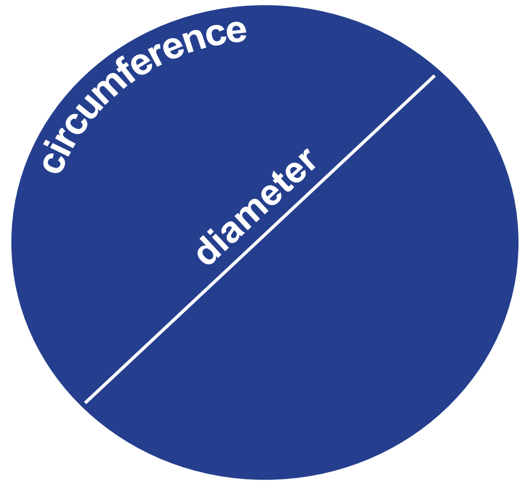
Measuring Circles

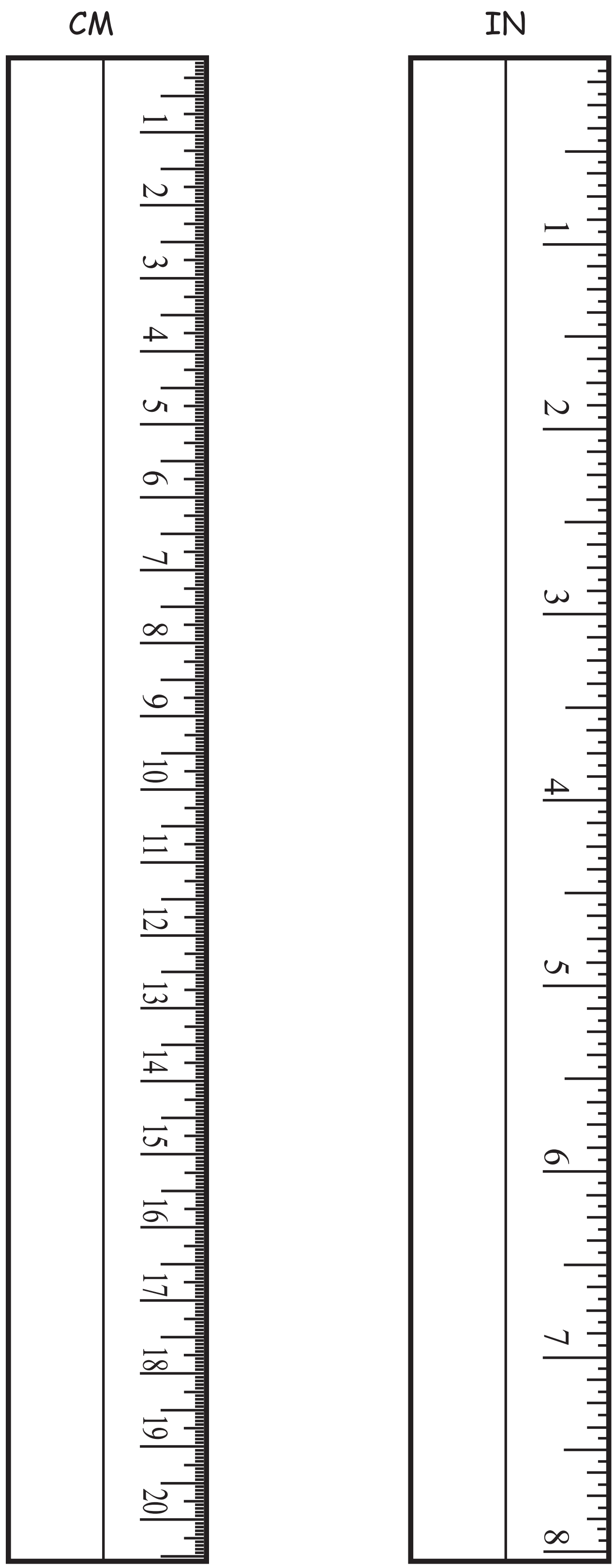
- **Find 3 round objects to measure.**
- **With a partner, carefully measure the circumference and the diameter of your items.**
- **Measure to the nearest centimeter.**



Measurement Chart

Object	Circumference	Diameter	

Ruler



Recording Measurements

Object	Circumference	Diameter	

π How do we use the value of pi? π

The Mad Hatter

"One size" does not fit all!

If you do not know your hat size,
it is easy to find out for yourself.

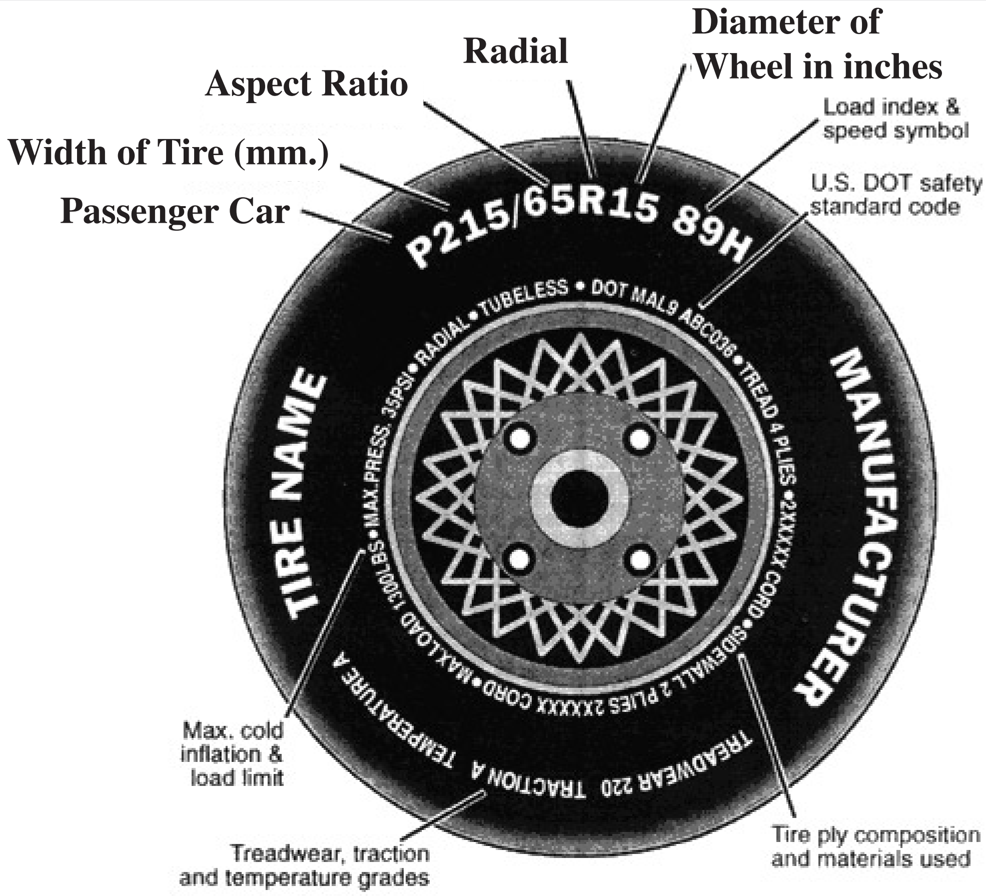
1. Measure the circumference of your head at the widest part (usually this is just above your ears and touching the very top of your eyebrows).

2. After you have found that measurement, check the chart to see what size you wear.

Circumference to nearest 1/4 inch	Hat Size
19 3/4	6 1/4
20	6 3/8
20 1/2	6 1/2
21	6 5/8
21 1/4	6 3/4
21 1/2	6 7/8
22	7
22 1/2	7 1/8
22 3/4	7 1/4
23 1/4	7 3/8
23 3/4	7 1/2
24	7 5/8
24 1/2	7 3/4

What is the approximate relationship between your head measurement and your hat size?

Sidewall of a Tire



The graphic shows what each letter and number on the sidewall of a tire indicates. The following is a breakdown of the components of the size of the tire (shown in top, center of tire graphic).

P Passenger car tire. If there is no P before the size it would indicate it is a European metric tire. An LT before the size would designate a light truck tire.

215 This is the Section Width in millimeters. This measurement is taken from sidewall to sidewall.

65 This number refers to the height of the sidewall, or the Aspect Ratio.

R Radial tire construction.

15 Wheel diameter in inches.

Tire Ad

TARZAN'S TIRES

4 NEW TIRES!
STEEL RADIALS ANY SIZE LISTED
A SWINGIN DEAL!

$55	$65	$75
165/80R13	185/75R14	215/75R15
30,000 MILE WARRANTY	30,000 MILE WARRANTY	30,000 MILE WARRANTY

no carryouts • installation extra

What do you know about tires from this ad?

Tire Applications

TARZAN'S TIRES

4 NEW TIRES!
STEEL RADIALS ANY SIZE LISTED
A SWINGIN DEAL!

$55	$65	$75
165/80R13	**185/75R14**	**215/75R15**
30,000 MILE WARRANTY	30,000 MILE WARRANTY	30,000 MILE WARRANTY

no carryouts • installation extra

Tires are sold according to the diameter of the wheel or rim. (The last 2 numbers are the diameter.) When these tires are added to the wheels, the total diameters become about 23", 25", and 27" respectively

1. **What is the approximate circumference on each of these tire sizes?**

2. **What size of tire fits on your car?**

3. **How far has the car traveled when the tires have completed 3 rotations? Is it the same for each tire?**

4. **Speedometers are calibrated according to the size of tire recommended for your car. A man was stopped for speeding and told the officer that he had just changed tires and had bought a different size than recommended Do you think that he bought larger or smaller tires? Explain your thinking.**

NCTM Measurement Standard and Expectations

Measurement Standard:

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Apply appropriate techniques, tools, and formulas to determine measurements

Grade 6-8 Expectations:

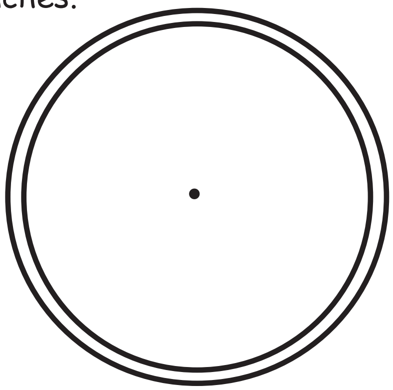
- Use common benchmarks to select appropriate methods for estimating measurements.
- Develop and use formulas to determine circumference and area of circles

Grade 9-12:

- Understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres, and cylinders

Circumference Applications

1. You have worn down your tires by 1/2 inch. The original tire had a diameter of 25 inches.



a) What is the new diameter?
b) How does the difference in diameters affect the accuracy of your speedometer?
c) Does it register that you are going faster or slower than your actual speed?

2. Draw the largest circle that you can in this 5″ by 5″ square.

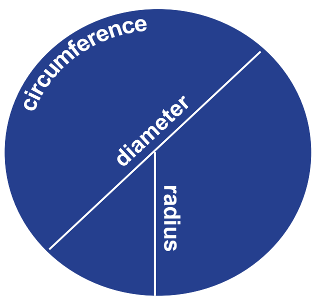
a) What is the diameter of the circle?
b) What is the circumfernce of the circle?
c) What is the perimeter of the square?
d) What is the ratio of the perimeter to the circumference?
e) Draw another square and draw the biggest circle that you can inside of it. Is the ratio of the perimeter to the circumference the same?

3. Suppose Earth is exactly 25,000 miles around at the equator. Suppose you make a long string that is intended to fit perfectly around the equator but you made it too long. Your string is 1 yard too long. You put the string around the equator anyway and you are able to adjust it so that it is uniformly off the ground by the same amount over the whole equator.

a) Would you be able to crawl under the string?
b) Would a bug be able to crawl under the string?

Facts Sheet: The Distance Around

What does it mean?



Circumference: The distance around a circle

Diameter: The distance across one end to another; or a chord of a circle that passes through the center of a circle.

Radius: The distance half-way across; or a line segment that connects the center of the circle to a point on the circle.

Average: A number that best represents a list of numbers.

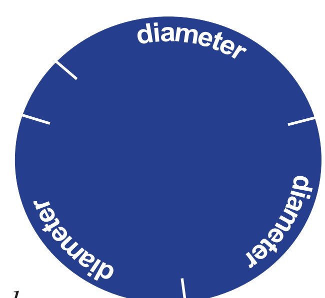
- **Mean:** Add up all the numbers in a set of numbers and divide the sum by the number of items in the list.
- **Mode:** The number that occurs most often in a set of numbers.
- **Median:** Rewrite the set of numbers in order from smallest to largest and find the *middle number in the set of numbers.

  * *There will be a middle number if the number of items is odd, but there will not be a middle number if the number of items is even. If two numbers share the middle, find the number that is exactly halfway between them or their average.*

Ratio: A comparison of two things or quantitites.

"Pi" or π: A comparison of the circumference to the diameter of a circle.

*π = 3.14159… or ≈ 3.14 $\qquad \dfrac{\text{Circumference}}{\text{Diameter}} = \pi$



* *The Ancient Greeks discovered that if you divide the circumference of a circle by its diameter, you get 3.14159… They named this number π, a Greek letter that is read as "pi". We use "pi" as a benchmark to help make easy estimations.*

Formulas: Circumference = π x Diameter or πd

Circumference = π x Radius x 2 or $2\pi r$

Diameter = 2 x Radius or $2r$

Never to Always

DIRECTIONS:

What is the chance that a pig will fly?

Below is a scale. On one end is Never (0), which would relate to something that is impossible. On the other end is Always (1), which would relate to something that is certain.

Decide on the probability of each of the events below. Write the letter that corresponds to the event on the scale.

A. Flipping a coin and getting heads.

B. You will win the lottery.

C. Going to a store and finding that they don't have your size in the T-shirt you like best.

D. The sun will come up in the East tomorrow.

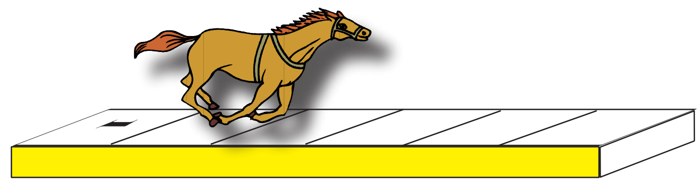
E. It will rain today.

F. That you will draw a red marble out of a mystery bag that contains 3 red marbles and 1 blue one.

G. Rolling a number cube and getting a 6.

Never to Always Scale

The Horse Race Directions



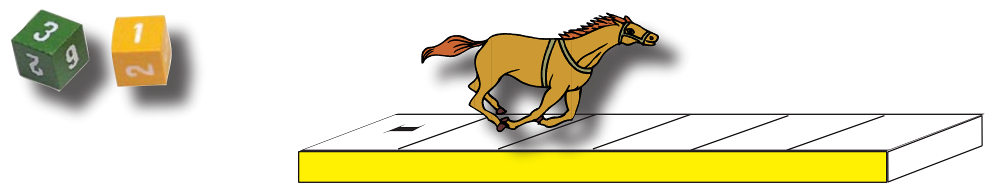
Directions:

1. Each player chooses a number on the gameboard.
2. Two number cubes are rolled and the sum is called out.
3. Place an X on the gameboard in the START area above the sum that is called.
4. The winner is the first to place an X in the FINISH area (it takes 5 Xs above the number chosen to win with this gameboard).

					FINISH					
					START					
2	3	4	5	6	7	8	9	10	11	12

Sums

The Horse Race Gameboards



				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12

Sums

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12

Sums

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12

Sums

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12

Sums

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12

Sums

				FINISH						
				START						
2	3	4	5	6	7	8	9	10	11	12

Sums

Outcome Matrix

Complete the chart to show all possible outcomes of rolling 2 number cubes.

+	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

How many spaces are in the outcome grid? _______

How many of the spaces have sums of:

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

Probabilty

Description: Probability will help you decide how often something is likely to happen. The probability of an event is the ratio of the number of desired outcomes to the total number of possible outcomes.

$$P\ (\text{event}) = \frac{\text{desired outcomes}}{\text{total possible outcomes}}$$

For example: $$P\ (\text{rolling a sum of } 3) = \frac{\text{number of 3s}}{\text{total number of squares}}$$

Directions: What are the following theoretical probabilities?

P (rolling a sum of 1)? ________________________

P (rolling a sum of 2)? ________________________

P (rolling a sum of 3)? ________________________

P (rolling a sum of 4)? ________________________

P (rolling a sum of 5)? ________________________

P (rolling a sum of 6)? ________________________

P (rolling a sum of 7)? ________________________

P (rolling a sum of 8)? ________________________

P (rolling a sum of 9)? ________________________

P (rolling a sum of 10)? ________________________

P (rolling a sum of 11)? ________________________

P (rolling a sum of 12)? ________________________

Description:

Probability will help you decide how often something is likely to happen.

$$P\,(\text{event}) = \frac{\text{desired outcomes}}{\text{total possible outcomes}}$$

For example:

$$P\,(\text{rolling a sum of 3}) = \frac{\text{number of 3s}}{\text{total number of squares}}$$

Directions:

What are the following probabilities?

P (rolling a sum of 1)? ______________________

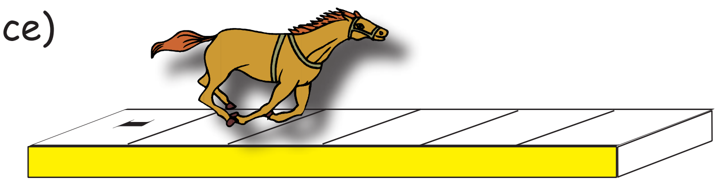
P (rolling a sum of 2)? ______________________

P (rolling a sum of 3)? ______________________

P (rolling a sum of 4)? ______________________

Now finish the rest on your own.

Is It Fair?



Materials: 2 number cubes (or dice)
Gameboard

Number of Players: 4

The game:

1. Each player chooses a column on the gameboard.
2. Two number cubes are rolled and the sum is called out.
3. The player with that sum places an X on the gameboard in the START area's column that contains the number called.
4. The winner is the first to reach the FINISH area.

FINISH			
START			
4 or 5	2 or 7	8 or 11	9 or 10

* For sums of:

3, 6, 12

no one advances

NCTM Expectations

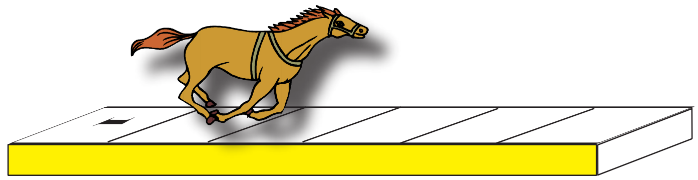
How did we address the following probablity expectations for grades 6-8 from the NCTM Standards for school mathematics in this session?

- Understand and use appropriate terminology to describe complementary and mutually exclusive events.

- Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations.

- Compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models.

A Different Race



Materials: 2 number cubes
(or dice)
Gameboard

Number of Players: 2 or more

The Game:

1. Each player chooses a number on the gameboard.
2. Two number cubes are rolled and the difference is called out (6-4=2).
3. Place an X on the gameboard in the START area above the difference called.
4. The winner is the first to move into the FINISH area.

FINISH					
START					
0	1	2	3	4	5

Differences

Adapted from "They're Off!" by Alfinio Flores and "Mathematical Activities from Poland" by Jerzy Gwirko-Goadycki

Game Variations for Home

Materials: 2 number cubes (or dice)

Game 1: Roll Odd, Roll Even
Gameboard: The Horse Race gameboards
The Game:
1. One player chooses the odd numbers and one player chooses the even numbers.
2. Two number cubes are rolled and the sum is called out.
3. Place an X on the gameboard above the sum that was called.
4. The winner is the first to place an X in the finish area.
5. Is this a fair game?

Game 2: Roll Odd, Roll Even Variation
Gameboard: A Different Race gameboard
The Game:
1. One player chooses the odd numbers and one player chooses the even numbers.
2. The number cubes are rolled and the difference is called out.
3. Place an X on the gameboard above the difference that was called.
4. The winner is the first to place an X in the finish area.
5. Is this a fair game?

Game 3: Over-the-Hill
Gameboard: Create a new gameboard with places for two horses, one for the numbers 1-15, and one for the numbers 16-36.
The Game:
1. One player chooses the first horse: numbers 1-15, and the second player chooses the other horse: numbers 16-36.
2. The number cubes are rolled and the product is called out. (ex: if 2 and 5 were rolled, call out 2X5 = 10)
3. Place an X on the gameboard above the horse that has that number, in the example it would be horse one iwht the numbers 1-15.
4. The winner is the first to place an X in the finish area.
5. Is this a fair game?

Double Trouble

Materials: 2 number cubes (or dice)
Paper and pencil for scoring

Number of Players: 2 or more

The game:
1. Each turn of the game consists of one or more rolls of the number cubes.
2. Keep rolling until you decide to stop, or roll a double.
3. You may choose to stop anytime.

Scoring:
1. You receive one point for each time that you roll without getting doubles.
2. If you stop before you roll a double, you keep all your points. If you roll a double, you receive no points for that turn, no matter how many rolls you had before the double.
3. Each turn is scored separately.
4. Add the score from 5 turns together to determine your final score for the game.
5. The winner is the one with the highest score.

Noncompetitive version:
Try to get your highest score together, making decisions as a team. This game could also be played by one person who tries to beat his own record score.

Player One

Round Number	Round Total
1	
2	
3	
4	
5	
Grand Total	

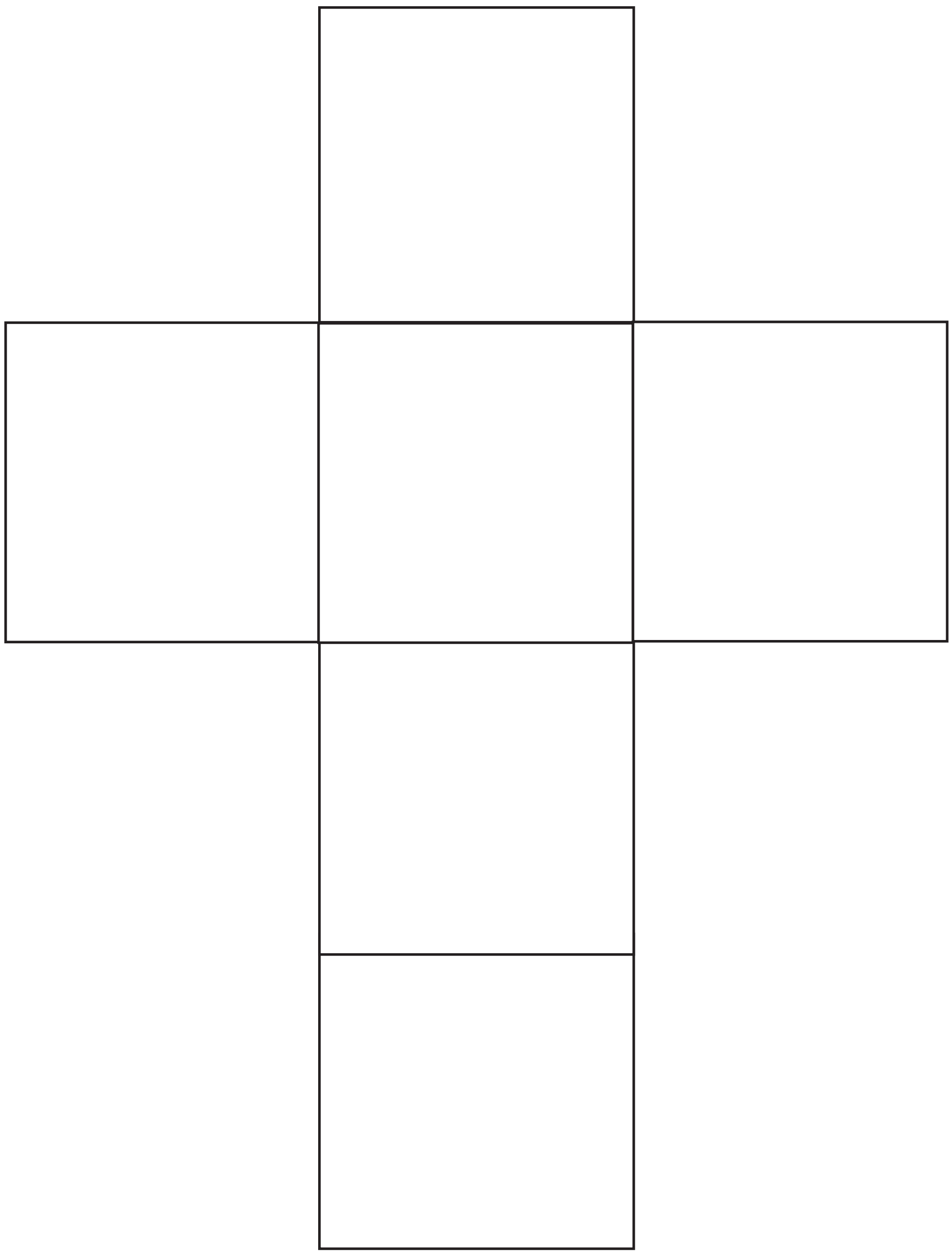
Player Two

Round Number	Round Total
1	
2	
3	
4	
5	
Grand Total	

Cube

Cut around the outline of the shape below. Fold to make a cube.

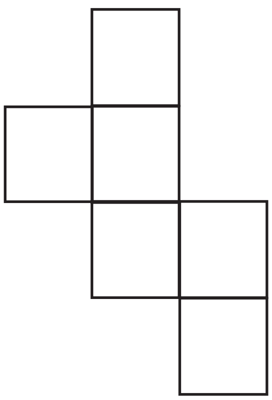
Cube



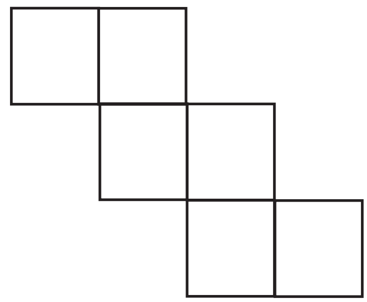
Does it make a cube?

Glance at these nets and guess if they will fold into a cube.

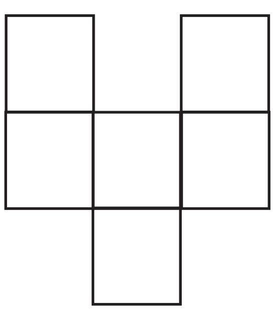
Will this net fold into a cube?
Yes No



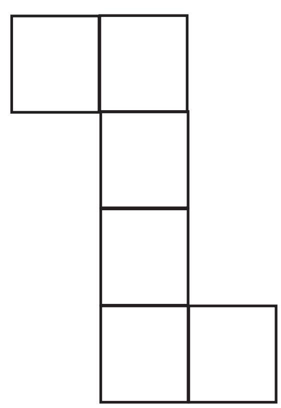
Will this net fold into a cube?
Yes No



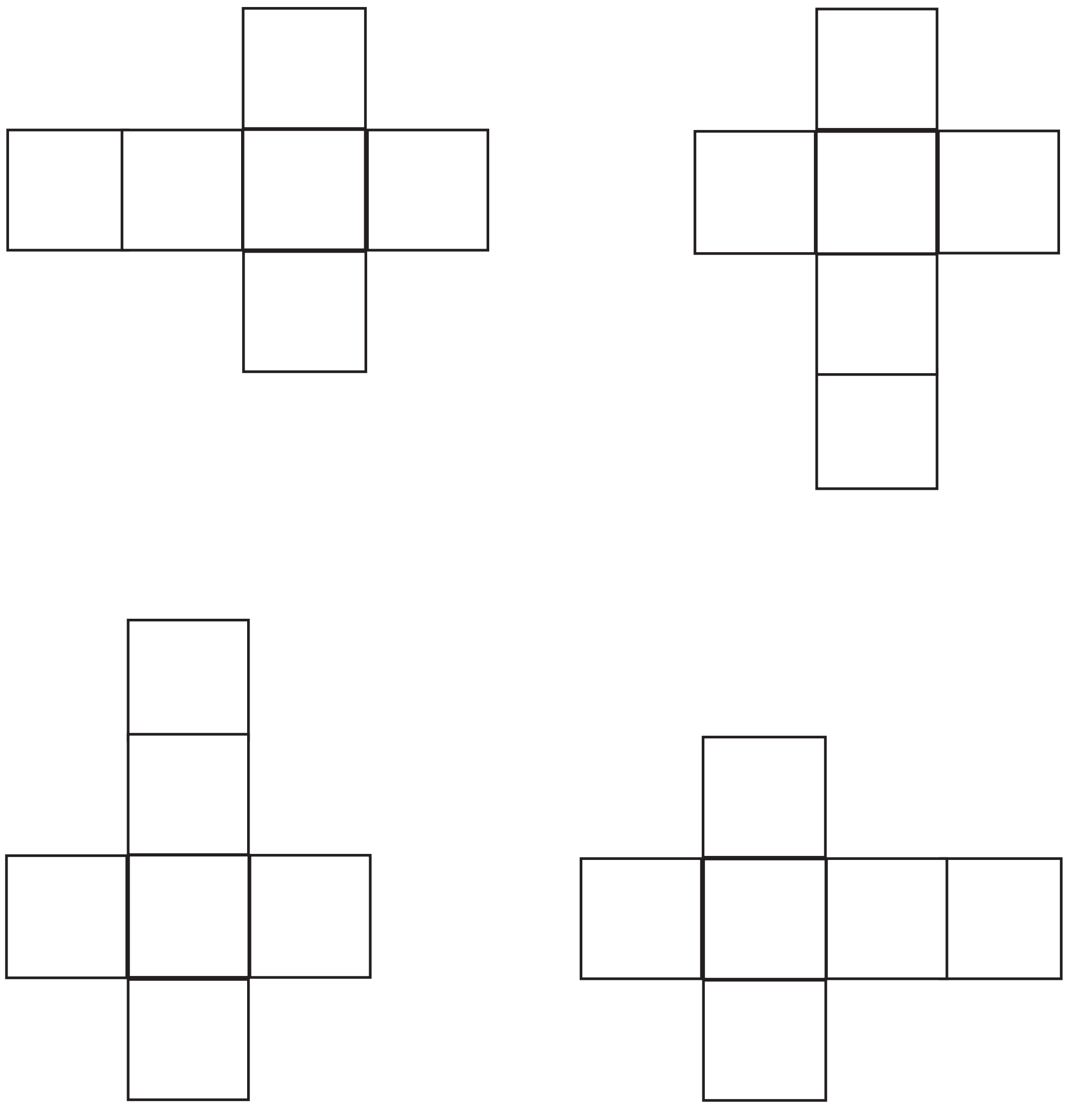
Will this net fold into a cube?
Yes No



Will this net fold into a cube?
Yes No

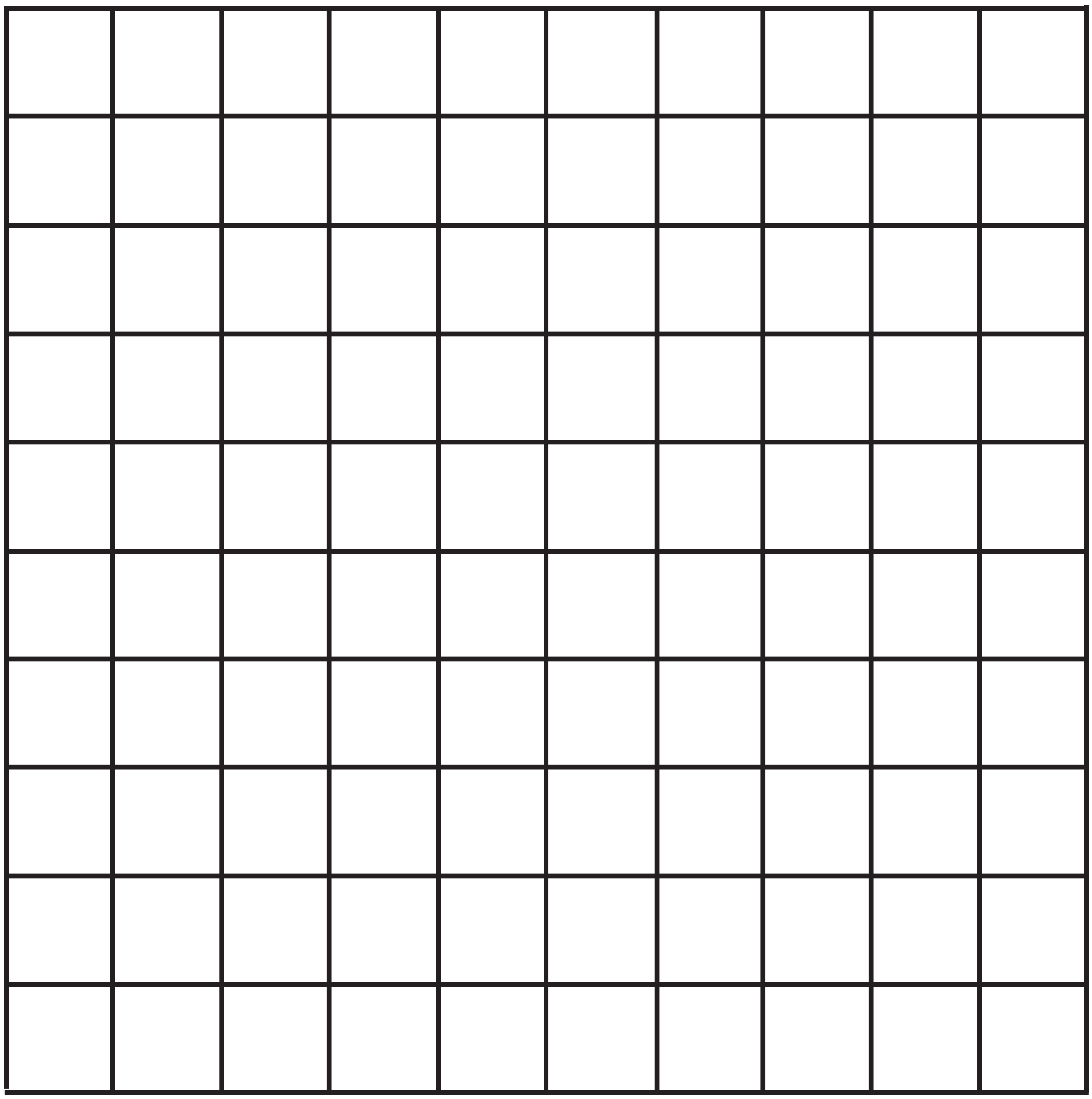


How are these the same?
How are these different?

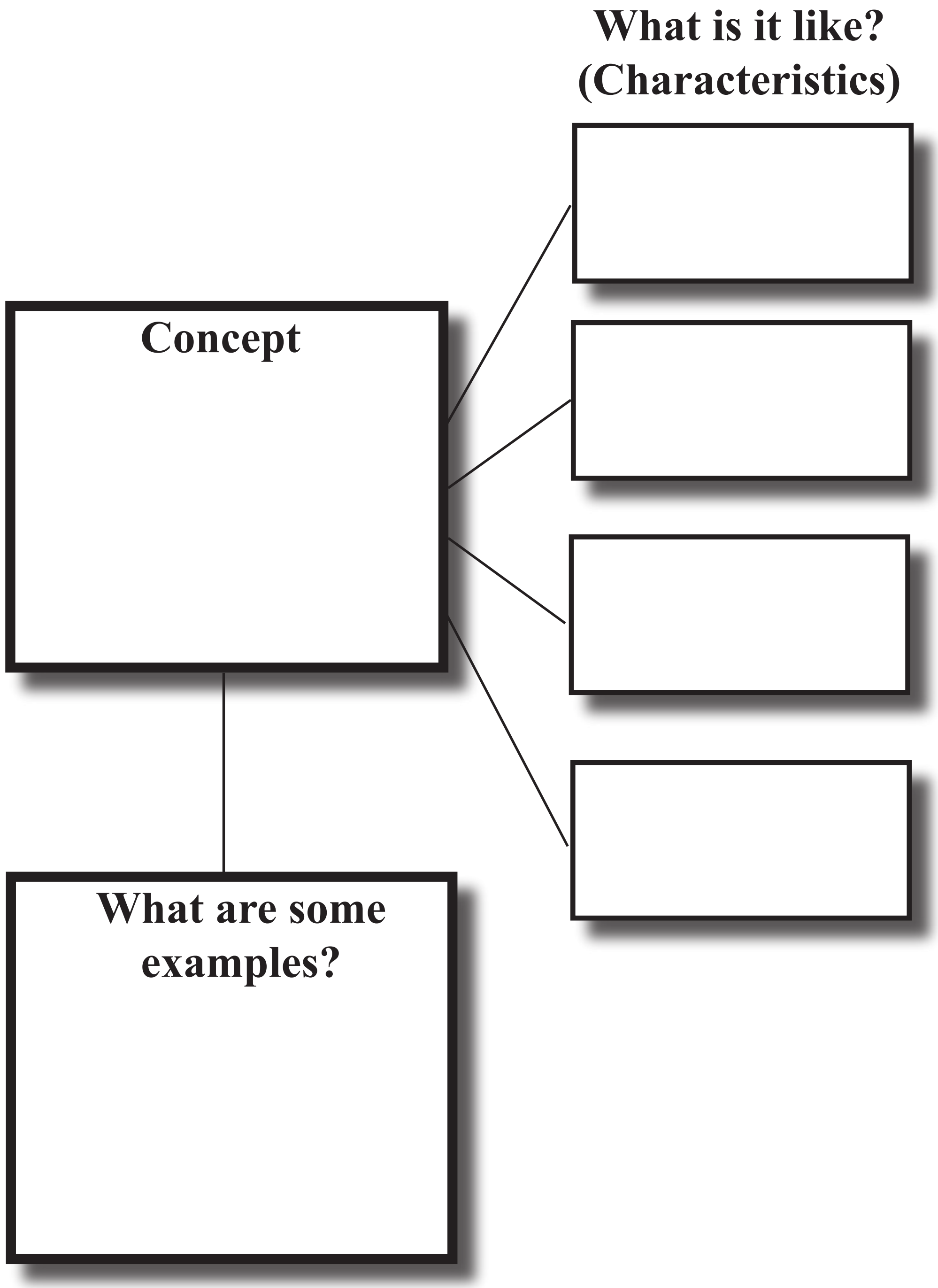


Grid Paper for Nets

As you find the nets, cut them out from the grid paper, put your name on them, and number them.



Concept Definition Map



Career Opportunities

WHAT CAN I DO WITH A PACKAGING DEGREE?

Package engineers create, design and manage a package development process that is vital to the society in which we live. Package engineers are employed by:

Raw material manufacturers: produce plastics, paper, metals and glass
Package converters: form packages out of raw materials
Package machine manufactureres: design machines to make and fill packages
End-user companies: design and select the most effective packages for their products

WHERE CAN I GET A PACKAGING TECHNOLOGY DEGREE?

California Polytecnic State Institue (Cal Poly)
Clemson University
Indian Institute of Packaging
Indiana State University
Michigan State University
Purdue University
Rochester Institute of Technology
Rutgers - The State University of New Jersey
San Jose State University
University of Florida
University of Illinois
University of Massachusettes
University of Missouri - Rolla
University of Wisconsin - Stout
U.S. Army Ordinance Center and School
Virginia Polytechnic Institute

WHAT COMPANIES HIRE PEOPLE WITH PACKAGING TRAINING?

SAMPLES OF COMPANIES INCLUDE:

Blue Ribbon Packaging Systems, Inc.
Bosch Packaging machinery
Bostik Findley
Creative Packaging, Corp.
Doven Medipham Ltd.
Eastman Chemical Co.
Evalca A Kurary Co.
FMC FoodTech
Impaxx Label-Aire, Trine Labeling
Markem Corp.
Nercon
Optima Machinery Corp.
Pacity
Salwasser, SWF Co.
Tap Tone
T.H.E.M.

MAGAZINES ON PACKAGING

<u>Food and Drug Packaging</u>
<u>Brand Packaging</u>
<u>Flexible Packaging</u>
<u>The Journal for Packaging Professionals</u>

NCTM Geometry/Representation Standards

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

Specify location and describe spatial relationships using coordinate geometry (graphing) and other representational systems (examples: navigation longitude and latitude, polar coordinates)

Apply transformations (flips and rotations) and use symmetry to analyze mathematical situations

Use visualization (seeing in your mind), spatial reasoning, and geometric modeling to solve problems

Representation

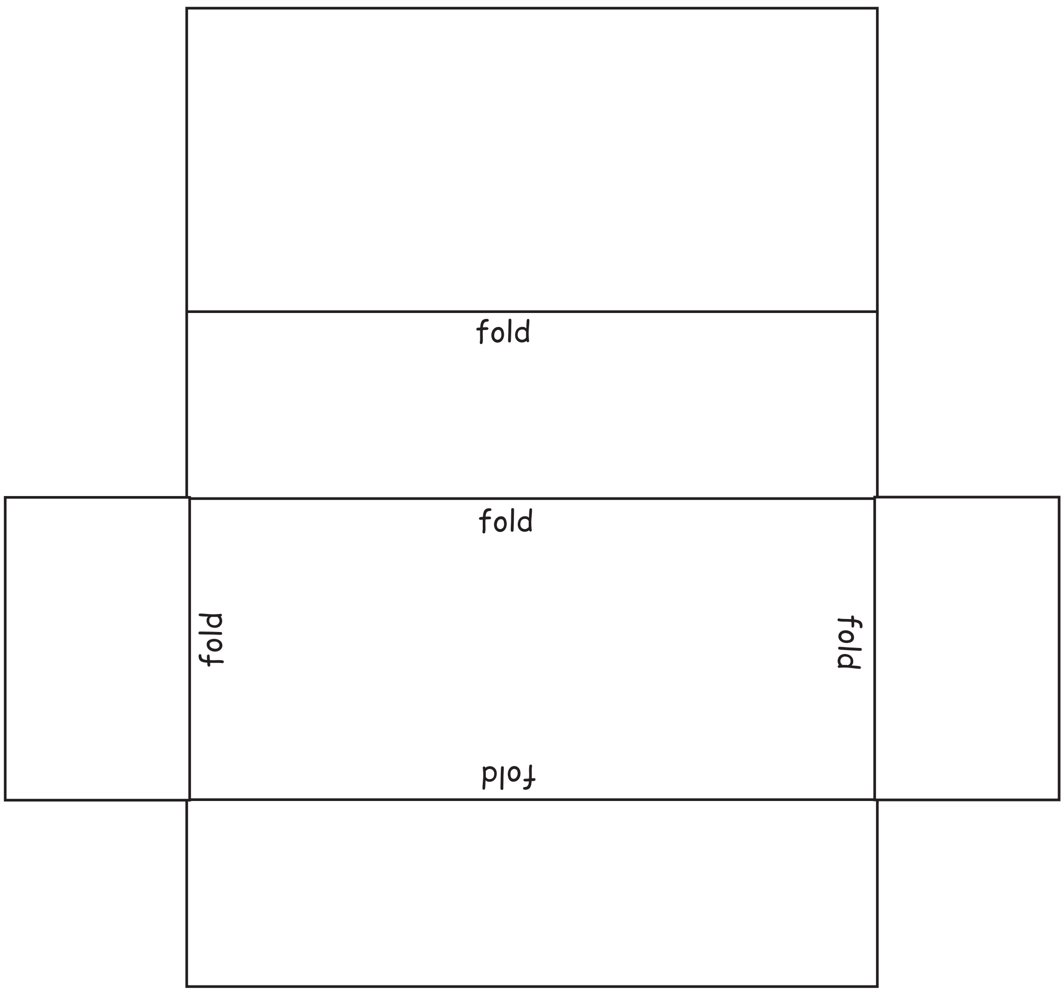
Create and use representations (models, graphs) to organize, record, and communicate mathematical ideas

Select, apply and translate among mathematical representations (example: connect a graph with its equation) to solve problems

Use representations to model and interpret physical, social, and mathematical phenomena (example: graph, diagram)

Nets for Home

Cut out the Rectangular Prism.
Fold on the fold lines to make a 3-dimensional shape.
Tape edges to hold together.

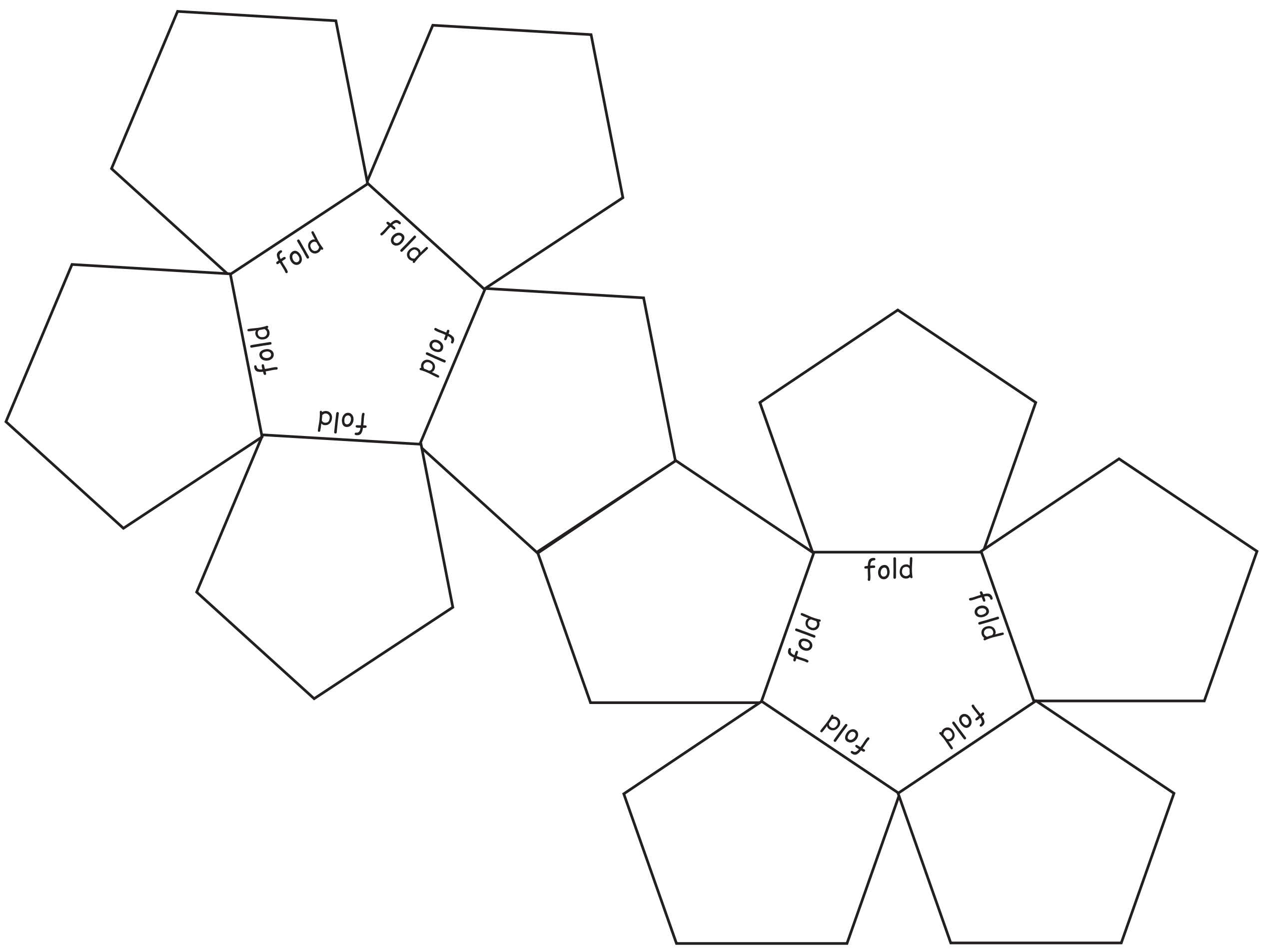


Nets for Home

Cut out the Regular Dodecahedron.
Fold it into a 3-dimensional shape.

Instructions:

a) Start by gluing this sheet onto a piece of thin cardboard or cardstock.
b) Cut out around the perimeter.
c) Lightly score along the fold lines.
d) Close up the shape and hold it closed with a small rubber band.
e) When completed, the figure can be flattened by squeezing on the words "fold" When it is released again, it will pop back into a dodecahedron.



Applications for Home

NOTICE PACKAGING AROUND YOU

What has changed since you were younger? What remained the same, and why?
Ideas to think about:

- waxed paper to ziplock bags
- milk (glass) bottle to carton
- movement away from glass containers to cans, pouches, and sacks

Let your imagination run with you and think about repackaging things in your daily life. How would you improve upon the packaging?

NETS

Explore the nets of objects around your home. Tear the empty package apart to discover the nets.

- cereal boxes (usually rectangles of 3 sizes)
- Pringles containers (rectangle and 2 circles)
- tea bag wrappers
- frozen orange juice cans

Try other unusual shapes:

- drink pouches
- french fry boxes at fast food stores
- popcorn containers at theaters

INTERNET SITES TO EXPLORE

Career Information for Parents: http://stats.bls.gov/k12/html/edu_over.htm

This resource is from the Bureau of Labor Statistics and it helps you to explore careers with your child / children.

Math, Art, and Fun: http://www.mathartfun.com

Where math, art, and fun come together to spark creative learning! A store, gallery, and resources for tessellations, polyhedra, Escher, and more.

List of Terms

What does it mean?

Cube: A closed 3-dimensional object which has six square faces

Edge: Line where two faces meet

Face: Side of a 3-dimensional geometric object

Net: A pattern; a flat drawing that can be folded into a 3-dimensional object

Representation: Some examples are: models, graphs, organized charts, and equations

Spatial: Relating to 3-dimensions

Vertex: (for a 3-dimensional object) Point where edges meet

Visualization: Seeing in your mind

Rotate: To turn a figure (around a point)

Reflect: To flip a figure; to create a mirror image of an object (on the opposite side on a line)

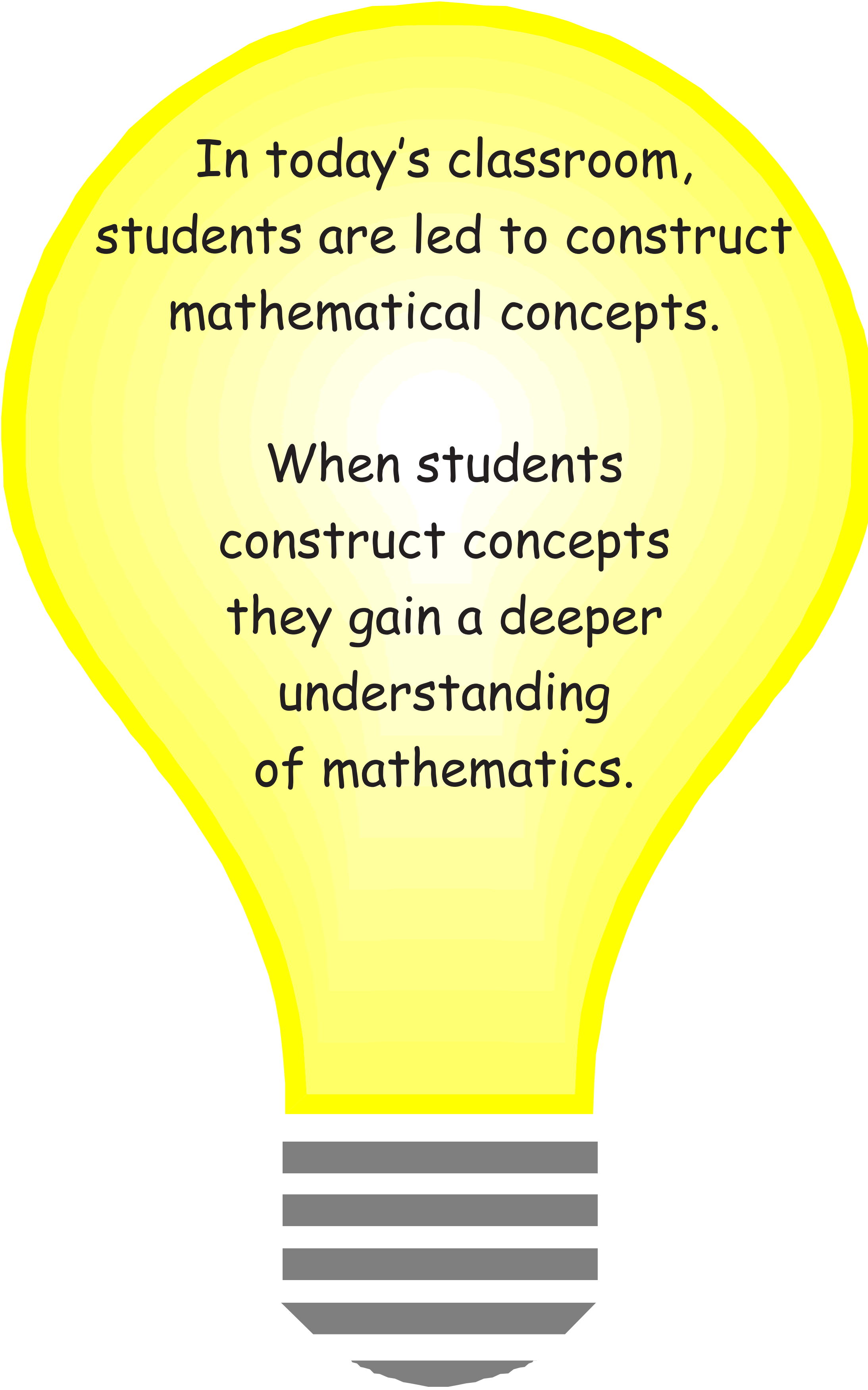
Growing Your Money

Your Grandmother gave you a gift of $1,000. You have placed it in a certificate of deposit. The bank is paying you 5% annual interest, compounded each year.

Use a calculator to fill in the table below. To arrive at the new amount, add the amount in the account plus the interest earned.

Year Number	Amount in Account	Interest Rate (Decimal Form)	Interest Earned	New Amount
Year 1	$1000.00	X .05	$50	$1050.00
Year 2	$1050.00	X .05	$53	$1102.50
Year 3	$1102.50	X .05	$55	$1157.63
Year 4	$1157.63	X .05	$	
Year 5				
Year 6				
Year 7				
Year 8				
Year 9				
Year 10				

Watch your money grow!

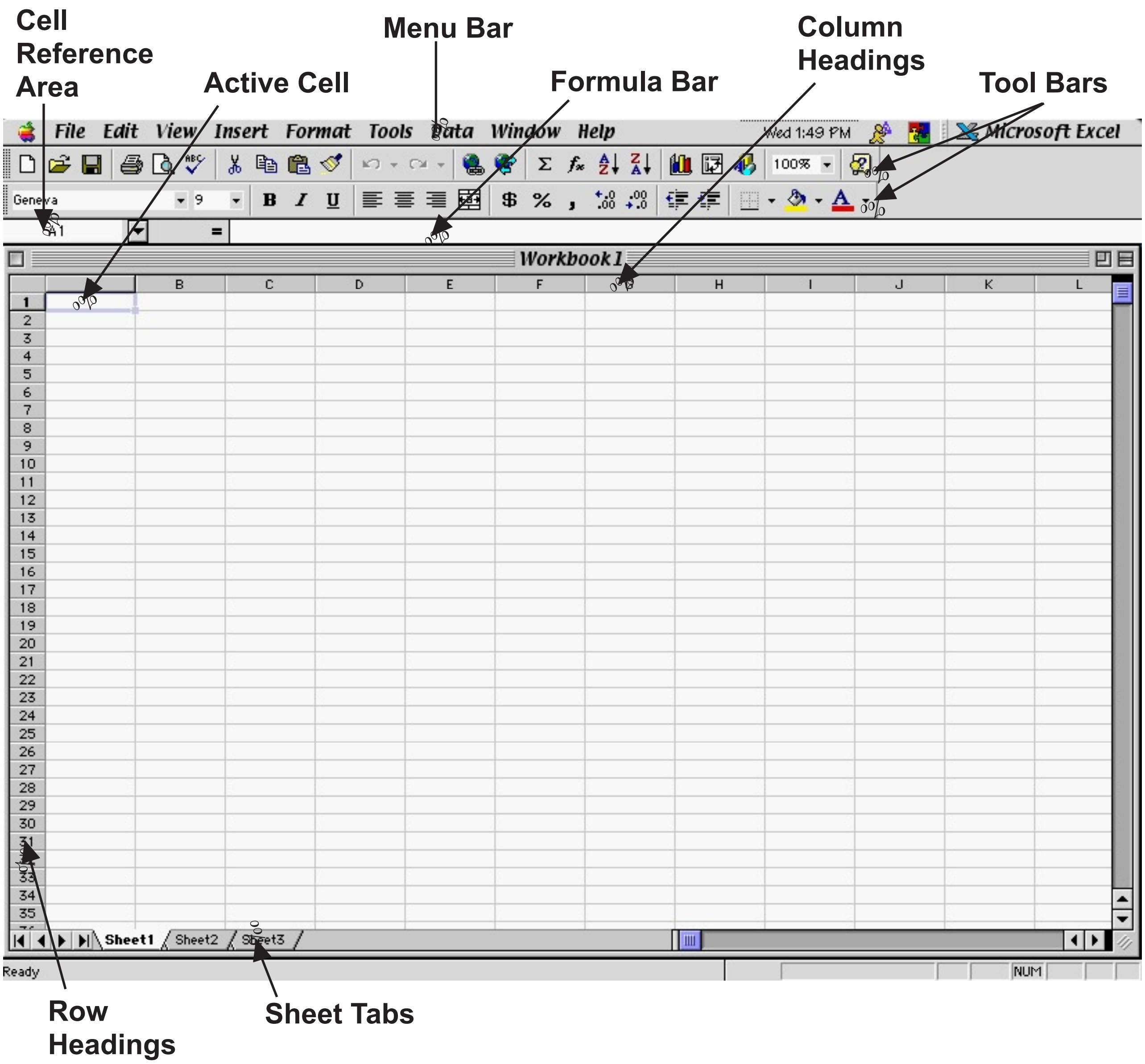

In today's classroom, students are led to construct mathematical concepts.
When students construct concepts they gain a deeper understanding of mathematics.

NTCM Technology Principle

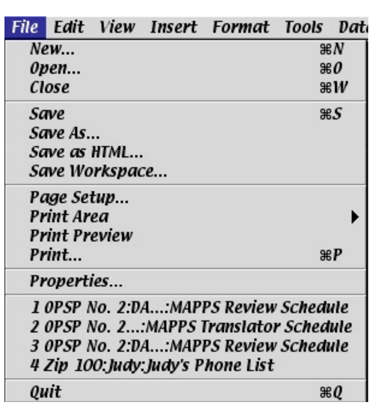
Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.

- Technology enhances mathematics learning.
- Technology supports effective mathematics teaching.
- Technology influences what mathematics is taught.

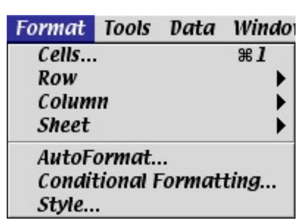
Sample Excel Spreadsheet

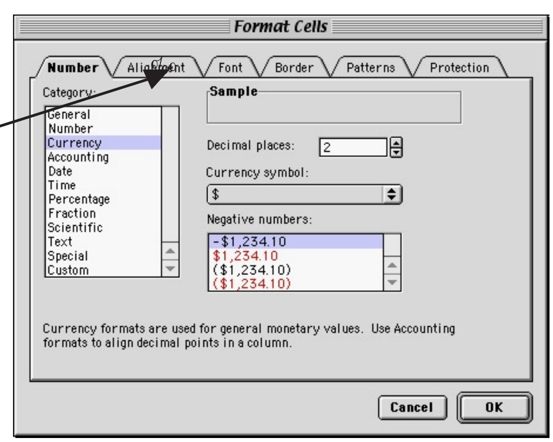


To save click on File Menu then choose Save



To format cells click on Format Menu then choose Cells to get this dialog box.





Spreadsheet Instructions

Putting *"Growing Your Money"* on a Spreadsheet

1. Creating a new spreadsheet
   a) Choose **Excel**.
   b) Pull down **FILE**.
   c) Choose **NEW**.
   d) Click **OK** for new workbook or double click on the workbook icon *(picture).*

2. Setting up the spreadsheet
   a) Numbering from 1 to 20 *(These numbers represent 20 years of growth).*
      1. Click on **cell A1** *(in upper left corner).*
      2. Number from 1 to 20 in colum A *(the far left column).*
         To number press **1** and press **return/enter**, then press **2** and **return/enter**.
         Repeat until you have reached 20.
      3. Save what you have done by pulling down **FILE** in the top left corner of your screen and choose **SAVE**.
      4. Name your document ***"Growing Your Money Spreadsheet"*** under **SAVE AS**, then click **SAVE**.
   b) Filling in the amount of money
      1. Click on **cell B1**.
      2. Write **1000** and press **return/enter**.
      3. Change to money by clicking on the **B** above cell B1. This will highlight the entire column.
      4. Pull down **FORMAT**. Choose **Cells**. *(A box will open.)*
         Click on the word **currency** and click **OK**. *(On some machines, you will have to look to the right for "list" to choose the .00 currency.)*
      5. Repeat instructions 3 and 4 for the column D and E.
      6. Save what you have done by pulling down **FILE** in the top left corner of your screen and choose **SAVE**.
   c) Choosing the interest rate *(decimal form)*
      1. Click on **cell C1**.
      2. Write in **.05** and press **return/enter**.
      3. Save what you have done by pulling down **FILE** in the top left corner of your screen and choose **SAVE**.

3. Setting formulas
   a) To find the interest, multiply B1 times C1 and place the answer in cell D1
      (Refer to Growing Your Money worksheet. All formulas must start with an equal sign.)
      1. Click on **cell D1**.
      2. Press the **=** sign.
         (It will appear in the formula bar above the spreadsheet.)
         Now you will tell the computer what to do.

Spreadsheet Instructions

Putting *"Growing Your Money"* on a Spreadsheet
Page 2

3. Click on **cell B1**.
   (This will also appear in the formula bar so that the bar now reads = B1.)
4. Press multipy *** sign**.
   (This symbol can be found above the 8 on the keyboard or on the number pad.)
5. Click on **cell C1**.
   (Your bar should now read **=** *B1 * C1).*
6. Press **return/enter**.
7. Save what you have done by pulling down **FILE** in the top left corner of your screen and choose **SAVE**.
8. Click on **cell E1**.
   (To find the new amount in your account, add B1 and D1 and place the answer in cell E1.)
9. Press the **= sign**.
   (All formulas must start with an equal sign. It will appear in the formula bar. Now you will tell the computer what to do.)
10. Click on **cell B1**.
    (This will also appear in the formula bar so that the bar now reads = B1.)
11. Press the **+ sign**.
    (The addition button is on the number pad to the right.)
12. Click on **cell D1**.
    (Your bar should now read = B1 + D1.)
13. Press **return/enter**.
14. Save what you have done by pulling down **FILE** in the top left corner of your screen and choose **SAVE**.
15. Click on **cell B2**.
    (To start the second year with the new amount of money, make B2 equal E1. The new amount is in cell E1. We want it to appear in cell B2. Refer to Growing Your Money worksheet.)
16. Press the **= sign**.
    (All formulas must start with an equal sign. It will appear in the formula bar. Now you will tell the computer what to do.)
17. Click on **cell E1**.
    (This will also appear in the formula bar so that the bar now reads = E1.)
18. Press **return/enter**.
    (Cell B2 should now contain $1050.00.)
19. Save what you have done by pulling down **FILE** in the top left corner of your screen and choose **SAVE**.

Spreadsheet Instructions

Putting “Growing Your Money” on a Spreadsheet
Page 3

4. Filling the Worksheet
   a) Now you are ready to have the computer do the work for you.
      1. Click and hold on **cell B2** and drag down to **cell B20**.
         (Highlighting B2-B20)
      2. Pull down **EDIT** and drag down to **FILL** *(moving on the right hand side of the box)* and across to **DOWN**. *(This may take several tries.)*
         Boxes will be filled with $0.00.
      3. Click and hold on **cell C1 (0.05)** and drag to **cell C20**.
         (C1 to C20 should be highlighted.)
      4. Pull down **EDIT** and drag down to **FILL** and across to **DOWN**.
         Boxes will be filled with 0.05.
      5. Click and hold on **cell D1 ($50.00)** and drag to cell **D20**.
         (D1 to D20 should be highlighted.)
      6. Pull down **EDIT** and drag down to **FILL** and across to **DOWN**.
         Boxes in column D will be filled with $0.00 except D1 and D2.
   b) Fill column E from E1 to E 20 by following the same pattern.
      (Now boxes in column B and column E will be filled with the growth of the money for 20 years.)

5. Fill in the information below.
   a) Percent of interest _____
   b) Years it took to double the money _____
   c) Product of these numbers _____ (a x b)

"Growing Your Money" Spreadsheet

This is what your spreadsheet should look like.

Growing Your Money Spreadsheet

	A	B	C	D	E
1	1	$1,000.00	0.05	$50.00	$1,050.00
2	2	$1,050.00	0.05	$52.50	$1,102.50
3	3	$1,102.50	0.05	$55.13	$1,157.63
4	4	$1,157.63	0.05	$57.88	$1,215.51
5	5	$1,215.51	0.05	$60.78	$1,276.28
6	6	$1,276.28	0.05	$63.81	$1,340.10
7	7	$1,340.10	0.05	$67.00	$1,407.10
8	8	$1,407.10	0.05	$70.36	$1,477.46
9	9	$1,477.46	0.05	$73.87	$1,551.33
10	10	$1,551.33	0.05	$77.57	$1,628.89
11	11	$1,628.89	0.05	$81.44	$1,710.34
12	12	$1,710.34	0.05	$85.52	$1,795.86
13	13	$1,795.86	0.05	$89.79	$1,885.65
14	14	$1,885.65	0.05	$94.28	$1,979.93
15	15	$1,979.93	0.05	$99.00	$2,078.93
16	16	$2,078.93	0.05	$103.95	$2,182.87
17	17	$2,182.87	0.05	$109.14	$2,292.02
18	18	$2,292.02	0.05	$114.60	$2,406.62
19	19	$2,406.62	0.05	$120.33	$2,526.95
20	20	$2,526.95	0.05	$126.35	$2,653.30

Sheet1 Sheet2 Sheet3

How long to double?

To do this investigation, change the interest rate in your spreadsheet.

1. Choose an interest rate from the chart.
2. Click on C1, and change the multipliar to the number in parenthesis.
3. Fill down the multiplier column as you have done before.
4. Look in column E to find when your money has grown to $2000 or more.
5. Record this number of years.

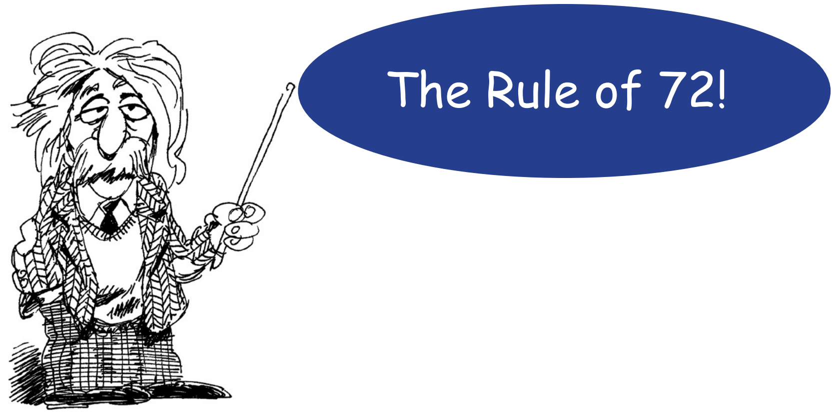
Interest Rate (*computer multiplier*)	**Years to Double**	**Interst Rate X Years to Double**	
4% ***(.04)***			
5% ***(.05)***	**14.5**	**5 X 14.5 =**	**72.5**
6% ***(.06)***			
7% ***(.07)***			
8% ***(.08)***			
9% ***(.09)***			
10% ***(.10)***			
12% ***(.12)***			
15% ***(.15)***			
18% ***(.18)***			

Now that we have filled this chart together, look at the far right column.

What number would best represent all of those numbers?

The Rule of 72

You have just discovered:



The rule states that if you divide 72 by an interest rate, you will estimate the number of years for doubling your money.

Let's say that your interest rate is 8%.
Divide 72 by 8.
The answer is 9.

$$72 \div 8 = 9$$

Your money will double in approximately 9 years.
Check this answer with our "How Long to Double" chart.

Approximately how long would it take for your money to double if your interest rate was 12%? Check your answer with our chart.

Baby Jebidiah's Fund

Zack and Ellie Mae are looking for a way to invest money so that in **18 years** they will have **$100,000** for baby Jebidiah's college education. They are looking into an investment account that earns **8.25% interest**, compounded annually.

They want to know how much money they should deposit today in this account so that in 18 years the account will have $100,000.

- Make a guess for the amount they need today ________________.
- Enter that guess on the spreadsheet to see how close you are.
- Keep guessing and checking on the spreadsheet. See how close you can come.
- Record your guesses in the table below.

Guesses	Money after 18 years

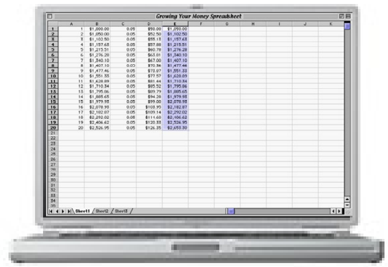
Your conclusion:

Zack and Ellie Mae should invest $____________today in order to have $100,000 in 18 years.

Extension:

If Zack and Ellie Mae needed $200,000 instead, what interest rate would they need to find?______________

Technology in the Classroom



Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.

Calculators and computers are essential tools for teaching, learning, and doing mathematics. They help organize and analyze information, and they compute efficiently and accurately. Because of this, they can help students to do investigations in every area of mathematics. When technology is available, students can focus on decision making, reflection, reasoning, and problem solving. Students learn more mathematics in greater depth with the use of technology. Technology should not be used as a replacement for basic understandings and intuitions; rather, it can and should be used to foster those understandings and intuitions.

The power and speed of technology make it possible and necessary to reexamine what mathematics students should learn, and how they should learn it.

Technology enhances mathematics learning.

Students can decide on possible patterns and rules for experiments and then check these conjectures with technology. Students can gather large amounts of information rapidly in order to learn about patterns. It is not unusual for students to exchange information with classes across the country through the use of technology. Students can quickly make changes in information and see how the graph of that information changes. Technology is a dynamic tool in today's classroom. The effective use of technology depends on the teacher.

Technology influences what mathematics is taught.

Technology has also changed what is taught. With calculators, young students can explore patterns with large numbers. Middle school students can use scientific probes attached to calculators that combine science experiments with the sound mathematical concepts of slopes and rates of change. There are geometry programs for computers that allow students of all ages to explore the relationships in geometry. Using the internet, students are able to ask experts questions and receive answers. Through technology, students can explore complicated problems that were not available several years ago.

Using Technology

Where can I borrow a computer?

Your Public Library generally has computers available that have internet access. You can sign up for an hour at a time. In order to get this time, sometimes you need to sign up a day or two in advance. Computers are available in most larger cities in the world.

What can I do with one when I find it?

You can use the internet to find information about careers, purchases, directions for driving, and an unlimited amount of information. Have the librarian help you find some of the more popular sites to visit.

Translations: systransoft.com
To translate a passage into almost any language, you can visit this site.
Teachers use this or any of several other translating services in order to help students who speak another language. The student can translate homework or tests into their own language.

Homework help: mathforum.org/dr.math
This site offers a place for students (or parents) to ask mathematical questions and get an answer. The site is provided for us by Swarthmore College. Their site also has problem of the week contests and mathematics discussion forums. This is one of the most extensive sites promoting mathematics.

Family Mathematics: figurethis.org
Figure This! is a program that provides a fun way for you and your son/daughter to explore how math is an important part of everyday life. It offers monthly challenges that are interesting and challenging. You can recieve a free challenge book with tips for parents in English or Spanish by calling 1-877-GO SOLVE.

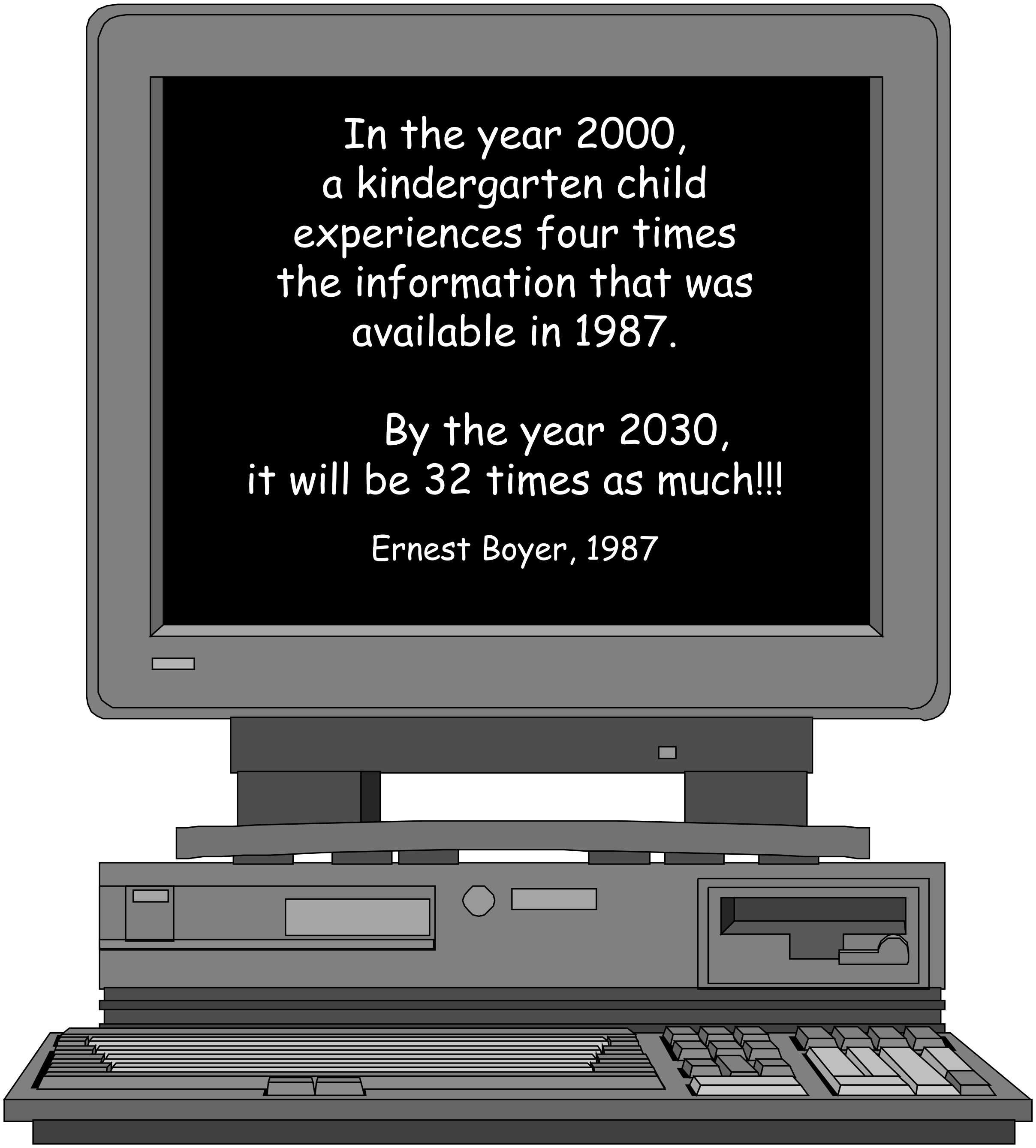
Maps for going anywhere you would like to go: local.excite.com/maps
This site will provide you with directions for driving from your house to wherever you would like to drive! It will provide a map and directions.

Email free of charge: mail.yahoo.com
There are many sites that give you free email. One of them is yahoo. You have to register and give yourself a name. Chances are that your name will be taken, so you can add some numbers after it, like Darcy808. Then you have to enter a password that you want to use. It will ask for personal information, like address. You can give your work address if you want to remain private. After you have set up the account, you can communicate with anyone else that has an email. When my family goes out of the country on a trip, we always communicate through email.

The opportunities are limitless. It is no wonder that today is called the Information Age.

Communication Tools

 Grandparents	Today 


In the year 2000,
a kindergarten child
experiences four times
the information that was
available in 1987.
By the year 2030,
it will be 32 times as much!!!
Ernest Boyer, 1987

My Web Sites

School District Web Site:

State Web Site:

Curriculum Support Web Site:

Career Planning Web Site:

www.doleta.gov/youth__service/yocorner

Web Site with Math Problem (to do with family):

My Favorite Web Sites:

"Students can learn more mathematics more deeply with the appropriate use of technology. Technology should not be used as a replacement for basic understandings and intuitions; rather, it can and should be used to foster those understandings and intuitions."

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Internet and Web History

The **Internet** is a global network connecting millions of computers. As of 1999, the Internet has more than 200 million users worldwide, and that number is growing rapidly. More than 100 countries are linked into exchanges of data, news and opinions.

Great web sites that give the history of the Internet:

Internet Society ™

http://www.isoc.org/

Hobbes' Internet Timeline v6.1

by
Robert H'obbes' Zakon
Internet Evangelist
http://www.zakon.org/robert/internet/timeline/#Growth

Web site that gives the history of the World Wide Web:

W3C WORLD WIDE WEB consortium

http://www.w3.org/History.html

Exploring the Internet On Your Own

If you do not have a computer at home, you can go to your local library and use one. Below are some informational sites to help you understand the world of computers. Also listed are some search engines to help you surf the net. Web sites are constantly changing. The ones listed below were still active as of April 2003.

Informational Web Sites

FOLDOC
Free On-Line Dictionary Of Computing

Free On-Line Dictionary of Computing
wombat.doc.ic.ac.uk/foldoc

SYSTRAN
Information and translation technologies

On-Line Translator
systransoft.com/

(Webopedia)™

On-Line Dictionary for Computer and Internet Terms
webopedia.com/

how to be a...
WEB HOUND
Web Surfing Tutorial
www.mcli.dist.maricopa.edu/webhound/index.html

Ask Jeeves®
Searches the Web by asking questions
www.ask.com/index.asp

SEARCH ENGINE COLOSSUS
The Search Engine of Search Engines
www.searchenginecolossus.com/
www.searchenginecolossus.com/Mexico.html

English Search Engines

YAHOO!®
www.yahoo.com/

YAHOOLIGANS!
the Web Guide for Kids
www.yahooligans.com/

Google™
www.google.com/

Spanish Search Engines

YAHOO!® EN ESPAÑOL
espanol.yahoo.com/

México Iguana
www.iguana.com.mx/

Google™
Mexico
www.google.com.mx/

List of Internet Terms

Internet: A global network connecting millions of computers. As of 1999, the Internet has more than 200 million users worldwide, and that number is growing rapidly. More than 100 countries are linked into exchanges of data, news and opinions.

World Wide Web: A system of Internet servers that support specially formatted documents. The documents are formatted in a language called HTML (HyperText Markup Language) that supports links to other documents, as well as graphics, audio, and video files. This means you can jump from one document to another simply by clicking on hot links. Not all Internet servers are part of the World Wide Web.

HTML: Stands for HyperText Markup Language, the protocol or instructions used to present information and connect it together with hyperlinks as Web pages.

Web site: A site (location) on the World Wide Web. Each Web site contains a home page, which is the first document users see when they enter the site. The site might also contain additional documents and files. Each site is owned and managed by an individual, company or organization.

Web page: A document on the World Wide Web. Every Web page is identified by a unique URL (Uniform Resource Locator).

Browser: Short for Web browser, a software application used to locate and display Web pages. Two popular browsers are Microsoft Internet Explorer and Netscape Navigator. Both of these are graphical browsers, which means that they can display graphics as well as text. In addition, most modern browsers can present multimedia information, including sound and video, though they require additional programs for some formats.

Search engine: A program that searches documents for specified keywords and returns a list of the documents where the keywords were found. Although search engine is really a general class of programs, the term is often used to specifically describe systems like Google and Lycos, that enable users to search for documents on the World Wide Web. Typically, a search engine works by sending out a "spider" to traverse as many documents as possible. Another program, called an indexer, then reads these documents and creates an index based on the words contained in each document. Each search engine uses a proprietary algorithm to create its indices such that, ideally, only meaningful results are returned for each query.

Bookmarks/Favorites: To mark a document or a specific place in a document for later retrieval. Nearly all Web browsers support a bookmarking feature that lets you save the address (URL) of a Web page so that you can easily re-visit the page at a later time.

Instant Messaging: A type of communications service that enables you to create a kind of private chat room with another individual in order to communicate in real time over the Internet, analogous to a telephone conversation but using text-based, not voice-based, communication. Typically, the instant messaging system alerts you whenever somebody on your private list is online. You can then initiate a chat session with that particular individual.

To find the meaning of other Internet or Web terms link to Webopedia: http://www.webopedia.com/

Web Sites On Parent Tour

To take the Parent Tour on the internet type the Web site address www.math.arizona.edu/~mapps/ in the location part of the browser then click on

Parent Tour

Web sites you will be visiting on the tour

Figure This! Math Challenges for Families
www.figurethis.org/index40.htm

No Child LEFT BEHIND
www.ed.gov/index.jhtml

NCTM NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS
www.nctm.org/corners/family/websites.htm

enc ONLINE
enc.org/weblinks/math/

NCTM ILLUMINATIONS marcopolo
illuminations.nctm.org/index.html

Ask Dr. Math®

mathforum.org/dr.math/

Problems of the Week
mathforum.org/pow/

Links to other mathematical Web sites

education.ti.com/us/student/main.html
www.coolmath.com/
www.csun.edu/~vceed009/puzzles.html
www.gnarlymath.com/gnarlink.html
www.eduplace.com/parents/
www.eduplace.com/kids/
oncampus.richmond.edu/academics/as/education/projects/webunits/math/sport.html
www.math.ucalgary.ca/~laf/colorful/games.html
math.rice.edu/~lanius/Lessons/
www.dpgraph.com/janine/mathpage/handson.html
www.purplemath.com/index.htm
www.umanitoba.ca/faculties/education/edlab/math.resources.html
www.edinformatics.com/timss/timss_intro.htm
www.doyourmath.com
www.exploremath.com
www.nationalmathtrail.org
www.mathgoodies.com
www.learner.org/exhibits/dailymath
www.mathdork.com
www.math.com
mighty-mm-math.caffeinated.org