Unit 5: Polynomial Functions
Unit Assignment

Read the course material and complete the practice questions and suggested textbook questions throughout the Unit content before working on this Unit Assignment. The following chart shows you which lesson to review if you're having difficulty with the questions in this assignment booklet.

Unit Assignment Question	Lesson
1, 2, 3, 4	5A
5, 6, 7	5B
8	*Logic and Reasoning

*Contact your teacher if you need help with Logic and Reasoning.

For full marks, show all calculations, steps, and/or explain your answers.

Total Marks: _____/58

1. Which of the following equations is not a polynomial function? Justify your answer. (2 marks)

   i. $y = -11x^3 + 5$

   ii. $y = \frac{3}{4}x - \frac{1}{2}$

   iii. $y = \frac{2x}{x+1}$

   iv. $y = -2x^3 + \frac{5}{3}x^2 - 14$

2. Complete the following chart to analyze the characteristics of each polynomial function. Express your answers to the nearest tenth, if necessary. (24 marks)

	$y = -5x + 1$	$y = 0.5x^2 - 2x - 1$	$y = -2x^3 - 7x^2 - 2x + 3$
Graph			
Degree			
Domain			
Range			
Coordinates of *x*-intercept(s)			
Coordinates of *y*–intercept			
End Behaviour			
Number of Turning points			

3. Match each equation with the corresponding graph. Write the number of the matching graph on the line in front of the equation. You will not need to use every graph. (6 marks)

a. _____ $y = 2x + 3$

b. _____ $y = x^3 + 2x^2 + 1$

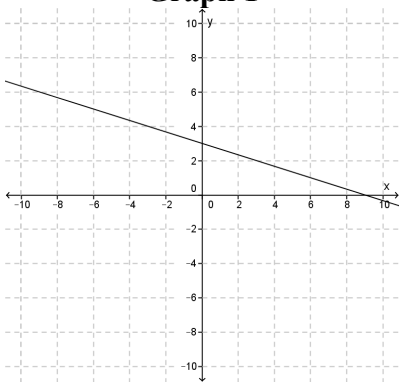
c. _____ $y = x^2 - 3x - 7$

d. _____ $y = -\frac{1}{3}x + 3$

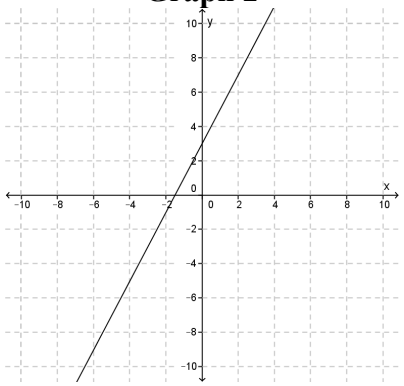
e. _____ $y = -x^3 - 3x^2 + x - 2$

f. _____ $y = -x^2 + 2x + 4$

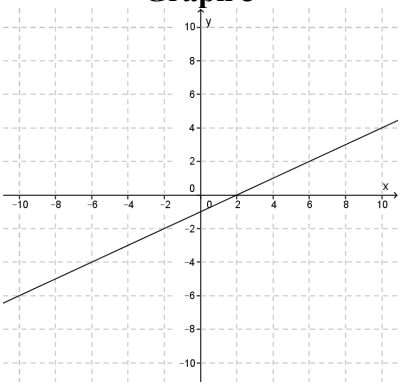
Graph 1



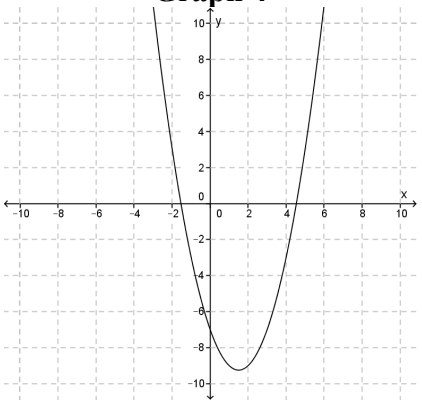
Graph 2



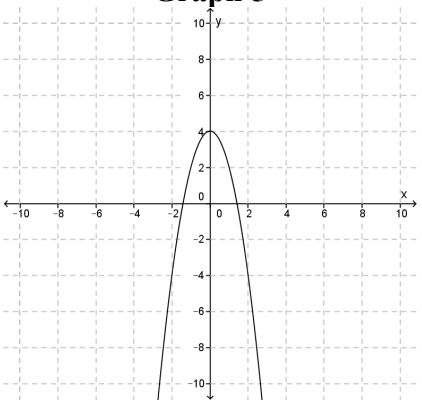
Graph 3



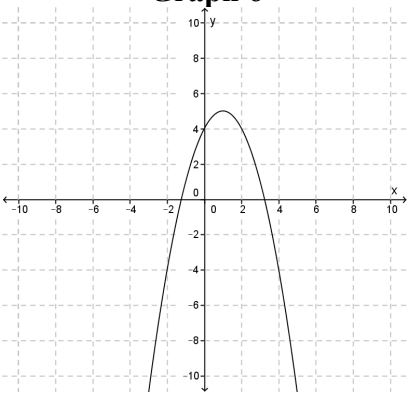
Graph 4



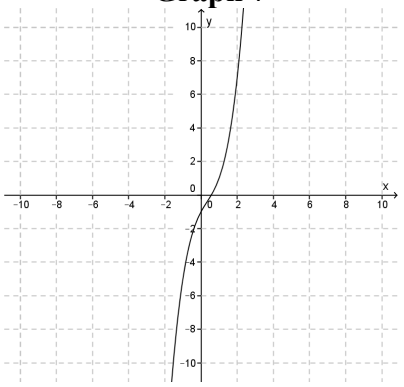
Graph 5



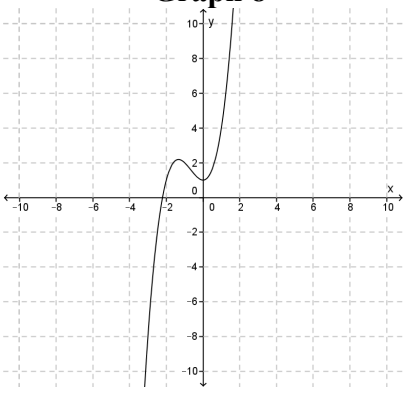
Graph 6



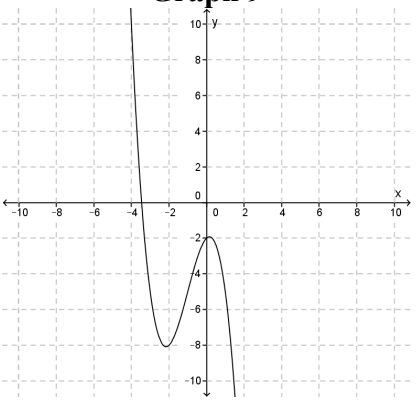
Graph 7



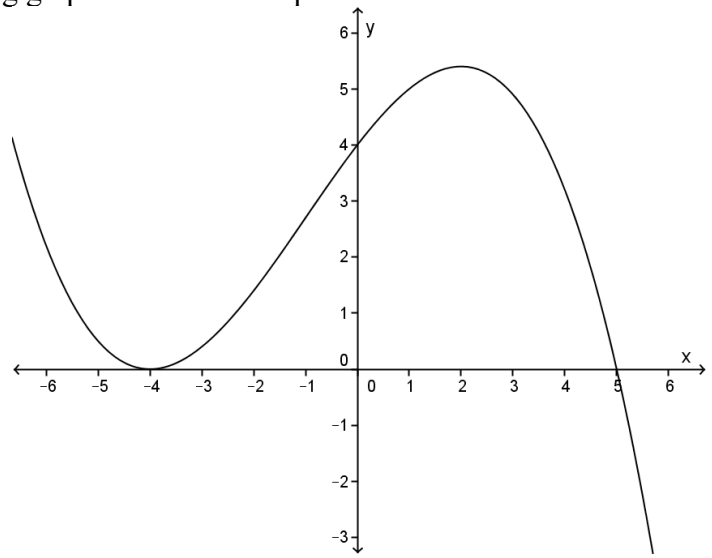
Graph 8



Graph 9



4. Use the following graph to answer the questions below.



Circle the bold word or number that correctly completes each statement. (4 marks)

a. The graph has a **negative / positive** leading coefficient.

b. The graph has **one / two** *x*-intercept(s).

c. The graph has a constant term of **4 / 5**.

d. The equation of this graph would be **linear / quadratic/ cubic.**

5. Consider the following table of data.

x	-3	-2	-1	0	1	2	3
y	0	20	18	6	-4	0	30

a. Determine the type of polynomial function which best approximates the data. Justify your answer. (2 marks)

b. Write the regression equation that represents the data. (1 mark)

c. Using the graph of the equation, determine the coordinates of any maximum or minimum points, stating if these points are relative or absolute. Express the values to the nearest hundredth, if necessary. (2 marks)

6. Each year, a baseball team sells boxes of chocolates as a fundraiser to lower the cost of team fees. The price of the chocolates and the number of boxes sold varies each year. The information from five years of sales is given in the table below.

Price per box ($)	3.00	4.00	5.50	6.50	8.00
Boxes sold	5837	3571	1950	1409	1118

a. Find the regression equation in the form $y = ax^3 + bx^2 + cx + d$ that best approximates the data. Express the values of a, b, c, and d to the nearest hundredth. (1 mark)

b. Use the equation to find the number of boxes, to the nearest whole number, that the team will sell if they charge $4.35 per box. (1 mark)

c. One year, the team only sold 366 boxes of chocolates. What price did they charge for each box? (1 mark)

d. If the team raises the price too high, they will not sell any boxes. Use your regression equation to predict the price of a box that will result in zero boxes sold. (1 mark)

7. The path of a baseball after it is hit is modelled by the equation $h = -4.98t^2 + 10.75t + 1.4$, where h is the height, in metres, of the ball and t is the time, in seconds, after the ball is hit.

   a. Find the maximum height that the ball reaches, to the nearest hundredth of a metre. (1 mark)

   b. Determine the height of the ball, to the nearest hundredth of a metre, at **2** seconds. (1 mark)

   c. Determine when the ball is at a height of **6.5m**, to the nearest hundredth of a second. (2 marks)

   d. State the y-intercept of the graph to the nearest hundredth. Describe what the y-intercept represents in the context of this question. (2 marks)

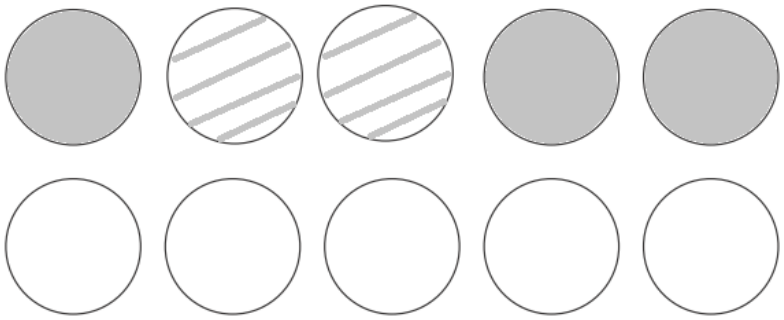
   e. i. Find the coordinates of both x-intercepts of the graph to the nearest hundredth. (2 marks)

      ii. State what the positive x-intercept represents in the context of this problem. (1 mark)

      iii. Explain why the negative x-intercept is not valid in the context of this problem. (1 mark)

8. Patterns and Games: Logic and Strategy Game

In a two player strategy game, players take turns shading one or two circles on a board. The goal of the game is to shade the last of the ten circles on the board. In the game below, Player A is shading in a solid colour, and Player B is shading with lines.



It's now Player B's turn. How many circles should Player B shade to guarantee a win? Explain why this move will guarantee a win, using diagrams if necessary. (3 marks)

End of Assignment