James Webb Space Telescope

Webb Telescope Fun Pad

PACKED WITH THINGS TO DO!
Note to Parents:

This Fun Pad is designed for ages 5 - 10 years old and is divided into sections.

- The front section contains general information about Webb Telescope
- The middle section contains activities for younger children
- The back section contains more challenging activities

For more information on NASA and the Webb Telescope, visit these web sites:

http://education.nasa.gov
http://nasascience.nasa.gov/
http://www.jwst.nasa.gov/
http://www.nasa.gov/hubble
http://www.stsci.edu/jwst/
This is the Webb telescope mission patch. The National Aeronautics and Space Administration (NASA), the European Space Agency (ESA), and the Canadian Space Agency (CSA) are working together to create and build this new telescope.
The Webb telescope was named after the person who was the head of NASA in the 1960s. Though he is most commonly linked to the Apollo Moon Program, James Webb was the one who thought NASA should be doing more science. Because he inspired NASA’s successful science program, it is only fitting that the next generation space telescope bears his name.
The Hubble Space Telescope was launched into space in 1990. After more than 20 years and a few upgrades, Hubble keeps sending back beautiful images and helping scientists to learn about the universe. The Webb telescope will be the “big brother” to Hubble and scientists expect great discoveries and wonderful images from the Webb telescope.
The Webb telescope will have the largest mirror ever placed in space, so large that for it to fit in the rocket, it will have to be folded like origami. The five layer sunshield, the size of a tennis court, will protect the telescope from the light and heat of the Sun, Earth, and Moon. The sunshield adds protection to the telescope that is equivalent to SPF 1,000,000. Webb will be such a powerful telescope that it will be able to see a penny from 24 miles away.

The Webb will be a giant leap forward in our quest to understand the universe and our origins. The Webb will examine every phase of cosmic history: from the bright glows after the Big Bang to the formation of galaxies, stars, and planets to the evolution of our own solar system.
The Webb mirror is very large and will collect 7 times more light than Hubble’s mirror. However, a large, solid mirror (like Hubble’s) would be too heavy to launch into space, Webb’s is made up of 18 mirror segments that will act as one. The mirror segments will be folded up and put inside the rocket for launch.
A NEW IDEA TO SEE BETTER

How microshutters work

One of the science instruments on the Webb telescope has a new way of looking at faint, far away galaxies. It uses something called microshutters. To get an idea of how this works, think about how you would make something far away look clearer—just squint! By squinting, your eyelashes block out the light closest to you. This is very similar to how microshutters work.
READY TO LAUNCH

Find out how Webb folds up and fits into the launch rocket nose cone

The Webb telescope is as wide as a tennis court and as tall as a 3-story building.

It is too big to fit into a rocket, so Webb will be folded up like origami and tucked inside the nose of the rocket.

Once in space, the telescope will open like a transformer.
WEBB TELESCOPE IN SPACE

How far away will it be?

The Webb telescope will live 1 million miles from Earth. This is nearly 4 times the distance between the Earth and the Moon.
DOWNLOADING DATA

How does the information get to us?

There are three stages in getting the data from Webb to the ground:

1. The Webb gathers the data
2. The Webb sends the data down to ground stations on Earth
3. The data is sent to the Science Center
INFRARED IMAGING

How Webb will see objects in space

Infrared light can be seen through some materials that visible light cannot. Notice that in the visible light image, you cannot see the man’s hand in the black bag. With an infrared camera, however, we can detect the heat from the man’s arm and hand and thus “see” through the bag. Similarly, Webb can detect the infrared light from young stars hidden in clouds and dust.
Infrared facts

Can you tell what animals are in these pictures?

A. ________________  D. ________________

B. ________________  E. ________________

C. ________________  F. ________________

To make infrared pictures like the ones above, we can use special cameras that sense heat. Many things besides people and animals give off infrared light — the Earth, Sun, and far away things like stars and galaxies do also!
HOW DID WE GET HERE?
From the first light in the universe to the
birth of planets and the origins of life

The launch of the Webb
telescope will be a giant step in
the human quest to understand
our place in the universe. With
the largest telescope mirror
ever placed in space, the Webb
telescope will examine every
phase of our history: from
wisps of gas condensing into
the first stars and galaxies after
the Big Bang, to the formation
of solar systems capable of
supporting life on planets like
Earth, and to the evolution of
our own Solar System.

FILL IN THE NUMBERS
Write in the missing digits
MAKE A MATCH

Draw a line between the matching pictures and words

Hubble Telescope

Galaxy

Webb telescope

Earth

The Webb telescope will be launched on an Ariane-5 rocket in South America.
DRAW A FACE ON THE STAR

Make it sad, mad, or glad!
LOOKING DIFFERENT

Circle the one that is not the same

SAD
MAD
GLAD
COLOR THE WEBB TELESCOPE

Make this a work of art and space
MIX AND MATCH

Draw a line from the shape to its shadow
MOON DOGGIE

Color-by-number space dog

1 - Green
2 - Blue
3 - Light Blue
4 - Brown
5 - Tan
6 - Red
What word replaces the question mark?

Is it freezing in space?

Connect the dots to see a cold spot

The snowman’s temperature is around 27° Fahrenheit (-3° Celsius). The Webb telescope has to stay at -400° F (-240° C) below zero.
WHAT DOES NOT BELONG?

Circle the one that doesn’t belong

Astronaut, Comet, Earth
WHAT COMES NEXT?

Draw the picture that comes next in each row.

- Hexagon, Planet, Hexagon, Planet
- Link, Telescope, Link, Telescope
- Star, Peace Sign, Star, Peace Sign
- Atom, Paintbrush, Atom, Paintbrush
- Moon, Satellite, Moon, Satellite
An astronomer is a scientist who studies celestial bodies such as planets, stars, and galaxies. NASA has many astronomers who will use the Webb telescope to look at new and wondrous things.
Draw a line between the pictures and the words that match.
RHYME TIME

What other words rhyme with STAR?

Candy Bar, Guitar, Car, Jar

Hubble Space Telescope, Webb telescope
ORDER UP!

Alphabetize these space-related words:

Asteroid, Comet, Galaxy, Meteor, Microshutters, Mirrors, Nebula, Planet, Star, Sunshield

1. Asteroid
2. Comet
3. Galaxy
4. Meteor
5. Microshutters
6. Mirrors
7. Nebula
8. Planet
9. Star
10. Sunshield

Help the astronaut place the flag:

1 - Tan
2 - Blue
3 - Gray
4 - Red
5 - Brown
6 - Dark Gray
ONE MORE WORD

What word replaces the question mark?

- Webb
- Hubble Space
- Ultraviolet
- Optical
- Radio
- X-ray
DRAWING LESSON

Draw your own space telescope
SPACE STUFF

Unscramble the letters to spell space words

1. XLAYGA
2. HRATE
3. NTEPAL
4. NUHALC
5. UNS
6. RSTA
7. UDLCO

Beryllium is a steel grey, strong, light-weight metal that is used to make the Webb’s mirrors and optics.

Lime, Mill, Brim, Yell, Bell, Mile, Mule, Lie, Rim, Rule, Rye, Bill

Galaxy, Earth, Planet, Launch, Sun, Star, Cloud
ORDER UP!

Alphabetize these space-related words

1. ____________________  6. ____________________
2. ____________________  7. ____________________
3. ____________________  8. ____________________
4. ____________________  9. ____________________
5. ____________________ 10. ____________________
How many words can you spell using the letters in BERYLLIUM?

Beryllium is a steel grey, strong, light-weight metal that is used to make the Webb's mirrors and optics.
THE PLANETS AROUND US

Name the planets in our Solar System

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

DRAWING LESSON

HINT: My Very Educated Mother Just Served Us Noodles

HINT: My Very Educated Mother Just Served Us Noodles

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

M_________________ J_________________

V_________________ S_________________

E_________________ U_________________

M_________________ N_________________
The universe continues to grow and the galaxies keep moving farther apart.

One way to understand this is to look at chocolate chips in the dough of unbaked cookies. As the dough bakes and rises, the chocolate chips move farther apart making more space between the chocolate chips.
Finding Some Shade

How many times can you find the word “sunshade”?

The large sunshield (sunshade) will protect the Webb telescope from getting hot by direct sunlight, allowing it to cool down to a temperature -400° below zero Fahrenheit (or -240° Celcius).
CROSSWORDS

Answer the clues to fill in the word

CLUES:
1. The fifth planet from the Sun, the largest and most massive in the solar system
2. Our solar system is in the Milky Way ______
3. Celestial bodies that are seen as points of light in the night sky
4. A scientist who studies planets, stars, and galaxies
5. A small extraterrestrial body that is a frozen mass that travels around the Sun
6. Any small solid extraterrestrial bodies that hits the Earth's atmosphere
LOOK FOR WEBB TELESCOPE WORDS

Search and find

EARTH  ENERGY  GALAXY  HEAT  IMAGE

INFRARED  LIGHT

NEBULA  OBSERVATORY

SENSOR  SHIELD

SPACE

SPECTRAL  TELESCOPE  WAVE

D  E  R  A  R  F  N  I
D  J  D  L  E  I  H  S
O  E  W  A  V  E  T  G
B  E  T  S  K  Y  R  A
S  P  E  C  T  R  A  L
E  O  T  A  T  L  E  A
R  C  E  N  U  S  T  X
V  S  L  B  E  N  H  Y
A  U  E  N  D  E  G  H
T  N  S  C  A  F  I  C
O  O  C  T  A  M  L  N
R  D  O  L  A  P  O  U
Y  N  P  G  NASA
E  N  E  R  G  Y  E  L

Primary Mirror, Secondary Mirror, Trim Tab, Spacecraft Bus, Sunshield
WEBB TELESCOPE IN SPACE

How far away will it be?

The Webb telescope will live 1 million miles from Earth. This is nearly 4 times the distance between the Earth and the Moon.

COMPARE THE SIZE

Hubble or Webb: Which is bigger?

The Hubble Space Telescope is about the size of a large tractor trailer truck.

The Webb telescope’s sunshield is almost as big as a Boeing 737 airplane!
CROSSWORDS

Answer the clues to fill in the word

CLUES:
1. What the Sun, a lamp, or a beacon gives off
2. The Webb telescope will be launched into outer ______
3. Webb _____ or Hubble Space _____
4. Heavenly bodies that look like points of light in the sky
5. The shape of Webb’s eighteen mirrors
6. Equipment that is launched on board the Shuttle or rockets for a mission in space

W AY  O U T  O F  H E R E

Get Webb to the launch pad

The Webb telescope will be launched on an Ariane-5 rocket in South America.
SEARCHING FOR WORDS

Circle the Webb telescope words

C A M E R A L Y
P N I R O I K E
A S C O R S N P
Y A R R A C R G
L C O R T I A P
O O S I S T O Y
A S H M A P R M
D M U D R O B O
E O T C R I N
L S T K L T O
B B E W G I R
B T R A W N T
U E S J D E M S
H T E N A L P A

✓ NASA  ARRAY  DATA  MIRROR  PRISM  STAR
ASTRONOMY  GAS  ORBIT  RING  SUN
CAMERA  HUBBLE  OPTICS  ROCKET  WEBB
COSMOS  LENS  PAYLOAD  SKY
MICROSHUTTERS  PLANET
WEBSITE HAS EIGHTEEN...

Find the answer by writing the first letter of each object in the box beside the picture.

Moone, ice cream, rabbit, rocket, orange, ring, Saturn = MIRORS
SPACE COUNTING

How many times can you find the word “space”?

Answer the clues to fill in the word “space”:

1. The fifth planet from the Sun, the largest and most massive in the solar system
2. Our solar system is in the Milky Way
3. Celestial bodies that are seen as points of light in the night sky
4. A scientist who studies planets, stars, and galaxies
5. A small extraterrestrial body that is a frozen mass that travels around the Sun
6. Any small solid extraterrestrial bodies that hits the Earth’s atmosphere

CLUES:

SPACE COUNTING ANSWER:

S P A C E C E C E S
P P C A E S P C
A E A S E A S S
C S C C C P P E
E C A E A A A C
P P C A P A E A
S E A P S E P P
S P A C E C E S
MAZE CRAZE
Help light get from the galaxy to the Webb telescope

The Webb telescope will be a million miles from Earth, which means that it will be much farther away from us than the Moon! Webb needs to stay cool so it can see faint, far away galaxies. The place where Webb will be will let the telescope use its large sunshield to block out infrared light from the Sun, Earth, and Moon.

DIFFERENT EARTHLINGS
Find and circle 8 different things
MAZE CRAZE

Help light get from the galaxy to the Webb telescope

Start Here

The Webb telescope will be a million miles from Earth, which means that it will be much farther away from us than the Moon! Webb needs to stay cool so it can see faint, far away galaxies. The place where Webb will be will let the telescope use its large sunshield to block out infrared light from the Sun, Earth, and Moon.
WEBB TELESCOPE PARTS

Use the code to name the parts of the spacecraft

A = ●  F = □  K = ♦  O = ⊙  S = ♦  W = ♦
B = ▲  G = ☀  L = 😊  P = ★  T = ⊙  X = ☪
C = ❤  H = ♦  M = □  Q = 😊  U = ⊙  Y = ★
D = ⊙  I = *  N = ✶  R = □  V = ○  Z = ♬
E = ✔  J = ☻
COUNT THEM UP

How many objects can you find?

How many telescopes? _______

How many stars? _______

How many galaxies? _______

How many planets? _______

How many radar antenna? _______

The universe continues to grow and the galaxies keep moving farther apart. One way to understand this is to look at chocolate chips in the dough of unbaked cookies. As the dough bakes and rises, the chocolate chips move farther apart making more space between the chocolate chips.
IDENTICAL WEBB

Circle the two telescopes that are the same
SCRAMBLE TIME

Trace over the dashed lines and unscramble the words to name the spacecraft

LEUBHB
CEPSA
LETPOESCE

BEBW
POCLEETSE

Hubble Space Telescope, Webb Telescope
HOW DID WE GET HERE?

From the first light in the universe to the birth of planets and the origins of life

The launch of the Webb telescope will be a giant step in the human quest to understand our place in the universe. With the largest telescope mirror ever placed in space, the Webb telescope will examine every phase of our history: from wisps of gas condensing into the first stars and galaxies after the Big Bang, to the formation of solar systems capable of supporting life on planets like Earth, and to the evolution of our own Solar System.
For more information on NASA and the Webb Telescope, visit these web sites:

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http://www.jwst.nasa.gov/
http://www.nasa.gov/hubble
http://www.stsci.edu/jwst/
James Webb Space Telescope

Webb Telescope

Fun Pad

PACKED WITH THINGS TO DO!