

Atmospheric Waves Experiment



MISSION MATCHUP



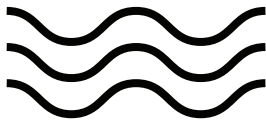
Match the picture to the word.



EARTH



SPACE



TORNADO



MOUNTAINS



WAVE

Atmospheric gravity waves (AGWs) are pulses of air formed by weather disturbances on Earth, such as thunderstorms, hurricanes, or winds rushing over mountaintops. Their energy then breaks into space, influencing space weather. The AWE mission will observe these interactions and the effects on spacecraft we rely on, like GPS.

DISCOVER THE DIFFERENCE –



Atmospheric gravity waves are different than gravitational waves. Read the description of each type of wave below and place each fact from the word bank under the correct type of wave.

Atmospheric Gravity Waves

AGWs are pulses of air that form by weather events on Earth, such as thunderstorms or winds rushing over high mountaintops. When their energy breaks into space, AGWs affect space-based communication like GPS.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Gravitational Waves

Gravitational waves are fast, invisible ripples in space and time that travel at the speed of light. These waves are caused by massive objects moving with acceleration, and they squeeze and stretch objects in their path as they pass by.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

WORD BANK:

Invisible
Acceleration
Travel
Speed of light
Energy
Space communication

GPS
High mountaintops
Squeeze and stretch objects
Pulses of air
Thunderstorm
Ripples in space and time

SPACE SCRAMBLE



Unscramble each word in the left column and draw a wavy line to its correct spelling in the right column.

AEW

EWVA

APSCE

BRTOI

TMSRO

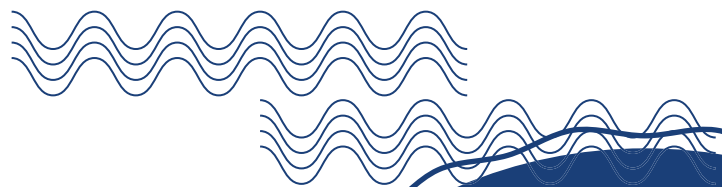
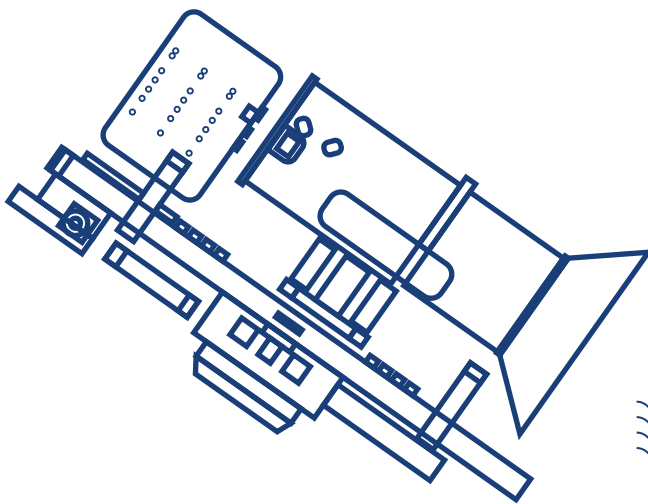
ORBIT

STORM

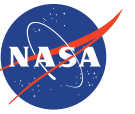
SPACE

WAVE

AWE



DATA MODULATION



Unscramble each AWE mission word in the left column and draw a wavy line to its correct spelling in the right column.

SPHSLCHIIOEY

PCTRHMEAIO S

USHTRDNTORME

MSUTENTNRI

EEMHHRSOETPR

NTUIANMOTSOP

EASCP

HEAWTER

AIVGRTY

AESVW

RENIFADR

THUNDERSTORM

THERMOSPHERE

MOUNTAINTOPS

SPACE

WEATHER

GRAVITY

WAVES

HELIOPHYSICS

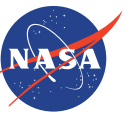
INSTRUMENT

INFRARED

ATMOSPHERIC

Space communication relies on a transmitter and a receiver. Transmitters encode a message onto electromagnetic waves through modulation, changing the properties of the wave to represent the data. Receivers receive these waves as they flow through space.

AWEsome Word Search - 1



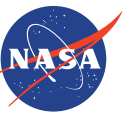
Search up, down, forward, backward, and on the diagonal to find the hidden AWE mission words listed below.

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



- ~SPACE ~EARTH ~AWE ~RIPPLE ~ORBIT
- ~WAVE ~ISS ~WIND ~GLOBE ~SUN

AWEsome Word Search - 2



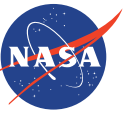
Search up, down, forward, backward, and on the diagonal to find the hidden AWE mission words listed below.

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

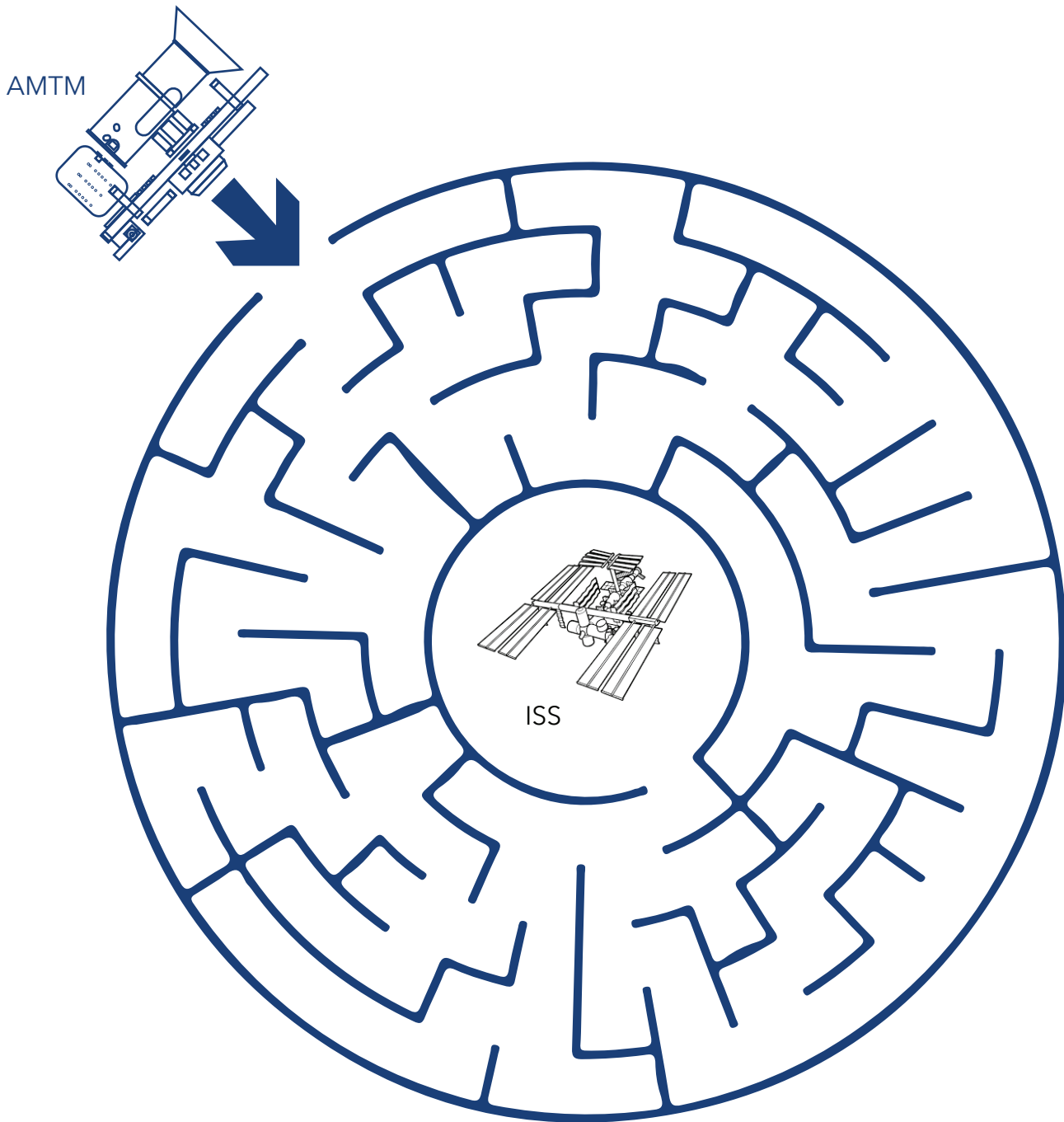


- ~Altitude
- ~Engineer
- ~Infrared
- ~Observe
- ~Telescope
- ~Atmosphere
- ~Exosphere
- ~Images
- ~Radio
- ~Thermosphere
- ~Atmospheric
- ~GPS
- ~Ionosphere
- ~Research
- ~Thunderstorm
- ~AWE
- ~Gravity
- ~ISS
- ~Scientist
- ~Topography
- ~Data
- ~Heliophysics
- ~Mesosphere
- ~Seasons
- ~Troposphere
- ~Earth
- ~Horizon
- ~Mission
- ~Space
- ~Waves
- ~Energy
- ~Hurricane
- ~Navigation
- ~Stratosphere
- ~Weather

Installation Maze - 1



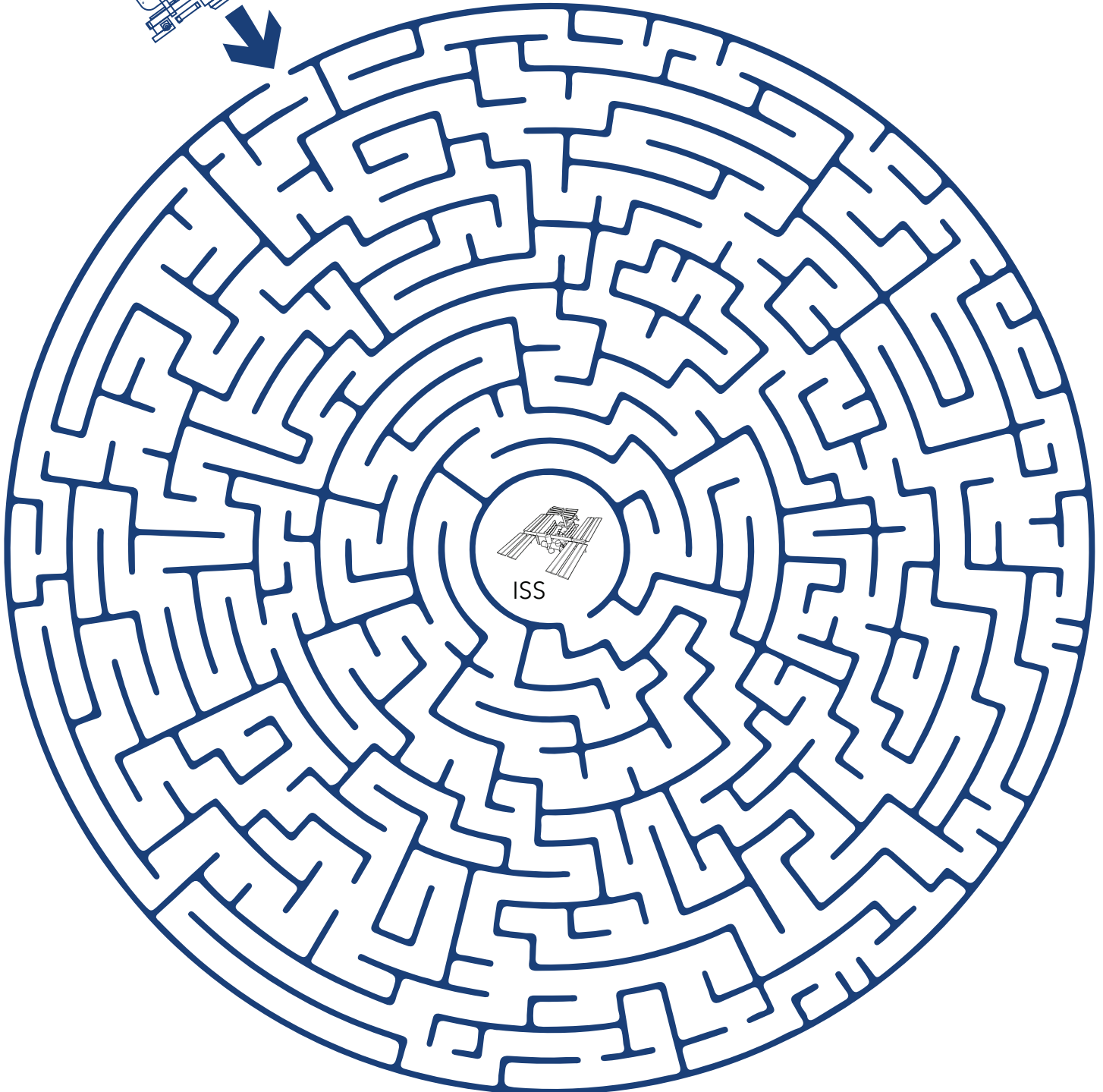
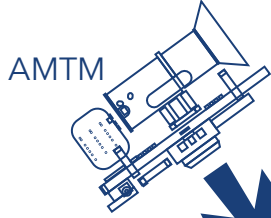
Find the correct path to install AWE's Advanced Mesospheric Temperature Mapper (AMTM) instrument onto the International Space Station (ISS).



Installation Maze - 2



Find the correct path to install AWE's Advanced Mesospheric Temperature Mapper (AMTM) instrument onto the International Space Station (ISS).





Explore how many words you can make with the letters in

WEATHER



Weather is the way the atmosphere behaves at a place and time. Weather can affect life and human activity and includes dryness, sunshine, rain, cloud cover, wind, hail, snow, freezing rain, flooding, blizzards, ice storms, and thunderstorms.





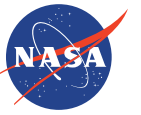
Explore how many words you can make with the letters in

MESOSPHERE

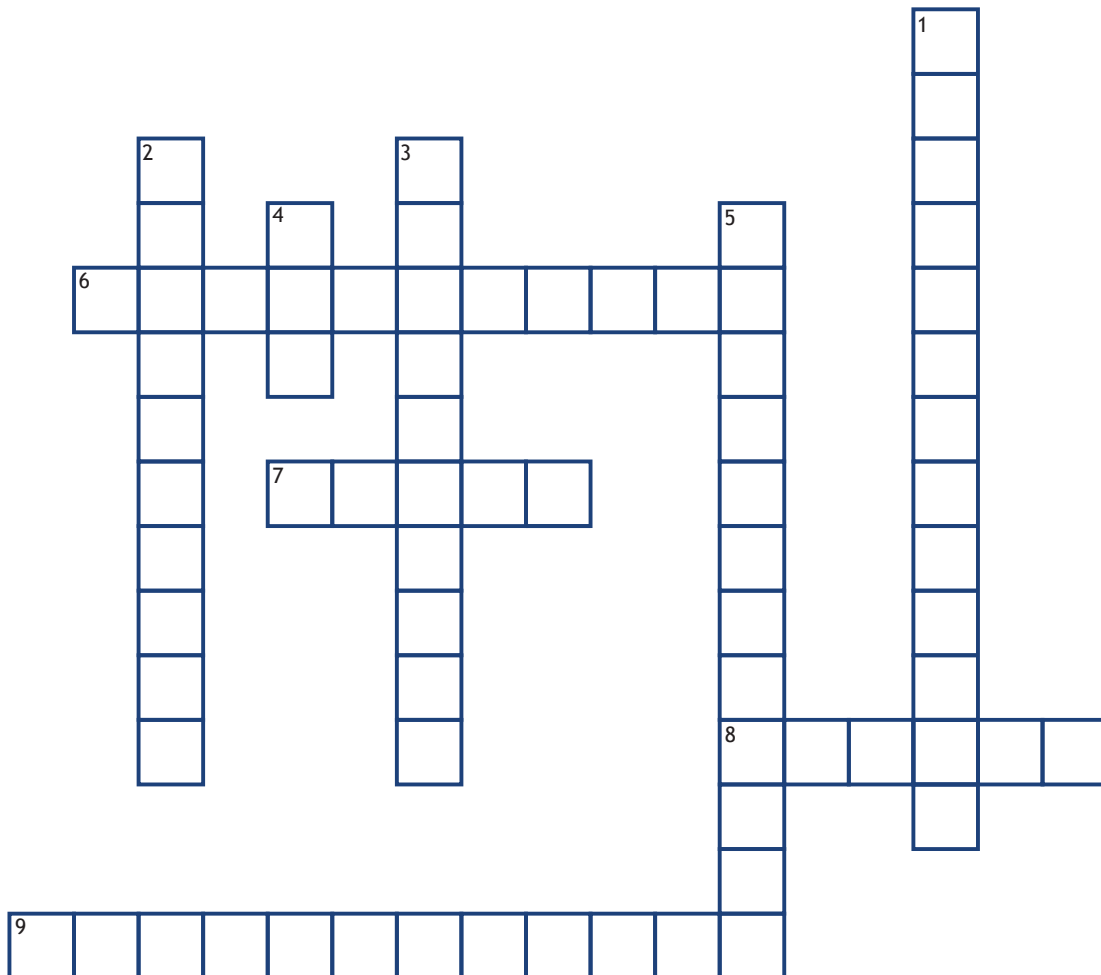
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

The mesosphere is the region of the upper atmosphere that AWE surveys. This region is like Earth's doorway to space weather. Everything that impacts space weather from below passes through this doorway.

Mission Crossword - 1



Fill the squares with the correct answers to the questions below.



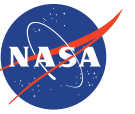
DOWN:

1. Space weather can disrupt _____ and navigation systems.
2. _____ are the most violent storms on Earth.
3. Which layer of the atmosphere is between the thermosphere and the stratosphere?
4. _____ is a system of 30+ satellites that circle Earth and send out signals.
5. What is the division of the NASA Science Mission Directorate that studies the Sun and how it influences space?

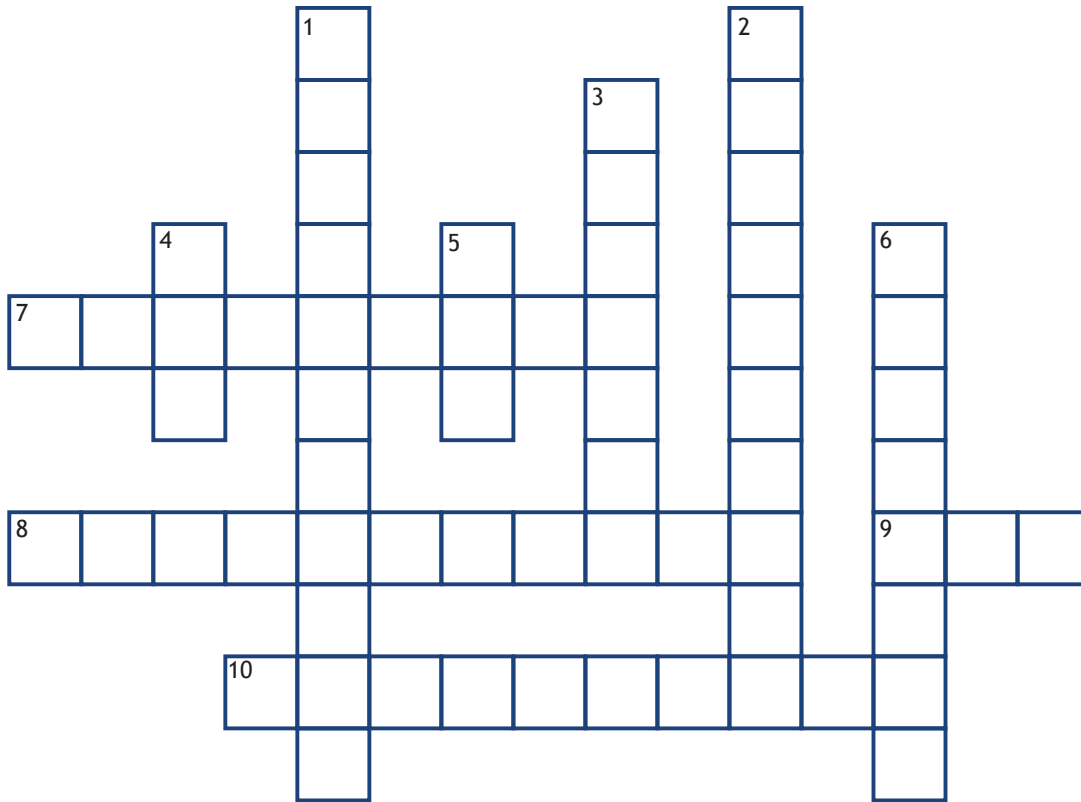
ACROSS:

6. Which layer of the atmosphere is closest to Earth?
7. AWE will look at gravity waves affecting the _____ atmosphere.
8. AWE will take one image per _____.
9. AWE will identify how atmospheric _____ contribute to space weather.

Mission Crossword - 2



Fill the squares with the correct answers to the questions below.



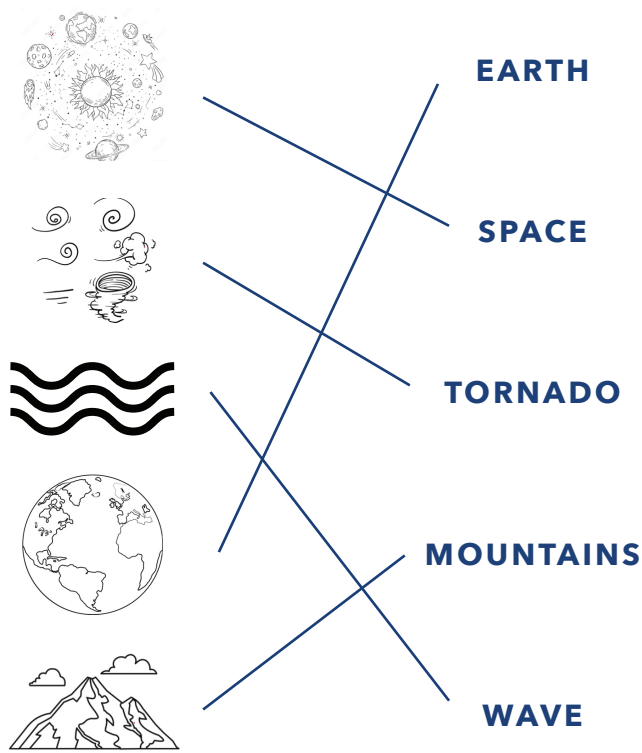
DOWN:

1. Atmospheric gravity waves in space can disrupt _____ and their navigation apps on Earth.
2. What surrounds Earth, keeps us warm, contains oxygen to breathe, and is where Earth's weather occurs?
3. AWE is ____! (Another word for impressive.)
4. Which star gives Earth light and warmth?
5. How many layers are in our atmosphere?
6. What is the part of the electromagnetic spectrum that we cannot see with our eyes but can feel as heat?

ACROSS:

7. Atmospheric gravity waves form _____ when wind rushes over these landforms.
8. What is the innermost layer of Earth's atmosphere?
9. What is the acronym for Atmospheric Waves Experiment?
10. Which layer of the atmosphere is located above the stratosphere and below the thermosphere?

MISSION MATCHUP ~ PG 1



DISCOVER THE DIFFERENCE ~ PG 2

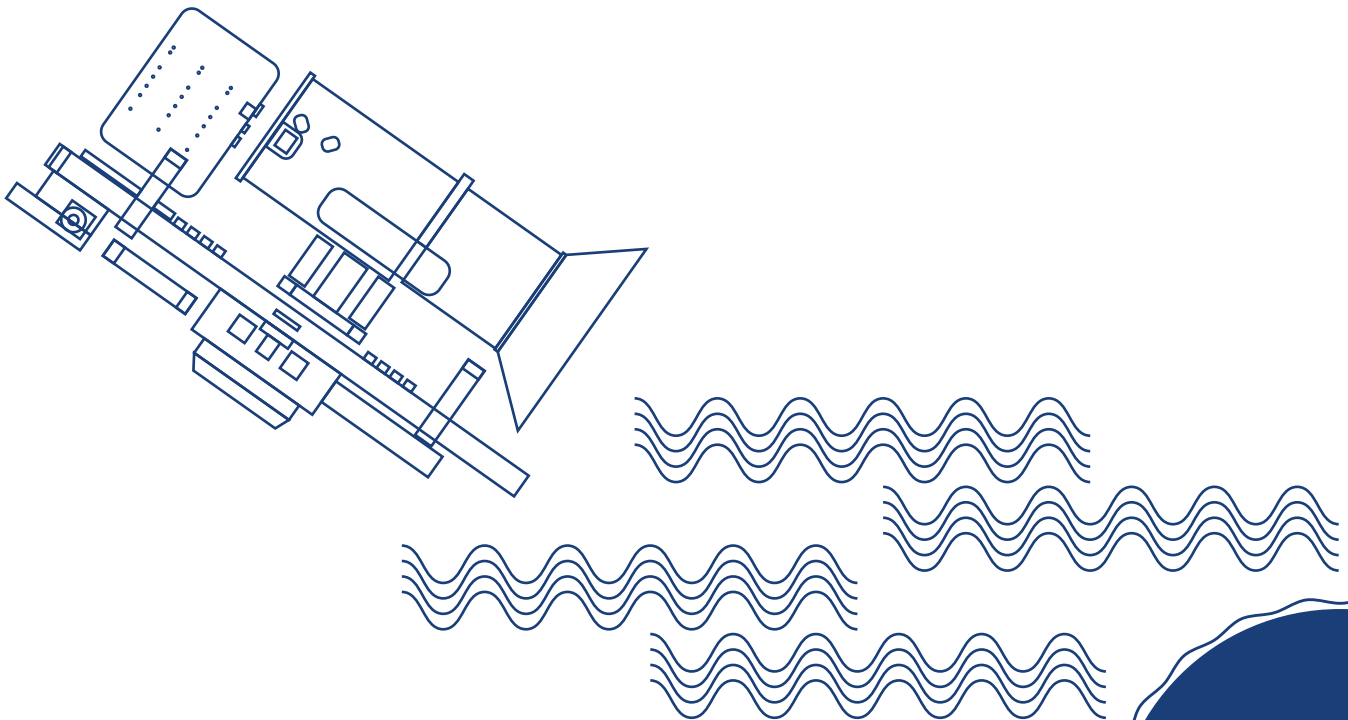
- | | |
|------------------------|--------------------------------|
| 1. Energy | 1. Invisible |
| 2. Space communication | 2. Acceleration |
| 3. High mountaintops | 3. Travel |
| 4. Pulses of air | 4. Speed of light |
| 5. Thunderstorm | 5. Squeeze and stretch objects |
| 6. GPS | 6. Ripple in space and time |

SPACE SCRAMBLE ~ PG 3

- | | |
|-------|-------|
| AEW | AWE |
| EWVA | WAVE |
| APSC | SPACE |
| BRTOI | ORBIT |
| TMSRO | STORM |

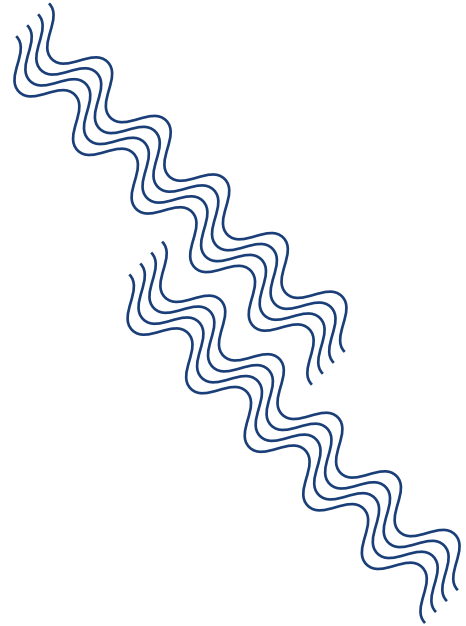
DATA MODULATION ~ PG 4

- | | |
|--------------|--------------|
| SPHSLCHIIOEY | HELIOPHYSICS |
| PCTRHMEAIOS | ATMOSPHERIC |
| USHTRDTORME | THUNDERSTORM |
| MSUTENTNRI | INSTRUMENT |
| EEMHHRSOETPR | THERMOSPHERE |
| NTUIANMOTSOP | MOUNTAINTOPS |
| AIVGRTY | GRAVITY |
| AESVW | WAVES |
| EASCP | SPACE |
| HEAWTER | WEATHER |



AWESome Word Search - 1 ~ PG 5

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



AWESome Word Search - 2 ~ PG 6

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

