

Math 5e, Fall 2025 Homework 10

Homework #10 is due November 24

Instructions: Some of the problems we solved in class, and some are new. Please try to solve all problems, do your best, and show your work. **Write on separate sheets of paper, not between the lines of this handout!**

General notation (n is a whole number):

$$a^n = a \times a \times a \times \dots \times a \text{ (} n \text{ times)}$$

Special cases:

$a^0 = 1$	read: a -to-the-zero
$a^1 = a$	is just itself ' a '
$a^2 = a \times a$	read: a -squared
$a^3 = a \times a \times a$	read: a -cubed

Product	$a^n a^m = a^{n+m}$
Division	$\frac{a^n}{a^m} = a^{n-m}$
	$a^n = \frac{1}{a^{-n}} \quad \text{and} \quad a^{-n} = \frac{1}{a^n}$

Power of a product $(ab)^n = a^n \times b^n$

1. Solve the equations

(a) $5 - x = -4 - 2x$

(b) $7 - 2(1 - x) = -5$

(c) $\frac{(x-2)}{(x-1)} = 3$

2. If you take half my age and add 7, you get my age 13 years ago. How old am I?

3. Simplify:

(a) $\frac{(x^2 y^2) x^3}{x^2 y^5}$

(b) $(3y^3 \cdot y^5)^2$

4. Let $a = 2 \cdot 10^8$, $b = 10^5$. Compute $a^2 \cdot b$, $\frac{a}{b}$, $a^2 \div b^3$. Remember $(a)^2 = (a) \times (a)$

5. How many cubic centimeters are there in one cubic kilometer = $(1 \text{ km})^3$? ($1 \text{ km} = 1000 \text{ m}$, $1 \text{ m} = 100 \text{ cm}$). Use powers of 10!

6. It is known that $2^{10} = 1024$, which is very close to 10^3 . Use this to estimate the value of 2^{20} , and then 2^{32} .

Hint: $2^{20} = 2^{10+10} = 2^{10} \cdot 2^{10}$

7. Evaluate:

(a) $(x - 5)(2x + 1) =$

(b) $(x + 7)(x^2 - 2x) =$

8. Solve:

(a) $2^{-2} \cdot (2^2 + 4^2) =$

(b) $6^3 \cdot (2^{-3} + 3^{-3}) =$

(c) $\frac{2^8 + 2^{10}}{2^8} =$

9. The distance from Earth to the Sun is approximately 150 000 000 000 m. Write it as a product of two numbers with the largest possible power of 10.

10. Assume that a dandelion has 100 seeds. Each seed planted itself the next year and produced a dandelion with 100 seeds. If this continues year after year, how many dandelions will there be after 3 years? After how many years will we have 10 billion dandelions?