Christmas Mock AMC8

Presented by ariedel contributors: checkmatetang, lion11012, ariedel, jonyj1005

1 Instructions

Read all instructions BEFORE moving on to the next page.

Submit your answers with a letter per problem and ONLY a letter per problem. If you would like to participate officially, submit your answers to the google form described in thread.

1. This is a twenty-five question multiple choice test. Each question is followed by the answers A, B, C, D, and E. Only one of these is correct.

2. You will receive 1 point for each correct answer and 0 points for each incorrect answer.

3. No aids are permitted other than scratch paper, graph paper, pencils, and erasers. No calculators are allowed. No problems on the test will require the use of a calculator.

4. Figures are not necessarily drawn to scale.

5. You will be given 40 minutes to complete the test.

6. Merry Christmas! In celebration most of these problems are Christmassy themed. Enjoy!

2 Error in a Problem

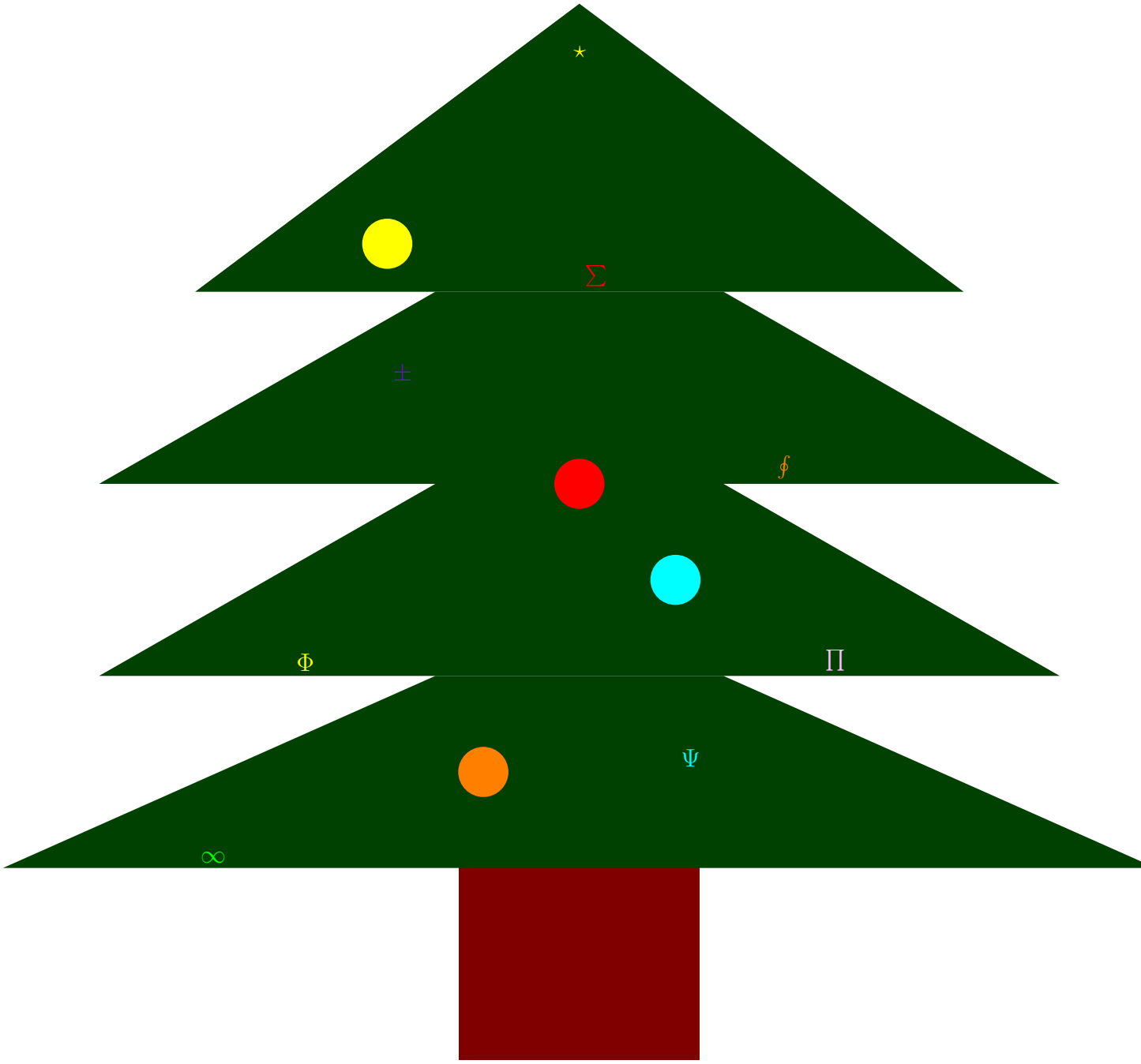
There may very well be errors in problems. Problem writers have tried to minimize the number of typos and errors in problems, but we may have missed something. In that case, please let us know! If you think you see an error with a problem, please evaluate which of the following describes the error.

2.1 Problem is not affected by error

In this case, there may just be a simple typo or grammar mistake. This does not affect the problem itself, so they can wait. Finish the test, and then afterwards, along with your submission, you may make a note of the error and we will look into it.

2.2 Problem Error

Here, you see something that must be resolved in order to solve the problem; it affects the problem's answer. Pause your timer (unless you want to just assume it is correct). PM us about the problem and exactly what you think is the error. We will reply ASAP to tell you the outcome of our investigation, and announce in thread to clarify. Start your timer again.



Merry Christmas!

3 Problems

1. If $t = 0$, $a = 1$, $s = 3$, and $n = 2$ then what is the numerical value of $(sa)^{n^{ta}}$

(A) 0 (B) 3 (C) 4 (D) 4 (E) 512

2. Simplify (12)/(24/2015). express your answer as a common fraction.

$(A.)$ $\frac{2015}{4}$ $(B.)$ $\frac{2015}{2}$ $(C.)$ $\frac{4030}{3}$ $(D.)$ 2015 $(E.)$ 4030.

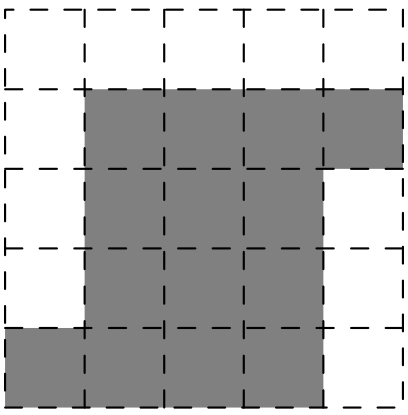
3. What is the area of triangle ABC if $AB = 8 - 3$ $BC = 8 - 4$ and $AC = 8 - 5$?

(A) 3 (B) 4 (C) 6 (D) 12 (E) 15

4. jonyj1005 is trying to wrap his presents. There is $\frac{1}{3}$ chance that he will wrap a present correctly. What is the probability that he wraps his only three presents correctly?

(A) $\frac{1}{9}$ (B) $\frac{1}{8}$ (C) $\frac{1}{27}$ (D) 1 (E) $\frac{8}{27}$

5. What is the volume of the present whose net is shaded below in the unit grid?



(A) 1 (B) 2 (C) 3 (D) 4 (E) 14

6. Ariedel shoveled 19 gallons of snow and jonyj shoveled 21 gallons of snow. After that lion11012 shoveled the rest of the driveway. If the driveway had 60 gallons of snow on it what fraction of the driveway did lion11012 shovel?

(A) $\frac{1}{3}$ (B) $\frac{4}{9}$ (C) $\frac{5}{9}$ (D) $\frac{1}{2}$ (E) $\frac{2}{3}$

7. Checkmatetang, ariedel, lion11202, and jonyj1005 compete at a skiing competition. In this competition they split into a team of checkmatetang and jonyj1005, and ariedel and lion11202. The judges score by taking the average of each individual on a team's points scored. Individually,

1st place gets 17 points,

2nd place gets 14 points,

3rd place gets 11 points, and

4th place gets 9 points.

Since ariedel is bad at skiing he always gets 4th place. What is the probability that ariedel and lion11202 win? (One possible scoring would be checkmatetang gets 1st and jonj1005 gets 3rd so their team score would be $\frac{17+11}{2}$ and ariedel and lion11202 would have a team score of $\frac{14+9}{2}$)

(A) 0 (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) $\frac{1}{2}$ (E) $\frac{2}{3}$

8. On their way to Bethlehem Mary's donkey traveled at a speed of 4 miles per hour. Near the end of their journey they made him move at a speed of 6 miles per hour. If he was traveling at that speed for 3 hours and 20 minutes, and the total journey is 80 miles, how many miles did he travel at 4 miles per hour?

(A) 20 (B) 45 (C) 60 (D) 64 (E) 80

9. Santa is delivering presents from 11 PM of December 24 to 2 AM of December 25. In each hour, he successfully goes down all chimneys of the hour with probability 2/5. What is the probability that he has exactly two successful hours without being stuck in a chimney?

(A) $\frac{12}{125}$ (B) $\frac{1}{5}$ (C) $\frac{36}{125}$ (D) $\frac{2}{3}$ (E) $\frac{89}{125}$

10. A Snowball fighting league consists of 6 teams each with 8 members. 8 league members are to be chosen from the pool of all participants to be in the "Super Awesome Snowball Team". What is the probability that there are at least 2 people in the "Super Awesome Snowball Team" from the same league team?

(A) 0 (B) $\frac{1}{6}$ (C) $\frac{41}{48}$ (D) $\frac{7}{8}$ (E) 1

11. Santa Clause weighs 320 pounds. Each plate of cookie he eats makes him 9 pounds phatter. Now Snorlax is phat and weighs 1337 pounds. What is the least number of plates of cookies Santa Clause must eat to be phatter the Snorlax?

(A) 42 (B) 63 (C) 81 (D) 113 (E) 114

12. Our Problem Writing Group goes to play lazer tag for the holidays. Half of ariedel's points plus 1 is equal to checkmatetang's points. A third of checkmatetang's points plus 2 is equal to mathawesomeness's points. What is the smallest possible number of points ariedel got if everyone got a positive integer amount of points?

(A) 1 (B) 2 (C) 4 (D) 10 (E) 16

13. How many positive two digit integers, ab, exist such that $\frac{a}{2} \geq b$?

(A) 8 (B) 14 (C) 18 (D) 20 (E) 29

14. Ashton is going to the bakery to get Christmas cookies. There are 2 boxes of gingerbread, 3 boxes of mint chocolate chip, 1 box of candy cane cookies, and 4 boxes of sugar cookies. If he must bring home two not necessarily different boxes of cookies how many different ways can he do this?

(*A.*) 8 (*B.*) 9 (*C.*) 12 (*D.*) 15 (*E.*) 16

15. At the annual Elf Sled-Off Tournament there are eight teams competing for the prize. If the teams are randomly paired up in to groups of two and whoever that match wins moves on to the next bracket and so

on until there is one person left, how many matches must they have to decide a winner?

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

16. Let lines m and n intersect at a 28° angle. Now let their point of intersection be A. If we choose arbitrary point B on m, and arbitrary point C on n what is the average of the possible values of $\angle ACB + \angle ABC$?

(A) 28° (B) 56° (C) 90° (D) 152° (E) 180°

17. Alphy the Elf is out buying supplies for toys at Parts in the Polls Shed. He buys 9 toy dolls and 10 buckets of paint. One of the items costs \$2 and Alphy pays \$308 then what is the cost of the other item if it is cheaper then \$30? (Assume there is no fractional dollar)

(A) 19 (B) 20 (C) 21 (D) 29 (E) 32

18. On the 12 days of christmas, each day, lion11202 gets some gifts. On the first day s/he would get 1 partridge in a pear tree, and on the 2nd day, s/he would get 1 partridge in a pear tree and 2 turtle doves for a total of 3 gifts, so the amount of gifts he gets on the nth day is the nth triangular number. How many gifts would lion11202 get in total?

(A) 100 (B) 140 (C) 240 (D) 337 (E) 364

19. John has a bag of 6 different types of ornaments. Ron has a bag of 10 different types of ornaments. Lou has a bag of 2 different types of ornaments. Zachary combines all of their ornaments into one bag. What is the least number of possible types of ornaments in that bag?

(A) 10 (B) 12 (C) 15 (D) 16 (E) 18

20. Five siblings have received their Christmas gift. Each child either likes or dislikes the gift they received. If they like the gift, they will tell the truth. If they don't like their gift, they lie about everything they say. The following remarks occur by the five children:

Albert: Brett doesn't like his gift.

Brett: I like my gift and so does Daniel.

Christina: Ellen likes her gift.

Daniel: Albert doesn't like his gift.

Ellen: I like my gift but Daniel doesn't.

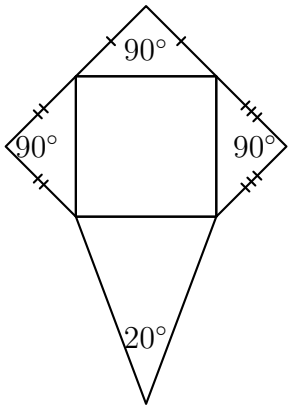
If there are exactly two people who like their gift who are they?

(A) Albert & Daniel (B) Brett & Daniel (C) Christina & Ellen (D) Daniel & Christina (E) Ellen & Albert

21. Isosceles non-congruent triangles ABC and BCD have the same circumcircle and $\angle BAC = 40^\circ$. Let the largest angle measure of $\triangle ABC$ be r and the largest angle measure of $\triangle BDC$ be s. What is $r + s$, in degrees?

(A) 180° (B) 200° (C) 210° (D) 220° (E) 360°

22. The three wise mathematicians saw the star in the sky symbolizing Christs birth and began their journey to wherever it came to rest. Being mathematicians they decided to calculate the area of the star. They noted it could be divided into a square and four triangles as shown below. What is the area of the star if the side length of the square was 4 thousand miles and the height of the star is 12 thousand miles (Express your answer in square thousand miles.)



(A) 40 (B) 41 (C) 42 (D) 44 (E) $48\sqrt{2}$

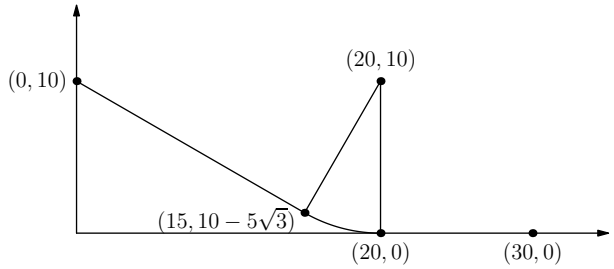
23. Santa decides to amuse himself by telling Loki the elf to make the largest amount of presents n such that all digits of n are distinct and the sum of the digits of n equals 20. Just before Christmas Eve, Santa realizes he needs 16 more presents. He then tells Loki to make them. What is the sum of the even digits of the number of presents Loki had to make?

(A) 10 (B) 16 (C) 24 (D) 32 (E) 42

24. Santa is getting ready to deliver the presents to all the kids. He is arranging Rudolph, Dasher, Dancer, Prancer, Vixen, Comet, Cupid, Donner, and Blitzen to go on his sleigh that has 2 rows, and one leader. How many ways can he arrange his reindeer if Rudolph wants to be the leader, Dancer and Prancer want to be beside each other, and if Vixen will not go behind or beside Cupid?

(A) 336 (B) 720 (C) 1024 (D) 2016 (E) 4032

25. Ariedel is going sledding down a hill. The top of the hill is at $(0, 10)$ on a graph and the hill has a slope of $-\frac{\sqrt{3}}{3}$ until point $(15, 10-5\sqrt{3})$ where the hill levels like a sector with center $(20, 10)$ until it hits the x axis at a right angle. Then ariedel sleds on level ground until he hits a tree at $(30, 0)$. How far did ariedel sled?



(A) $10\sqrt{3}+10+\frac{5\pi}{3}$ (B) $10\sqrt{3}+10+6\pi$ (C) $8\sqrt{3}+10+\frac{7\pi}{3}$ (D) $25+\frac{3\pi}{2}$ (E) $20\sqrt{3}+20+10\pi$