Wed Oct 24, 2012 **MATH 210** **Quiz 6** Prof. V. Panferov

Name (print): Solutions.

Each problem is worth 2 points. Show all your work.

1. Find the prime factorizations of the following numbers (write them in exponential form):

(a) 324

$324 = 18^2 = (2\cdot 9)^2 = 2^2 \cdot 3^4$

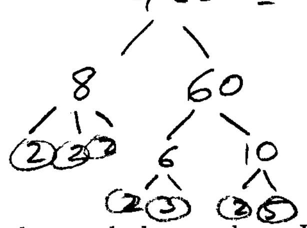
or

$324 = 2 \cdot 162 = 2 \cdot 2 \cdot 81$

$= 2^2 \cdot 3^4$

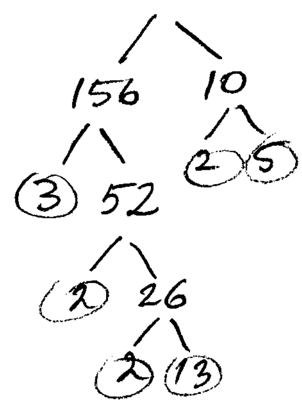
in other version

$480 = 2^5 \cdot 3 \cdot 5$



(b) 1560

$1560 = 2^3 \cdot 3 \cdot 5 \cdot 13$



2. Let m be a whole number. If 18 divides m, then 3 and 6 divide m as well. Show that the converse of this fact is not true: find a number which is divisible by 3 and 6 but not by 18. (Show your work.)

Smallest such number is 6

$6 = 3\cdot 2, \quad 6 = 6 \cdot 1$

$6 < 18$, so $18 \nmid 6$.

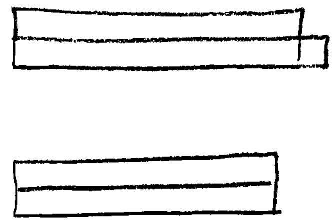
other multiples of 6 (which do not have another 3 in their prime factorization) work:

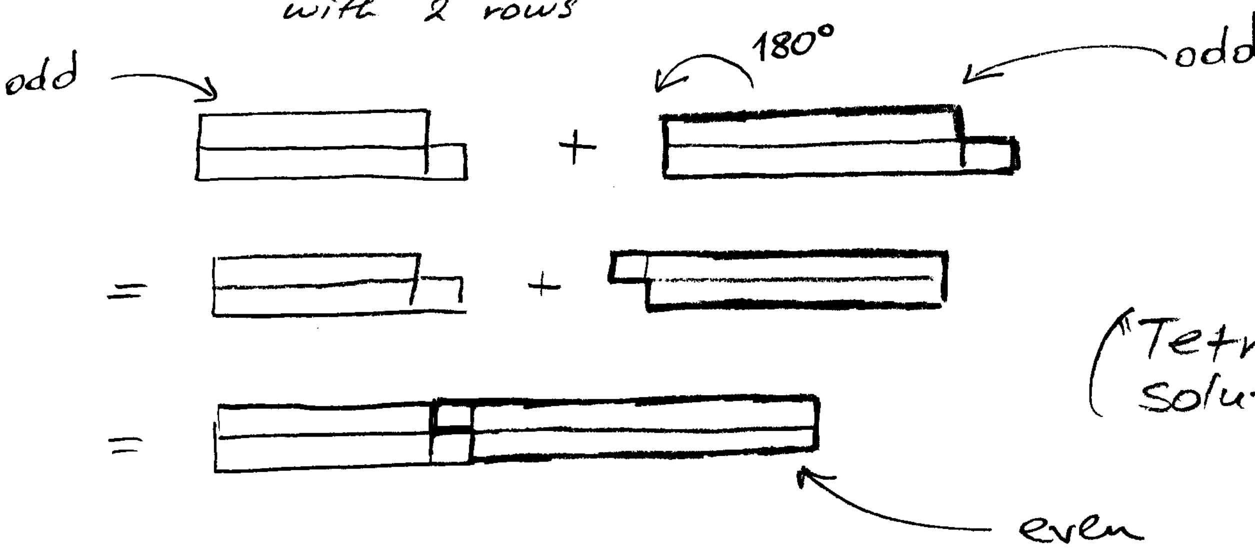
12, 24, 30...

Please turn over...

3. (a) Give a picture proof of the fact *"The sum of two odd numbers is an even number"*.

odd number :
even number + 1
even number :
repr. as array
with 2 rows





(b) Give an algebraic proof of the same fact.

a is odd : $a = 2k+1$, k - whole #

b is odd : $b = 2m+1$, m - whole #

$$a+b = (2k+1) + (2m+1)$$
$$= 2(k+m) + 2$$
$$= \underbrace{2(k+m+1)}_{\text{even}}$$

$k+m+1$
- whole #