E. SPATIAL SENSE

By the end of each grade, students will:

OVERALL EXPECTATION E1. describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them

SPECIFIC EXPECTATIONS

Geometric Reasoning

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
E1.1 sort three-dimensional objects and two-dimensional shapes according to one attribute at a time, and identify the sorting rule being used	**E1.1** sort and identify two-dimensional shapes by comparing number of sides, side lengths, angles, and number of lines of symmetry	**E1.1** sort, construct, and identify cubes, prisms, pyramids, cylinders, and cones by comparing their faces, edges, vertices, and angles	**E1.1** identify geometric properties of rectangles, including the number of right angles, parallel and perpendicular sides, and lines of symmetry	**E1.1** identify geometric properties of triangles, and construct different types of triangles when given side or angle measurements	**E1.1** create lists of geometric properties of various types of quadrilaterals, including the properties of the diagonals, rotational symmetry, and line symmetry	**E1.1** describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry	**E1.1** identify geometric properties of tessellating shapes and identify the transformations that occur in the tessellations
E1.2 construct three-dimensional objects, and identify two-dimensional shapes contained within structures and objects	**E1.2** compose and decompose two-dimensional shapes, and show that the area of a shape remains constant regardless of how its parts are rearranged	**E1.2** compose and decompose various structures, and identify the two-dimensional shapes and three-dimensional objects that these structures contain		**E1.2** identify and construct congruent triangles, rectangles, and parallelograms	**E1.2** construct three-dimensional objects when given their top, front, and side views	**E1.2** draw top, front, and side views, as well as perspective views, of objects and physical spaces, using appropriate scales	**E1.2** make objects and models using appropriate scales, given their top, front, and side views or their perspective views
E1.3 construct and describe two-dimensional shapes and three-dimensional objects that have matching halves	**E1.3** identify congruent lengths and angles in two-dimensional shapes by mentally and physically matching them, and determine if the shapes are congruent	**E1.3** identify congruent lengths, angles, and faces of three-dimensional objects by mentally and physically matching them, and determine if the objects are congruent		**E1.3** draw top, front, and side views of objects, and match drawings with objects			**E1.3** use scale drawings to calculate actual lengths and areas, and reproduce scale drawings at different ratios

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SPECIFIC EXPECTATIONS

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Location and Movement							
E1.4 describe the relative locations of objects or people, using positional language	**E1.4** create and interpret simple maps of familiar places	**E1.4** give and follow multistep instructions involving movement from one location to another, including distances and half- and quarter-turns	**E1.2** plot and read coordinates in the first quadrant of a Cartesian plane, and describe the translations that move a point from one coordinate to another	**E1.4** plot and read coordinates in the first quadrant of a Cartesian plane using various scales, and describe the translations that move a point from one coordinate to another	**E1.3** plot and read coordinates in all four quadrants of a Cartesian plane, and describe the translations that move a point from one coordinate to another	**E1.3** perform dilations and describe the similarity between the image and the original shape	**E1.4** describe and perform translations, reflections, rotations, and dilations on a Cartesian plane, and predict the results of these transformations
E1.5 give and follow directions for moving from one location to another	**E1.5** describe the relative positions of several objects and the movements needed to get from one object to another		**E1.3** describe and perform translations and reflections on a grid, and predict the results of these transformations	**E1.5** describe and perform translations, reflections, and rotations up to 180° on a grid, and predict the results of these transformations	**E1.4** describe and perform combinations of translations, reflections, and rotations up to 360° on a grid, and predict the results of these transformations	**E1.4** describe and perform translations, reflections, and rotations on a Cartesian plane, and predict the results of these transformations	

OVERALL EXPECTATION E2. compare, estimate, and determine measurements in various contexts

SPECIFIC EXPECTATIONS

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Attributes	Length	Length, Mass, and Capacity	The Metric System				
E2.1 identify measurable attributes of two-dimensional shapes and three-dimensional objects, including length, area, mass, capacity, and angle	**E2.1** choose and use non-standard units appropriately to measure lengths, and describe the inverse relationship between the size of a unit and the number of units needed	**E2.1** use appropriate units of length to estimate, measure, and compare the perimeters of polygons and curved shapes, and construct polygons with a given perimeter	**E2.1** explain the relationships between grams and kilograms as metric units of mass, and between litres and millilitres as metric units of capacity, and use benchmarks for these units to estimate mass and capacity	**E2.1** use appropriate metric units to estimate and measure length, area, mass, and capacity	**E2.1** measure length, area, mass, and capacity using the appropriate metric units, and solve problems that require converting smaller units to larger ones and vice versa	**E2.1** describe the differences and similarities between volume and capacity, and apply the relationship between millilitres (mL) and cubic centimetres (cm^3) to solve problems	**E2.1** represent very large (mega, giga, tera) and very small (micro, nano, pico) metric units using models, base ten relationships, and exponential notation
E2.2 compare several everyday objects and order them according to length, area, mass, and capacity	**E2.2** explain the relationship between centimetres and metres as units of length, and use benchmarks for these units to estimate lengths	**E2.2** explain the relationships between millimetres, centimetres, metres, and kilometres as metric units of length, and use benchmarks for these units to estimate lengths	**E2.2** use metric prefixes to describe the relative size of different metric units, and choose appropriate units and tools to measure length, mass, and capacity	**E2.2** solve problems that involve converting larger metric units into smaller ones, and describe the base ten relationships among metric units		**E2.2** solve problems involving perimeter, area, and volume that require converting from one metric unit of measurement to another	
	E2.3 measure and draw lengths in centimetres and metres, using a measuring tool, and recognize the impact of starting at points other than zero	**E2.3** use non-standard units appropriately to estimate, measure, and compare capacity, and explain the effect that overfilling or underfilling, and gaps between units, have on accuracy					

OVERALL EXPECTATION E2. compare, estimate, and determine measurements in various contexts

SPECIFIC EXPECTATIONS

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
		Length, Mass, and Capacity					
		E2.4 compare, estimate, and measure the mass of various objects, using a pan balance and non-standard units					
		E2.5 use various units of different sizes to measure the same attribute of a given item, and demonstrate that even though using different-sized units produces a different count, the size of the attribute remains the same					
Time							
E2.3 read the date on a calendar, and use a calendar to identify days, weeks, months, holidays, and seasons	**E2.4** use units of time, including seconds, minutes, hours, and non-standard units, to describe the duration of various events	**E2.6** use analog and digital clocks and timers to tell time in hours, minutes, and seconds	**E2.3** solve problems involving elapsed time by applying the relationships between different units of time				

OVERALL EXPECTATION E2. compare, estimate, and determine measurements in various contexts

SPECIFIC EXPECTATIONS

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
			Angles			Circles	Lines and Angles
			E2.4 identify angles and classify them as right, straight, acute, or obtuse	**E2.3** compare angles and determine their relative size by matching them and by measuring them using appropriate non-standard units	**E2.2** use a protractor to measure and construct angles up to 360°, and state the relationship between angles that are measured clockwise and those that are measured counterclockwise	**E2.3** use the relationships between the radius, diameter, and circumference of a circle to explain the formula for finding the circumference and to solve related problems	**E2.2** solve problems involving angle properties, including the properties of intersecting and parallel lines and of polygons
				E2.4 explain how protractors work, use them to measure and construct angles up to 180°, and use benchmark angles to estimate the size of other angles	**E2.3** use the properties of supplementary angles, complementary angles, opposite angles, and interior and exterior angles to solve for unknown angle measures	**E2.4** construct circles when given the radius, diameter, or circumference	
						E2.5 show the relationships between the radius, diameter, and area of a circle, and use these relationships to develop the formula for measuring the area of a circle and to solve related problems	

OVERALL EXPECTATION E2. compare, estimate, and determine measurements in various contexts

SPECIFIC EXPECTATIONS

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
		Area			Area and Surface Area	Volume and Surface Area	Length, Area, and Volume
		E2.7 compare the areas of two-dimensional shapes by matching, covering, or decomposing and recomposing the shapes, and demonstrate that different shapes can have the same area	**E2.5** use the row and column structure of an array to measure the areas of rectangles and to show that the area of any rectangle can be found by multiplying its side lengths	**E2.5** use the area relationships among rectangles, parallelograms, and triangles to develop the formulas for the area of a parallelogram and the area of a triangle, and solve related problems	**E2.4** determine the areas of trapezoids, rhombuses, kites, and composite polygons by decomposing them into shapes with known areas	**E2.6** represent cylinders as nets and determine their surface area by adding the areas of their parts	**E2.3** solve problems involving the perimeter, circumference, area, volume, and surface area of composite two-dimensional shapes and three-dimensional objects, using appropriate formulas
		E2.8 use appropriate non-standard units to measure area, and explain the effect that gaps and overlaps have on accuracy	**E2.6** apply the formula for the area of a rectangle to find the unknown measurement when given two of the three	**E2.6** show that two-dimensional shapes with the same area can have different perimeters, and solve related problems	**E2.5** create and use nets to demonstrate the relationship between the faces of prisms and pyramids and their surface areas	**E2.7** show that the volume of a prism or cylinder can be determined by multiplying the area of its base by its height, and apply this relationship to find the area of the base, volume, and height of prisms and cylinders when given two of the three measurements	**E2.4** describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle
		E2.9 use square centimetres (cm^2) and square metres (m^2) to estimate, measure, and compare the areas of various two-dimensional shapes, including those with curved sides			**E2.6** determine the surface areas of prisms and pyramids by calculating the areas of their two-dimensional faces and adding them together		