

Math 5a HW 3

#1. 2024^{23} last digit will be the same as 4^{23} .

1 4, 6, 4, 6, 4, ...
1' 2' 3' 4' 5' ...

Even exp. have 6 at the end
odd exp have 4 at the end
23 is odd, so the last digit will be 4.

2023^{23}

3	9	24	81	...	3	9	7	1
1	2	3	4	...	5	6	7	8

4 period

$23:4 = 5R(3)$, last digit 7.

#2. Sum of even numbers is always even.
Sum of odd numbers can be even, if
the total number of odd numbers is even
(each pair produces an even sum)
or odd, if the total number of odd numbers
is odd.

How many odd numbers are before an arbitrary
even number?

If we divide this even number by 2, we will find
the number of pairs (odd + even)

$1990 : 2 = 995$ (so there are 995 odd numbers
and the sum will be odd).

#3.

$$\frac{5^3 \cdot 7^7}{5^2 \cdot 7^6} = 5^{3-2} \cdot 7^{7-6} = 5 \cdot 7 = 35$$

$$\frac{(8 \cdot 9)^5 \cdot 7^{10}}{8^2 \cdot 9^3 \cdot 7^7} = \frac{8^5 \cdot 9^5 \cdot 7^{10}}{8^2 \cdot 9^3 \cdot 7^7} = 8^{5-2} \cdot 9^{5-3} \cdot 7^{10-7} = 8^3 \cdot 9^2 \cdot 7^3$$

#4. x is Peter father's age

$$\frac{1}{2}x + 4 = x - 14$$

$$x - \frac{1}{2}x = 14 + 4$$

$$\frac{1}{2}x = 18, \quad x = 18 \cdot \frac{1}{2} = 36 \text{ years.}$$

$$\# 5. \frac{(2.3 + 5.8) \cdot 3\frac{5}{7}}{(4.9 - 2.3) \cdot \frac{7}{9}}$$

$$2.3 + 5.8 = 8.1.$$

$$4.9 - 2.3 = 2.6.$$

$$\frac{8.1 \cdot \frac{26}{7}}{2.6 \cdot \frac{9}{7}} = \frac{\frac{81}{10} \cdot \frac{26}{7}}{\frac{26}{10} \cdot \frac{9}{7}} = \frac{81}{10} \cdot \frac{\cancel{26}}{7} \cdot \frac{10}{\cancel{26}} \cdot \frac{\cancel{7}}{9} = 9.$$

7. 1. $345 \div 15 \approx 23$ miles per gallon

2. $23 \cdot 35 = 805$ miles.

6

$$a. \quad 2^x \cdot 2^{2x} = 64$$

$$2^{x+2x} = 64$$

$$64 = 2^6$$

$$2^{3x} = 2^6$$

$$3x = 6$$

$$x = 2$$

$$\text{Check: } 2^2 \cdot 2^4 = 4 \cdot 16 = 64.$$

$$b. \quad 3^n \cdot 9 = 81$$

$$9 = 3^2$$

$$81 = 3^4$$

$$3^2 \cdot 3^2 = 3^4$$

$$3^{n+2} = 3^4$$

$$n+2 = 4$$

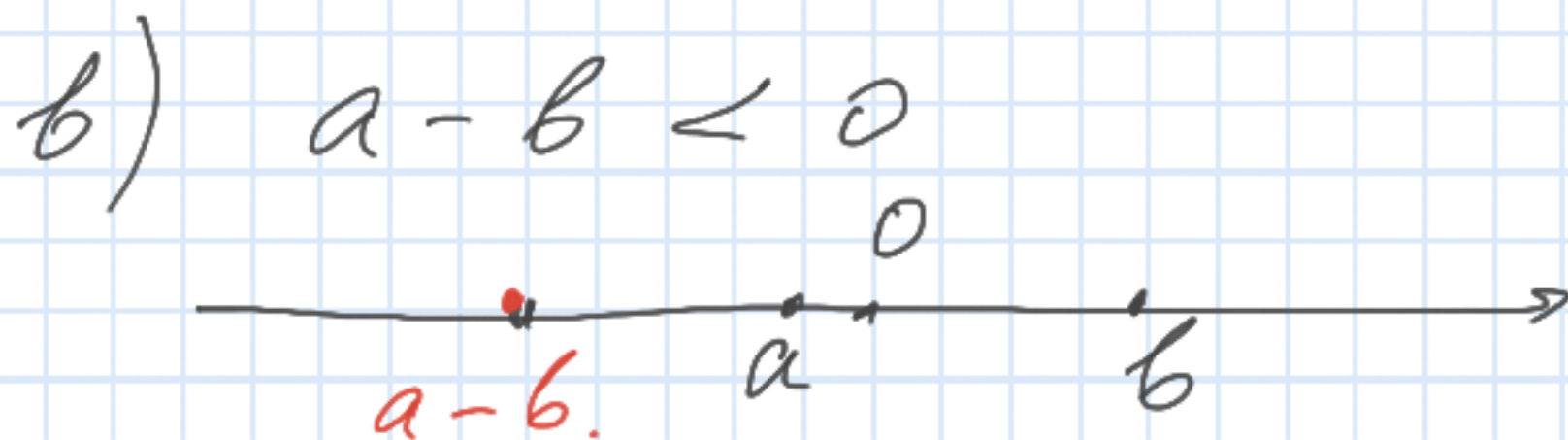
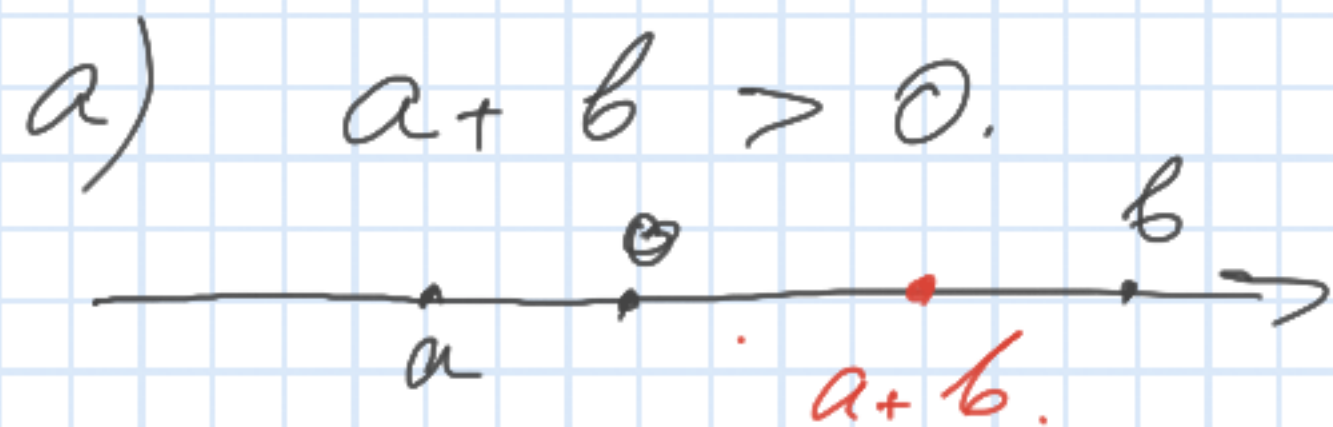
$$n = 4 - 2 = 2.$$

Check:

$$3^2 \cdot 9 = 9 \cdot 9 = 81.$$

8.

a is negative
 b is positive
 $|a| < |b|$



c) $ab < 0$

d) $\frac{b}{a} < 1$ (a is negative, so $\frac{b}{a} < 0$).

9.

g - number of girls

b - number of boys.

m - number of girls who solved the problem.

$b - m$ - number of boys who solved the problem

Total number of students who solved the problem is

$$m + (b - m) = b.$$

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