

Individual – 5th Grade

Instructions: Problems 1 – 10 are multiple choice and count towards your team score. Bubble in the letter on your answer sheet. Be sure to erase all mistakes completely.

1. Which one of the following four numbers is not equivalent to the other three numbers?
 (A) 2.54 (B) 25.4 tenths (C) 254 hundredths (D) 25400 thousandths
 (E) All are equivalent
2. George was given five large bags, each of which had the length of the enclosed jungle rope written on the outside. If he wants the longest rope, which should he choose?
 (A) 3.5 yards (B) $2\frac{14}{9}$ yards (C) 10.103 feet (D) 2 meters (E) $\frac{1}{600}$ mile
3. Which of the following measures is the greatest for the data: 3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5, 8, 9?
 (A) Mean (B) Median (C) Mode (D) Range
 (E) More than one choice is correct
4. Which of the following is least likely to be drawn, without replacement, from a standard deck of 52 cards?
 (A) A spade then a heart (B) A seven then an eight (C) A club then a nine
 (D) An ace then a spade (E) A diamond then a second diamond
5. Two fair six-sided dice are rolled and the numbers showing on the top are added. If the dice are rolled a total of 108 times, how many times, on average, would you expect a sum of 2 or 3 to occur?
 (A) 1 (B) 3 (C) 9 (D) 27 (E) 36
6. A magical Chia plant grows 2 feet each day. When it reaches 20 feet in height, it automatically and instantaneously shrinks back to 2 feet in height. If the plant is initially 2 feet tall on Day 0, on which day will the plant be exactly 16 feet tall?
 (A) Day 8 (B) Day 17 (C) Day 25 (D) Day 35 (E) Day 42
7. What is the sum of all the even numbers from 2 to 288, inclusively?
 (A) 10295 (B) 10440 (C) 20590 (D) 20880 (E) 41760

8. At your bake sale, you were selling marshmallow muffins for \$0.50 each and blueberry brownies for \$0.55 each. Which of the following amounts of money **cannot** be your total earnings for the day?
- (A) \$3.70 (B) \$3.75 (C) \$3.80 (D) \$3.85 (E) \$3.90
9. Which of the following is the smallest?
- (A) 2^{150} (B) 4^{70} (C) 8^{35} (D) 16^{24} (E) 32^{10}
10. What is the remainder when the sum of the first 5000 positive integers is divided by 7?
- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

Problems 11 – 30: Bubble in your answers on the answer sheet. Be sure to erase all mistakes completely. You do not need to bubble in leading zeros – the answer of “7” does not need to be answered as “007”. If your answer is a fraction like $\frac{3}{16}$, bubble in 316.

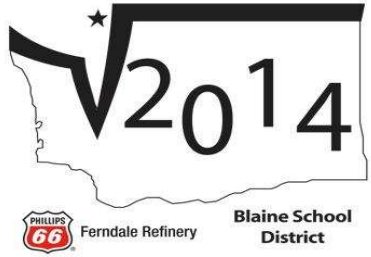
11. If it takes you 5 hours to create 2 of your legendary pi-symbol Lego creations, how many hours would it take you to create 42 of your creations?
12. A group of 140 kids – 68 boys and 52 girls – are traveling up to Mountain School by car. Only 7 kids can travel in each car, and each car can only have all girls or all boys. What is the fewest number of cars that would be required to transport everyone up to Mountain School?
13. Mr. Nelson has 25 students in his class. Each student goes through 3 pencils every 6 school weeks. A school week is 5 days and the school year is 180 days long. If pencils come in packs of 12, what is the fewest number of packs of pencils Mr. Nelson must buy to ensure every student will have enough pencils to last through the entire school year?
14. Cole and his friend Lishon were riding their bikes straight towards each other, starting from a distance 5000 feet. If Cole was traveling at 400 feet per minute, and Lishon was traveling at 800 feet per minute, how many **seconds** would it take for them to crash into each other?
15. After adding a 22.5% tip, your final total at a restaurant was \$73.50. How much was the bill, in dollars, before the tip was added?
16. What is the sum of the next two numbers in the following sequence?

2, 5, 11, 23, 47, 95, ____, ____

17. There are 12 students standing evenly spaced around a circle. What is the degree measure of the smaller of the two angles that are created if a line were to be drawn between student 3 and the center of the circle, and between student 8 and the center of the circle?
18. After your school wins first place this afternoon, you and your six fellow school teammates will decide to high-five each other. If each person high-fives every other person on the team exactly once, how many high-fives will occur?

19. When you left on your road trip to Nowhere, South Dakota, you had exactly $\frac{1}{4}$ of a tank of gas. 75% of that gas was used by the time you arrived at a gas station. If your car's gas meter indicated that you had used 4.5 gallons from when you left to when you arrived at the gas station, how many gallons can your gas tank hold?
20. In a bag of salt water taffies, there are 6 cherry taffies, 2 watermelon taffies, and some number of chocolate taffies. If a taffy is randomly selected from the bag, the probability that a chocolate taffy will be drawn is $\frac{1}{3}$. How many taffies are in the bag altogether?
21. What is the greatest common factor of 2014 and 314?
22. Five friends are standing in a straight line. Abby is 2 yards away from Barry, Barry is 4 yards away from Chloe, Chloe is 10 yards away from Dillon, and Dillon is 9 yards away from Elias. What is the shortest possible distance in yards between Abby and Elias?
23. When cashing his \$314 check at a strange local bank, Mr. Pai received 85 bills. He noticed that they were a mix of \$5 and \$2 bills. How many \$5 bills did he receive?
24. How many four-digit perfect squares are divisible by 3?
25. A runner begins running a 20 mile race at 8 miles per hour. To make sure he has enough energy to make it through the race, he cuts his speed in half every 90 minutes. How many hours does it take for him to complete the race?
26. Sir Guess-A-Lot had such a good grade in his Probability and Statistics class that he decided to randomly guess at each of the 6 questions on his weekly test. If the first two questions were multiple choice questions with three possible choices each, and the last four were true or false questions, what is the probability that he will answer none of the questions correctly?
Express your answer as a reduced fraction.
27. A group of kids had a stack of 8.5-inch by 11-inch pieces of paper that they wanted to place down on the floor to create a paper square with integral side lengths. Assuming only whole pieces were used and none can overlap or be folded, what is the fewest number pieces of paper that would be needed?
28. When writing a letter to your friend, you started to write down the zip code, but realized you couldn't remember the final two digits. The first three digits were 364, and you remember your friend, a math enthusiast, was excited that her zip code was divisible by 3, that the last digit was prime, and that the second-to-last digit was one greater than the last digit. What is the smallest possible sum of the final two digits?
29. A $5 \times 5 \times 5$ cube is made up of 125 $1 \times 1 \times 1$ cubes. If you were to remove the 13 cubes that span from the center of each of the sides and go straight through to the center of the opposite side, and then you were to cover the remaining surface with a blue-green colored paint, how many unit cubes will have exactly one side covered in paint?

30. From your house, your favorite toy store is exactly 8 miles north and 3 miles east. From the toy store, your favorite calculator store is 2 miles north and 8 miles west. What is the shortest distance from your house to your favorite calculator store? **Express your answer to the nearest mile.**



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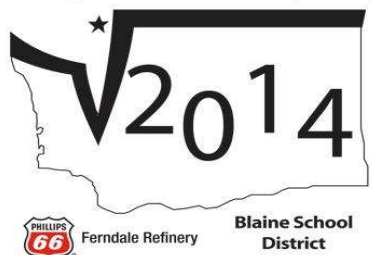
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Individual – 7th Grade

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6. At which of the following times do the minute and hour hands of a standard analog clock form a 90 degree angle?
 (A) 12:15 (B) 3:00 (C) 4:05 (D) 8:55 (E) 9:30
7. Which of the following shapes cannot have two parallel sides?
 (A) Triangle (B) Trapezoid (C) Parallelogram (D) Pentagon (E) Hexagon
8. Which of the following sets of three points cannot lie on the same line?
 (A) (0, 1), (2, 3), (4, 5) (B) (2, 2), (3, 6), (6, 18) (C) (−3, 4), (4, 3), (−10, 2)
 (D) (−2, −9), (4, −1), (1, −5) (E) (0, 0), (4, −3), (−4, 3)
9. Which of the following must be true for a base-9 number that ends with the digit 3?
 (A) The number is odd. (B) The number is even. (C) The number is prime.
 (D) The number is a perfect square. (E) The number is divisible by 3.

10. If $0 < c < d < 10$, which of the following **must** be true?

- (A) $\frac{1}{c+1} < 1$ (B) $\frac{1}{d} < \frac{1}{c}$ (C) $\frac{1}{c} < \frac{1}{d}$ (D) $\frac{1}{d-1} < 1$
(E) More than one must be true

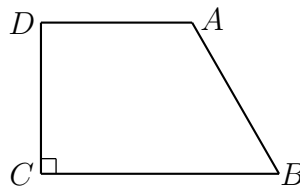
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19. A $5 \times 5 \times 5$ cube is made up of 125 $1 \times 1 \times 1$ cubes. If you were to remove the 13 cubes that span from the center of each of the sides and go straight through to the center of the opposite side, and then you were to cover the remaining surface with a blue-green colored paint, how many unit cubes will have exactly one side covered in paint?

20. From your house, your favorite toy store is exactly 8 miles north and 3 miles east. From the toy store, your favorite calculator store is 2 miles north and 8 miles west. What is the shortest distance from your house to your favorite calculator store? **Express your answer to the nearest mile.**
21. To determine the Most Valuable Player (MVP) out of a group of 3 players, 20 coaches vote on their first, second, and third choices, with those players receiving 2, 1, and 0 points respectively. The player with the most points is considered the MVP. If the winner received 35 points, what is the fewest number of points that the runner-up could have had?
22. If you were to take a rectangular prism and increase the length by 10%, the width by 20%, and the height by 30%, by what percent does volume of the original solid increase?
23. Six cards are placed in a hat. Two of the cards have the letter W, two have I, and two have N written on them. The game is won if you end up with one of each of the letters W, I, and N, in any order. If you get to choose three cards without replacement, what is the probability that you will win the game? **Express your answer as a reduced fraction.**
24. Beginning with a stick measuring 10 inches in length, a 3-inch portion is cut off from one end. If a random spot on the remaining 7-inch portion is then chosen, what is the probability that the two resulting pieces and the 3-inch piece will be able to form a closed triangle? **Express your answer as a reduced fraction.**
25. The three vertices of a triangle are at the points with coordinates $(-8, -8)$, $(6, -8)$, and $(6, 6)$. If the triangle were placed on a coordinate plane, what percentage of the triangle would be located in the first quadrant? **Express your answer to the nearest percent.**
26. Nine students, working equally hard to paint a mural along a dark tunnel wall, would take 15 days to complete the job. Assuming they work at the same pace, if only five students were to be working, how many days would it take them to complete the job?
27. What is the sum of all possible real value(s) of x that satisfy the equation:

$$x - 9\sqrt{x} + 8 = 0?$$

28. In the right trapezoid below, angle A is 120 degrees. If the height of the trapezoid is 4 and $\overline{AD} \cong \overline{CD}$, what is the area of the trapezoid? **Express your answer to the nearest tenth.**



29. In poker, a *pair* consists of two cards with the same rank, such as “2, 2” or “K, K”. A *two-pair* consists of two pairs, each pair of a different rank, and a fifth card that does not match the rank of any of the other four cards. If five cards are randomly dealt from a standard 52-card deck, what is the probability of being dealt a two-pair? For example, the hand 2, 2, 3, 3, Q would be considered a two-pair, but the hand 2, 2, 3, 3, 3 would not. **Express your answer to the nearest percent.**
30. Mr. McDonald wants to build two adjacent, rectangular pig pens, such that the pigs have the maximum area possible to roam. If Mr. McDonald has 48 yards of fencing, what is the greatest possible total area of the two pens, in square yards?



Individual – 8th Grade

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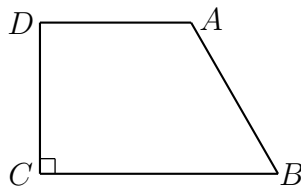
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22. If you were to take a rectangular prism and increase the length by 10%, the width by 20%, and the height by 30%, by what percent does volume of the original solid increase?
23. Six cards are placed in a hat. Two of the cards have the letter W, two have I, and two have N written on them. The game is won if you end up with one of each of the letters W, I, and N, in any order. If you get to choose three cards without replacement, what is the probability that you will win the game? **Express your answer as a reduced fraction.**
24. Beginning with a stick measuring 10 inches in length, a 3-inch portion is cut off from one end. If a random spot on the remaining 7-inch portion is then chosen, what is the probability that the two resulting pieces and the 3-inch piece will be able to form a closed triangle? **Express your answer as a reduced fraction.**
25. The three vertices of a triangle are at the points with coordinates $(-8, -8)$, $(6, -8)$, and $(6, 6)$. If the triangle were placed on a coordinate plane, what percentage of the triangle would be located in the first quadrant? **Express your answer to the nearest percent.**
26. Nine students, working equally hard to paint a mural along a dark tunnel wall, would take 15 days to complete the job. Assuming they work at the same pace, if only five students were to be working, how many days would it take them to complete the job?
27. What is the sum of all possible real value(s) of x that satisfy the equation:

$$x - 9\sqrt{x} + 8 = 0?$$

28. In the right trapezoid below, angle A is 120 degrees. If the height of the trapezoid is 4 and $\overline{AD} \cong \overline{CD}$, what is the area of the trapezoid? **Express your answer to the nearest tenth.**



29. In poker, a *pair* consists of two cards with the same rank, such as “2, 2” or “K, K”. A *two-pair* consists of two pairs, each pair of a different rank, and a fifth card that does not match the rank of any of the other four cards. If five cards are randomly dealt from a standard 52-card deck, what is the probability of being dealt a two-pair? For example, the hand 2, 2, 3, 3, Q would be considered a two-pair, but the hand 2, 2, 3, 3, 3 would not. **Express your answer to the nearest percent.**
30. Mr. McDonald wants to build two adjacent, rectangular pig pens, such that the pigs have the maximum area possible to roam. If Mr. McDonald has 48 yards of fencing, what is the greatest possible total area of the two pens, in square yards?