MTAP SATURDAY PROGRAM IN MATHEMATICS GRADE 9 SESSION 1
QUADRATIC EQUATIONS

A. Write the standard form of the following quadratic equations, then identify the a, b and c.

1. $3x^2 = 5 - 2x$
2. $x - 5x^2 = 10$
3. $16 + x^2 = 7$
4. $\frac{1}{2}x^2 - \frac{1}{4} = x$
5. $2(3x - 4) = (4x - 1)^2$
6. $\frac{2}{5}x^2 + 10 = 0.75x$
7. $(2x + 1)^2 = 5x$
8. $(x + 3)^2 = 1$
9. $2(x - 1)^2 + 3 = 1$

B. Solve the following quadratic equations using the indicated method.

By Extracting the Square Root.

1. $5a^2 = 20$
2. $p^2 = 36$
3. $9q^2 - 36 = 0$
4. $9x^2 = 36$
5. $b^2 + 26 = 35$
6. $\frac{1}{4}c^2 - 15 = -6$
7. $(x - 5)^2 = 25$
8. $-2(x + 5)^2 = -8$
9. $x^2 - 21 = 4$

By Factoring.

1. $x^2 + 6x + 9 = 0$
2. $x^2 + 2x - 15 = 0$
3. $x^2 + 9x - 10 = 0$
4. $x^2 - 5x - 6 = 0$
5. $x^2 + x - 42 = 0$
6. $x^2 + 8x + 12 = 0$
7. $2x^2 + 13x + 15 = 0$
8. $2x^2 - 11x + 5 = 0$
9. $2x^2 + x - 2 = 0$

By Completing the Square.

1. $x^2 - 10x + 25 = 0$
2. $x^2 + 2x - 24 = 0$
3. $x^2 - 4x - 45 = 0$
4. $x^2 + 7x - 8 = 0$
5. $x^2 + 10x + 16 = 0$
6. $x^2 - 13x + 42 = 0$
7. $4x^2 + 4x - 3 = 0$
8. $2x^2 - 7x + 3 = 0$
9. $5x^2 - 6x - 2 = 0$

By Quadratic Formula.

1. $x^2 + 6x + 8 = 0$
2. $x^2 + 8x + 15 = 0$
3. $x^2 + 4x - 11 = 0$
4. $x^2 - 2x - 8 = 0$
5. $x^2 - 5x + 2 = 0$
6. $x^2 - 8x + 12 = 0$
7. $2x^2 - 2x - 24 = 0$
8. $2x^2 - 3x - 6 = 0$
9. $5x^2 + 9x - 2 = 0$

C. Find the discriminant of the following quadratic equations and describe the nature of its roots.

1. $x^2 + 10x + 16 = 0$
2. $x^2 + 4x - 11 = 0$
3. $x^2 + 2x - 24 = 0$
4. $x^2 - 8x + 12 = 0$
5. $x^2 + 2x - 15 = 0$
6. $x^2 - 5x - 6 = 0$
7. $2x^2 - 2x - 24 = 0$
8. $2x^2 + 13x + 15 = 0$
9. $2x^2 - 4x + 5 = 0$

D. Determine the sum and product of the roots of each equation.

1. $x^2 + 7x + 10 = 0$
2. $x^2 + 2x - 15 = 0$
3. $x^2 - 13x + 42 = 0$
4. $x^2 + 6x + 9 = 0$
5. $x^2 - 12x = 0$
6. $x^2 + 4x + 5 = 0$
7. $2x^2 - 11x + 5 = 0$
8. $2x^2 - 7x + 3 = 0$
9. $2x^2 - 12x = 0$

E. Write QI if the given statement is a quadratic inequality. Otherwise, write NQI.

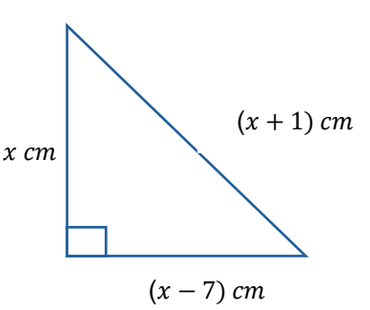
1. $-4x^2 + x > 1$
2. $2x^2 + 4x = -2$
3. $5x^2 + 3 < -2$
4. $x^2 + 2x + 1 = 0$
5. $5x - 1 > 0$
6. $-x^2 + x + 6 = 0$
7. $x(x + 1)^2 - 2 < 0$
8. $x^3 > 25$
9. $-x^2(x - 2) - 5 < 0$

F. Determine the solution of each inequality.

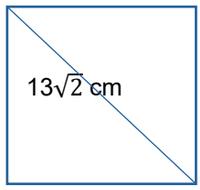
1. $x^2 + 5x + 6 > 0$
2. $x^2 + 7x > 0$
3. $(x - 5)^2 \geq 25$
4. $x^2 - 9x + 14 \leq 0$
5. $x^2 + 5x - 15 \leq -1$
6. $x^2 - x - 12 < 0$

G. Solve the following figures.

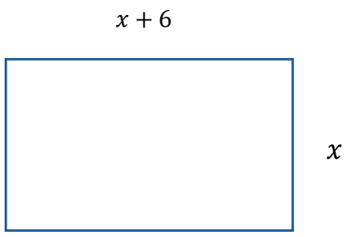
1. The length of the two shorter sides in a right triangle are $x\ cm$ and $(x - 7)\ cm$. If the length of the hypotenuse is $(x + 1)\ cm$, find the value of x and the lengths of the sides of the triangle.



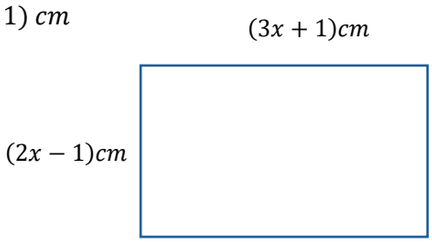
2. Find the length of the side of a square whose diagonal has a length of $13\sqrt{2}$ cm.



3. The area of a rectangle is $16\ square\ centimeters$ and its length is 6 more than the with. What is the length of the rectangle?



4. The length and height of a rectangle are $(3x + 1)$ and $(2x - 1)\ cm$ respectively. If the area of the rectangle is 144 cm^2, find x.



H. Analyze and solve the problems.

1. Two numbers differ by 9. The sum of their squares is 653. What are the numbers?
2. The difference between 2 positive numbers is 7 while their product is 60. Find the two numbers.
3. A rectangle is 30 cm long and 20 cm wide. A rectangular strip added to one side and another of the same width to the other side results in the doubling of the area. Find the width of the strip.
4. Two bikers started at the same corner, one going east, the other going north. One biker was traveling 3 kph faster than the other. After one hour, the two bikers were 15 km apart. Find the rate of each.
5. The sum of the areas of 2 squares is 53 cm^2. The length of the side of the larger square is 5 cm more than that of the smaller square. Find the length of the side of each square.
6. A rectangle has a perimeter of 38 cm and an area of 90 cm^2. Find the dimensions of the rectangle.
7. The sum of the two numbers 18 and the product is 72. Find the numbers.
8. If Bella were younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than 5 times her actual age. What is her age now?
9. If we take the square of Leah's age now, in years, and subtract 5 times her age 2 years ago, the result is 160. What is Leah's age now?
10. A rectangular pool with a length of 3 meters and a width of four meters is surrounded by a deck of uniform width. The total area of the pool and deck together is 172 square meters. Find the width of the deck.

Challenge!

1. Solve for the solutions of $\frac{1}{x-3} + \frac{1}{(x-3)^2} = \frac{2}{x^2-9}$.
2. What value/s of k will $2x^2 + kx + 16 = 0$ will have a positive root?
3. If r and s, are the roots of $x^2 + 13x + 36 = 0$ what is $(r + s)^2 + 12(r + s) + 36$?
4. At what point are the quadratic equations $x^2 + 3x + 16 = 0$ and $x^2 + 2x + 20 = 0$ will meet?
5. Find the solution of $|x^2 + 2x + 1| = 0$.

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