

REVIEW

May 3, 2020

- **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 | 516 |

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

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

$$\sqrt{a + b} \neq \sqrt{a} + \sqrt{b}$$

$$\sqrt{a^2} = |a|$$

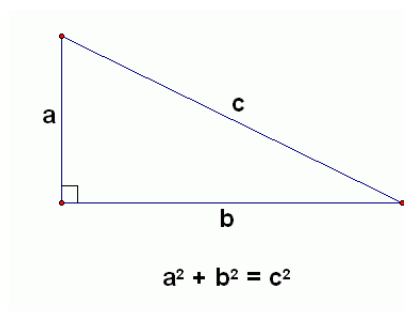
$$\sqrt{8} = \sqrt{4 \cdot 2} = \sqrt{4} \cdot \sqrt{2} = \sqrt{2^2} \cdot \sqrt{8} = 2 \cdot \sqrt{2}$$

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

Square roots naturally appear in geometry:

Pythagorean Theorem: In a right triangle with legs a , b and hypotenuse c , one has

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



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 27: 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:

$$\begin{array}{ll}
 \text{(a)} \quad 3(a - 5) - 2(2a - 9) = & \text{(b)} \quad 12x - 3x(x + 4) = \\
 \text{(c)} \quad 5x - 5(7 - a + x) = & \text{(d)} \quad -3z - (z - 4) + 2(2z - 5) = \\
 \text{(e)} \quad a(a + b) + b(a + 1) = & \text{(f)} \quad 2a(a - 2) - a(a - 1) =
 \end{array}$$

Open parenthesis, simplify.

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

8. Simplify:

$$\begin{array}{lll}
 \text{(a)} \quad \left(\frac{5a^2b^5}{4a^3b^3}\right)^3 = & \text{(b)} \quad (2z^2 \cdot 3z^3 \cdot z)^2 = & \text{(c)} \quad \frac{(-ab)^8}{(ab)^2} = \\
 \text{(d)} \quad \left(\frac{3ab^3}{15b}\right)^2 \cdot \frac{75c}{a^2b^6} = & \text{(d)} \quad \left(\frac{3a^5b^2}{21ab}\right)^2 \cdot \frac{7^4}{a^{16}b^2} = &
 \end{array}$$

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

$$\begin{array}{ll}
 \text{a)} \quad \frac{3}{4}(x + 8) = 10 & \text{b)} \quad \frac{1}{2}(x + 1) = x - 3 \\
 \text{c)} \quad \frac{1}{2}x + \frac{1}{3}x = x - \frac{1}{12} & \text{d)} \quad \frac{3x+2a}{2a-5x} = -1 \quad \text{e)} \quad \frac{3x+2a}{2a-5x} - 7 = 8
 \end{array}$$

10. Open parenthesis, simplify:

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

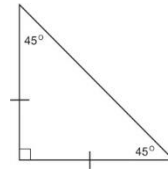
$$2a(2a - 3) - 3(2a + 3) =$$

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

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 $AMB = 90^\circ$) then this triangle is isosceles?

Hint: use definition of isosceles triangle

Use congruency rules

