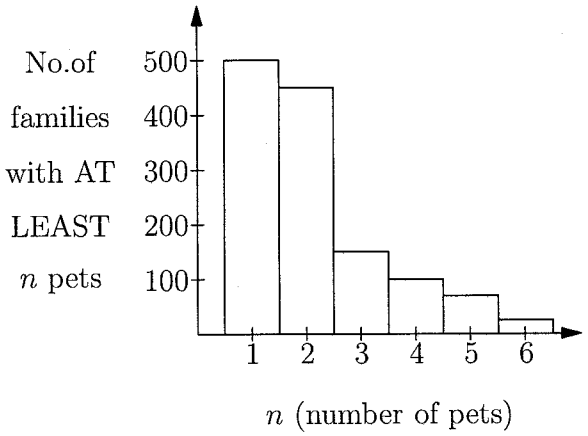
Mathcounts / AMC 8

1. _____ A fair six-faced die is rolled. Statement P is "true" if the die reads 1 or 2. Otherwise P is "false." Statement Q is "true" if the die reads an even number. Otherwise Q is "false." What is the probability that statement P *or* Q is "true?" Express your answer as a common fraction.

2. _____ According to the graph, what is the mode of the number of pets (n) among the families surveyed?



3. _____ Three segments are chosen at random from six segments having lengths of 2, 3, 5, 6, 7 and 10 units. What is the probability that the three segments chosen could form a triangle? Express your answer as a common fraction.

4. _____ Moon has five boxes labeled 1, 2, 3, 4 and 5 which are arranged in increasing order from left to right. She wants to get them into descending order from left to right. To do this, she will repeatedly switch the order of two adjacent boxes. What is the fewest number of switches needed to achieve the desired order?

5. _____ Using pennies, nickels, dimes and quarters, what is the least number of coins needed to make 68 cents in change?

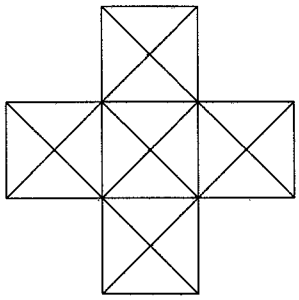
6. _____ A drawer contains ten socks with one pair of each of the following colors: brown, black, blue, tan and white. How many socks must be removed from the drawer to guarantee at least two socks of the same color have been removed?

7. _____ A number n is randomly selected from the set $\{1, 2, 3, 4, \ldots, 100\}$. What is the probability that n can be expressed as the sum of two non-zero squares of integers? Express your answer as a common fraction.

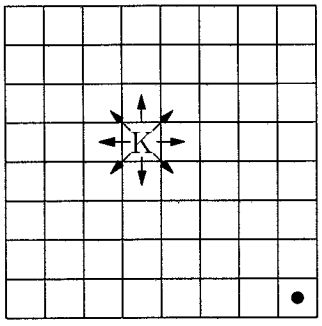
8. _____ Each row of passenger seats on an airplane is set up as shown, where "(" and ")" indicate windows, each square represents a seat, and an aisle is between the second and third seat in every row. There are 96 passenger seats that are not along the aisle. How many passenger seats are along the aisle?

window aisle seat
↓ ↓ ↓
(□□ □□□)

9. _____ How many triangles of any size are in the figure shown?



10. _____ The game of chess is played on an eight by eight grid of squares. In one move, the king may be moved to any of the squares which adjoin the square it currently occupies, either along an edge or at a corner. If the king starts in a corner square, how many different squares could it occupy after exactly four moves?



Start here

11. _____ May 1, 2004 is a Saturday. On what day of the week does June 1, 2006 fall?

12. _____ The points $(-10, 0)$, $(0, 5)$ and $(10, 0)$ are vertices of a triangle. If x and y are integers, how many points (x, y) are in the interior of this triangular region?

13. _____ There are 5 red, 7 white, and 9 black cards in a stack. How many cards must be chosen to guarantee three of the same color?

Name _____

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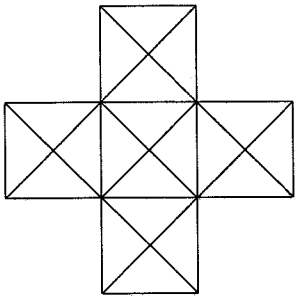
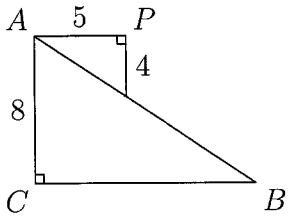
14 1. _____ A 3" x 5" piece of paper can be rolled to form a cylinder by taping either pair of parallel edges together. What is the ratio of the volumes of the larger cylinder to the smaller cylinder obtained in this way? Express your answer as a common fraction.

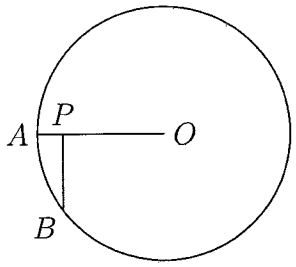
2. _____ How many triangles of any size are in the figure shown?



15 3. _____ In the figure, $AP \parallel BC$. How many units are in the perimeter of $\triangle ABC$? Express your answer to the nearest whole number.

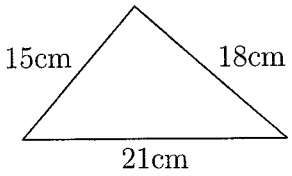


16 ~~4.~~ _____ In circle O, $AP = 2$ cm, $PO = 3$ cm, and $m\angle BPO = 90°$. What is the number of centimeters in the length of $\overline{BP}$?



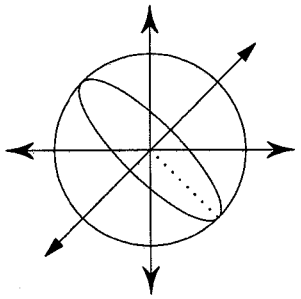
17 ~~5.~~ _____ What is the number of units in the circumference of the circle with center at $(-2, 3)$ and passing through $(10, -2)$? Express your answer in terms of π.

18 ~~6.~~ _____ What is the number of square centimeters in the area of the triangle shown? ~~Express your answer in simplest radical form~~.

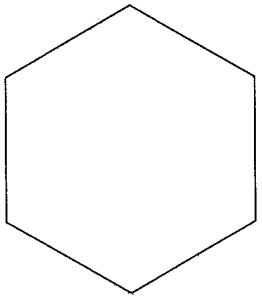


19 ~~7.~~ _____ One leg of a right triangle is two meters longer than twice the length of the other leg. The hypotenuse is eight meters longer than the shorter of the two legs. What is the perimeter of the triangle, in meters?

20 ~~8.~~ _____ A circle centered at the origin has a radius of 6 cm. The circle is rotated about the line $y = x$ to form a sphere. What is the number of cubic centimeters in the volume of the sphere? Express your answer in terms of π.



21 ~~9.~~ _____ How many lines of symmetry does a regular hexagon have?



22 ~~10.~~ _____ Pamela wants to make a quilt using fabric squares that are pre-cut to three inches on a side. One-fourth of an inch on each side is the margin for the seam and will be sewn under and out of view. How many of these fabric squares will she need to make a square quilt with side length five feet?

23 ~~11.~~ _____ Each edge of a cube is decreased by 40%. What is the percent of decrease in the volume of the cube? Express your answer to the nearest tenth.

Answer Sheet

Number	Answer	Problem ID
1	2/3	CB55
2	2	5BA5
3	9/20	BB55
4	10	3C55
5	7	0B13
6	6	0B03
7	$\frac{7}{20}$	0CB3
8	64	2C03
9	56 triangles	3AC3
10	25	CCB3
11	Thursday	5A13
12	36	5013
13	7 cards	00C31

Answer Sheet

Number	Answer	Problem ID
14 ~~1~~	$\frac{5}{3}$	4C55
~~2~~	~~56 triangles~~	3AC3
15 ~~3~~	31	DBC3
16 ~~4~~	4	0004
17 ~~5~~	26π	1BC3
18 ~~6~~	$54\sqrt{6}$	3CC3
19 ~~7~~	30 meters	DBB3
20 ~~8~~	288π	5AA5
21 ~~9~~	6	1C55
22 ~~10~~	576	CAA5
23 ~~11~~	78.4 %	5CB3