SCHOLASTIC

Must-Know Math™

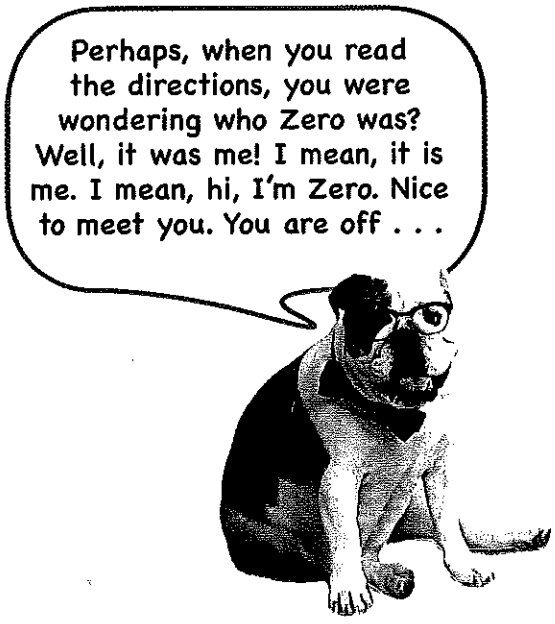
25 Activities to Build Key Skills in 6th Grade

My name _____

Off and Running!

After you solve each problem, find the answer in the chart at the bottom of the page. Cross out that answer and the letter below it. (We did the first one for you.) When you are done, the remaining letters will spell out the rest of Zero's message.

1. Round 376 to the nearest 10 380
2. Round 2,293 to the nearest 100 _____
3. Round 5.49 to the nearest tenth _____
4. In the number 34.567, what digit is in the hundredths place? _____
5. In the number 409.21, what digit is in the ones place? _____
6. Find the sum: 32.4 + 17.6 _____
7. Find the sum: 56.03 + 9.06 _____
8. Find the difference: 52.3 – 26.5 _____
9. Find the difference: 4,312.07 – 4,302.07 _____
10. Find the product: 7.2 × 9.5 _____
11. Find the product: 0.0005 × 8,000 _____
12. Find the quotient: 140 ÷ 3.5 _____
13. Find the quotient: 63.18 ÷ 0.09 _____



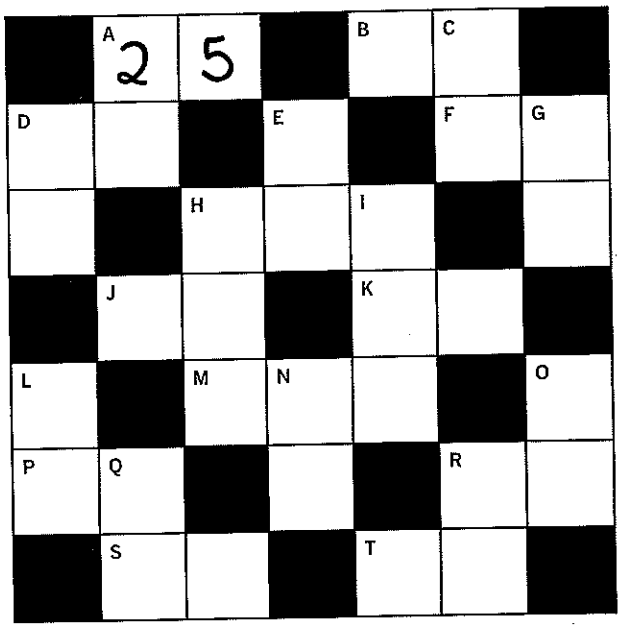
3	4	5	5.5	5.8	6	7	8	9	10	14.2	25.8	37	40	48
t	m	o	u	a	s	g	r	i	l	e	c	a	r	t

50	51.7	53	65.09	65.9	68.4	173	~~380~~	702	2,200	2,300
p	s	t	e	a	v	r	~~w~~	e	t	y

Cross-Number Puzzle

Circle the correct number to make each statement true. Write your answer in the grid. Because we're nice in "multiple" ways, we did the first one for you.

multiple: A multiple of a number is the product of that number and any whole number.
prime number: A whole number with only two factors: itself and 1.
composite number: A whole number that has more than two factors.
greatest common factor (GCF): The greatest whole number that is a common factor of two or more numbers.
least common multiple (LCM): The lowest whole number greater than 0 that is a common multiple of two or more numbers.
perfect square (or square number): A number that is the product of a number multiplied by itself. (For example, 25 is a perfect square, because it is the product of 5×5.)



Across		Down	
A.	**(25 / 52)** is a multiple of 5.	**A.**	**(23 / 26)** is a composite number.
B.	**(17 / 27)** is a prime number.	**C.**	**(70 / 72)** is divisible by 9.
D.	**(14 / 16)** is the GCF of 32 and 48.	**D.**	**(12 / 18)** is the GCF of 36 and 54.
F.	**(24 / 48)** is the LCM of 6 and 8.	**E.**	**(11 / 88)** is the LCM of 22 and 88.
H.	**(486 / 489)** is divisible by 9.	**G.**	**(45 / 49)** is a perfect square.
J.	**(67 / 77)** is a multiple of 11.	**H.**	**(436 / 475)** is divisible by 5.
K.	**(22 / 36)** is a perfect square.	**I.**	**(630 / 645)** is divisible by 10.
M.	**(390 / 520)** is the LCM of 13 and 40.	**L.**	**(76 / 79)** is a composite number.
P.	**(68 / 78)** is divisible by 4.	**N.**	**(23 / 46)** is the GCF of 23 and 46.
R.	**(17 / 34)** is the LCM of 17 and 34.	**O.**	**(54 / 57)** is divisible by 6.
S.	**(15 / 19)** is a prime number.	**Q.**	**(80 / 81)** is a perfect square.
T.	**(57 / 68)** is divisible by 3.	**R.**	**(33 / 37)** is a prime number.

Big Screen Numbers

Big movies, big numbers—that's what this page is about. The problems below tell how much money some IMAX® movies of the past have made. Check out the "Powers of 10" box for a quick review, then solve the problems.

Powers of 10

The **base** is the number used as a factor. → 10^4 ← The **exponent** tells you how many times to multiply the base by itself.

A **power of 10** is the product of multiplying 10 by itself one or more times. So 10^4, or "ten to the fourth power," means that you multiply 10 by itself 4 times: $10 \times 10 \times 10 \times 10$.

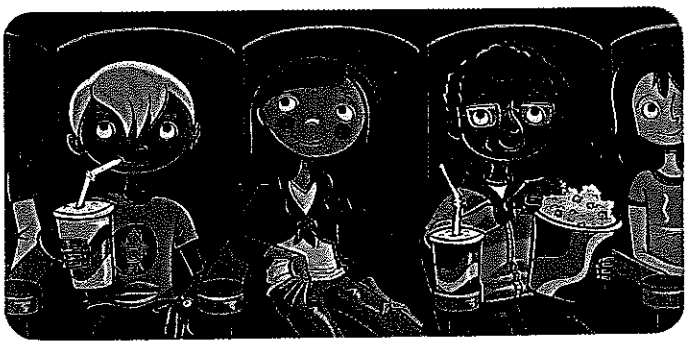
- To write powers of 10 with positive exponents in standard form, look at the exponent to see how many zeros you need: 10^4 means you need 4 zeros: 10,000.
- Now let's say you want to write the number 28,632 in expanded form using powers of 10. Start by writing the expanded standard form and take it from there, like this:

$$28{,}632 = 20{,}000 + 8{,}000 + 600 + 30 + 2$$
$$(2 \times 10{,}000) + (8 \times 1{,}000) + (6 \times 100) + (3 \times 10) + (2 \times 1)$$
$$(2 \times 10^4) + (8 \times 10^3) + (6 \times 10^2) + (3 \times 10^1) + (2 \times 10^0)$$

All figures are U.S. gross as of July 2009. Source: Nash Information Services, LLC.

1 *T-Rex: Back to the Cretaceous* (1998) scared a lot of people while making 50,000,000 + 3,000,000 + 700,000 + 40,000 + 3,000 + 200 + 40 + 9 dollars. Write that number in standard form.
$\_\_\_\_\_$

2 *Dolphins* (2000) traveled deep into the ocean and took in 54×10^6 dollars at the box office. Write that number in standard form. $ _____



3 Featuring one of the world's greatest athletes, *Michael Jordan to the Max* (2000) made $18,642,318. Write that number in expanded form using powers of 10.

_____

_____

4 The most money made by an IMAX® film was for *The Dream Is Alive* (1985), about astronauts on the space shuttle. It made almost 126×10^6 dollars, or $_____ in standard form.

5 One of the earliest IMAX® films is still one of the most popular: *To Fly!* (1979), a documentary about the history of flight, has so far made $86,600,000. Write that number as a power of 10:

_____

The Idiom Zoo

Complete the sentences below that describe various residents at the Animal Idiom Zoo. For each fraction or decimal listed, write an equivalent decimal (if it's a fraction) or fraction in lowest terms (if it's a decimal) on the line below it. Then find your answer in the answer box. Write the animal listed next to it on the blank in the sentence.

$4\frac{9}{100}$

_____

There's no point trying to have a conversation with Keith. He's as crazy as a _____.

$\frac{75}{100}$

_____

Be warned: Martin and Mina put on a real _____ show, but that stuff they're selling won't do anything for you (except maybe give you a rash).

0.3

_____

If you happen to embarrass yourself in front of Phil, he'll remind you of it years later. He's got the memory of an _____.

0.84

_____

Mike will appreciate it if you buy him something from the vending machine near the entrance. He's always as hungry as a _____.

0.2

_____

Tina will walk up to you like she's going to speak, but at the last moment she will _____ up and simply stare at you.

9.04

_____

Lyle likes to greet his visitors with, "Let's get down to the facts, folks. That's the way I am, folks: I talk _____. If you don't like it, move on."

$8\frac{9}{10}$

_____

Austin will weep and tell you how much he hates living in the Animal Idiom Zoo, but don't believe him. He cries _____ tears while secretly thinking about what a great life he has.

$2\frac{5}{1000}$

_____

If Janet stares at you, don't take it personally. She watches everyone like a _____.

1.25

_____

Visiting with Pam can be a little hard on your nerves. She's got _____ in her pants and never holds still for longer than a second.

ANSWERS

2.005 — hawk	$\frac{1}{50}$ — cow	$\frac{3}{10}$ — elephant	2.05 — bat
$9\frac{1}{25}$ — turkey	$1\frac{1}{40}$ — squirrels	$\frac{1}{5}$ — clam	8.9 — crocodile
$1\frac{1}{4}$ — ants	$\frac{3}{100}$ — owl	4.9 — skunk	4.09 — loon
$\frac{21}{25}$ — bear	$9\frac{2}{5}$ — frog	0.75 — dog and pony	7.5 — cat and mouse

Name That Author

In the problems below, you will be comparing fractions, decimals, and mixed numbers. Circle the letters next to the correct answers. The directions next to the stack of books tell you what to do with the letters you have circled.

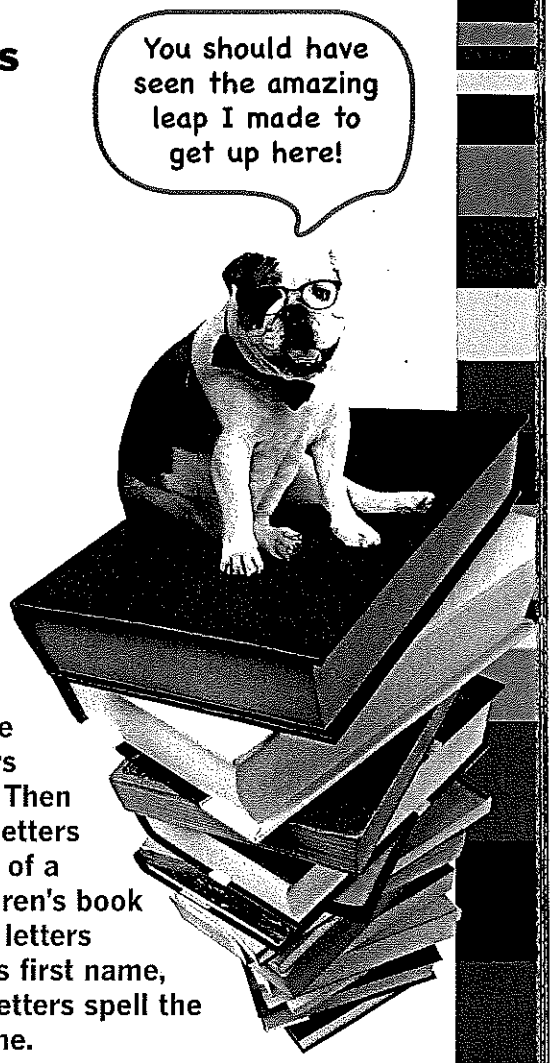
Cheat Sheet: **Converting Percents and Decimals**

To write a percent as a decimal, remove the percent symbol and move the decimal point two places to the left. **For example:**

34% = 0.34 8% = 0.08 139% = 1.39

To write a decimal as a percent, you do the reverse: move the decimal point two places to the right and add a percent sign. **For example:**

0.57 = 57% 0.009 = 0.9% 3.5 = 350%



Circle the greatest value in each set:

1. $\frac{3}{5}$ **Y** 3.5 **W** 35% **C**

2. 18% **T** $\frac{4}{9}$ **H** 0.62 **N**

3. $\frac{5}{6}$ **S** 0.56 **I** 56% **B**

Circle the least value in each set:

4. 54% **A** 0.45 **T** $\frac{7}{10}$ **O**

5. $\frac{2}{3}$ **A** $\frac{3}{4}$ **P** $\frac{4}{5}$ **B**

6. $\frac{12}{5}$ **D** 125% **N** 12.5 **J**

Circle the two equivalent values in each set:

7. 17% **L** 1.7 **G** $\frac{17}{100}$ **E** 70% **F**

8. 4.2 **D** $\frac{42}{5}$ **K** 42% **O** 420% **M**

9. $\frac{7}{20}$ **E** 7.2 **U** 0.35 **R** 350% **R**

10. 2.04 **I** 2.4 **C** 24% **G** $\frac{12}{5}$ **E**

On the first line below, write all the **blue** letters that you circled. On the second line, write the **orange** letters that you circled. Then unscramble the letters to find the name of a well-known children's book author. The blue letters spell the author's first name, and the orange letters spell the author's last name.

Letters:

_____ _____

Answer:

_____ _____

Mexican Fiesta

Sam is hosting a Cinco de Mayo party for 12 people. Adjust the recipes below so that they serve 12.

Black Bean Salad

Serves 6	Serves 12
$2\frac{3}{4}$ cups black beans	_____ cups black beans
$\frac{2}{3}$ cup corn	_____ cups corn
$\frac{1}{2}$ cup chopped red onion	_____ cups chopped red onion
$\frac{3}{4}$ cup chopped tomato	_____ cups chopped tomato
1 red pepper, diced	_____ red peppers, diced
$\frac{3}{4}$ cup avocado	_____ cups avocado
$\frac{1}{2}$ cup chopped cilantro	_____ cup chopped cilantro
$\frac{1}{4}$ cup lime juice	_____ cup lime juice
2 tablespoons lemon juice	_____ tablespoons lemon juice
3 tablespoons vegetable oil	_____ tablespoons vegetable oil

Here's a hint for the chili: Sam is making $1\frac{1}{2}$ times the original recipe!

Chili

Serves 8	Serves 12
$\frac{1}{2}$ pound dry pinto beans	_____ pound dry pinto beans
4 cups water	_____ cups water
28 ounces of diced tomatoes in juice	_____ ounces of diced tomatoes in juice
4 ounces green bell pepper, chopped	_____ ounces green bell pepper, chopped
2 tablespoons vegetable oil	_____ tablespoons vegetable oil
$2\frac{1}{2}$ cups onions, coarsely chopped	_____ cups onions, coarsely chopped
2 cloves garlic, crushed	_____ cloves garlic, crushed
$\frac{1}{2}$ cup parsley, chopped	_____ cup parsley, chopped
$\frac{1}{4}$ cup butter	_____ cup butter
$\frac{1}{3}$ cup chili powder	_____ cup chili powder
1 tablespoon salt	_____ tablespoons salt
$1\frac{1}{2}$ teaspoons pepper	_____ teaspoons pepper

Fraction Frenzy

Solve each fraction problem. Write the answer in lowest terms. Use the letters next to your answers to reveal a basic rule about fractions at the bottom of the page. We did the first one for you.

1. $\frac{3}{5} + \frac{4}{5} =$ $1\frac{2}{5}$ R

2. $\frac{9}{10} - \frac{3}{10} =$ ____ E

3. $7\frac{5}{8} - 5\frac{1}{8} =$ ____ N

4. $4\frac{7}{10} - 1\frac{2}{5} =$ ____ D

5. $\frac{3}{5} \times \frac{3}{4} =$ ____ M

6. $3\frac{4}{5} \times \frac{10}{19} =$ ____ F

7. $18 \div \frac{4}{5} =$ ____ V

8. $1\frac{1}{5} \times 1\frac{1}{4} =$ ____ A

9. $3\frac{2}{3} + 6\frac{1}{3} =$ ____ T

10. $\frac{5}{8} + \frac{1}{6} =$ ____ I

11. $4\frac{8}{9} - 4\frac{5}{9} =$ ____ C

12. $8 \times \frac{3}{8} =$ ____ H

13. $2\frac{1}{5} \times \frac{6}{11} =$ ____ B

14. $\frac{17}{37} \times \frac{37}{17} =$ ____ O

15. $3\frac{1}{2} \div 2\frac{1}{4} =$ ____ Z

The Rule

10	3	$\frac{3}{5}$		$3\frac{3}{10}$	$\frac{3}{5}$	$2\frac{1}{2}$	1	$\frac{9}{20}$	$\frac{19}{24}$	$2\frac{1}{2}$	$1\frac{1}{2}$	10	1	R $1\frac{2}{5}$
1	2	$1\frac{1}{2}$		2	R $1\frac{2}{5}$	$1\frac{1}{2}$	$\frac{1}{3}$	10	$\frac{19}{24}$	1	$2\frac{1}{2}$			
$\frac{1}{3}$	$1\frac{1}{2}$	$2\frac{1}{2}$	10		$1\frac{1}{5}$	$\frac{3}{5}$		$1\frac{5}{9}$	$\frac{3}{5}$	R $1\frac{2}{5}$	1	!		

A Saturday with Zoe

Answer the questions about how Zoe spent her Saturday.

1 It's Saturday, so Zoe springs out of bed as soon as her alarm goes off. (This does not happen on school days.) She brushes her teeth for 100 seconds, then she brushes her hair for 3 times that long. In minutes, how long does Zoe spend brushing her hair?

Answer:

2 Zoe begins eating breakfast at 8:15 a.m. and eats for 22 minutes. What time does she finish breakfast?

Answer:

3 At 8:59 a.m., Zoe, who lives in California, calls her BFF, Erika, who lives in Washington, D.C. The girls talk for 14 minutes. What time does Erika's clock show when they hang up? (FYI: D.C. is 3 hours ahead of California.)

Answer:

4 Already a little late to meet her friend Alex, Zoe runs to the bus stop in 7 minutes and 42 seconds. That's twice as long as it takes Alex to get to the stop. (Alex lives much closer.) How long does it take Alex to get to the bus stop?

Answer:

5 The bus leaves their stop at 9:52 a.m. They get off at the mall at 10:34 a.m. How long was the bus ride?

Answer:

6 While browsing at Amy's Accessories, Alex says, "I spent 140 minutes on the science project yesterday." Zoe answers, "Oh yeah? I spent three and a quarter hours on my project!" How much longer did Zoe spend on her project than Alex?

Answer:

7 Zoe and Alex go to a movie and sit in their favorite spot, third row center. There are 6 minutes of previews, which start at 11:50 a.m. The movie then runs for 2 hours and 8 minutes. What time does the movie end?

Answer:

8 After arriving home, Zoe decides to score some points with her parents by making dinner. She wants her famous baked ziti to be ready at exactly 6:15 p.m. The ziti must bake for 40 minutes, and then sit for 10 minutes before serving. What time should Zoe put the ziti into the oven?

Answer:

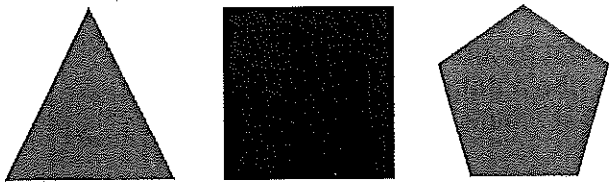
What's Up Next?

Look at each sequence of numbers or symbols. Determine what the next three items in the sequence should be and write or draw them in the spaces provided.

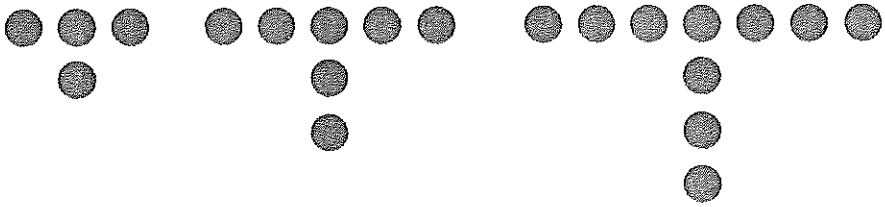
1. 135, 245, 355, 465, _____, _____, _____

2. YX, VU, SR, PO, _____, _____, _____

3. 4, 11, 25, 53, 109, _____, _____, _____

4. 

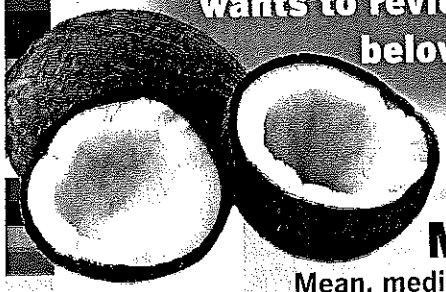
5. 240, 213, 186, 159, _____, _____, _____

6. 

7. $2x - 3$, $5x - 7$, $8x - 11$, $11x - 15$, _____, _____, _____

Fruity Felicia's

Fruity Felicia's serves fresh-squeezed juices and smoothies. Felicia is considering some changes to her shop, but first she wants to review some recent data. Answer the questions below using mean, median, mode, and range.



Mean, Median, Mode, and Range

Mean, median, and mode are measures of central tendency because they are meant to identify the center of a set of data.

- The **mean**, or average, is the sum of the data points divided by the number of data points.
- The **median** is the middle number when the data are put in order. (Or the value halfway between the two middle numbers when there are an even amount of numbers.)
- The **mode** is the number (or numbers) that occurs most often in the data set.
- **Range** is another number used to describe a data set. The range is the difference between the greatest and least values in the data set.

SMOOTHIE MENU	16 oz	24 oz
Banana Bonanza Banana, blueberries, yogurt, skim milk, wheat germ	$4.25	$5.50
Mango Magic Mango, peach, coconut milk, honey, skim milk	$4.50	$5.75
Peanut Butter Perfection Banana, peanut butter, yogurt, skim milk	$5.25	$6.50
Sunrise Cantaloupe, orange, pineapple, yogurt, honey	$4.25	$5.50
Tropical Breeze Strawberry, peach, banana, yogurt, skim milk	$4.25	$5.50
Gardener's Delight Fresh veggie juice, flax oil, lecithin, spirulina	$5.75	$7.25
Razzamatazz Raspberries, strawberries, kiwi, lemon sorbet	$5.00	$6.50
Beet It Beets, banana, nutmeg, yogurt	$5.00	$6.50

1 Use the menu on page 12 to complete the table below. Round your answers to the nearest whole cent.

	16 oz smoothie	24 oz smoothie
Median price:	_____	_____
Mean price:	_____	_____
Mode price:	_____	_____
Range of price:	_____	_____

2 One week, Felicia's sold 79 smoothies on Sunday, 67 on Monday, 77 on Tuesday, 85 on Wednesday, 80 on Thursday, 74 on Friday, and 86 on Saturday. What is the mean number of smoothies sold that week? (Round your answer to the nearest whole number.) _____

3 The table below shows how many customers Fruity Felicia's had each day of the week for four weeks. Use it to answer the questions below. Round all answers to the nearest whole number.

NUMBER OF CUSTOMERS PER DAY							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Week 1	115	146	153	140	148	156	166
Week 2	127	147	154	149	153	162	165
Week 3	104	130	159	143	152	139	157
Week 4	150	148	152	135	165	170	166

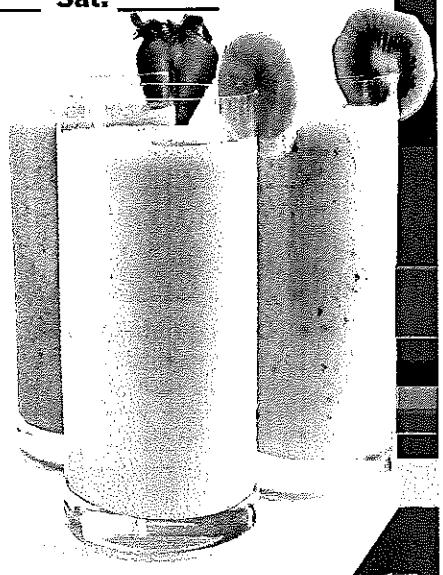
a. What was the mean number of customers each week?

Week 1: _____ **Week 2:** _____ **Week 3:** _____ **Week 4:** _____

b. What was the mean number of customers over the 4 weeks? _____

c. What was the mean number of customers each day of the week?

Sun: _____ **Mon:** _____ **Tue:** _____ **Wed:** _____ **Thu:** _____ **Fri:** _____ **Sat:** _____



4 One week, Fruity Felicia's sold 8 cups of Ginger Blast on Sunday, 5 cups on Monday, 0 cups on Tuesday, 6 cups on Wednesday, 3 cups on Thursday, 11 cups on Friday, and 6 cups on Saturday. What is the mode for the number of cups of Ginger Blast sold that week? _____

5 One week, Fruity Felicia's sold 6 cups of Green Goodness on Sunday, 3 cups on Monday, 2 cups on Tuesday, 5 cups on Wednesday, 1 cup on Thursday, and 4 cups on Friday.

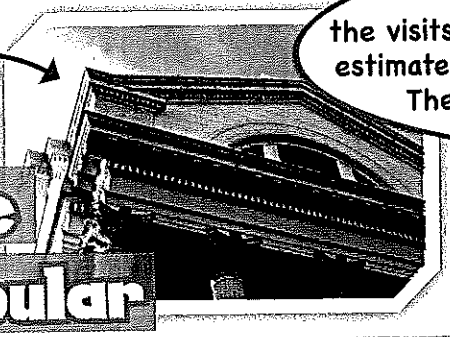
a. The mode of cups of Green Goodness sold that week was 3. How many cups were sold on Saturday? _____

b. What was the range of cups of Green Goodness sold that week? _____

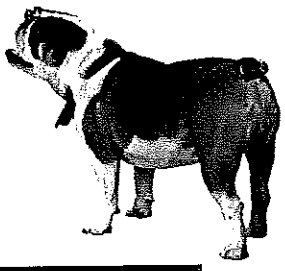
Days at the Museums

The Smithsonian Institution runs 19 museums, 9 research centers, and a zoo. Most of them are located in Washington, D.C. The table below shows how many visits there were to the 10 most popular Smithsonian museums during the first 5 months of 2009. First, fill in the third column on the chart by estimating the number of visits to the museums for January–December, 2009. Then use the table to draw a bar graph on page 15.

Natural History Museum.



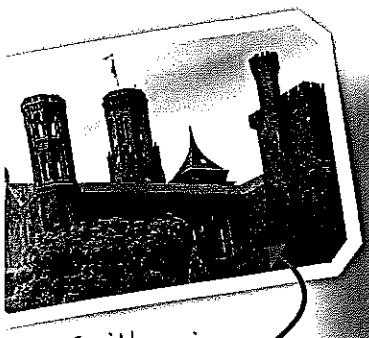
Here's one way to project the visits for all of 2009: For each museum, estimate the number of visits in one month. Then multiply that number by 12.



Visits to the 10 Most Popular Smithsonian Museums, 2009

Museum	Actual visits, January–May, 2009	Projected visits, January–December, 2009
National Portrait Gallery	451,000	
Freer Gallery of Art	250,000	
Hirshhorn Museum	288,000	
National Air and Space Museum	2,700,000	
Steven F. Udvar-Hazy Center	480,000	
National Museum of American History	2,000,000	
National Museum of the American Indian	569,000	
National Museum of Natural History	3,000,000	
National Zoo	980,000	
The Castle	671,000	

SOURCE: http://newsdesk.si.edu/visits/. Tallies have been rounded to the nearest thousand or nearest hundred thousand.



Smithsonian Institution's The Castle.

Use the table to create a bar graph titled "Visits to the 10 Most Popular Smithsonian Museums, January–May, 2009." We provided the basic design of the chart, but you need to fill in all of the information.

Gorilla at the National Zoo.

Write the graph's title here.

Label the vertical axis here.

Choose a scale and label the intervals. Remember, the number of visits should start at 0 and extend to a number just above the greatest number of visits to any museum.

National Portrait Gallery

Draw the bars to show the number of visits to each museum.

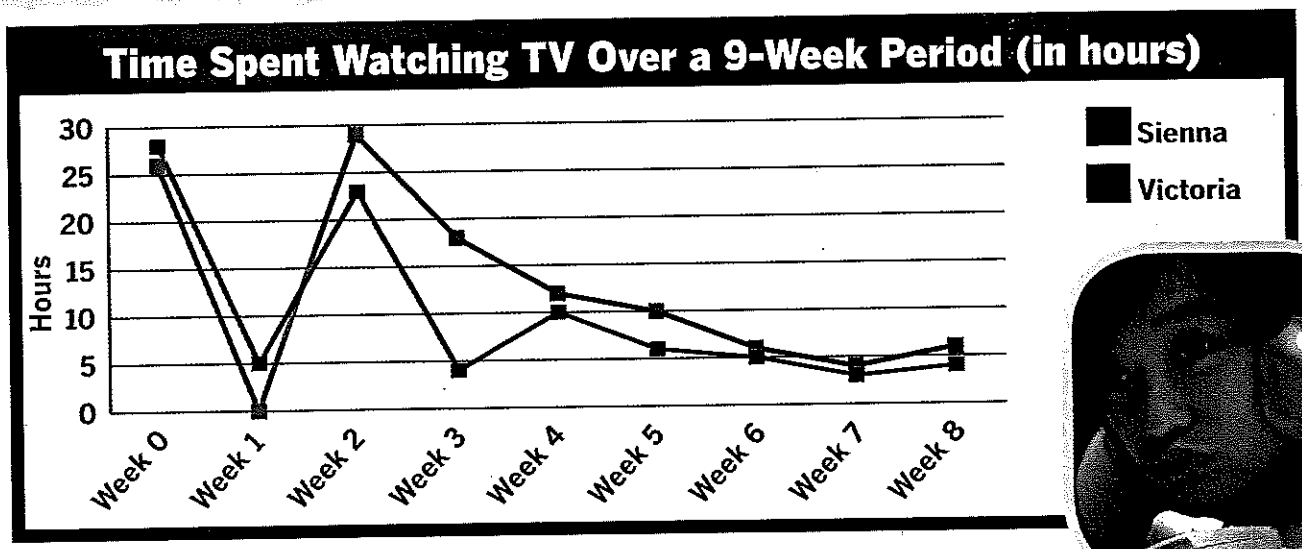
Use these lines to label the bars.

Label the horizontal axis here.

Making Changes

There must have been something in the air on Monday—or maybe there was something in the cafeteria food. During lunch, several pairs of friends decided to make some changes in their lives. Use the double-line graphs to answer questions about how successful each pair was in making the changes they planned.

Sienna and Victoria decided they were watching too much TV. As Sienna put it, "I think I can feel my brain rotting." The girls made a pact to reduce the amount of TV they'd watch over the next eight weeks. The graph below shows how much time the girls spent watching TV, starting with the week before they made their pact (Week 0).



1 During which week was there the greatest difference in the amount of time each girl spent watching TV?

- **a.** Week 2
- **b.** Week 3
- **c.** Week 7

2 Between which two weeks did the amount of time Victoria spent watching TV change the most?

- **a.** Weeks 0 and 1
- **b.** Weeks 1 and 2
- **c.** Weeks 5 and 6

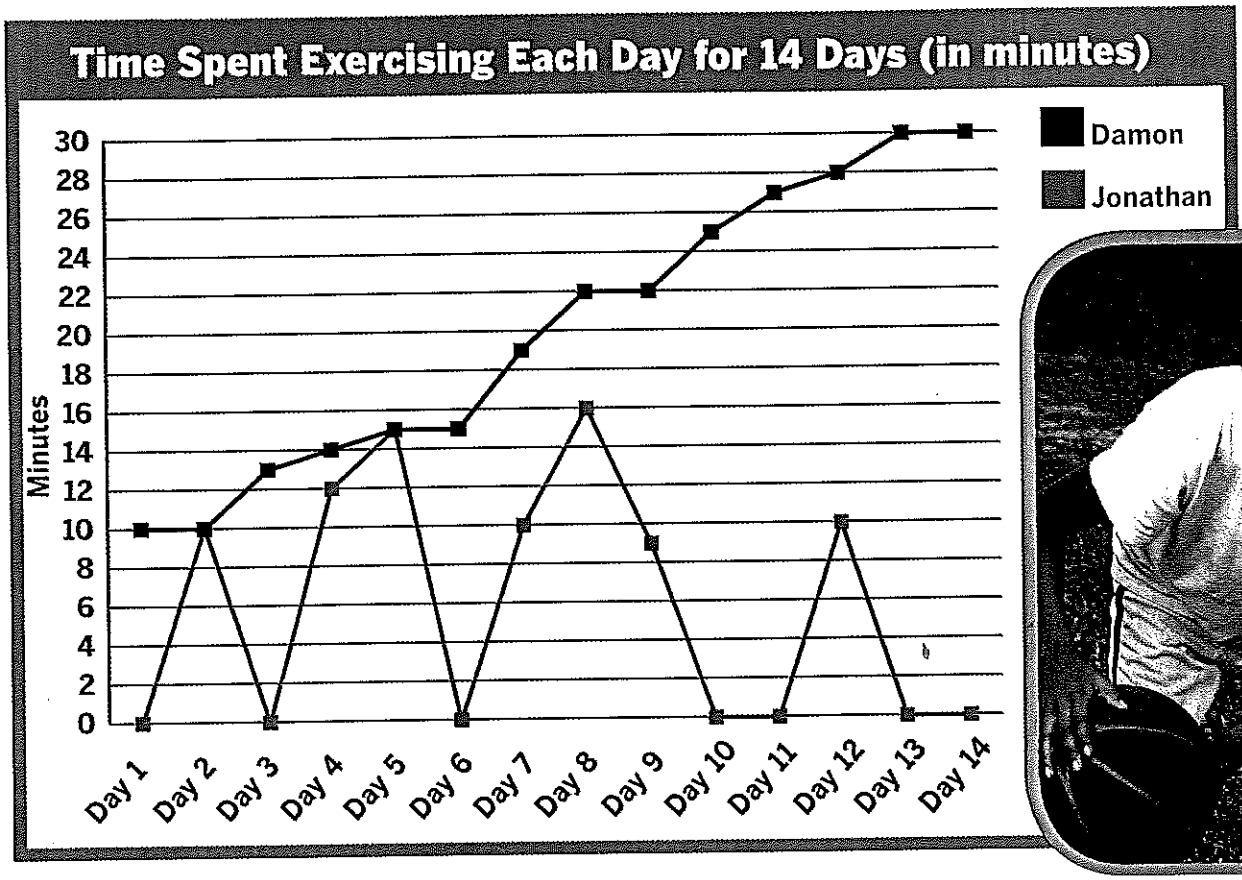
3 Who had a greater range in the amount of time spent watching TV?

- **a.** Sienna
- **b.** Victoria
- **c.** The girls had an equal range.

4 Which would be the most accurate statement at the end of the 8 weeks?

- **a. Sienna:** "Oh well, so I couldn't cut back. I guess there are worse things than a rotten brain."
- **b. Sienna:** "Wow! We decided to cut back on TV and just like that, we did it!"
- **c. Victoria:** "OK, we both got off to a rocky start, but we did well overall."

"Damon, I think we should start exercising," announced Jonathan. After his initial shock wore off, Damon agreed. He had been feeling a little like a lump of clay lately. The line graph below shows how many minutes per day each boy exercised over the next two weeks.



5 **On Day 10, how many minutes did each boy spend exercising?**

- **a.** Damon: 25; Jonathan: 0
- **b.** Damon: 0; Jonathan: 25
- **c.** Damon: 10; Jonathan: 10

6 **On which day did Jonathan hit his highest number of minutes exercising?**

- **a.** Day 8
- **b.** Day 5
- **c.** Day 1

7 **Which boy do you think had a higher mean number of minutes of exercise over the 2-week period?**

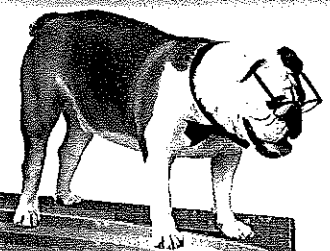
- **a.** Damon
- **b.** Jonathan
- **c.** It was about equal.

8 **Which of the following comments would you NOT expect one of the boys to make?**

- **a. Damon:** "I slowly but steadily increased the number of minutes I exercised each day. I'm feeling great!"
- **b. Jonathan:** "I tried, dude, but a boy has got to get his rest, you know?"
- **c. Jonathan:** "If I continue what I've been doing, I should be up to an hour a day in no time."

Integer Towers

For each tower, start at the top and work down. Read the first addition or subtraction problem, and choose the correct answer from the two boxes below it. Lightly shade the box with the correct answer. The number in the shaded box becomes the first integer in the next addition or subtraction problem. (We got the first puzzle started for you.) Note: If you make a mistake and shade the wrong box, you will not find a correct answer for the next problem. If this happens, go back a step and try again.



When you **add a positive integer and a negative integer,** the sum will have the same sign as the integer with the greater absolute value (distance from zero). **Subtracting an integer** is the same as adding its opposite. (For example, $^{-}2 - {}^{-}3$ is the same as $^{-}2 + 3$.)

Proper Properties

Draw a line from each property of multiplication in the column on the left to the equation in the column on the right that is an example of that property. We did one for you. (For a quick review of the properties, see the box below.)

Properties of Multiplication

Commutative Property: Changing the order of factors does not change their product.
Associative Property: Changing the grouping of factors does not change their product.
Distributive Property: The product of a factor and a sum or difference equals the sum or difference of the products.
Zero Property: The product of any number and 0 is 0.
Identity Property: The product of any number and 1 is that number.

Commutative Property	$5\,(y + 3) = 5y + 15$
Associative Property	$17 \times 0 = 0$
Distributive Property	$5\,(2 \times 8) = (5 \times 2) \times 8$
Zero Property	$^{-}463 \times 1 = {}^{-}463$
Identity Property	$b \times c = c \times b$

In each equation below, use a property of multiplication to fill in what's missing. Write the name of the property you used.

$1 \times 36 =$ ___ _____ Property

$12 \times 4 = 4 \times$ ___ _____ Property

$52.04 \times 0 =$ ___ _____ Property

$8\,(c + 5) = 8c +$ ___ _____ Property

$6\,(5 \times 3) = (6 \times$ ___ $) \times$ ___ _____ Property

Expression Connection

Evaluate each expression using the indicated values for the variables. Keep the order of operations in mind as you work. (See below for a quick review of this.) Find your answers in the answer box and cross them off. (We did the first problem for you.) When you are done, there will be four "leftover" answers. Use them to fill in the blanks in the bonus equation.

Order of Operations

When evaluating expressions:

1. Do operations in parentheses first.
2. Evaluate any exponents.
3. Multiply and divide from left to right.
4. Add and subtract from left to right.

Answer Box

1	4	7	520
13	16	20	23
~~-1~~	26	30	44
48	76	115	144

Evaluate for $a = 7$, $b = 5$ and $c = -2$

1. $2b + 14 =$ 24

2. $5c + 30 =$

3. $2a + b + 3c =$

4. $(a + b)^2 =$

5. $25 - 3a =$

6. $400 - 35a + 20c =$

Evaluate for $w = -3$, $x = 13$, $y = -2.5$ and $z = 1.3$

7. $4(w + x + y) =$

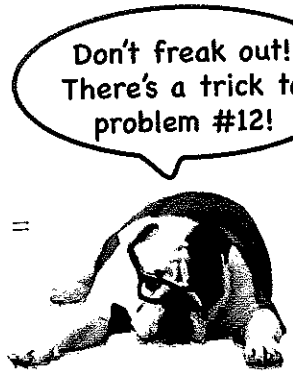
8. $14z + 57.8 =$

9. $40x =$

10. $x^2 + 50y =$

11. $3(x - w) =$

12. $\dfrac{(w + x)^2 + 7(y - z)^3}{(w + x)^2 + 7(y - z)^3} =$



BONUS: _____ + (_____ − _____)² = _____

Illegal Laughter

Solve for the variable in each equation. Then use the variables to spell out the punch line of the joke at the bottom of the page. (You won't use all of the variables.) We did one for you.

1. $R - 2{,}000 = 1{,}529$
$R = 3{,}529$

2. $O + 13 = 358$
$O =$ _____

3. $6L = 78$
$L =$ _____

4. $Z \div 8 = 9$
$Z =$ _____

5. $E - 13{,}791 = 51{,}402$
$E =$ _____

6. $F \div 4{,}238 = 10$
$F =$ _____

7. $3Y - 5 = 37$
$Y =$ _____

8. $V \div 7 + 13 = 20$
$V =$ _____

9. $A - 40 = 5{,}678$
$A =$ _____

10. $3.7S + 5 = 745$
$S =$ _____

11. $4N = 260$
$N =$ _____

12. $W \div 9 = 567$
$W =$ _____

13. $T + 51 = 379$
$T =$ _____

14. $I - 2{,}345 = 95{,}186$
$I =$ _____

15. $3C + 2C = 109{,}225$
$C =$ _____

16. $37 + G = 99$
$G =$ _____

17. $3B = 270$
$B =$ _____

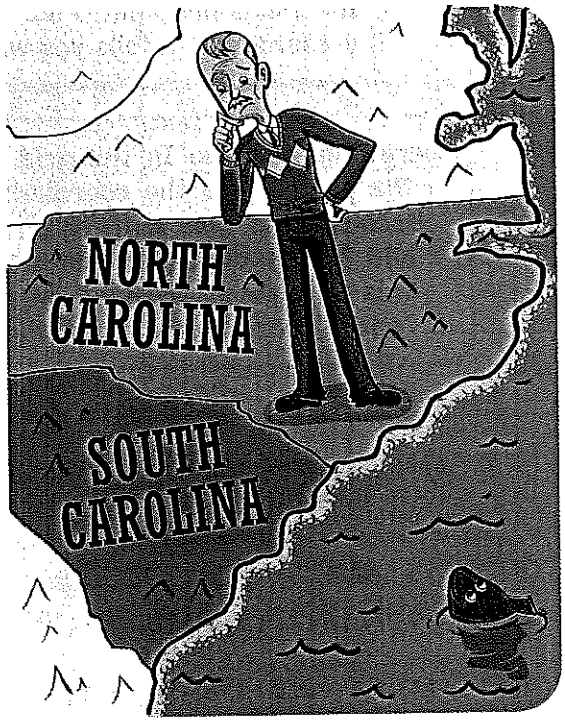
18. $U \div 8 = 574$
$U =$ _____

19. $9D - 10 = 2{,}132$
$D =$ _____

20. $\frac{3}{4}H = 12$
$H =$ _____

When solving for a variable, you must use inverse operations (operations that undo each other) to isolate the variable. For example:

$t + 5 = 20$
$t + 5 - 5 = 20 - 5$
$t = 15$



Why is it illegal for a man living in North Carolina to be buried in South Carolina?

97,531	328	200		5,718	62	5,718	97,531	65	200	328		328	16	65,193			
13	5,718	5,103		328	345		90	4,592	R 3,529	14		328	16	65,193			
13	97,531	49	97,531	65	62	!											

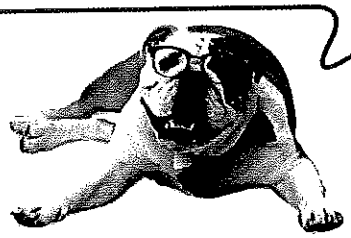
Get to the Point

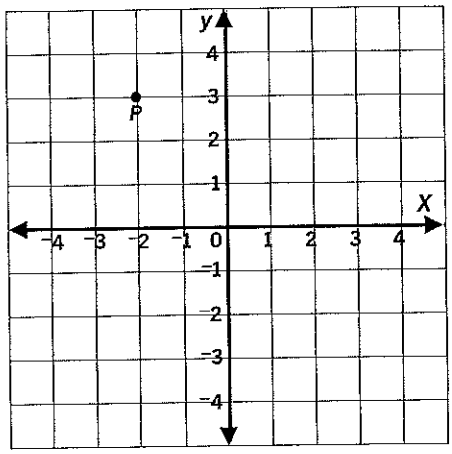
To find the answer to the riddle at the top of page 23, plot each set of ordered points on the coordinate plane. Connect the points in each set in the order they are given, then connect the last point in the set to the first point in the set. We graphed and connected a few points in the first set to get you started.

A **coordinate plane** is formed by the perpendicular intersection of two number lines. The horizontal number line is called the *x*-axis and the vertical number line is called the *y*-axis. The point where the two axes intersect is called the origin. The origin always has the coordinates (0, 0).

An **ordered pair** tells you the location of a point in the coordinate plane. The first number in the ordered pair is the *x*-coordinate. It tells you where along the *x*-axis the point is located. The second number in an ordered pair is the *y*-coordinate. It tells you where along the *y*-axis the point is located.

Here's an example: In the grid to my right, the point *P* has the coordinates (−2, 3) because it is even with −2 on the *x*-axis and 3 on *y*-axis. (You can also think of this as 2 places *below* 0 on the *x*-axis and 3 places *above* 0 on the *y*-axis.)





Set 1: (7, −7) (7, −1) (8, −1) (8, −6) (10, −6) (10, −7)

Set 2: (−7, 5) (−8, 5) (−8, 6) (−7, 6)

Set 3: (2, 3) (2, −3) (−1, −3) (−1, 3) (0, 3) (0, −2) (1, −2) (1, 3)

Set 4: (5, 0) (5, −1) (4, −1) (4, 0)

Set 5: (5, −3) (5, −4) (4, −4) (4, −3)

Set 6: (11, −9) (11, −3) (15, −3) (15, −4) (12, −4) (12, −5) (14, −5) (14, −6) (12, −6) (12, −8) (15, −8) (15, −9)

Set 7: (−14, 9) (−9, 9) (−9, 8) (−11, 8) (−11, 3) (−12, 3) (−12, 8) (−14, 8)

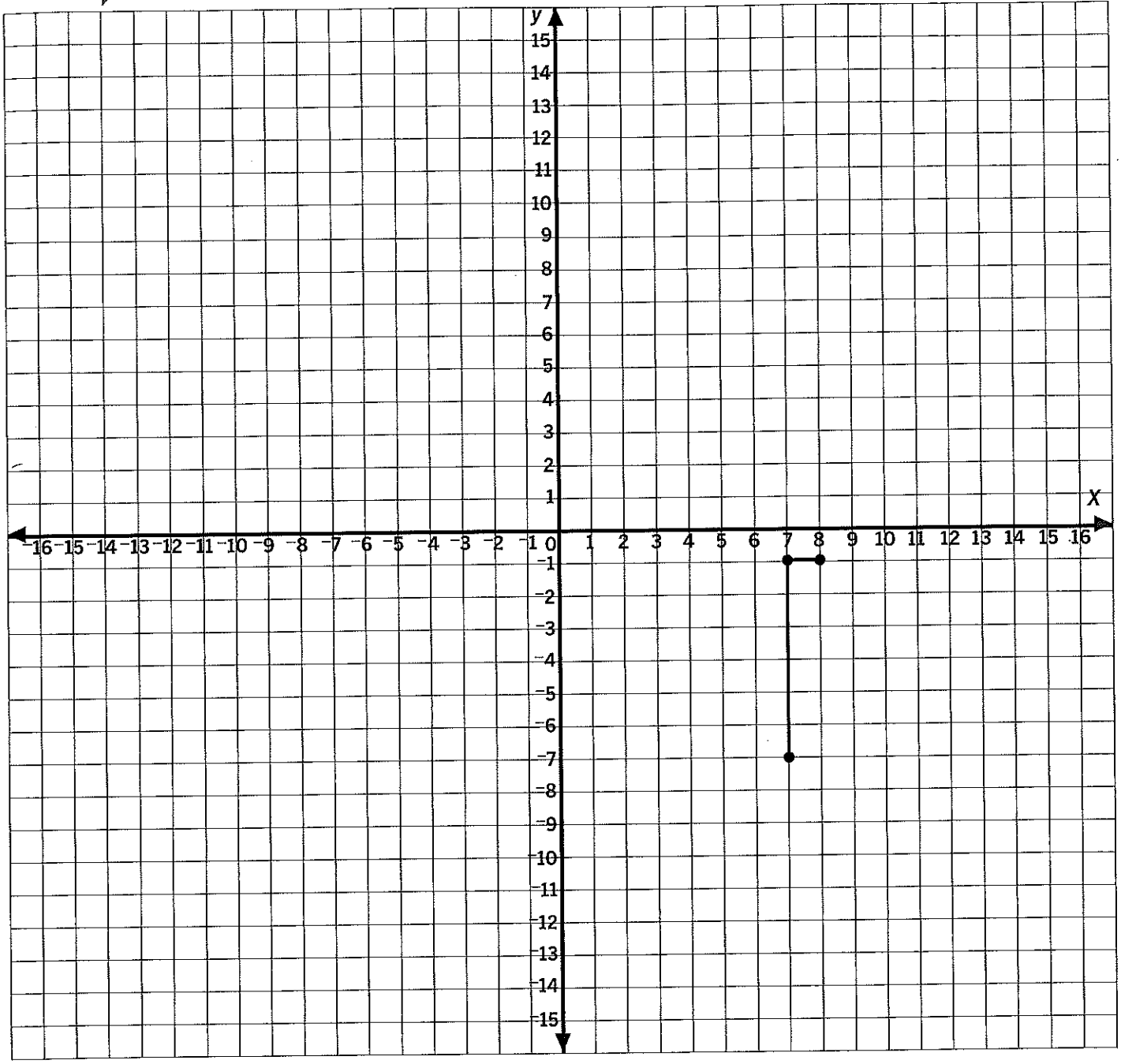
Set 8: (−4, 4) (−3, 4) (−3, 0) (−4, 0)

Set 9: (−5, 5) (−2, 5) (−2, −1) (−5, −1)

Set 10: (5, −2) (6, −3) (6, −5) (3, −5) (3, 1) (6, 1) (6, −1)

Set 11: (−9, 7) (−6, 7) (−6, 4) (−7, 4) (−6, 1) (−7, 1) (−8, 4) (−8, 1) (−9, 1)

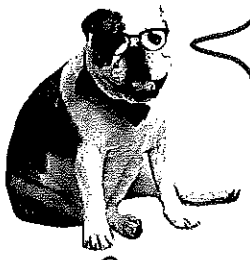
What's easy to get into but hard to get out of?



Graphing all those points was a lot of work, huh? I find that after any kind of work, it's nice to take a little nap. If now is not a convenient time for a nap, though, a bite of cheese or a good scratch behind the ears can also be quite refreshing.

Function Machines

Complete the function table on each Function Machine below. Fill in each blank with the correct input value, output value, or rule. (See Zero's box for more information.) We started the first one for you.



You know how a washing machine works: Dirty clothes go in, the machine washes them, and clean clothes come out. These function machines work in a similar way: A number goes in, the machine applies a rule to the number, and a new number comes out. The number you put in is called the input, the rule is called the function, and the number that comes out is called the output. A function table lists the output for each input you run through the machine.

FUNCTION #1

Rule: $4x = y$

Input (x)	Output (y)
5	20
3	___
-4	___
1.2	___
___	24
___	-32

FUNCTION #2

Rule: $2f + 3 = g$

Input (f)	Output (g)
4	___
-6	___
0	___
___	13
___	803
-2.5	___

FUNCTION #3

Rule: $3q - 5 = r$

Input (q)	Output (r)
8	___
___	13
100	___
___	-17
___	3.4
___	40

FUNCTION #4

Rule: _____

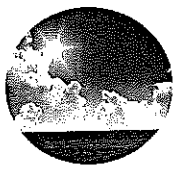
Input (s)	Output (t)
5	-20
-6	24
3	-12
11	___
___	-60
-12	___

What Makes Sense?

For each, circle the choice that makes the most sense.

1. The distance of a tall man's "wingspan," from fingertips to fingertips with arms outstretched:

2 yards 2 kilometers 2 centimeters



2. The temperature on a warm, sunny day:

85° Celsius 28° Fahrenheit 85° Fahrenheit

3. The distance between New York City and Washington, D.C.:

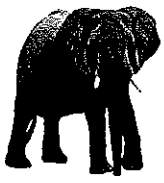
250 meters 250 miles 250 centimeters

4. The amount of lemonade in a full pitcher:

40 quarts 64 ounces 20 milligrams

5. The weight of your brown-bag lunch:

$\frac{1}{2}$ kilogram $\frac{1}{2}$ ounce $\frac{1}{2}$ gram



6. The amount of food an elephant eats in a day—about 200 kilograms—is about the same as . . .

4.4 pounds 44 pounds 440 pounds

7. The length of a family-size car:

192 inches 43 feet 17 yards

8. The approximate distance of the Boston Marathon:

26 centimeters 26 yards 26 miles

Pete's Proportion Puzzlers

Pete has realized he spends his whole day surrounded by proportions. Sometimes he finds this puzzling! We propose you help him find peace of mind by solving these problems. Use cross-multiplication. (We've done the first one for you.)

1 Pete is one of the 35 out of 80 kids in his neighborhood who walk to school every day. The ratio of kids who walk in his neighborhood is the same as the ratio of kids who walk in the entire school. If there are 400 kids in the school, how many of them walk to school every day?

$$\frac{35}{80} = \frac{x}{400}$$

$$80x = (35)(400)$$

$$80x = 14{,}000$$

$$x = 175$$

Answer: 175 kids

2 For English class, Pete needs to memorize a poem of 240 words. He is able to memorize 20 words in 3 minutes. How long will it take him to memorize the whole poem?

Answer: _____

3 Pete's school has a goal of owning 2 computers for every 5 students. How many computers does the school hope to have? (Remember, there are 400 kids in the school.)

Answer: _____

4 Tossing free throws in gym, Pete made 17 of 25 shots. At this rate, how many free throws would he make if he took 150 shots?

Answer: _____

5 On a math quiz, Pete answered the first 6 problems in 10 minutes. At the same rate, how long would it take him to complete the 15 problems on the quiz?

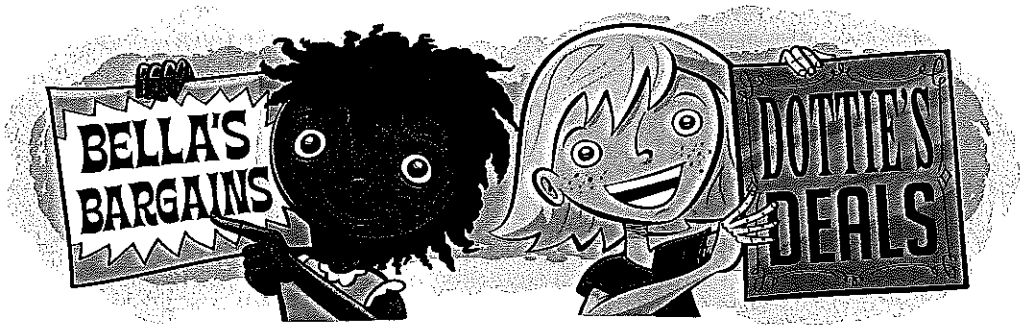
Answer: _____

6 At home, Pete counts the $42 he's saved during 6 weeks of babysitting. How much can he expect to save during 11 weeks?

Answer: _____

What's the Real Deal?

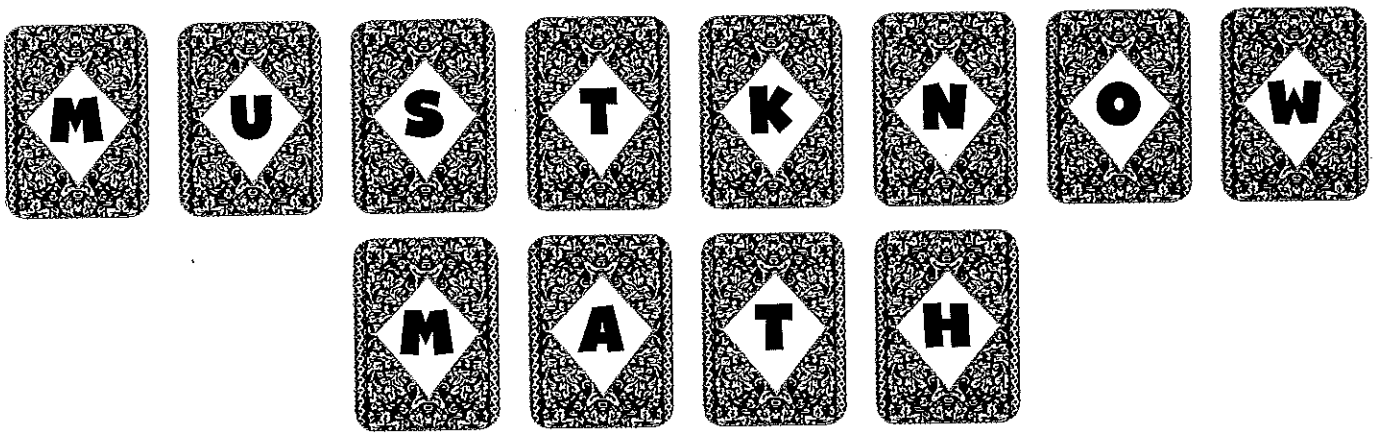
Bella's Bargains just opened up across the street from Dottie's Deals. Which store offers the better deal on each of the items below? Determine the value of each store's offerings by figuring out the unit rate for each item—in other words, how much would *one* cost? (Round your answers to the nearest cent.) Then circle the better deal. (We've done the first one for you.)



Product	Bella's Bargains	Unit Rate	Dottie's Deals	Unit Rate
apples	$3.20 for 8	$.40/apple	$1.80 for 6	$.30/apple
Peanut Butter Puffs cereal	$3.60 for 12 oz		$4.50 for 18 oz	
Zippy Juice energy drink	$16.00 for 10 bottles		$27.00 for 18 bottles	
1% milk	$2.38 for 2 half-gallons		$5.37 for 3 half-gallons	
organic eggplant	$9.95 for 5 lbs		$6.87 for 3 lbs	
Randy's Recycled Aluminum Foil	$4.99 for 75 sq ft		$10.89 for 200 sq ft	

Must-Know Probability

Figure the probability for each problem below. Write each answer as a fraction. The problems are based on 12 cards labeled as follows:



1 If you were to select one card at random, what would be the probability of selecting:

a. the letter "M"? ___

b. the letter "K"? ___

c. the letter "R"? ___

d. any vowel? ___

e. Which letter is as likely to be drawn as the "M"? ___

2 If you were to select two cards at random, being sure to put the first card back ("with replacement"), what would be the probability of selecting:

a. the letter "M" twice? ___

b. two vowels? ___

3 If you were to select two cards at random and did not put the first card back ("without replacement"), what would be the probability of selecting:

a. the letter "M" twice? ___

b. two vowels? ___

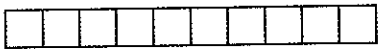
Remember! To find the probability of a compound event (like twice finding a card of the same letter), multiply the probability of the first event by the probability of the second event. But be careful! Sometimes the first event changes the probability of the second event (like when you don't put a card back after selecting it).

BONUS:

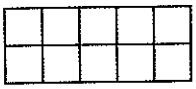
Using actual cards, see how many selections it takes for you to draw 2 M's. Try it with and without replacement. Are your results consistent with the theoretical results you found above? (Your teacher can download and print a reproducible template for the cards at www.scholastic.com/mustknowmath. Or you can create your own cards by labeling blank index cards with the letters.)

How Do Perimeters Measure Up?

Do rectangles with the same area also have the same perimeter? Let's find out! Find the area and perimeter of the two rectangles shown below. Then follow the second set of directions, below.

10 × 1 units 

Area:_____ Perimeter:_____

5 × 2 units 

Area:_____ Perimeter:_____

Next, find all rectangles with areas equal to 24 square units, using whole numbers only. If you like, draw the rectangles on a separate piece of paper to help you. Write each rectangle's dimensions in the spaces provided. Then find each rectangle's perimeter—but first, put a * by the one you think will have the largest perimeter. Circle the one you think will have the smallest perimeter.

_____ × _____ units Area: 24 sq units Perimeter: _____

_____ × _____ units Area: 24 sq units Perimeter: _____

_____ × _____ units Area: 24 sq units Perimeter: _____

_____ × _____ units Area: 24 sq units Perimeter: _____

_____

_____

_____

_____

Angle Answers

Wondering if you'll be President? Wondering if you'll live in France? Wondering if you might just be the most brilliant kid in the whole school? Well, wonder no more—the Amazing Angles can answer all of your most important yes-or-no questions! Here's how to use them: On a separate sheet of paper, write 10 yes-or-no questions and number them 1-10. Then, complete the problems below. The Amazing Angle that answers each problem will also provide an answer to one of your questions. Problem #1 answers your first question, Problem #2 answers your second question, and so forth.

The Amazing Angles

$\angle o = 5\frac{1}{2}°$	$\angle p = 25°$	$\angle q = 40°$	$\angle r = 50°$	$\angle s = 58°$	$\angle t = 70°$
Most likely.	Nope.	Of course.	It's complicated.	Absolutely not.	You don't want to know.
$\angle u = 80°$	$\angle v = 95\frac{1}{2}°$	$\angle w = 130°$	$\angle x = 148°$	$\angle y = 160°$	$\angle z = 170°$
It's highly doubtful.	Uh-uh.	Ha! No.	Count on it.	Absolutely.	Oh yeah!

1. $\angle a = 20°$
complement: _____

2. $\angle b = 65°$
complement: _____

3. $\angle c = 84\frac{1}{2}°$
complement: _____

4. $\angle d = 100°$
supplement: _____

5. $\angle e = 10°$
supplement: _____

6. $\angle f = 32°$
supplement: _____

7. $\angle g = 32°$
complement: _____

8. $\angle g = 50°$
supplement: _____

9. This angle combines with Amazing $\angle w$ to form a straight angle: _____

10. This angle combines with Amazing $\angle r$ to form a right angle: _____

No doubt you are deep in thought about the Amazing Angles' predictions, but please take a moment to circle the answers to the two questions at right.

Which two angle measures would form a complementary pair?

37° 29° 116° 64° 39° 61° 80°

Which two angle measures would form a supplementary pair?

54° 80° 96° 42° 118° 90° 84°

What's Your Angle?

Decide if each angle described or pictured below is acute, right, obtuse, or straight. Circle the word next to the correct answer. Then write it in the appropriate blank at the bottom of the page to unscramble a riddle.

1. A 125-degree angle

a. acute angle	even
b. right angle	more
c. obtuse angle	less
d. straight angle	odd

2. A 43-degree angle

a. acute angle	there
b. right angle	should
c. obtuse angle	wasn't
d. straight angle	they're

3. 

a. acute angle	by
b. right angle	with
c. obtuse angle	at
d. straight angle	of

4. 

a. acute angle	the
b. right angle	and
c. obtuse angle	too
d. straight angle	for

5. Each angle of a rectangle

a. acute angle	Who
b. right angle	What
c. obtuse angle	When
d. straight angle	Where

6. 

a. acute angle	me
b. right angle	her
c. obtuse angle	you
d. straight angle	him

7. Each angle of a STOP sign

a. acute angle	less
b. right angle	many
c. obtuse angle	more
d. straight angle	few

8. The hands of a clock at 6:00 p.m.

a. acute angle	was
b. right angle	have
c. obtuse angle	are
d. straight angle	is

9. Each angle of an equilateral triangle

a. acute angle	see
b. right angle	smell
c. obtuse angle	hear
d. straight angle	touch

10. The corner of any page in this workbook

a. acute angle	Light
b. right angle	Darkness
c. obtuse angle	Invisible
d. straight angle	Sunshine

Q: _____ _____ _____ _____ _____

5 8 2 7 3

_____ _____ _____ _____? **A:** _____!

4 1 6 9 10

Here's a bonus question. What kind of angle is formed by clock hands at 3:30? Answer: _____ *Careful—the answer is NOT a right angle. Can you explain why?*

_____

_____