4th Grade Solutions

1. The ones digits are 0 and 0, respectively. Their difference is **0**.
2. Since the ninja steals \$73 per minute and he steals for 5 minutes, multiply \$73 by 5 to get \$**365**.
3. The total number of seats is $67 \times 30 = \mathbf{2010}$.
4. After the first exchange, Andrew has $2010 - 260 = 1750$ frakes. After the second exchange, Andrew has $1750 + 640 = \mathbf{2390}$ frakes.
5. Anything multiplied by 0 equals 0; therefore, the answer is **0**.
6.
$$\begin{array}{cccccccc} & & & 2 & 6 & 2 & 6 & 2 \\ & & & 3 & 6 & 3 & 6 & 3 \\ + & 1 & 3 & 8 & 4 & 3 & 9 \\ \hline & \mathbf{2} & \mathbf{0} & \mathbf{1} & \mathbf{0} & \mathbf{6} & \mathbf{4} \end{array}$$
7. Austin has 252 gems and 64 sapphires, therefore, $252 - 64 = \mathbf{188}$ gems that aren't sapphires.
8. Since there are 100 cents in one dollar, Henry spent $(6 \times 100) + (4 \times 50) = \mathbf{800}$ cents.
9. We first note that $1000 \div 260 = 3.8$. Since 3 Gigantic men can only lift $260 \times 3 = 780$ pounds, we need **4** Gigantic men to lift a Gigantic Lion.
10. 16 club players divided by 64 total players = $\mathbf{\frac{1}{4}}$
11. 64 total problems − 12 problems already written = **52** remaining problems.
12. The least common multiple of 6 and 9 is 18. Putting everything over a common denominator, we have $\frac{1}{9} + \frac{1}{6} = \frac{2}{18} + \frac{3}{18} = \mathbf{\frac{5}{18}}$.
13. Since there are 12 inches in a foot, multiply 5 feet by 12 inches to convert feet to inches. next, add 4 inches to this result to get $12 \times 5 + 4 = 60 + 4 = \mathbf{64}$ inches total.
14. The perimeter of a triangle is equal to the sum of the lengths of its sides, so the answer is $4 + 5 + 6 = \mathbf{15}$
15.
$$\begin{array}{cccccccc} & & & & 1 & 1 & 1 & 1 \\ & & & \times & 1 & 1 & 1 & 1 \\ \hline & & & & 1 & 1 & 1 & 1 \\ & & & 1 & 1 & 1 & 1 & 0 \\ & & 1 & 1 & 1 & 1 & 0 & 0 \\ + & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ \hline & \mathbf{1} & \mathbf{2} & \mathbf{3} & \mathbf{4} & \mathbf{3} & \mathbf{2} & \mathbf{1} \end{array}$$
16. The least common multiple of these fractions is 40. Put these fractions over a common denominator to get $\frac{1}{8} = \frac{5}{40}$ and $\frac{1}{10} = \frac{4}{40}$. Their average is their sum divided by 2, or $\frac{\frac{5}{40} + \frac{4}{40}}{2} = \frac{\frac{9}{40}}{2} = \mathbf{\frac{9}{80}}$.
17. Divide 1 by 16 to get **0.0625**.
18. One ten dollar bill and two quarters is equal to \$10.50 We find that the quotient of 10.5 upon division by 1.75 is 6. Hence, you can buy at most **6** water bottles.
19. Given that they are going to plant 5 trees, 5 trees in a row will yield 6 spaces in between trees (between Regina's house and the first tree, the first tree and the second tree, etc.) Since we are splitting 60 meters into 6 spaces, each space will be **10** meters long.
20. First, 2 must be added to 26: $2 + 26 = 28$. Next, 28 must be multiplied by 2: $28 \times 2 = 56$. After that, 36 must be subtracted from 56: $56 - 36 = 20$. Afterwards, 20 must be divided by 5: $20 \div 5 = 4$. Lastly, 4 must be multiplied by 2: $4 \times 2 = \mathbf{8}$.

21. To answer this question, one must find the number of channels between 64 and 26. This is done by subtracting the two: $64 - 26 = \mathbf{38}$.

22. Divide 3.33 by 0.25, which gives 13.32 packs of gum. Because I cannot buy a fraction of a pack and I cannot fully pay for the 14th pack, I can buy a total of **13** packs of gum.

23.
$$\begin{array}{cccccc} & 2 & . & 7 & 1 & \\ & 7 & . & 1 & 8 & \\ + & 1 & . & 8 & 2 & 8 \\ \hline \mathbf{1} & \mathbf{1} & \mathbf{.} & \mathbf{7} & \mathbf{1} & \mathbf{8} \end{array}$$

24. When the 9 people went on the bus, there were 35 people on the bus. After 18 people left the bus, there remained **17** people on the bus.

25. 26 letters in the alphabet + 7 days in a week + 31 days in the Month of December = **64**

26. Since 17 is a prime, the only two positive whole numbers that we could multiply to get 17 are 17 and 1. $17 + 1 = \mathbf{18}$.

27. There are 10 total letters and 5 vowels, so the answer is $\mathbf{1/2}$.

28. The store bought $3000 \div 6 = 500$ groups of 6 bracelets at a total cost of $500 \times 2 = 1000$ dollars. It sold $3000 \div 2 = 1500$ groups of 2 bracelets for a total of $1500 \times 1 = 1500$ dollars. Its profit was $\$1500 - \$1000 = \$\mathbf{500}$.

29. This problem can be solved by trying out all cases. Jonathan can either move to the right or up. If he moves to the right, he can again either move to the right or up. If he moves to the right after moving to the right for his first step, he must go up twice in a row. If he chooses to move up after moving right first, then there are two ways to get to Kyle: moving up then right, and vise versa. Similarly, if Jon moves up as his first move, he can either move right or up. From the center square, Jon again has two ways to get to Kyle. From the top left square, Jon has one way to get to Kyle. Adding up all these possible ways, we get that there are **6** ways for Jon to reach Kyle.

30. One groundhog pops out at the start of every hour, so we just need to find the shortest amount of time it will take for the second groundhog to pop out at the start of an hour again. At his first pop, it is 9:40 AM; at his second pop, it is 10:20 AM; at his third, it is 11:00 AM, so they will next pop out at the same time again at $\mathbf{11:00AM}$.

31. Writing out the prime factorization for 455 and 70, we have that $455 = 5 \times 7 \times 13$ and $70 = 2 \times 5 \times 7$. This yields that the greatest common factor of 455 and 70 is $5 \times 7 = \mathbf{35}$.

32. The primes less than 10 are 2, 3, 5, and 7. Therefore, there are **4** prime numbers less than 10.

33. To create 250 problems, Jongwhan has to complete 25 laps. To do so, he must walk 25×240 feet, which would take him $(25 \times 240) \div 4 = 1500$ seconds. Since there are $1500 \div 60 = 25$ minutes in 1500 seconds, the answer is **25** minutes.

34. Write out every term of the sequence: $-4, -1, 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32$. There are **13** numbers in this list.

35. The numbers Terence writes down are 1223334444555556666667777777888888888 .... The thirtieth number in this list is $\boxed{8}$.

36. $\frac{6!}{4!} = \frac{6\times5\times4\times3\times2\times1}{4\times3\times2\times1}$. Cancel out the terms to get 6×5 which is **30**.

37. If we divide 123456789 by 6, we get a quotient of 20,576,131 and a remainder of **3**.

38. The area of a square of side length s is s^2. Since $144 = 12^2$, the square has a side of length **12**.

39. The volume of a cube is taken by cubing the length of one side (that is, multiplying the length of a side by itself 3 times.) This means the volume is $8 \times 8 \times 8 = \mathbf{512}$.

40. The odd multiples of 5 between 10 and 50 are simply the multiples of 5 and not the multiples of 10: 15, 25, 35, and 45. $15 + 25 + 35 + 45 = \mathbf{120}$

41. The other side of the rectangle must have length $24 \div 4 = 6$. The perimeter of this rectangle is $2(6 + 4) = \mathbf{20}$.

42. By doing 58 nontrivial problems, his math level increase by $58 \times 2 = 116$. In addition, his math level decreased by 87 by doing 87 trivial problems. Therefore, his final math level is $0 + 116 - 87 = \mathbf{29}$.

43. The cost of each day's chocolate is $105 \div 21 = 5$ dollars. Let x denote the cost of one piece of milk chocolate. Then $x + (x - 2) = 5$, so $x = \mathbf{3.50}$.

44. Since Stephanie currently has a 100, and needs to have a score of 65 or lower to fail, we can find out how many points Stephanie must lose in order to fail: $100 - 65 = 35$ points to lose. From here, we must figure out how many questions Stephanie must ask to lose 35 points. Seeing how Stephanie loses $\frac{2}{7}$ points for every question asked and that Stephanie can lose 35 points at most, we can 35 by $\frac{2}{7}$ to see how many points she loses. $35 \div \frac{2}{7} = 35 \times \frac{7}{2} = 122.5$. Since this is not a whole number, the answer must be **122** since Stephanie cannot ask half of a question and if she asks 123 questions, she fails.

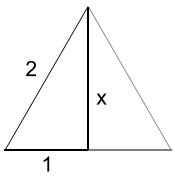
45. Use Order of Operations: $2(2-2(2-2(2-2(2-2(2)))))) = 2(2-2(2-2(2-2(2-4)))) = 2(2-2(2-2(2-2(2-(-2))))) = 2(2-2(2-2(2-(-4)))) = 2(2-2(2-2(2+4))) = 2(2-2(2-2(6))) = 2(2-2(2-12)) = 2(2-2(-10)) = 2(2-(-20)) = 2(2+20) = 2(22) = \mathbf{44}$.

46. The fact that Austin defeated seven opponents to win means that there were seven rounds in total. If each round cuts the number of remaining competitors in half, and if Austin is the sole competitor left after Round 7, then there were $2^7 = 128$ competitors to begin with. After Round 1, half of the initial group is left, so there are $128/2 = \mathbf{64}$ competitors.

47. This is easiest solved with a ratio. Construct the ratio as $\frac{6ft}{3ft} = \frac{xft}{10ft}$. By cross multiplying and solving, you will find that the tree is **20** feet tall.

48. There are two instances where the encounter will not be awkward. The first instance is if both people forget. The probability of this happening is $60\% \times 10\%$, which is 6%. The other instance is if both people remember. The probability of Alex remembering is $40\%(100\% - 60\%)$, and the probability of Austin remember is $90\%(100\% - 10\%)$. The chance of both of them remembering then is $40\% \times 90\% = 36\%$. $6\% + 36\% = \mathbf{42}\%$.

49. To solve this problem, we must first find how many pushups each person did. Starting with James, he forgot to turn off the light the second time so he did $3(2) - 2 = 4$ pushups. Additionally, James forgot to turn off his light the fouth time meaning that he had to do $3(4) - 2 = 10$ pushups. If we do this for the fifth and sixth times, and then add up the total number of pushups, we can see that James did $4 + 10 + 13 + 16 = 43$ pushups. On the other hand, Jongwhan didn't turn off the lights for the 1st, 3rd and 7th times meaning he did $1 + 7 + 19 = 27$ pushups. The final step to this problem is taking the difference between the number of pushups the two did: $43 - 27 = \mathbf{16}$.

50. 

To find the area of a triangle, we must find the height of the said triangle. As the diagram shows, we can split the equilateral triangle into two right triangles, giving us the height of the equilateral triangle. It can be seen that the hypotenuse of both right triangles have a length of 2 and that each of their legs have a length of 1. The last length is shared, and can be found using the Pythagorean Theorem. $\sqrt{2^2 - 1^2} = \sqrt{3}$. This means the shared side of the right triangles is $\sqrt{3}$. The area, using the formula $\frac{1}{2}bh$, is $\frac{1}{2}(2)\sqrt{3}$, giving us an area of $\sqrt{\mathbf{3}}$. Alternatively, we can use the formula $A = \frac{s^2\sqrt{3}}{4}$.