MATH ENTRANCE EXAM

11^{th} Grade

1. **Simplify each expression.**

   a) $\sqrt[3]{27z^4}$

   b) $13^{-\frac{1}{2}} \times \sqrt{13^3}$

   c) $\frac{\sqrt[3]{5^{-2}} \times (5^{-6})^{\frac{1}{4}}}{\sqrt{5^4} \times (5^{-3})^{\frac{1}{5}}}$

2. **Solve each equation.**

   a) $\frac{4x-15}{3x-1} + 7 : \frac{7x^2+14x+7}{x+1}$

   b) $3|2x + 8| = 36x + 9$

   c) $x^2 - 19x - 42 = 0$

3. **Solve each inequality and graph the solution.**

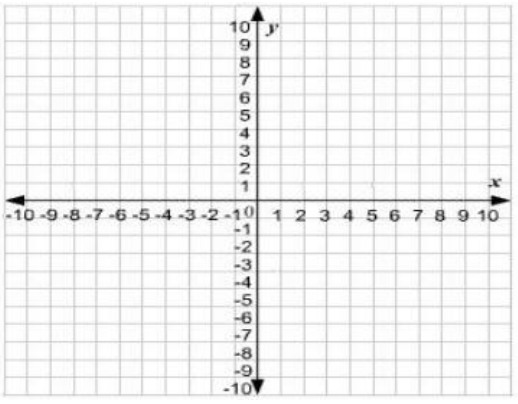
   a) $x + 2(5x - 6) < 4x + 12x - 27$

   b) $2 < -\frac{2x}{3} < 6$

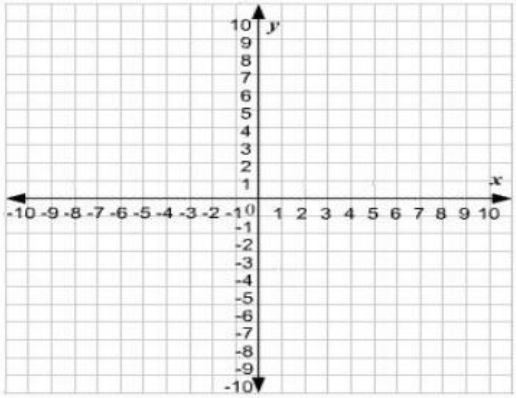
   c) $2|4x - 1| - 4 \geq 6$

4. **The following equation represents a circle in the xy-plane. Graph the circle.**

   $(x - 4)^2 + (x - 9)^2 = 16$



5. **Given a point on a circle (2,14) that intersects the y-axis at a single point.**
   a) Find the point where the circle intersects the x-axis.
   b) Graph the circle.

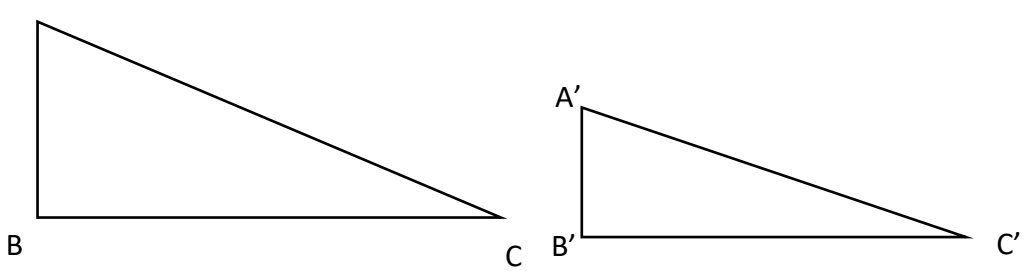


6. **The graph of a line in the xy-plane has slope 2 and contains the point (1, 8). The graph of a second line passes through the points (1, 2) and (2, 1). If the two lines intersect at the point (a, b), what is the value of a + b?**

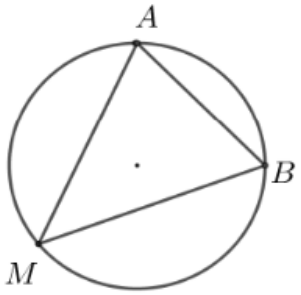
7. **Two hundred tickets were sold for the high school concert for a total income of $475. Student tickets were sold for $2 each and adult tickets for $3 each. How many adult tickets were sold?**

8. **A store is having a sale on electronics. The original price of a television was $1000. During the sale, the price of the television is reduced by 30%. After the sale, the store further reduces the price by an additional 15%. What is the final price of the television?**

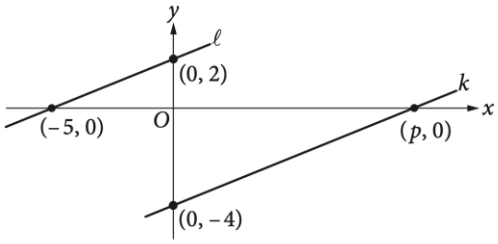
9. **Given two similar triangles ΔABC and $\Delta A'B'C'$, it is known that BC = 14, A'C' = 34, and angle BAC measures 60 degrees. Prove that $\frac{AB}{A'B'} = \frac{BC}{B'C'}$.**



10. Consider triangle ΔAMB, where AB has a length of $5\sqrt{2}$ cm, and the triangle is inscribed in a circle with a radius of 5 cm. What is the measure of angle AMB?



11. In the xy-plane below, line *l* is parallel to line *k*. What is the value of *p*?



12. The figure below represents a metal piece in the shape of a regular triangular prism, from which the pyramid MABB'A' is obtained, where M is the midpoint of the edge (CC'). It is known that AB = AA' = 10 cm.

a) Find the height of the pyramid

b) Calculate the lateral surface area of the pyramid

c) Determine the volume of the lost metal.