## *Program*

- Division with remainder. Divisibility tests by 2, 3, 4, 5, 6, 9. Divisors (factors), multiples.
- LCM, GCD. Finding by listing of all divisors.
- Prime and composite numbers. Prime factorization.
- Finding GCD and LCM using prime factorization.
- Fraction: addition and subtraction. Comparison.
- Multiplication and division of fractions. Finding a fraction of a number. Finding a number given its fraction.
- Speed, time, distance problems.
- Basic geometric concepts. Angles.
- Sum of angles of a triangle and a polygon.
- Quadrilaterals: parallelogram, rectangle, square, rhombus.
- Areas. Area of triangle, trapezoid, parallelogram.
- Negative numbers. Addition, subtraction, comparison. Absolute values. Multiplication and division of negative numbers.
- Distributivity. Opening the parentheses.
- Solving basic equations, including ones with negative numbers.

## *Problems*

1. Find the following sums

$$\text{(a)} \quad 1 + 2 + 3 + \cdots + 49$$

$$\text{(b)} \quad 1 + 3 + 5 + \cdots + 49$$

2. Is the number 12345 divisible by 3? by 9? by 5? by 10?

3. If it is 7am now, what time of the day will it be in 27 hours? 127 hours? 11043 hours?

4. Find the LCM and GCD of 28 and 30.

5. A package of plastic forks contains 16 forks. A package of plastic knives contains 12 knives. What is the smallest number of packages of each kind you have to buy to get exactly the same number of forks as knives?

6. Find a prime factorization of 204.

7. Find LCM and GCD of 365 and 30.

8. Consider the product of all numbers from 1 to 25: $1 \times 2 \times \cdots \times 24 \times 25$. How many 3s will there be in the prime factorization for this number?

9. Compute $\frac{14}{7} + \frac{45}{11}$, $\frac{7}{10} - \frac{1}{2}$.

10. Compare $\frac{11}{6}$ and $\frac{7}{4}$.

11. Compute

$$\text{(a)} \ \frac{3}{14} \times \frac{7}{9} \qquad \text{(b)} \ \frac{12}{33} \times \frac{55}{56}$$

12. Compute

$$\text{(a)} \ \frac{3}{14} \div \frac{7}{9} \qquad \text{(b)} \ \frac{12}{33} \div \frac{55}{56}$$

13. Mrs. Weatherby baked 175 cookies for a party. The children ate $\frac{4}{7}$ of the cookies. The adults ate 48 cookies. How many cookies were left?

14. There are 4 short stories in the book. The first story is 12 pages long, which is $\frac{2}{3}$ of the second story. The third story is $\frac{5}{6}$ of the length of the first two stories together. How long is the fourth story, if four stories together occupy 64 pages in the book?

15. A boat has speed of 8 miles per hour (mph).

    a. Two towns, A and B, are on the shores of a lake. How long would it take the boat to go from A to B and back if the distance between the towns is 10 miles?

    b. Two other towns, C and D, also 10 miles apart, are on a river: C is upstream, D is downstream. The river flows at the speed of 2 mph. How long will it take the boat to go from C to D? from D to C?

16. In the figure on the right, $\angle a = 30°$ and $\angle b$ is the right angle. Can you find the sizes of all other angles in the figure?
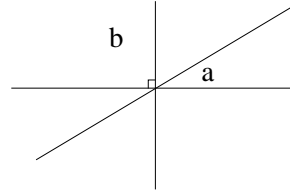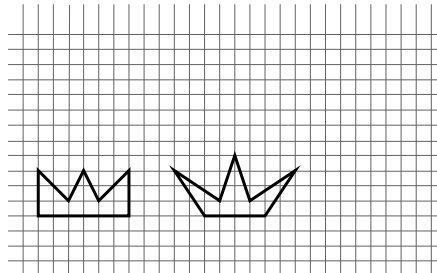
17. Find the angle between the two clock hands at 12:20.

18. Two of the angles between the diagonal and the side in parallelogram $ABCD$ are marked. Can you find all other angles – including the angles between sides and diagonals, and the angles between diagonals?
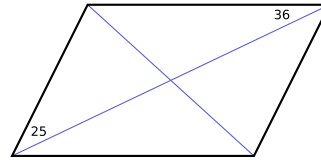
19. Find the area of the figures show to the right.

20. Compute the area of the figures below. The picture is not to scale, so do not try measuring the lengths - use the numbers given. In the last one, find the area of the shaded part.
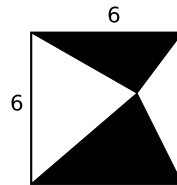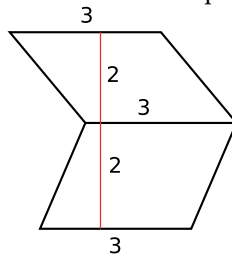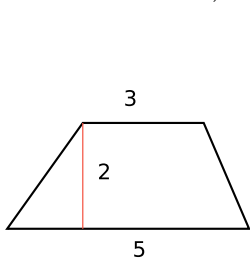
21. Compute

    (a) $(-7) + (-9) =$      (b) $3 + (-6) + (-7) =$      (c) $(-3) + 5 + (-7) =$

22. Solve the equations

    (a) $x - 12 = -10$      (b) $z + (-6) = -15$      (c) $|x| = 3$      (d) $|5 + x| = 3$

23. Compute the following expressions:

    (a) $(-6) \div (-2) + 3$      (b) $(-2) \div (-3)$      (c) $(-4) \times (-7) \div 9$

24. Solve the following equations

    (a) $(-2) \times x = -7$      (b) $(-3) \times x + 2 = x - 18$

25. Simplify the following expressions

    (a) $2(x + y) - 2(x - y)$      (b) $1 - 2(1 - 2(1 - 2x))$

26. Solve the following equations.

    (a) $5(x - 2) = 25$      (b) $4x = 2x + 8$      (c) $(-2x) + 3 - (-5x) - (-7) = -(-1)$