COMBINATIONS AND COUNTING STRATEGIES FOR AMC 8: PRACTICE SET

ANDY JO

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1. Problems

Beginner.

1. (1990 AJHSME, Problem #14) A bag contains only blue balls and green balls. There are 6 blue balls. If the probability of drawing a blue ball at random from this bag is $\frac{1}{4}$, then the number of green balls in the bag is

(A) 12 **(B)** 18 **(C)** 24 **(D)** 30 **(E)** 36

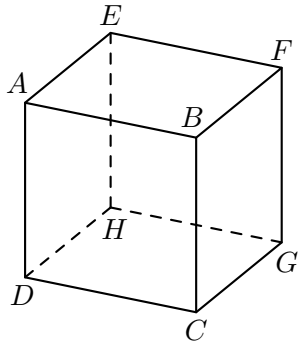
2. (2011 AMC 8, Problem #12) Angie, Bridget, Carlos, and Diego are seated at random around a square table, one person to a side. What is the probability that Angie and Carlos are seated opposite each other?

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

3. (2016 AMC 10B, Problem #12) Two different numbers are selected at random from $\{1, 2, 3, 4, 5\}$ and multiplied together. What is the probability that the product is even?

(A) 0.2 **(B)** 0.4 **(C)** 0.5 **(D)** 0.7 **(E)** 0.8

4. (2015 AMC 8, Problem #12) How many pairs of parallel edges, such as $\overline{AB}$ and $\overline{GH}$ or $\overline{EH}$ and $\overline{FG}$, does a cube have?



(A) 6 **(B)** 12 **(C)** 18 **(D)** 24 **(E)** 36

5. (2004 AMC 8, Problem #17) Three friends have a total of 6 identical pencils, and each one has at least one pencil. In how many ways can this happen?

(A) 1 **(B)** 3 **(C)** 6 **(D)** 10 **(E)** 12

Intermediate.

6. (1987 AJHSME, Problem #25) Ten balls numbered 1 to 10 are in a jar. Jack reaches into the jar and randomly removes one of the balls. Then Jill reaches into the jar and randomly removes a different ball. What is the probability that the sum of the two numbers on the balls removed is even?

(A) $\frac{4}{9}$ **(B)** $\frac{9}{19}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{10}{19}$ **(E)** $\frac{5}{9}$

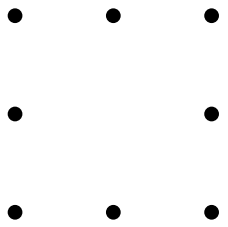
7. (2020 AMC 10B, Problem #11) Ms. Carr asks her students to read any 5 of the 10 books on a reading list. Harold randomly selects 5 books from this list, and Betty does the same. What is the probability that there are exactly 2 books that they both select?

(A) $\frac{1}{8}$ **(B)** $\frac{5}{36}$ **(C)** $\frac{14}{45}$ **(D)** $\frac{25}{63}$ **(E)** $\frac{1}{2}$

8. (1991 AJHSME, Problem #23) The Pythagoras High School band has 100 female and 80 male members. The Pythagoras High School orchestra has 80 female and 100 male members. There are 60 females who are members in both band and orchestra. Altogether, there are 230 students who are in either band or orchestra or both. The number of males in the band who are NOT in the orchestra is

(A) 10 **(B)** 20 **(C)** 30 **(D)** 50 **(E)** 70

9. (2008 AMC 8, Problem #19) Eight points are spaced at intervals of one unit around a 2×2 square, as shown. Two of the 8 points are chosen at random. What is the probability that the points are one unit apart?



(A) $\frac{1}{4}$ **(B)** $\frac{2}{7}$ **(C)** $\frac{4}{11}$ **(D)** $\frac{1}{2}$ **(E)** $\frac{4}{7}$

10. (2006 AMC 8, Problem #11) How many two-digit numbers have digits whose sum is a perfect square?

(A) 13 **(B)** 16 **(C)** 17 **(D)** 18 **(E)** 19

Advanced.

11. (2007 AMC 10A, Problem #12) Two tour guides are leading six tourists. The guides decide to split up. Each tourist must choose one of the guides, but with the stipulation that each guide must take at least one tourist. How many different groupings of guides and tourists are possible?

(A) 56 **(B)** 58 **(C)** 60 **(D)** 62 **(E)** 64

12. (2000 AMC 8, Problem #21) Keiko tosses one penny and Ephraim tosses two pennies. The probability that Ephraim gets the same number of heads that Keiko gets is

(A) $\frac{1}{4}$ **(B)** $\frac{3}{8}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{2}{3}$ **(E)** $\frac{3}{4}$

13. (2016 AMC 8, Problem #21) A box contains 3 red chips and 2 green chips. Chips are drawn randomly, one at a time without replacement, until all 3 of the reds are drawn or until both green chips are drawn. What is the probability that the 3 reds are drawn?

(A) $\frac{3}{10}$ **(B)** $\frac{2}{5}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{3}{5}$ **(E)** $\frac{2}{3}$

14. (2007 AMC 8, Problem #24) A bag contains four pieces of paper, each labeled with one of the digits 1, 2, 3 or 4, with no repeats. Three of these pieces are drawn, one at a time without replacement, to construct a three-digit number. What is the probability that the three-digit number is a multiple of 3?

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

15. (2010 AMC 8, Problem #20) In a room, $\frac{2}{5}$ of the people are wearing gloves, and $\frac{3}{4}$ of the people are wearing hats. What is the minimum number of people in the room wearing both a hat and gloves?

(A) 3 **(B)** 5 **(C)** 8 **(D)** 15 **(E)** 20

2. Answer Key

Problem	Letter	Value
1	B	18
2	B	$\frac{1}{3}$
3	D	0.7
4	C	18
5	D	10
6	A	$\frac{4}{9}$
7	D	$\frac{25}{63}$
8	A	10
9	B	$\frac{2}{7}$
10	C	17
11	D	62
12	B	$\frac{3}{8}$
13	B	$\frac{2}{5}$
14	C	$\frac{1}{2}$
15	A	3