Lesson 8 Assessment

Note: This peer assessment is not for marks. Although marks are provided, the marks in this assessment will not be included in your final mark. They have only been provided to give you an idea of how your actual marks are tallied throughout the course.

Task 1: Knowledge and Understanding questions

1. State the dominant term, leading coefficient, and degree of the polynomial for the function $f(x) = 3(x + 4)^2(4x - 1)(x - 5)^2$. **(3 marks)**

2. Write the following polynomial function in standard form: $g(x) = 4(x - 2)^3 + 5$. **(3 marks)**

3. Factor each of the following expressions completely. **(8 marks: 2 marks each)**

   a) $4a^2b - 8a^3b^5 + 2ab^7$

   b) $12x^2 - 75y^2$

   c) $x^2 - 2x - 35$

   d) $3x^2 + 14x + 8$

4. Determine the vertex of the following quadratic equations. **(3 marks)**

   a) $f(x) = -3(x + 2) + 9$

   b) $g(x) = x^2 - 8$

   c) $h(x) = 7(x - 5)^2$

5. Using the mapping formula, map the following point on the graph of $y = x^3$ onto the corresponding graph of $y = 5(x - 7)^3 - 2$. **(8 marks: 2 marks each)**

   a) (0,0)

   b) (1,1)

   c) (2,8)

   d) (–2,–8)

Task 2: Thinking questions

6. Given the following table of values, determine the equation of the polynomial function in standard form. **(10 marks: 2 marks for each step)**

x	y
–4	–56
–3	–12
–2	0
–1	–8
0	–24
1	–36
2	–32
3	0
4	72

7. a) Graph $y = x^2$ and $y = 4x^2$ on the same grid. Describe the transformation that has been applied to $y = 4x^2$ in relation to its parent function. **(2 marks)**

   b) Graph $y = x^2$ and $y = (2x)^2$ on the same grid. Describe the transformation that has been applied to $y = (2x)^2$ in relation to its parent function. **(2 marks)**

   c) Show that the graphs of $y = 4x^2$ and $y = (2x)^2$ are equivalent. Explain your answer algebraically, using a table of values. **(3 marks)**

8. For the function $f(x) = -5(2x + 1)(x - 2)^2(x - 6)$:

   a) State the end behaviours of the graph. **(3 marks)**

   b) Determine the roots of the equation. **(3 marks)**

   c) Sketch a graph of the function. **(2 marks)**

   d) State the domain and range of the function. **(2 marks)**

Task 3: Communication questions

9. Define a *term*, an *expression*, and an *equation*, giving an example of each. What is the difference between an expression and an equation? **(4 marks)**

10. Determine whether the following equations are even, odd, or neither. Explain your reasoning. **(6 marks: 2 marks each)**

    a) $f(x) = 3x^4 - 5x^2 + 8$

    b) $g(x) = 7x^3 - 11x$

    c) $h(x) = 6x^5 - 9x^3 + 2$

11. Explain how to find the domain and range of a polynomial function. **(6 marks)**

12. State the value of a, k, c, and d for the following equation and describe the transformations that apply: $f(x) = -\frac{1}{4}(x + 2)^3 - 7$. **(8 marks)**

Task 4: Application questions

13. A potter sells bowls for $18 each. The equation that models revenue is $R(x) = 18x$, where $R(x)$ represents the total revenue (in dollars), and x represents the number of bowls sold. The potter's set-up fees for making the bowls are $132, and the bowls cost $6 each to make. The equation that models the cost of the bowls is $C(x) = 6x + 132$, where $C(x)$ represents the total cost and x represents the number of bowls sold.

    a) How many bowls must the potter sell in order to break even? What is the cost of making this many bowls? Show your calculations algebraically. (**Hint:** The break-even point is where the revenue equals the cost.) **(3 marks)**

    b) How many bowls must the potter sell in order to make a profit? **(1 mark)**

14. To maximize yearly revenue, a company wishes to determine the best selling price for their new line of shirts. They realize that, if the price is too low or too high, they will not sell as many shirts. The equation $y = -16(x - 30)^2 + 10\,000$ models this scenario, where x represents the selling price per shirt and y represents the number of shirts sold.

    a) Sketch a graph of the function, indicating the vertex and x-intercepts. Show how you determined the x-intercepts algebraically. **(4 marks)**

    b) Determine the selling price that will maximize revenue. **(1 mark)**

    c) Determine the number of shirts sold yearly at this selling price. **(1 mark)**

    d) What is the maximum yearly revenue? **(1 mark)**

    e) What do the x-intercepts represent? **(1 mark)**

15. The dimensions of a box are 8 cm × 10 cm × 12 cm. The width, length, and height of the box must be increased by the same amount, x, in order for the box to have a volume of 2688 cm^3.

    a) Determine the equation for the volume of the new box. **(3 marks)**

    b) Determine the value of x. **(5 marks)**

    c) What dimensions will create a box with a volume of 2688 cm^3? **(2 marks)**