



Assessment task

Year level	6
Learning area	Mathematics
Subject	Number and Algebra: Number and Place Value/Patterns and Algebra
Title of task	Pascal's Triangle
Description of task	Students interpret given information on a worksheet. They follow prescribed steps to complete the numbering of Pascal's Triangle and answer the following questions.
Type of assessment	Summative assessment
Purpose of assessment	Written task
Assessment strategy	Worksheet
Suggested time	40 minutes

Content description

Content from the Western Australian Curriculum	<ul style="list-style-type: none"> Identify and describe properties of prime, composite, square and triangular numbers Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence 			
Proficiencies	Understanding	Fluency	Problem Solving	Reasoning
	✓	✓	✓	✓

Task preparation

Prior learning	Students have prior knowledge of the factors of numbers. They can describe, continue and create patterns with whole numbers resulting from addition. Students can identify and describe prime and composite numbers.
Assessment differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment tasks.
Assessment conditions	Students complete the task individually. During the task, students may refer to the information provided only.
Suggested resources	Writing materials

Instructions for teacher

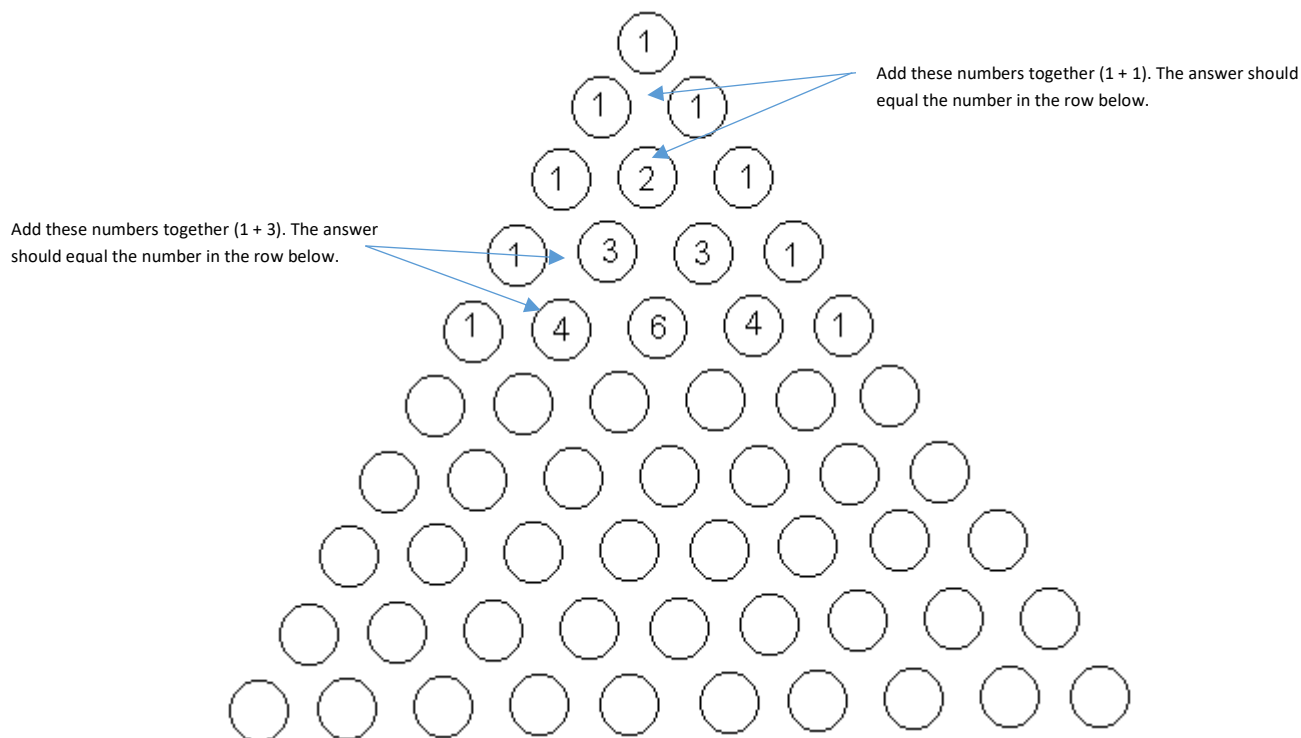
Explicitly guide students through the first five rows of Pascal's Triangle to ensure understanding of the number pattern. Following this, instruct students that they are to work on the task individually under test conditions however, support can be provided with reading if a student(s) has difficulty reading the question.

Instructions to students

Pascal's Triangle is named after a famous mathematician, Blaise Pascal. He stated that, within a triangle, exist some particular number patterns. These patterns can describe certain types of numbers, such as triangular and square numbers. Follow the step-by-step instructions to finish numbering the triangle and then answer some questions to describe and explain the patterns and properties of the numbers you have found.

Task 1

Look at the diagram of Pascal's Triangle below. Follow the steps to complete the numbering and then answer the following questions.



Steps to build the triangle

1. Repeat the number 1 along the left and right diagonal sides of the triangle until you reach the base and all the circles are labelled with the number 1.
2. Continue the number pattern for the rest of the triangle by adding the two numbers next to each other to find the answer on the row underneath (adding these numbers should equal the number below).

Task 2




Questions

1. Do you notice any number patterns in the triangle? Describe the pattern/s you see.

2. Is there a way of predicting the next number in any row (without having to add the two numbers in the row above)? If so, describe it.

A triangular number is created from a pattern of dots which form a triangle. By adding another row of dots each time we create a new row, we can find the next number in the sequence: e.g. 1, 3, 6...

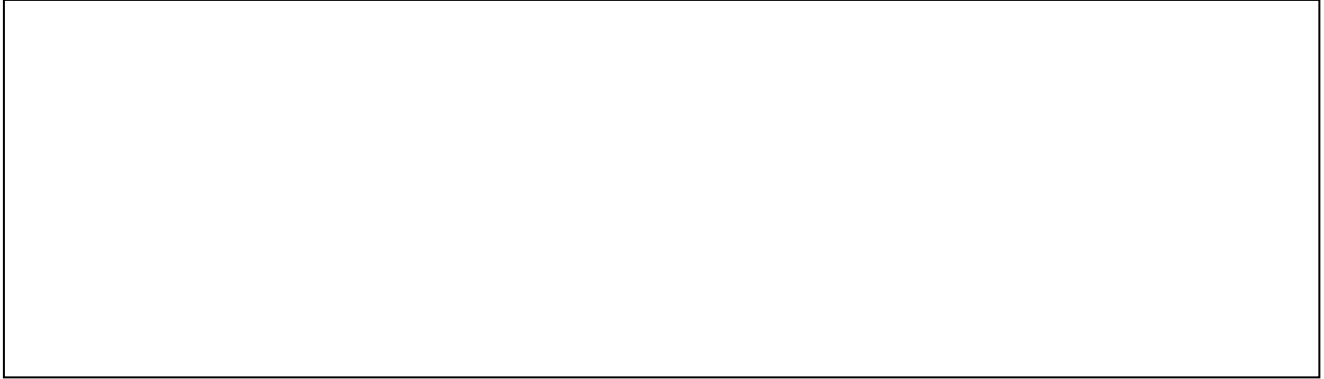
Triangular patterning

1 dot	
3 dots	
6 dots	

3. Can you see any triangular number pattern in Pascal's Triangle? Where? Colour it a different colour.

A square number is 'a number that has been multiplied by itself': e.g. $2 \times 2 = 4$. The number **4** is the square number. Another example is: $3 \times 3 = 9$. The number **9** is the square number.

4. Can you find any square numbers that form a pattern in Pascal's Triangle? Where? *You may draw a diagram, if you like, or use a different colour to show the pattern.*



5. What other interesting patterns do you see in Pascal's Triangle? *Hint: look at the rows, the diagonals and the columns. Describe any other patterns below (you may draw a diagram if you like).*



Sample marking key

Pascal's Triangle – Sample marking key	
Description	Marks
Task 1: Building the triangle - continues patterns using addition	
Correctly continues and completes pattern of whole triangle using addition, by adding the two numbers above to find the number below.	3
With some inconsistencies, continues and completes pattern of whole triangle using addition, by adding the two numbers above to find the number below.	2
Incorrectly continues pattern using addition, by adding the two numbers above to find the number below.	1
Subtotal	3
Description	Marks
Task 2: Questions – justifies and explains patterns	
Question 1 Identifies and describes a number pattern. Explains how the number pattern works.	3
Question 1 Identifies a number pattern. Provides a simple explanation of how the number pattern works.	2
Question 1 Identifies a number pattern. Explanation for how the number pattern works is disjointed or inaccurate.	1
Subtotal	3
Description	Marks
Task 2: Questions – justifies and explains patterns and uses reasoning to continue number sequences	
Question 2 Uses knowledge of existing number patterns to correctly predict new patterns and justifies new pattern, using mathematical terms to explain how it has been created.	3
Question 2 Uses knowledge of existing number pattern to predict new patterns and explains in a simple way how a new number pattern was created.	2
Question 2 Is unable to use knowledge of existing number pattern to predict new patterns or patterns predicted are not correct.	1
Subtotal	3

Description	Marks
Task 2: Questions – describes connections between numbers and patterns	
Questions 3 and 4 Finds examples of triangular and/or square numbers and shows or explains the pattern.	3
Questions 3 and 4 Finds an example of a triangular and/or square number; however, explanation of this is incorrect or not logical.	2
Questions 3 and 4 Does not find an example of a triangular and/or square number.	1
Subtotal	3
Description	Marks
Task 2: Questions – identifies and describes unfamiliar patterns	
Question 5 Finds and accurately describes a new pattern, using reasoning to provide an explanation for the pattern.	3
Question 5 Finds a new pattern, using simple reasoning to provide an explanation for the pattern.	2
Question 5 Does not find a new pattern.	1
Subtotal	3
Total	15