

MATH 5e: Class Work 19

Topics: Equations, word problems

- Use the power rules; similarly to $(ab)^n = a^n b^n$, similarly $\sqrt{ab} = \sqrt{a}\sqrt{b}$.
 $a^m a^n = a^{m+n}$ and $a^{m+n} = a^m a^n$, similarly $\sqrt{a}\sqrt{a} = a^{1/2} a^{1/2} = a^{\frac{1}{2}+\frac{1}{2}} = a$
 $(a^m)^n = a^{m \times n}$, similarly $(\sqrt{a})^2 = (a^{1/2})^2 = a$
- Theorem (Pythagorean theorem). In a right triangle with legs (sides) a , b and hypotenuse c , one has:

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

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

- Formulas for fast multiplication

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a - b)(a + b) = a^2 - b^2$$

Do it on your own

1. Calculate:

a) $\sqrt{25 \cdot 9}$; $\sqrt{49 \cdot 16}$; $\sqrt{36 \cdot 9 \cdot 64}$; $\sqrt{400 \cdot 25}$

b) $\sqrt{\frac{1}{36} \cdot 49}$; $\sqrt{0.6^4 \cdot (-4)^2}$; $\sqrt{(-3)^4 \cdot 0.3^2}$;

Problems

1. Open the parentheses and solve. Is there a faster way to do this?

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

b) $(3x + y)^2 =$

c) $(3y^2 - 5)^2 =$

d) $(2x - y)^2(x + y) =$

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2. Write down a series of 7 numbers; the first number is 8^{-3} and every following number is a product of the previous number multiplied by 8. Then, find the product of
- The first number and the seventh
 - The second and the sixth
 - The third and the fifth
 - All seven numbers
3. Write in scientific notation
- $10 \cdot 10^6 =$
 - $0.5 \times 10^{-8} =$
 - $17.5 \cdot 10^6 =$
 - $15\,000\,000 =$
 - $254\,000\,000 =$
 - $0.00000009 =$
 - $0.000000723 =$
4. In an isosceles triangle $\triangle ABC$, the height towards the base is 10 cm, and the height towards one of the sides is 12 cm. Find the lengths of all sides in the triangle.
5. The perimeter of a triangle is $2a + b + 1$. One of the sides is equal to $a + b$, and the second side is smaller than the first by $2a$. Find the third side.
6. Solve the equations
- $3(x - 6) = 24$
 - $2x - x(x - 3) = 5 - x^2$
 - $(3x - 1)(2x + 7) = (x + 1)(6x - 5)$

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d) $(x + 1)^2 - x(x + 2) = 4$

7. Solve by creating an equation.

The number of students in three 5th-grade classes is 110. In 5a, there are 4 more students than in 5b, and 3 less than in 5c. How many students are there in each class?

8. The distance between 2 cities, A and B, is 270 km. A car starts from A with a speed of 60 km/h. An hour and 20 minutes before that, a truck starts from B with a speed of 15 km/h less than the car's/
How long will it take to meet on the road as measured after the car left A.

9. Solve the equations

a) $|4x - 5| = 25$

b) $|-x - 1| = 1$

c) $|x + 2| = -1$