Mathcounts / AMC 8 Advanced
Homework 1

Name: _____

1) A wooden cube that measures 8-inch along each edge is painted yellow. The cube is then cut into 2 inch cubes. How many of the 2 inch cubes have paint on two surface?

2) Making cuts across the diameter, a lumberjack can cut a log into 4 pieces in twelve minutes. How long would it take to cut a log of the same size and shape into 6 pieces?

3) I have four 3-cents and three 5-cents stamps. Using one or more of these stamps, how many different amounts of postage can I make?

4) A collection of thirty coins consists of dimes and quarters and has a total value of $4.35. How many of each type of coin are in this collection?

5) Suppose that you roll two number cubes, each of which has faces numbered from 1 through 6. What is the probability of rolling a sum of 8 in the uppermost faces?

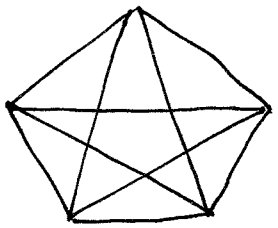
6) What is the sum of each of the following series of numbers?

$$11 + 13 + 15 + \text{----------} + 397 + 399 + 401$$

7) Suppose all the counting numbers are arranged in columns as shown at the right. Under what column-letter will 1000 appear?

A	B	C	D	E	F	G
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	..	..	..	..

8) How many triangles are in this picture?



9) In a stationary store, pencils have one price and pens have another price. Two pencils and three pens cost 78 cents. But three pencils and two pens cost 72 cents. How much does one pencil cost?

10) I went into a store and spent half of my money and then $20 more. I went into a second store and spent half of my remaining money and then $20 more. Then I had no money left. How much money did I have when I went into the first store?

11) Ashley gave Ben and Chris as much money as each had. Then Ben gave Ashley and Chris as much money as each already had. Then Chris gave Ashley and Ben as much money as each had. Then each of the three people had $24. How much money did each have to begin with?

12) Suppose that you just completed a nonstop bicycle trip of 5.5 km. You know that each wheel of your bicycle has radius of 35 cm. About how many times did each wheel turn during this trip?

13) A train that is 1 km long is traveling at 30 km/hr. If the train enters a tunnel that is 1 km long, how much time will it take the train to clear the tunnel?

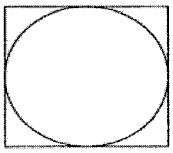
14) Using one piece of type for each digit, how many 2s will the printer need in printing page numbers from 1 through 250?

15) Working alone, an adult requires three hours to do a certain job. A child working alone requires seven hours to do the same job. How long will it take the adult and child working together to do this job?

16) Eight people are introduced to each other, and each person shakes hands with each of the others exactly one. How many handshakes are exchanged altogether?

17) In a ten-sided polygon (DECAGON), how many diagonals can be drawn in it?

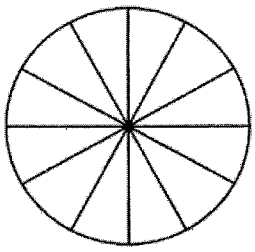
18)



In the figure, a circle with radius 4 ft is inscribed in a square. What is the area of the square?

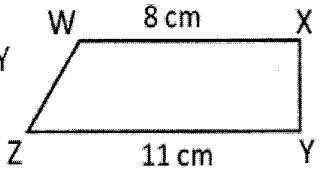
19)

A circular pizza was cut into 12 congruent slices, as shown. If 2 slices were eaten, what is the sum of the central angles of the slices that were not eaten?



20)

In trapezoid WXYZ, shown here, WX = 8 cm and ZY = 11 cm. Segment XY is half as long as the shorter base, and ∠WXY and ∠XYZ are each right angles. What is the area of trapezoid WXYZ?

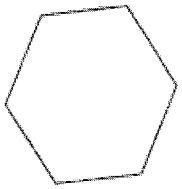


21)

A rectangle measures 18 m by 24 m. What is the sum of the lengths of its diagonals?

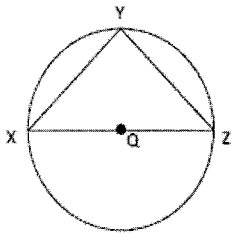
22)

A cake with a regular hexagonal top is sliced along each of its 9 diagonals. What percent of the resulting 24 pieces are triangles?



23)

Isosceles triangle XYZ is inscribed in circle Q, as shown. If diameter XZ is 2 inches, what is the area of ΔXYZ?

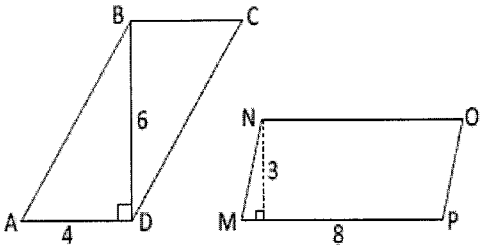


24)

In a triangle with angles measuring a, b and c degrees, the mean of b and c is a. What is the value of a?

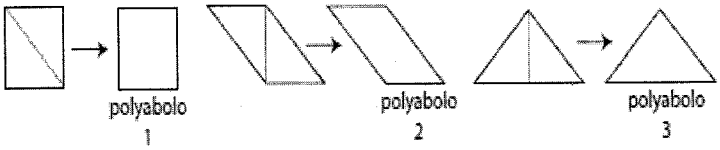
25)

What is the ratio of the area of ΔABD to the area of parallelogram MNOP, shown here? Express your answer as a common fraction.



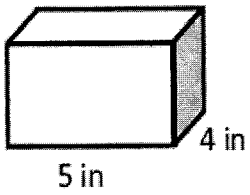
26)

A polyabolo is a polygon formed by joining congruent isosceles right triangles in such a way that each triangle shares a side with at least one other triangle. Three distinct polyaboloes can be formed from two triangles, as shown below. If rotations and reflections are not counted separately, how many distinct polyaboloes can be formed from three triangles?



27)

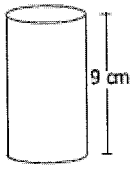
The volume of a rectangular prism is 120 in^3. Its length and width are 5 in and 4 in, respectively, as shown. What is the height of the prism?



28)

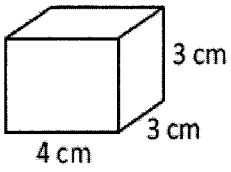
Each face of a 5 × 5 × 5 cube is painted red. This cube is then cut into 125 unit cubes. How many of the unit cubes have no faces that are painted red?

29)



A right circular cylinder has a volume of 144π cm^3 and a height of 9 cm. What is the area of its base? Express your answer in terms of π.

30)



How many 0.5 cm × 0.5 cm × 0.5 cm cubes are needed to completely fill this rectangular prism measuring 4 cm × 3 cm × 3 cm?

31)

The sum of the lengths of the edges of a cube is 24 inches. What is the volume of the cube?

32)

Phara purchased four different items from the list shown. The total price of the four items, not including tax, was $17.36. What is the positive difference in the prices of the two items that she did not purchase?

Notebook	$2.99
Wallet	$3.49
Puzzle	$6.29
Photo Album	$4.99
Card Game	$3.89
Book	$5.49

33)

What is the product of the greatest and least two-digit prime numbers?

34)

When writing twenty-one-and-a-half trillion in scientific notation, what is the exponent needed on the base 10?

35)

A dog is chasing a rabbit that has a head start of 150 ft. If their leaps are synchronized, and the dog leaps 9 ft every time the rabbit leaps 7 ft, in how many leaps will the dog catch up to the rabbit?