Math Curriculum

Fourth Grade

By the end of fourth grade students have used various addition, subtraction, multiplication, and division algorithms, mastered place value to the millions place, and used associated vocabulary. They have applied and adapted a variety of appropriate strategies to solve problems. Students have identified and constructed geometric figures according to their properties using appropriate terminology. Students applied appropriate units of measure to perimeter and area, selected appropriate tools, measured accurately, and worked with equivalent relationships. Students understood and applied data collection, organization, representation, and vocabulary to record, predict, interpret, and answer questions.
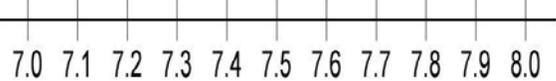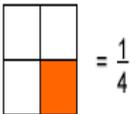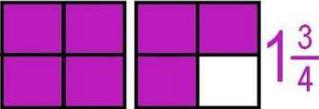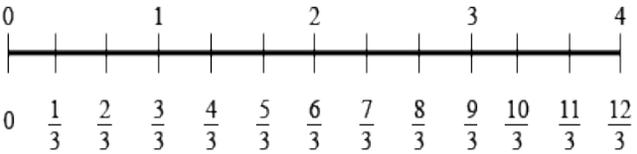
Archdiocese of Santa Fe Standard 1:   **Numbers and Operations:**
Students understand numbers, ways of representing numbers, relationships among numbers, and number systems; understand meanings of operations and how they relate to one another; and compute fluently and make reasonable estimates. NCTM
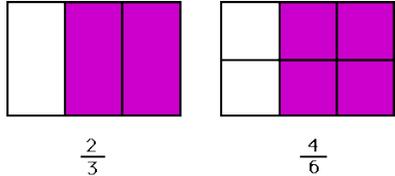
Critical for Mastery in Grade 4

LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Number Sense: **Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**		
1. Read whole numbers to 100 millions place.	• Given a written number students will orally read 123,456,789.	
2. Write (standard, expanded, and word form) whole numbers to 100 millions place.	• Standard -123,456,789 • Expanded - 100,000,000+20,000,000+3,000,000+ 400,000+50,000+6,000+700+80+9 • Word - One hundred twenty-three million, four hundred fifty-six, seven hundred eighty-nine	

3. Estimate by rounding whole numbers to 1 millions place.	• 3,456,789 rounded to 3,000,000	

4. Identify place value to 100 millions place.	• Name the place value of the bold faced underlined number.
	   o 123,4 **5** 6,789 Ten thousands
	   o 98 **7** ,654,321 Millions	

5. Compare and order numbers to 1,000,000 using the inequality symbols $<$, $>$ and $=$.	1,510,000 > 1,501,000 23,478 < 23,748	
6. Determine multiples and factors of whole numbers through 144.	Multiples of 4: 4, 8, 12, 16, 20,… Factors for 4 (1,2,4) 1x4=4 2x2=4 4x1=4	

7. Apply special classes of numbers:
   a) Even and odd
   b) Multiples
   c) Factors
 	
   d) Square numbers
      Square root of a number
	a) The same number of boys and girls are in a classroom which could be the total number of students in the class?
	  A. 21 B. 15 C. 20
	There are 21 books in a pile. Is there and even or odd number of books?
	b) What is the fourth multiple of six?
	What are the third, fourth, and fifth multiples of 8?
	c) List the factors for 7.
	Two factors for 18 are 1 and 18. Find four factors for 18.
	
	d) $1^2 = 1$ $\square$ $\sqrt{1} = 1$
	$2^2 = 4$ $\boxplus$ $\sqrt{4} = 2$
	$3^2 = 9$ $\sqrt{9} = 3$
	$4^2 = 16$ $\sqrt{16} = 4$
	$5^2 = 25$ $\sqrt{25} = 5$	

B. Addition and Subtraction: **Compute fluently and make reasonable** **estimates.**		
1. Identify Addends and Sum.	Addend + Addend = Sum	
2. Identify Minuend and Difference.	Minuend – Subtrahend = Difference	
3. Add and subtract up to a 5 digit by 5 digit number with or without regrouping.	$\begin{array}{r}4,356\\+5,644\end{array}$ $\quad$ $\begin{array}{r}46,027\\+39,682\end{array}$ $\quad$ $\begin{array}{r}3,479\\-1,234\end{array}$ $\quad$ $\begin{array}{r}12,345\\-\ 7,243\end{array}$	
4. Add columns of numbers with regrouping.	$\begin{array}{r}4\overset{1}{3}2\\917\\+\ \ 514\\\hline 1863\end{array}$	
5. Evaluate reasonableness of solutions by comparing estimate to actual answer.	$\begin{array}{r}2,341\\+1,578\\\hline 3,919\end{array}$ $\quad$ $\begin{array}{r}2,000\\+2,000\\\hline 4,000\end{array}$	
6. Add and subtract decimal numbers to hundredths.	$\begin{array}{r}3.47\\+3.41\\\hline 6.88\end{array}$ $\quad$ $\begin{array}{r}5.6\\+5.6\\\hline 11.2\end{array}$ $\quad$ $\begin{array}{r}0.75\\-0.50\\\hline 0.25\end{array}$ $\quad$ $\begin{array}{r}4.25\\-3.75\\\hline 0.50\end{array}$	
C. Multiplication and Division: **Compute fluently and make reasonable** **estimates.**		
1. Maintain mastery of multiplication and division facts 0-12.	• Mastery using three second rule.	
2. Identify Factor and Product	• Factor x Factor = Product	
3. Identify and use • and ( ) for multiplication.	6 x 8 = 48 6 · 8 = 48 6(8) = 48 (6)(8) = 48	
4. Multiply a 4 digit by 1 digit number.	$\begin{array}{r}1234\\\times\ \ \ \ 7\end{array}$ $\quad$ $\begin{array}{r}5678\\\times\ \ \ \ 5\end{array}$	
5. Multiply a 2 digit number by a 2 digit number with and without regrouping.	$\begin{array}{r}72\\\times\ 12\end{array}$ $\quad$ $\begin{array}{r}56\\\times\ 49\end{array}$	
6. Identify Dividend, Divisor and Quotient.	$\text{Divisor}\ \overline{)\ \text{Dividend}}$ Quotient	

7. Divide up to a 4 digit dividend by a 1 digit divisor with and without a remainder.	$\begin{array}{r} 618 \\ 8\overline{)4944} \\ 48\downarrow\downarrow \\ \hline 14 \\ 8\downarrow \\ \hline 64 \\ 64 \\ \hline 0 \end{array}$ $\begin{array}{r} 32\ R3 \\ 5\overline{)163} \\ -15 \\ \hline 13 \\ -10 \\ \hline 3 \end{array}$	
D. Properties: **Understand the meaning of operations and how they relate to one another.**		
1. Select and use appropriate operations to solve problems.	• Sum = addition • Difference = subtraction • Product = multiplication • Quotient = division	

2. Demonstrate:
   a) Commutative property of addition and multiplication.
   b) Associative property of addition and multiplication.
   c) Distributive property of multiplication.
   d) Identify property of addition and multiplication.
   e) Zero property of multiplication.
	a) Commutative:
	  $a + b = b + a$ e.g., $8 + 2 = 2 + 8$
	  $a \times b = b \times a$ e.g., $8 \times 2 = 2 \times 8$
	
	b) Associative:
	  $a + (b+c) = (a+b) + c$
	  e.g., $(8+4) + 2 = 8 + (4+2)$
	  $a \times (b \times c) = (a \times b) \times c$
	  i.e., $(8\times4) \times 2 = 8 \times (4\times2)$
	
	c) Distributive:
	  $a \times (b + c) = (a \times b) + (a \times c)$
	  (i.e., $8 \times (2+3) = (8 \times 2) + (8 \times 3)$
	
	d) Identity:
	  $N + 0 = N$ (i.e., $8 + 0 = 8$)
	  $N \times 1 = N$ (i.e., $8 \times 1 = 8$)
	
	e) Zero:
	  $0 \times N = 0$ (i.e., $0 \times 5 = 0$)	

E. Decimals/Fractions/Ratios/Percents: **Understand the meaning of operations and how they relate to one another.**		

1. Add and subtract decimal numbers to hundredths.	$$12.31 \quad \overset{4\,\;5}{50.60}$$ $$+5.60 \quad -12.32$$ $$\overline{17.91} \quad \overline{38.28}$$	
2. Round numbers to nearest whole number.	$10.41 = 10.00 $4.5 = 5$	
3. Locate decimals on a number line.	7.0 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 8.0	
4. Explain fractions as part of the whole.	$= \frac{1}{4}$ **Numerator** - top number — how many parts you are interested in. **Denominator** - bottom number — how many parts to the whole. To remember which is which: n**U**merator **U**p and **D**enominator **down**	
5. Explain mixed numbers as more than a whole.	$1\frac{3}{4}$	
6. Identify numerator and denominator.	$$\frac{3}{5}$$ ← numerator ← denominator	
7. Read fractions and mixed numbers on a number line.	0 1 2 3 4 0 $\frac{1}{3}$ $\frac{2}{3}$ $\frac{3}{3}$ $\frac{4}{3}$ $\frac{5}{3}$ $\frac{6}{3}$ $\frac{7}{3}$ $\frac{8}{3}$ $\frac{9}{3}$ $\frac{10}{3}$ $\frac{11}{3}$ $\frac{12}{3}$	
8. Add and subtract fractions with common denominators.	$\frac{1}{7} + \frac{5}{7} = \frac{6}{7}$ and $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$	

9. Use pictures to show two fractions are equivalent.	$\frac{2}{3}$ $\frac{4}{6}$	
10. Recognize equivalent fractions, decimals, and percents.	<table><tr><td>1/4</td><td>0.25</td><td>25 %</td></tr><tr><td>1/2</td><td>0.50</td><td>50 %</td></tr><tr><td>3/4</td><td>0.75</td><td>75 %</td></tr></table>	

Archdiocese of Santa Fe Standard 2: **Measurement:**
Students understand measurable attributes of objects and the units, systems and processes of measurement; and apply the appropriate techniques, tools, and formulas to determine measurements. NCTM

Critical for Mastery in Grade 4

LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Linear Measurement: Understand measurable attributes of objects, and the units, systems, and processes of appropriate measurement.		
1. Identify units of length in US Customary and Metric Systems.	US Customary Metric <table><tr><td>12 in.</td><td>1 ft.</td></tr><tr><td>3 ft.</td><td>1 yd.</td></tr><tr><td>36 in.</td><td>1 yd.</td></tr><tr><td>5280 ft.</td><td>1 mi.</td></tr></table> <table><tr><td>10 mm</td><td>1 cm</td></tr><tr><td>1000 mm</td><td>1 m</td></tr><tr><td>100 cm</td><td>1 m</td></tr><tr><td>1000 m</td><td>1 km</td></tr></table>	
2. Convert in US Customary and in Metric System.	• 2 yards is how many feet? 6 feet. • 2 yards is how many inches? 72 inches. • Two 12 inch rulers are how many feet? 2 ft.	

	• How many mm are on a meter stick? 1000 mm. • How many cm are on a meter stick? 100 cm.	
3. Measure length to nearest ¼ inch or to nearest millimeter or centimeter.	Measure to ¼ inch. 4 ¼ in. Measure to cm and mm. 7 cm 74 mm	
4. Compare units of length.	• Compare a yardstick and a meter stick. Which is longer? • Jan ran 100 yards. Mike ran 100 meters. Who ran farther?	
B. Weight: **Understand measurable attributes of objects, and the units, systems, and processes of appropriate measurement.**		
1. Identify units of weight in US Customary and Metric System.	US Customary Metric 16 oz. | 1 lb. 1000 g | 1 kg 2000 lb. | 1 ton	
2. Choose the most reasonable measure.	• Pair of shoes: 1kg or 1g • Tennis ball: 57g or 57kg	
3. Convert in US Customary and in Metric System.	• Three tons is how many pounds? 6,000 lb. • Two pounds is how many ounces? 32 oz. • Seven kilograms is how many grams? 7000 g.	
C. Temperature: **Understand measurable attributes of**		
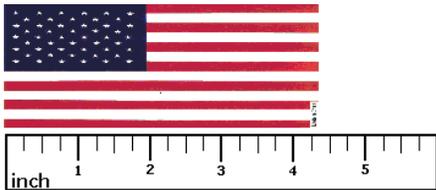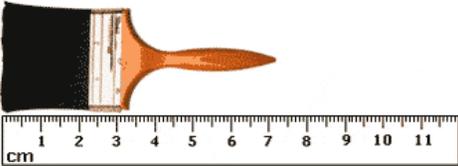
objects, and the units, systems, and processes of appropriate measurement.		
1. No objectives.		
D. Time: **Understand measurable attributes of objects, and the units, systems, and processes of appropriate measurement.**		
1. Count forward or backward on a clock to show elapsed time.	• It is afternoon, what time will it be in 2 hours and 25 minutes? • At soccer camp, Tony spent 2 hours and 25 minutes practicing defense and 1 hour and 15 minutes shooting. If the camp ended at 1:35 p.m., what time did it start?	
2. Convert minutes to hours.	<table><tr><td>60 min</td><td>1 hour</td></tr><tr><td>120 min</td><td>2 hours</td></tr></table>	
E. Money: **Understand measurable attributes of objects, and the units, systems, and processes of appropriate measurement.**		
1. Count to one hundred dollars.	• Given different money manipulatives, students will be able to make $100 in several ways.	
2. Calculate amount of change to be given after a purchase.	• Amber purchased six bolts costing $5.34, she paid with a ten dollar bill. How much change will she receive? $10.00 - $5.34 = $4.66	
F. Capacity: **Understand measurable attributes of**		
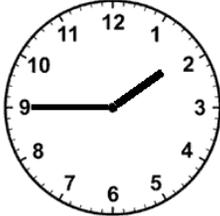
objects, and the units, systems, and processes of appropriate measurement.		
1. Identify units in US Customary and Metric System.	US Customary Metric System | 8 fl. oz.	1 cup
2 cups	1 pint
2 pints	1 quart
4 quarts	1 gallon | | 1000 mL	1L		
2. Convert in US Customary and Metric System.	• How many cups are in a pint? 2 cups • How many quarts equal a half gallon? 2 quarts • A 2 liter bottle is how many mL? 2000 mL	

Archdiocese of Santa Fe Standard 3: **Algebra and Problem Solving:**
Students understand patterns, relations, and functions; represent and analyze mathematical situations and structures using algebraic symbols; use mathematical models to represent and understand quantitative relationships; analyze change in various contexts; and apply and adapt a variety of appropriate strategies to solve problems. NCTM

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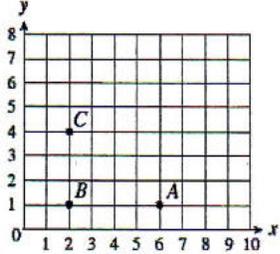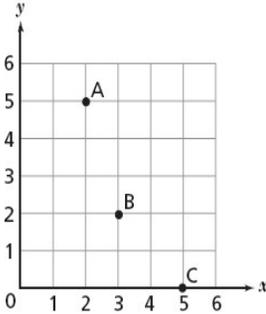| LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Variables and Expressions: **Represent and analyze mathematical situations and structures using algebraic symbols.**		

1. Evaluate expressions for:
   a) Addition
   b) Subtraction
   c) Multiplication
   d) Division
	a) A+B when A = 9 and B = 15 24
	b) If M = 12, Value of M - 10 2
	c) xy when x is 6 and y is 7 42
	d) $\frac{m}{n}$, using m = 12 and n = 3 4	

B. Equations:		

Use mathematical models to represent and understand quantitative relationships.		
1. Solve simple equations.	$N + 4 = 12$ $2x = 12$ $N = 8$ $x = 6$	
2. Identify missing operation in an equation.	$36 \bigcirc 6 = 6$ ÷ $6 \bigcirc 6 = 36$ ×	
C. Inequality: **Represent and analyze mathematical situations and structures using algebraic symbols.**		
1. Compare two numbers using the inequality symbols <, >, =	$-3 < -2$ $2 + 3 \bigcirc 3 + 2$ =	
D. Patterns, Sequences and Functions: **Understand change in various contexts.**		
1. Find the missing number(s) in counting sequence and include the rule.	6, 12, 18, <u>24, 30, 36</u> count up by 6 45, 36, 27, <u>18, 9, 0</u> count down by 9	
E. Functions:		
1. Use Function chart to solve each function.	Function: $z = w + 13$ <table><tr><td>w</td><td>z</td></tr><tr><td>1</td><td>?</td></tr><tr><td>2</td><td>?</td></tr><tr><td>3</td><td>16</td></tr></table>	

Archdiocese of Santa Fe Standard 4:   **Geometry:**
Students analyze characteristics and properties of two-and-three dimensional geometric shapes and develop mathematical arguments about geometric relationships; specify locations and describe spatial relationships using coordinate geometry and other representational systems; apply transformations and use symmetry to analyze mathematical situations; and use visualization, spatial reasoning, and geometric modeling to solve problems. NCTM

Critical for Mastery in Grade 4

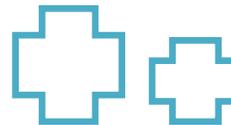| LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Geometric Terms: Specify locations and describe spatial relationships using coordinate geometry and other representational systems.		
1. Graph a point on a coordinate grid.		
2. Name the coordinates of a point on a coordinate grid.	A (2,5) B (3,2) C (5,0)	
B. Identify and Classify Shapes: Analyze characteristics and properties of 2-D and 3-D shapes and develop mathematical arguments.		
1. Recognize characteristics of a polygon.	• Closed figure • Flat shapes • Formed by line segments	

2. Identify and name regular polygons according to number of sides.	Triangle	3 sides	
	Quadrilateral	4 sides	
	Pentagon	5 sides	
	Hexagon	6 sides	
	Octagon	8 sides	
	N-gon	N sides	
3. Identify and compare congruent and similar figures.	Congruent Similar	
4. Identify and draw a line segment.	X ———— y	
5. Identify and draw a ray.	Endpoint	

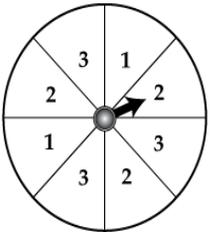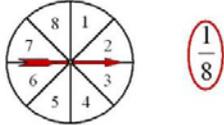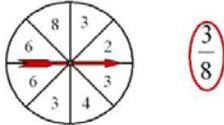| 6. Identify:
   • Parallel Lines
   • Intersecting Lines
   • Perpendicular lines
	Parallel lines Intersecting lines Perpendicular
	Right Angle	
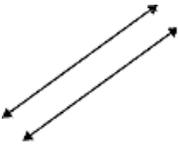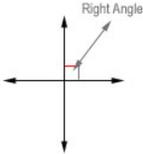
C. Geometric Formulas: **Use visualization, spatial reasoning, and geometric modeling to solve problems.**		
1. Find the perimeter of a rectangle.	Perimeter = 2 x Length + 2 x Width P = (2L+2W)	
2. Find the formula for area of a rectangle.	Area = Length x Width A = LW	

Archdiocese of Santa Fe Standard 5:   **Data Analysis, Statistics and Probability:**
Students formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them; select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions based on data; and understand and apply basic concepts of probability. NCTM
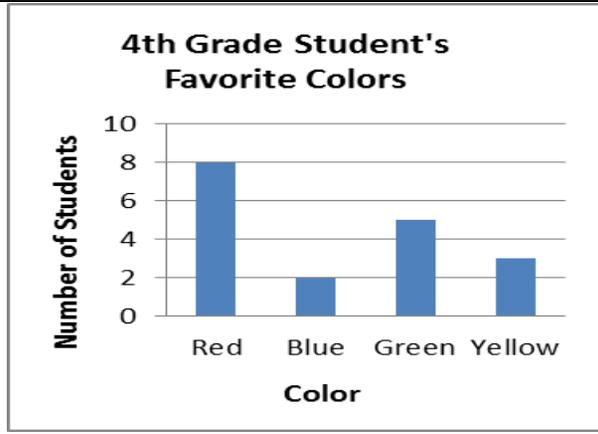
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LEARNING OUTCOMES (What students will be able to do, know, understand and value)	SAMPLE ASSESSMENTS/STRATEGIES (What evidence will demonstrate that students have achieved the Learning Outcome)	BEST PRACTICES
A. Statistics: **Select and use appropriate statistical methods to analyze data.**		
1. Use organizational tools to collect data set.	Test Scores | Test	Score | |---|---|
1	95
2	100
3	75
4	95
5	80		

2. Compute mean of a data set.	95+100+75+95+80 = 445 445 ÷ 5 = 89	
3. Identify median and mode, and range of data set.	1st Arrange least to greatest 75,80,95,95,100 Median 95 Mode 95 Range 25	
B. Probability: **Understand and apply basic concepts of probability.**		
1. Use experiments to determine probability and predict results (likely, unlikely, or impossible).	 • If arrow is spun once, what outcomes are possible? 1,2,3 • On which number is arrow most likely to stop? • 2 or 3 - They cover same area of the spinner. • On what number is the spinner unlikely to stop? • 1, the number one covers less area on the spinner. • What is the probability the arrow will stop on number 4? Impossible there is not a 4 on the spinner.	

2. Find possible combinations for three sets of objects.	• You are at a birthday party. You have cake, cupcakes, and pie to eat. You have milk, juice, and water to drink. How many combinations of 1 dessert and 1 drink do you have?
	    o Cake-milk-juice-water
	    o Cupcakes-milk-juice-water
	    o Pie-milk-juice-water
	    o 9 combinations	

3. Represent probability as a fraction.	• What is the probability of flipping a coin and it landing heads? **½** Write the probability of the pointer landing on 7. $\left(\dfrac{1}{8}\right)$ Write the probability of the pointer landing on 3. $\left(\dfrac{3}{8}\right)$	
C. Data Analysis: **Develop and evaluate inferences and predictions that are based on data.**		
1. Write questions (without bias) for a survey.	• What is your favorite color?	
2. Collect and organize data (frequency table).	4th Grade Student's Favorite Colors 	Color	Tally	Frequency
Red	⊬⊬ lll	8
Blue	ll	2
Green	⊬⊬	5
Yellow	lll	3		

3. Represent collected data in an organized and accurate manner including titles, labels, and intervals on a pictograph (legend), line graph, bar graph, and circle graph.	**4th Grade Student's Favorite Colors** Number of Students: 10, 8, 6, 4, 2, 0 Colors: Red (8), Blue (2), Green (5), Yellow (3) Color	
4. Evaluate graph and make further predictions.	• More 4th grade students like the color red. 4th grade student's least favorite color is blue. • I can predict that more 4th grade students will have red colored items than blue items like notebooks, shoes, etc.	

Archdiocese of Santa Fe Standard 6:   **Mathematical Processes:**
With opportunities integrated throughout the curriculum, students develop mathematical practices and processes such as solving problems, making connections, understanding multiple representations of mathematical ideas, communicating their thought processes, and justifying their reasoning appropriate to grade level. NCTM

Mathematical Processes and Practices:	Teacher Notes:
1. Students make sense of problems and persevere in solving them.	
2. Students select and use various types of reasoning and methods of proof.	
3. Students construct viable arguments and critique the reasoning of others.	
4. Students evaluate the reasonableness of predictions, estimations and solutions.	
5. Students use a variety of tools and strategies in problem solving.	
6. Students attend to accuracy and precision and proof their work.	
7. Students use a variety of mathematical representations to organize, record and communicate mathematical ideas.	
8. Students apply mathematical knowledge and skills routinely in other content areas and practical situations.	