

*2023 Castro Valley Junior Math Tournament
Hosted by CV Mu Alpha Theta*

Middle School Division

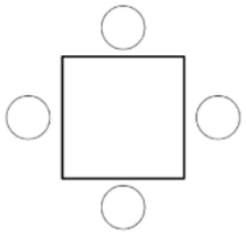
Algebra & Probability Group Round

15 minutes 20 questions

Instructions

- Do not turn over this test until you are instructed to begin.
- Write your answers on the separate answer sheet.
- Express all of your answers in simplified form.
- Do not include units.

#	Problems
1	<p>Let's play a game!</p> <ol style="list-style-type: none"> 1. Pick a number between 1 and 25. 2. Add 9 to it. 3. Multiply the result by 3. 4. Subtract 6. 5. Divide by 3. 6. Subtract your original number. <p>What number do you have?</p>
2	<p>The ages of Liz, Tom, and Kara are 4, 5, and 6 respectively. In how many years will the sum of their ages be 60?</p>
3	<p>When paper strip x with a length of 23 inches is attached onto paper strip y, the new strip of paper has a length of 31 inches. If the length of the overlapping part is 2 inches, how long is paper strip y?</p>
4	<p>Anna was given homework for summer break. She finished $\frac{5}{7}$ of it after 25 days. If she continues working at the same rate, how much longer will it take for her to finish the homework?</p>
5	<p>According to the poster on a printing shop, it costs \$1 to print each page. However, they offer a 15% discount to customers who print at least 500 pages. John was planning to print less than 500 pages, but he realized that the total cost would be cheaper if he printed 500 pages. What is the minimum possible number of pages John was planning to print?</p>
6	<p>Eva made a sugar solution with 20g of sugar and 100g of water. She then added 5g of sugar into the solution. How much water in grams should be added to the solution order to keep the original ratio of sugar to water?</p>
7	<p>Car A and Car B are in a race. Car A is driving at 60 mph and is 30 miles away from the finish line. If Car B is 40 miles away from the finish line, what is the minimum speed that Car B must be driving at in order to not lose the race? Assume that the speed is constant throughout the race.</p>
8	<p>A card is drawn from a standard 52-card deck. What is the probability that it is a red face card or the ace of hearts? Jacks, Queens, and Kings are considered face cards.</p>
9	<p>If there are 2 green and 2 blue candies in a bag, what is the probability of getting blue candies twice in a row?</p>
10	<p>If the sum of two different positive integers is 41, find the maximum possible value of their product.</p>
11	<p>Bill has 4 red socks, 5 pink socks, 9 black socks, and 17 purple socks. What is the minimum number of socks Bill needs to pull from his sock closet to guarantee that he has at least 5 pairs of matching socks?</p>

12	<p>Laura, her brother, and their parents were dining out in a restaurant. The arrangement of their seats is shown in the diagram below. If they picked their seats randomly, what is the probability of Laura sitting opposite to her brother?</p> 
13	<p>The distance between Eric and the train station is 8 cm on a map with a scale of 1 : 25000. If Eric walks at 3 km/h and leaves his home at 8:30 AM, when will he arrive at the train station?</p>
14	<p>The teacher is calculating the average score of each row in his classroom. In a row where there are 5 students sitting, the first three students' average score is 83, while the last three students' average score is 74. If the student in the middle of the row has a score of 81, what is the average score of this row?</p>
15	<p>Jordan is taking a taxi to catch a tour bus that has left without her. The taxi driver told her, "If I drive at 80 km/h, we can catch the tour bus in 1.5 hours, but if I drive at 90 km/h, we can catch it in 40 minutes." Based on the conversation, what is the speed of the tour bus in km/h?</p>
16	<p>A truck driver is hired to deliver 500 glass bottles. He earns \$1.50 for each successful delivery but pays \$13.50 for each broken glass. If he earned a total of \$675 in the end, how many glass bottles were broken?</p>
17	<p>According to the directions on a bottle of liquid laundry detergent, the amount detergent used each time should be $\frac{1}{3}$ of the cap. However, Katie mistakenly read it as $\frac{1}{2}$. When she realized this, she had already used the detergent 12 times, which is $\frac{1}{3}$ of the bottle. If she follows the directions correctly every time afterwards, how many more times can it be used?</p>
18	<p>The plan for a tree planting event was to plant 20 trees per hour. However, during the actual event, 8 more trees were being planted per hour. As a result, the event ended 2 hours sooner than planned. How many trees were planted during the event?</p>
19	<p>The photocopier outputs 100 sheets of paper per minute. If the photocopying time exceeds 30 minutes, the machine will stop for 10 minutes. Then it will continue to operate at the same speed. If Tom uses this photocopier to print all the pages at 14:30, it will stop printing at 17:00. How many sheets of paper did Tom print during this time?</p>
20	<p>Emily, Thomas, and George each spent 20 minutes, 25 minutes, and 100 minutes on their homework respectively. How much time would be needed if all three of them were doing the homework together?</p>