

Problems marked with ** are very difficult.

1. Draw a triangle. Measure the sides of the triangle, mark the midpoint of each side and draw medians. (remember, median is a segment, drawn from the vertex of a triangle to the midpoint of the opposite side)
2. Draw a triangle, measure each angle, draw three bisectors.
3. Draw a triangle. Take a sheet of paper, fold it twice. Do it accurately. You now have a right angle template. Draw three altitudes in your triangle. Use ruler, pencil.
4. A traveler to the island of Knights and Knaves meets a group of five people (call them A, B, C, D, E).
A says: "exactly one of us is a Knight"
B says: "exactly two of us are Knights"
C says: "exactly three of us are Knights"
D says: "exactly four of us are Knights"
E says: "all five of us are Knights"
Can you find out which of them are Knights? (Remember, Knights always tell the truth, and Knaves always lie).
5. Water lilies are growing in a lake. The area covered with lilies is doubling every week. The lake was completely covered with lilies in 8 weeks. In how many weeks only half of the lake was covered?
6. Calculate (first represent the periodic decimals as fractions);
 - a. $0.\overline{71} + \frac{1}{2}$;
 - b. $0.\overline{6} \cdot 0.\overline{4}$;
 - c. $0.\overline{8} - 0.\overline{80}$;
 - d. $0.7272 \dots + \frac{3}{11}$;

Example, how represent the periodical decimals as fractions:

$$\begin{aligned}
 x &= 0,0(7), \\
 x &= 0,0777\dots, \\
 10x &= 0,777\dots, \\
 100x &= 7,777\dots, \\
 100x - 10x &= 7, \\
 90x &= 7, \\
 x &= \frac{7}{90};
 \end{aligned}$$

$$\begin{aligned}
 x &= 0,5(7), \\
 x &= 0,5777\dots, \\
 10x &= 5,777\dots, \\
 100x &= 57,777\dots, \\
 100x - 10x &= 52, \\
 90x &= 52, \\
 x &= \frac{52}{90}
 \end{aligned}$$

7. Compare:

$$7^3 \square (-7)^3;$$

$$7^4 \square (-7)^4;$$

$$(-5)^2 \square 5^2;$$

$$7^2 \square 7^3;$$

$$3^2 \square 2^3;$$

$$4^2 \square 2^4;$$

$$5^2 \square 2^5;$$

$$3^4 \cdot 3^2 \square 3^{4+2};$$

$$(2 \cdot 3)^4 \square 2^4 \cdot 3^4.$$

8. Without doing direct calculation, prove that
- a. $A = 121 \cdot 19 + 212 \cdot 19$ is divisible by 57
 - b. $B = 765 \cdot 25 - 421 \cdot 25$ is divisible by 100

9. Which fractions among the following can be represented as finite decimals? Represent them as fraction with denominator 100 and decimals.

$$\frac{7}{25}, \frac{9}{60}, \frac{5}{12}, \frac{6}{15}, \frac{3}{20}, \frac{7}{70}, \frac{3}{18}, \frac{5}{4}.$$

10. Compare with 0 following expressions:

Example:

$$(-7)^2 \cdot (-3)^7$$

$$(-7)^2 > 0, (-3)^7 < 0,$$

$$(-7)^2 \cdot (-3)^7 < 0$$

$$\begin{array}{lll} (-11)^{30} \cdot (-9)^{20}; & \frac{(-3)^{15}}{(-15)^5}; & -\frac{(-9)^4}{(-21)^{10}}; \\ (-5)^{20} \cdot (-4)^9; & \frac{(-12)^5}{(-65)^{12}}; & -\frac{(-7)^{10}}{(-8)^{11}}. \end{array}$$

11. Draw a segments 3 cm long, 5.4 cm long, 7.8 cm long. Draw angles 35° , 57° , 200° .