

A Mathematical Adventure !

Level 6

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Brain Research

(Completed by University California, Irvine brain physicists)

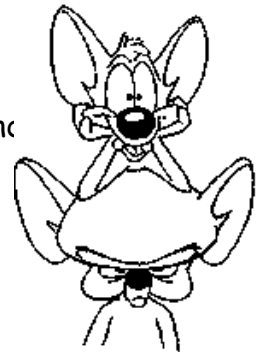
- Half the class juggled 4 days, 5 minutes each day. Half the class memorized a word list 4 days, 5 minutes each day.
- On the fifth day, the juggling group memorized word list for 20 minutes, word list group juggled for 20 minutes.
- Students were tested the following week; both groups performed well.
- Everyone took a week break from studying. Students were retested after the break: Drastic changes in retention of material.
- Studying something 5 minutes a day is better for retaining information over time.
- As educators, we would agree to this fact. How do we teach reading? Grammar & punctuation? Spelling? Writing?.....Math?

Why do patterns?

The most prominent reason is that it takes different kinds of "thought" to find the solution to different kinds of patterns.

Most of us rely exclusively on "figuring it out." People need to challenge their minds daily with simple and complex patterns. Many of these problems will defy their usual 'thinking' processes.

This gives them an opportunity to practice using higher reasoning when necessary. This is the "Aha" voice. Listen to this voice. The more you do, the louder it will become. The louder it becomes the more you realize it is there all the time to help you see the solution to any problem you may have.



Star Voyagers Overview

What is Star Voyagers? Star Voyagers is a supplemental mathematical basic skills program that spirals through the standards challenging students on a daily basis.

How does it work? Students work independently computing four math problems, each from a different math strand, then meet as a team to compute an averaged team score, tally errors, and help each other to become more capable mathematicians. A weekly homework assignment is completed at home for further practice of skills. After every third homework assignment, an assessment is given to ensure mastery of the skills. Students use the homework to practice and prepare for the test and ask for help.

What is the Star Voyagers simulation? Students are traveling in groups on a space ship in the solar system. Since they are humans, daily math practice, or Photon Work, provides the necessary oxygen. If the team averages a score of 3 or 4 points on their Photon Work, they will be provided with 24 earthly hours of oxygen. If a team is not capable of earning an acceptable score, they will become Aliens. Aliens also need to complete the daily Photon Work for sustenance, however, planetary travel is prohibited.



Star Voyagers Synopsis:

Several elements make up this 36-week Star Voyagers program. The first component is the simulation, the part that makes the learning fun and purposeful. The simulation will provide opportunities for students to develop persevering skills, evaluate mistakes, and work toward mastering necessary math concepts.

As with all long-term retention, there needs to be the element of practice; the second piece of the Star Voyagers program. Research has proven that repetition over a period of time is the best method for our brains to retain information in our long-term memory. The practice portion is in the form of four problems provided four days a week, either on an overhead or in hard copy form.

The third segment is weekly practice at home to reinforce the skills taught in the classroom. This additional practice is necessary preparation for the assessment, the final section. Assessments provide the feedback that teachers, parents, and students need in order to demonstrate and document mastery of these skills.

Simulation Summary:

Star Voyagers are human adventurers traveling as a team of three or four members through the solar system. Human beings require oxygen in order to breathe. To "earn" oxygen, Star Voyagers will complete daily Photon Work. If a team is successful in completing 3 of the 4 problems correctly as an averaged team score, 24 hours of oxygen (weekends and holidays are exempt) in the form of a Megabeam Thruster Unit, or MATH unit, will be provided.

Photon Work, supplied four times a week by Pythagoreus, the goddess of space, will be available either on an overhead or hard-copy form. If overheads are used, answers may be recorded in 70 page spiral notebooks available for purchase in most stores.

There is absolutely no talking during the Photon Work. Being a neutral goddess, even Pythagoreus may not assist in any way. Since math is an individualized subject, everyone needs to understand the skills on their own without assistance. During the Photon Work stage, each Star Voyager may miss one problem. By working completely independently, Star Voyagers will be developing important skills for scholarly learners; persevering with problem solving, making connections with information, and learning to ask questions.

After completing of the Photon Work, Star Voyagers switch their work with someone not on their team for the correcting process. Any questions may now be asked. The best method for correcting is to randomly call on students for responses and accept any answer that a student offers; whether it is correct or incorrect. Remember that Pythagoreus is a neutral party, it is the Star Voyagers' responsibility to ask for clarification. If a Star Voyager is not sure whether an accepted response is correct, they will need to ask. Pythagoreus will then review the problem in question, and a final decision of the answer will be made.

When correcting is completed, Pythagoreus dismisses the teams to meet for two minutes to take care of necessary Star Voyagers business. During the team meeting, every member will have a job to do. The **Captain** will record each team member's daily score and calculate the team's average. The **Scribe** tallies errors and lets the members know if a concept has not been mastered. By tallying mistakes, Star Voyagers are able to see whether they are making the same mistakes over a period of time, which is helpful in evaluating whether an error was careless. The **First Mate** double checks to make sure each member is accurate in reporting his/her score. Additionally, the First Mate will double check the Captain's calculations to guarantee accuracy. **Attendants** tend to the ship by bringing the Captain's calculated score sheet to Pythagoreus for their MATH unit, and then moving the ship to another destination.

If a team is not able to earn their MATH Unit, they become Aliens. Aliens still need to complete the Photon Work for necessary sustenance, however, they are forbidden to travel. Aliens need to try to earn back their "Humanhood" before the round of play (twenty Photon days) is over in order to reap the "rewards". Humanhood can be retrieved by earning a Shield. Shields are rewarded when every member on the team scores a 4 on any given Photon Work day. There are approximately two "Shield Days" in each quarter where the students should be able to have a perfect score and earn a Shield. Pythagoreus also has the liberty of providing a Shield for other accomplishments depending on Star Voyagers' needs.

Weekly homework assignments are completed at home for additional practice. An **assessment**, similar in appearance to the weekly homework, takes place approximately once a month. The purpose for the homework and assessment is to supply additional reinforcement for the skills to be mastered, and focus more intensely on a few skills over time. After three consecutive homework assignments, the students will complete an assessment. At the end of the 36 week program, Star Voyagers will have a stronger foundation with their math skills, and Pythagoreus will rest assured that all of the skills have been incorporated throughout the year.

Selecting Teams & Explaining Jobs:

Selecting teams will vary depending on the makeup of your class. Ideas for choosing teams:

- * place two competent with two less capable mathematicians for balance
- * for students who might sabotage a team, place together on their own team(s)
- * place struggling students together with additional opportunities to earn Shields
- * place strong mathematicians together, but don't allow rounding for their score
- * allow students to select their own team, anyone "left out" needs to come up to the front and form their own team with other "left-outs".



Selecting Teams & Explaining Jobs: (continued)

Explaining jobs is easier in small groups.

After teams have been formed and jobs have been decided upon, meet with each job group individually. While the Attendants decorate the ship and First Mates fill out the Agreement call the Captains together for a meeting. Explain 1) how to write the names of their team members on the Score Sheet 2) how to cut the Score Sheet down to fit on the inside of their spiral binder and be glued in place 3) how to complete the Score Sheet 4) how to round (if that applies to grade level) since they are allowed to round their scores to help their team earn a MATH Unit 5) check for understanding 6) explain that you will soon be calling the First Mates over to join the Captains; the Captains will be responsible for explaining the scoring process to their First Mates. Dismiss the Captains to explain Score Sheet procedures to First Mates.

While Captains are explaining Score Sheet to First Mates, meet with the Scribes to explain 1) the different topics on their Scribe Sheet 2) how to write the names of their team members on the Scribe Sheet 3) how to cut the Scribe Sheet down to fit on the inside of their spiral binder and glue in place 4) how to complete the Scribe Sheet 5) what Scribes need to do if a member gets three tally marks in one box. (This could be to tell the member, write Pythagoreus a note, etc.)

Lastly, meet with the First Mates to ensure understanding of their jobs. 1) Double check to make sure they understood how to complete the Score Sheet, (First Mates will take over if/when the Captain is not available) 2) reinforce calculating the daily score to make sure there are no errors in the Captain's calculations 3) the First Mate needs to understand responsibility of making sure every score each member reports is accurate. Errors in reporting or calculating score could prove fatal (result in disqualification).

End of Round Procedures:

Team Ranking: To rank the teams, make a grid (with rows to accommodate all teams) divided into 4 columns on the overhead or board. Ask all Captains to stand and state the name of their team for you to record on the grid. First Mates report the MATH Units, Scribes report the number of Shields. As a group, rank the teams. If a team has needed to use a Shield in order to receive oxygen and become humans again, they will not be able to count that as a MATH Unit, nor will they be able to count the Shield since it has been used. The first place team will have first pick from the rewards, second place team has second pick, and so on. Pythagoreus can decide if Aliens are rewarded.

Ideas for rewards: Rewards are subject to Pythagoreus' discretion. You might want to set out enough candy of various sizes (larger bars down to single small pieces), books, stickers, homework passes, assorted coupons, etc. for everyone who will be receiving a reward. After the first place team chooses, remove the highly desirable items from the pile before the second place team selects. This process continues until all "Humans" have been able to reap the rewards. Aliens may pick from the pile at the end.





Star Voyagers Rules

You and your comrades are adrift in space, your sole purpose is survival and adventure. Beware as there are other Star Voyagers' ships hoping for your team's demise so that they may prove to be the better adventurers. At the end of the quarter, each surviving spaceship will reap the rewards.

Pythagoreus, the goddess of space, will be providing you with opportunities to gain valuable oxygen by presenting you with Photon Work on a daily basis. Always do your best with your Photon Work as this will replenish your ship with oxygen, a necessity for human life support. Each team's averaged score of 3 points or better, will allow Pythagoreus to furnish your ship with a Megabeam Action Thruster unit, also known as a MATH unit.

MATH units are very important for your survival in space as they will supply your ship with the necessary oxygen for your continued journey in outer space, where the atmosphere is quite different than here on Earth. One MATH unit provides enough oxygen for you and your team to live comfortably for 24 earthly hours; weekends and holidays are exempt in Star Voyagers. Traveling for more than 24 earthly hours without life support will cause you and your crew to weaken and become aliens. Aliens also need MATH units for their recommended daily sustenance, however, they are not permitted to travel; they just sadly drift aimlessly in outer space.

If every member on your team earns a perfect score on their personal Photon Work, your team will be rewarded with a Shield. Shields are a valuable commodity as they provide your ship with an additional 24 hours of oxygen should your team need it. Shields can be used retroactively if need be.

It is now time for you and your crew to decide on the name of your team, and who the Captain, First Mate, Scribe, and Attendant will be. The Captain must be a mighty mathematician capable of accurately completing the team's Score Sheet on a daily basis. This needs to be carefully administered as any mistake could prove disastrous.

The First Mate must learn to do the Captain's job as he/she will take over if the Captain is not available. The First Mate will also check over the Captain's calculations, as well as each of the crew member's scores, to prevent any mistakes from occurring.


The Scribe is in charge of keeping track of each crew member's progress. He/she will tally the errors and assess the needs of each crew member on the team. If the Scribe is not able to assist a team mate in need, it is the Scribe's duty to leave a note for Pythagoreus keeping her aware that assistance is necessary.

The Attendant will take the Captain's calculated Score Sheet to Pythagoreus for the final check of the team's progress, and then tend to the ship. Remember, any error could prove fatal, so double check before this stage. If Pythagoreus gives the O.K., your team will need to get ready for take-off.

Good luck, and may the Math Source be with you!


Star Voyagers Score Sheet



	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
 Star Voyagers																	
Captain																	
1st Mate																	
Scribe																	
Attendant																	
Averages																	
MATh unit																	
Shields																	

Star Voyagers Scribe Sheet

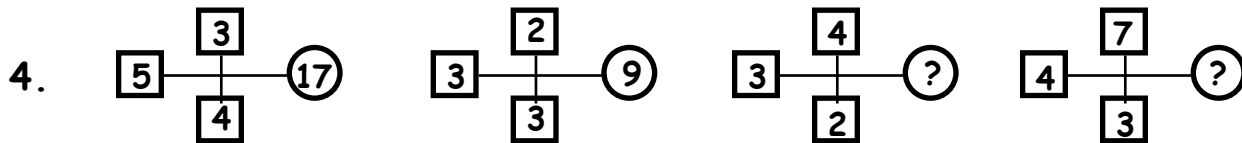


	Addition	Subtraction	Multiplication	Division	Place Value	Converting Fractions	Fractions <small>+ , x, ÷ of</small>	Decimals <small>+ , x, ÷ of</small>	Algebra	Ratios, Proportions	Math Language	Exponents	Percentages	Integers	Area, Volume, Perimeter	Surface Area, Circumference	Geometric Terms	Order of Operations	Patterns	Other
Captain:																				
1st Mate:																				
Scribe:																				
Attendant:																				

The Scribe must use this sheet to tally errors of teammates. Assistance is needed when three or more tally marks are present in any one category. Remember to work as a team and help each other. If the team's help is not sufficient, Pythagoreus is available to offer further guidance.

4th Quarter-Week 6-day 3

1. What is the value of the 3 in the number 27,854,010.2763 ?
2. Use digits and symbols to write:
Negative seven and four-tenths is less than one and one-hundredth.
3. Find the mean for these numbers:
3.873, 2.657, 3.554, 4.332, 4.632, 2.346



4th Quarter-Week 6-day 4

1. Round the difference of 7.45 and .6784 to the nearest thousandths place.
2. Find the quotient: $11 \div 4 \frac{3}{7} =$
3. 3,421 mm = _____ cm
4. Which of these numbers does not belong? Explain.




Star Voyagers Homework
 Level 6

Name _____

Date _____

Solve for X and ✖ :

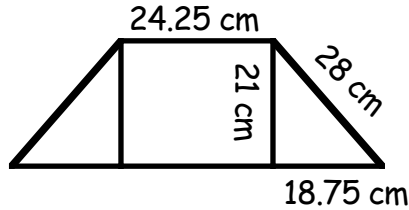
1. $5x - 2✖ - 3x = 3x + 7$

1. $X = \underline{\hspace{1cm}}$ $✖ = \underline{\hspace{1cm}}$ check: $\underline{\hspace{1cm}}$

2. $3✖ + -5 = -11$

2. $X = \underline{\hspace{1cm}}$ $✖ = \underline{\hspace{1cm}}$ check: $\underline{\hspace{1cm}}$

3. Find the area:



3. _____

4. Find the perimeter:

4. _____

5. $\frac{27}{54} = \frac{?}{6}$

6. $\frac{8}{3} = \frac{?}{15}$

5. _____

6. _____

7. What percent of 80 = 16 ?

7. _____

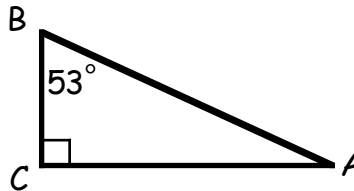
8. 75 % of 180 =

8. _____

9. 10 % of what equals 660 ?

9. _____

10. What does $\angle CAB = ?$



10. _____

11. $127 \text{ m} = \underline{\hspace{1cm}} \text{ mm}$

11. _____ mm

12. $72 \text{ m} + 65 \text{ cm} = \underline{\hspace{1cm}} \text{ mm}$

12. _____ mm

13. $323 \text{ inches} = \underline{\hspace{1cm}} \text{ yds}, \underline{\hspace{1cm}} \text{ ft}, \underline{\hspace{1cm}} \text{ in}$

13. _____ yds, _____ ft, _____ in

14. If $x = -3$ and $y = -4$, evaluate the expression:

14. _____

$x(2x + 2y) - y(x + y) =$

15. If $x = 8$ and $y = 2$, evaluate the expression:

15. _____

$\sqrt{4x + 2y} \div (x - y) =$



Star Voyagers Assessment #8

Level 6

Name _____

Date _____

Solve for X and ✖:

1. $2(\text{✖} + 3) + 6X = 2X + 24$

1. X=_____ ✖ = _____ check: _____

2. $4\text{✖} + 2 = -8 + 2\text{✖}$

2. X=_____ ✖ = _____ check: _____

3. $3\text{✖} - 2\text{✖} + 14 = 2\text{✖} + 4$

3. X=_____ ✖ = _____ check: _____

Solve:

4. 45 of $\frac{30}{50} =$

4. _____

5. $7\frac{3}{7} \times 3\frac{2}{9} =$

5. _____

6. $35 - \frac{5}{21} =$

6. _____

7. $\frac{4}{5} \div 2\frac{1}{2} =$

7. _____

8. 3,264 in = _____ yds, _____ ft

8. _____ yds, _____ ft

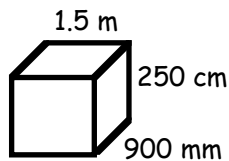
9. $4 \times 10^3 + 9 \times 10^2 + 1 =$

9. _____

10. $37 + (10 - 4 + -6) =$

10. _____

11. Find the volume:



11. _____

12. 3, 12, 5, 20, 12, 48, 39, ?, ?, ?

12. _____, _____, _____

13. Write the probability of drawing a black jack from a deck of cards (52 cards, 4 suits) as a fraction, decimal, and percent.

13. _____

NOTES, QUESTIONS, DOODLES:

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