

## The Mystery of Dark Matter

Have you ever thought that the universe might have things we cannot see? Scientists think this is true. They call one of these things **Dark Matter**.

Dark Matter is everywhere in space. It is around our galaxy, the Milky Way, and all other galaxies. In fact, there is four times more Dark Matter in the universe than the matter we can see. However, we have never seen it directly.

So, how do we know it exists? We know because of **gravity**.

Imagine a galaxy is like a big merry-go-round. All the stars are on it. To stay on, the stars need to hold on tightly. Gravity is the force that holds them. Without enough gravity, the stars would fly away.

Scientists see a problem: the gravity from the stars we can see is not strong enough to hold the galaxy together. The stars should fly away, but they do not. It is as if an **invisible rope** is helping them hold on. Physicists believe this "rope" is the gravity from something we cannot see. They call this Dark Matter.

How do we study this? We measure how fast the stars are moving. We use a scientific idea called the **Doppler Effect**. You hear the Doppler Effect when a police car passes you; the siren's sound changes from high to low.

Light acts in a similar way. This helps police radar measure the speed of a car. It also helps astronomers measure the speed of stars in distant galaxies.

In conclusion, we use what we **can** see (stars and light) to learn about what we **cannot** see (Dark Matter).

### Comprehension Activities

#### Activity 1 : True or False?

Read the sentences below. Write **T** for True or **F** for False.

1. Dark Matter is something we can see with our eyes.
2. There is more Dark Matter in the universe than visible matter.
3. Gravity is the force that tries to pull stars apart.
4. The Doppler Effect helps us measure the speed of stars.
5. We know exactly what Dark Matter is because we have seen it.

#### Activity 2 : Fill in the Blanks

Complete the sentences using words from the word bank.

**Word Bank:** *gravity, invisible, see, galaxies, Doppler Effect*

1. Dark Matter is found all around other \_\_\_\_\_.
2. The force that holds stars in a galaxy is called \_\_\_\_\_.
3. Dark Matter is \_\_\_\_\_, which means we cannot see it.
4. We use what we can \_\_\_\_\_ to learn about what we cannot.
5. The \_\_\_\_\_ explains why a siren's sound changes as a car passes.

**Activity 3 : Matching Meanings**

Match the word or phrase on the left with its correct meaning on the right.

Word/Phrase	Meaning
1. Dark Matter	a) The force that holds things together.
2. Gravity	b) A large group of stars, like the Milky Way.
3. Galaxy	c) Something that cannot be seen.
4. Invisible	d) Matter that we cannot see but we know exists.

**Activity 4 : Short Answer Questions**

Answer the questions in your own words. Use 1 or 2 sentences.

1. Why don't the stars fly away from their galaxies ?

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2. What is one example of the Doppler Effect from the text ?

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3. What is the "invisible rope" that helps hold galaxies together ?

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**Activity 5 : Put the Sentence in Order**

The sentences below explain how we know Dark Matter exists, but they are in the wrong order. Number them from 1 to 5 to show the correct sequence.

- \_\_\_\_ So, scientists believe something invisible, called Dark Matter, must also be there.
- \_\_\_\_ The gravity from all the visible stars is not strong enough to hold the galaxy together.
- \_\_\_\_ We observe that the stars in a galaxy do not fly away; they stay together.
- \_\_\_\_ A galaxy has many stars that are all held together by gravity.
- \_\_\_\_ The extra gravity from Dark Matter acts like an invisible rope to hold the stars.

### Activity 6 : Find the Word

Read the sentence and choose the best word (A, B, or C) to complete it.

1. Dark Matter is \_\_\_\_\_, so we cannot see it with our eyes.  
A. visible B. invisible C. bright
2. The \_\_\_\_\_ of gravity keeps the stars from flying off into space.  
A. problem B. force C. speed
3. Astronomers use the \_\_\_\_\_ to measure how fast stars are moving in distant galaxies.  
A. Milky Way B. police car C. Doppler Effect
4. The matter we can see, like stars, is called \_\_\_\_\_ matter.  
A. dark B. visible C. common

### Activity 7 : Complete the Summary

Fill in the gaps in the summary using the words from the box.

**Word Bank :** *see, gravity, Dark Matter, galaxies, Doppler Effect*

The universe has something mysterious called (1) \_\_\_\_\_. It is invisible and exists all around (2) \_\_\_\_\_. We know it is there because of (3) \_\_\_\_\_. Without it, stars would fly away from their galaxies. We measure the speed of stars using the (4) \_\_\_\_\_. This shows us that we can use what we can (5) \_\_\_\_\_ to learn about what we cannot.

### Activity 8 : Question and Answer Match

Match the questions on the left with the correct answers on the right.

Questions	Answers
1. What is four times more common than visible matter ?	a) It changes from a high sound to a low sound.
2. What happens to a siren's sound because of the Doppler Effect ?	b) The gravity from Dark Matter.
3. What is the "invisible rope" that holds galaxies together ?	c) Dark Matter.
4. How do astronomers measure the rotation of galaxies ?	d) By using the Doppler Effect.

## Answer Key

### Activity 1:

1. F
2. T
3. F
4. T
5. F

### Activity 2 :

1. galaxies
2. gravity
3. invisible
4. see
5. Doppler Effect

### Activity 3 :

1. d
2. a
3. b
4. c

### Activity 4 :

(Sample answers)

1. They don't fly away because gravity (and Dark Matter) holds them on.
2. One example is the sound of a police siren changing as the car passes.

3. The "invisible rope" is the gravitational force from Dark Matter.

**Activity 5:**

Correct Order: 3, 2, 1, 4, 5

(1. A galaxy has many stars... 2. The gravity from all the visible stars... 3. We observe that the stars... 4. So, scientists believe... 5. The extra gravity...)

**Activity 6:**

1. B (invisible)
2. B (force)
3. C (Doppler Effect)
4. B (visible)

**Activity 7:**

1. Dark Matter
2. galaxies
3. gravity
4. Doppler Effect
5. see

**Activity 8 :**

1. c (Dark Matter)
2. a (It changes from a high sound to a low sound.)
3. b (The gravity from Dark Matter.)
4. d (By using the Doppler Effect.)