

Buying a Car

Take-home kit



Primes
Parents. Schools. Math.

A Primes workshop sponsored by WestEd and Stanford University, made possible by a grant from the National Science Foundation.

Messages to Take Home:

The following pages will provide you with activities and information that will help you to take the Primes messages home with you and to make them part of your life.

1. You do math everyday. (pp. 2-5)

In the workshop, you used the internet to choose a car and make financing decisions to buy that car. To succeed with the activities, you used your everyday knowledge of variables and your skill of looking for patterns and relationships in tables—two important concepts in algebra.

2. Algebra is taught in middle school. (pp. 2-5)

Variable is a fundamental concept in algebra and statistics. In middle school, students move from very informal to more standard treatments of variable.

Using patterns and tables to analyze relationships among variables is an important algebraic skill developed in middle school.

3. Today's math classrooms are different. (pp. 6-8)

In today's classrooms, technology is used to help build mathematical knowledge. Calculators, computers and other tools do not make the mathematics easier or less rigorous; technology is used to help students make quick numerical discoveries that they can use to engage in higher level math thinking.

4. You can help your child with math. (pp. 9-11)

Go online to help your child with homework, to find math activities for review or enrichment, or to find more ways to get involved with your child's math education. The internet is a valuable resource that offers assistance and ideas no matter what your child's math needs are.

Additional information:

You'll also find more information about using the internet to help you buy a car and you'll find answers for the different puzzles and games in this booklet.

Learn more about buying a car online. (pp. 12-13)

Answers. (p. 14)

Learn more about Primes. (p. 15)

You do math everyday.

In the Primes workshop, you used the internet to help you figure out how to finance a new car within a given budget. To do this you applied your everyday knowledge of **algebra**. You used **variables**—amounts that change in value—when you adjusted the down payment, interest rate and length of the loan to reflect different situations. And, you used the information you recorded in the **table** to discover how the differences in down payment, interest rate and length of loan affected the monthly payments and total cost of the car.

Algebra is taught in middle school.

Since the 1950s, it has been common for students in the U.S. to study algebra in high school. Now math educators believe that it is helpful for students to develop the reasoning and skills that algebra requires starting in the lower grades. In middle school, students develop a deep understanding of variables. They also learn to use tables of values to see patterns. By getting a head start with important concepts like these, more students get the chance to really understand the basic ideas of algebra before they are formally introduced to Algebra and the mysteries of X.

Reinforce these middle school math concepts at home.

Activities:

- **Fortune Teller—(p. 3-4)**
Use a variable expression to answer questions about the future. Your fortune is in the cards.
- **What Comes Next?—(p. 5)**
Patterns are very important in the study of algebra. Study these mathematical and not-so-mathematical patterns to figure out what comes next?

Fortune Teller

No one can predict the future, but it's fun to try. To use this fortune teller you need a deck of cards, your mathematical mind, and a question about the future. Here's how it works:



Ask a yes or no question about the future.



Pick a card from a deck of playing cards.



Substitute the value of the card for x in the expression, **$3x + 7$** .

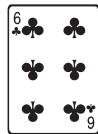


Evaluate the expression.



Check the fortune key (page 4) to answer your question.

For example:



Say you pick this card.

• It is a 6, so substitute 6 for x in the expression $3x + 7$.

$$3(6) + 7$$

• The expression now reads: three times six plus seven.

Look for **25** on the next page to find the answer to your question.

$$3(6) + 7$$

$$18 + 7$$

$$25$$

• Three times six is eighteen, plus seven is twenty-five.

Math hints: A number written directly next to a variable (letter) with no symbols in between indicates multiplication. So, to evaluate the expression $3x + 7$, you multiply the variable (the value of the card) by three and add seven.

In algebra, a letter that stands for a number is called a **variable**. Depending on the situation, the value of the **variable** can change, or **vary**. **X** is the variable in the fortune teller expression $3x + 7$, it changes values each time a card is picked.

Fortune Teller Key

Now that you have evaluated the variable expression, use this key to find the answer to your question. If you are unsatisfied with your fortune, try again. (See the answers on p. 14 for the math behind each fortune.)

- 28** Yes, definitely.
- 34** It is unclear.
- 19** It looks promising.
- 10** If you want it, it will happen.
- 46** Concentrate and ask again later.
- 25** No, but it's for the best.
- 40** It doesn't look good.
- 3** Too early to tell.
- 31** Answer hazy, try again.
- 43** Signs point to yes.
- 16** Better not tell you now.
- 37** My sources say no.
- 22** You can count on it.

What Comes Next?

Many algebra problems can be solved by identifying patterns. While patterns are often found in charts or tables, they can also be found in other sequences. Study each sequence below to find the missing element in the pattern. Then state the rule for creating the pattern. (Answers on p.14)

Pattern	Rule
ex. 2, 4, 6, 8, 10, <u>12</u>	<u>Add two every time</u>
1. 20, 15, 10, _____, 0	_____
2. 72, 64, 56, 48, 40, _____, 24, 16	_____
3. 1, 2, 4, 8, 16, 32, 64, 128, 256, _____	_____
4. 1, 4, 9, 16, 25, 36, 49, _____, 81, 100	_____
5. 0, 1, 3, 6, 10, 15, 21, 28, 36, _____, 55	_____
6. 16, 8, 4, 2, 1, _____	_____
7. 1, 1, 2, 8, 3, 27, 4, 64, 5, _____	_____
8. 1, 5, 25, 125, 625, _____	_____
9. 9:30am, 11:00am, _____, 2:00pm	_____
10. March, June, September, _____	_____
11. 6, 6, 7, 9, 8, 6, _____ Clue: Don't be in a daze about days.	_____
12. 1 uses 1, 2 uses 2, 3 uses 3, 4 uses 2, five uses _____, 6 uses 2 Clue: Romans could count on this pattern.	_____

Today's classrooms are different.

Your child(ren) may be learning math in ways that seem very different from your own experiences in school. Students today work in groups, on long-term projects and sometimes without textbooks. Many math classrooms are equipped with computers, the internet and other kinds of technology that are used to help build mathematical knowledge. These tools do not make the mathematics easier or less rigorous; technology is used to help students make quick numerical discoveries that they can analyze using higher-level math thinking.

In the Primes workshop, you used technology to help you find information about cars and investigate financing options. Each time you changed your down payment, interest rate or loan term, you saw the effects in your monthly payment and total cost. As you made more and more attempts, you noticed mathematical patterns that helped you find a way to afford a car within your given budget. The technology did not give the answers away, it helped make the mathematics more accessible—enabling you to quickly see the relationships among the variables and make an informed decision.

Use calculator technology at home to help build mathematical knowledge.

Activities:

- **Four in a row—(p. 7)**
Play a calculator game to practice mental multiplication and estimation. Connect four to win.
- **Target math—(p. 8)**
Play a calculator game to make discoveries about multiplication and division of rational numbers. The first one to hit the target wins.

Four in a Row

This calculator game will help you practice your mental math skills of multiplication and estimation. Before each turn, decide where you want to move. Then try to pick the numbers that will get you there.

You need:



a calculator



small markers—20 for each team
(coins, scraps of colored paper, etc.)



this paper

Playing the game

1. Play with 2 players or two teams.
2. The player/team with the next birthday goes first.
3. On your turn, pick two numbers from the list.
Multiply the numbers on your calculator.
4. Cover the product (the answer) on the board below with your marker.
5. The first player/team with four in a row (horizontally, vertically or diagonally) wins.

These are your choices:

41	29	7
11	53	19
61	3	21

1281	147	583	63	1537	399
609	3233	21	427	209	2501
133	319	371	1133	57	1769
1007	183	33	671	123	451
203	861	287	231	551	1189
779	159	1159	87	2173	77

Target Math

This calculator game will help you make discoveries about rational numbers. On each turn, as you multiply or divide, pay attention to how the calculations affect the answer. Try to figure out what numbers you'll need to use to hit the target.

You need:



a calculator

Playing the game

1. Pick a target range. (Start with a wide range of 10, like 100-110. As you get better, narrow the range to 5, like 150-155. Eventually, use a range of 1, like 202-203.)
2. Decide if you want to play the game with multiplication or division. Once you decide, that will be the only operation allowed in the game.
3. Player 1: Enter any number on the calculator.
4. Player 2: Multiply (or divide, whichever you decided) by another number to get as close to the range as possible.
5. Player 1: Multiply (or divide) the new number by another number to try to get within the range. (You may have to use decimal numbers between 0 and 1.)
6. The winner is the first player to get an answer within the range.



152.386 is a winning answer for a game with a range of 150-155.

You can help your child with math.

Though you may not always recognize it, you do math in all sorts of situations every day. Even if you believe that you are not good at math, you CAN do lots of things to help your child succeed in math. Simple things such as looking over your child's homework or having a conference with your child's math teacher can go a long way. If your child realizes that you take his math education seriously, he will feel supported and will be more likely to take responsibility for his own math learning.

In addition to supporting your child's math education in school, there are many things that you can do to help your child outside of school. The internet offers a wealth of information that you can use to help your child with homework, find mathematical puzzles and games for review or enrichment, and learn about important issues in education and parenting. The internet can help you find answers to questions that you don't know how to answer yourself. Try using the internet with your child. If you don't have an internet connection at home, you can often make use of one at a library, school or community center.

Activities:

- **Math Online—(pp. 10-11)**
If you know where to look, you can find excellent math resources and other tips about school on the internet. Here are some ideas to get you started.

Math Online

We all need help in supporting our children's learning, but it's not always clear where to look. The internet is a great place to find useful resources dealing with topics in math or general parenting issues. Here are some sites to get you started.

<http://www.figurethis.org>

This site provides a fun and family-friendly way to become more involved in learning math. It features interesting math challenges that middle-school students can do at home with their families. It also boasts the "Family Corner", a series of excellent brochures designed to help families support their children's math studies. These resources include sample questions to ask teachers and administrators, suggestions to help with math homework and information on changes in math education.

Figure This!
Math Challenges for Families

<http://www.middleweb.com>



This site offers a wealth of information for parents interested in the latest news and discussions on topics surrounding middle school reform. Issues of gender, age, class size and content are all reviewed on this site. You will also find worthwhile links to other resources for parents of middle school students.

Start out by going to the home page and clicking on the words "tips on how to use our site." This link will help make the information on the site more manageable.

Math Online

<http://mathforum.com/dr.math>

Ask Dr. Math is a question and answer service for math students. Students submit questions to Dr. Math by filling out a form on the web site. Answers are sent back by e-mail. The best questions and answers are collected in a searchable archive organized by grade level and topic. If you have a question, use the Dr. Math searcher to see if your question has already been answered or explore the Dr. Math FAQ to check if your question is addressed in the Frequently Asked Questions.



<http://www.bigchalk.com>



This site provides resources for teachers, parents, and students and can be browsed by subject and age group. The parent section is quite comprehensive and is divided into two categories: support your child's learning and explore the web with your child. The support section provides information on everything from homework resources to expert advice to parent interest links and periodicals. The explore section includes links to the weeks top 8 learning websites, online field trips and regularly updated themes and knowledge spotlights.

<http://www.math.com>

The content on this site is divided into sections for parents, students, teachers and everyone. The parents section includes support to for parents to help their kids with math homework including clear explanations of different math topics, math dictionaries, formulas, tables and online math tools. The site includes interesting articles on everything from special needs to homeschooling and tutoring and also promotes educational books and games that focus on math.



More about buying a car.

In addition to learning a bit about middle school math and how you can help your child succeed, this workshop also taught you a few things about using tools on the internet to buy a car. Beyond the Primes website, the internet has all sorts of tools and tips for buying and financing a car.

Activities:

- **Buying a Car-online information—(p. 13)**
Before you make any big financial decision, it's helpful to educate yourself as much as possible. Here are some useful car buying/financial sites on the internet.

Car Buying Websites

Many sites on the internet are geared toward helping you find out information about cars, as well as allowing you to purchase cars and arrange financing. Here are some sites to get you started.

The Motley Fool

<http://www.fool.com/car/Buyingacar.htm>

This site provides a good overview of the issues around buying a new or used car, along with some strong opinions about the best way to proceed.

Edmunds

<http://www.edmunds.com>

This site provides information about new cars, including pricing, options and industry news.

Kelly Blue Book

<http://www.kbb.com>

This site provides used car pricing and trade-in values.

MSN CarPoint

<http://carpoint.msn.com>

Microsoft's one-stop shopping site for new cars. Some of the features on this site require the latest software to use.

Giggo

<http://www.giggo.com>

Another car buying site.

Cars.com

<http://www.cars.com>

Information about new and used cars as well as maintenance advice and more.

E-Loan

<http://www.eloan.com>

Provides loans of all types.

Answers

Fortune Teller Key—page 4

card	A	2	3	4	5	6
	$x = 1$	$x = 2$	$x = 3$	$x = 4$	$x = 5$	$x = 6$
	$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$
	$3(1) + 7$	$3(2) + 7$	$3(3) + 7$	$3(4) + 7$	$3(5) + 7$	$3(6) + 7$
	$3 + 7$	$6 + 7$	$9 + 7$	$12 + 7$	$15 + 7$	$18 + 7$
answer	10	13	16	19	22	25
7	8	9	10	J	Q	K
$x = 7$	$x = 8$	$x = 9$	$x = 10$	$x = 11$	$x = 12$	$x = 13$
$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$	$3x + 7$
$3(7) + 7$	$3(8) + 7$	$3(9) + 7$	$3(10) + 7$	$3(11) + 7$	$3(12) + 7$	$3(13) + 7$
$21 + 7$	$24 + 7$	$27 + 7$	$30 + 7$	$33 + 7$	$36 + 7$	$39 + 7$
28	31	34	37	40	43	46

What Comes Next?—page 5

- 5 — subtract 5 every time
- 32 — subtract 8 every time
- 512 — double the number that comes before
- 64 — find the next square number ($1 \times 1 = 1$, $2 \times 2 = 4$, $3 \times 3 = 9$, and so on)
- 45 — add the next counting number ($0 + 1 = 1$, $1 + 2 = 3$, $3 + 3 = 6$, $6 + 4 = 10$, and so on)
- $\frac{1}{2}$ — take half of the number that comes before
- 125 — the counting numbers followed by their cubes (1, $1 \times 1 \times 1 = 1$, 2, $2 \times 2 \times 2 = 8$, 3, $3 \times 3 \times 3 = 27$)
- 3125 — find the next power of 5 ($5^0 = 1$, $5^1 = 5$, $5^2 = 25$, and so on) or multiply by 5 every time
- 12:30 pm — add an hour and a half
- December — every third month
- 6 — the number of letters in each day of the week starting with Sunday
- 1 — the number of characters for each number in Roman numerals (1=I, 2=II, 3=III, 4=IV)



Primes
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Primes consists of workshops, a Parent Action Guide and a television special, all created with the goal of getting parents involved with their child's math education.

If you'd like to attend another Primes workshop, host one yourself, or find out more about Primes. . .

Contact us

WestEd



visit our website:
<http://primes.wested.org>



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