



## Algebra – 8<sup>th</sup> Grade

- 2 points:** The sum of 28 consecutive odd integers is 1232. When written from least to greatest, what is the 11<sup>th</sup> number that would be written?
- 2 points:** What is the sum of all possible integer values of  $x$  such that  $0 \leq (x^2 + 4x + 4)^4 \leq 1$ ?
- 2 points:** What is the sum of the even numbers between 40 and 2040, inclusively?
- 3 points:** If the first and second terms of an arithmetic sequence are 20 and 17, respectively, what is the sum of the first 2017 terms of the sequence?
- 3 points:** Three people are working on building a playhouse. By themselves, person 1 can do it in 12 hours, person 2 can do it in 8 hours, and person 3 can do it in 10 hours. Person 1 works for a half-hour before person 2 shows up, and then the two of them work together for an hour before person 3 shows up. At that point, all three people work together. Assume that they each work at the same pace that they would have worked individually. How long will it have taken to complete the playhouse, including breaks, when it is finished? **Express your answer to the nearest tenth of an hour.**
- 3 points:** If  $43_x = 30_y$  and  $51_x = 34_y$ , what is the value of  $x + y$ ?
- 3 points:** Consider the equation  $2x^2 + kx - 17 = 0$ . What is the smallest possible positive integral value of  $k$  such that this equation will have an integral root?
- 4 points:** The first three terms of a geometric sequence are positive and their sum is 19. If the first term is 4, by what factor does each term increase? **Express your answer as a reduced improper fraction.**
- 4 points:** Two containers each contain an equal amount of peanut butter and jelly mixture. The first container's mixture is 40% peanut butter and 60% jelly. The second container's mixture is 75% peanut butter and 25% jelly. Stephanie takes  $\frac{1}{4}$  of the mixture from the first container and places it into the second container. After she mixes the contents of the second container thoroughly, she places enough of the mixture back into the first container so that it has the original amount of peanut butter and jelly mixture. In the end, what percentage of the mixture in the first container is peanut butter? **Express your answer as a percent.**

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10. **4 points:** What is the area of the region formed by the inequalities  $y < 2x + 1$ ,  $y > \frac{3}{4}x - \frac{3}{2}$ , and  $y < -\frac{1}{2}x + 1$ ?