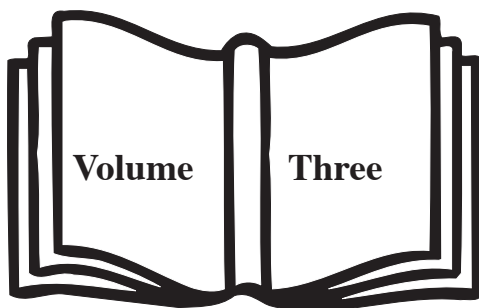


**GRADE FIVE INDICATORS
FOR THE
2003 MATHEMATICS
STANDARD COURSE OF STUDY**



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The Indicators for Grade Five Mathematics

What are Indicators?

Indicators are measures to determine mastery of a concept, procedure, or application within a specific objective or group of objectives. The Indicators illustrate and elaborate each objective with sample problems and tasks, vocabulary, and related concepts and skills. They are written to provide a fuller explanation of the objectives in the Grade Five Mathematics Standard Course of Study. Whenever possible they are embedded in a context to further illustrate the scope of the objectives. Indicators are summative in nature, that is, they are intended to show the kind of mathematical problem-solving that is appropriate to indicate a student's mastery of the curriculum after an extended period of instruction and practice.

The items contained in this document are not intended to represent sample end-of-grade test questions. Students are encouraged to explain or defend their responses and not merely give an answer. Communication is an important part of mathematics and mathematics education. Writing in mathematics helps students solidify their thinking and gives teachers an insight into the thought process of their students.

Our goal is for teachers to find this material useful in understanding both the intent of the 2003 revised Mathematics Standard Course of Study and the thinking of their students.

Questions and comments should be directed to Donna Thomas (dthomas@dpi.state.nc.us or 919.807.3934) or Lisa Mackey (lmackey@dpi.state.nc.us or 919.807.3843).

Number and Operations

- 1.01 Develop number sense for rational numbers 0.001 through 999,999.
- a) Connect model, number word, and number using a variety of representations.
 - b) Build understanding of place value (thousandths through hundred thousands).
 - c) Compare and order rational numbers.
 - d) Make estimates of rational numbers in appropriate situations.
- 1.02 Develop fluency in adding and subtracting non-negative rational numbers (halves, fourths, eighths; thirds, sixths, twelfths; fifths, tenths, hundredths, thousandths; mixed numbers).
- a) Develop and analyze strategies for adding and subtracting numbers.
 - b) Estimate sums and differences.
 - c) Judge the reasonableness of solutions.
- 1.03 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

Measurement

- 2.01 Estimate the measure of an object in one system given the measure of that object in another system.
- 2.02 Identify, estimate, and measure the angles of plane figures using appropriate tools.

Geometry

- 3.01 Identify, define, describe, and accurately represent triangles, quadrilaterals, and other polygons.
- 3.02 Make and test conjectures about polygons involving:
 - a) Sum of the measures of interior angles.
 - b) Lengths of sides and diagonals.
 - c) Parallelism and perpendicularity of sides and diagonals.
- 3.03 Classify plane figures according to types of symmetry (line, rotational).
- 3.04 Solve problems involving the properties of triangles, quadrilaterals, and other polygons.
 - a) Sum of the measures of interior angles.
 - b) Lengths of sides and diagonals.
 - c) Parallelism and perpendicularity of sides and diagonals.

Data Analysis and Probability

- 4.01 Collect, organize, analyze, and display data (including stem-and-leaf plots) to solve problems.
- 4.02 Compare and contrast different representations of the same data; discuss the effectiveness of each representation.
- 4.03 Solve problems with data from a single set or multiple sets of data using median, range, and mode.

Algebra

- 5.01 Describe, extend, and generalize numeric and geometric patterns using tables, graphs, words, and symbols.
- 5.02 Use algebraic expressions, patterns, and one-step equations and inequalities to solve problems.
- 5.03 Identify, describe, and analyze situations with constant or varying rates of change.

1.01 Develop number sense for rational numbers 0.001 through 999,999.

- a) *Connect model, number word and number using a variety of representations.*
- b) *Build understanding of place value (thousandths through hundred thousands).*
- c) *Compare and order rational numbers.*
- d) *Make estimates of rational numbers in appropriate situations.*

To achieve this objective, students should be able to:

- Use rational numbers (whole numbers, fractions, and decimals) to represent real life situations.
- Represent rational numbers on the number line.
- Compare rational numbers using the symbols $=$, $>$, $<$, \geq , \leq .
- Rename whole numbers in a variety of ways (e.g. in 3,248 there are 3 thousands, or 32 hundreds, or 324 tens, or 3248 ones).
- Determine equivalent fractions and decimals.
- Estimate rational numbers in problem situations.

Vocabulary and Resources

standard form
written form
expanded notation
hundred thousands place
ten thousands place
thousands place
hundreds place
tens place
ones place
tenths place
hundredths place
thousandths place
equivalence
ascending
descending
approximately
about
estimate
 \leq
 \geq
 $<$
 $>$
 \neq
fractions
decimals

A. Which is the greater number, fifty-eight thousands or forty ten thousands?

B. In each pair, insert the correct symbol: $>$, $<$, $=$.

or

- | | |
|---------------------|------------------|
| 36 thousands | 14 ten thousands |
| 2 hundred thousands | 33 thousands |
| 74 ten thousands | 739 thousands |
| 53 hundredths | 5 tenths |
| 24 ten thousands | 240 thousands |

C. Complete the following chart.

Standard	Expanded	Word
23,400,021		
	$4 \cdot 10000 + 3 \cdot 1000 + 2 \cdot 10$	
		two hundred thirty-four thousand
		three hundred ninty four thousand, six hundred seventy-two

D. Four athletes competed in the mile race. Amy finished the race in 7.428 minutes, Savannah finished in 7.41 minutes, Mataya finished in 7.42 minutes and Jalisa finished in 7.2 minutes. Who finished in the shortest time? Who finished last?

E. Write a decimal that is equivalent to $\frac{3}{4}$.

F. Place the following fractions and decimals on the number line below: $\frac{3}{2}$, 0.6, $\frac{2}{3}$, 1.04, 2.25



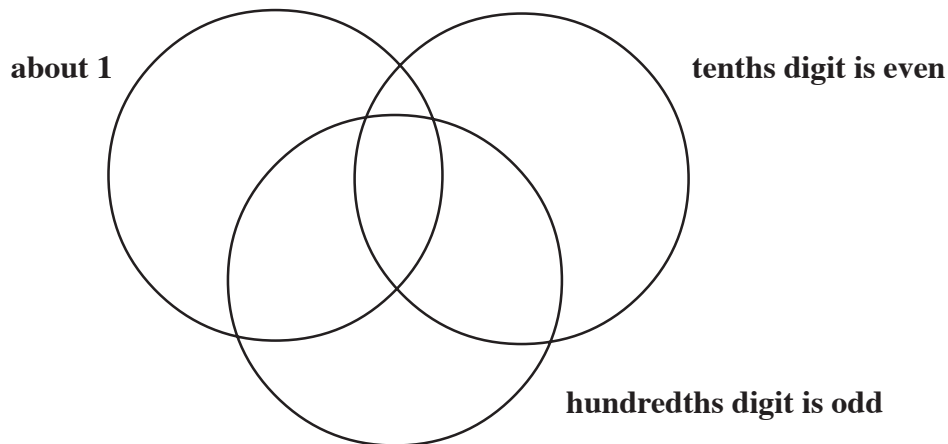
G. Juan placed the following numbers in ascending order.

$$\frac{2}{3} \quad \frac{7}{12} \quad \frac{5}{6}$$

Is he correct? Explain how you know. If he is not correct, write them in the correct order from least to greatest.

H. Place each number in the Venn diagram below.

0.87	0.973	0.31
0.6	0.27	1.12
1.023	0.94	1.03
2.5	3.2	5.33



Note: Data not fitting any 3 categories would go outside the Venn.

*Vocabulary
and
Resources*

fraction
decimal
numerator
denominator
factor
multiple
approximately
about
equivalent
benchmark numbers
landmark numbers
reasonable

Note: Addition and subtraction of fractions with unlike denominators are within the same family. The families are

- *halves, fourths, eighths*
- *thirds, sixths, twelfths*
- *fifths, tenths, hundredths, thousandths*
- *improper fractions within the families*
- *mixed numbers within the families*

1.02 Develop fluency in adding and subtracting non-negative rational numbers (halves, fourths, eighths; thirds, sixths, twelfths; fifths, tenths, hundredths, thousandths; mixed numbers).

- Develop and analyze strategies for adding and subtracting numbers.*
- Estimate sums and differences.*
- Judge the reasonableness of solutions.*

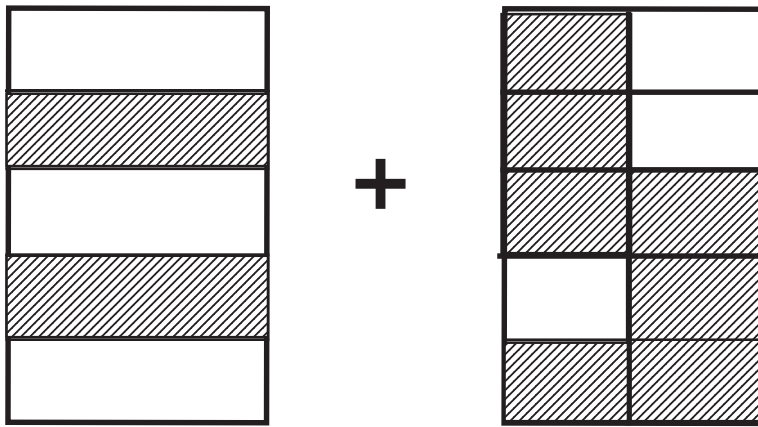
To achieve this objective, students should be able to:

- *Develop ways of modeling addition and subtraction of fractions and decimals.*
- *Develop algorithms for addition and subtraction of fractions and decimals.*
- *Apply knowledge of addition and subtraction of fractions and decimals to solve problems.*

- A.** Jacob's class had a pizza party. They bought one pizza for \$12.99, another pizza for \$8.25 and a third pizza for \$13.60. How much did they spend on pizza? If they included a three dollar tip for the delivery man and paid with two twenty dollar bills, how much change did they get back?

- B.** Hakkim had two and five-eighths cups of milk to use for baking a batch of cookies. The recipe requires three and one-fourth cups of milk. How much more milk does he need to bake the cookies?

- C.** Show the sum as many ways as you can.



- D.** Troy purchased two caps, one for \$8.99 and one for \$11.20. He paid \$1.39 sales tax on the purchases. About how much was his total cost (to the nearest dollar)?

- E.** Alex bought lunch meat to make sandwiches. He bought $2\frac{1}{4}$ lb of ham, $\frac{6}{8}$ lb of turkey and $1\frac{3}{4}$ lb of bologna.

How many pounds of lunch meat did he buy?

*Vocabulary
and
Resources*

Note: Fluency implies:

- Accuracy - knowledge of number facts and number relationships to reason and solve problems;
- Flexibility - knowledge and use of a variety of strategies to solve problems;
- Efficiency - acquisition of strategies that are manageable, easily carried out, and generate results that help solve problems.

- F.** Karoli has three-fourths of a gallon of yellow paint. If he mixes it with three-twelfths of a gallon of red paint how much orange paint will he have? (Red and yellow mixed make orange.)
- G.** Marta bought a package that contained one-half pound of ham and three-fourths of a pound of cheese at the deli. Did her package weigh more or less than a pound? How do you know? How much more will she need to buy if she needs two pounds of ham and two pounds of cheese?
- H.** Lakesha has two and one-third yards of rope. Tara has one and five-sixths yards of rope. How much more rope does Lakesha have than Tara?
- I.** Abigail mixed one and a half cans of blue paint with three-fourths of a can of yellow paint. Freddy said she should have about four and one-half cans of green paint. Is Freddy's estimate reasonable? How do you know? (Blue and yellow mixed make green.)
- J.** Odoi has \$25.00. He plans to buy a shirt for \$14.99 and a pair of shorts. What is the most he can spend on the shorts?

1.03 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers and paper and pencil.

Vocabulary
and
Resources

To achieve this objective, students should be able to:

- *Use strategies such as making a list, table, graph, or diagram, using guess-and-check, looking for patterns, simplifying the problem, and working backwards to solve problem.*
- *Use strategies such as decomposing numbers, estimation, and compensation to solve problems using mental computation.*

about
approximately
make a list
draw a picture
guess and check
equation
solve simpler problem
make a table/chart/graph
working backwards
looking for a pattern
decomposing

- A.** Toni filled the empty fuel tank on her airplane. It cost her \$850 to fill the tank. She can travel 2,420 miles on a tank of fuel. Will \$1300 be enough money to buy fuel for a trip that is 5,200 miles long? Why or why not?
- B.** John's father is planting a garden. He wants to plant carrots in one-third of the garden, potatoes in two-twelfths and melons in two-sixths. Does he have enough room to plant four-twelfths of the garden in flowers? Why or why not?

- C.** The fifth grade has 348 students and 14 teachers. They will attend the North Carolina Symphony and ride on school buses that carry 48 people. How many buses will be needed?
- D.** Linda walks 2.3 miles each morning and she walks 2.8 miles each afternoon. If she walked Monday through Friday, approximately how far did she walk?
- E.** I have twice as many nickels as quarters. The total value of all my nickels and quarters is \$4.20. How many quarters and nickels do I have?

- F.** Jessica uses a “short-cut” to add in her head. To find $\$7.99 + \5.47 , she thinks:

$$\begin{array}{r} \$7.99 \\ \$5.47 \\ \hline \end{array}$$

$$\begin{array}{r} \$8.00 - .01 \\ \underline{\$5.50 - .03} \\ \hline \end{array}$$

and gets $\$13.50 - .04$ or $\$13.46$

Write out the steps, using Jessica’s “shortcut” to show how she would add: $\$24.98 + \9.99

Explain why Jessica’s shortcut gives the correct answer.

- G.** Estimate (no calculators, no paper and pencil) the following values and write the letter in the appropriate container.

- | | |
|---------------------|--------------------|
| a. $2,978 + 6,453$ | b. $2,769 - 382$ |
| c. 17×198 | d. $595 \div 24$ |
| e. 98×43 | f. $8.49 + 17.75$ |
| g. $19,704 - 9,755$ | h. $6,890 \div 46$ |
| i. 189×52 | |



1 - 2,499



2,500 - 4,999



5,000 - 7,499



7,500 - 9,999

liter
centimeter
meter
kilometer
quart
gallon
pint
cups
grams
kilograms
miles
inches
feet
yards
pounds
ounces
benchmark
landmark
mass

Note: Students at this grade level are not expected to make exact conversions between systems of measurement. Continue to maintain Grade 3 objective 2.01 b) conversions within systems.

2.01 Estimate the measure of an object in one system given the measure of that object in another system.

To achieve this objective, students should be able to:

- *Develop benchmark comparisons (a liter is about a quart, a kilogram is a little more than two pounds).*
- *Use benchmark comparisons to solve problems relating measurement systems.*

- A.** Susan has 15 quarts of soda. About how many liters is this?
- B.** Jorge measured the width of his desk to be 50 centimeters. About how many inches is this?
- C.** The new road from Raleigh to Harristown is 10 miles long. About how many kilometers is this?
- D.** Leonardo has a fish tank that holds 50 liters of water. 50 liters is approximately equal to how many gallons? About how many quarts is this?
- E.** Helga packed a box of books that has a mass of 40 kilograms. About how many pounds is this?

2.02 Identify, estimate, and measure the angles of plane figures using appropriate tools.

Vocabulary
and
Resources

To achieve this objective, students should be able to:

- Identify angles as acute, obtuse, right, or straight.
- Recognize and use correct angle notation (e.g. $\angle CDE$).
- Identify pairs of angles as complementary, supplementary, or neither.
- Find the measure of the complement or supplement of a given angle.
- Develop angle benchmarks (e.g. more or less than 90° , about 30°).
- Estimate the measure of an angle (e.g. before using a protractor).
- Use a protractor correctly to measure an angle.

angle
protractor
degree
acute
right
obtuse
straight
angle notation

supplementary
complementary

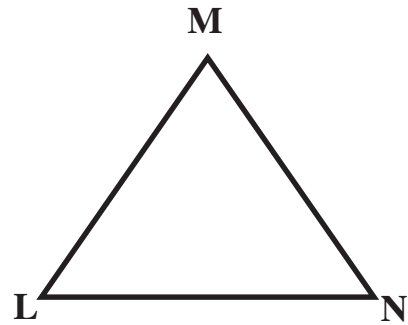
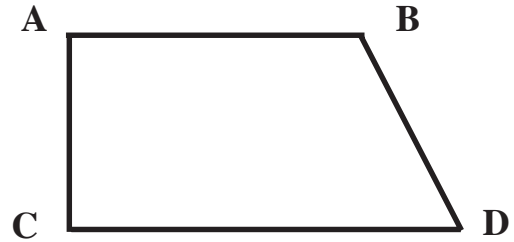
congruence

adjacent angle

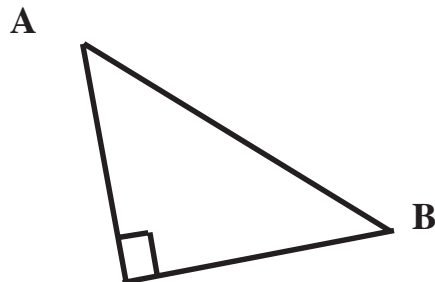
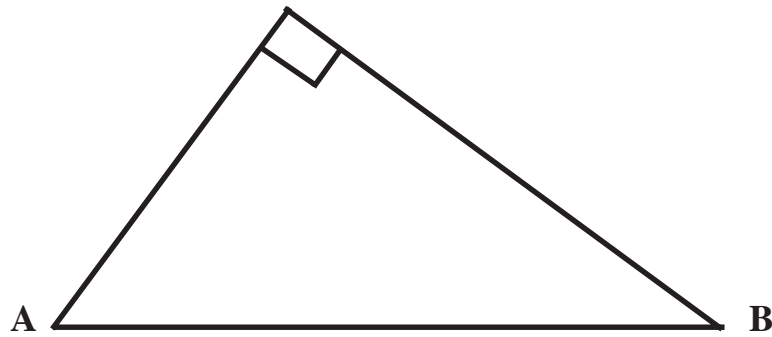
A. Draw the complement and supplement of this angle:



- B.** Jeane drew the following polygons and claims the angles of each polygon are all acute. Is she correct? How do you know?



- C.** Estimate the measure of angles A and B. Measure the angles. How close were your estimates?



- D. Determine whether each figure represents complementary angles, supplementary angles or neither.

Figure 1

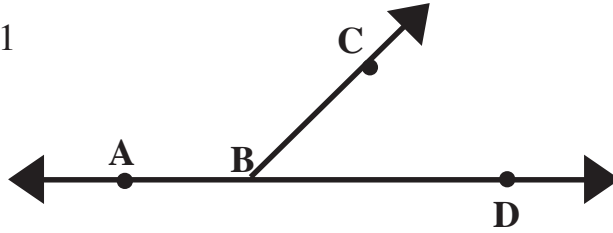


Figure 2

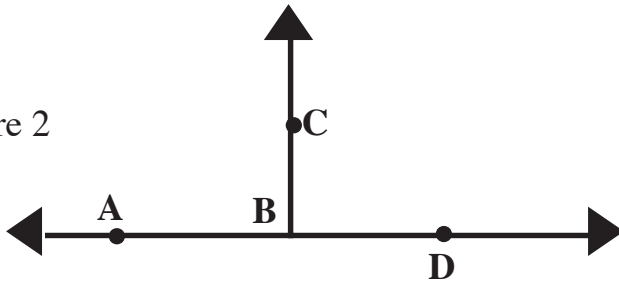


Figure 3

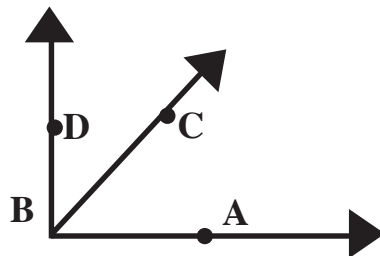
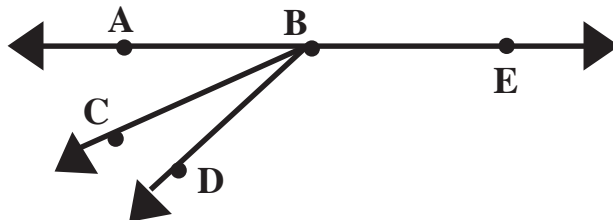


Figure 4



E.



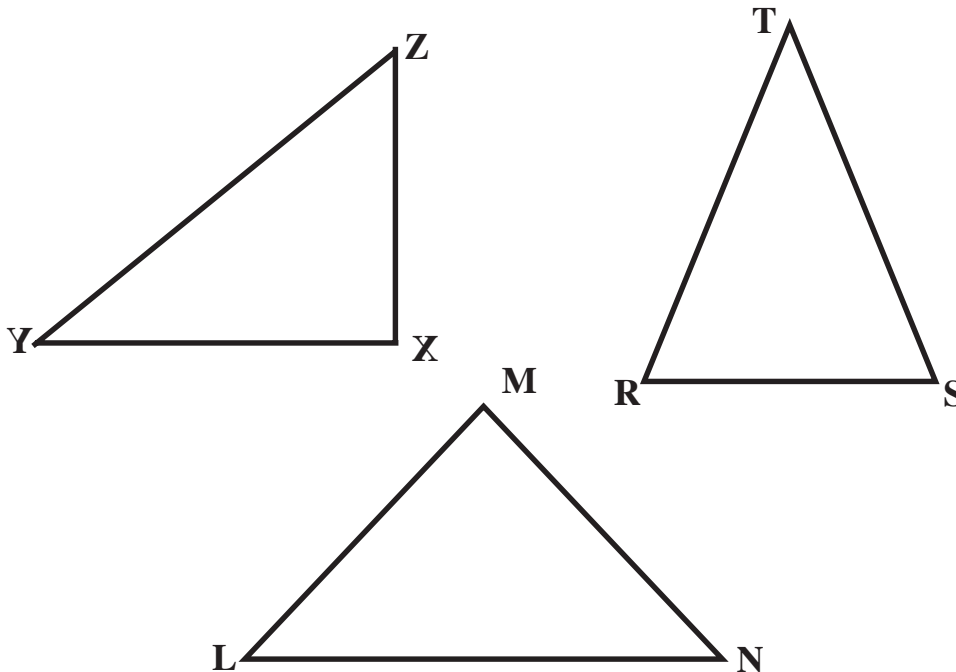
Measure the angles of trapezoid RSTU. Are there any congruent angles? What is the relationship between the adjacent obtuse and acute angles at each end?

3.01 Identify, define, describe, and accurately represent triangles, quadrilaterals and other polygons.

To achieve this objective, students should be able to:

- Distinguish between and among different types of triangles and quadrilaterals using their properties (sides, angles and diagonals).
- Relate groups of quadrilaterals (e.g. squares are always rectangles, rhombuses, parallelograms and kites; trapezoids are not parallelograms, parallelograms are sometimes rhombuses).
- Find the number of diagonals in a polygon.

- A. Joe drew the following triangles and claims they are all isosceles. Is his statement correct? How do you know?



Vocabulary and Resources

triangle
 right
 obtuse
 acute
 isosceles
 scalene
 equilateral
 congruent (\cong)

quadrilateral
 rectangle
 square
 rhombus

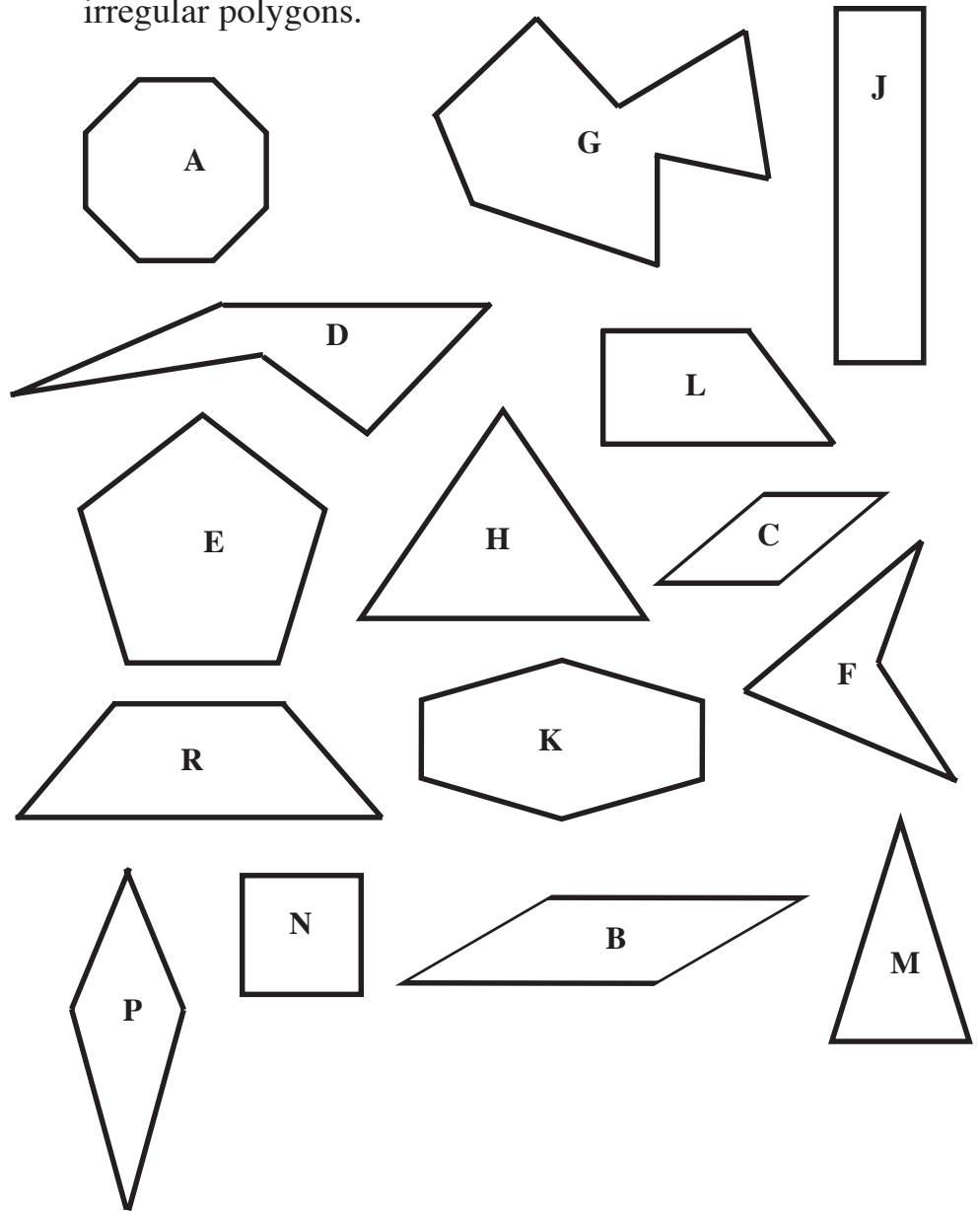
isosceles trapezoid
 right trapezoid
 trapezoid
 parallelogram
 kite
 pentagon
 hexagon
 octagon
 decagon

regular polygon
 irregular polygon

line
 line segment
 midpoint
 ray
 angle
 vertex (vertices)
 adjacent
 opposite
 properties
 parallel
 perpendicular
 bisect
 intersection

B. Use these polygons to answer the following questions.

- Jane says polygons A, G, and H are all octagons. Is she correct? If not, why not? If yes, why? How do you know?
- Look at polygons A, G, and H. Explain how they are alike and how they are different.
- Sort the polygons according to regular and irregular polygons.



- C.** Which of the following statements are:
S - Sometimes true, A – Always true, N – Never true

Explain your answers using words and/or pictures.

- a. An obtuse triangle contains a right angle.
- b. A right triangle is an isosceles triangle.
- c. A scalene triangle is an acute triangle.
- d. A kite is a parallelogram.
- e. The diagonals of a trapezoid are congruent.
- f. Two adjacent angles of a parallelogram are supplementary.

- D.** How many diagonals are there in each of the following polygons?
- a. rectangle
 - b. octagon
 - c. triangle

- E.** Draw a trapezoid that has two right angles. Is it possible to draw a trapezoid with one right angle? Why or why not?

F. Which quadrilaterals have sides that could be perpendicular?
parallel? both parallel and perpendicular?

G. Which of the polygons below have:

polygons	only 1 pair of congruent sides?	only 2 pairs of congruent sides?	more than 2 pairs of congruent sides?
trapezoids			
isoceles trapezoid			
rectangles			
squares			
rhombuses			
kites			
regular hexagons			
regular octagons			

3.02 Make and test conjectures about polygons involving:

- a) *Sum of the measures of interior angles.*
- b) *Lengths of sides and diagonals.*
- c) *Parallelism and perpendicularity of sides and diagonals.*

To achieve this objective, students should be able to:

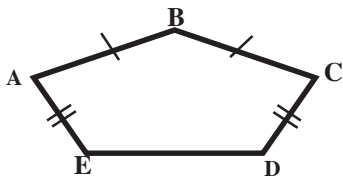
- *Measure sides in a variety of triangles to discover that the sum of the lengths of any two sides is greater than the length of the third side.*
- *Measure angles in a variety of triangles to discover that the sum of the measures of interior angles is 180 degrees.*
- *Measure angles in a variety of quadrilaterals to discover that the sum of the measures of interior angles is 360 degrees.*
- *Discover patterns in other polygons to determine the sum of the measures of interior angles.*
- *Develop strategies for determining the sum of the measures of the interior angles of a polygon.*
- *Determine whether a polygon has congruent diagonals.*
- *Determine whether a polygon has perpendicular diagonals.*

Vocabulary and Resources

justify
conjecture
triangle
right
obtuse
acute
isosceles
scalene
equilateral
quadrilateral
rectangle
square
rhombus
trapezoid
isosceles trapezoid
right trapezoid
parallelogram
kite
pentagon
hexagon
octagon
decagon
regular polygon
irregular polygon
line
segment
ray
angle
vertex
diagonal
opposite
parallel
perpendicular
bisect
line of symmetry
side
adjacent
congruent
angle measure

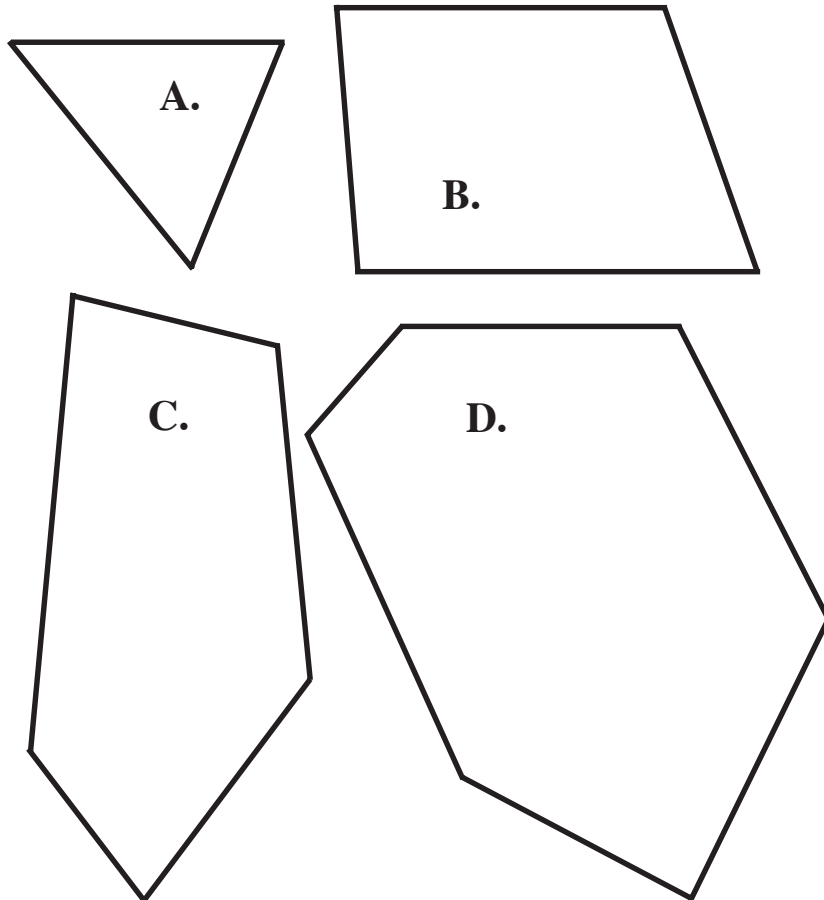
Vocabulary
and
Resources

Note: Marks on the sides of polygons indicate that the sides marked are congruent.



Side AB is congruent to side BC.

- A.** What is the sum of the measures of the interior angles of a pentagon? Justify your answer.
- B.** Jacob draws a hexagon. The sum of the measures of four of the interior angles is 510° . What is the measure of the other two congruent angles? Show how you know.
- C.** The sum of the interior angles equals 360° in which polygons? Justify your answer.
- D.** Helga drew several polygons. Find the sum of the measures of the interior angles in each polygon. Are there any patterns in the sums?



- E.** In which of the polygons below are the diagonals always longer than the sides? Justify your answer.

right trapezoids squares parallelograms kites
rectangles regular hexagons isosceles trapezoids
regular octagons regular pentagons rhombuses

- F.** In which quadrilaterals below are the diagonals always congruent? Explain how you know.

kites parallelograms isosceles trapezoids
rectangles squares rhombuses right trapezoids

- G.** Which of the following statements are:
S = Sometimes true A = Always true N = Never true
Draw and label examples to support your answers.

1. ____ A rectangle has perpendicular diagonals.
2. ____ A square has perpendicular diagonals.
3. ____ A parallelogram has perpendicular diagonals.
4. ____ A diagonal of a square is perpendicular to a side.

*Vocabulary
and
Resources*

counterclockwise
clockwise
side
adjacent
congruent
line symmetry
rotational symmetry
point of rotation
reflect
rotate (turn)
line of symmetry
90° rotation
180° rotation
270° rotation

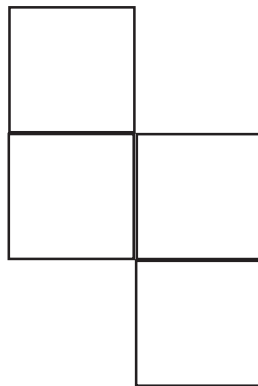
*Note for teachers:
In rotational symmetry,
the number of positions
in which an object
looks exactly the same
gives you its order of
symmetry. When we
rotate an equilateral
triangle, it looks exactly
the same in three
positions. Therefore, an
equilateral triangle has
rotational symmetry of
order 3. A rotational
order of one means an
object **does not** have
rotational symmetry.*

3.03 Classify plane figures according to types of symmetry (line, rotational).

To achieve this objective, students should be able to:

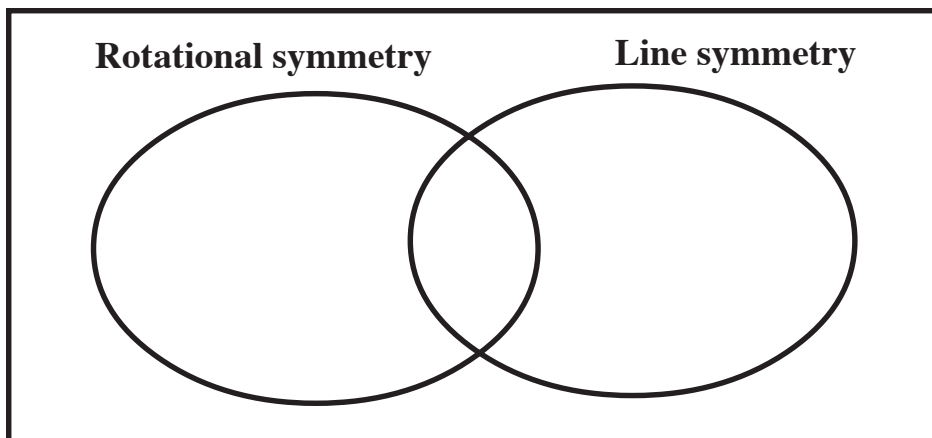
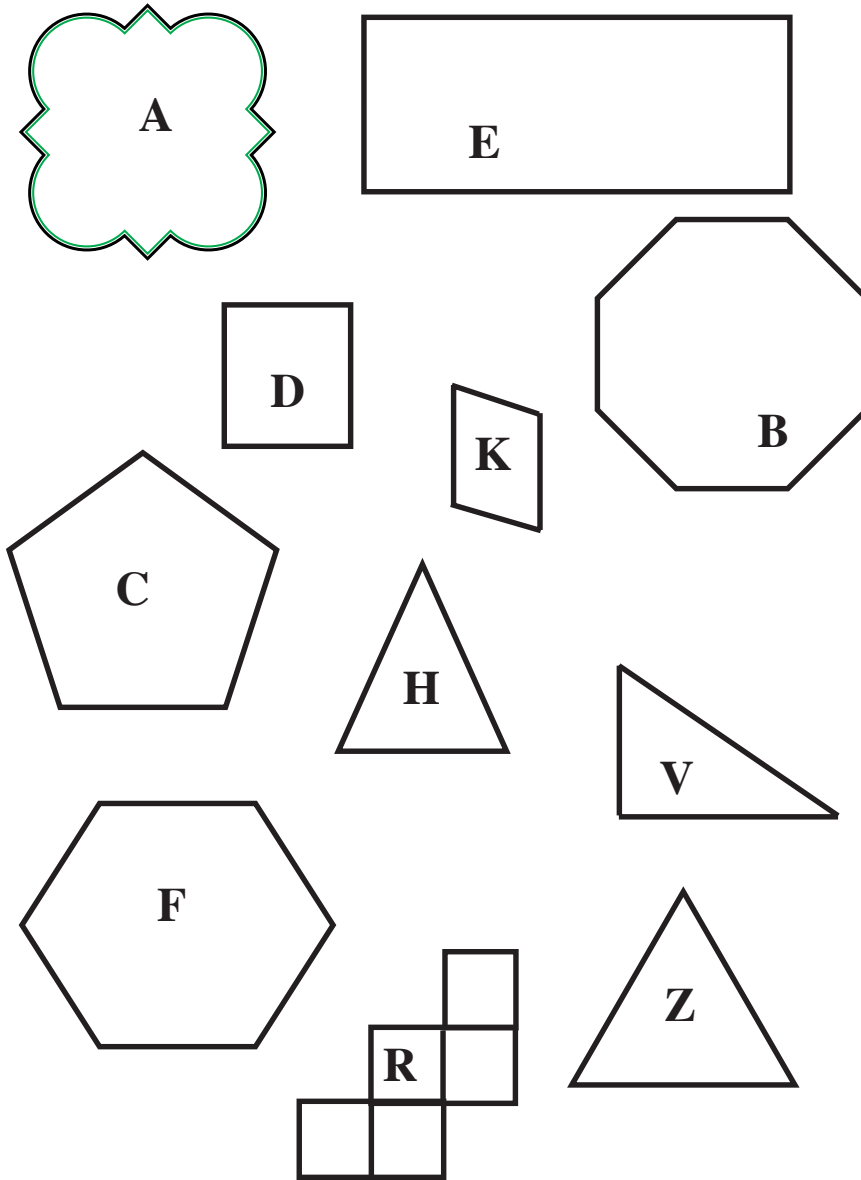
- *Identify lines and points of symmetry in plane figures.*
- *Determine whether a figure has line symmetry, rotational symmetry, both, or neither.*

- A.** Complete this figure so that it has a line of symmetry.
Can you complete this figure so that it has both rotational and line symmetry?

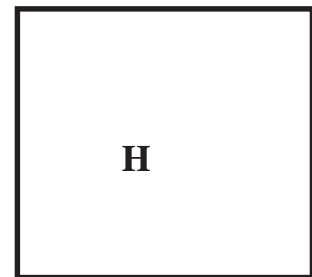
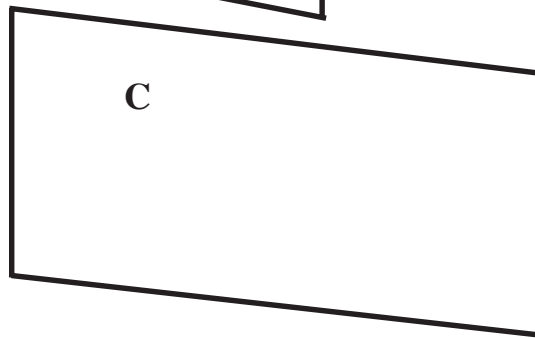
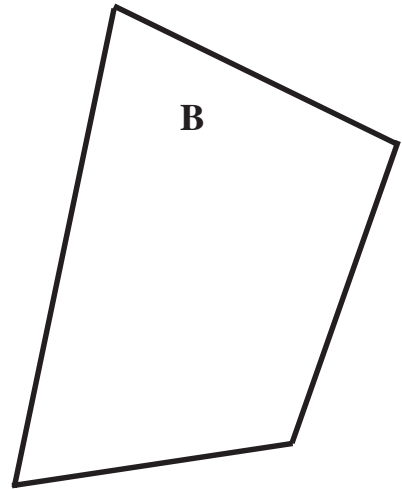
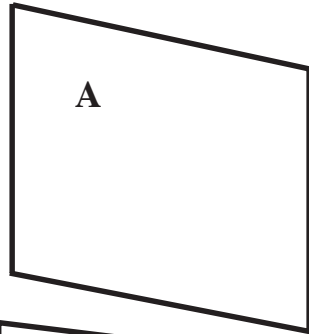


- B.** In the letters A, C, and I draw all possible lines of symmetry. If the figure has rotational symmetry, label the point of rotation.

C. Sort these figures using the Venn diagram below.



- D.** Which figures have a diagonal that is also a line of symmetry? If you cut each along a diagonal what new shapes do you get?



3.04 Solve problems involving the properties of triangles, quadrilaterals and other polygons.

- a) *Sum of the measures of interior angles.*
- b) *Lengths of sides and diagonals.*
- c) *Parallelism and perpendicularity of sides and diagonals.*

To achieve this objective, students should be able to:

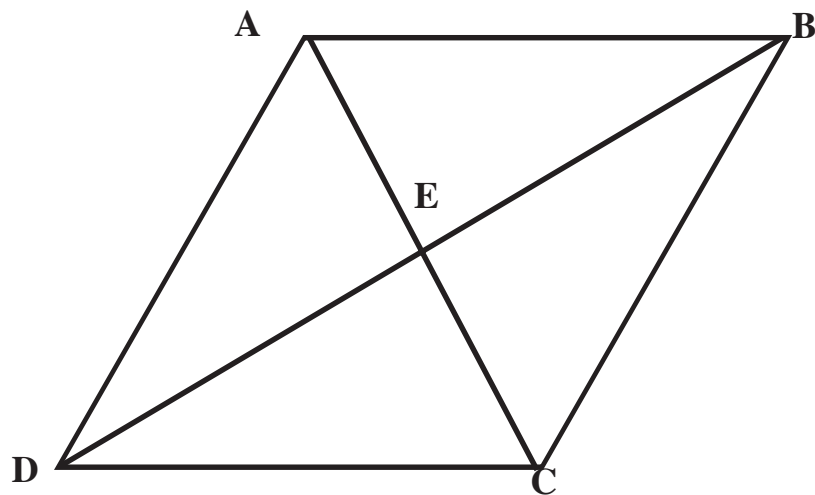
- Apply knowledge of the properties of polygons to solve problems.

- A. A pentagon has two angles that measure 145° and 74° . If the other angles are all congruent, what are their measurements? Explain.
- B. If a regular octagon has a perimeter of 200 centimeters, what is the measure of each interior angle and each side? Explain.
- C. A rhombus has one angle that measures 45° . What are the measures of the remaining angles? If its perimeter is 80 yards, what is the length of a side?

Vocabulary and Resources

interior angles
triangle
right
obtuse
acute
isosceles
scalene
equilateral
quadrilateral
rectangle
square
rhombus
trapezoid
isosceles trapezoid
right trapezoid
parallelogram
kite
pentagon
hexagon
octagon
decagon
regular polygon
irregular polygon
line
segment
ray
angle
vertex
diagonal
line symmetry
rotational symmetry
side
adjacent
opposite
perpendicular (\perp)
parallel (\parallel)
congruent
bisect
protractor
angle measure
supplementary
complementary

- D.** The sum of the measures of two adjacent sides and one diagonal in a rhombus equals 24 inches. When will the sum of the measures of the other sides and the other diagonal be 24 inches? Explain.
- E.** An isosceles triangle has a perimeter of 78 cm and one side measures 28 cm. How many different triangles could have a perimeter of 78cm? Give the dimensions of each.
- F.** Rhombus \overline{ABCD} has a perimeter of 40 inches. The diagonals \overline{AC} and \overline{BD} measure 12 inches and 16 inches and intersect at a point E. What is the perimeter of triangle AED and triangle ABC?



4.01 Collect, organize, analyze, and display data (including stem-and-leaf plots) to solve problems.

Vocabulary
and
Resources

To achieve this objective, students should be able to:

- Create and use different graphs to highlight or emphasize important features of a data set.
- Choose the most appropriate graph to display a set of data.

data
median
mode
range

- A.** The students in Mr. Smith’s PE class collected data on the number of sit ups the students were able to do in three minutes. Use the data to create a stem-and-leaf plot.

0	74	8	50	58	49	40
0	15	0	37	8	33	23
1	31	3	43	23	6	13
17	35	11	42	0	16	19

line plot
circle graph (pie graph)
pictograph
line graph
tallies
bar graph
frequency tables
stem-and-leaf plots
interval
frequency
x and y axis

What is the median for the class data? range? mode? Is the mode or median a good indicator of the number of sit ups completed by a student in Mr. Smith’s class? Why?

- B.** How many times can you write your name in one minute? Try it several times each day for a week and display your results. Compare your results with those of other students. What conditions might affect a student’s results? (Length of names, etc.)

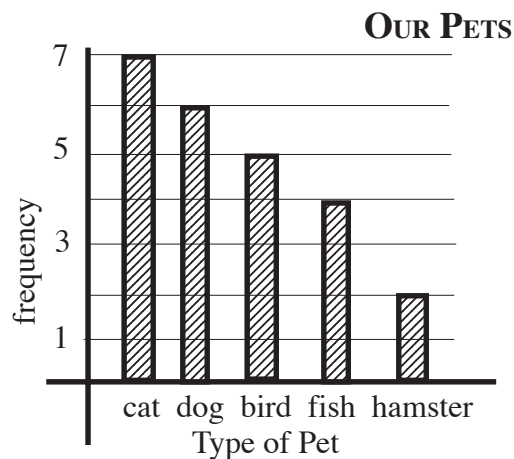
4.02 Compare and contrast different representations of the same data; discuss the effectiveness of each representation.

To achieve this objective, students should be able to:

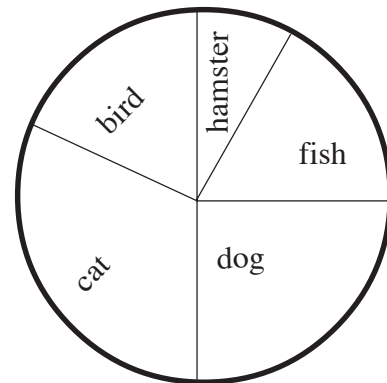
- Determine whether data are categorical or numerical.
- Determine which graphs are appropriate for a set of data.
- Compare and contrast different representations of the same data with respect to appropriateness, purpose, clarity, scale, etc.

line plot
circle graph
pictograph
line graph
tallies
bar graph
frequency tables
stem-and-leaf plots
categorical
numerical

- A. Mr. Taylor's class collected information about the types of pets in their homes. They displayed the data in the following graphs:



Mr. Taylor's Class



Mr. Taylor's Class
(24 pets)

When should you choose each graph? Why?
Are there other graphs you could use?

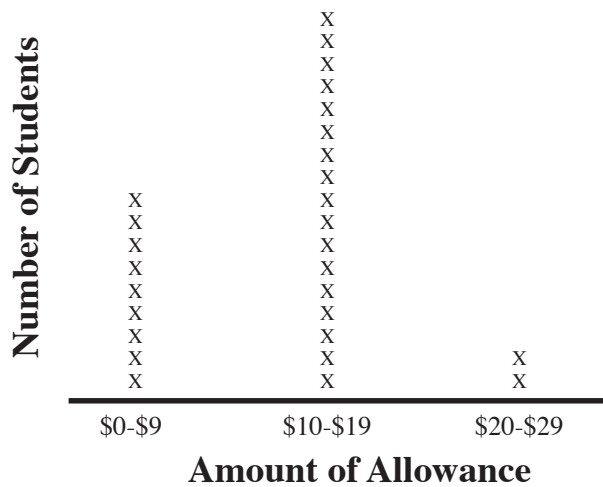
- B.** Using the data below, create a stem-and-leaf plot and a bar graph for the heights (in inches) of students in a fifth grade class at Griffin Elementary.

60	63	59	60	63	60	55
61	57	55	61	59	57	59
57	61	59	57	61	57	55

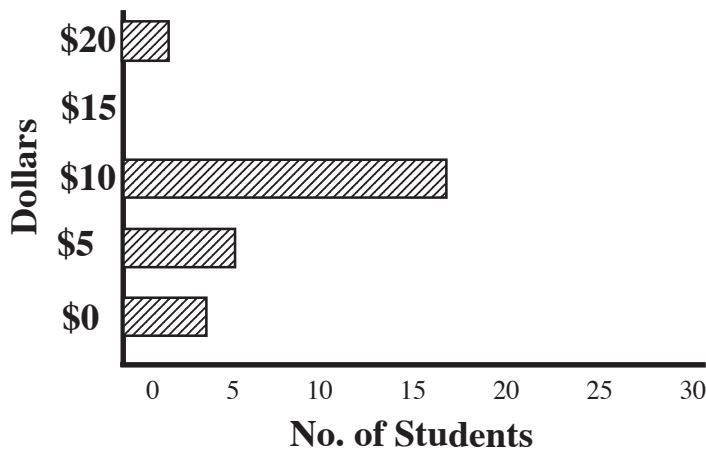
Which graph is better for analyzing the data? Why?

- C.** Which graph would you show to your parents if you wanted to get more allowance? Why?

5th Grade Allowances



5th Grade Allowances



midpoint

line plot
circle graph
pictograph
line graph
tallies
bar graph
frequency
tables

double bar graph

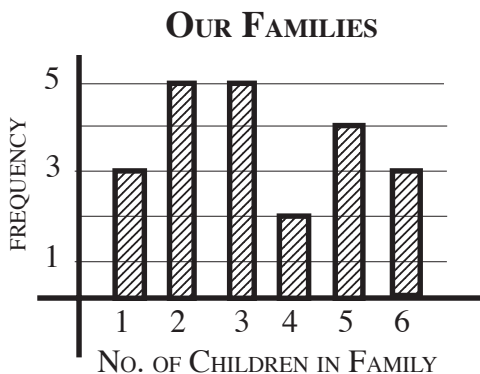
Note: Students need to understand categorical and numerical data. Only the mode can be found for categorical data.

4.03 Solve problems with data from a single set or across multiple sets of data using median, range, and mode.

To achieve this objective, students should be able to:

- *Interpret the meaning of the median, range, and mode within the context of a problem, involving either a single set of data or across multiple sets of data.*

- A. A class collected information about the number of children in their families. They shared the data in this graph:

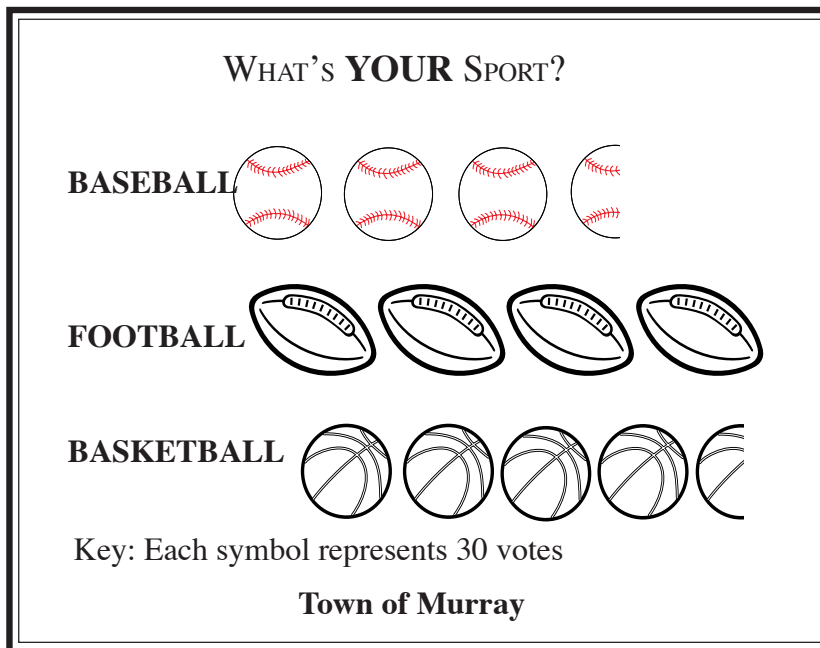
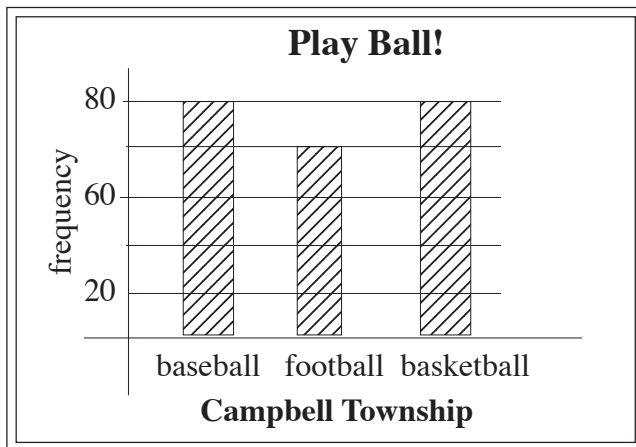


What is the median of the class? the range? the mode?

Using the data, how many children would you expect there to be in a family? Explain.

If a new student enters the class, how many children do you expect will be in his/her family?

- B.** A newspaper collected data about the sport preferences of two communities.



How many people in each town participated in the surveys?

How do the modes of these two sets of data compare?

Is there a dominant sports preference in either town?

How do you know?

- C. The following represents the heights (in inches) of fifth grade students at Marybond School.

How **Tall** Are We?

4		2	2	3	4	4	5	5	5	5	7	8	9	9
5		1	1	2	2	4	6	6	6	7	7	8	8	9
6		0	1	3	3									

The median height of all students at Marybond School is 45 inches. How much greater is the median height of fifth graders than the median height of the entire school? Explain why this might be true. How much taller is the tallest student than the shortest?

- D. The following are Mike's grades in math and science.

Math: 95, 88, 92, 76, 84, 77, 98, 93, 90, 81

Science: 76, 87, 89, 75, 87, 76, 77, 89, 85, 95, 89, 90, 98

Is the median greater in math or science? How much greater? In which subject is the range of his grades greater? Which subject do you think Mike is better at? Why?

5.01 Describe, extend, and generalize numerical and geometric patterns using tables, graphs, words, and symbols.

Vocabulary
and
Resources

To achieve this objective, students should be able to:

- Determine whether a pattern has a constant or varying change between terms.
- Develop appropriate vocabulary for describing change.
- Use multiple representations to show a pattern (e.g. function table, coordinate plane, algebraic expression).

variable
constant
unknown
varying
algebraic expression
pattern
geometric
numeric
algebraic equation
function table
in/out chart
T - chart
x-y chart
nth term
input/output chart

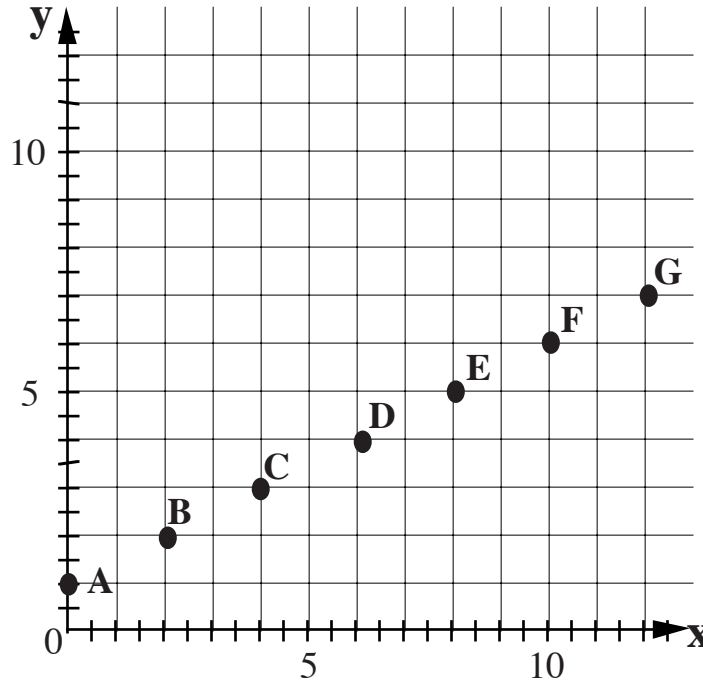
- A.** Twanna graphed the ordered pairs listed below. If the pattern continues, what would be the tenth ordered pair? Explain your answer.

$(0, 2), (3, 4), (6, 6), (9, 8) \dots$

- B.** Complete the table below. Describe in words the relationship between the number of sides and the number of diagonals. Extend the table to 12-sided polygons. Confirm your results with diagrams.

Number of sides	3	4	5	6	7	8	9 . . . n
Number of diagonals							

- C. If this pattern continues, what will be the ordered pair for point K? What rule can be used to find any ordered pair for this pattern?



- D. Using the figures below, how many P's will be in the 7th figure?
Challenge: What will be a rule for finding the number of P's in the nth figure?

Figure 1

P

Figure 2

P
PP

Figure 3

P
PP
PPP

Figure 4

P
PP
PPP
PPPP

- E.** Using the following pattern, find the 10th term, the 20th term, the 100th term. Find the n th term.

1, 4, 7, 10, 13, . . .

- F.** Sue and Ann built toothpick bridges like the following:



How many toothpicks would be used to build a bridge eight spans long? Write an expression to find the answer.

variable
less than
more than
at most
the least
less than or equal
more than or equal
opposites
reciprocals
algebraic equation
inequality
algebraic expression
fact family
pan balance
>
<
=
≠
≈
≠

Note: It is important for students to realize the equal sign does not mean you need to do something. Instead children should think of the equal sign meaning “the same as” or “balanced on both sides.”

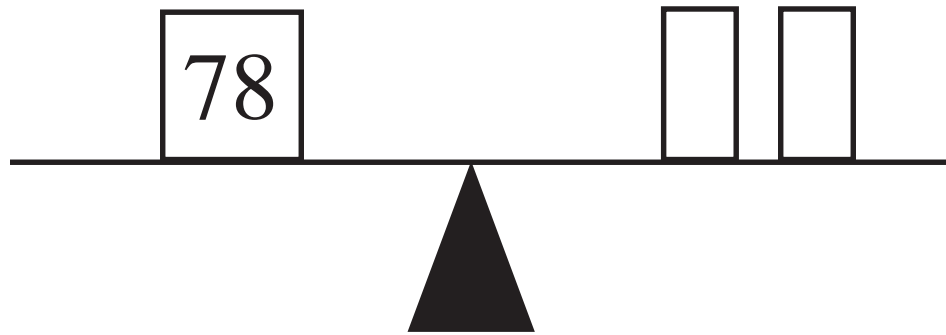
5.02 Use algebraic expressions, patterns, and one-step equations and inequalities to solve problems.

To achieve this objective, students should be able to:

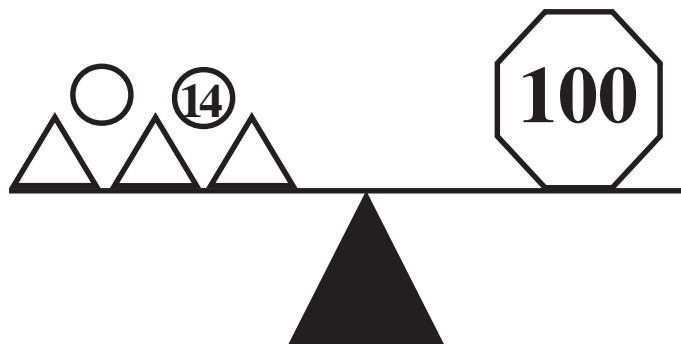
- Distinguish among expressions, equations, and inequalities.
- Write expressions, equations, and inequalities to represent problem situations.
- Solve one-step equations and inequalities.

A. Use the balance to complete the equation.

How much is each rectangle on the right side of this balance worth?



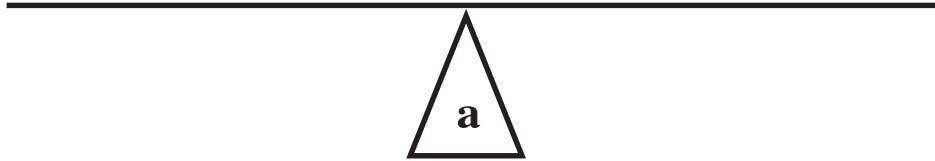
How much is each triangle on the left side of the balance worth?



B. Which scales are balanced? Explain.

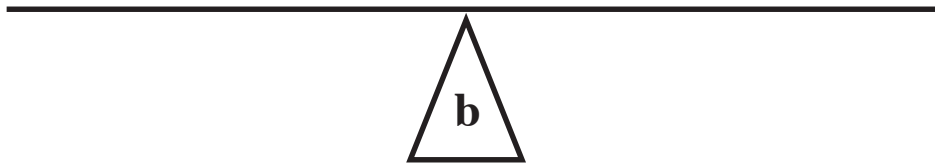
$$28 - (6 \times 3) + 2$$

$$(15 \times 2) - (9 \times 2)$$



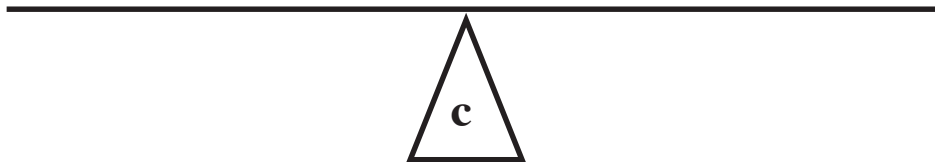
$$6 \times (3 + 8)$$

$$9 \times (9 - 3)$$



$$2 \times \text{Hexagon}$$

$$6 + (2 \times \text{Triangle})$$



Note: Hexagon = 6
Triangle = 3

- C.** Think about this problem: Janice brought 16 brownies to school. Betty also brought some brownies to school. Together they brought 35 brownies. How many brownies did Betty bring?

Circle the equations below that would be appropriate to represent this problem.

- a) $16 + a = 35$
- b) $35 = 16 + b$
- c) $35 - c = 16$
- d) $35 = d - 16$
- e) $35 + 16 = e$
- f) $35 - 16 = f$
- g) $g = 35 - 16$
- h) $h - 35 = 16$

- D.** Solve each of these equations or inequalities:

- a) $40.24 + x = 65.3$
- b) $3x = 12$
- c) $x - \frac{5}{12} = \frac{7}{6}$
- d) $\frac{x}{5} = 1,705$
- e) $14 < x + 2.5$
- f) $8x \leq 48$

- E.** Billy's mother gave him \$50 to open his bank account. He earned \$4 each week doing chores. He put that money in his bank account each week. At the end of six weeks he bought a CD for \$13. Which expression below shows how much money he had left?

- a) $50 + 6 \cdot 4 - 13$
- b) $(50 + 6) \cdot 4 - 13$
- c) $50 + 4 + 6 - 13$

5.03 Identify, describe, and analyze situations with constant or varying rates of change.

Vocabulary
and
Resources

To achieve this objective, students should be able to:

- *Determine whether a given situation involves a constant or varying rate of change.*
- *Determine the meaning of the rate of change within the context.*
- *Solve simple problems involving constant and varying rates of change*

equivalent
less than
more than
constant
varying
proportional

- A.** Alesha is baking cookies for the party. Using the following recipe, how many cups of flour will she need for 40 cookies? 60 cookies? 90 cookies? Explain your answers.

Sugar Cookies

$\frac{2}{3}$ cup sugar

2 cups flour

1 stick butter

Makes 20 cookies

- B.** Tracey travels 50 miles in one hour. At this rate, how long will it take her to travel 450 miles?

- C. Using the figures below, what will be the number of ●'s in the 10th figure? Write an algebraic expression to solve for the 12th figure.

Figure 1



Figure 2

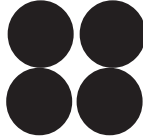


Figure 3

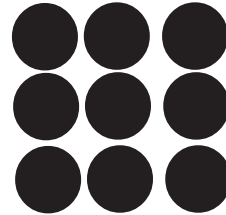
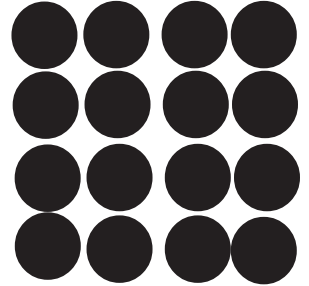


Figure 4



- D. A day care charges the following for parents who are late picking up their children. What is the fee for parents who are 90 minutes late?

Time Late	Late Fee
15 minutes	\$0.50
30 minutes	\$1.50
45 minutes	\$3.00
60 minutes	\$5.00
75 minutes	
90 minutes	

