

- A. 1
- B. 2
- C. 3
- D. 4

7. Where is the south pole?

- A. 1
- B. 2
- C. 3
- D. 4

8. Which of the figures below correctly show the direction of the magnetic field lines around a permanent magnet?

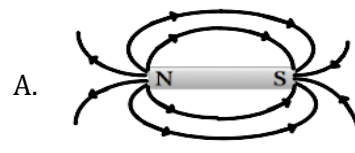


Figure 1

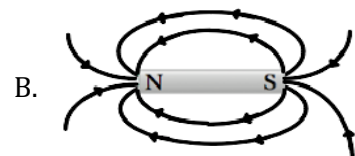


Figure 2

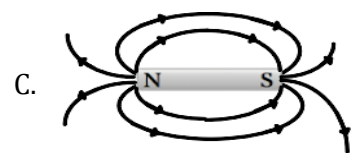


Figure 3

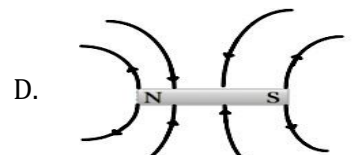
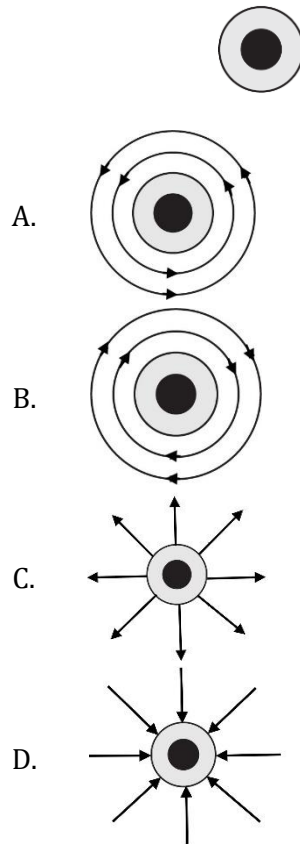
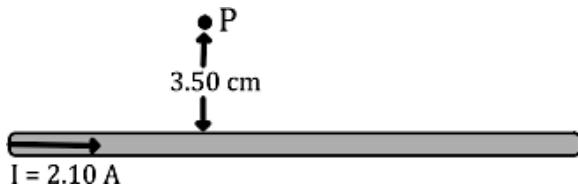


Figure 4

9. The current in a wire is coming straight out of the page in the figure below. Which of the diagrams represent the magnetic field that the current generates.



10. A long straight wire carries a current of 2.10 A, in the direction shown below.



9. What is the direction of the magnetic field at point P?

- A. To the left
- B. To the right
- C. Into the page
- D. Out of the page

11. The magnitude of the current in a wire is ___ to the magnetic field around the wire.

- A. directly proportional
- B. inversely proportional
- C. equal
- D. parallel

12. Which of the following is/are true regarding the magnetic field around a long current-carrying wire?

- I. The magnetic field strength increases as the current increases
- II. When the current is reversed, the magnetic field is also reversed
- III. The magnetic field strength decreases as the distance from the wire decreases

- A. I only
- B. II only
- C. III only
- D. I and II only

13. The current in a long wire creates a magnetic field in the region around the wire. How is the strength of the field at distance r from the wire center related to the magnitude of the field?

- A. field directly proportional to r
- B. field inversely proportional to r
- C. field directly proportional to r^2
- D. field inversely proportional to r^2

14. A current in a long, straight wire produces a magnetic field. The magnetic field lines ____.

- A. go out from the wire to infinity
- B. come in from infinity to the wire
- C. form circles that pass through the wire
- D. form circles that go around the wire

15. How can you make a magnet out of a long strand of wire and an iron bar?

- A. Send a current through the bar
- B. Spin the bar over the wire as a current run through it
- C. Wrap the wire around the bar, and send a current through it
- D. Attach the wire to either end of the bar, and send a current through it

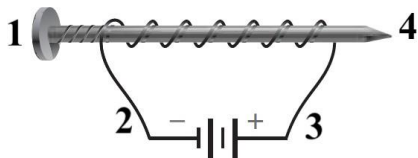
16. If current is reduced in an electromagnet, what happens to the magnetic field strength?

- A. it cancels out the magnetic field
- B. it remains the same
- C. it is reduced
- D. it increases

17. Increasing the number of loops in an electromagnet causes the strength of the magnetic field to____.

- A. increase
- B. decrease
- C. Remain the same
- D. double

18. A student makes an electromagnet by winding wire around a nail and connecting it to a battery, as shown below.



Where will the north pole be formed?

- A. 1
- B. 2
- C. 3
- D. 4

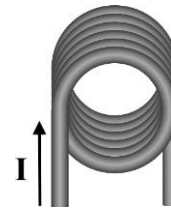
19. Which of the following factors increase the strength of an electromagnet?

- I. The current is increased
- II. The number of turns is increased
- III. A soft iron core is placed into the solenoid
- IV. The turns of wire are pushed closer together to shorten the length of the solenoid

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II, III and IV

Questions 20 and 21

The figure shows the end view of an electromagnet with current flowing through it.



20. What is the direction of the magnetic field inside the loops?

- A. Down, into the page
- B. Up, out of the page
- C. To the right
- D. To the left

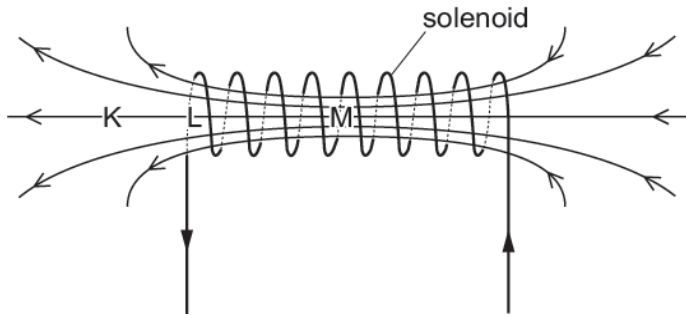
21. What is the direction of the magnetic field outside the loops?

- A. Down, into the page
- B. Up, out of the page
- C. To the right
- D. To the left

Questions 22 and 23 (DOK2)

The diagram shows the magnetic field pattern of a current in a solenoid.

22. When the current in the solenoid is increased, where is there an increase in the magnetic field strength?



- A. M only
- B. L only
- C. L and M only
- E. K, L and M

23. Where is the magnetic field uniform?

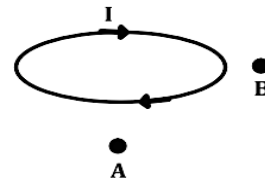
- A. M only
- B. L only
- C. L and M only
- D. K and L only

24. A current in a solenoid coil creates a magnetic field inside that coil. The field strength is directly proportional to the_.

- I. coil area
- II. current
- III. number of turns in the coil

- A. I only
- B. II only
- C. III only
- D. II and III only

25. A conducting loop shown below carries a current in the clockwise direction as seen from the top of the loop. What is the direction of the magnetic field at points A (below-center) and B (to the right)?



	Magnetic field at A	Magnetic field at B
A.	Upward	Upward
B.	Upward	Downward
C.	Downward	Upward
D.	Downward	Downward

Answer the following Questions (DOK2)

1. True or false

- a. When a magnet is allowed to swing freely, it comes to rest aligned in an east–west direction.
- b. Like poles attract each other.
- c. Monopoles do not exist.
- d. Heating a magnet can demagnetize it.
- e. If Earth is considered to be a giant magnet, the south pole of the magnet is near Earth's geographic north pole.
- f. When a piece of iron is not in a magnetic field, the domains point in random directions.
- g. In permanent magnets, the domains point in random directions.

2. If you broke a magnet in two, would you have isolated north and south poles? Explain.

3. Describe how a temporary magnet differs from a permanent magnet.

4. Describe how to use the first right-hand rule to determine the direction of a magnetic field around a straight current-carrying wire.

5. If a current-carrying wire is bent into a loop, why is the magnetic field inside the loop stronger than the magnetic field outside?

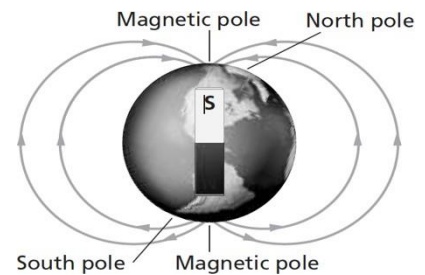
6. Describe how to use the second right-hand rule to determine the polarity of an solenoid/electromagnet.

7. Each electron in a piece of iron is like a tiny magnet. The iron, however, may not be a magnet. Explain.

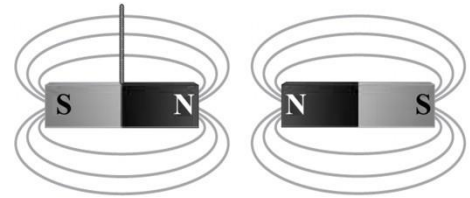
8. Why will dropping or heating a magnet weaken it?

9. A piece of metal is attracted to one pole of a large magnet. Describe how you could tell whether the metal is a temporary magnet or a permanent magnet.

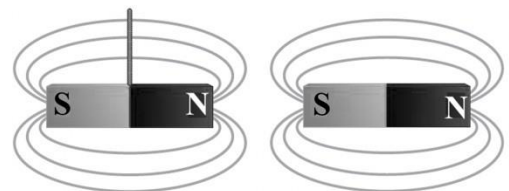
10. Earth's magnetic field lines are shown in the figure below. At what location, poles or equator, is the magnetic field strength greatest? Explain.



11. As the magnet below in the figure moves toward the suspended magnet, what will the magnet suspended by the string do?



12. As the magnet below in the figure moves toward the suspended magnet, what will the magnet suspended by the string do?

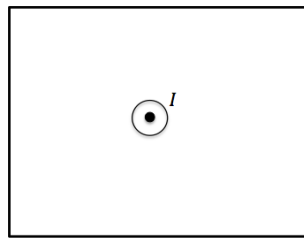


13. How does the strength of a magnetic field, 1 cm from a current-carrying wire, compare with each of the following? **(DOK3)**

- a. The strength of the field that is 2 cm from the wire.
- b. the strength of the field that is 3 cm from the wire.

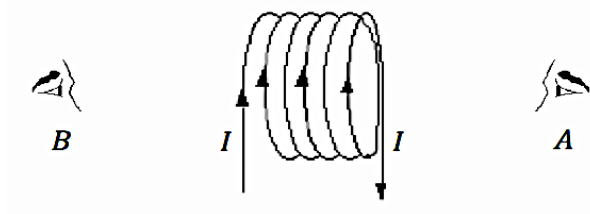
14. A straight wire carrying a current out of the page (represented by the dot) is as shown below.

- a. In the space provided, draw four magnetic field lines around the current-carrying wire, indicating the strength and direction of the field.



- b. The current in the wire is now increased. Explain what happens to the magnetic field strength around the current-carrying wire?
- c. If the direction of the original current in the wire is now reversed, explain what happens to the direction of the magnetic field around the wire?

15. A straight long wire that carries a current I is bent into a solenoid of 5 turns as shown below. **(DOK3)**



- a. Which end of the solenoid is the north pole?
- b. Sketch and explain the magnetic field inside the solenoid as it appear for an observer at position A?

- c. Sketch and explain the magnetic field inside the solenoid as it appear for an observer at position B ?
- d. The direction of the original current passing through the solenoid is now reversed, how would that affect the direction of the magnetic field inside the solenoid?
- e. The solenoid is now used as an electromagnet to lift iron scrap. State three ways that you can increase the strength of the electromagnet.