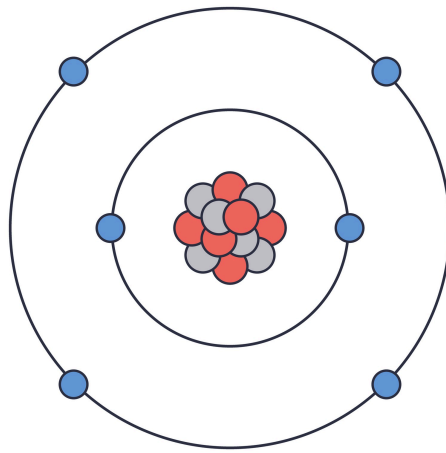


Parts of an Atom

Protons, neutrons and electrons, and what makes one element different from another



7

printable sheets

17

pages

All

answer keys included

Parts of an Atom Teaching Pack

Protons, neutrons and electrons, and what makes one element different from another

How to use this pack. The sheets are in a suggested teaching order: show the labeled diagram, have students label the blank one, then work through the practice sheets and finish with the quiz. Use them all over a week or pick the ones you need. The answer keys are together at the back.

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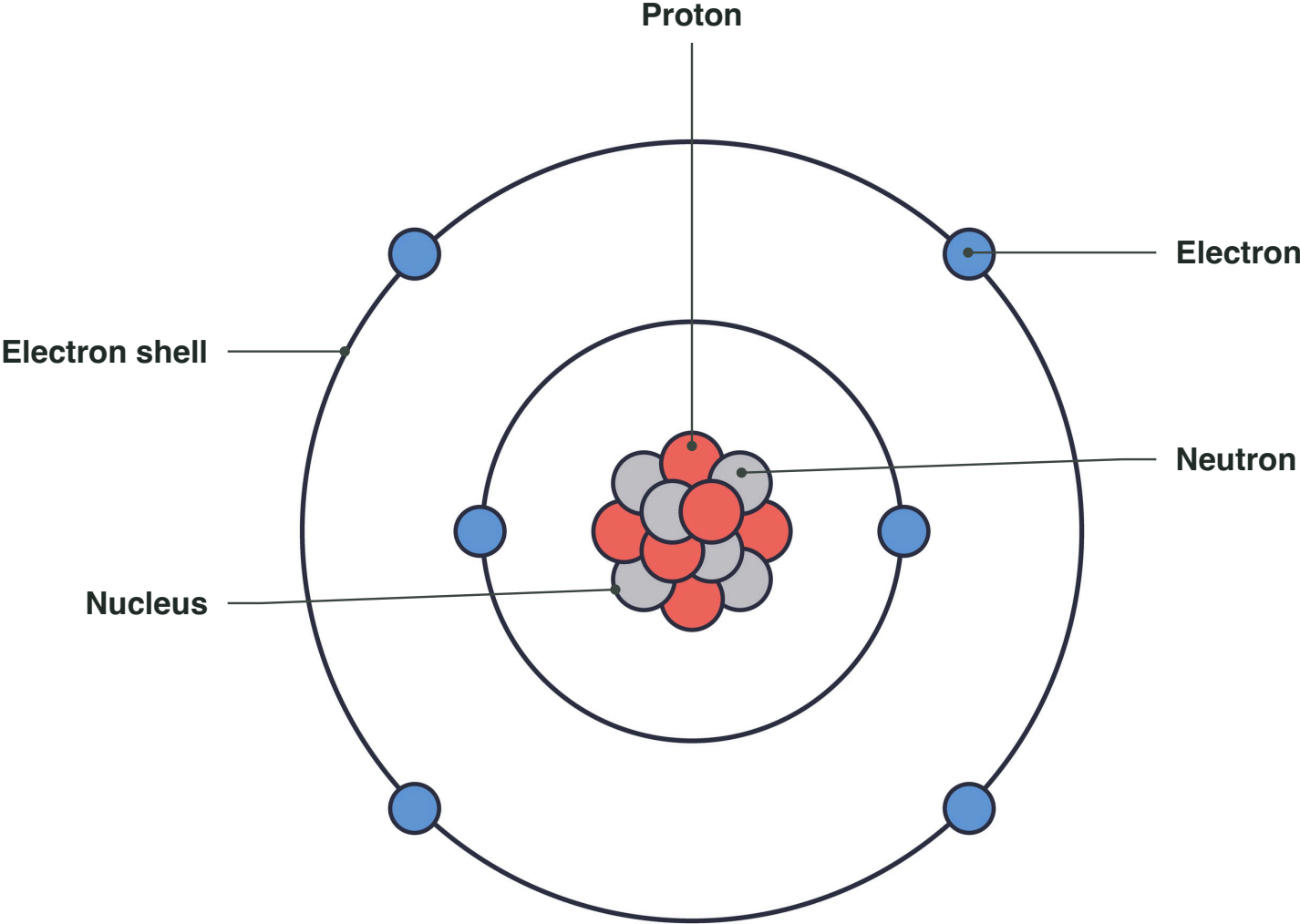
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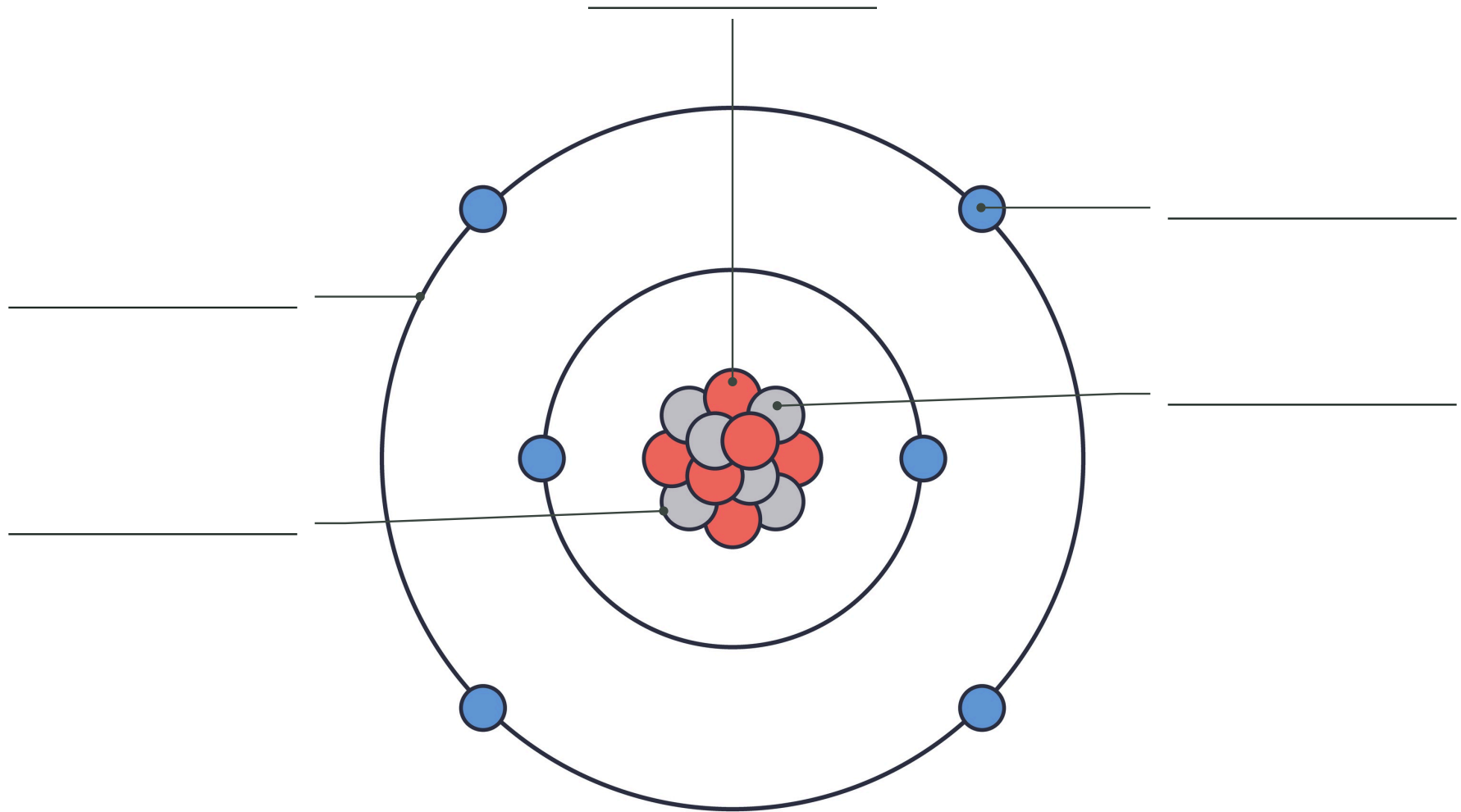
Parts of an Atom



Parts of an Atom

Name: _____

Write the name of each part on its line. Use the word bank.



Word bank

Electron

Electron shell

Neutron

Nucleus

Proton

Parts of an Atom

Use the labeled diagram of an atom to help you.

Part A. Write the word or words that fit each description.

Word bank

Atom

Atomic number

Electron

Electron shell

Element

Molecule

Neutron

Nucleus

Periodic table

Proton

1. A particle with a positive charge, found in the center of the atom. _____
2. Two or more atoms joined together. _____
3. The small, dense center of the atom. It holds almost all of the atom's mass. _____
4. How many protons an atom has. It tells you which element the atom is. _____
5. A tiny particle with a negative charge that moves around the center of the atom. _____
6. The tiny building block that all matter is made of. _____
7. A particle with no charge, found in the center of the atom. _____
8. A substance made of only one kind of atom, such as carbon, oxygen or gold. _____
9. In this model, a ring around the center of the atom where the negative particles are drawn. _____
10. The chart that lists all the elements in order of their number of protons. _____

Part B. Answer the questions.

1. Which two kinds of particles are found in the nucleus?

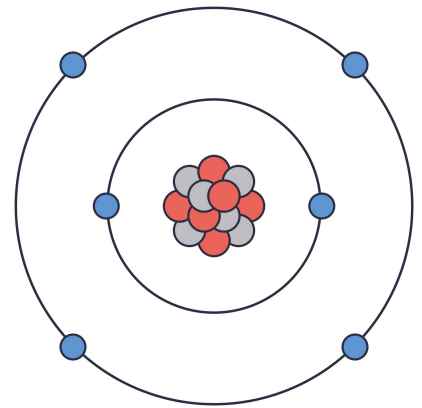
2. Which kind of particle decides which element an atom is?

3. A neutral atom has 6 protons. How many electrons does it have? How do you know?

Inside an Atom

Read the text. Then answer the questions on the next page.

- 1 Everything you can touch is made of matter, and all matter is made of **atoms**. A gold ring, the water in a glass and the air you breathe are all made of atoms. Atoms are far too small to see. Millions of them would fit across the period at the end of this sentence. Even so, an atom is made of smaller particles.
- 2 The center of an atom is the **nucleus**. It holds two kinds of particles. **Protons** have a positive charge. **Neutrons** have no charge. The nucleus is tiny compared with the whole atom, but it holds almost all of the atom's mass.
- 3 **Electrons** move around the nucleus. They have a negative charge, and they are much lighter than protons and neutrons. The picture shows the electrons on rings called **electron shells**. This is a simple model. In this model, the first shell holds up to two electrons, and the others go on the next shell. Real electrons do not travel in neat circles. Most of an atom is empty space.
- 4 The number of protons decides which **element** an atom is. This number is called the **atomic number**. Every atom with one proton is hydrogen. Every atom with six protons is carbon, and every atom with eight protons is oxygen. The atom in the picture has six protons, so it is a carbon atom. The periodic table lists all the elements in order of atomic number.
- 5 Opposite charges attract. The positive protons pull on the negative electrons, and that pull keeps the electrons around the nucleus. A **neutral** atom has the same number of protons and electrons, so the charges balance. The carbon atom in the picture has six protons and six electrons. It also has six neutrons.



A model of a carbon atom. The nucleus is in the center. Six electrons are drawn on two shells around it.

Inside an Atom: Questions

Go back to the text to find each answer. The paragraphs are numbered to help you.

1. What is this text mostly about?

- ☐ How to read the periodic table
- ☐ The particles that make up an atom
- ☐ Why carbon is important to living things
- ☐ How scientists first discovered atoms

2. Which particle has no charge?

- ☐ The proton
- ☐ The electron
- ☐ The neutron
- ☐ The nucleus

3. Where is almost all of an atom's mass?

4. What decides which element an atom is?

- ☐ The number of neutrons
- ☐ The number of electron shells
- ☐ The size of the atom
- ☐ The number of protons

5. Number the elements 1, 2 and 3 from the fewest protons to the most (paragraph 4).

- ☐ Oxygen
- ☐ Hydrogen
- ☐ Carbon

6. What keeps the electrons around the nucleus?

- ☐ The pull between the positive protons and the negative electrons
- ☐ The neutrons push them into place
- ☐ The electron shells are solid walls
- ☐ The empty space holds them still

7. The text says the picture is a simple model. What is one way a real atom is different from it?

8. Why do the charges in a neutral atom balance?

Count the Particles

Two rules: the atomic number is the number of protons, and a neutral atom has the same number of electrons as protons. Every atom on this sheet is neutral.

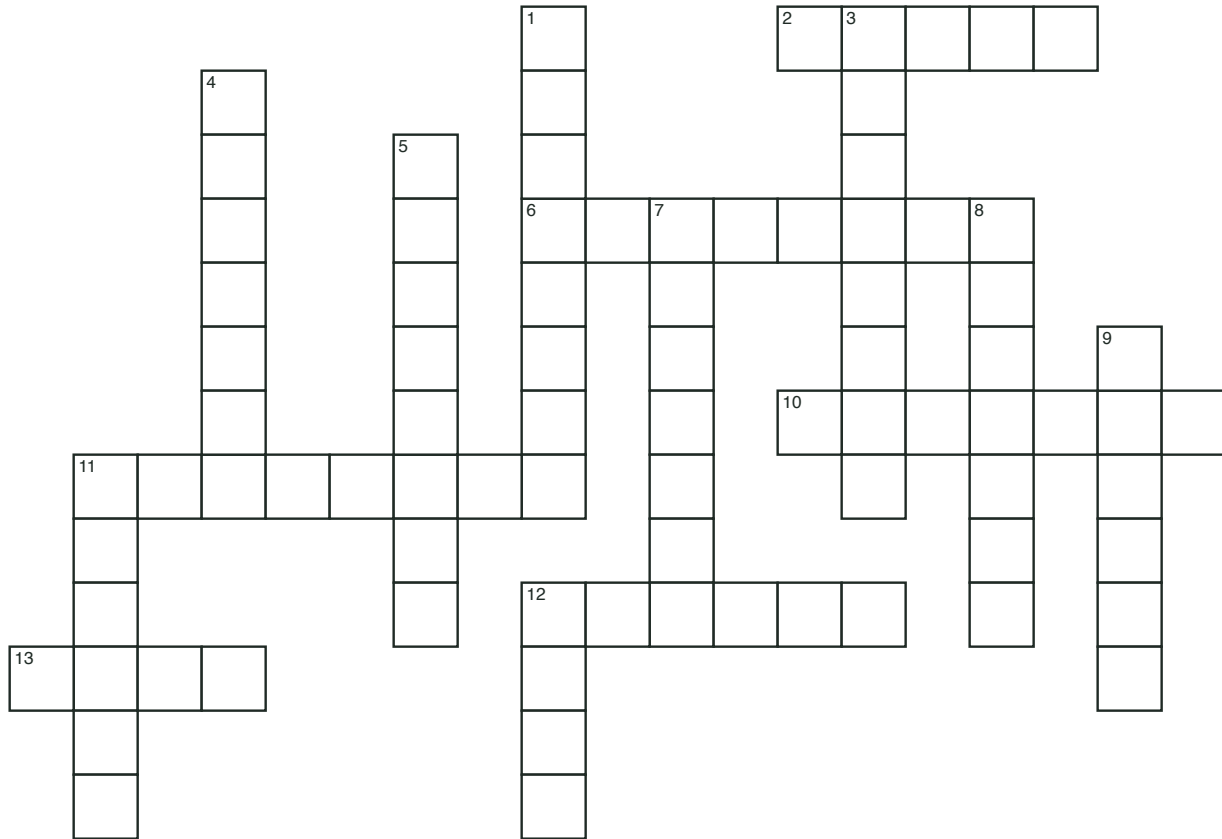
ATOM	WHAT YOU KNOW AND WHAT TO FIND	YOUR ANSWER
1. Hydrogen	Its atomic number is 1. How many protons does it have?	_____
2. Helium	It has 2 protons. How many electrons does it have?	_____
3. Lithium	Its atomic number is 3. How many electrons does it have?	_____
4. Carbon	It has 6 electrons. What is its atomic number?	_____
5. Nitrogen	It has 7 protons. What is its atomic number?	_____
6. Oxygen	Its atomic number is 8. How many protons and electrons does it have in all?	_____
7. Neon	It has 10 electrons. How many protons does it have?	_____
8. A helium atom	This atom has 2 protons and 2 neutrons. How many particles are in its nucleus?	_____
9. A carbon atom	This atom has 6 protons and 6 neutrons. How many particles are in its nucleus?	_____

Your turn

A neutral atom has 8 electrons. Which element on this sheet is it? Tell how you worked it out.

Atoms Crossword

Read each clue. Write the answer in the puzzle, one letter in each box. Use the word bank if you get stuck.



ACROSS

2. In the model, a ring around the nucleus where electrons are drawn.
6. A tiny particle with a negative charge that moves around the nucleus.
10. An atom with the same number of protons and electrons is _____.
11. The kind of charge a proton has.
12. Anything that has mass and takes up space.
13. The tiny building block that all matter is made of.

DOWN

1. Two or more atoms joined together.
3. The element whose atoms have one proton.
4. The small, dense center of an atom.
5. The kind of charge an electron has.
7. A substance made of only one kind of atom.
8. A particle in the nucleus with no charge.
9. The element whose atoms have six protons.
11. A particle in the nucleus with a positive charge.
12. The amount of matter in something. Almost all of an atom's is in the nucleus.

Word bank

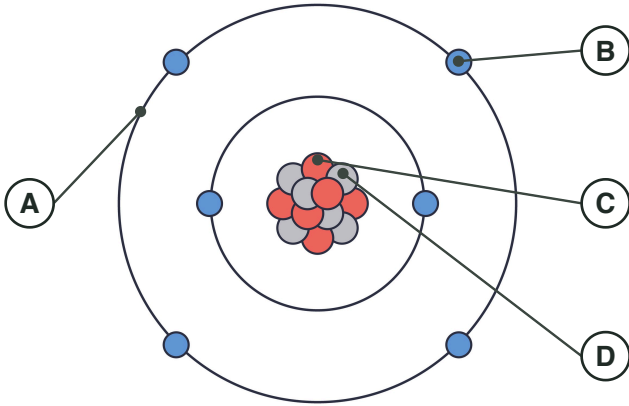
atom carbon electron element hydrogen mass matter molecule
negative neutral neutron nucleus positive proton shell

Parts of an Atom Quiz

Score _____ / 12

In the picture, the red (darker) particles in the center have a positive charge. The gray (lighter) ones have no charge.

Part A. This is a model of an atom. Write the name of each part.



- A _____
B _____
C _____
D _____

Electron · Electron shell · Neutron · Proton

Part B. Choose the best answer.

1. Which particle has a negative charge?

- ☐ The proton
- ☐ The neutron
- ☐ The electron
- ☐ The nucleus

2. Where is almost all of an atom's mass?

- ☐ In the electrons
- ☐ In the nucleus
- ☐ In the electron shells
- ☐ In the empty space

3. What decides which element an atom is?

- ☐ The number of protons
- ☐ The number of neutrons
- ☐ The number of shells
- ☐ The size of the atom

4. A neutral atom has 8 protons. How many electrons does it have?

- ☐ 2
- ☐ 4
- ☐ 8
- ☐ 16

5. What is most of an atom?

- ☐ Protons
- ☐ Neutrons
- ☐ Electrons
- ☐ Empty space

6. What is the atomic number of an element?

- ☐ The number of neutrons in one atom
- ☐ The number of protons in one atom
- ☐ The number of shells in one atom
- ☐ The number of atoms in the element

Part C. Write your answer.

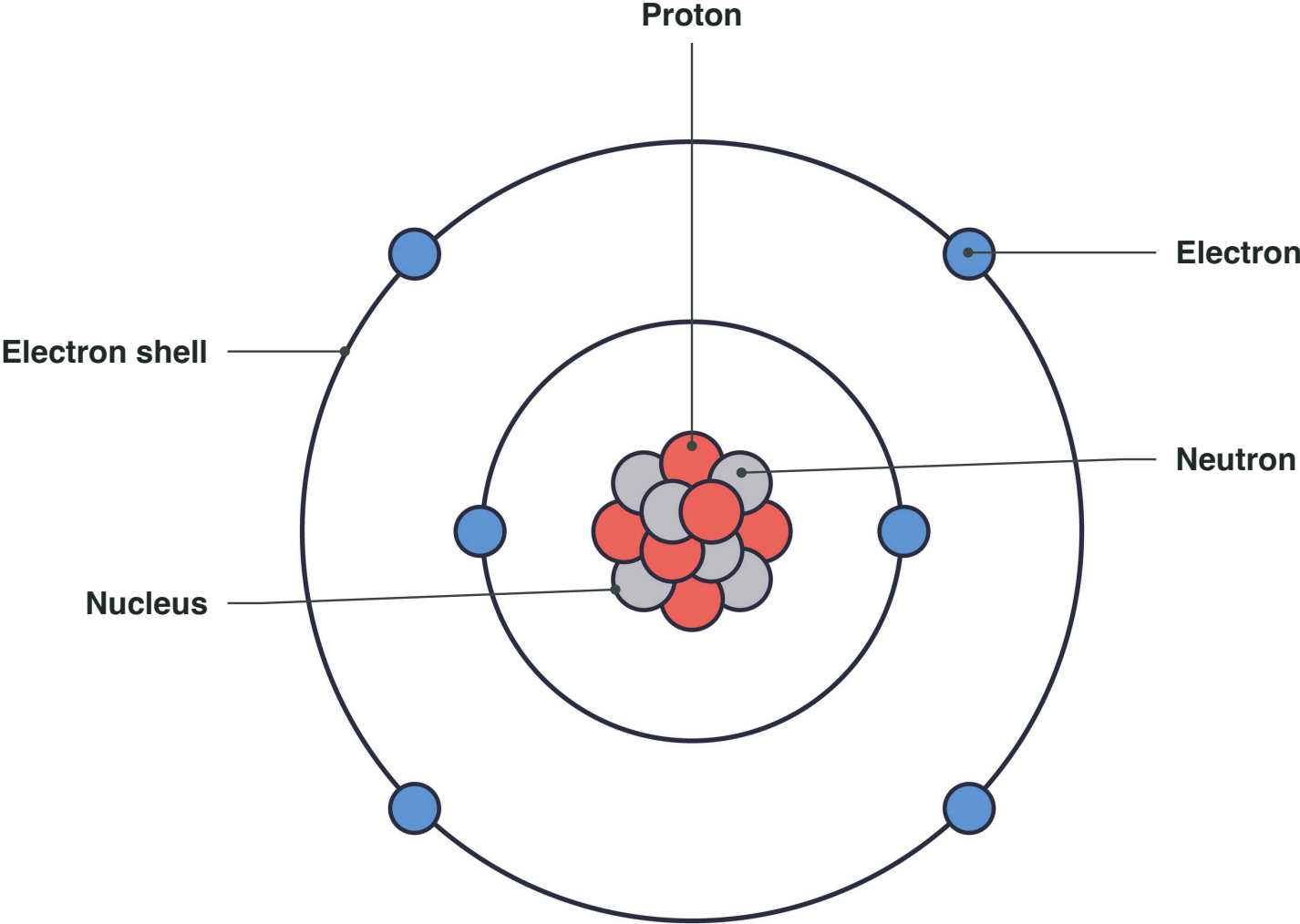
7. Which two kinds of particles are in the nucleus? Give the charge of each one.

8. Why does a neutral atom have no overall charge?

Answer Keys

In the same order as the sheets.

Parts of an Atom: Answer Key



Parts of an Atom: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. Write the word or words that fit each description.

Word bank

Atom

Atomic number

Electron

Electron shell

Element

Molecule

Neutron

Nucleus

Periodic table

Proton

- | | |
|--|-----------------------|
| 1. A particle with a positive charge, found in the center of the atom. | Proton |
| 2. Two or more atoms joined together. | Molecule |
| 3. The small, dense center of the atom. It holds almost all of the atom's mass. | Nucleus |
| 4. How many protons an atom has. It tells you which element the atom is. | Atomic number |
| 5. A tiny particle with a negative charge that moves around the center of the atom. | Electron |
| 6. The tiny building block that all matter is made of. | Atom |
| 7. A particle with no charge, found in the center of the atom. | Neutron |
| 8. A substance made of only one kind of atom, such as carbon, oxygen or gold. | Element |
| 9. In this model, a ring around the center of the atom where the negative particles are drawn. | Electron shell |
| 10. The chart that lists all the elements in order of their number of protons. | Periodic table |

Part B. Answer the questions.

- | | |
|--|---|
| 1. Which two kinds of particles are found in the nucleus? | Protons and neutrons. |
| 2. Which kind of particle decides which element an atom is? | The proton. The number of protons decides the element. |
| 3. A neutral atom has 6 protons. How many electrons does it have? How do you know? | It has 6 electrons. A neutral atom has the same number of protons and electrons. |

Inside an Atom: Answer Key

Answers are in green. Written answers will vary; these are examples.

1. What is this text mostly about?

- ☐ How to read the periodic table
- ☒ **The particles that make up an atom**
- ☐ Why carbon is important to living things
- ☐ How scientists first discovered atoms

2. Which particle has no charge?

- ☐ The proton
- ☐ The electron
- ☒ **The neutron**
- ☐ The nucleus

3. Where is almost all of an atom's mass?

In the nucleus.

4. What decides which element an atom is?

- ☐ The number of neutrons
- ☐ The number of electron shells
- ☐ The size of the atom
- ☒ **The number of protons**

5. Number the elements 1, 2 and 3 from the fewest protons to the most (paragraph 4).

- 3** Oxygen
- 1** Hydrogen
- 2** Carbon

6. What keeps the electrons around the nucleus?

- ☒ **The pull between the positive protons and the negative electrons**
- ☐ The neutrons push them into place
- ☐ The electron shells are solid walls
- ☐ The empty space holds them still

7. The text says the picture is a simple model. What is one way a real atom is different from it?

Real electrons do not travel in neat circles.

8. Why do the charges in a neutral atom balance?

It has the same number of positive protons and negative electrons.

Count the Particles: Answer Key

Answers are in green. The last answer will vary; one example is given.

ATOM	WHAT YOU KNOW AND WHAT TO FIND	YOUR ANSWER
1. Hydrogen	Its atomic number is 1. How many protons does it have?	<u>1</u>
2. Helium	It has 2 protons. How many electrons does it have?	<u>2</u>
3. Lithium	Its atomic number is 3. How many electrons does it have?	<u>3</u>
4. Carbon	It has 6 electrons. What is its atomic number?	<u>6</u>
5. Nitrogen	It has 7 protons. What is its atomic number?	<u>7</u>
6. Oxygen	Its atomic number is 8. How many protons and electrons does it have in all?	<u>16</u>
7. Neon	It has 10 electrons. How many protons does it have?	<u>10</u>
8. A helium atom	This atom has 2 protons and 2 neutrons. How many particles are in its nucleus?	<u>4</u>
9. A carbon atom	This atom has 6 protons and 6 neutrons. How many particles are in its nucleus?	<u>12</u>

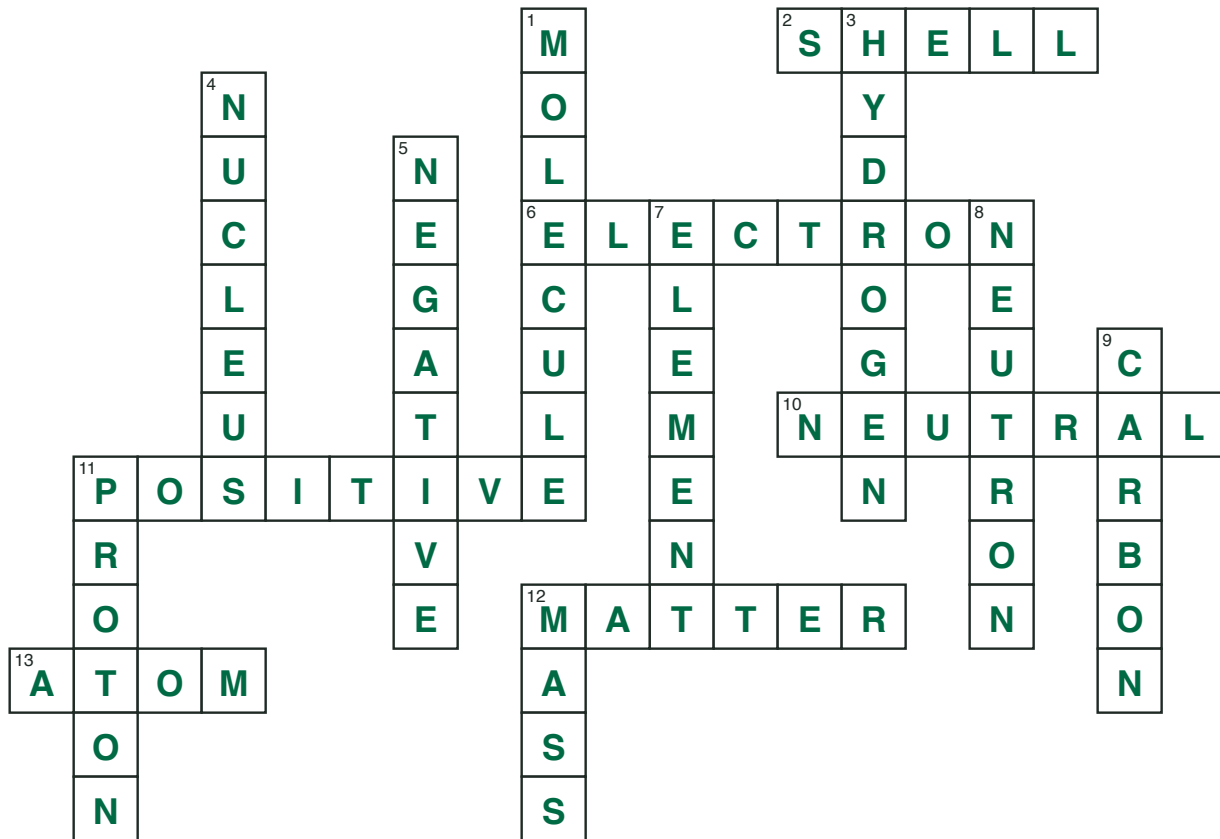
Your turn

A neutral atom has 8 electrons. Which element on this sheet is it? Tell how you worked it out.

Oxygen. A neutral atom has the same number of protons and electrons, so it has 8 protons. Its atomic number is 8, and that is oxygen.

Atoms Crossword: Answer Key

Answers are in green.



ACROSS

2. In the model, a ring around the nucleus where electrons are drawn.
6. A tiny particle with a negative charge that moves around the nucleus.
10. An atom with the same number of protons and electrons is ____.
11. The kind of charge a proton has.
12. Anything that has mass and takes up space.
13. The tiny building block that all matter is made of.

DOWN

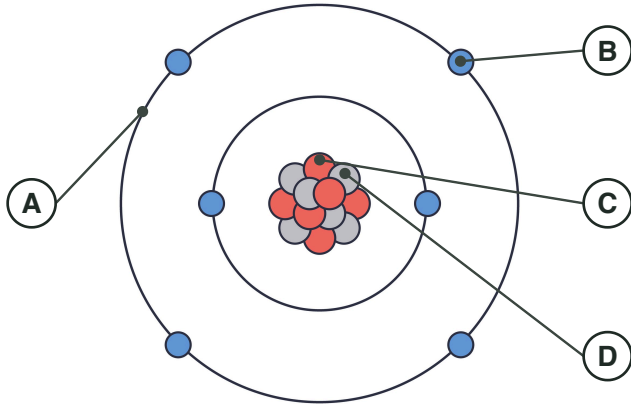
1. Two or more atoms joined together.
3. The element whose atoms have one proton.
4. The small, dense center of an atom.
5. The kind of charge an electron has.
7. A substance made of only one kind of atom.
8. A particle in the nucleus with no charge.
9. The element whose atoms have six protons.
11. A particle in the nucleus with a positive charge.
12. The amount of matter in something. Almost all of an atom's is in the nucleus.

Word bank atom carbon electron element hydrogen mass matter molecule
negative neutral neutron nucleus positive proton shell

Parts of an Atom Quiz: Answer Key

Answers are in green. Written answers will vary; these are examples.

Part A. This is a model of an atom. Write the name of each part.



A Electron shell

B Electron

C Proton

D Neutron

Electron · Electron shell · Neutron · Proton

Part B. Choose the best answer.

1. Which particle has a negative charge?

- ☐ The proton
- ☐ The neutron
- ☒ The electron
- ☐ The nucleus

2. Where is almost all of an atom's mass?

- ☐ In the electrons
- ☒ In the nucleus
- ☐ In the electron shells
- ☐ In the empty space

3. What decides which element an atom is?

- ☒ The number of protons
- ☐ The number of neutrons
- ☐ The number of shells
- ☐ The size of the atom

4. A neutral atom has 8 protons. How many electrons does it have?

- ☐ 2
- ☐ 4
- ☒ 8
- ☐ 16

5. What is most of an atom?

- ☐ Protons
- ☐ Neutrons
- ☐ Electrons
- ☒ Empty space

6. What is the atomic number of an element?

- ☐ The number of neutrons in one atom
- ☒ The number of protons in one atom
- ☐ The number of shells in one atom
- ☐ The number of atoms in the element

Part C. Write your answer.

7. Which two kinds of particles are in the nucleus? Give the charge of each one.

Protons, which are positive, and neutrons, which have no charge.

8. Why does a neutral atom have no overall charge?

It has the same number of positive protons and negative electrons, so the charges balance.