Math 5B: Classwork 28
Homework #28 is due May 16-th.

TEST NEXT SUNDAY

REVIEW

May 9, 2021

- **Binary numbers. Powers of 2:**

n	0	1	2	3	4	5	6	7	8	9
2^n	1	2	4	8	16	32	64	128	256	512

Numbers in decimal notation can be presented like this

$351 = 1{\cdot}2^8 + 0{\cdot}2^7 + 1{\cdot}2^6 + 0{\cdot}2^5 + 1{\cdot}2^4 + 1{\cdot}2^3 + 1{\cdot}2^2 + 1{\cdot}2^1 + 1{\cdot}2^0 = 101011111b$

Recall: Square root of a (denoted $\sqrt{a}$ is a number whose square is equal to a. For example: square root of 25 is 5, because $5^2 = 25$.
We discussed that

$$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$$

$$\sqrt{a + b} \neq \sqrt{a} + \sqrt{b}$$
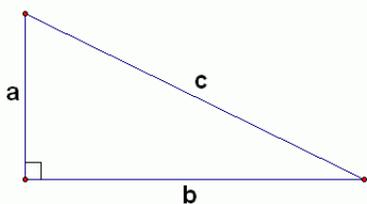
$$\sqrt{a^2} = |a|$$

$$\sqrt{8} = \sqrt{4 \cdot 2} = \sqrt{4} \cdot \sqrt{2} = \sqrt{2^2} \cdot \sqrt{8} = 2 \cdot \sqrt{2}$$

$$\sqrt{a^8} = \sqrt{(a^4)^2} = a^4$$

Square roots naturally appear in geometry:
Pythagorean Theorem: In a right triangle with legs a, b and hypotenuse c, one has

$$a^2 + b^2 = c^2 \quad \text{or} \quad c = \sqrt{a^2 + b^2}$$

$a^2 + b^2 = c^2$

Review Exponents Properties/Rules:

1. $a^0 = 1$
2. $a^m \cdot a^n = a^{m+n}$
3. $a^m \div a^n = \frac{a^m}{a^n} = a^{m-n}$
4. $(ab)^n = a^n \cdot b^n$
5. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
6. $a^n = \frac{1}{a^{-n}}$
7. $(a^m)^n = a^{m \cdot n}$

Proportions

To make 13 cookies you need 2 cups of flour. How much flour you need to make 20 cookies?

13 cookies – 2 cups
20 cookies – x cups

$$\frac{13}{20} = \frac{2}{x}$$

$$13x = 2 \cdot 20$$

Homework 28: REVIEW

1. Binary numbers:
   a. Write as binaries: 35, 11, 40
   b. Write as Decimals: 101010b, 11100011b

2. Solve equations:

   a) $\frac{3}{8}x = \frac{1}{3}$ b) $|2x - 5| = 1$ c) $\frac{x-2}{x-1} - 4 = 3$

3. Simplify:

   $\frac{6^5 \cdot 2^4}{3^5 \cdot 2^2} =$ $\frac{42^2}{6^2} =$ $\frac{9^2 \cdot 2^4}{6^2} =$ $\sqrt{\frac{4^2}{5^{10}}} =$ $\sqrt{12} =$

4. A piece of cable 8.5 cm long weighs 52 grams. What will a 10-cm length of the same cable weigh?

5. Find a simple fraction form for the following repeating decimals:

   a) $0.\overline{73}$ b) $0.\overline{81}$

   If you forgot how to do it, please refresh your memory here ->
   https://www.youtube.com/watch?v=xX1sqV1nSAQ

6. The standard card deck has 4 suits (hearts, diamonds, spades, and clubs); each suit has 13 different card values: 2 through 10, jack, queen, king, and ace. If you randomly draw one card, what is the probability of getting
   (a) The queen of spades
   (b) A face card (i.e., jack, queen, or king)
   (c) Anything but the queen of hearts

7. Open parenthesis, simplify:

   (a) $3(a - 5) - 2(2a - 9) =$ (b) $12x - 3x(x + 4) =$

   (c) $5x - 5(7 - a + x) =$ (d) $-3z - (z - 4) + 2(2z - 5) =$

   (e) $a(a + b) + b(a + 1) =$ (f) $2a(a - 2) - a(a - 1) =$

   Open parenthesis, simplify.

$(2x - 3)^2 =$ $(4x - 5)(4x + 5) =$

8. Simplify:

   (a) $\left(\dfrac{5a^2 b^5}{4a^3 b^3}\right)^3 =$ (b) $\left(2z^2 \cdot 3z^3 \cdot z\right)^2 =$ (c) $\dfrac{(-ab)^8}{(ab)^2} =$

   (d) $\left(\dfrac{3ab^3}{15b}\right)^2 \cdot \dfrac{75c}{a^2 b^6} =$ (d) $\left(\dfrac{3a^5 b^2}{21ab}\right)^2 \cdot \dfrac{7^4}{a^{16} b^2} =$

9. Solve equations: Find x, **DO NOT FORGET TO CHECK**

a) $\dfrac{3}{4}(x + 8) = 10$ b) $\dfrac{1}{2}(x + 1) = x - 3$

c) $\dfrac{1}{2}x + \dfrac{1}{3}x = x - \dfrac{1}{12}$ d) $\dfrac{3x + 2a}{2a - 5x} = -1$ e) $\dfrac{3x + 2a}{2a - 5x} - 7 = 8$

10. Open parenthesis, simplify:

$3a(b + ac) - c(3a^2 - 2) + 2ab =$

$2a(2a - 3) - 3(2a + 3) =$

$(2a - 3)(2a + 3) =$

11. Find legs....

Find the length of legs, if hypotenuse is 10?
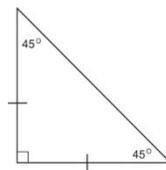
DISTANCE- SPEED- TIME

12. A man travels at 4 mph in still water. If the current's velocity is 2 mph, it takes 4 hours to row to a place and come back. How far is the place?

13. If a person walks at 4 mph, he covers a certain distance. If he walks at 9 mph, he covers 7.5 miles more. How much distance did he cover?

14. A swimming pool can be filled by one pipe in 3 hours, by another pipe in 5 hours and by a third pipe in 10 hours. How long it will take to fill up the pool if all three pipes are working?

15. Prove that if in the triangle $\triangle ABC$ $\angle A = \angle C$ and the point M of the side AC is such that BM is a height (angle $AMB = 90^o$) then this triangle is isosceles?

Hint: use definition of isosceles triangle

   Use congruency rules