

## Sample Problems For Applied Mathematics Olympiad

1. When tourists from USA come to Europe, they often convert temperatures in the Celcius scale into their familiar Fahrenheit scale using the approximate formula  $F=2C+30$ . Find the range of temperatures (in Celcius degrees) within which the temperature in Fahrenheit calculated by this approximate formula differs from the temperature obtained by the exact formula by at most 5%. To write out the exact formula it suffices to know that water freezes at  $32^{\circ}\text{F}$  and boils at  $212^{\circ}\text{F}$ .
2. On a hot summer day Alice felt like having some cold water. She poured water into a glass and added ice so that the liquid's level rose to the rim of the glass. But then she became anxious that the water will spill over the rim as the ice melts. Are the fears of the girl justified? Will there a puddle on the table when the ice has melted away? Explain your answer.
3. A motion picture film must be wound off one reel and on another. The diameters of empty reels are both equal to  $a$ . How much time will the rewinding take if the length of the film is  $L$ , its thickness is small and equals  $S$ , and the receiving reel rotates with a constant angular velocity of  $\omega$ .