

LEVEL 8

FUNBOOK

There's **Power** In Numbers

stjude.org/math



St. Jude patient
Harmony



St. Jude
Math-A-Thon

Welcome to The St. Jude Math-A-Thon®!

Thank you for supporting St. Jude Children's Research Hospital®. Because of fundraising programs like St. Jude Math-A-Thon and supporters like you, St. Jude is leading the way the world understands, treats and defeats childhood cancer and other life-threatening diseases. You're an important part of making this fundraiser a success, and participation is easy:

- 1** Raise money online using the tools available at **stjude.org/math**
- 2** Complete the math worksheets in this workbook
- 3** Earn cool prizes!

St. Jude patient
Harmony

Meet Harmony

Harmony honed her debate skills at school where she would walk back and forth to classes. It was on these walks where the first signs that something might be wrong first appeared: Harmony was having to sit down for multiple breaks and was short of breath, nauseated and in pain. The official diagnosis, Wilms tumor, came at St. Jude Children's Research Hospital®, but so did immediate support. Harmony underwent surgery to remove the tumor, her left kidney and the affected lymph node. Her treatment plan also includes radiation therapy and chemotherapy. "To see her be as resilient as she is, I mean, it's amazing. I'm just proud every single day, every single day," said her mom, Ashley.



How Math Helps St. Jude

Math is used every day on the St. Jude campus. From careful measurements for patient medicine to the complex mathematics needed in our state-of-the-art research facilities, numbers play an important role in helping our patients. As you complete each worksheet, know that you're sharpening important skills that are used every day to help the kids of St. Jude.



- Since opening, St. Jude has helped push the overall cancer survival rate from 20% to more than 80%. Using your math skills, you notice that means St. Jude is 20% away from totally beating cancer. We won't stop until no child dies from cancer!
- More than 75% of our operating costs come from generous donors. That means more than half of our needs are met thanks to people like you and your family—thank you!
- Most of our patients are treated as outpatients and stay in one of our three housing facilities. We use math to keep track of our nearly 300 rooms specifically designed and managed by us for families of children with cancer and other diseases.

Ready to Sign Up?

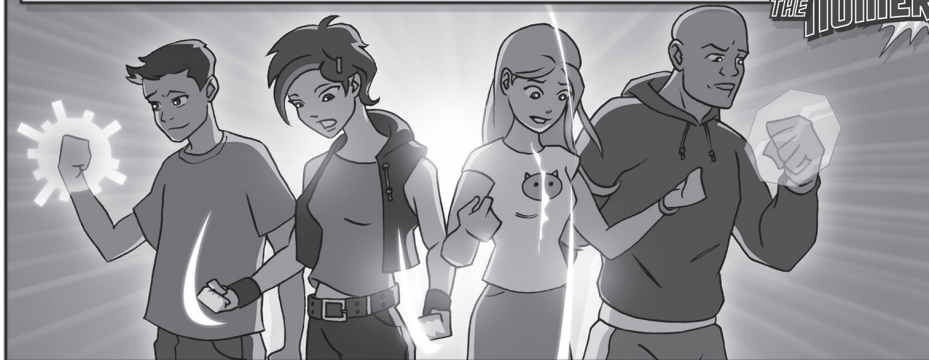
St. Jude relies on the power in numbers. Math plays a vital role in nearly every aspect of our campus, but the strength in numbers is never more powerful than when it helps our patients. That's where you come in—turn to the back page of your funbook to start the sign up process. You can even have your parents scan the QR code and sign up online.

St. Jude patient
Eli

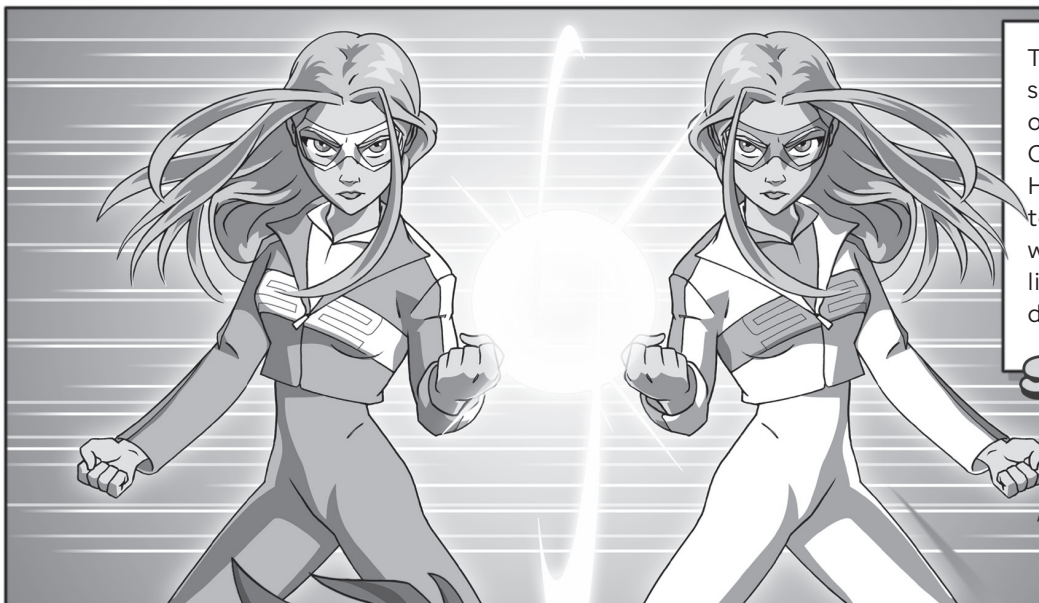
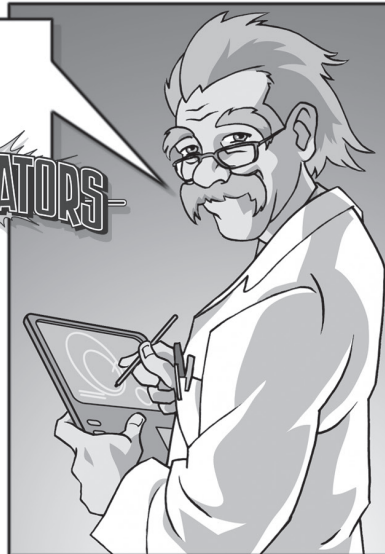


MEET **THE NUMERATORS**

My name is Dr. Jax. Not long ago, four ordinary students discovered they had extraordinary mathematical abilities. Under my guidance, they learned to harness their skills into incredible powers—powers that can be used to help those less fortunate than themselves. Armed with super powers, these once ordinary students became...



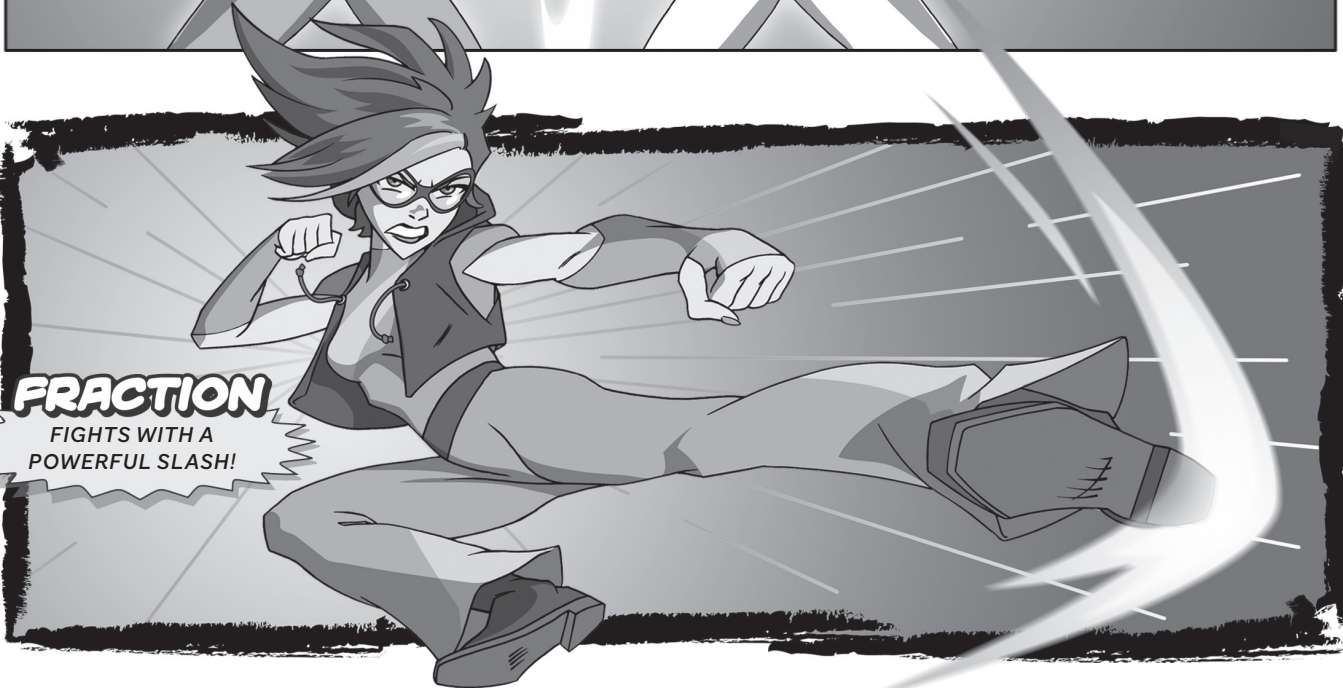
THE NUMERATORS



They used their math skills for the good of others, helping St. Jude Children's Research Hospital® raise money to find cures for children with cancer and other life-threatening diseases.

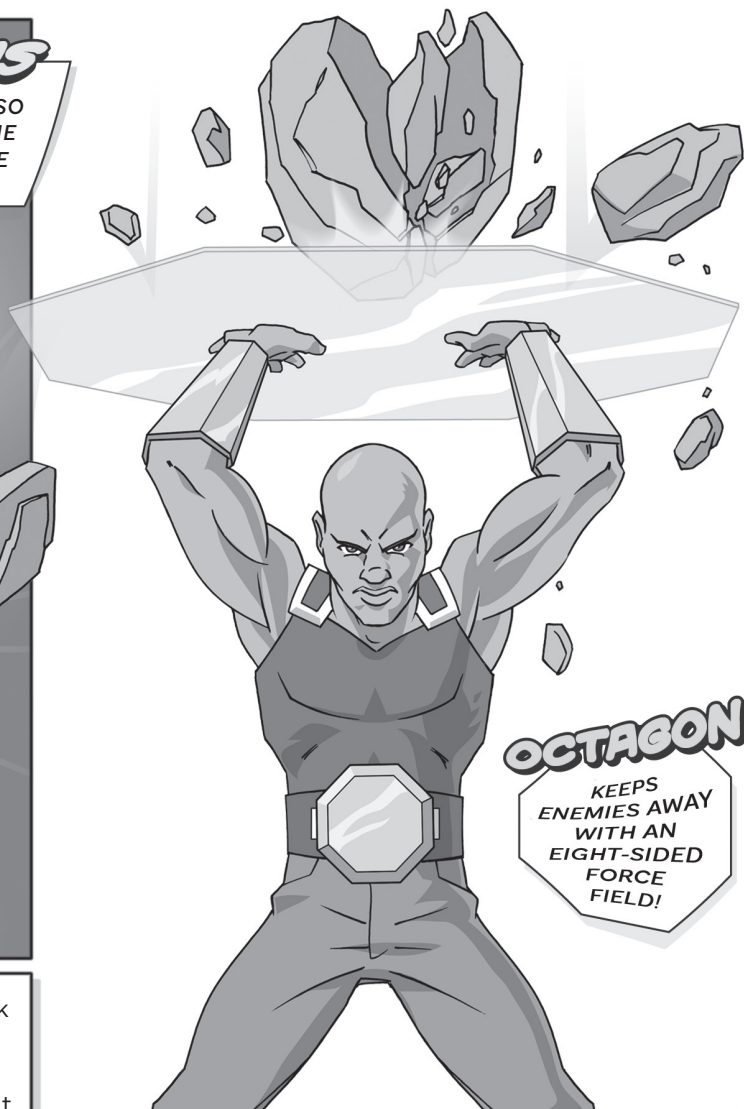
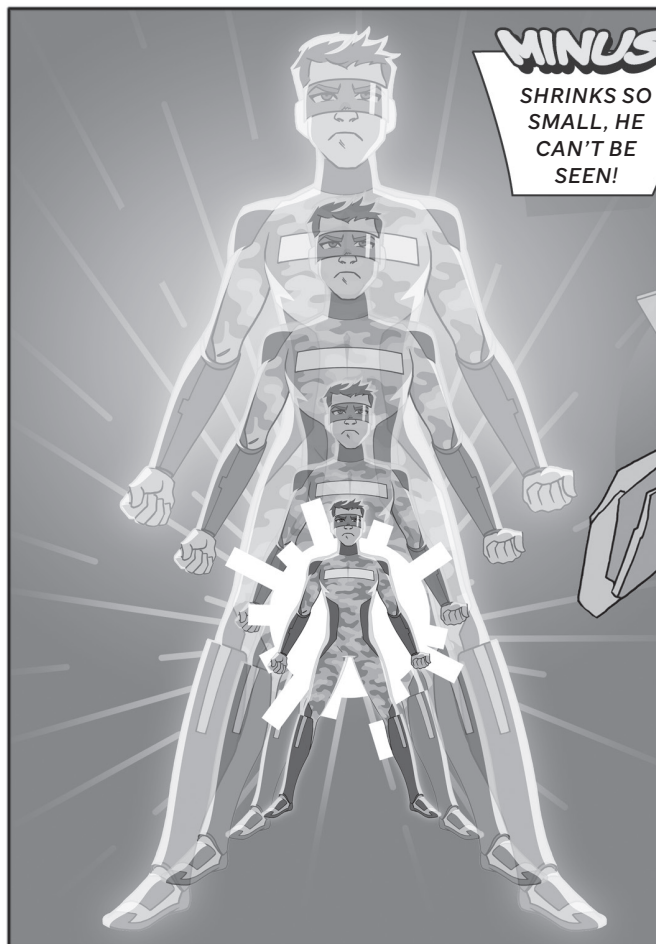
SYMMETRY

SPLITS INTO
EQUAL PARTS FOR
A DOUBLE ATTACK!

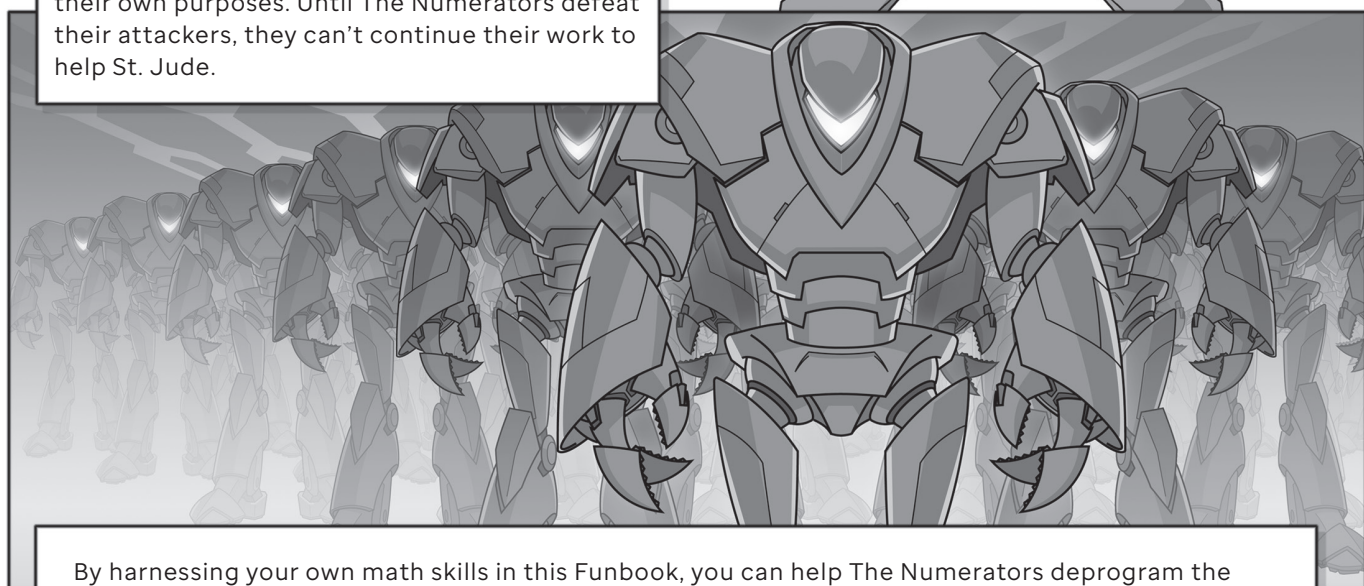


FRACTION

FIGHTS WITH A
POWERFUL SLASH!



But, nothing prepared them for a surprise attack by armored droids sent from the future. These robots want to use The Numerators' powers for their own purposes. Until The Numerators defeat their attackers, they can't continue their work to help St. Jude.

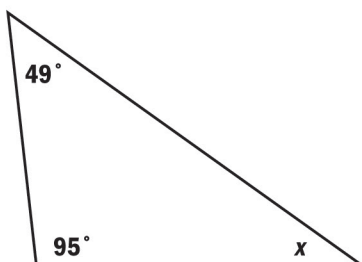


By harnessing your own math skills in this Funbook, you can help The Numerators deprogram the robots. By participating in the St. Jude Math-A-Thon, you'll raise money to help kids at St. Jude. Just like The Numerators, you can use math to help fund research and find cures for kids. Help The Numerators while helping St. Jude, and begin your own adventure today!

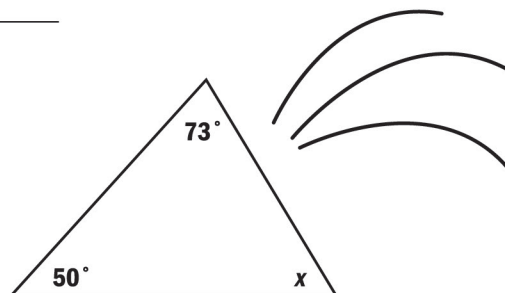
“Tri,” “Tri” Again, Ninjas!

The Numerators are under attack by the Math Ninjas! While they fight them off, you find the missing angle in each of their triangular weapons shown!

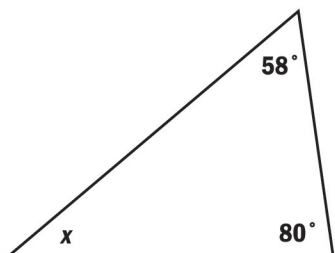
1. $x =$ _____



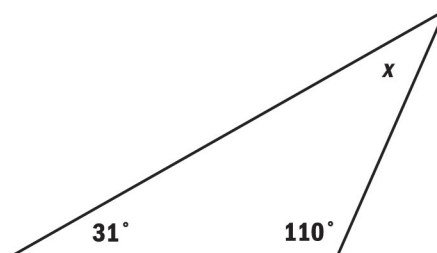
2. $x =$ _____



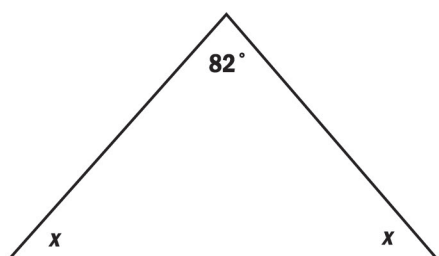
3. $x =$ _____



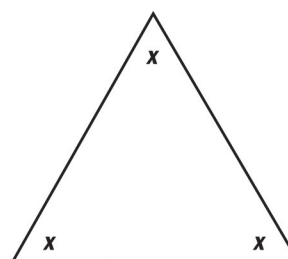
4. $x =$ _____



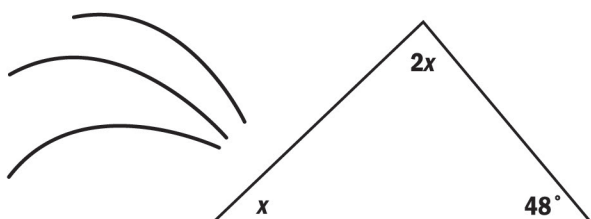
5. $x =$ _____



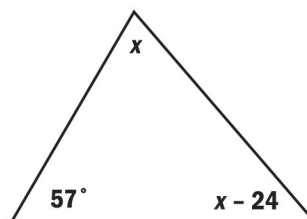
6. $x =$ _____



7. $x =$ _____



8. $x =$ _____



Whew! Thanks for helping us take care of those nasty ninjas!

Code Break

Break the code to find the name of the man who founded the first trading post in what is now Chicago.
Compare each fraction. Match the fraction with the greater value to its corresponding letter. Then write the letter on top of the example number in the blanks at the bottom of the page.

- | | | |
|---|---|---|
| 1. $\frac{4}{5}$ <input checked="" type="radio"/> $\frac{2}{9}$ $\frac{4}{5} = J$ | 2. $\frac{3}{14}$ <input type="radio"/> $\frac{2}{43}$ | 3. $\frac{2}{9}$ <input type="radio"/> $\frac{1}{4}$ |
| 4. $\frac{1}{6}$ <input type="radio"/> $\frac{4}{7}$ | 5. $\frac{5}{7}$ <input type="radio"/> $\frac{9}{14}$ | 6. $\frac{1}{4}$ <input type="radio"/> $\frac{1}{7}$ |
| 7. $\frac{1}{3}$ <input type="radio"/> $\frac{2}{3}$ | 8. $\frac{1}{3}$ <input type="radio"/> $\frac{1}{2}$ | 9. $\frac{1}{10}$ <input type="radio"/> $\frac{2}{9}$ |
| 10. $\frac{3}{4}$ <input type="radio"/> $\frac{5}{8}$ | 11. $\frac{2}{5}$ <input type="radio"/> $\frac{1}{2}$ | 12. $\frac{3}{14}$ <input type="radio"/> $\frac{1}{7}$ |
| 13. $\frac{1}{3}$ <input type="radio"/> $\frac{2}{3}$ | 14. $\frac{1}{5}$ <input type="radio"/> $\frac{1}{3}$ | 15. $\frac{2}{9}$ <input type="radio"/> $\frac{2}{10}$ |
| 16. $\frac{1}{9}$ <input type="radio"/> $\frac{4}{7}$ | 17. $\frac{1}{2}$ <input type="radio"/> $\frac{1}{4}$ | 18. $\frac{3}{28}$ <input type="radio"/> $\frac{3}{14}$ |
| 19. $\frac{1}{3}$ <input type="radio"/> $\frac{7}{12}$ | 20. $\frac{1}{14}$ <input type="radio"/> $\frac{1}{16}$ | 21. $\frac{5}{8}$ <input type="radio"/> $\frac{3}{4}$ |
| 22. $\frac{2}{11}$ <input type="radio"/> $\frac{1}{4}$ | 23. $\frac{5}{7}$ <input type="radio"/> $\frac{2}{3}$ | 24. $\frac{2}{7}$ <input type="radio"/> $\frac{3}{14}$ |
| 25. $\frac{3}{14}$ <input type="radio"/> $\frac{1}{6}$ | | |

$A = \frac{1}{4}$

$B = \frac{5}{7}$

$D = \frac{7}{12}$

$E = \frac{3}{14}$

$I = \frac{2}{9}$

$J = \frac{4}{5}$

$L = \frac{2}{7}$

$N = \frac{4}{7}$

$O = \frac{1}{3}$

$P = \frac{2}{3}$

$S = \frac{3}{4}$

$T = \frac{1}{2}$

$U = \frac{1}{14}$

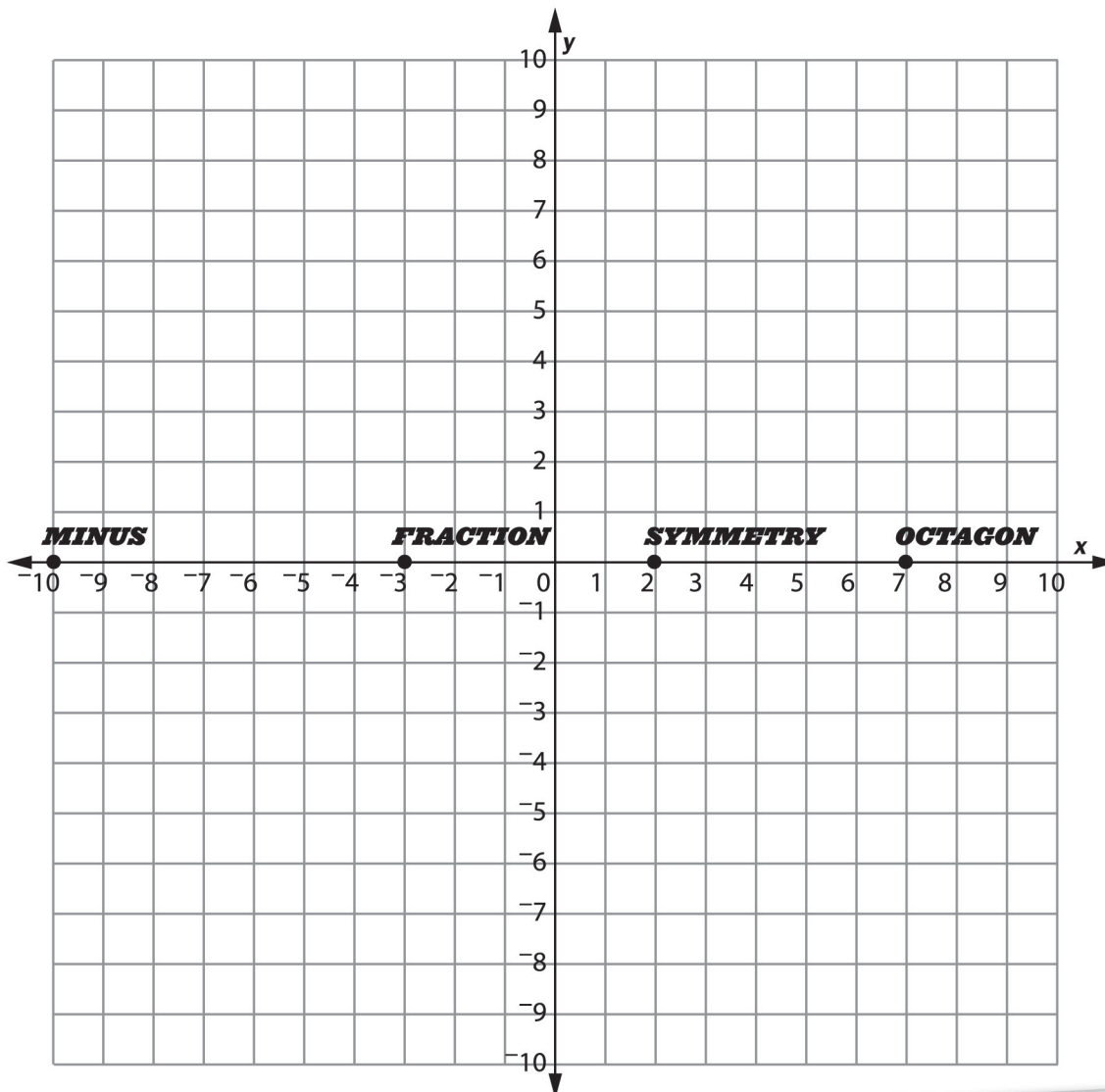
J

1 2 3 4 5 6 7 8 9 10 11 12

13 14 15 16 17 18 19 20 21 22 23 24 25

Invaders From Planet x

Evil alien invaders are heading for Earth! Each equation below shows an alien's path toward the ground. Graph each equation on the grid. Then write the name of The Numerator who is closest to where that alien will intercept the x-axis. This is The Numerator who must battle that alien!



1. $y = 8 - 2x$

Closest Numerator: _____

2. $y = -5 - x$

Closest Numerator: _____

3. $y = (5/2)x + 5$

Closest Numerator: _____

4. $y = (1/3)x - 2$

Closest Numerator: _____

5. $y = 5x + 45$

Closest Numerator: _____

6. $y = 2 - (3/7)x$

Closest Numerator: _____

Bonus:

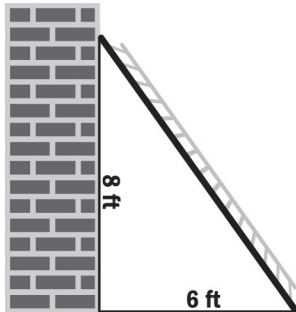
One more alien is on the way, and it will pass through point $(-6, 1)$. What question number's alien passed through that same point?



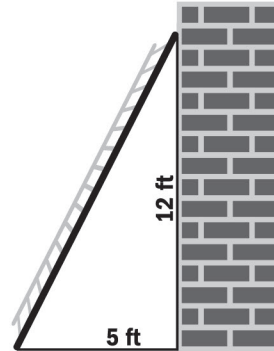
Ladders to the Rescue!

The Numerators are using ladders to rescue people in tall buildings that are on fire. Find each ladder's length based on the height of the window, the distance from the foot of the ladder to the building and the Pythagorean theorem! If necessary, round your answers to the nearest tenth.

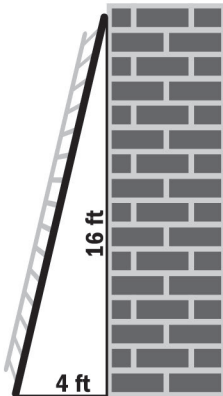
1. Ladder length = _____



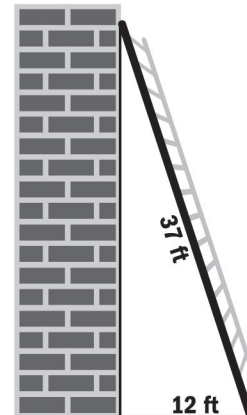
2. Ladder length = _____



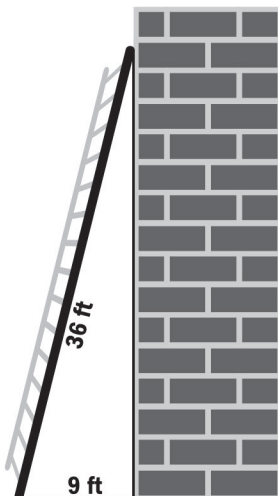
3. Ladder length = _____



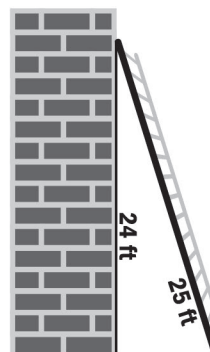
4. Wall height = _____



5. Wall height = _____



6. Distance to wall = _____



Great job! You followed our instructions to the "ladder"!



B-mx Bikers

The B-mx Biker Gang just robbed a bike shop. Now they're racing away from the scene of the crime. Each one is following a straight path from the shop at (0, 0). Help The Numerators follow each gang member's path based on these grid coordinates in our city.

1. The Wheel Thing

x	$y = 3x$	y
0	$3 \cdot 0$	0
1	$3 \cdot 1$	_____
2	_____	_____
3	_____	_____
4	_____	_____

2. Penny Peddler

x	$y = 7x$	y
0	_____	_____
2	_____	_____
5	_____	_____
8	_____	_____
10	_____	_____

3. Helmut Rohl

x	$y = -2x$	y
2	_____	_____
3	_____	_____
5	_____	_____
9	_____	_____
11	_____	_____

4. Tread Master

x	$y = (1/3)x$	y
3	_____	_____
9	_____	_____
15	_____	_____
21	_____	_____
28	_____	_____

5. Spike Spoke

x	$y = (-2/5)x$	y
10	_____	_____
15	_____	_____
25	_____	_____
29	_____	_____
32	_____	_____

6. B-mx Master

x	$y = (7/4)x$	y
8	_____	_____
16	_____	_____
20	_____	_____
22	_____	_____
$25 \frac{6}{7}$	_____	_____

7. Symmetry catches a B-mx Biker at (15, -30). Which Biker does she catch?

8. Fraction catches another at (25, -10). Which Biker does she catch?



Wow! You're
"wheely" good
at this!

Downloads of Trouble

The Tune Broker is overcharging people for music they buy from his online music store and the customers don't find out until they go broke! Use what you know of linear functions to figure out how much each customer will owe if The Numerators don't stop this pricey plot.



1. Poor Kent Dance. He has been buying song after song at a price of \$2.59 per tune.

a. Write an equation that shows the total price (t) Kent will owe depending on how many songs (s) he buys. _____

How much will Kent owe if he purchases...

- b. 5 songs _____
c. 10 songs _____
d. 57 songs _____

2. Dee Jay has been buying music for \$3.29 per song.

a. Write an equation that shows the total (t) Dee will owe based on how many songs (s) she buys.

How much will Dee owe if she buys...

- b. 8 songs _____
c. 13 songs _____
d. 38 songs _____

3. Oren Bea has been buying music for \$4.89 per song.

a. Equation for total owed: _____

How much will Oren owe if he buys...

- b. 6 songs _____
c. 21 songs _____
d. 45 songs _____

4. For her first purchase, Carrie DeTune paid \$35.91 for 9 songs.

a. How much did she pay for each song? _____

b. Equation for total owed: _____

At that price, how much will Carrie owe if she buys...

- c. 25 songs _____
d. 74 songs _____

5. By the time we caught the Tune Broker, Kent had bought 62 songs, Dee had bought 51 songs, Oren had bought 63 songs, and Carrie had bought 83 songs. They should have paid only \$.95 per song. What is the total amount that the Tune Broker will need to pay back to these customers?



LEVEL 8

FUNBOOK



Answer Key

Page 5

"Tri," "Tri" Again, Ninjas!

1. $x = 36^\circ$
2. $x = 57^\circ$
3. $x = 42^\circ$
4. $x = 39^\circ$
5. $x = 49^\circ$
6. $x = 60^\circ$
7. $x = 44^\circ$; ($2x = 88^\circ$)
8. $x = 73.5^\circ$; ($x - 24 = 49.5^\circ$)

Page 6

Chicago's Founder's Code

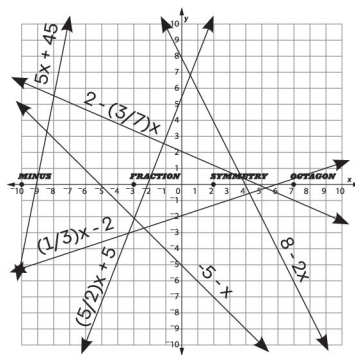
- | | | |
|-------------|-------------|-------------|
| 1. $>$, J | 11. $<$, T | 21. $<$, S |
| 2. $>$, E | 12. $>$, E | 22. $<$, A |
| 3. $<$, A | 13. $<$, P | 23. $>$, B |
| 4. $<$, N | 14. $<$, O | 24. $>$, L |
| 5. $>$, B | 15. $>$, I | 25. $>$, E |
| 6. $>$, A | 16. $<$, N | |
| 7. $<$, P | 17. $>$, T | |
| 8. $<$, T | 18. $<$, E | |
| 9. $<$, I | 19. $<$, D | |
| 10. $>$, S | 20. $>$, U | |

Secret Phrase: Jean Baptiste
Pointe du Sable

Page 7

Invaders from Planet x

1. Symmetry
 2. Fraction
 3. Fraction
 4. Octagon
 5. Minus
 6. Octagon
- Bonus: Question #2's alien



Page 8

Ladders to the Rescue!

1. 10 ft
2. 13 ft
3. 16.5 ft
4. 35 ft
5. 34.9 ft
6. 7 ft

Page 9

B-mx Bikers

1. The Wheel Thing

x	y = 3x	y
0	3 • 0	0
1	3 • 1	3
2	3 • 2	6
3	3 • 3	9
4	3 • 4	12

2. Penny Peddler

x	y = 7x	y
0	7 • 0	0
2	7 • 2	14
5	7 • 5	35
8	7 • 8	56
10	7 • 10	70

3. Helmut Rohl

x	y = -2x	y
2	-2 • 2	-4
3	-2 • 3	-6
5	-2 • 5	-10
9	-2 • 9	-18
11	-2 • 11	-22

4. Tread Master

x	y = (1/3)x	y
3	(1/3) • 3	1
9	(1/3) • 9	3
15	(1/3) • 15	5
21	(1/3) • 21	7
28	(1/3) • 28	9 1/3

5. Spike Spoke

x	y = (-2/5)x	y
10	(-2/5) • 10	-4
15	(-2/5) • 15	-6
25	(-2/5) • 25	-10
29	(-2/5) • 29	-11 3/5
32	(-2/5) • 32	-12 4/5

6. B-mx Master

x	y = (7/4)x	y
8	(7/4) • 8	14
16	(7/4) • 16	28
20	(7/4) • 20	35
22	(7/4) • 22	38 1/2
25 6/7	(7/4) • 25 6/7	45 1/4



St. Jude patient
Samantha

Check out stjude.org/math to start fundraising online today! Packed with tools to help you manage your fundraising efforts, raise more money and save time, stjude.org/math includes tools to help you:

- + Find your school
- + Create your own fundraising webpage and set your goal
- + Accept online donations
- + Integrate with Facebook Fundraising



Scan to find your
school and sign up!



St. Jude Children's
Research Hospital

St. Jude
Math-A-Thon

mathathon.org | mathathon@stjude.org | [#stjudemathathon](https://twitter.com/stjudemathathon) | 1-800-386-2665

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