

### □ Mathematics

Mathematics can be defined as the study of certain fundamental concepts such as number, shape, and pattern. It has been developed and extended into a coherent body of thought with countless applications as well as a strong tradition of theoretical research. Mathematics progresses naturally from basic concepts and procedures through more complex ideas and applications, and mathematics education generally follows this natural progression.

To ensure that *TerraNova* provided a broad coverage of mathematics, several conceptually separate objectives in mathematics were identified; test questions that assess students' growth within each objective were then designed.

The following objectives were identified: Number and Number Relations; Computation and Numerical Estimation; Operation Concepts; Measurement; Geometry and Spatial Sense; Data Analysis, Statistics, and Probability; Patterns, Functions, Algebra; Problem Solving and Reasoning; and Communication.

The performance descriptors listed below describe the progression of knowledge and skills demonstrated by students who take the *TerraNova* Mathematics test.

### **Grades 1 and 2, Mathematics**

#### **Starting Out**

Students identify ordinal numbers; add and subtract numbers; solve one-step problems; recognize identity property; read hour on clock; read calendar; measure to the nearest inch and with non-standard units; find area of shape on grid; identify and sort common shapes by geometric attributes; recognize congruent and similar shapes and line of symmetry; read pictograph; partially construct bar graph.

#### **Progressing**

Students compare and order numbers; add two-digit numbers without regrouping; sort objects by two attributes; solve simple equation with unknown number; extend geometric pattern; identify missing element to solve problem; solve problem using deductive/inductive reasoning; select operation to solve problems.

#### **Nearing Proficiency**

Students use place value models; read numbers to 100; estimate by rounding; identify odd and even numbers; identify appropriate measurement tool; read time to half hour; identify shape after transformation; draw conclusions from data; use data to solve problems; extend number pattern; identify extra information; identify fact family; model multiplication; develop/explain strategy to solve problem.

#### **Proficient**

Students count by fours; count bills and coins; subtract three-digit numbers without regrouping; multiply one-digit numbers; apply addition and subtraction skills to money problems; calculate perimeter; read thermometer; read and subtract weight measurement; interpret and compare data; identify probability of event.

#### **Advanced**

Students identify fractional part; identify point on number line; solve equation with unknown number; represent operation with model; estimate measurement; identify missing information; evaluate solution using estimation; estimate quantity and volume.

**Grades 3–5, Mathematics****Step 1**

Students connect number words and numerals; identify fractional part; identify place value; identify operation to solve problem; recognize similar and congruent figures; combine and subdivide shapes; calculate perimeter; measure to the nearest centimeter and inch; use table to create bar graph; interpret data in bar graph; solve one-step problem with addition and subtraction.

**Progressing**

Students recognize expanded notation; add money; identify related facts; identify common 3-D shapes; recognize transformations; solve equations with unknown number; identify inequalities. Students performing at this level should work on prerequisite skills necessary to begin work on the more challenging subject matter in order to master the skills at the Nearing Proficiency level.

**Nearing Proficiency**

Students convert numbers to percents; use number line; multiply and divide numbers; estimate; find perimeter and area; calculate elapsed time; read thermometer and scales; measure to half inch; interpret/make inference/draw conclusion from data; identify probability of event; extend number pattern; identify function in table; identify missing/extra information; develop strategy to solve problem.

**Proficient**

Students compare fractions; identify equivalent forms; calculate ratio; locate fraction and decimal on number line; round numbers; identify multiples; represent number with model; multiply decimals; solve problem with two operations; use commutative and associative property; estimate measurement; read circle graph and table; compare graphs; understand variables; use deductive/inductive reasoning.

**Advanced**

Students identify factors and prime numbers; solve one-step problem with division; recognize when to estimate; use permutations and combinations to solve problem; read map using scale drawing; convert measurement units; recognize angles; identify range and mean; solve non-routine problems; use proportional reasoning to solve problems; make conjectures.

