1. For scientific notation, we have a number between 1 and 10 multiplied by ten raised to a power. So, 300,000,000 = 3.0 × 108,**(C)**
2. One light minute would be the distance light travels in one minute. Thus we would do 300,000,000 m/s ×60 s = 18,000,000,000 m, **(D)**
3. If it takes 4.2 years to get to the star, it would take 4.2×365=1533 days **(C)**
4. (5★9)★(12★4)

= (52  9)★(122 4)

= 16★140

= 162140

= 256140

= 116, **(C)**

1. The absolute value of any expression cannot be negative, thus there are no solutions and no such stars exist, **(D)**
2. The first inequality simplifies to and the second to The integers satisfying this is 4, 5, 6, 7, and 8. The sum is 30, **(B)**
3. To find the midpoint we take the average of the x-coordinates and the y-coordinates. The x-coordinate of the midpoint is and the y-coordinate is . The midpoint is (2.5, 1) **(A)**
4. First divide and then combine like terms:

, **(C)**

1. If the moon is in its last quarter, there will be 28/4 = 7 days until it becomes a new moon. Then after half of its cycle (14 days) it will be a new moon. Thus, the next full moon will be after 21 days on December 30th, **(D)**
2. The pattern is obtained by multiplying perfect squares by 2. Thus the next number in the sequence is 62 × 2 = 72, **(B)**
3. The part cancels in the numerator and denominator, leaving , **(E)**
4. N, or the natural numbers, does not describe the set as it only contains integers greater than 0, **(A)**
5. A point would be on this line if the slope connecting it to any of the points on the belt was the same as the slope of the belt. The slope of the belt can be calculated by the change in y over the change in x, or . With trial and error, (-50, -2) is the point that creates the same slope with the other points, **(D)**
6. The x-intercept is located at (3, 0) and the y-intercept is located at (0, 2). The distance between the two points is , **(A)**
7. First we find how long the airplane flew for. From the information give, we see that it flew for 1500/1200 = 5/4 minutes = 75 seconds. To Townsend, if the plane moves 5 mm/s it would have moved 75 × 5 millimeters, **(B)**
8. Using elimination to cancel the y’s, we get 14x + 21y = 84

15x – 21y = -258

29x = -174, x = -6 **(A)**

1. It would be easiest for us to convert the units of Star A to Star B’s, inches/second. . Thus, Star B flew faster, **(B)**
2. First, simplify the expression:

Now, substituting, we get 2(-2)6(2)5 = 4096, **(E)**

1. Slope is change in y divided by change in x. So, , **(C)**
2. The slope of Leon’s laser’s path is , perpendicular to the path of the alien’s laser. Leon is positioned at (2, 0). Using point-slope form, y – 0 = (x – 2) 🡪 y = x + 3 🡪 x + y = 3 🡪 3x + 2y = 6, **(C)**
3. A fourth degree polynomial always has 4 roots, though they may not all be real, **(D)**
4. The sum of the roots is ; a is the coefficient of the x4 term, b is the coefficient of the x3 term. Thus, , **(B)**
5. We must factor the equation now. . The roots, respectively, are 2, -2, 3, and -3. The smallest root is -3, **(E)**
6. Using substitution, plug in a = 11 – b into the second equation to get Simplify and factor to get . The roots are 3 and 8, so a = 8 and b = 3; **(E)**
7. Allow to equal the total number of stars in the sky regardless of visibility. so We want to know what happens when 30% of the 700 is covered up, which is **(B)**
8. The system would be inconsistent if the lines were parallel and thus their slopes were equal. We determine the slope of the first line to be -2/3. The second line has a slope of 5/k. We set the two equal, and solve for k. k = , **(D)**
9. Using basic trial and error we see the smallest such number is 17. To find the second smallest number, we just add the LCM of 5 and 7 which is 35. 17 + 35 = 52, 5 + 2 = 7 **(E)**
10. We can find the x-coordinate by determining the axis of symmetry with the equation so . We plug 3 into the function to determine y, so . The vertex is at (3, 3). 3+3=6, **(A)**
11. The points would be the roots of the equation. Solving by factoring, , so the roots are (2, 0) and (4, 0), **(B)**
12. We need to determine the probability the nebula would make a yellow star. This is **(C)**