MATH 5 — PREREQUISITES FOR MATH 6

1. Program

- Algebraic expressions. Commutativity, associativity, distributivity.
- Equations. Solving word problems with equations.
- Powers of 2.
- Binary numbers.
- Powers. Negative powers. Scientific notation.
- $a^2 - b^2 = (a - b)(a + b)$
- Square roots.
- Pythagorean theorem.
- Basic probability theory: addition rule, complement rule, product rule.
- Geometry: parallel lines and angles (alternate interior, alternate exterior, corresponding).
- Parallelogram, various definitions, properties.
- Congruence tests for triangles (SAS, ASA, SSS).
- Isosceles triangle. Median, bisector, height.
- Trapezoid. Its midline. Area.

2. Homework 2

1. Let $a = 2 \cdot 10^8$, $b = 10^5$. Compute $a^2 \cdot b$, $\frac{a}{b}$, $a^2 \div b^3$.

2. If $a = 2^{-13}3^9$, $b = 2^{11}3^{-7}$, what is the value of ab? of a/b?

3. Write the following numbers using scientific notation.
(a) the distance from Earth to Pluto is $\approx$ 7,527,000,000 km;
(b) the distance from Earth to the star Sirius is $\approx$ 81,900,000,000,000 km;

4. Find the following square roots. If you can not find the number exactly, at least say between which two whole numbers the answer is, e.g., between 5 and 6.
(a) $\sqrt{81}$
(b) $\sqrt{10,000}$
(c) $\sqrt{10^8}$

5. If, in a right triangle, one leg has length 1 and the hypotenuse has length 2, what is the other leg?

6. Simplify: $(\sqrt{17})^2$, $(\sqrt{13})^4$, $(\sqrt{11})^3$, $\sqrt{2^4\,3^6}$, $\sqrt{2^4\,3^5}$.

7. A license plate consists of 3 letters, followed by three digits. How many possible license plates are there?

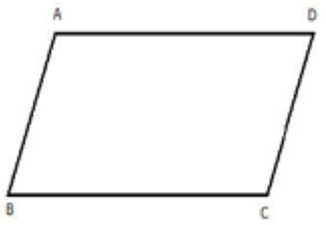
8. We roll two identical dice. What is the probability of getting 1 and 3?

9. If we toss a coin 5 times, what is the probability that **at least one** will be heads?

10. Solve equations:

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

11. Show that in a parallelogram, diagonally opposite angles are equal $\angle A = \angle C$, $\angle B = \angle D$



12. Let $ABCD$ be a parallelogram, and let BE, CF be perpendiculars from B, C to the line AD.

(a) Show that triangles $\triangle ABE$ and $\triangle DCF$ are congruent.
(b) Show that the area of parallelogram is equal to height$\times$base, i.e. $BE \times AD$.