

## Chapter 9 Prerequisite Skills

1. Consider the function  $f(x) = x^3 - 2x^2 - 11x + 12$ .

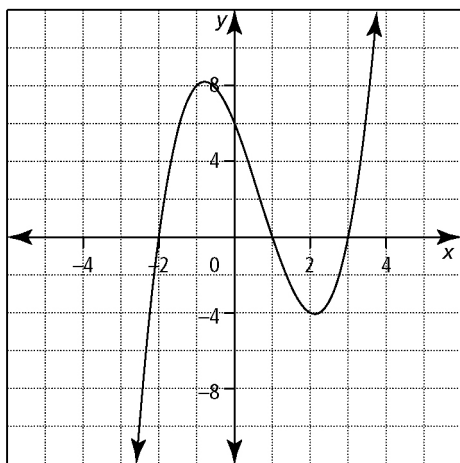
- a) Show that  $x + 3$  is a factor of  $f(x)$ .  
b) If  $f(x) = (x + 3)g(x)$ , what is  $g(x)$ ?

2. Factor each expression fully.

- a)  $30g - 4g^2$       b)  $6fg - 8g^2$   
c)  $x^2 - 6x + 5$       d)  $2x^2 + 11x + 5$   
e)  $6a^2 - 11a + 3$       f)  $x^2 - 0.01$   
g)  $20x^2y^2 - 45$

3. Consider the sketch of the function

$$h(x) = x^3 - 2x^2 - 5x + 6.$$



- a) What are the zeros of the function?  
b) Express  $h(x)$  in factored form.  
c) What are the roots of the equation  $x^3 - 2x^2 - 5x + 6 = 0$ ?

4. Identify all non-permissible values for each expression.

- a)  $\frac{4a}{3bc}$       b)  $\frac{x-1}{2x-1}$   
c)  $\frac{2x-5}{2x^2-3x-5}$       d)  $\frac{1}{t^2-6t+9}$   
e)  $\frac{6x+2}{(3x+1)(2x-5)}$       f)  $\frac{1}{(a-1)(a-2)(a+3)}$

5. Consider  $P(x) = x^3 - 5x^2 + 2x + 8$ .

- a) Use the Factor Theorem to find a factor of  $P(x)$ .  
b) Completely factor  $P(x)$ .  
c) What is the solution of  $P(x) = 0$ ?  
d) Sketch the graph of  $P(x)$ . Explain the significance of the  $x$ -intercepts.

6. a) Arrange the equation  $x = 4 + \frac{12}{x}$  into the form  $ax^2 + bx + c = 0$ , where  $a$ ,  $b$ , and  $c$  are integers. State the solution for this equation.  
b) Rewrite the function you developed in part a) in the form  $y = (x - h)^2 + k$ , where  $h$  and  $k$  are real numbers.  
c) Graph the function. Explain the relationship of the  $x$ -intercepts and coordinates of the vertex to the functions in parts a) and b).

7. Solve each equation algebraically. Express answers as exact values and identify non-permissible values, where necessary.

- a)  $x^2 - 14x + 49 = 0$   
b)  $6x^2 + 17x - 3 = 0$   
c)  $x^2 - 6x + 7 = 0$   
d)  $2x^2 - 3x - 4 = 0$   
e)  $\frac{2}{x} + \frac{2}{x+1} = 3$   
f)  $\frac{4x-1}{x+2} - \frac{x+1}{x-2} = \frac{x^2-4x+24}{x^2-4}$

8. Complete the square. Leave your answers in the form  $a(x - h)^2 + k = 0$ , where  $a$ ,  $h$ , and  $k$  are real numbers.

- a)  $x^2 + 10x + 4 = 0$       b)  $x^2 - 8x = -13$   
c)  $3x^2 + 1 = -6x$       d)  $-2x^2 = -4x - 3$

9. Solve each equation by graphing the corresponding function.

- a)  $-x^2 - 5x - 4 = 0$   
b)  $x^3 + 4x^2 - 7x - 10 = 0$

10. Simplify each rational expression. State any non-permissible values for the variables.

- a)  $\frac{x^2-1}{x^2+2x-3}$       b)  $\frac{10k^2+55k+75}{20k^2-10k-150}$

11. Simplify each product or quotient. Identify all non-permissible values.

- a)  $\left(\frac{4z^2-25}{2z^2-13z+20}\right)\left(\frac{z-4}{4z+10}\right)$   
b)  $\frac{2x^2-7x-15}{2x^2-10x} \div \frac{4x^2-9}{6} \times (3-2x)$

