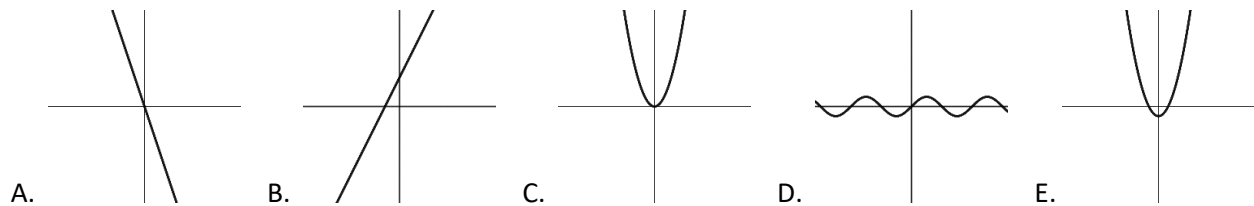


# 2023 7<sup>th</sup> Grade Math Contest

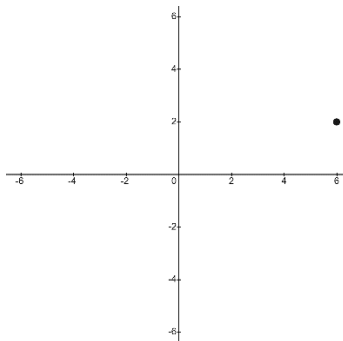
1. Ava lives four miles from the barn where she boards her horse. She takes 2 hours to walk to the barn. Then she takes 30 minutes to ride her horse back to her house. In miles per hour, what is her average speed for the entire trip?

- A. 5
- B. 0.2
- C. 3.2
- D. 0.3125
- E. 1

2. Which of these graphs illustrates a proportional relationship?



3. Jason made a mistake and accidentally deleted almost all of his data. Only the plot below remains. But Jason remembered that his data was in a proportional relationship. Which of the following could have been a point on his graph?



- A.  $(-1/3, -1)$
- B.  $(6, 0)$
- C.  $(2, 6)$
- D.  $(-1, -1/3)$
- E. There is not enough information provided to answer the question.

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4. Connor is buying a pack of Pokémon cards that have a \$5.00 price tag on them. However, the store is offering a 10% discount on everything. In addition, the state sales tax is 10%. How much will the pack cost Connor?

- A. \$5.00
- B. \$5.05
- C. \$0.45
- D. \$0.55
- E. \$4.95

5. On a number line, what is the distance between  $-1/2$  and  $1/3$ ?

- A.  $5/6$
- B.  $-5/6$
- C.  $1/6$
- D.  $-1/6$
- E.  $1/5$

6. Alana has a calculator that shows at most 10 digits. Alana uses her calculator to work a problem and the calculator shows an answer of 1.414213562. What can she conclude from this fact?

- A. The number is rational.
- B. The number is irrational.
- C. The number is both rational and irrational.
- D. The number is neither rational nor irrational.
- E. None of these.

7. The number obtained by dividing 2 by -3 can be expressed as a fraction

- A. only as  $\frac{2}{-3}$ .
- B. only as  $\frac{2}{-3}$  and  $\frac{-2}{3}$ .
- C. as  $\frac{2}{-3}$  and  $\frac{-2}{3}$  and  $-\frac{2}{3}$ .
- D. only as  $\frac{2}{-3}$  and  $-\frac{2}{3}$ .
- E. only as  $\frac{2}{-3}$  and  $\frac{3}{-2}$ .

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8. There are 5,280 feet in a mile. How many square feet are in  $\frac{2}{3}$  of a square mile?
- A. 3520
  - B. 12,390,400
  - C. 27,878,400
  - D. 9,292,800
  - E. 18,585,600
9. A taxi company charges \$2.00 per ride plus an additional 10 cents per mile. In addition, the city charges a 2% tax on all taxi travel. Josh took a taxi ride and had to pay a total of \$3.06. How far did he travel?
- A. 14 miles
  - B. 13 miles
  - C. 12 miles
  - D. 11 miles
  - E. 10 miles
10. Steve works at a hardware store. He makes \$50 each day plus \$5 for each customer he helps. Steve would like to make more than \$185 today. If  $x$  denotes the number of customers he helps, which of the following inequalities should he solve to determine the minimum number of customers he should help?
- A.  $50 + 5x > 185$
  - B.  $50 + 5x < 185$
  - C.  $50x + 5 > 185$
  - D.  $50x + 5 < 185$
  - E.  $(50 + 5)x = 185$
11. Monique is very bored on a very long car ride and rolls a 6-sided die 300 times. The die is fair, so shows a 1, 2, 3, 4, 5, or 6 with equal probability. She keeps track of the number of times the number is at least 2. Which of the following outcomes is most likely?
- A. The die will show at least 2 exactly 250 times.
  - B. The die will show at least 2 approximately 250 times, but not exactly 250 times.
  - C. The die will show at least 2 exactly 200 times.
  - D. The die will show at least 2 approximately 200 times, but not exactly 200 times.
  - E. The die will always show at least 2.

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12. In Maria's class, there are two teams of students. Team Purple has 14 students and Team Gold has 15 students. Maria's teacher is choosing one student from Team Gold at random to come to the board to write the answer. Maria is on Team Gold. What is the probability that Maria is chosen?

- A.  $1/29$
- B.  $1/14$
- C.  $1/15$
- D.  $13/14$
- E.  $14/15$

13. Wen flips a fair coin 100 times. Which of the following is the best estimate and explanation of the probability that Wen gets heads every time?

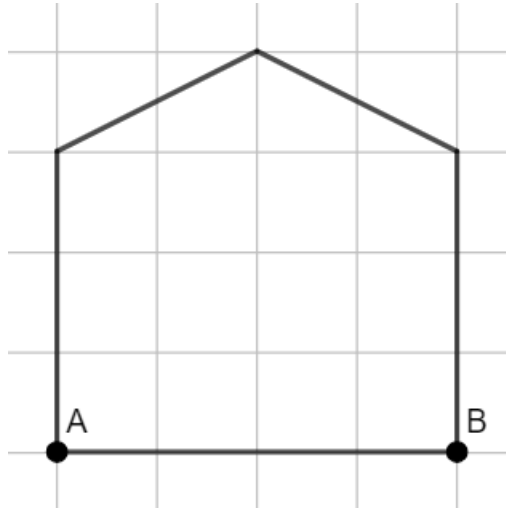
- A. 1 because Wen is extremely likely to get heads every time.
- B. 1 because Wen is extremely unlikely to get heads every time.
- C.  $1/2$  because there are two cases: either Wen will get all heads, or Wen won't get all heads.
- D. 0 because Wen is extremely unlikely to get heads every time.
- E. 0 because Wen is extremely likely to get heads every time.

14. How many non-congruent triangles exist which have one side length of 1 inch and another side length of 1 foot?

- A. 0
- B. 1
- C. 2
- D. 3
- E. Infinitely many

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15. The image below is a scale drawing of the front of a doghouse Aleah just made for her dog. Each square block represents 36 square inches. In the actual doghouse, what is the distance from A to B?



- A. 4 feet
- B. 12 feet
- C. 2 feet
- D. 6 feet
- E. 3 feet

16. A muffin recipe requires  $3\frac{1}{4}$  cups of flour to make 12 muffins. Laquita needs to make 30 muffins for her classmates. How many cups of flour will she need?

- A.  $1\frac{2}{5}$
- B.  $8\frac{3}{4}$
- C.  $97\frac{1}{2}$
- D.  $1\frac{3}{10}$
- E.  $8\frac{1}{8}$

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17. Which of the following is the best approximation for the area of the sheet of paper on which this question is printed?

- A. 6 square centimeters
- B. 60 square centimeters
- C. 600 square centimeters
- D. 6,000 square centimeters
- E. 60,000 square centimeters

18. Miguel has to make up a test that he missed because he was sick. He scored a 92 on it. The other 25 people in his class had an average score of 76. After he completes the test, what is the new test average for the class? Round your answer to one decimal point.

- A. 77
- B. 79.5
- C. 84
- D. 76.6
- E. There is not enough information to answer the question.

19. Mary and Selah find some gold coins. Selah takes exactly  $\frac{2}{3}$  of them and Mary takes exactly  $\frac{1}{3}$ , and they go to their separate homes. After getting home, Mary keeps exactly  $\frac{1}{2}$  of her coins and gives the other  $\frac{1}{2}$  of her coins to her brother Ezra. What is the fewest number of coins that Mary and Selah could have found?

- A. 12
- B. 9
- C. 6
- D. 3
- E. 1

20. A water sprinkler waters a circular patch of a grass with a total area of 300 square feet. The sprinkler begins to malfunction, so only sprays water out half the distance it used to. It still waters a complete circle. What area can the sprinkler now cover?

- A. 212.13 square feet
- B. 150 square feet
- C. 106.07 square feet
- D. 75 square feet
- E. There is not enough information to answer the question.

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21. A cube has a volume of 1728 cubic inches. What is the total area of all the square faces?

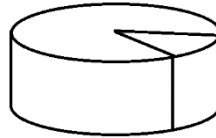
- A. 864 square inches
- B. 576 square inches
- C. 288 square inches
- D. 144 square inches
- E. 12 square inches

22. What angle is complementary to the angle supplementary to a 30 degree angle?

- A. 120 degrees
- B. 90 degrees
- C. 60 degrees
- D. 30 degrees
- E. There is no such angle.

23. A cake is in the shape of a cylinder with a height of 6 inches and a 1 foot diameter. Connor removes a slice in the shape of a sector with a 30 degree angle. What's the volume of his slice? (See the picture below, which is not necessarily to scale)

- A. 56.55 cubic inches
- B. 452.39 cubic inches
- C. 678.58 cubic inches
- D. 565.49 cubic inches
- E. 113.10 cubic inches



24. Two students, Alice and Bob, are running for student body president at a school containing thousands of students. Charlie asks his twenty closest friends who they are going to vote for, finding that 80% are going to vote for Alice and 20% are going to vote for Bob. Debra selects a random sample of 20 students from the whole school and asks who they are going to vote for. She finds that 20% are going to vote for Alice and 80% are going to vote for Bob. Which of the following is the best conclusion which can be reached about how the whole student body would vote?

- A. It's likely that exactly 80% will vote for Alice and exactly 20 % will vote for Bob.
- B. It's likely that approximately 80% will vote for Alice and approximately 20% will vote for Bob.
- C. It's likely that approximately 50% will vote for Alice and approximately 50% will vote for Bob.
- D. It's likely that approximately 20% will vote for Alice and approximately 80 % will vote for Bob.
- E. It's likely that exactly 20% will vote for Alice and exactly 80% will vote for Bob.

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25. If you assume that the equation  $1/3 = 0.3333\dots$  (with the 3s repeating forever) is a true statement, and then multiply both sides by 3, you obtain the equation  $1 = 0.9999\dots$  (with the 9s repeating forever). What can you conclude from this?

- A. Since 1 is not exactly equal to 0.9999....., the equation  $1/3 = 0.3333\dots$  is not exactly correct.
- B. Since 1 is not exactly equal to 0.9999....., you must not be allowed to multiply both sides of  $1/3 = 0.3333\dots$  by 3.
- C. Since 1 is not exactly equal to 0.9999....., the distributive property failed.
- D. 1 must be exactly equal to 0.9999....
- E. You cannot conclude anything.

26. Compute  $\frac{100}{99} * \frac{99}{98} * \frac{98}{97} * \dots * \frac{3}{2}$ , where "\*" indicates multiplication.

- A. 100
- B. 75
- C. 50
- D. 25
- E. 1

27. Which of the following is not equivalent to  $\frac{2}{3}(x - \frac{4}{5})$ ?

- A.  $\frac{2}{3}x - \frac{8}{15}$
- B.  $\frac{2x}{3} - \frac{8}{15}$
- C.  $\frac{1}{3}(2x - \frac{8}{5})$
- D.  $2(\frac{x}{3} - \frac{4}{15})$
- E. They are all equivalent.



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28. DeMarkus and Ryan are playing a game which involves rolling a fair 6-sided die to determine how many spaces to move their character. According to the rules of the game, rolling a ONE doesn't count: if a player rolls a ONE, he or she must repeatedly re-roll (and if a ONE is re-rolled, the die is rolled again, continuing until a number other than ONE appears.) On DeMarkus's turn, he wants his character to move an even number of steps. What's the probability that this happens?

- A.  $\frac{3}{5}$
- B.  $\frac{3}{6}$
- C.  $\frac{2}{5}$
- D.  $\frac{1}{3}$
- E.  $\frac{2}{3}$

29. Ignoring punctuation, what is the median number of letters of the words in this sentence?

- A. 3.5
- B. 4
- C. 4.5
- D. 5
- E. 5.5

30. Right now, Ross is twice as old as Jackson. Next year, Ross's age will only be  $\frac{5}{3}$  times Jackson's age. Right now, how many years old is Jackson?

- A. 6
- B. 5
- C. 4
- D. 3
- E. 2