

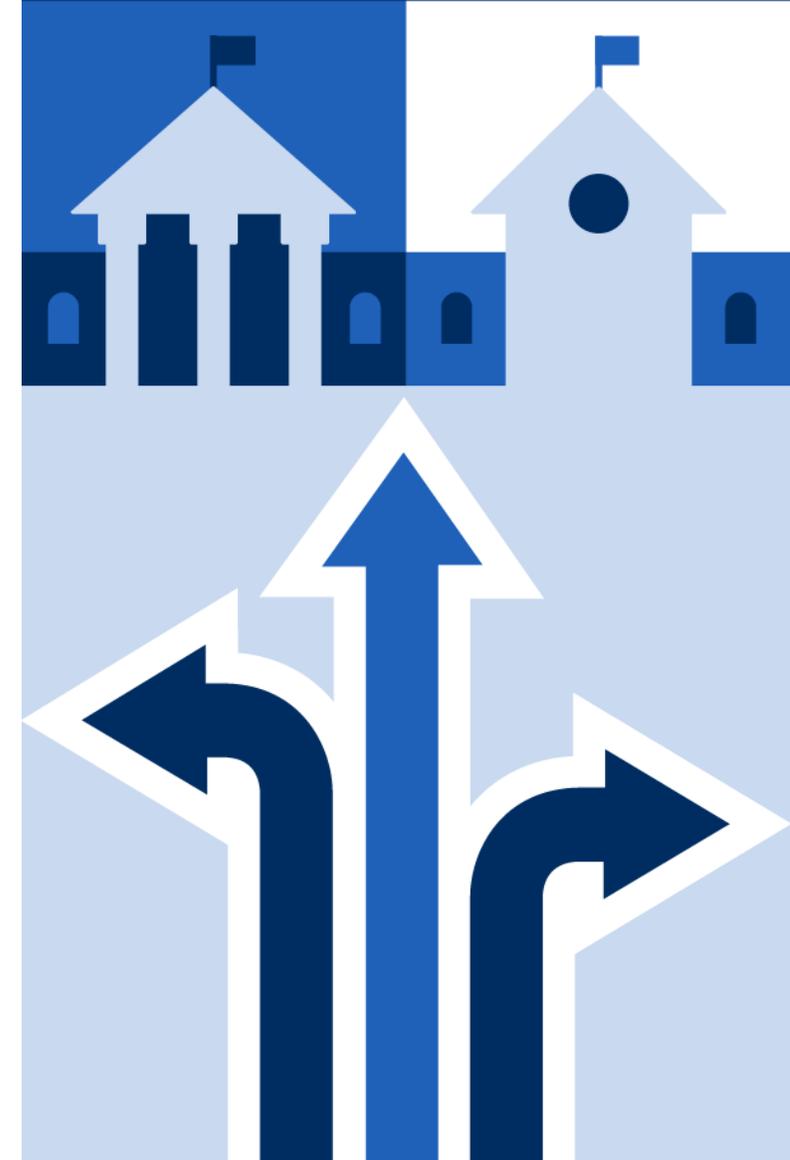
# STEM EXCHANGE



PRESENTED BY DOD STEM

Department of Defense  
**DoDSTEM**  
Science · Technology · Engineering · Mathematics

Session Focus:  
**PATHWAYS  
FOR ACCESS**



# **MATHCOUNTS & Math Contests**

**Leveraging MATHCOUNTS to Host  
Local Math Contests – A Fun and  
Meaningful Experience for Students  
and DoD STEM Lab Professionals**

**Kavi Dotson**

**Charles Fisher**

**NSWC Carderock Division**

**Kristen Chandler, CAE**

**Amanda Naar, PMP, CAE**

**MATHCOUNTS Foundation**

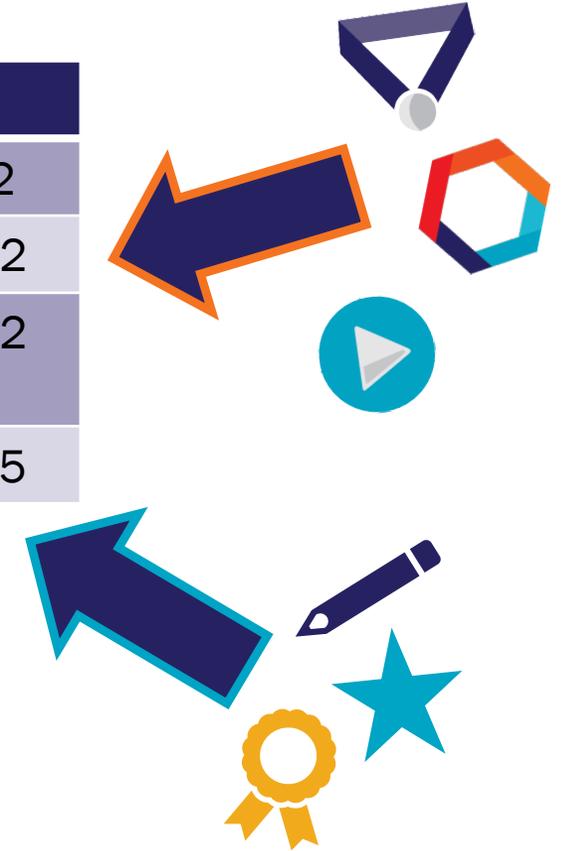
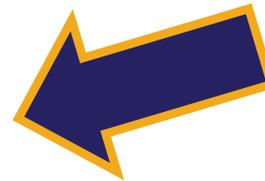


# Session Agenda

Topic	Speaker(s)	Time
Welcome	Kristen Chandler	08:30 – 08:32
Introduction to MATHCOUNTS	Kristen Chandler & Amanda Naar	08:32 – 08:42
Bringing MATHCOUNTS-Style Math Contests to Your DoD STEM Lab	Kavi Dotson & Charles Fisher	08:42 – 09:02
MATHCOUNTS Finale	Kavi Dotson & Charles Fisher	09:02 – 09:15

## Takeaways

- MATHCOUNTS resources and info
- [Guide A: Event Planning & Logistics](#)
- [Guide B: Engaging with Schools](#)
- [Guide C: Volunteer Recruitment](#)
- [Guide D: “Greatest Hits” of Activities](#)
- Contact info for requesting more math contests



# INTRODUCTION TO MATHCOUNTS

Just-for-Fun Team Round

Kristen Chandler & Amanda Naar  
MATHCOUNTS

The **MATHCOUNTS Competition Series** is the premier math competition for middle school students in the US.

With live events in **over 500 locations** every year, MATHCOUNTS is the **only** nationwide competition that brings together grades 6-8 students to compete **in person** in math.



# How It Works



**40K US middle schools** receive free math materials each fall

**80K-90K students** take part in 5000 school-based competitions hosted by teachers in Jan.



**25K-40K students** advance in Feb. to one of 500 chapter competitions

In Mar., state competitions are held in **56 states** and US territories



  
**224 stellar students** earn a trip to the National Competition in May...

...where **1 National Champion** is crowned during the live Countdown Round



# Just-for-Fun Team Round

- Work together in groups of 3-5.
- You'll have 4 minutes to answer 3 problems.
- We will keep time and give you a 1-minute warning.
- Pencils, scratch paper and test papers at your table.



# Answers

**1:** 11 paths

**2:** 277

**3:**  $4 \frac{1}{6}$

**4 (bonus):** 1 bird

## Deep Dive into Question 2

If  $3x + 155 = 272$ , then what is the value of  $3x + 160$ ?

**A common solution:** Solve for  $x$  and plug that value into  $3x + 160$ .

$$\begin{array}{r} 3x + 155 = 272 \\ -155 \quad -155 \\ \hline \end{array}$$

$$\frac{3x}{3} = \frac{117}{3}$$

$$x = 39$$

$$\begin{array}{r} 3x + 160 = \underline{\quad} \\ 3(39) + 160 \\ = \mathbf{277} \end{array}$$

**A MATHCOUNTS solution...**

$$160 - 155 = 5 \quad \curvearrowright$$
$$272 + 5 = \mathbf{277}$$

There is no need to solve for  $x$ . Because  $3x + 160$  is 5 more than  $3x + 155$ , the value of  $3x + 160$  is  $272 + 5 = \mathbf{277}$ .

# **BRINGING MATHCOUNTS- STYLE CONTESTS TO YOUR DOD STEM LAB**

Our Top 5 Picks for Event Planning Essentials

Kavi Dotson & Charles Fisher  
NSWC Carderock Division

# Successful MATHCOUNTS Events Require...

**A:** Solid logistics and planning. 

**B:** The right communications with participants. 

**C:** Volunteers to help run the event. 

**D:** Fun add-on activities. 

*We'll go over each of these in more detail with our picks for the "top 5" most important considerations and guides you can take with you today.*

# A: EVENT PLANNING & LOGISTICS

Guide A: Event Planning & Logistics

Kavi Dotson & Charles Fisher  
NSWC Carderock Division



## Event Planning & Logistics: Our Top 5

**1**

Get started on planning early!

**3**

Get buy-in from lab leadership early.

**5**

Leave as little as possible for the day of the event.

**2**

Understand access requirements for non-DoD guests.

**4**

Create processes to ensure everyone's safety.

*See Guide A: Event Planning & Logistics*

# **B: ENGAGING WITH SCHOOLS**

**Guide B: Engaging with Schools**

Kavi Dotson & Charles Fisher  
NSWC Carderock Division



## Engaging with Schools: Our Top 5

**1**

Reach out to multiple groups in a school, if possible. (Teachers are busy!)

**2**

Address concerns schools often have, from educational value to transportation.

**3**

Get started with comms early and check in often using a single source (ie: 1 email).

**4**

Provide a set of rules to schools so all are treated fairly and know what to expect.

**5**

Offer resources for practice.  
*(MATHCOUNTS can help!)*



See Guide B: Engaging with Schools

# **C: VOLUNTEER RECRUITMENT**

**Guide C: Volunteer Recruitment**

Kavi Dotson & Charles Fisher  
NSWC Carderock Division



## Volunteer Recruitment: Our Top 5

**1**

Ask early,  
communicate  
regularly,  
remind the day  
before.

**2**

Create value,  
not just work,  
for volunteers,  
including  
leaders.

**3**

Train volunteers  
on the most  
important  
processes and  
tasks.

**4**

Recruit enough  
volunteers,  
including a  
group to help  
from the start.

**5**

Ask for help from teachers, parents and other people coming  
to your event anyway.

*See Guide C: Volunteer Recruitment*

# D: FUN ADD-ON ACTIVITIES



Guide D: “Greatest Hits” of Activities

Kavi Dotson & Charles Fisher  
NSWC Carderock Division



## Fun Add-on Activities: Our Top 5

**1**

Give tours of the DoD lab!

**3**

Provide a hands-on math or engineering activity. (*MATHCOUNTS can help!*)

**5**

Rotate locations and activities.

**2**

Bring in a guest speaker to share their STEM story. (*DoD STEM can help!*)

**4**

Do prize drawings, trivia and smaller contests.

See Guide D: “Greatest Hits” of Activities

# MATHCOUNTS FINALE

Countdown Round

Kavi Dotson & Charles Fisher  
NSWC Carderock Division

# Countdown Round

- 4 volunteers will compete in head-to-head match-ups.
- 45 seconds to answer each problem.
- Buzz in once you know the answer but wait until the moderator finishes reading the question.
- The competitor with the most correct out of 5 questions wins the match-up and goes on to the next round.
- We'll do a bracket with 3 rounds to determine our winner!
- Pencils, scratch paper and buzzers are at the table.



**If a person enters a room with  
5 doorways, how many ways are  
there to leave through a  
different door?**

**ANSWER: 4 (ways)**

**What is the average of  
23, 25, 27, 29, 31?**

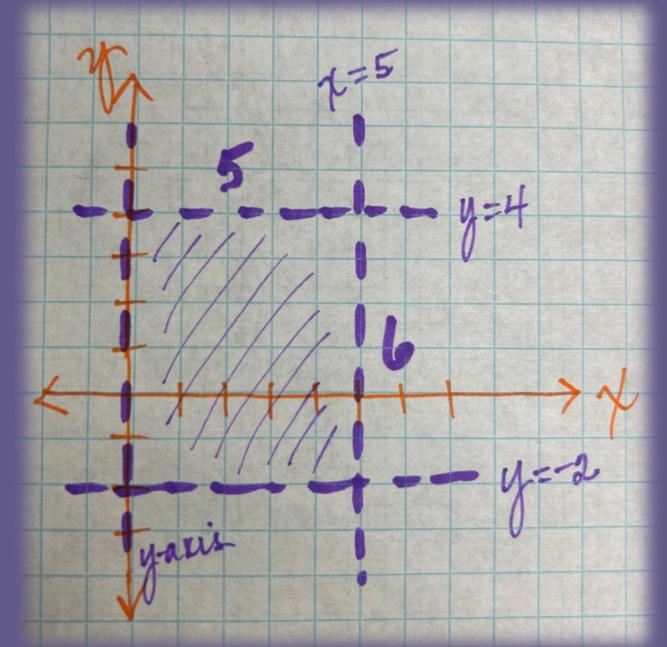
**ANSWER: 27**

$$(23 + 25 + 27 + 29 + 31) \div 5$$

$$135 \div 5$$

**or...could see that 27 is the middle term  
of what happens to be an arithmetic  
sequence**

**How many square units  
are in the area of the  
rectangular region  
bounded by the y-axis  
and the lines  
 $x = 5$ ,  $y = 4$  and  $y = -2$ ?**



**ANSWER: 30 (square units)**

**This creates a 5 by 6 rectangle with  
an area of  $5 \times 6 = 30$  square units.**

**If  $5x + 3 = 11$ , what is the  
value of  $5x + 9$ ?**

**ANSWER: 17**

**Similar to the Team Round question...**

**$5x + 9$  is 6 more than  $5x + 3$ .**

**If  $5x + 3 = 11$ , then  $5x + 9 = 11 + 6 = 17$**

**If  $x$  is an integer such that  $1 < x < 10$ , what is the greatest possible value of  $5x + 10$ ?**

**ANSWER: 55**

**We should pick  $x = 9$ , so**

$$**5x + 10 = 5(9) + 10 = 45 + 10 = 55**$$

**If 2 apples cost 60 cents,  
how many dollars will  
10 apples cost?**

**ANSWER: 3 (dollars)**

**What is the value of  $x$   
in the equation  
 $3^2 + 7 = 2^x$ ?**

**ANSWER: 4**

$$3^2 + 7 = 2^x$$

$$9 + 7 = 2^x$$

$$16 = 2^x$$

$$16 = 2 \times 2 \times 2 \times 2 = 2^4$$

**What is the greatest possible sum (addition) of two consecutive integers whose product (multiplication) is less than 400?**

**ANSWER: 39**

**Since  $20 \times 20 = 400$ , we should pick  
19 and 20 as our integers and their  
sum (addition) is  $19 + 20 = 39$ .**

**What is 10% of 50% of 80?**

**ANSWER: 4**

**10% of 50% of 80**

**10% of 40**

**4**

**Bobbi wants to make a profit of at least \$500 by holding a raffle. If each raffle ticket is to cost \$3 and the total expenses will be \$100, what is the fewest tickets that must be sold?**

**ANSWER: 200 (tickets)**

$$(x \text{ tickets})(\$3) = \$500 + \$100$$

$$(x \text{ tickets})(\$3) = \$600$$

$$x = 200 \text{ tickets}$$

**A bus leaves school with 48 kids on board. One-half of the kids on the bus get off the bus at each of the first three stops. How many students remain on the bus after the third stop?**

**ANSWER: 6 (kids)**

**48 kids start**

**24 remain after the 1<sup>st</sup> stop**

**12 remain after the 2<sup>nd</sup> stop**

**6 remain after the 3<sup>rd</sup> stop**

**Store A sells 21 pencils for \$1.50; Store B sells 5 pencils for \$0.85; and Store C sells 7 pencils for \$1.20. At which of store is the average cost per pencil the least?**

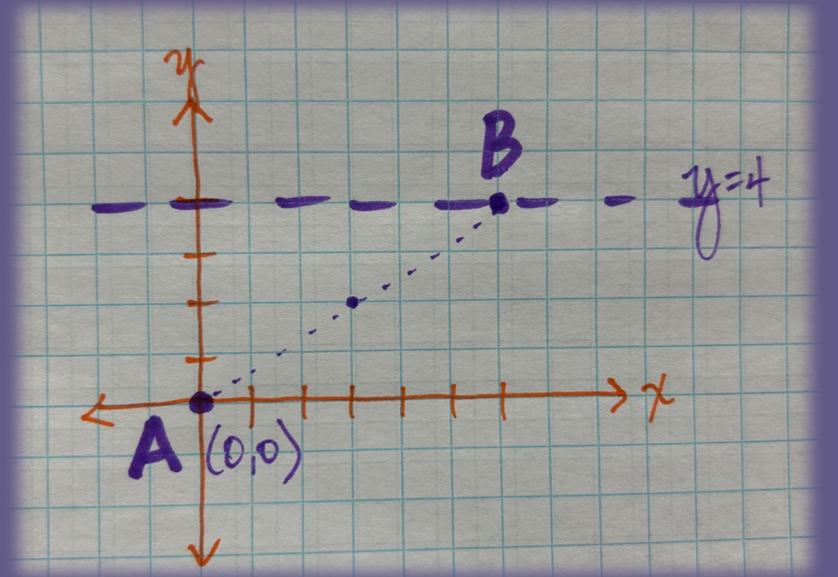
**ANSWER: (Store) A**

**A:  $\$1.50/21$  is less than 10 cents each**

**B:  $\$0.85/5$  is 17 cents each**

**C:  $\$1.20/7$  is close to 20 cents each**

Point A is at  $(0, 0)$  and  
Point B is on the line  
 $y = 4$ . The slope of  
segment AB is  $\frac{2}{3}$ .  
What is the sum of  
the  $x$ - and  $y$ -  
coordinates of B?



**ANSWER: 10**

**Point B is at (6, 4) and  $6 + 4 = 10$ .**

**Using two distinct members of the set  $\{0, 1, 2, 3, 4\}$ , how many different sums can be attained?**

**ANSWER: 7 (sums)**

**The numbers can be paired in 20 different ways, but only the sums 1, 2, 3, 4, 5, 6 and 7 are possible.**

If  $a \$ b = a^2 + b^2$ , then

$$3 \$ 4 = 3^2 + 4^2$$

$$= 9 + 16$$

$$= 25$$

What is the value of  $0 \$ 5$ ?

**ANSWER: 25**

$$0 \$ 5 = 0^2 + 5^2$$

$$0 \$ 5 = 0 + 25$$

$$0 \$ 5 = 25$$

**A drawer contains 120 socks.  
Each sock is one of four colors.  
What is the minimum number of  
socks that must be drawn at  
random to guarantee two socks  
of the same color are drawn?**

**ANSWER: 5 (socks)**

**The value of  
8 nickels and 6 dimes  
is the same as  
4 nickels and how many dimes?**

**ANSWER: 8 (dimes)**

**8 nickels + 6 dimes = \$0.40 + \$0.60 = \$1.00**

**4 nickels + ? dimes = \$1.00**

**\$0.20 + \_\_\_ = \$1.00**

**the missing \$0.80 is 8 dimes**

**What is the sum of the two positive integers that have a product of 36 and a difference of 5?**

**ANSWER: 13**

**Many pairs of integers multiply to 36.**

**1 & 36    2 & 18    3 & 12    4 & 9    6 & 6**

**Only 4 & 9 have a difference of 5.**

**The sum of 4 & 9 is 13.**

**When Jen bought a new car, she bought 5 tires, although the car had only 4 wheels. The tires were rotated so that when the car had been driven 50,000 miles, each tire had equal mileage. For how many miles was each tire used?**

**ANSWER: 40,000 (miles)**

**The car went 50,000 miles and had  
4 tires at all times, so that is  
 $4 \times 50,000 = 200,000$  total tire miles.**

**Split evenly between 5 tires is  
 $200,000 \div 5 = 40,000$  miles per tire.**

**A circular region of radius  
2 units is completely inside a  
circular region of radius 5 units.**

**What percent of the larger  
region is occupied by the  
smaller region?**

**(area of a circle =  $\pi r^2$ )**

**ANSWER: 16 (percent)**

**area of a circle =  $\pi r^2$**

**big circle =  $25\pi$  ; little circle =  $4\pi$**

**$4\pi / 25\pi = 4/25 = 16/100 = 16\%$**

# Contact Us!

Name	Organization	Can send you...	Contact Info
Kristen Chandler, CAE	MATHCOUNTS	Math practice resources, ready-made engineering/math activities	kristen@mathcounts.org (703) 299-9006 x107
Amanda Naar, PMP, CAE	MATHCOUNTS	Math practice resources, ready-made engineering/math activities	amanda@mathcounts.org (703) 299-9006 x105
Kavi Dotson	NSWC Carderock Division	Pre-written math contests, DoD lab activity ideas	charles.r.fisher73.civ@us.navy.mil (301) 227-4969
Charles Fisher	NSWC Carderock Division	Pre-written math contests, DoD lab activity ideas	kavi.s.dotson.civ@us.navy.mil (301) 227-1797

**Go to [mathcounts.org/stemexchange](https://mathcounts.org/stemexchange)**

for Guides A-D, this slide deck, PDFs of the MATHCOUNTS materials shared today and links to more resources!