

# Assignment

## Write

Describe how the Binomial Theorem is related to Pascal's Triangle.

## Remember

The Binomial Theorem states that it is possible to extend any power of  $(a + b)$  into a sum of the form:

$$(a + b)^n = \binom{n}{0} a^n b^0 + \binom{n}{1} a^{n-1} b^1 + \binom{n}{2} a^{n-2} b^2 + \dots + \binom{n}{n-1} a^1 b^{n-1} + \binom{n}{n} a^0 b^n$$

The formula for a combination of  $k$  objects from a set of  $n$  objects for  $n \geq k$  is:

$$\binom{n}{k} = {}_n C_k = \frac{n!}{k!(n-k)!}$$

## Practice

1. Consider  $(v + w)^8$ .
  - a. Use Pascal's Triangle to expand  $(v + w)^8$ .
  - b. Determine the coefficient of  $v^5 w^3$  in the expansion of  $(v + w)^8$ .
  - c. Determine the coefficient of  $v^5 w^3$  in the expansion of  $(2v + w)^8$ .
  - d. Determine the coefficient of  $v^4 w^4$  in the expansion of  $(2v + 3w)^8$ .
2. Expand  $(4x + 2y)^5$ .
3. Expand  $(3m - n)^6$ .
4. Expand  $(-5x - 3y)^4$ .
5. Determine the coefficient of  $c^5 d^4$  in the expansion of  $(2c + 3d)^9$ .
6. Determine the coefficient of  $j^7 k^3$  in the expansion of  $(2j - k)^{10}$ .

## Stretch

1. Determine the coefficient of  $x^{10} y^5$  in the expansion of  $(-7x - 3y)^{15}$ .

2. Consider the scatter plot shown.

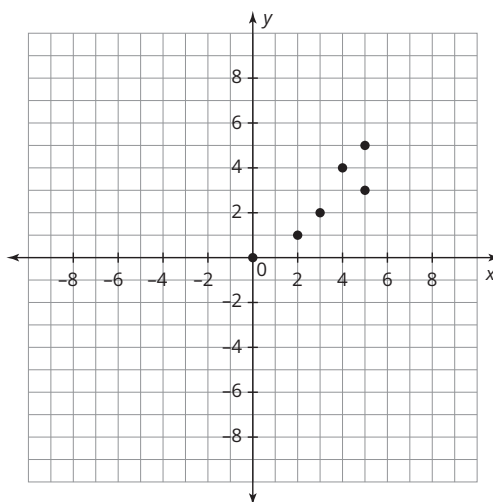
- a. The equation  $y = 0.8761x - 0.2743$  represents the line that best fits the points on the graph, and the equation  $y = 0.0433x^2 + 0.649x - 0.125$  represents the curve that best fits the points on the graph. Graph each equation on the scatterplot.

b. Which curve appears to fit the data the best? Explain your reasoning.

c. The coefficient of determination is a value that measures the strength of the relationship between the original data and the regression equation. The closer the value is to 1, the stronger the relationship.

The coefficient of determination for the linear

equation is 0.8761, and the coefficient of determination for the quadratic equation is 0.8312. Do these values match your answer from part (b)?



## Review

- Use polynomial identities and number properties to calculate  $42^3$ .
- Arjun measures the side lengths of a triangular piece of glass. The side lengths are 120 in., 209 in., and 241 in.
  - Verify that the triangular piece of glass is a right triangle.
  - Use Euclid's Formula to determine the positive integers  $r$  and  $s$ , where  $r > s$ , that will generate these three side lengths.
- Completely factor each expression over the set of real numbers.
  - $2x^3 - 12x^2 + 16x$
  - $8x^3 - 64$
- Use long division to determine whether  $x + 4$  is a factor of  $5x^4 + 16x^3 - 15x^2 + 8x + 16$ . Show your work.