

## Object

The object of this game is to get to the space station with minimal radiation exposure.

## Instructions

- 1** Start  
Place your token on the Start spot on the board. The student whose birthday is closest to February 14<sup>th</sup> begins. Play proceeds in a clockwise direction.

- 2** Determine your Career  
Each person should roll the dice to determine their career. Use the list below. Write your occupation on your Tally sheet. Record in the Add column the mrem/year associated with this occupation.

OCCUPATIONS	EXPOSURE
1= Airplane pilot	600 mrem/yr
2= Nuclear Medicine Technologist	520 mrem/yr
3= Dental hygienist	300 mrem/yr
4= Concrete Layer (mason)	3 mrem/yr
5= Nuclear Power plant Worker	600 mrem/yr
6= Optometrist (making eyeglasses with thorium)	11 mrem/yr

- 3** Determine Where you Live  
Roll the dice to determine where you live. Use the list below. Write your place of residence on your Tally sheet. Record in the Add column the mrem/year associated with your chosen residence.

PLACES TO LIVE	EXPOSURE
1= Washington State (Northwest Region)	240 mrem/yr
2= Washington State (Northeast Region)	1700 mrem/yr
3= Directly outside a Nuclear Power Plant	661 mrem/yr
4= Living off of the Atlantic Coast	23 mrem/yr
5= Living in the Rocky Mountains	90 mrem/yr
6= Chicago, Illinois	46 mrem/yr

- 4** Proceed from the starting position. For each move, be sure to read the square carefully and record on your Tally sheet either the addition or subtraction of mrem.

**5**

Astronaut Training

Every player must stop at Astronaut Training and roll the dice to determine their age. Use the list below.

If you roll a: Your age is:

1 or 2	= 25 years old
3	= 35 years old
4 or 5	= 45 years old
6	= 55 years old

Record your age and sex on your Tally sheet. Calculate your exposure limits using this formula:

Males	Take your age, and subtract 30. Multiply this by 7500 mrem and then add 200,000 mrem.
Females	Take your age, and subtract 38. Multiply this by 7500 mrem and then add 200,000 mrem

**6**

Record the number that you calculated from #5 on your Tally sheet. This will be the number that you will use at the end of the game to help to determine the winner.

**7**

Every player must stop at the Launch site and wait until their turn to roll again.

**8**

Continue the game until you reach the space station.

**9**

Once all players finish, everyone must calculate their exposure on their Tally sheet. To do this, you first need to convert all units into the time frame of one day. Add all the columns for a Grand Total.

**10**

Determining the Winner

Using the number that you calculated in #5, did your total number exceed your exposure limit? If so, you are disqualified. If not, use the Career Exposure Limits by Age and Sex Table and the player with the lowest exposure limit for sex and age, wins.

## Career Exposure Limits by Age and Sex

Sex	Age 25 years	Age 35 years	Age 45 years	Age 55 years
Male	162,500 mrem	237,500 mrem	312,500 mrem	387,500 mrem
Female	102,500 mrem	177,500 mrem	252,500 mrem	327,500 mrem

### Tally Sheet for Each Player

	mrem/min	mrem/hr	mrem/day	mrem/year
Sub Totals				
	Multiply by 1440	Multiply by 24	Multiply by 1	Divide by 365
Total mrem/day				
Grand Total mrem/day				



Flew during a major SPE.  
**Add 90 mrem/hr to Tally card.**



Flew during a major SPE.  
**Add 90 mrem/hr to Tally card.**



Ask any team member what rem stands  
for (Roentgen equivalent man).  
**If they know, they subtract 10 mrem/hr  
from Tally sheet.**



Ask any team member what rem stands  
for (Roentgen equivalent man).  
**If they know, they subtract 10 mrem/hr  
from Tally sheet.**



Used shielding when sleeping.  
**Subtract 15 mrem/hr from Tally sheet.**



Used shielding when sleeping.  
**Subtract 15 mrem/hr from Tally sheet.**



Get hurt while practicing acrobatics  
without gravity.  
**Add 440 mrem/hr to Tally sheet.**



Get hurt while practicing acrobatics  
without gravity.  
**Add 440 mrem/hr to Tally sheet.**





Bonus card:

**Delete highest exposure on Tally card.**



Bonus card:

**Delete highest exposure on Tally card.**



Exposure high!! Did not watch TEPC reading.

**Add 250 mrem/min to Tally card.**



Exposure high!! Did not watch TEPC reading.

**Add 250 mrem/min to Tally card.**



Doctor found radionuclides in your body.

**Add 39mre/yr to Tally sheet**



Doctor found radionuclides in your body.

**Add 39mre/yr to Tally sheet**



Checked TEPC readings.

**Add 0.1 mrem/min to Tally card.**



Checked TEPC readings.

**Add 0.1 mrem/min to Tally card.**





Found old pocket watch with radium dial.  
**Add 6-mrem/yr to Tally sheet.**



Found old pocket watch with radium dial.  
**Add 6-mrem/yr to Tally sheet.**





# ARE YOU TOO HOT?

eMISSION  
SPACE STATION ALPHA

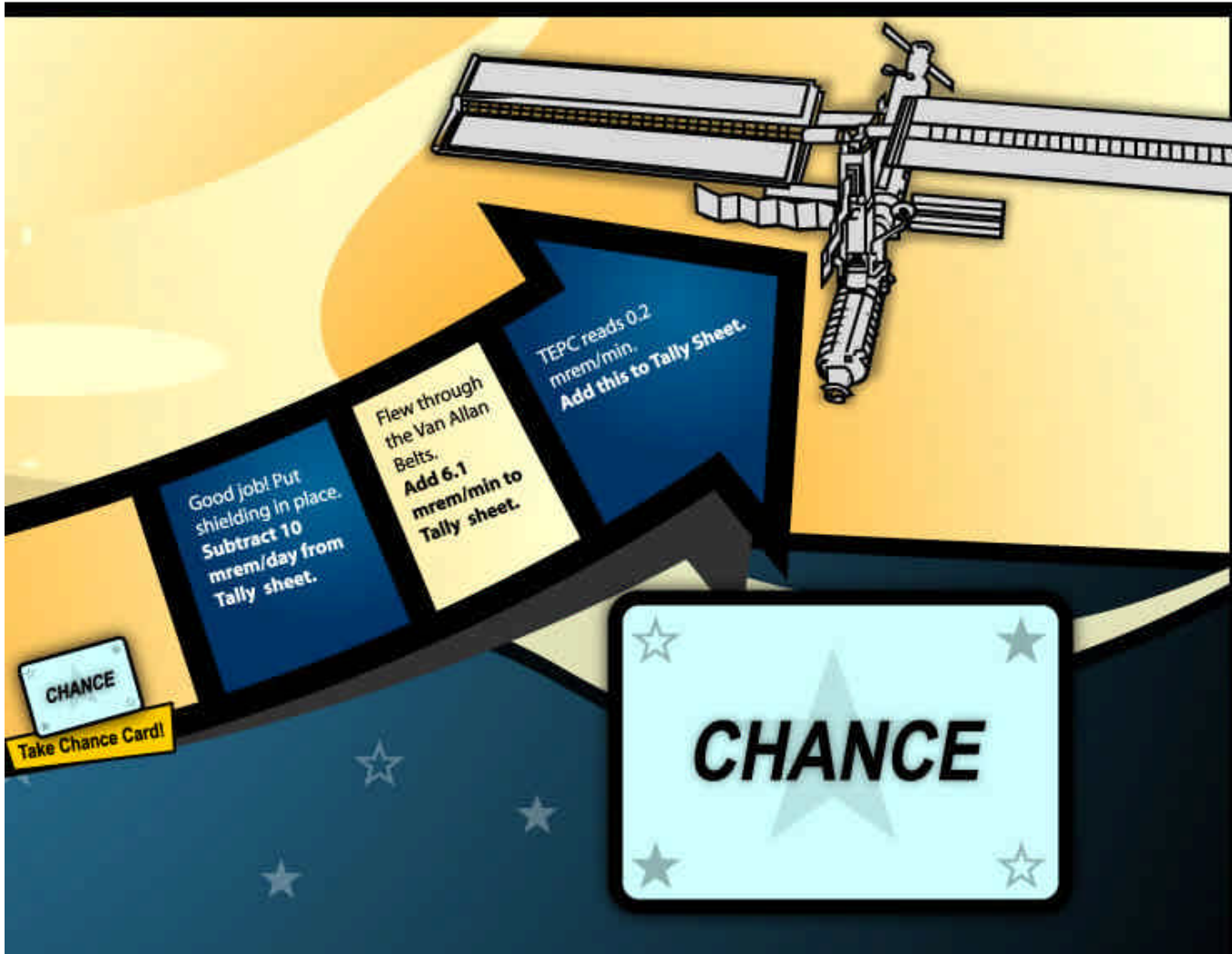
**STOP  
HERE**

**CHANCE**  
Take Chance Card!

Very thirsty. Drink water.  
Add 5 mrem/year to  
Tally sheet.

Big solar flare hits  
shuttle.  
Add 300 mrem/min  
to Tally sheet.

Do not abide by  
the ALARA  
guidelines.  
Add 15 mrem/  
day to Tally  
sheet.







Wear eyeglasses that contain thorium.  
Add 6 mrem/year to Tally sheet.

Took pocket watch with a radium dial to keep track of training time.  
Add 6 mrem/year to Tally sheet.

CHANCE

Take Chance Card!

Sat too close to TV before launch for one hour. (X-ray from TV at 1 inch)  
Add 0.5 mrem/hr to Tally sheet.

Stressed from mission. Must have stomach X-ray.  
Add 245 mrem/hr to Tally sheet.

Learned about shielding.  
Subtract 4 mrem/min from Tally sheet.

# START

Roll For a Career and a Place to Live!



Exposed to cosmic radiation on Earth.  
Add 27 mrem/year to Tally sheet.

CHANCE

Take Chance Card!

The foundation of your house is made of concrete.  
Add 3 mrem/year to Tally sheet.

You live near a Nuclear Power plant.  
Add .6 mrem/year to Tally sheet.

# ASTRONAUT TRAINING

Roll For an Age!



Practicing for an EVA. Broken arm. Need X-ray.  
**Add 1 mrem/min to Tally sheet.**



Chipped your tooth while eating space food. Need dental X-ray.  
**Add 10 mrem/min to Tally sheet.**

Flew from California to Florida for shuttle mission.  
**Add 5 mrem/day to Tally sheet.**



You heat your home with Natural gas.  
**Add 9 mrem/year to Tally sheet.**

Hard to breathe. Need chest X-ray.  
**Add 8 mrem/min to Tally sheet.**

Nuclear bomb explodes nearby.  
**You are dead. Start over.**