



Special Operations Team

Mission Day Answer Key

Directions:

Use this answer key to guide the special operations team through the problem solving process. If your students are stumped, you can use the hints column at the right to prompt them. Do not distribute this answer key to the students.

Problem #	Answer	Hints for Special Ops Team
1.) Arranging the astronauts for the satellite capture		
Step 1: Finding the triangle's height	$h = 5.4$ meters	Hint 1: You could also say that the height of the triangle is three times the radius of the satellite.
Step 2: Finding the length of the triangle's base	$b = 6.26$ meters, rounded to the nearest hundredth	Hint 1: You already have the height of the triangle, which you found in step 1, and the area has been given to you in your downloaded material. You just need to plug that information into the formula for the base of a triangle, also located in your download.
2.) Moving the satellite into the cargo bay		
Step 1: Finding the volume of the satellite	Answer: 53.92 meters ³ , rounded to the nearest hundredth	Hint 1: Did you remember to square the radius? That means you multiply the radius by itself. Hint 2: Did you remember to insert Pi into the formula as 3.14?
Step 2: Finding the mass of the satellite	Answer: $14,396.64$ kg	Hint 1: Did you remember to cross-multiply to solve the problem?
Step 3: Finding the amount of force needed to move the satellite	Answer: $143,966.4$ Newtons	Hint 1: Did you remember to cross-multiply to solve the problem?
3.) Moving the satellite into the cargo bay		
Step 1: What is the missing angle of the robotic arm (X) relative to the surface of the space shuttle?	Answer: $X = 30$ degrees	Hint 1: How many degrees are in a triangle? Hint 2: There are 180 degrees in a triangle. Hint 3: What does a small square mean when it is placed in an angle of a geometric shape?
4.) Relaunching the satellite at the correct angle		
Step 1: Find the measure of angle X to find the angle at which the satellite thrusters should be fired.	Answer: $X = 30$ degrees	Hint 1: Angle X and the angle that measures 150 degrees are supplementary angles Hint 2: Supplementary angles equal 180 degrees when they are added together.
5.) When should the shuttle be relaunched?		
Step 1: Finding the diameter of the shuttle's orbit	Answer: $13,456$ km	Hint 1: The radius is half of the diameter. Hint 2: To find the diameter of the shuttle's orbit, you must include the Earth's radius and the altitude of the shuttle in the picture that was downloaded by you.
Step 2: Finding the circumference of the shuttle's orbit	Answer: $42,251.84$ km	Hint 1: Use the diameter you found in step 1 of this problem and Pi, 3.14, to solve this problem.
Step 3: Finding the time it will take to complete a revolution around the Earth	Answer: 1.55 hours, or 1 hour, 33 minutes	Hint 1: Divide the circumference you found in step 2 by the speed of the shuttle to find the answer. You can find the speed of the shuttle in the download.