

**Year 4. Problem Set 90 (2008-2009).**

1. How to cook a dish that requires exactly 15 minutes preparation time if you have two sand timers: 7-minutes one, and 11-minutes one.



2. Find  $\left(\frac{a}{c}\right)^3$  if it is known that  $\frac{1}{a+c} = \frac{1}{a} + \frac{1}{c}$

3. Find the sum  $\frac{1}{3+2\sqrt{2}} + \frac{1}{2\sqrt{2}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{5}} + \frac{1}{\sqrt{5}+2} + \frac{1}{2+\sqrt{3}}$

4. If  $a + b = 1$  and  $a^2 + b^2 = 2$ , find  $a^4 + b^4$ .

5. Masha drew a pentagon inscribed in a circle. Then she measured its 5 consecutive angles – and said that these angles are:  $80^\circ, 90^\circ, 100^\circ, 130^\circ, 140^\circ$ . Does Masha know how to use a protractor correctly?

6. Three kids tried to divide 120 post stamps. At first, Vania and Masha received from Petia exactly as many stamps as they had already. Then Petia and Masha received from Vania exactly as many stamps as they have had after the first operation. And, finally, Vania and Petia received from Masha as much as they've had by this moment. As a result, everybody got an equal share. How much each had at the very beginning?

