HOMEWORK

Ratios

The **ratio** of two numbers, a and b, is their quotient $\frac{a}{b}$. This ratio can be expressed as $\frac{a}{b}$, $a : b$, a to b, or simply as a decimal.

Two ratios are considered proportional to each other (more specifically, directly proportional) if the two ratios equal each other. In other words, $\frac{a}{b} = \frac{c}{d}$.

Watch this video from AoPS about **Proportion :** **Videos**

I. Complete all the problems that you did not finish in class.

1.1 Six painters can paint a room in 5 days. How many painters are needed to paint the same room in 3 days?

1.2 Three painters can paint 60 windows in 5 days. How many windows will 5 painters paint in 4 days?

1.3 Divide the number 88 into three parts proportional to the numbers ½, ¾ and 1½.

1.4 Divide the number 93 into three parts a, b, and c such that a : b = 3 : 2 and b : c = 5 : 3.

1.5 Ivan had some cookies. He ate some of them, and then Tali came to visit and together, they split the rest of the cookies evenly. It turned out that Ivan ate five times more cookies than Tali. What portion of the cookies did Ivan eat beforeTali arrived?

1.6 After Natasha has eaten half of the peach slices from a can the level of liquid went down by one third of the height of the can. At what fraction of the current level will the liquid level decrease if she eats half of the remaining peach slices?

1.7 After Natasha has eaten one third of the peach slices from a can the level of liquid went down by one quarter of the height of the can. At what fraction of the current level will the liquid level decrease if she eats all the remaining peach slices?

1.8 The father is 25 years older than his son. The ratio of the father's age to the son's age is $\frac{3}{2}:\frac{2}{3}$. How old is the father and how old is the son?

1.9 Danny and Tommy live in a city in the same apartment building. Danny lives on the 6th floor. Tommy was daydreaming when he left his apartment, and went upstairs instead of downstairs. Reaching the top floor, he realized his mistake, and went down to his floor. It turned out Tommy walked one and a half more flights of stairs than he would going straight down. How many floors are there in the building?

1.10 Betty is a geophysicist on her shift at the station in Antarctica. One of her responsibilities is to fill the generator with fuel. Every morning at 8:30 am she fills it to the top, using 5 gallons of diesel fuel. Every night at the same time, right before going to bed, she again fills it to the top using 7 gallons. What time does Betty go to bed?

II. Math Kangaroo Problems.

4 point questions

11) For how many positive whole numbers does a^2 und a^3 have the same number of digits?

A) 0   B) 3   C) 4   D) 9   E) infinitely many

12) What is the minimum number of dots that must be taken away from the picture so that no three of the remaining dots lie on a straight line?
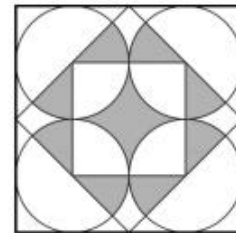
A) 1   B) 2   C) 3   D) 4   E) 7

13) Nick measured all 6 angles in two triangles. One of the triangles was acute angled and the other obtuse angled. He noted four of the angles to be: 120°, 80°, 55° und 10°. What is the size of the smallest angle in the acute angled triangle?

A) 45°   B) 10°   C) 5°   D) 55°   E) not possible to answer.

14) What fraction of the largest square is grey?

A) $\frac{1}{4}$ B) $\frac{1}{5}$ C) $\frac{2}{5}$ D) $\frac{3}{8}$ E) $\frac{1}{3}$

15) On the island of the truth tellers and the liars, there are 25 people standing in a line. The person at the front claims that everybody standing behind him is a liar. Everybody else claims that the person standing in front of them is a liar. How many liars are standing in the line? (Truth tellers always tell the truth and liar always lie.)

A) 0   B) 12   C) 13   D) 24   E) not possible to answer.

16) In the diagram opposite there is an object with 6 triangular faces. On each corner there is a number (two are shown). The sum of the numbers on the corners of each face is the same. What is the sum of all 5 numbers?

A) 9   B) 12   C) 17   D) 18   E) 24