




1.  (a) What is the value of  $\frac{3^2 - 2^3}{2^3 - 3^2}$  ?

 (b) What is the value of  $\sqrt{\sqrt{81} + \sqrt{9} - \sqrt{64}}$  ?

 (c) Determine all real numbers  $x$  for which  $\frac{1}{\sqrt{x^2 + 7}} = \frac{1}{4}$ .



- (b) Stephanie starts with a large number of soccer balls. She gives  $\frac{2}{5}$  of them to Alphonso and  $\frac{6}{11}$  of them to Christine. The number of balls that she is left with is a multiple of 9. What is the smallest number of soccer balls with which Stephanie could have started?



- (c) Each student in a math club is in either the Junior section or the Senior section. No student is in both sections.
- Of the Junior students, 60% are left-handed and 40% are right-handed.
- Of the Senior students, 10% are left-handed and 90% are right-handed.
- No student in the math club is both left-handed and right-handed.
- The total number of left-handed students is equal to the total number of right-handed students in the math club.
- Determine the percentage of math club members that are in the Junior section.

4.



- (a) Hexagon  $ABCDEF$  has vertices  $A(0,0)$ ,  $B(4,0)$ ,  $C(7,2)$ ,  $D(7,5)$ ,  $E(3,5)$ ,  $F(0,3)$ . What is the area of hexagon  $ABCDEF$ ?

8.



(a) Suppose that  $a > \frac{1}{2}$  and that the parabola with equation  $y = ax^2 + 2$  has vertex  $V$ . The parabola intersects the line with equation  $y = -x + 4a$  at points  $B$  and  $C$ , as shown. If the area of  $\triangle VBC$  is  $\frac{72}{5}$ , determine the value of  $a$ .

