

Bringing Maths to Life (Levels 1-2)

Read the questions below carefully and see if you can use your mathematical skills to solve the problems all the way to Level 3. If you're struggling to solve the problem, the tip might be able to help you.

Question	Tip	Answer
Astra has 12 years of experience, Orion has 26, Aurora has 25, Stella has 18, and Nova has 35. How many years of experience do they have together?	Add each of the astronaut's years of experience together. Remember you can add your numbers in any order to make it easier if you want. That's the commutative property of addition!	
Assume that when Earth and Mars are at their closest, a spaceship could leave Earth and arrive at Mars in 9 months. Also assume that at their furthest, a spaceship would take two years to make the same trip. What is the difference between the two trips in months?	First, change the time in years into months. Then subtract the smaller duration from the longer duration to find the difference. Remember, difference is the answer to a subtraction problem.	
If estimates suggest 105,000 people are needed to have a fully self-sustaining colony on Mars and that the largest spaceship taking humans to Mars can take 100 people. How many ships would need to set up a self-sustaining colony?	Divide the number of people by the number of ships. A shortcut when dividing by powers of 10 (1, 10, 100, etc.) is to count the number of zeros and move the decimal to the left.	
Since Mars is further than Earth from the Sun, solar panels are less effective. If we simplify the difference to say that we need two and a half panels on Mars to equal one on Earth, how many solar panels would be needed on Mars to create the same amount of energy as 56 panels on earth?	If 1 panel on Earth is equal to 2.5 panels on Mars, then we need to multiply the 56 panels on Earth by 2.5 to see how many panels would be needed to create a similar amount of energy on Mars.	
Astra has completed $\frac{3}{4}$ of a special training. If the training is 80 days, how many days has Astra completed?	Multiply the fraction times the total days of training to figure out how many days of training Astra has completed.	
The first lemon tree was planted in soil of Mars. It was a scientific marvel. The first harvest had 2 lemons. The second had 4 lemons, double the amount in the first harvest. The third had 8, again double the previous harvest. If this pattern continued, how many harvests until the lemon tree got to 128 lemons?	This is a pattern of exponential growth. Start with the first harvest (2 lemons), and keep doubling the number of lemons for each subsequent harvest. Continue this process until you reach 128 lemons. Count each step in this doubling process to determine the number of harvests needed to reach 128 lemons.	



Bringing Maths to Life (Levels 3-5)

Read the questions below carefully and see if you can use your mathematical skills to solve the problems all the way to Level 3.

If you're struggling to solve the problem, the tip might be able to help you.

Question	Tip	Answer
Orion has twice as many years of experience as an astronaut as Aurora. Astra has 3 years less experience than Orion. Nova has 5 more years of experience than Astra. Stella, the most experienced astronaut of the group, has twice as many years of experience as Nova. If Aurora has 6 years of experience, how many years of experience do each of the astronauts have?	Start with the information we know which is that Aurora has 6 years of experience. From there, use the hints to find each person one at a time. Starting with Aurora, the next person to figure out is Orion because they have twice as many years as Aurora. Follow this logic to find them all.	
The forecast has the following percentages for rain on the next 5 days: 50%, 75%, 25%, 100%, 40%. If the mission to Mars is only going to launch on a clear day with no rain, what is the probability that the spaceship never launches?	To find the probability that it rains every day (and thus the mission does not launch), multiply the probabilities of rain for each of the 5 days together.	
Mars and Earth are at their closest to each other about every 780 days. If the next launch window is March 1 to March 8, when is the next launch window? Assume there is no leap year.	Since the next window starts on March 1, calculate the date that falls 780 days after this. Remember to account for the total number of days in each month and assume no leap year in your calculations.	
If the spaceship carrying the astronauts is about 50 meters tall and a person whose eyes are 2 meters above the ground is looking at the top of the rocket at a 30° angle, how far are they from the rocket? Assume the rocket is perpendicular to the ground.	The scenario forms a right triangle where the height of the rocket is one side, the distance from the person to the rocket is the other side, and the line of sight to the top of the rocket is the hypotenuse. The angle given is 30° , and you know the height of the rocket from the person's eyes to the top of the rocket, which is 48 meters (50 meters - 2 meters).	
Dynamic pressure is the aerodynamic stress on a rocket's structure due to the combination of air density and its velocity. Since the air density decreases as the rocket gets higher in the atmosphere and simultaneously the rocket is obtaining a higher velocity, we have less pressure due to density, but more pressure due to velocity as the rocket gains altitude. If we are able to simplify this phenomenon to the function $y = 2x^2 + 20x - 15$ where y is pressure on the rocket and x is the number of minutes, how many minutes into the launch does the rocket experience maximum pressure?	In a quadratic function of the form $y = ax^2 + bx + c$, the x -coordinate of the vertex (which gives the time of maximum pressure in this case) can be found using the formula $-b/2a$. Apply this formula to the given equation to find the value of x (time in minutes) when the pressure is at its maximum. Remember, this formula gives you the time at which the dynamic pressure (y) is at its peak based on the simplified model provided.	

