MATH CONNECTION
Lesson 1 – Math: The Protractor

Objective: The objective of this lesson is to teach students how to measure angles with a protractor. This basic skill is needed to measure triangles and rectangles as stated in the California standards.

Introduction: Students will arrive to class with a protractor, ruler, and a piece of paper on their desk. On the board will read:

> What do you think the object on your desk is? What do you do with it?
> Can you use it to measure angles? Can you draw an angel?

Vocabulary: protractor, angle, obtuse angle, acute angle, right angle, straight angle, center point, degrees

Materials: protractors, ruler or straight edge, paper, pencils

Modeling: The teacher will show a PowerPoint (Protractor.ppt) slide of a protractor and the numbers (1-180) represent degrees. The following slides show various angles and its degrees. The teacher will then explain what constitutes a right, obtuse, acute, and straight angle.

Check for Understanding: The teacher will ask students for a "thumbs up" if they get it or "thumbs down" if their not sure. The teacher will then circulate and check if students need additional instruction or have any questions. Students who understand the concept can help other students who do not grasp the concept.

Independent Practice: A worksheet (Protractor Worksheet) is handed out. Students will complete the worksheet. Next, students will group into pairs to check each other's work. Then, each student will draw angles to be measured by the other student. Students keep track of how many each one gets correct.

Wrap Up: The teacher will review how to measure angles with a protractor, and identify the four different angles learned.

Next, the teacher will talk about how angles are used in outer space with satellites. Also, the class will be informed that they will be building satellites tomorrow. For homework, there is a word search (Word Search math) of vocabulary words due the next day.

Assessment: A quiz will be handed out with angles to be measured (degrees) on the front side. They must be categorized by name. On the backside, students will draw an acute, obtuse, straight, and right angle. Next, they will measure and write the degrees of each angle.

Standard Addressed: 2.1 Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools (e.g., straightedge, ruler, compass, protractor, drawing software.)

Lesson 2 – Math: Triangles

Objective: Students use their skill of measuring and identifying angles in a real life scenario (i.e. alignment of satellites). Students learn that all angles of a triangle equal 180 degrees, and all the angles of quadrilateral equal 360 degrees.

Introduction: An animation/movie is playing as the class enters. The animation shows satellites in orbit sending a beam (data signal) to a ground station and other satellites.

Next, the homework assignment word search will be corrected. All the words will be located. Then the instructor will read definitions out loud of all words. When a student has a definition that matches the instructor, they raise their hands. Papers will be collected.

Vocabulary: rectangle, parallel, perpendicular, deploy, solar arrays, bus, payload, satellites

Materials: paper satellite model, ruler/straight edge, tape, paper, and pencil

Modeling: The teacher will review the showing of the previous days' PowerPoint (Protractor Math Lesson 1) of how to use a protractor and how to measure an angle.

Next, a new PowerPoint (Triangles Math) will show that all angles of a triangle add up to 180 degrees and, that all the angles of a rectangle (parallelogram can be introduced at this point) equal 360 degrees.

The animation movie will show the launch of a rocket, deployment of solar arrays, and communication established. The satellites send signals to a ground station and then to other satellites. The signals will be represented by colored lines in the movie.

These beams connect to form angles, triangles, rectangles, and other closed figure geometry figures. The parallel and perpendicular beams will also be pointed out. Lines and angles will be pointed out with a cursor on the screen. The teacher will explain for both a triangle and rectangle.

Check for Understanding: Students will raise their hand if they understand. The PowerPoint (Triangles.ppt) will be replayed. This time students will narrate the slide show.

Students can do mini lesson on the white board with other students who are still having difficulty grasping the concept. The animation movie will be copied to cd and available for other computers.

Independent Practice: After the viewing, students will look for rectangles and triangles within the room. The teacher will ask the class for items that they have found. Students will give the measurements of the angles and see if they add up. The student will learn that for a rectangle the angles will always be 90 degrees.

If triangles are hard to find, the teacher can help in creating triangles by cutting a rectangle in half diagonally with an imaginary line. This will show that a triangle is half of a rectangle or any parallelogram. Students will then measure and add up the angles to see if they equal 180 degrees for triangles, and 360 for rectangles.

After that, students will bring up the item and explain how they got the answer. They will explain the steps to measure an angle and identify the type of angle. Further, they will set up an algorithm to total the degrees of a triangle and rectangle in a PowerPoint (Triangles.ppt).

For homework, students will be given construction paper to take home. They are to trace the protractor 4 to 5 times. For each drawing they are to mark imaginary points (two per tracing) that the instructor will supply. The teacher will then tell the students which drawing they will put perpendicular and parallel line. This will modeled on the board.

Wrap-Up: In closing, students will now be ready to learn about two dimensional and three dimensional views of solid rectangles and triangles. This is math standard 2.3 of the under Measurement and Geometry.

Assessment: A quiz will have several triangles and rectangles in different shapes and sizes. The triangles will have one measurement missing while the rectangle (parallelogram) will have all of them missing.

Standard Addressed: 2.2 Know that the sum of the angles of any triangle is 180 degrees and the sum of the angles of any quadrilateral is 360 degrees and use this information to solve problems.

Extension Activity: After the assessment, students can put together a paper model of GPS satellite. The templates will be included in this ETP. Originals can be requested.

The activity is a hands-on and a great way to end the lesson. The models are somewhat challenging. It is recommended that the teacher build the model before the lesson. The

modeling should be a joint effort and each step will have to be monitored closely. Students can finish models at home.

Lesson 3 – Math: Parallel & Perpendicular

Objective: The objective for the student is to identify and understand the meaning of perpendicular and parallel lines.

Introduction: There will be four straws on the desk of each student. On the board it will say: Use two straws to make a capital "T". Put the other two straws and make the number 11. Which one is perpendicular and which one is parallel?

This is a period of discovery which is the first step on engaging the student.

Vocabulary: perpendicular, parallel, animation, constellation

Materials: straws, color chalk, tape measure, straight edge, paper plates, yarn, paper, and pencil

Modeling: The teacher will review the introduction activity with the help of the animation movie and show the two geometric concepts (parallel and perpendicular), talk about how they are formed, and explain how geometry is used in satellite technology.

Check for Understanding: To make sure that students understand the concepts, the teacher asks the students to find things that are parallel and perpendicular in the class. Students will volunteer answers. Students who can teach, "What is parallel" and "what is perpendicular" can be used as tutors.

Independent Practice: The class will use pictures, posters, and pamphlets to draw the Earth and satellites orbiting it. Students will add more satellites and ground stations at various spots on the Earth to create a larger constellation of satellites. The lines they draw will represent data links connecting satellites and ground stations. The teacher will make sure parallel and perpendicular lines appear somewhere on the picture.

After the sketches are finished, the instructor will ask if anyone would like to volunteer to talk about their drawing. If not, the teacher will explain a drawing volunteered by a student.

The next activity will involve partners. Each pair of students will use a paper plate as the Earth, and yarn as the lines representing data sent by the satellite. The yarn will be tied in the middle of the plate with the other end help up by hand. Another piece of yarn will be tied to the middle with that end held. The pieces of yarn moving at different speeds

create different angles. Another piece of yarn can be tied to the plate, but not in the center. Students will move all the pieces of yarn until there are parallel and perpendicular lines.

Wrap-Up: The teacher will discuss the concepts of parallel and perpendicular lines, tell how important geometry is to the orbit of satellites, and how the math we learn in 5th grade applies to real life situations – location and orbits of satellites.

Assessment: Students will be given the task of drawing any figure or object they wish as long as they label all the parallel and perpendicular lines. The lines may belong to both a parallel and perpendicular. In other words, they may share a common line. Rulers and protractors can be used.

(At this time a comprehensive test covering how to use a protractor, identifying angles, and differentiating parallel and perpendicular lines.)

Standard Addressed: 2.1 Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools (e.g., straightedge, ruler, compass, and protractor, drawing software.

Extension Activity: Digital pictures can be taken of the activity and documented in a PowerPoint. Students can use the pictures and write a storyboard for the presentation. The PowerPoint can be edited and used for other classes, or shown at Open House.

SCIENCE CONNECTION
Lesson 1 – Science: Satellite Weather Maps

Objective: The objective is for students to tell what severe weather looks like from satellites weather maps (infrared, radar, Doppler, etc.). Students will need to know this to predict severe weather – another part of the standard.

Introduction: Students will enter with white construction paper on their desk. On the screen will be a slide with the following words: tornado, winter storm, hurricane, clouds, and tsunami.

Students are instructed to fold construction paper into five strips and write down one word on each strip. They should write the word length-wise and in large letters.

Vocabulary: weather, tornado, winter storm, hurricane, tsunami, satellite, radar, clouds

Materials: construction paper, newspaper, markers, pencils,

Modeling: The teacher will explain that the pictures (severe weather.ppt) they see are from satellites. The pictures are infrared (black and white, artificial color). Satellites take pictures to use for predicting weather that are shown on TV newscasts (i.e. The Weather Channel).

Each type of severe weather will be defined and shown on the screen. Clouds will be included, though not severe weather, but because they are integral in analyzing satellite weather maps.

Next, students will write the definition on the back of each strip. The definition should match the word. The teacher asks the students to raise their strip with the name of a weather pattern when the picture is shown on the screen. After everyone has shown his or her strip, the teacher will reveal the name of the correct weather pattern.

Check for Understanding: It is difficult to distinguish exactly what a winter storm, tornado, or a hurricane looks like from a satellite picture. Miles per hour, precipitation, and other variables separate them.

Students who are not sure of the weather patterns will be given a mini-lesson by the teacher while the rest of the class goes onto the independent practice.

If the entire class does not fully get how to read a weather map of severe weather, then the lesson can be repeated.

Independent Practice: A group of students will go on a web search on the following web sites to investigate satellite weather pictures:

http://dbaron.org/sat/

http://www.tech-faq.com/weather-satellite.shtml

http://www.usatoday.com/weather/satpic/wsatusa.htm

They should investigate these questions:

What do satellite images show?
Why is this information important?
How do we get satellite images?
What can meteorologists learn by the shade of the clouds on a satellite image?

The students will then report out to the class. Everyone must be doing something pro-active (holding a picture, running the computer, etc.) or speaking during the presentation.

Other students will start their severe weather poster. The severe weather patterns discussed will be drawn on white construction paper. The paper is folded into four squares so a picture can be drawn in each square.

Another group of students will look at the weather section of the newspaper and write a script for a TV weather report. Students can add a hurricane, tornado, winter storm, etc. into their script. The group will perform in front of the class.

Wrap-Up: Groups will present their findings or act out their skit. The poster-drawing group will not have to present. Groups will then switch activities until each group has completed all three activities.

Assessment: This will be based on the three activities in the lesson: web search report out, TV weather report, and the severe weather poster.

The assessment will be from your science textbook publisher adopted by your district. The test will be from the appropriate chapter about how to use weather maps.

Extension Activity: Students can set up a video camera and a stage for video taping the TV newscast. Students can dress for the occasion. Students can edit footage and make into a movie.

Standard Addressed: 4.d Students know how to use weather maps and data to predict local weather and know the weather forecasts depend on many variables.

Lesson 2 – Science: Rockets

Objective: - Students will understand Isaac Newton's 3rd Law of Motion – for every action there is an opposite and equal reaction. The concept will be used to explain how a satellite rocket is propelled into an orbit.

Introduction: Students will watch a PowerPoint on a previous class working on the Alka Rocket project. The teacher will explain that the satellites are carried in rockets and deployed in orbit.

Vocabulary: deploy, solar arrays, bus, payload, satellites, orbit, alignment

Materials: 8 1/2" x 11" binder paper or 5" x 8" index car, Alka-Seltzer® tablets, film canister, scissors, tape, and color pencils or markers, water.

Modeling: The teacher will have all the materials and construct the rocket in front of the class. The materials can be put together in advance to make the construction easier.

The instructor can choose to show how each step in the building process is done and have the class follow, or the entire rocket can be completed at one time while the class observes.

The rationale behind building the rocket in front of the class is they will be focused on your instruction because they want to start building the rocket. You will have students on task on your instruction.

Procedure/Steps:
1. Decorate the index card or binder paper. This will form the body of your rocket.
2. Roll the index card into an 8-inch-tall tube. Slide an empty film canister into tube so canister opens at one end of the tube. Securely tape the paper tube to the canister. These are not two separate parts.
3. Tape the 8-inch-long seam of the paper tube.
4. Cut two triangular papers fins, and tape them onto the rocket.
5. Make a small paper cone and tape it to the top of rocket.
6. Hold the rocket upside down and add water to the canister to one-quarter full.
7. Put down rocket and wait for lift off!

Check for Understanding: After each step of the building process, the instructor will ask if everybody understands what to do. Regardless if everybody understands, a student will be asked to explain the step to the class. Other students can add in information at this time with the instructor making sure everything has been covered.

Independent Practice: Students begin building their rocket.

The first rocket will be a control rocket - each one built the same way with same materials, etc. The next rockets will be the own design of the students. Data recorded for all rockets will be size of rocket, fuel mixture (water, Alka-Seltzer® tablets, baking powder, etc.), time it takes to launch, height of rocket in air, and angle of projection.

Questions to be answered:
What happened when Alka-Seltzer® was added to water?
What is the best combination of Alka-Seltzer® and water?
In what ways can you improve your rocket to go high?

Wrap-Up: The teacher will explain that Newton's 3rd Law of Motion is what made their Alka-Seltzer® rockets go up into the air. This is the same law that launches space shuttles that deploy satellites.

Assessment: There are three parts:

1) A chart consisting of rocket and launch factors

a. Size of fuselage
b. Mixture of fuel
c. Height of rocket
d. Time till launch
e. Angle of projection

2) Personal Paragraph – a summary of the events, feelings, observations during the project.

3) Assess student's cooperative skills (teamwork participation.

4) Individual or group presentation.

(Note: Students work better in pairs than larger groups. If students try experimenting at home, make sure they record the launch data. Launch rockets in the morning when there is less wind. This is a great activity to blast into Earth science.)

Resources
Boeing Satellite Systems, Inc.
Lockheed Martin Space Systems
Analytical Graphics, Inc.

Websites (URL)
http://www.spacegrant.hawaii.edu/class_acts/AlkaRocketTe.html (rocket lesson plan)

http://rubistar.4teachers.org/index.php (rubric for math and science assignments)

http://www.stk.com/resources/sattracker/ (satellite movie)

www.humboldt.edu/~tha1/hunter-eei.html (lesson plan format)

http://www.thursdaysclassroom.com/13oct00/protractors.html (picture of protractor)

http://www.cde.ca.gov/be/st/ss/index.asp (California state standards)

http://www.weatherwizkids.com/ (pictures, information, ideas)

Media Resources
Satellite Animation Movie & PowerPoint presentations – send email to:
ajmock@aol.com,
amock@mountpleasant.k12.ca.us

Name

_____

Student Number _____

The Protractor and Angles

C B G Q S A A S O L O C R T M A X S A J
E G T L P T E E H B E I S C P Q A P W X
J V O W S E R G C N E G S W R A N G L E
J B J W R W L A T J L L T H P R L J N W
L Z Z G V M G E I K D I G U V B K K O C
J H E A W Y R E O G D F V N I Q K H R J
C D B G K P Z S R E H U V Y A X F F B Z
W W O E O R O T C A R T O R P E O A L P
C G P I D X A A A E P O A X E W T A U X
U F N O U T M N Y L I K G N V M K U E K
Z T R M R S T I C D U N V D G K G G C G
E V H G G S H P O K X Z R W P L U U A A
V I T V S C L V B E Q R X H A S E M M X
U G M H W T Y F T L N Z G N Z N Z P Z Z

N N E V U G K G U G S I U H H T J L L V
U G U T L I V B S N M J L R I C W V T M
Y B B A K X B K E A Z Z R L N O L T G V
O X K W E X Z L A T S W Y P R K R F K I
Q G P G R X U N N H S T P I R Q S R Q Z
K X I A B W Z T G G D H G R G H O G P G
M A S T P C R A L I M P C H G R W J D A
V O Q Q G W I T E R L D L G Q M X N Z G
J B X Y X U U K L K O O A A Z W Q Z Y O
C F Y X G I Z Q N N T S M G S K Y P W N
Z M O Y O H L J F Z A I V Y X L B P B A
S Y M R I M T L J I O D F P P O R E L Q

Write vocabulary words here:

Name _____
Student # _____

Whether or Weather?

G S R O X K A P V R E K R O R U D R E D D B D G
D D U R S A M X K Z W E R G V D L B H H N V P B
J R S T W E T I L L E T A S L J E E G C V X B W
G S R A I Z D P Y L H C S L R J V P D M E W N T
G D L F N Q B V U B Q V V A T W X J H I B Y U J
F H U U T D B B L U M S V Z H N M U M C H H N K
M U H O E T Y Z D F D V N O Y N R A T N L U M V
G L M B R D K C Y K C D Z G B R N X Z P Z N J Y
Q O F P S M X V C D R P Z J I U A R V R D Z G T
D Q J H T H Z D S T S H R C S W O D I F V E B H
C F N J O L N X P Y V U A T R T M P A R V I A T
T C J A R H U Q J F I N G F X E Z H E R W N R H
V C X A M V W R X T E K D J B V H E P P T Y Y Z
U S I W C A C W J V A G X H N J B T M D A V N M
B S U A P Z R N X C L O U D S Y H L A C Q O O U

T S O E U Q D V U W S K L V H Q E N V E I D D T
Z Q L P P O N Y B V Y L P R I O R K N C W A A S
A T P K V B A P E K Z W Y O H U Z H T R W N G O
R U Y Z X X M A B Q W Q G J B Y U O D X S R V P
B B L Z R X X X C C C D G T K V L O D L N O T G
J H Z G H V R O L N M T G C B L H X B D I T Q N
K X W E N T M K V T S F C D Y J L Y I B W K C Q

CLOUDS
HURRICANE
RADAR
SATELLITE
TORNADO
TSUNAMI
WEATHER
WINTERSTORM

Building A Structure : Alka Rocket

Teacher Name: **Alan Mock**

Student Name: _____

CATEGORY	4	3	2	1
Modification/Testing	Clear evidence of troubleshooting, testing, and refinements based on data or scientific principles.	Clear evidence of troubleshooting, testing and refinements.	Some evidence of troubleshooting, testing and refinements.	Little evidence of troubleshooting, testing or refinement.
Construction - Materials	Appropriate materials were selected and creatively modified in ways that made them even better.	Appropriate materials were selected and there was an attempt at creative modification to make them even better.	Appropriate materials were selected.	Inappropriate materials were selected and contributed to a product that performed poorly.

Data Collection	Data taken several times in a careful, reliable manner.	Data taken twice in a careful, reliable manner.	Data taken once in a careful, reliable manner.	Data not taken carefully OR not taken in a reliable manner.
Plan	Plan is neat with clear measurements and labeling for all components.	Plan is neat with clear measurements and labeling for most components.	Plan provides clear measurements and labeling for most components.	Plan does not show measurements clearly or is otherwise inadequately labeled.

Date Created: **Aug 04, 2005 03:55 pm (CDT)**

Oral Presentation Rubric : Class Presentation

Teacher Name: **Alan Mock**

Student Name: _____

CATEGORY	4	3	2	1
Enthusiasm	Facial expressions and body language generate a strong interest and enthusiasm about the topic in others.	Facial expressions and body language sometimes generate a strong interest and enthusiasm about the topic in others.	Facial expressions and body language are used to try to generate enthusiasm, but seem somewhat faked.	Very little use of facial expressions or body language. Did not generate much interest in topic being presented.
Preparedness	Student is completely prepared and has obviously rehearsed.	Student seems pretty prepared but might have needed a couple more rehearsals.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.

Speaks Clearly	Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words.	Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word.	Speaks clearly and distinctly most (94-85%) of the time. Mispronounces no more than one word.	Often mumbles or can not be understood OR mispronounces more than one word.
Collaboration with Peers	Almost always listens to, shares with, and supports the efforts of ot hers in the group. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others in the group. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member.
Comprehension	Student is able to accurately answer almost all questions posed by classmates about the topic.	Student is able to accurately answer most questions posed by classmates about the topic.	Student is able to accurately answer a few questions posed by classmates about the topic.	Student is unable to accurately answer questions posed by classmates about the topic.

Date Created: **Aug 04, 2005 03:59 pm (CDT)**

Math - Problem Solving : Protractors & Angles

Teacher Name: **Alan Mock**

Student Name: _____

CATEGORY	4	3	2	1
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Use of Manipulatives	Student always listens and follows directions and only uses manipulatives as instructed.	Student typically listens and follows directions and uses manipulatives as instructed most of the time.	Student sometimes listens and follows directions and uses manipulatives appropirately when reminded.	Student rarely listens and often "plays" with the manipulatives instead of using them as instructed.

Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.
Diagrams and Sketches	Diagrams and/or sketches are clear and greatly add to the reader's understanding of the procedure(s).	Diagrams and/or sketches are clear and easy to understand.	Diagrams and/or sketches are somewhat difficult to understand.	Diagrams and/or sketches are difficult to understand or are not used.
Mathematical Reasoning	Uses complex and refined mathematical reasoning.	Uses effective mathematical reasoning	Some evidence of mathematical reasoning.	Little evidence of mathematical reasoning.

Date Created: **Aug 04, 2005 04:03 pm (CDT)**

Building A Structure : Model Satellite

Teacher Name: **Mr. Mock**

Student Name: _____

CATEGORY	4	3	2	1
Modification/Testing	Clear evidence of troubleshooting, testing, and refinements based on data or scientific principles.	Clear evidence of troubleshooting, testing and refinements.	Some evidence of troubleshooting, testing and refinements.	Little evidence of troubleshooting, testing or refinement.
Construction - Care Taken	Great care taken in construction p rocess so that the structure is neat, attractive and follows plans accurately.	Construction was careful and accurate for the most part, but 1-2 details could have been refined for a more attractive product.	Construction accurately followed the plans, but 3-4 details could have been refined for a more attractive product.	Construction appears careless or haphazard. Many details need refinement for a strong or attractive product.

Modification/Testing	Clear evidence of troubleshooting, testing, and refinements based on data or scientific principles.	Clear evidence of troubleshooting, testing and refinements.	Some evidence of troubleshooting, testing and refinements.	Little evidence of troubleshooting, testing or refinement.
Data Collection	Data taken several times in a careful, reliable manner.	Data taken twice in a careful, reliable manner.	Data taken once in a careful, reliable manner.	Data not taken carefully OR not taken in a reliable manner.

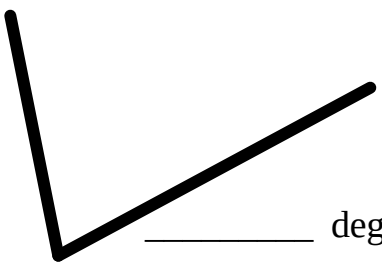
Date Created: **Aug 03, 2005 07:07 pm (CDT)**

The Protractor

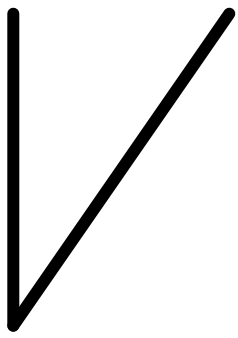
Quiz

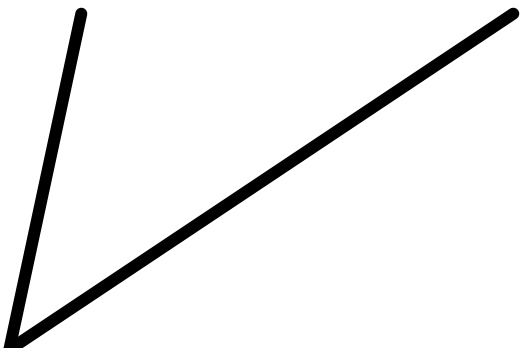
Name _____

Number _____

1.  _____ degrees

2.  _____ degrees

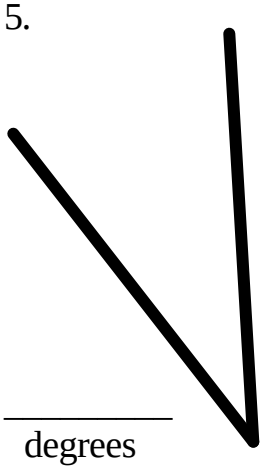
3. 

4. 

_____ degrees

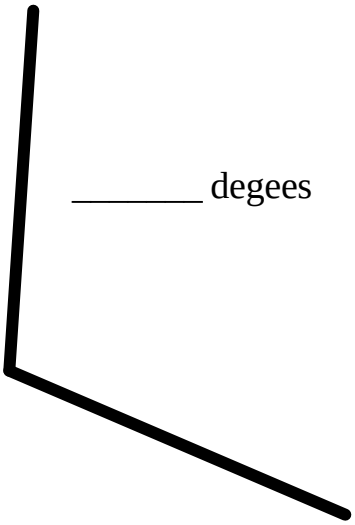
_____ degrees

5.



_____
degrees

6.



_____ degees

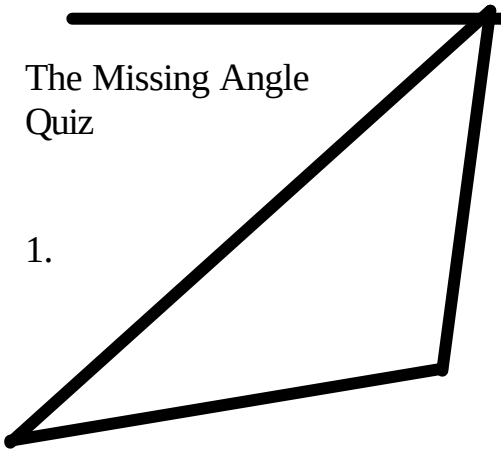
7.

_____ + _____ = 180 degrees

The Missing Angle Quiz

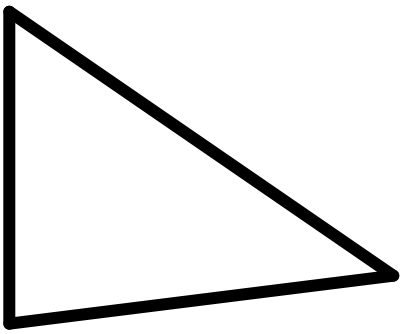
Name _____
Number _____

1.

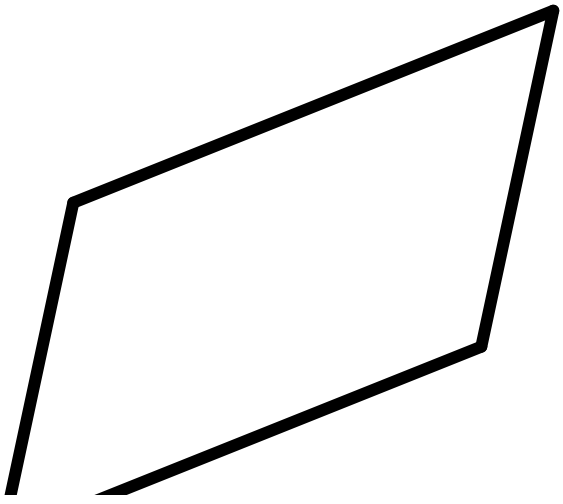


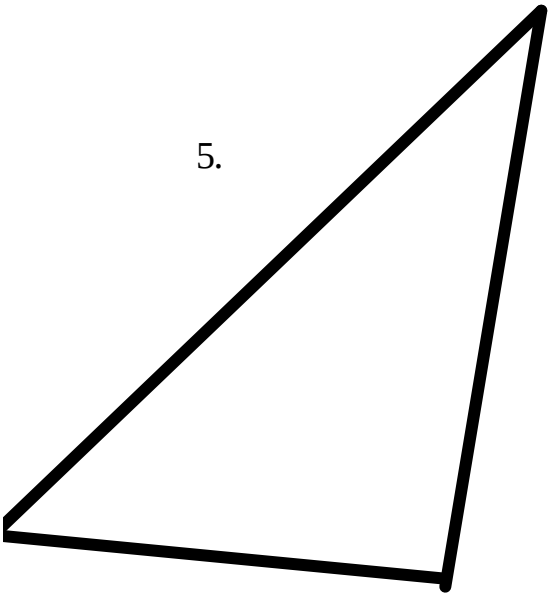
2.

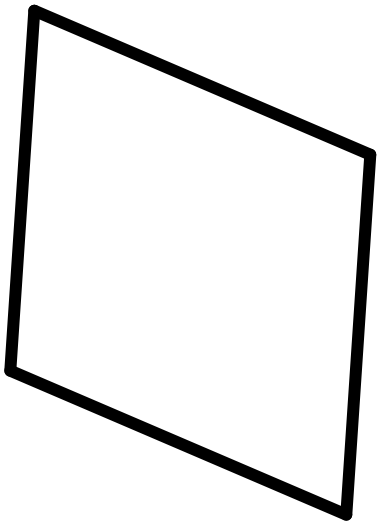
3.



4.



5. 

6. 

7. 

Parallel & Perpendicular **Name** _____

Quiz Number _____

Please write in your own words the definition of:

Parallel –

Perpendicular –

List 5 things that are parallel and 5 things that are perpendicular in the classroom. They have to be specific and detailed in your description.

Parallel

1. _____

2. _____

3. _____

4. _____

5. _____

Perpendicular

1. _____

2. _____

3. _____

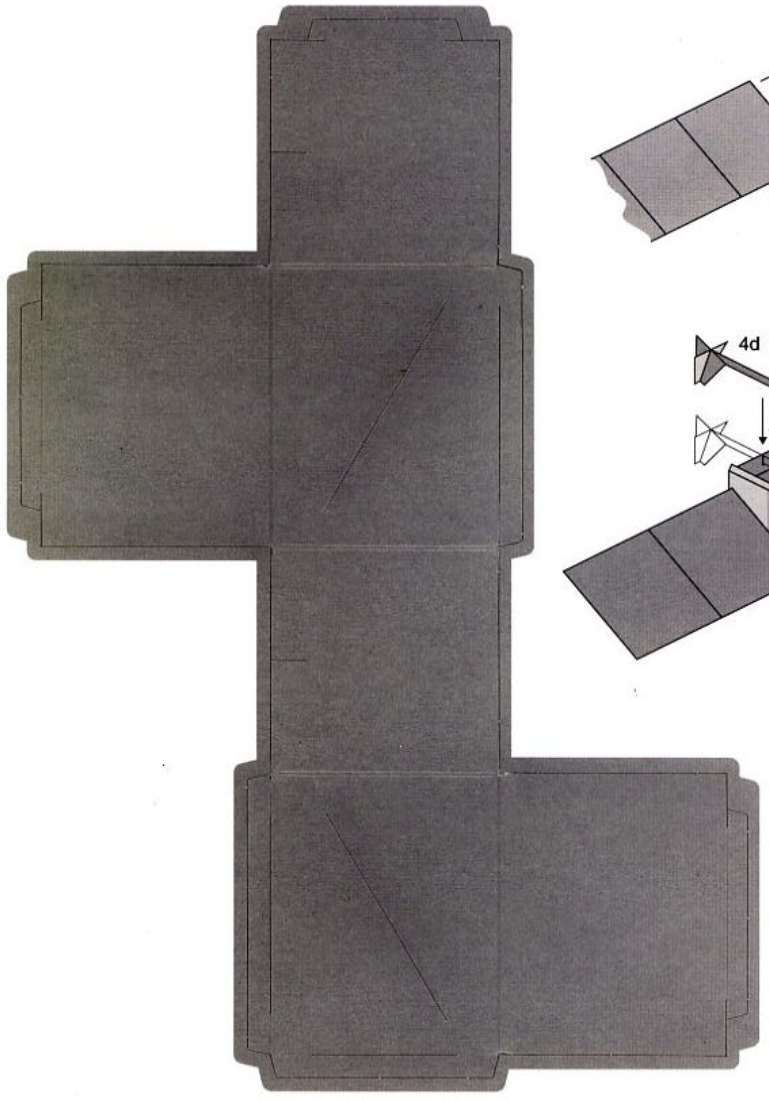
4. _____

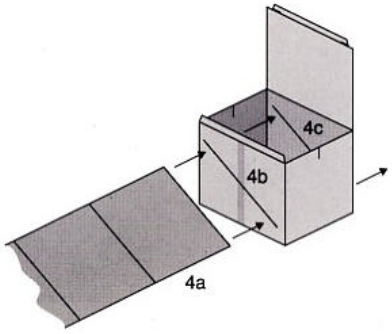
5. _____

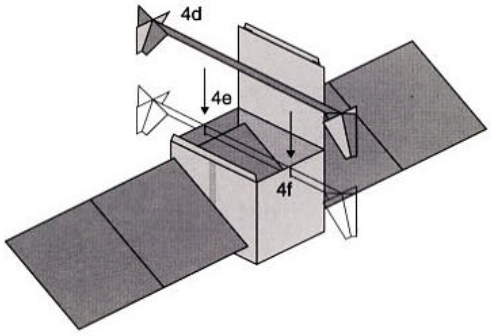
Make your own GPS satellite

LOCKHEED MARTIN

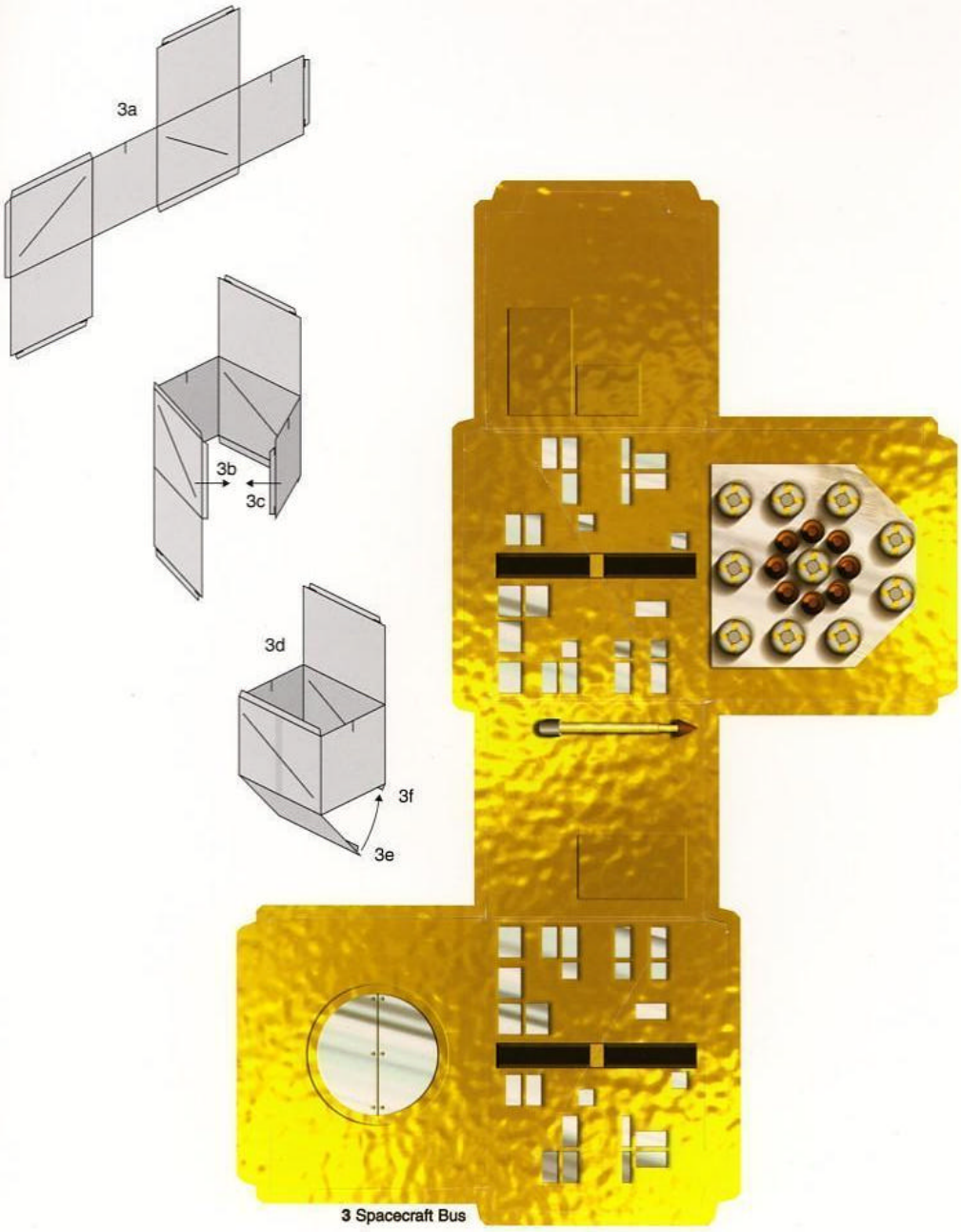
This precut model of a Global Positioning System satellite reflects the design developed by Lockheed Martin Space & Strategic Missiles, which has manufactured more than two dozen GPS satellites at its plant in Valley Forge, Pennsylvania.





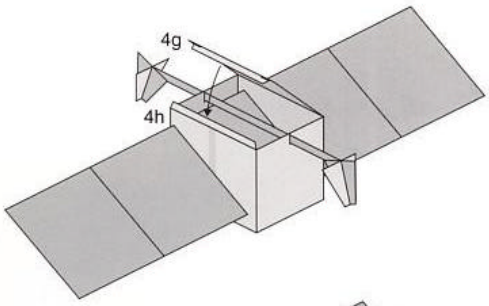


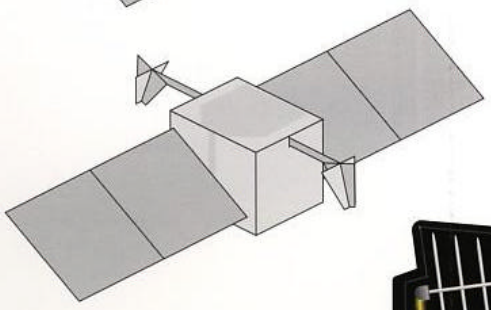
Bus Section



3 Spacecraft Bus

LOCKHEED MARTIN





4 Final Assembly

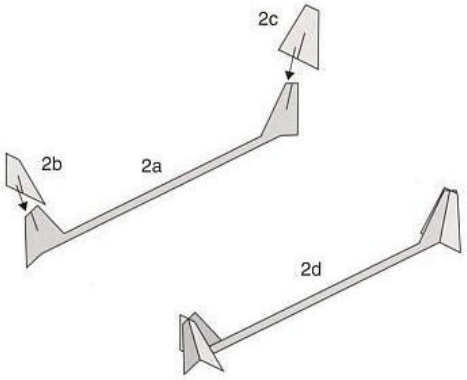
- Slide solar array **4a** through slots **4b** and **4c** on sides of bus.
- Slide antenna **4d** into slots **4e** and **4f** on top of bus.
- Fold top down and slide tongue **4g** into slot in tab **4h**.

Congratulations!
You have completed your own GPS satellite.

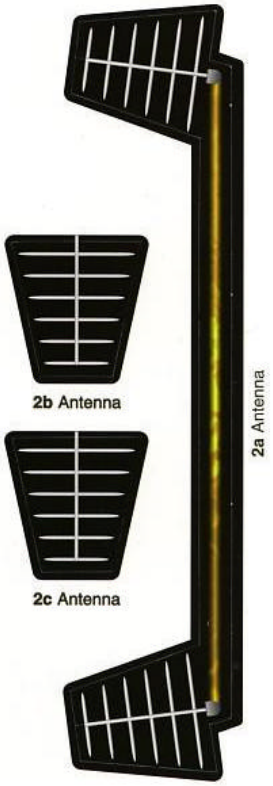
K2319_026-03

Solar Section

Punch out and fold each section before final assembly.



1 Solar Array



1 Solar Array

Collects and converts the Sun's energy into electricity.

- Punch out solar array and set aside until final assembly with bus.

2 Antenna

Links communications between spacecraft and ground station on Earth.

- Punch out antenna pieces **2a**, **2b** and **2c**.
- Slide antenna pieces **2b** and **2c** onto **2a** to create finished shape **2d**.

3 Spacecraft Bus

Houses the systems that control the spacecraft.

- Fold box **3a**.
- Fold tab **3b** into slot **3c** to form **3d**.
- Fold tab **3e** into slot **3f** to close bottom of box.

Assembly instructions continue on back of this page.

Slide 1

Answer the best you can

What do you think the object on your desk is?

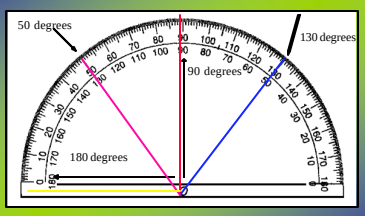
What do you do with it?

Can you use it to draw an angle?

How do you use it to measure an angle?

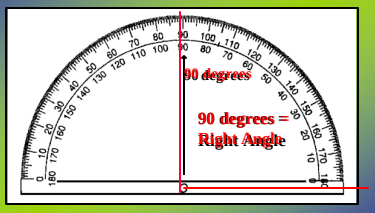
Slide 2

This is a PRO-TRAC-TOR

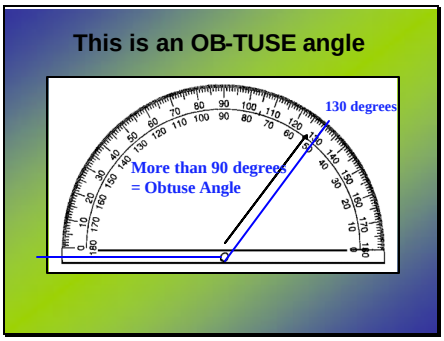


Slide 3

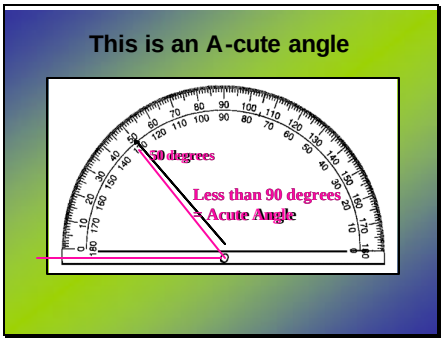
This is a RIGHT angle



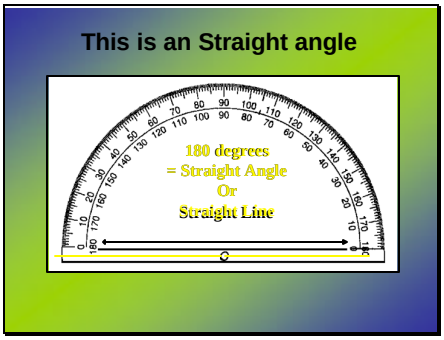
Slide 4



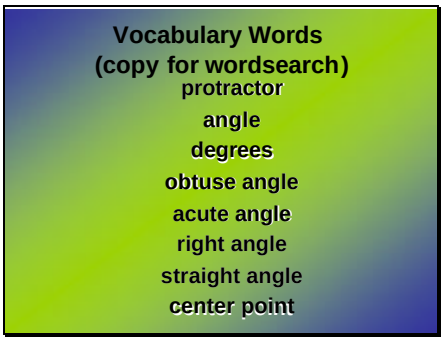
Slide 5



Slide 6



Slide 7


Vocabulary Words
(copy for wordsearch)
protractor
angle
degrees
obtuse angle
acute angle
right angle
straight angle
center point

Slide 1

The Alka Rocket
Mr. Mock's 6th Grade Class
2000-2001



24

Slide 2

Materials Required

Copy Paper
Color Markers & Pencils

Slide 3

Launch Data Chart

Teacher's Directions

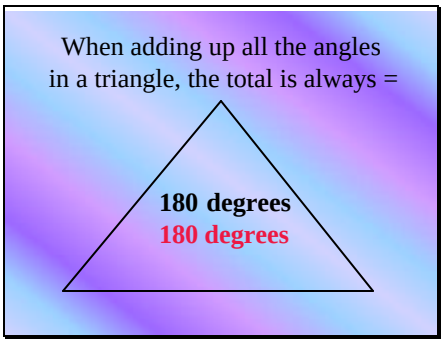
Slide 4

Slide 5

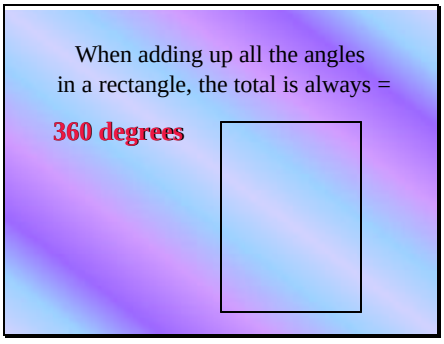
Slide 6

Slide 7

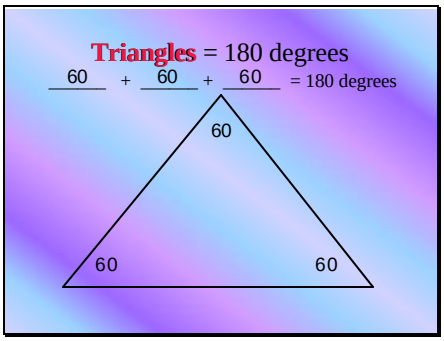
Slide 1



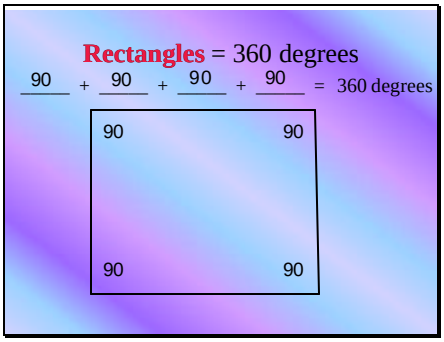
Slide 2



Slide 3



Slide 4



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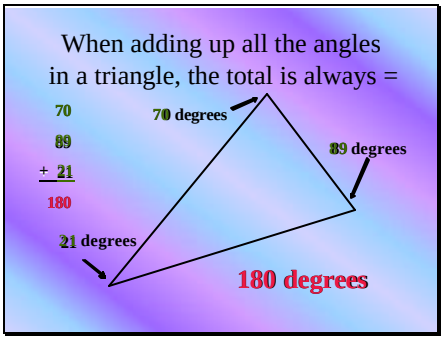
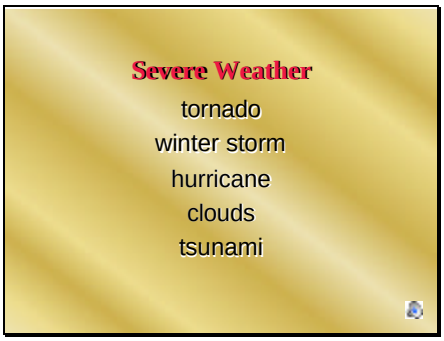
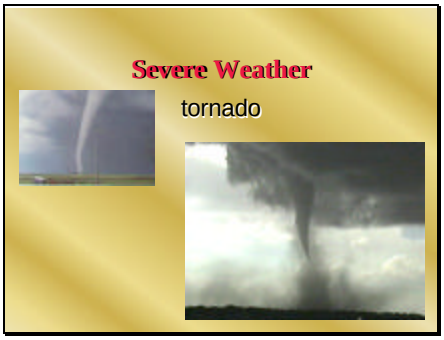


Slide 1



Slide 2

Slide 3



Slide 4

Slide 5

Slide 6

Slide 7

Slide 8

Slide 9