A STUDY GUIDES A

Fifth Grade Table of Contents

Probability Study Guide

Students will solve problems involving the probability of a single event by constructing a sample space and using a tree diagram to identify all possible outcomes of a single event.

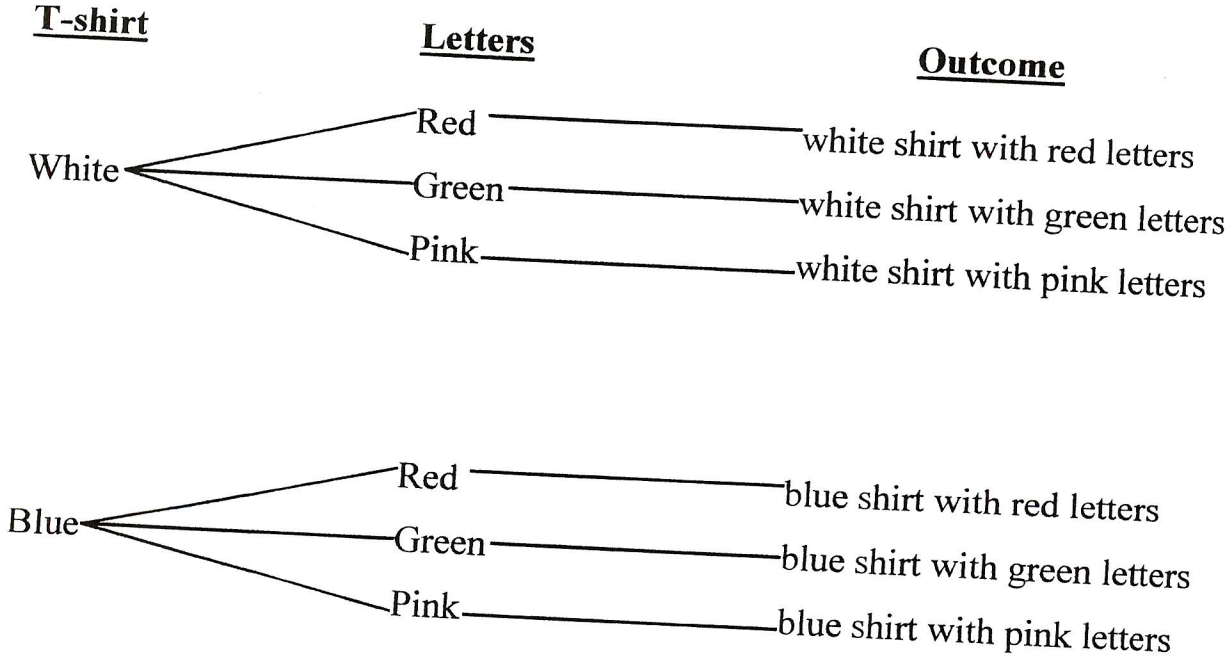
Sample space – A list of all the possible outcomes of an activity

Tree Diagram – A diagram that is commonly used to find the sample space.

Example:

Our class is ordering T-shirts. The choices are white or blue, and the letters can be red, green, or pink. How many different combinations can be made? Construct a sample space, using a list or chart to represent all possible outcomes.

Tree Diagram



So, there are 6 possible outcomes.

(You can also multiply the number of T-shirt choices by the number of letter choices)

$2 \times 3 = 6$

Students will determine the probability of a single event where the total number of possible outcomes is 12 or less.

$$P = \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$$

Example1: *Suppose you toss a coin. What is the probability of the coin landing on heads?*

$$P(\text{heads}) = \frac{\text{Number of sides with heads}}{\text{Number of sides}} = \frac{1}{2}$$

So there is a 1 out of 2 chance that the coin will land on heads.

You can also say that there is a 50% chance that the coin will land on heads *since ½ = .50 or 50%)*

Example 2: *If you roll a standard die (or number cube), what is the probability it will land on 6?*

$$P(6) = \frac{\text{Number of sides with a 6}}{\text{Number of sides}} = \frac{1}{6}$$

So there is a 1 out of 6 chance that the die will land on a 6.

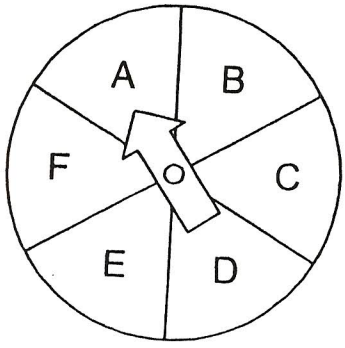
Example 3: *If you roll a standard die (number cube), what is the probability it will land on a number other than 6?*

$$P(\text{not 6}) = \frac{\text{Number of sides without a 6}}{\text{Number of sides}} = \frac{5}{6}$$

So there is a 5 out of 6 chance that the die will not land on a 6.

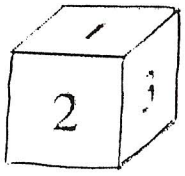
Sample SOL-style Questions:

1) Shoshanna spins the spinner. What is the probability the spinner will land on a vowel?



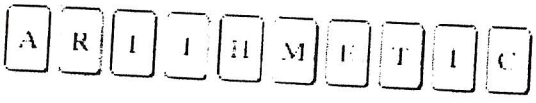
A. 1 out of 6
B. 1 out of 5
C. 2 out of 4
D. 2 out of 6

2) The sides of a block are numbered 1, 2, 3, 4, 5, and 6. If you toss the block once, what are the chances that the number on top will be a 2 or a 4?



A. 2 out of 6
B. 2 out of 4
C. 2 out of 1
D. 1 out of 2

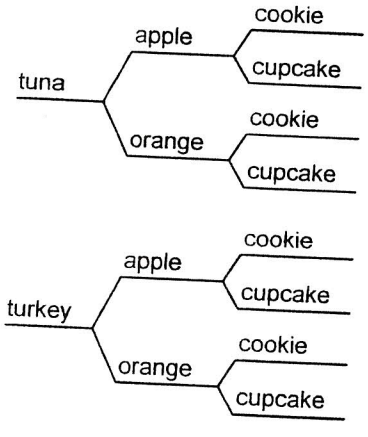
3) Look at the cards below and answer the following question.



Matt picks a card without looking. What is the chance that Matt will draw a T?

A. 2 out of 8 or $\frac{2}{8}$
B. 1 out of 3 or $\frac{1}{3}$
C. 2 out of 10 or $\frac{2}{10}$
D. 1 out of 8 or $\frac{1}{8}$

4) According to the tree diagram, how many different ways can you make lunch with 2 sandwich types, 2 types of fruit, and 2 types of dessert?



A. 2 ways
B. 4 ways
C. 8 ways
D. 14 ways

5) **Luke can either walk or ride the bus to the Y after school. At the Y, he can either swim or play basketball. Which diagram will help you find out how many different ways Luke can get to the Y and choose an activity?**

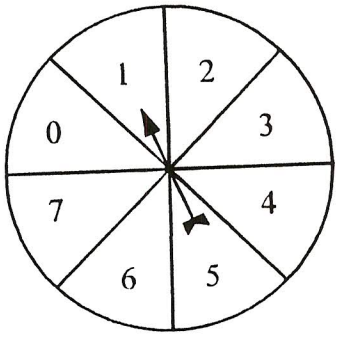
A.
walk——swim
bus——basketball

B.
walk——swim——basketball
bus——swim——basketball

C.
walk → swim, basketball
bus → swim, basketball

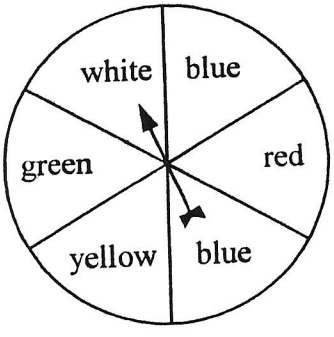
D.
walk → bus, swim, basketball

6) **Imagine that you spin the spinner below. The probability of spinning a number greater than zero is _____**



A. certain.
B. very likely.
C. doubtful.
D. impossible.

7) **Out of a total of 20 spins, which color will the spinner probably point to the greatest number of times?**



A. green
B. yellow
C. red
D. blue

8) **Jerome rolls a number cube labeled 1 to 6. What is the probability that he will roll an even number?**

A. $\frac{1}{6}$
B. $\frac{1}{2}$
C. $\frac{2}{3}$
D. $\frac{5}{6}$

Mean, Median, Mode, Range

SOL 5.19-- The student will find the mean, median, mode, and range of a set of data.

Understand:

Mean, median, mode, and range (MMMR) are four of the various ways that data can be analyzed.

Definitions:

- **Mean** – the AVERAGE of a set of data; found by **adding** each item of data and **dividing** by the number of items.

- **Median** – the number that lies in the **middle** when a set of numbers is arranged in order; if there are two middle values, the median is the mean of these two values.

- **Mode** – the number(s) that **occur(s) most often** in a set of numbers; there may be one mode, more than one mode, or no mode.

- **Range** – the **difference** between the greatest number and the least number in a set of data.

You can find the mean, median, mode, and range for many different types of data and representations of data, including:

- Stem and leaf plots
- Graphs
- Grades/Scores
- Temperatures or other measurements

HOW TO FIND MEAN

Problem: *Students in a math class earned the following scores on their tests:*

88, 90, 78, 87, 90, 100, 83, 96

How to find the MEAN (average):

Step 1: Add the scores: 88 + 90 + 78 + 87 + 90 + 100 + 83 + 96 = _____

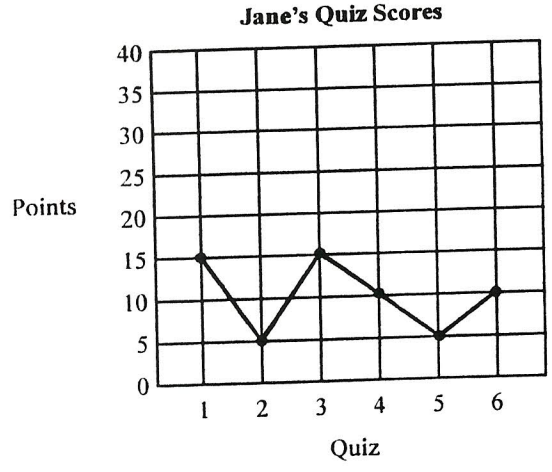
Step 2: Divide the sum by the number of addends (test scores):

_____	÷	_____	=	_____
sum of addends		number of addends		mean

What is the mean test score? _____

Mean Example 1:

Look at the graph below and answer the following question.



Find Jane's average quiz score.

A. 2 B. 5

C. 10 D. 12

Mean Example 2:

What is the mean number of schools in the six towns listed in the chart below?

Number of Schools			
Berkeley	16	Roscoe	14
Westerly	23	Pottstown	8
La Estrella	11	Humphrey	12

A. 12

B. 13

C. 14

D. 15

HOW TO FIND **MODE**

***Problem**: Students in a math class earned the following scores on their tests:*

88, 90, 78, 87, 90, 100, 83, 96

How to find the MODE:

Step 1: Put the numbers in order from least to greatest:

_____, _____, _____, _____, _____, _____, _____, _____

Step 2: Look at the ordered test scores: Is there a number or numbers that occur **more often** than the rest? That is your mode.

What is mode for this set of test scores? _____

Mode Example 1:

Tyrell got the following scores on his spelling test: 92, 91, 91, 90, 88, 86, 85, 92, 83, 91. What is the mode of Tyrell's scores?

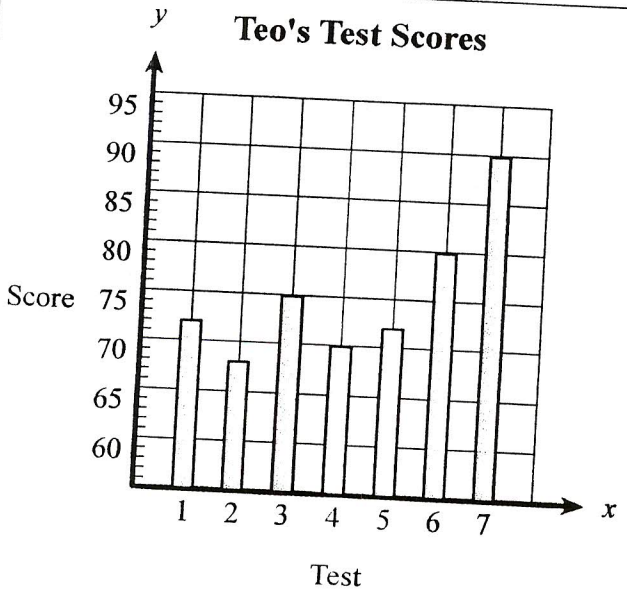
A. 92

B. 91

C. 90

D. 88

Mode Example 2:



What is the mode for the data?

A. 75 B. 90

C. 72 D. 68

HOW TO FIND **MEDIAN**

Problem: *Students in a math class earned the following scores on their tests:*

88, 90, 78, 87, 90, 100, 83, 96

How to find the MEDIAN:

Step 1: Put the numbers in order from least to greatest.

_____, _____, _____, _____, _____, _____, _____, _____

Step 2: Find the number(s) in the middle: _____ and _____

Important: *If you have an even number of values, you will have 2 numbers in the middle. In that case, you will find the mean of those two numbers. That will be your median.*

Step 3: Because there are two numbers in the middle, you will need to find the mean of those two numbers.

_____ (number 1) + _____ (number 2) = _____ (sum) THEN _____ (sum of two numbers) ÷ _____ (2) = _____ (median)

What is the median for this set of test scores? _____

Median Example 1:

Number of Puppies Born

Dog	Number of Puppies
Taffy	6
Princess	9
Bess	3
Roxy	5
Pinky	8
Lassie	4
Penny	10

What is the median number of puppies for the data collected?

A. 3 B. 5 C. 6 D. 7

Median Example 2:

Rashon takes a 10-word spelling test every Friday. His last six scores were as follows: 88, 92, 25, 40, 60, 80. What was Rashon's median score?

A. 40

B. 60

C. 70

D. 80

HOW TO FIND **RANGE**

Problem: *Students in a math class earned the following scores on their tests:*

88, 90, 78, 87, 90, 100, 83, 96

How to find the RANGE:

***Step 1**: Put the numbers in order form least to greatest.

_____, _____, _____, _____, _____, _____, _____, _____

***Step 2:** Find the greatest number: _____

***Step 3**: Find the lowest number: _____

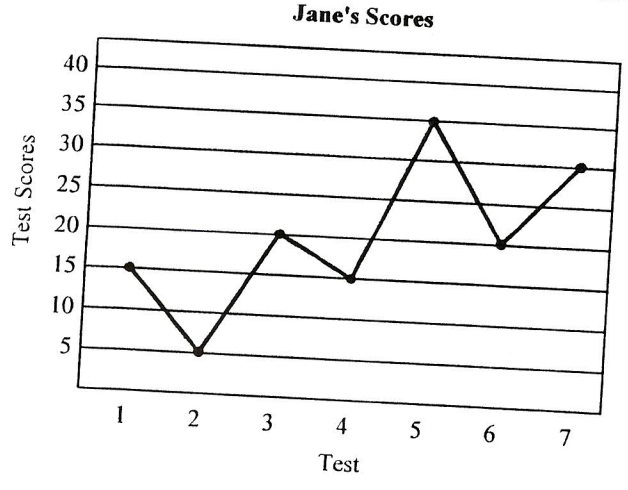
***Step 4**: Find the **difference** between the greatest and the lowest number:

_____ -- _____ = _____

greatest number lowest number range

What is the range for this set of test scores? _____

Range Example 1:



What is the range of Jane's test scores?

A. 10 points B. 15 points

C. 25 points D. 30 points

Range Example 2:

The list shows the lengths of six fish caught in the lake. What is the range in the lengths of the fish?

13 in.;	7.5 in.;	9 in.;	11.5 in.;	9.5 in.:	11 in.

A. 9 in.

B. 7.5 in.

C. 5.5 in.

D. 5 in.

MIXED EXAMPLES

1) The Lee family traveled from San Francisco to Los Angeles. They covered 300 miles on the first day, 250 miles on the second day, and 200 miles on the third day. What was the mean distance traveled by the Lee family?

A. 200

B. 250

C. 300

D. 350

2) David scored 89, 92, 78, 83, 83, and 87 in six tests. List the median and mode for David's scores.

A. 83 and 78

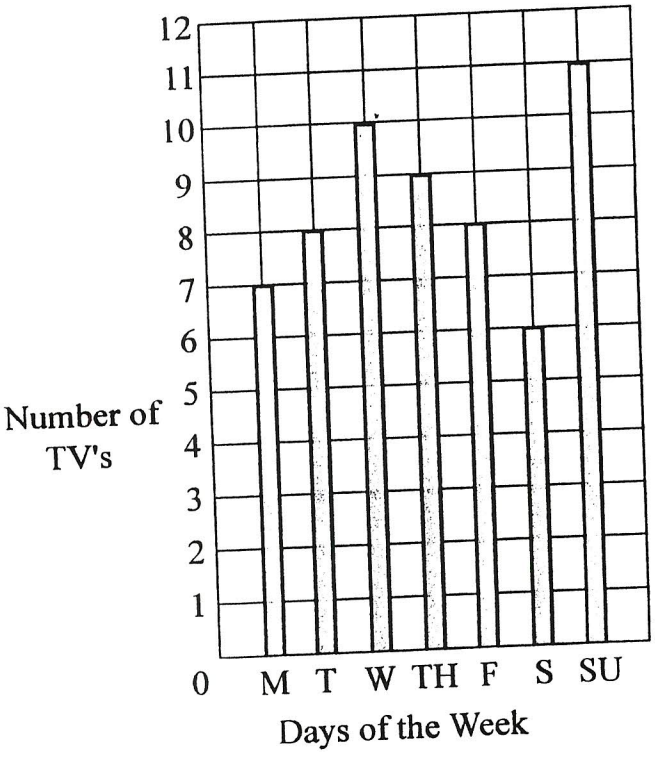
B. 85 and 83

C. 86 and 83

D. 87 and 83

3)

Number of TV's Sold in a Week



List the median and mode for the given data.

A. 8 and 9

B. 9 and 10

C. 6 and 10

D. 8 and 8

4) Look at the table.

Test Scores

Student	Test Score
Arial	88
Martin	84
Tisha	86
Aston	88
Sarah	72

Which student's score is the median and what is the mode of the test scores?

A. Arial, 72

B. Aston, 84

C. Tisha, 88

D. Sarah, 88

5) Which statement about the list of numbers is true?

26, 33, 24, 47, 28, 25, 33

A) The mode and the mean are the same.

B) The mean and the median are the same.

C) The mode and the median are the same.

D) The mode, median, and mean all are different.

6) Jenna scored 10, 20, 15, 25, and 10 points in five basketball games. Find the median and mode of Jenna's scores.

A. 10 and 10

B. 15 and 10

C. 20 and 10

D. 25 and 10

7) The fourth-grade classes held a canned food drive. The chart below shows the number of cans collected by each class.

Fourth-Grade Classes	Number of Cans Collected
Ms. Easler	95
Mr. Ketcham	111
Mrs. Mullens	143
Miss Pankow	108
Mr. Turner	153

What was the mean number of cans collected by the five classes?

A. 111 B. 122

C. 129 D. 153

8) Which set of numbers has a mean equal to its median?

A. 5, 1, 1, 1, 5

B. 2, 2, 3, 2, 2

C. 1, 3, 6, 9, 12

D. 1, 2, 3, 4, 5

Use the stem and leaf plot below to answer questions 9 - 12.

Number of Birds

STEM	LEAF
0	2 6
1	2 6 7 9
2	2 3 5 7 9

Key: 1/6 = 16

9. What is the mean? _____

10. What is the range? _____

11. What is the median? _____

12. What is the mode? _____

Create a stem and leaf plot for the following data.

Test Scores

76 54 92 88 76 88 75 93 92

68 88 76 76 88 80 70 88 72

STEM	LEAF

Use the stem and leaf plot you made above to answer the following questions.

13. What is the median? _____

14. What is the mean? _____

15. What is the mode? _____

16. What is the range? _____

Variables and Variable Expressions

SOL 5.21-- The student will investigate and describe the concept of a variable and use a variable expression to represent a given verbal expression involving one operation

Understand:

- A **variable** is a symbol that can stand for any number

  Example: in $x + 5$, x is a variable

- A **variable expression** is a variable or combination of variables (x, z, n), numbers (1,2,3), and symbols (⍓) that represents a mathematical relationship.

  Examples: $29 + x$

  $412 - \square$

  $20m$

Parts of an algebraic expression: ***number, variable, and operation***

The variable represents what you do not know.

$3 \times n$

Number _____

Variable _____

Operation _____

$6 - x$

Number _____

Variable _____

Operation _____

Using a variable to represent a verbal expression

Create a variable expression for each verbal expression below.
Use the variable m to represent what you do not know.

Verbal Expression	**Variable expression**
Seven plus a number	_____
A number minus 6	_____
Thirty-two minus a number	_____
A number divided by 34	_____ or _____
17 times a number	_____ or _____

Write a verbal expression for each algebraic expression below

Variable expression	**Verbal Expression**
$z \div 407$	_____
$402 + n$	_____
$450y$	_____
$n - 32$	_____
$28 \times n$	_____
$\frac{32}{x}$	_____
$\frac{x}{12}$	_____

1) Translate.

eight less than some number

A. $8 < x$

B. $x > 8$

C. $8 - x$

D. $x - 8$

2) Translate.

the sum of seven and some number

A. $x - 7$

B. $7x$

C. $x + 7$

D. $7 - x$

3) Translate this expression.

the product of fifteen and n

A. $15n$

B. $15 + n$

C. $15 - n$

D. $15 \div n$

4) *Twelve increased by four* can be written as

A. $12 \div 4$.

B. $12 + 4$.

C. $12 - 4$.

D. 12×4.

5) *The difference between twelve and some number* can be written as

A. $12 - n$

B. $12 - 9$

C. $12 \times n$

D. $n + 12$

6) Which is the correct phrase for the expression $n - 11$?

A. a number subtracted from 11

B. 11 subtracted from a number

C. a number is less than 11

D. a number decreased 11 times

7) Which is the variable expression for

Twice a number

A) $n - 2$

B) $2 - n$

C) $2n$

D) $2 \div n$

8) Which could be the verbal expression for

$m \div 2$

A) The product of a number and two

B) Twice a number

C) The difference of a number and two

D) Half a number

9) Which could be the verbal expression for

$7 + y$

A) The difference of seven and a number

B) The product of seven and a number

C) Seven more than a number

D) Seven less than a number

10) *Three more than the quotient of four divided by two* can be written as

A. $4 + 2 \div 3.$

B. $4 \div 2 + 3.$

C. $4 - 2 + 3.$

D. $3 \div 4 + 2$

11) Which is the correct phrase for the expression $3n - 11$?

A. three times a number subtracted from 11

B. eleven less than three times a number

C. three times a number is less than 11

D. three times a number less than 11

12) Which phrase describes $\frac{7}{2n}$?

A. seven times a number divided by 2

B. twice a number divided by 7

C. 7 divided by twice a number

D. 2 divided by 7 times a number

Variable Expressions & Word Problems

SOL 5.21-- The student will write a variable expression to represent a given mathematical relationship and word problem, using a variable

When writing an algebraic expression for a word problem, you use a variable to represent the value(s) that are unknown.

Example 1:

Chris has $28. He earns an unknown amount of dollars by doing chores. What expression would show this?

Value you *do* know _____ Operation _____ Variable _____

Variable expression of problem: _____

Example 2:

The fifth grade raised an unknown amount of money for a field trip. Each class earned an equal amount. If there are five classes in the fifth grade, what expression would show how much each class earned?

Value you know _____ Operation _____ Variable _____

Variable expression: _____ or _____

Example 3:

Tamar is going to bake the same number of cupcakes each day for the next 14 days. What expression would show his plan?

Value you know _____ Operation _____ Variable _____

Variable expression: _____ or _____

Example 4:

Raina bought an item at the grocery store using a coupon. The original price of the item was $8.00. The coupon reduced the price. What expression would show this?

Value you know _____ Operation _____ Variable _____

Variable expression: _____

5) Sean washes cars to earn enough money to buy a computer. He charges $4.50 to wash a car. The computer costs $800. Which expression will help find the number of cars Sean must wash before he can buy the computer?

A. $800 ÷ $4.50
B. $800 × $4.50
C. $800 – $4.50
D. $800 + $4.50

6) Members of the soccer team held a car wash to raise money for new team uniforms. They charged $5 for each car they washed. Let m represent the total amount of money raised at the car wash. Which expression could be used to find out how many cars the soccer team washed?

A. $m + 5$
B. $m - 5$
C. $m \times 5$
D. $m \div 5$

7) Dane gets 5¢ back for every empty soda bottle he recycles. Let b represent the cost of a bottle of soda. After recycling a bottle, which expression below could be used to show how much Dane paid for one soda?

A. $b - 5$
B. $b \div 5$
C. $5 - b$
D. $5 \div b$

8) Which problem would you use subtraction to solve?

A. Kerrie has 13 fish and 2 cats for pets. How many pets does Kerrie have all together?

B. 37 books were on the shelf. 7 books were on the table. How many more books were on the shelf than on the table?

C. Jin Soo sold 56 tickets. His brother sold 98 tickets. How many tickets did they sell in all?

D. 24 baby monkeys were in the zoo. 15 mother monkeys were in the zoo. How many monkeys were in the zoo?

9) Wolfgang is cooking an 8-pound turkey. The turkey needs to cook 23 minutes per pound. Which expression should Wolfgang use to find out how long to cook the turkey?

A. $23 + 8$

B. $23 - 8$

C. 23×8

D. $23 \div 8$

10) Out of the 25 students who went to football tryouts, only 11 were selected. The number of students who were not selected was calculated as $25 - 11 = 14$.

Which of the problems below *cannot* be solved the same way?

A. At the final tryout, 25 students appeared. Of those, 11 failed. How many students passed?

B. Lisa had $25 with her before shopping. When she went home, she had $11. How many dollars did she spend?

C. A company had 25 computers. They purchased 11 more. How many did they have in all?

D. John had 25 T-shirts. He gave some of these to his friend. John had 11 T-shirts left. How many did he give away?

11) A nursery school had 100 students and 4 teachers. The school calculated the number of students in each class as $\frac{100}{4} = 25$.

Which of the problems below can be solved in the same way?

A. A teacher gave away 4 gifts each to a group of 100 kids. How many gifts did he give away?

B. Bruce had 100 toys. He received 4 more toys. How many toys did he have in all?

C. A zoo had 100 animals last year. This year, the zoo has 4 times more animals. How many animals does the zoo have now?

D. A group of 100 students played a game. Four teams were formed. How many members did each team have?

12) Lisa had 30 cookies. She gave a certain number of cookies to her brother. She wanted to figure out how many cookies were left.

Which expression below would help her find the answer?

A. $k - 30$

B. $k + 30$

C. $30 \div k$

D. $30 - k$

13) Merv is three times older than his younger brother. What expression would show how old Merv is?

A) $m + 3$

B) $m - 3$

C) $m \times 3$

D) $m \div 3$

14) Terrence read a certain number of AR books last year. His younger brother Sid read one-half as many books as Terrence did. Which expression would show how many books Sid read?

A) $t - 2$

B) $2 - t$

C) $t \times 2$

D) $t \div 2$

15) Richard received a certain amount of money for his birthday. Christa received twice as much as Richard did on her birthday. What expression would show how much Christa received?

A) $r \div 2$

B) $r \times 2$

C) $2 \div 10$

D) $r \times 10$

16) Clarence went to a clearance sale and bought a new motorcycle for one-fourth the original price. Which expression would show how much he paid for the motorcycle?

A) $m + 4$

B) $m - 4$

C) $m \times 4$

D) $m \div 4$

Solving Open Sentences

e

Addition – ***Use the inverse operation (subtraction) to solve if needed.***

$4 + n = 7$
(Subtract 4 from 7 to get answer)

$n =$ _____

$x + 3 = 5$

$x =$ _____

$9 + 5 = z$

$z =$ _____

Subtraction -- ***Use the inverse operation (addition) to solve if needed.***
If the variable comes immediately **after** the minus sign, you will need to find the difference of the other two numbers.

$n - 8 = 8$
(Add 8 to 8 to get answer)

$n =$ _____

$12 - x = 9$
(Subtract 12 - 9 to get answer)

$x =$ _____

$15 - 5 = z$

$z =$ _____

Multiplication -- ***Use the inverse operation (division) to solve if needed.***

$n \times 3 = 12$
(Divide 12 by 3 to get answer)

$n =$ _____

$7n = 49$

$n =$ _____

$5 \times 5 = z$

$z =$ _____

Division -- ***Use the inverse operation (multiplication) to solve if needed.***

$k \div 3 = 7$
(multiply 7 by 3 to get answer)

$k =$ _____

$42 \div n = 6$

$n =$ _____

$\frac{32}{z} = 4$

$z =$ _____

$\frac{x}{5} = 60$

$x =$ _____

1) Find the missing number.

$$8 + n = 16$$

A. $n = 24$

B. $n = 12$

C. $n = 10$

D. $n = 8$

2) What is the missing number?

$$13 - b = 6$$

A. $b = 8$

B. $b = 7$

C. $b = 19$

D. $b = 21$

3) Solve for n.

$$n + 47 = 72$$

A. $n = 17$

B. $n = 25$

C. $n = 35$

D. $n = 129$

4) Find the value of n.

$$2 \times n = 140$$

A. $n = 60$

B. $n = 70$

C. $n = 142$

D. $n = 280$

5) What is the value of k?

$$k \div 3 = 12$$

A. $k = 4$

B. $k = 9$

C. $k = 15$

D. $k = 36$

6) What number makes the following sentence true?

$$n - 6 = 17$$

A. $n = 11$

B. $n = 12$

C. $n = 23$

D. $n = 24$

Open Sentences & Word Problems

Open sentence – a mathematical sentence containing a variable and an equals (=) sign.

Example: $4 + x = 7$

Example 1:
(Hint: Highlight your known values and identify what the variable represents)

Tam writes four letters each day. How many letters does he write in 8 days?

Operation_____ Variable = m

Open sentence _____

m = _____ letters

Example 2:

A certain number of pencils are in a box at a store. Three pencils are sold and ten are left.

Operation_____ Variable = p

Open sentence _____

p = _____

Example 3:

Stan baked 24 cupcakes and divided them into an unknown number of containers. There are 6 cupcakes in each container. How many containers are there?

Operation_____ Variable = c

Open sentence _____

c = _____ containers

Example 4:

Samantha spends 35 minutes reading every day. Which equation shows how much time she spends reading in a week?

A) $35 \div 7 = y$

B) $35 + 7 = y$

C) $35 \times 7 = y$

D) $35 - 7 = y$

y = _____ **minutes**

Example 5:

Tamara ran 58 laps on Saturday. She ran 24 laps in the morning. Which equation below shows how many laps she ran in the afternoon?

A) $58 + 24 = x$

B) $58 + x = 24$

C) $58 \div x = 24$

D) $58 - x = 24$

x = _____ **minutes**

6) Out of the 25 students who went to football tryouts, only 11 were selected. The number of students who were not selected was calculated as 25 – 11 = 14.

Which of the problems below *cannot* be solved the same way?

A. At the final tryout, 25 students appeared. Of those, 11 failed. How many students passed?

B. Lisa had $25 with her before shopping. When she went home, she had $11. How many dollars did she spend?

C. A company had 25 computers. They purchased 11 more. How many did they have in all?

D. John had 25 T-shirts. He gave some of these to his friend. John had 11 T-shirts left. How many did he give away?

7) There are 10 pounds of oranges in each of 5 bags. How many pounds of oranges are there in all?

Which number sentence tells you how to find the answer to this problem?

A. $10 - 5 = n$

B. $10 + 5 = n$

C. $10 \times 5 = n$

D. $10 \div 5 = n$

8) Ryan has 60 pens, 20 of which are black. The rest of his pens are blue. Which number sentence could be used to find the number of Ryan's pens that are blue?

A. $50 + 20 = b$

B. $b - 20 = 60$

C. $60 - 20 = b$

D. $60 + 20 = b$

Eighty people attended the spaghetti dinner in the cafeteria at Villa Point Elementary School. They sat at 20 tables with the same number of people at each table. How many people sat at each of the tables?

Which number sentence would help you to solve the problem in the box above?

A. $80 - 20 = n$

B. $80 \times 20 = n$

C. $80 + 20 = n$

D. $80 \div 20 = n$

10)

Darla had 48 coins. She divided them evenly into piles. She made 6 piles in all. Find s, if s equals the number of coins in each pile.

A) $48 \times s = 6$

B) $48 \div s = 6$

C) $48 + s = 6$

D) $48 - s = 6$

11)

Dan bought 3 tickets to a show. He paid $24 in all. How much did each ticket cost, if the cost of a single ticket = m?

A) $3 + m = 24$

B) $3 - m = 24$

C) $3 \div m = 24$

D) $3 \times m = 24$

12)

Which of these could be solved using the open sentence $a - 4 = 32$?

A) Kiana had 32 pieces of candy. She divided the candy into 4 equal piles. How many pieces of candy were in each pile?

B) Joseph is 4 times older than his baby brother. If Joseph is 32 years old, how old is his baby brother?

C) Crystal earned $32 babysitting one Friday. She then earned $4 more by doing chores on Saturday. How much money did Crystal earn altogether?

D) Heather received money for her birthday, and then spent $4 of it at the store. She had $32 left. How much money did Heather receive for her birthday?

13)

Which can be solved by using the open sentence $k + 5 = ?$

A) John did 5 times as many sit-ups as Kurt. If k is the number of sit-ups Kurt did, how many sit-ups did John do?

B) Reba ran 5 fewer meters than Sharon. If k is the number of meters that Sharon ran, how many meters did Reba run?

C) Shaquan takes 5 minutes to run each lap around the football field. If k is the number of laps Shaquan ran, how long did he run?

D) Briana did 5 more push-ups than Karen. If k is the number of push-ups that Karen did, how many pushups did Briana do?

Patterns

Repeating Patterns

These are the simplest types of patterns. You only need to figure out the "core" or basic unit, and then repeat it.

Examples:

1) AABBCCAABBCCAABB ____ ____ **(Core: _____)**

2) ΔO ΔO ΔO _____,_____ **(Core: _____)**

3) Tamisha strung beads to make a necklace. The picture shows the pattern.

What will the *fifteenth* bead look like?

A. black
B. white
C. striped
D. green

4) Look at the pattern below.

A B C C D A B C C D A B

What will be the twentieth letter in the pattern shown above?

F. A
G. B
H. C
J. D

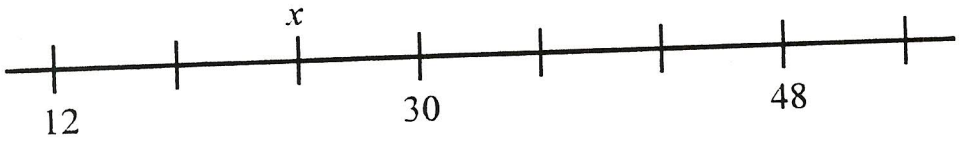
Growing Patterns

These are a little harder. You have to figure out the "rule", or what is happening to the part of the pattern you can see. Sometimes you also have to figure out what comes next or fill in missing pieces of the pattern.

Examples:

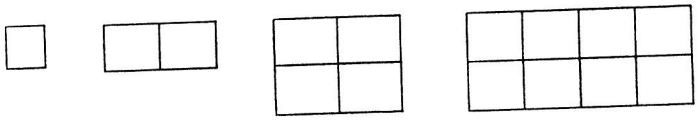
1) 6, 9, 12, 15, 18, _____, _____ (Rule: _____)

2)



What number is x ? _____ **What is the rule?** _____

3)



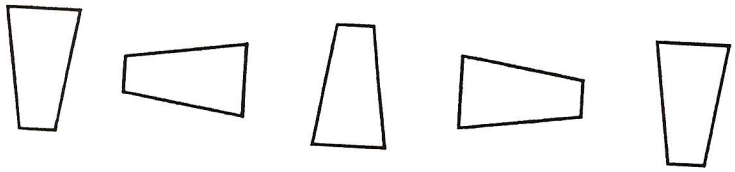
What is the rule? _____

4) 2.10, 2.13, _____, _____, 2.22, _____, _____

What is the rule? _____

Geometric Patterns

These usually involve a figure that changes in some way, usually by rotating (turning) or reflecting (flipping).



Draw the next figure

What is the rule? _____

5) During a math contest, Paul got 5 correct answers on the first day. On the second day, he got 8 correct. The third day he got 13 correct, and the fourth day he got 20 correct. If this pattern continues, how many correct answers will Paul get on the fifth day?

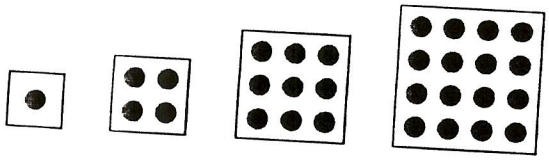
A. 21 B. 23 C. 25 D. 29

6) What will be the 5th term in the pattern below?

1, 5, 9, …

A. 10
B. 13
C. 14
D. 17

7) How many dots will be in the next box?



A.5 B. 20 C. 25 D. 36

8) Five students board a bus at the first stop, 7 at the second, 10 at the third, and 14 at the fourth. How many students board the bus at the fifth stop?

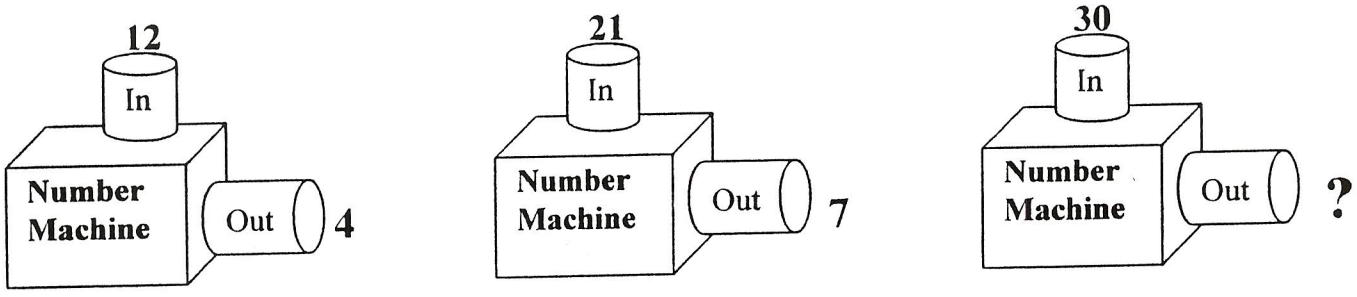
A. 17 B. 18 C. 19 D. 20

Function Machines/Tables

(also called Number Machines)

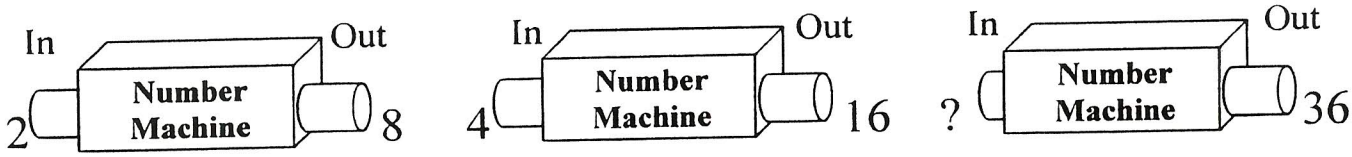
These are "math machines" where you put in a number and a (usually different) number comes out. There is a rule that the machine is using to change the numbers. Sometimes you have to find out the rule the machine is using, and sometimes you have to use the given rule to find missing numbers. The "machines" can look very different, but they all work in the same way.

EXAMPLE 1:



Rule:_____

EXAMPLE 2:



Rule:_____

EXAMPLE 3:

Rule:_____	
Input	**Output**
4	**8**
6	**12**
8	

EXAMPLE 4:

Rule:_____	
Input	Output
34	59
x	70
52	77
66	y

5) Look at the table below.

x	1	3	5	7
y	11	33	____	____

Identify the function of the table:

A. $y = x + 11$

B. $y = x + 0.11$

C. $y = 11x$

D. $y = x - 11$

6) Rakim is ordering new chairs for his office. A chart in the catalog gives him the weight of the chairs.

Number of Chairs	**2**	**3**	**4**	**5**
Total Weight	**16**	**24**	**32**	**40**

If the pattern continues, what would be the total weight of 8 chairs?

Answer: _____

Rule: _____

7) What three numbers should come next in the sequence?

1, 2, 4, 7, 11, 16, 22, . . .

A. 27, 32, 40

B. 28, 35, 43

C. 29, 37, 46

D. 30, 38, 47

8) Which statement about this pattern is true?

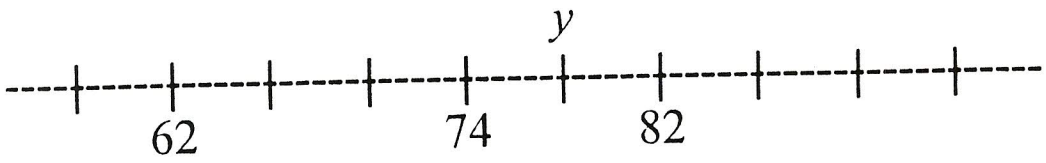
5, 11, 17, 23, . . .

A. Each number is 6 more than the number to its right.

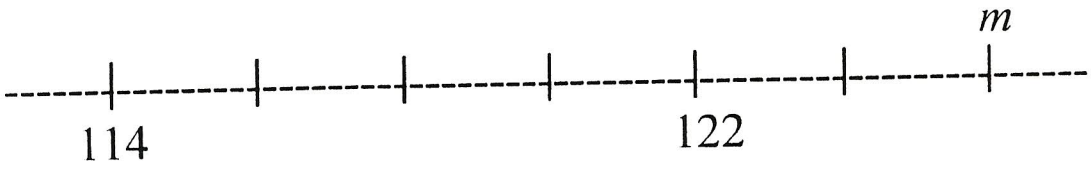
B. Each number is 2 times the number before it.

C. Each number is the second odd number after the number before it.

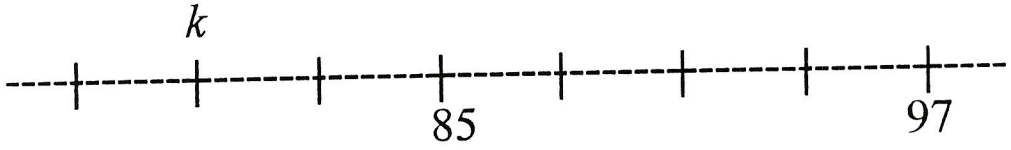
D. Each number is 6 less than the number to its right.

9) 

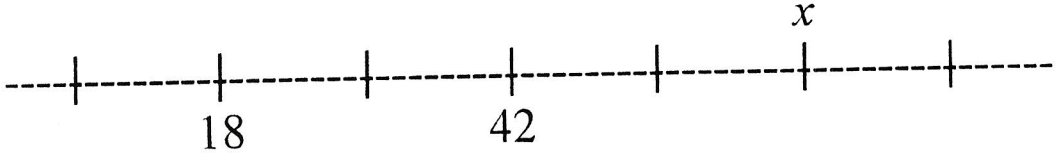
$y =$ _____ *Rule:* _____

10) 

$m =$ _____ *Rule:* _____

11) 

$k =$ _____ *Rule:* _____

12) 

$x =$ _____ *Rule:* _____

Lines

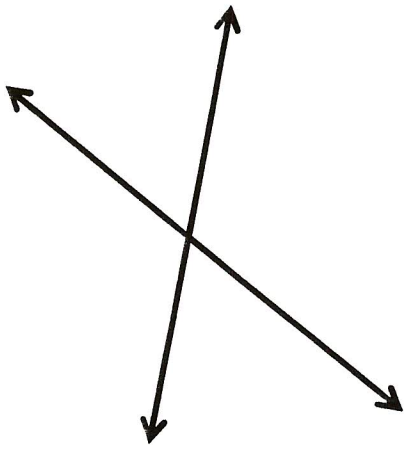
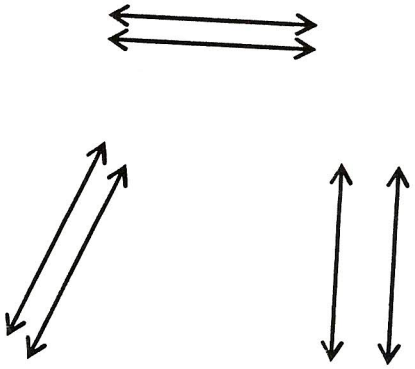
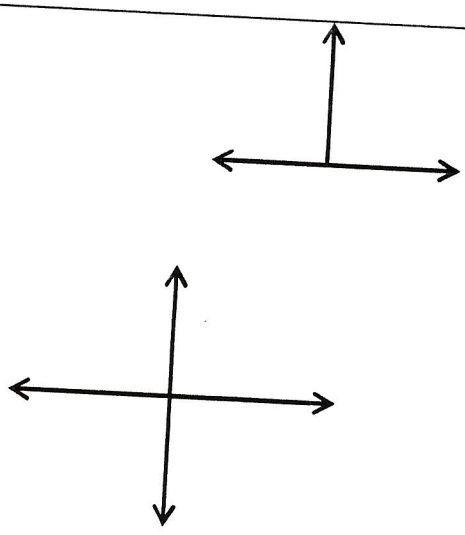
Point – A point is an exact location marked with a dot and a capital letter.

Ray – A ray is a line that has an endpoint and extends on forever in **one** direction

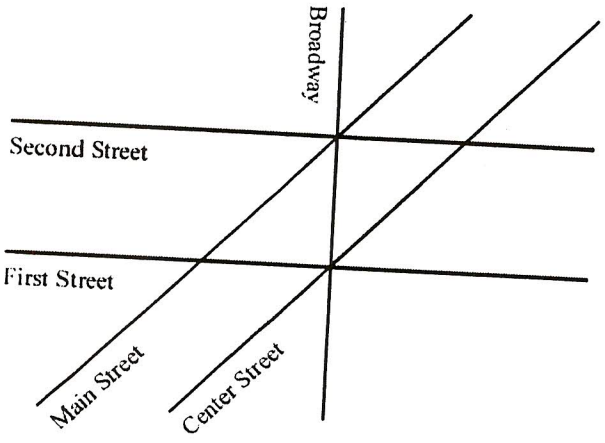
Line - A line is a straight path of points that never ends and goes on forever in **two** directions.

Types of Lines

Type	Example	Definition
Vertical Line		A **vertical** line goes straight up and down. *Think "y – axis"* *(y goes up to the sky.)*
Horizontal Line		A **horizontal** line goes from side to side, like the horizon. *Think "x – axis"*

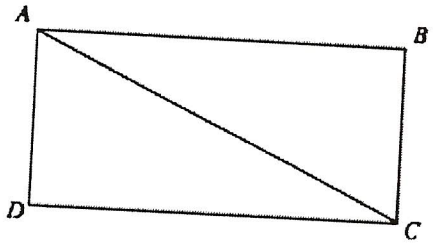
Type	Examples	Definition
Intersecting Lines		**Intersecting lines** are lines that cross each other. *Think of how streets cross each other at an intersection.*
Parallel Lines		**Parallel lines** are two lines that are *always* the same distance apart. They will *never* cross, or intersect, each other. *Think of railroad tracks.*
Perpendicular Lines		**Perpendicular lines** are two intersecting lines that meet to form a right angle (90°). *Think of a capital or lower case" t" or the sign for time-out in sports.*

1. Which street runs parallel to First Street?



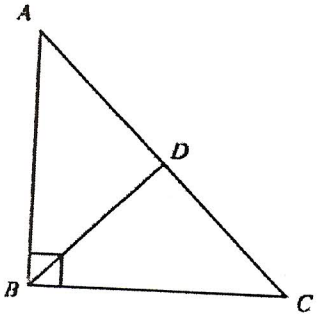
A. Broadway
B. Center Street
C. Second Street
D. Main Street

2. Which side of rectangle ABCD is parallel to $\overline{AB}$?



A. $\overline{BC}$
B. $\overline{CD}$
C. $\overline{AD}$
D. $\overline{AC}$

3. Which side of triangle ABC is perpendicular to $\overline{AB}$?



A. $\overline{BD}$
B. $\overline{AD}$
C. $\overline{BC}$
D. $\overline{DC}$

4. Which illustration shows perpendicular lines?

A. 

B. 

C. 

D. 

Parallel Lines

Draw a pair of parallel lines below using a ruler. *Your lines must be straight.*

Perpendicular Lines

Draw a pair of perpendicular lines below using a ruler. *Your lines must be straight.*

Intersecting Lines

Draw a pair of intersecting lines below using a ruler. <u>They should not be perpendicular lines.</u> *Your lines must be straight.*

Right Angle

Draw two <u>rays</u> that form a right angle. *Your lines must be straight.*