

2019-2020 M.A.T.H. Bowl Coaches Webinar

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Description of the Elementary M.A.T.H. Competition

- The competition will be made up of **four rounds with three different team members competing in each round**. Each round shall consist of eight multiple-choice questions. The competition will be based on The National Council of Teachers of Mathematics publication Curriculum and Evaluation Standards for School Mathematics. This includes thirteen curriculum standards.
- **Teams** - Teams are composed ideally of twelve members. Eight others may be used as alternates. There is no limit of how many students may come from any one grade level. A student may only participate in one round. At the end of the fourth question, one or two members of the squad may substitute for students at the table.
- **Eligibility** - All full-time students in grades 4-5 (6 where appropriate) are eligible to compete. Within these constraints, schools may select their teams in any manner and with any additional criteria they choose.
- **Format** - The competition will consist of four rounds with each round consisting of eight multiple-choice questions which will be read to the students and projected on the screen simultaneously. After consulting with the other team members at the table, the team captain will answer each question by circling the chosen response on the answer sheet. At the conclusion of the allotted time, (30, 45 or 60 seconds) the proctor will grade each response before the next question is read.



Elementary M.A.T.H. Contest

2020 Competition Timeline

Academic Coach of the Year Nomination form due	8/28/19
Practice Questions Posted on web site	January
Entry Form Due to IASP Office	1/31/20
Team Roster Form posted on www.iasp.org	2/24/20
Host Site Assignments posted on www.iasp.org	3/2/20
Invitational Weeks	3/2-3/14/20
Team Roster Form Due	3/15/20
Invitational Questions posted on www.iasp.org	3/30/20
Contest (5 pm start time)	4/14/20
Results posted on www.iasp.org	4/15/20
MATH Rules Meeting	TBA

The 2019-2020 Membership Participation Form is available online includes information to help schools enter the correct class. Each school will want to read the instructions carefully when completing the form, but the quick version looks like this:

Blue Class: Teams that include 6th graders, 187 Eligible Students and up

Green Class: Teams that include 6th graders, 186 Eligible Students or fewer

Orange Class: Teams that do not include 6th graders, 163 Eligible Students and up

Red Class: Teams that do not include 6th graders, 162 Eligible Students or fewer

Yellow Class: Teams Including ONLY 4th graders, regardless of size of school

- Over 520 teams as of December 10th
- A Confirmation list is posted on the M.A.T.H. Bowl website for coaches to check for correct class registrations for their teams.
- **M.A.T.H. Bowl Host Site Assignments** - Host site assignments for all teams will be listed on the M.A.T.H. Bowl Confirmation Page March 2, 2020.
- **M.A.T.H. Bowl Invitationals** - A list of invitationals will be kept on the M.A.T.H. Bowl page. These are not required, but may be attended as a means of practice for your team.
- [*NCTM Position Statement on calculator use in elementary school*](#)

Coaches Handbook

2020 Math Coach Handbook - The M.A.T.H. Bowl Coach Handbook contains all rules and instructions for your 2020 team and can be found on the M.A.T.H. Bowl website.

MATH ACADEMIC TEAMS FOR HOOSIERS - Student Answer Sheet

SCHOOL NAME _____ ROUND # _____ (1, 2, 3, or 4)

SQUAD MEMBERS: Captain _____ 2. _____

3. _____ 4. _____ 5. _____

(Alternate)

(Alternate)

SCORE SHEET: Circle the correct answer.

1. A B C D
2. A B C D
3. A B C D
4. A B C D

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

Students - Each question will have a designated time limit. After the emcee reads the question, circle the letter of the correct answer.

Proctor - Place a mark (+) in the left margin of a correct answer. Draw a horizontal line (A to D) to indicate an incorrect answer.

Record Previous Round Score _____ (This will be the same # as showing on the flip chart.)

Squad Score (Perfect Score = 8)

Grand Total After This Round (This should now be the new Flip Chart Score.)

Signify that the above score is correct: _____
(Proctor's signature) (Team Captain's signature)

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Electronic Scoring

An electronic scoring system will be utilized this year for the first time. This was rolled out to all contests beginning with the Spell Bowl contests in the fall. We received great reviews of the process. Students will continue to answer on a paper scoresheet, then the proctor will grade as normal, then enter the student answer into the electronic system. IASP will be able to see teams progress through the contest live, and IASP will be able to post scores much faster.

2020 Contest Standards

The Process Standards with Number Sense and Computation will be used every year. The other standards rotate on a 3-year cycle to provide a sharper focus each year.

THE STANDARDS TO BE UTILIZED IN 2020 WILL BE the Process Standards with Number Sense, Computation, and Data Analysis and Probability.

In 2020, the focus is Data Analysis and Probability.

In 2021 the focus will be Algebraic Thinking.

In 2022 the focus will be Geometry and Measurement.

2020 Contest Standards

- **All** Standards in grades K-4 are assumed mastered by contestants in grades 4-6 and thus those topics are fair game every year.
- Standards in grades 5-6 are grade level minimums. The focus applies here.
- Grade 7 Standards are used to challenge contestants and provide differentiation in scores at the top level for awarding of prizes. The focus here is further restricted and discussed in the Coaches Webinar.
- Contest questions are great for developing high expectations for all students, helping us improve instruction and learning.
[What does it mean to teach mathematics with high expectations?](#)

Practice Questions

MATH Bowl Practice Questions - The 2020 MATH Bowl competition will be using the same standards used for the 2008, 2011, 2014 and 2017 competitions. Instead of writing new practice questions for 2020, we will make available the questions used for those past competitions. By studying these questions with their teams, coaches can get a good picture of what the 2020 questions will be like. Questions will be posted on the M.A.T.H. Bowl page.

Each year we may focus on something special and that focus is in this presentation for 2020. So these questions are guides but may not contain all included this year and most likely has things not covered this year.

Calculators

Students may use almost any algebraic functioning calculator except the following: "hand-held" minicomputers, cell phones or laptop computers; pocket organizers; calculators with typewriter-style keypads; calculators with paper tape or printers; calculators that talk or make other noise; any device with internet access, or calculators that require an external power source, such as an electrical outlet. Any calculator with a memory must have the memory cleared before the competition. Solar-powered calculators with a battery back-up will be acceptable. Solar-powered calculators without battery back-up may be used at the student's own risk since lighting may be dim to allow better visibility of the screens. Students are expected to bring their own calculators. Fraction capable calculators are recommended. Unacceptable calculators will be held by an official until the end of the competition.



Calculators

Some problems require computations that would take elementary students a long time. They should know how to use their calculators to perform those computations quickly.

$$6\frac{3}{7} + 17\frac{3}{25} - 4\frac{2}{3} = 18\frac{463}{525}$$



$$25 \times 4.8(3.1 + 5) = 432$$

Calculators

They should also know that many problems are faster without a calculator.

$8 \times \$0.25 + 4 \times \0.25 is 12 quarters or \$3.00

$$2\frac{3}{6} + 12\frac{3}{24} = 14\frac{15}{24}$$

Please avoid cheap calculators that don't use order of operations.

$$10 - 2 \times 3 = 4 \text{ (not 24)}$$



Videos to help coaches

MATH Bowl Coaching Videos

Indiana State University has assembled two sets of videos, designed to help MATH Bowl Coaches. The first series is geared toward giving tips about coaching the contest, and stars the MATH Bowl Coach from Northwestern Elementary School, Jan Koloszar! Jan does a great job of sharing her successful system. The second set of videos discusses ways to teach the concept of “probability”, and may spark some ideas in both new and experienced coaches. Although the Topic Videos were created specifically for the 2011 Competition, they fit this year’s topics too.

Contest Curriculum

The previous contest sample questions are the best guides. Be sure all team members get to study all those questions and then work on the topics that they have trouble with. The questions come from the same question writers and the writers use the past contests to structure the new contest. Some special topics will change but those will be addressed in this webinar.

MATH Curriculum

The following information is meant to guide coaches in finding activities that teach the curriculum. We've looked at the actual questions written by the question writers so that those using this presentation will have a good focus. Because this is a contest for the best students, material comes from Standards for grades 4-7.

2020 Topic List – Prior Knowledge Needed

1 foot = 12 inches

16 ounces = 1 pound

Simple elapsed time, given start and end times

Follow directions to change units of measurement

Standard form \leftrightarrow numerical \leftrightarrow words

Place value, reading & writing numbers

Perimeter – distance around

2020 Topic List – General arithmetic

Order of operations

Compare integers, fractions, decimals with $<$, $>$, \leq , \geq , \neq

Absolute value – distance from zero

Simplify exponents – repeated multiplication

Basic arithmetic – integers, fractions, decimals

Prime & composite, prime factorization

Percent problems

Discount, markup, sales tax, percent of increase or decrease

2020 Topic List – Graph topics – can usually only read data from them in a contest but constructing them teaches concepts best

Bar Graphs - read and compare values

Line plot – read data, range, mode

Stem and Leaf – compute mean, median, more, range

Double Stem and Leaf – stem is between 2 sets of data

Box plot – shows least, greatest, and quartiles

Venn Diagrams – two overlapping sets

Using a table to make predictions

Data Analysis

- Mean, median, mode, range
- Line plot
- Stem-and-Leaf plots
- Box-and-whisker plots with quartiles
- Percent is part of whole (100%), percent of loss or gain (markup)
- Venn Diagrams – 2 overlapping groups

2020 Topic List – Probability

Basic probability – favorable / all possible events

Odds – favorable / unfavorable

Predictions based on past events, Spinners, dice, coins

Complement – probability of event not happening

Dependent and Independent events

Prob(independent events) = product of events

Dependent events – problems with replacement

Combinations – choose members for positions

Probability

- Definition probability
- Ratios and proportions
- Counting principle
- Finding simple probability
- Combinations and permutations though not using the formal terms
- Expected outcome of repeated experiment
- Difference between with and without replacement

2020 Topic List – Statistics

Range – difference in largest and smallest

Median – middle in ordered list of data

Mean – average

Mode – occurs most often

Quartiles – median plus median of upper half and median of lower half of a data set

Process (Problem Solving) & Computation

- Consumer purchases: Total Cost of multiple items, discounts
- Prime, composite, and prime factorization
- Simplify exponents like 4^3 , 6^2 , 10^5
- Equivalent ratios
- Next term in sequences involving mixed numbers
- Recipe adjustments
- Extraneous data is sometimes given, other needed data assumed known

Process (Problem Solving) & Computation

- Ordering of decimals & fractions
- Fraction (vertical and slanted bars) and decimal arithmetic
- Order of operations with squares, parentheses
- Fractions of something that add to one whole
- Sequences & patterns
- Input & Output patterns – one operation

2020 Topic List – More advanced hints

Fibonacci Numbers – 0, 1, 1, 2, 3, 5 ... each is sum of previous two

Sequences – arithmetic: add the same number to get next term

- harder if every other term has separate rule

Logic Tables help sort hints

Recipes are good practice and fun to make for practice

Games with spinners, coins, and dice great for learning probability

Money problems are everywhere

It's a factorial

Sum of consecutive numbers – Gauss' formula $n(n+1)/2$

Work backward from answers

Answer not given or not possible, too little data

Be familiar with Yahtzee game

Coach Practice Resources

The following slides contain several resources that you can use to practice with your teams. These are not the only resources, but ones that our question writing team has found to be very helpful.

Great Order of Operations practice

delete????

SpeedMath Deluxe

Welcome to SpeedMath Deluxe!

The goal of SpeedMath Deluxe is to create an equation, as quickly as possible, from the four digits the computer gives you. You can use addition, subtraction, multiplication and division to create your equation, but you are not allowed to rearrange the digits. Make certain that you remember the [order of operations!](#)

You are allowed to select the following:

Type of Game - Choose **Single Player** to practice SpeedMath Deluxe. Choose **Tournament Play** if you want to challenge your classmates!

Length of Game - Single players can choose games consisting of 5, 10 or 15 questions. All tournaments are 10 questions long.

[SpeedMath - Addition and Subtraction](#), [SpeedMath - Multiply and Divide](#) and [SpeedMath - Inequalities](#) are also available.

Type of Game

Single Player Tournament Play

Length of Game

5 10 15

I'm ready! Let's start!

Two Dice Sums

Two-Dice Sums (Grades 1–8)

Math concepts: Students of all ages can play this game, as long as they're able to add the numbers that come up on two dice. While younger children benefit from the practice of adding, older students have the opportunity to think about the probability of the sums from rolling two dice.

The object: to remove all the counters in the fewest rolls possible.

How to play: Two or more players can play. Each player needs 11 counters, a game strip that lists the numbers from 2 to 12 spaced far enough apart so the counters can fit on top of each number, and a recording sheet. Here are the rules for playing:

1. Each player arranges 11 counters on the game strip and records the arrangement.
2. Once the counters are arranged, players take turns rolling the dice.
3. For each roll, all players can remove one counter if it is on the sum rolled. Players keep track of the number of rolls of the dice it takes to clear their game board.

After students have had the chance to play the game for several days or so, have a class discussion about the different ways they arranged the counters and the number of rolls it took. Have them write about the arrangements that are best for removing the counters in the fewest number of rolls. For an extension, try Which Number Wins?

Although tossing the dice give random numbers, the sums are not all equally likely.

<http://www.aaamath.com/dec71cx2.htm>

Percent to Fraction example

- **Teachers - AAA Math in the Classroom**
- AAA Math Provides unlimited drills on many arithmetic topics.
- It is available on the internet for student use at home.
- AAA Math provides teachers with a valuable supplementary tool for helping students master arithmetic skills.
- It frees class time for hands on activities and exploring why and how math works.
- Each lesson is independent and can be integrated into any curriculum.
- AAA Math helps students improve scores on standardized tests.
- It allows students to work at their own level and pace.
- Timed practice and challenge games increase speed, accuracy and confidence.
- Immediate non-threatening feedback prevents practicing incorrect methods.
- Skills that have not been mastered can be reviewed easily.
- AAA Math helps build confidence, speed and accuracy on basic arithmetic drills.

[NCTM Illuminations fraction activity](#)

Must be a NCTM member for game to work.

Tap the deck to turn over a fraction card.



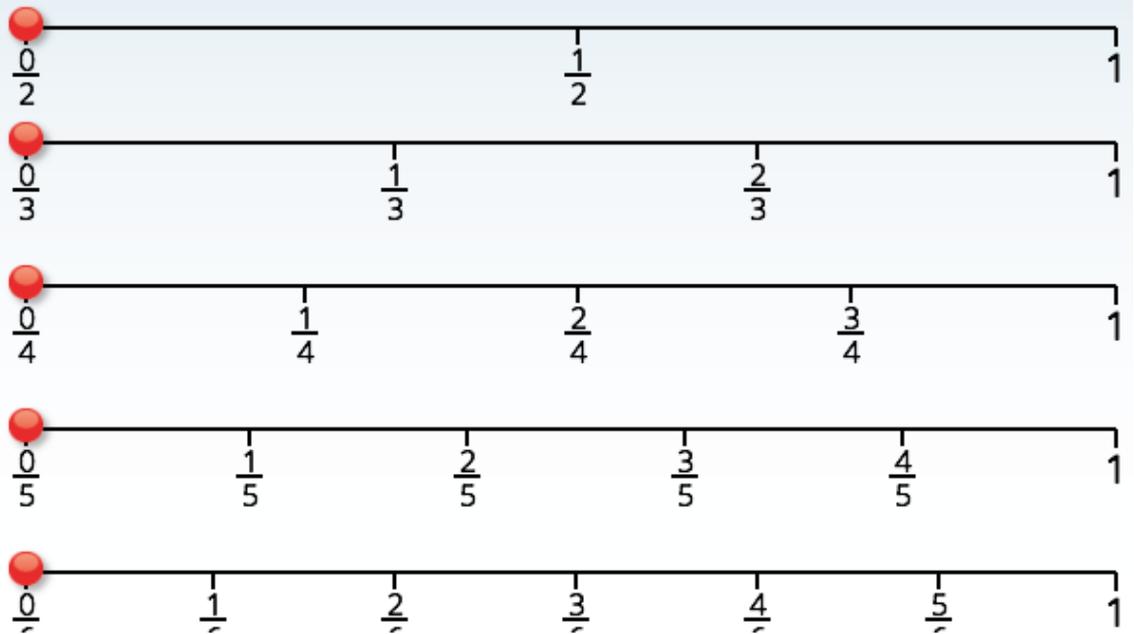
New Game



The object of the game is to get all of the markers to the right side of the game board, using as few cards as possible.



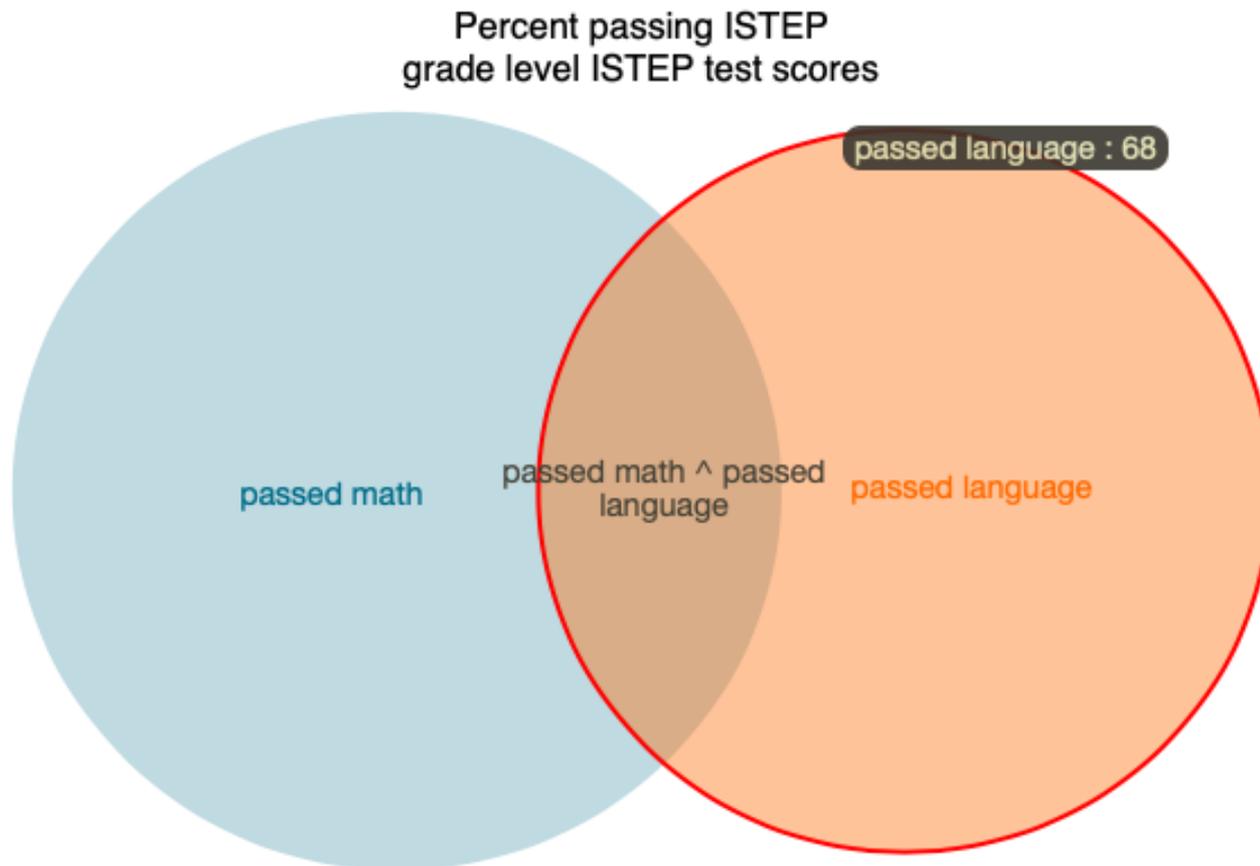
Cards Played: 0



Analyze Data with Graphs

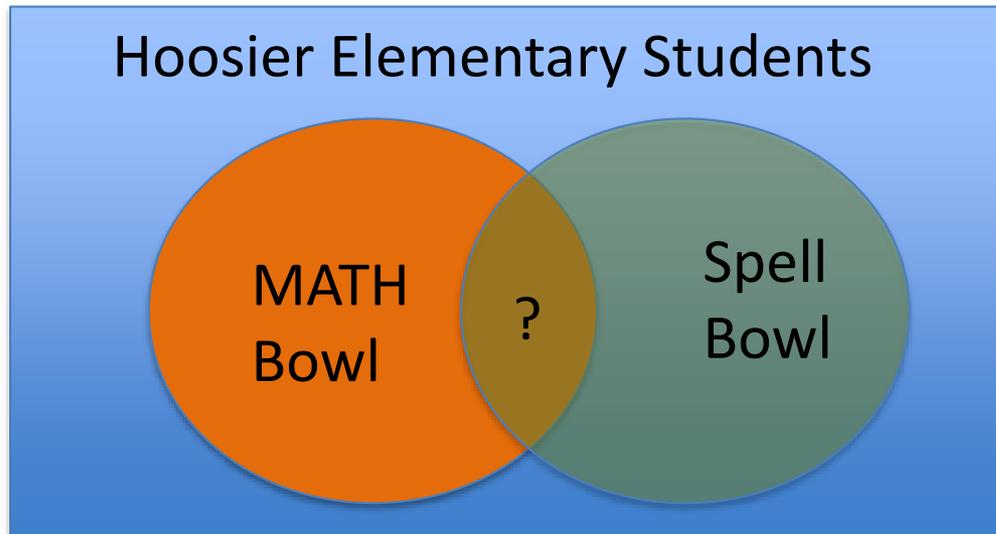
<https://www.meta-chart.com>

This is a Visualization App for creating all kinds of charts.
Design your own graphs and analyze the data.



Venn Diagrams

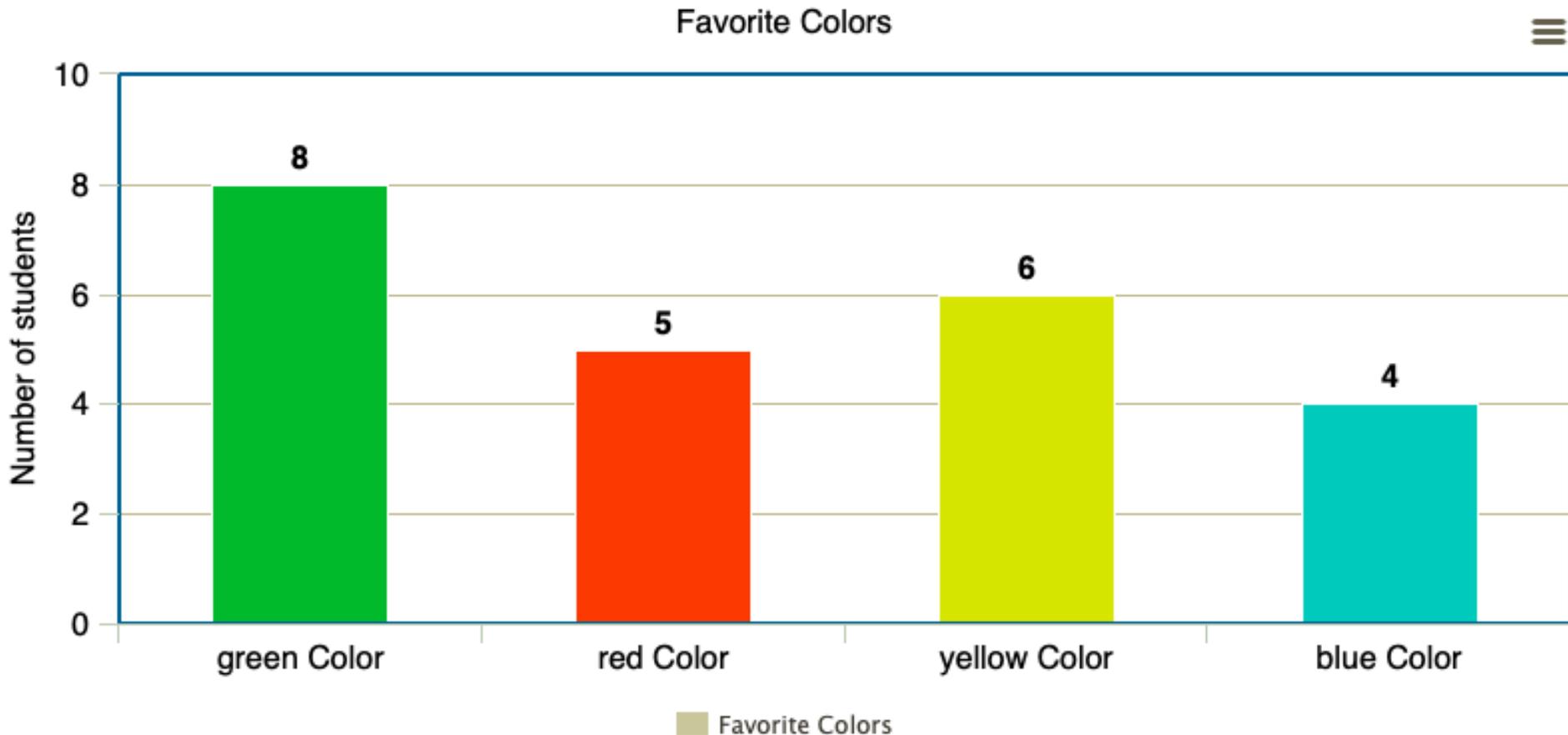
Problems giving numbers of objects in 2 overlapping sets can be solved with a Venn Diagram. The problems in this contest can be solved with guess and check as well but Venn Diagrams are fun to draw.



Analyze Data with Graphs

<https://www.meta-chart.com>

This is a Visualization App for creating all kinds of charts. Design your own graphs and analyze the data.



Stem and Leaf Plots

Great teaching video at:

http://www.mathplayground.com/howto_stemleaf.html

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

Box-and-Whisker Plots

Students learn to make a box-and-whisker plot for a given data set using the following steps. First, write the data set in order from least to greatest. Next, find the second quartile, which is the median for the entire data set. Next, find the first quartile, which is the median for the lower half of the data set, and find the third quartile, which is the median for the upper half of the data set. Next, find the least and greatest numbers in the data set. Next, draw a number line with vertical lines at the first, second, and third quartiles, and connect the endpoints of the vertical lines to make a "box". Next, plot the least number in the data set and connect it to the box with a segment, and plot the greatest number in the data set and connect it to the box with a segment, to make "whiskers".

Box-and-Whisker Plots

Know the terms
and be able to
find:

Minimum

Maximum

First quartile

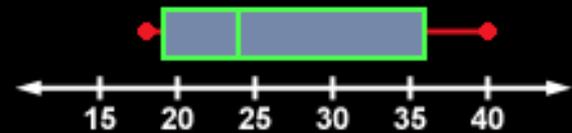
Second quartile

Third quartile

Draw a box-and-whisker plot for the following data.

18, 18, 19, 23, 24, 24, 26, 35, 36, 40, 40

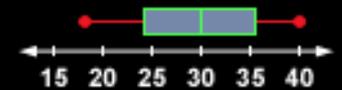
Least Number First Quartile Second Quartile Third Quartile Greatest Number



A.



C.



B.



D.



1

2

3

4

5

SCORE

✓ ✓ ○ ○ ○

A

B

C

D

WORK

RESET

Line Plots

Least
Greatest
Range
Mode

Homepage > 5th Grade Math >

Pictographs and Line Plots

58

of 59



[Already know this lesson?](#)

Instruction

Practice

Bonus

Test



1

2

3

[Worksheet](#)

[Notes](#)

[Worksheet Solutions](#)

▼ Guide

Use the numbered buttons to watch the videos, then use the PRACTICE, BONUS, and TEST tabs to go through the rest of the lesson (if available).

line plot for the following data set, and find the most common number and the range of the data set.

29, 32, 28, 32, 29, 28, 27, 28



Logic Puzzles Using a table

Four kids went to a very unusual pet store. Each child picked out a different animal to take home. Can you match the child with his or her new friend?

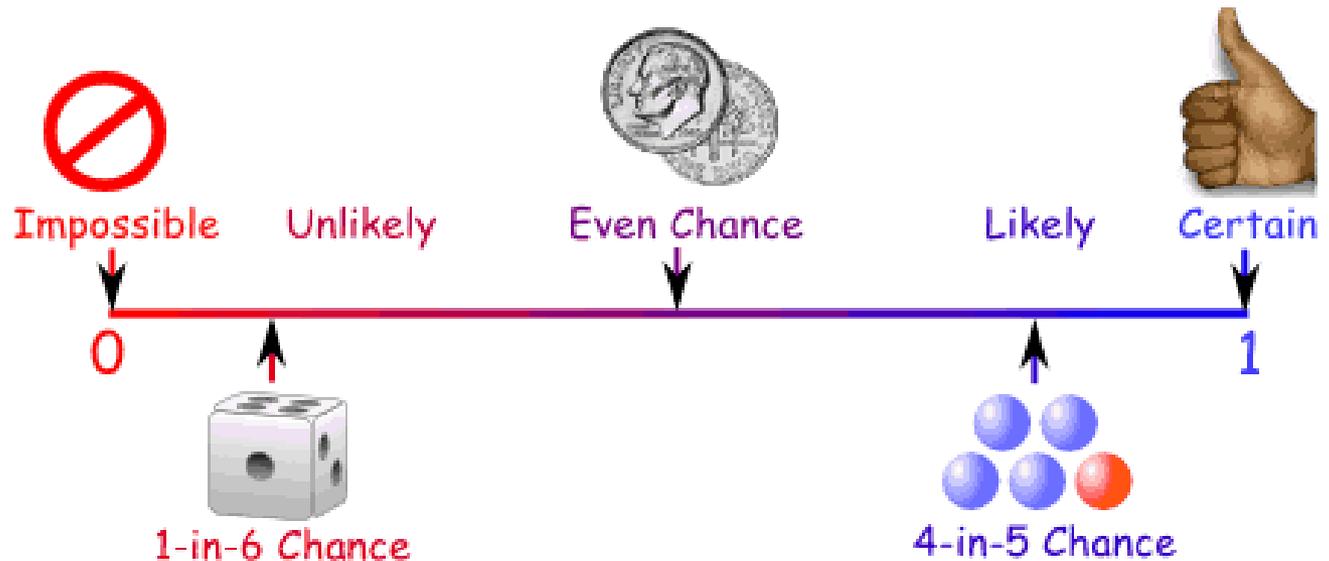
	Unicorn	Sea Serpent	Manatee	Dragon
Dan				
Sarah				
Melody				
Uli				

1. No child has a pet that starts with the same letter as his or her name.
2. Dan doesn't have a pet that lives in the water.
3. Melody is allergic to smoke.
4. Sarah loves to fly.

<http://www.mathsisfun.com/data/probability.html>

Probability Line

You can show probability on a [Probability Line](#):



Probability is always between 0 and 1

Definitions, examples, and some practice problems for many topics.

http://www.mathgoodies.com/lessons/vol6/intro_probability.html

Definition	Example
An experiment is a situation involving chance or probability that leads to results called outcomes.	In the problem above, the experiment is spinning the spinner.
An outcome is the result of a single trial of an experiment.	The possible outcomes are landing on yellow, blue, green or red.
An event is one or more outcomes of an experiment.	One event of this experiment is landing on blue.
Probability is the measure of how likely an event is.	The probability of landing on blue is one fourth.

In order to measure probabilities, mathematicians have devised the following formula for finding the probability of an event.

Probability Of An Event

$$P(A) = \frac{\text{The Number Of Ways Event A Can Occur}}{\text{The total number Of Possible Outcomes}}$$

Definitions, examples, and some practice problems for many topics.

<http://www.mathsisfun.com/data/basic-counting-principle.html>

Basic counting principle

When there are **m** ways to do one thing,
and **n** ways to do another,
then there are **$m \times n$** ways of doing **both**.

So if I roll a 6-side dice then choose a letter from MATH, there are $6 \times 4 = 24$ possible events.

Gauss and $N(N+1)/2$

<https://betterexplained.com/articles/techniques-for-adding-the-numbers-1-to-100/>

Here are several ways to explain how to add consecutive numbers, including when we don't start with the number 1.

Problem Solving Checklist

https://static.bigideasmath.com/protected/content/mtp/mtp_four_step_plan.pdf

4-Step Plan

Problem Solving Strategies

- Make a Model
- Draw a Diagram
- Use a Venn Diagram
- Act It Out/Use Manipulatives
- Guess, Check, and Revise
- Break into Parts
- Solve a Simpler Problem
- Look for a Pattern
- Work Backward
- Make an Organized List or Table
- Write a Number Sentence
- Use Logical Reasoning

EXPLORE

1. What do you know?
2. What do the terms mean?
3. What do you need to find?

PLAN

1. Choose a strategy.
2. How do the facts relate to each other?
3. Estimate the answer.

SOLVE

1. Use your strategy to solve the problem.
2. Pay close attention to the details of the problem.
3. If the plan does not work, revise it or start over with a different plan.

CHECK

1. Does your answer make sense?
2. Is your answer close to your estimate?
3. Did you answer the question?

Adding consecutive numbers

Add all the numbers from 1 to 100

$$\begin{array}{rcccccccc} 1 & & 2 & 3 & \dots & & 98 & 99 & 100 \\ 100 & 99 & 98 & \dots & & & 3 & 2 & 1 \\ \hline 101 & 101 & 101 & \dots & & & 101 & 101 & 101 \end{array}$$

$100(101) = 10,100$ but that's twice the sum needed. Answer is 5,050.

KNOW: $n(n+1)/2$ gives sum from 1 to n

<https://www.mathcounts.org>

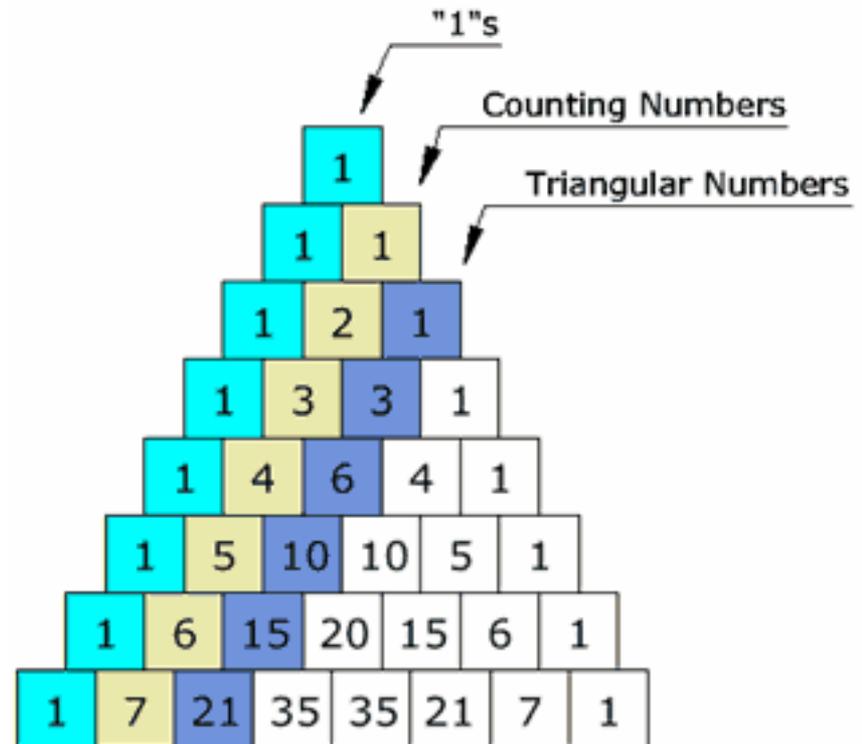
MathCounts is a national contest for students in grades 6-8. As a coach of eligible students, you can sign up to get the school handbook of 250 great questions for free. The problems are identified by standard. The information on problem solving strategies is great for teaching these skills.

<http://www.mathsisfun.com/pascals-triangle.html>

NOT in 2020 put left here for future reference or extra fun.

More than you knew existed about Pascal's Triangle and includes many other contest topics.

Patterns Within the Triangle



<http://www.tinkerplots.com/activities>

License for one computer \$7 for a year

Will run some things in preview mode

Lots of activities that would make a great team practice and teach the needed vocabulary and skills. Don't let up to grade 8 scare you.

See Who Has the Heaviest Backpacks?



1-877-ASK-ROSE
Toll-Free: 1-877-275-7673

Rose-Hulman Institute of Technology's Homework Hotline provides **FREE** math and science homework help to Indiana students.

- Tutors help students in grades 6-12.
- 7 p.m. - 10 p.m. (Eastern Time)
- Sunday - Thursday
- September - May

Call toll free at **1-877-ASK-ROSE**.

The program is funded by Lilly Endowment, Inc. and Rose-Hulman Institute of Technology.

Plus there are videos under Student Resources that are helpful.

<http://askrose.org/student-resources/>

Need More Help?

Middle school math textbooks, former team members, local MathCounts teams, other teachers, middle or high school math teachers, IASP staff, and **Google!**

Denise Buckingham at

denise.buckingham@comcast.net

812-275-2694 call or text