

# RACING WITH MATH

*RACING*

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## CONTENTS

1. Racing Rules
2. Track Index
3. Racing Sheets (10)

# Racing Sheet

A racing sheet is able to list up to six cars and record a maximum of twenty-five laps.

Track Name \_\_\_\_\_

\*Refer to track index for type (starting line) and banking (incline) of track.

Starting Line: \_\_\_\_\_ Incline: \_\_\_\_\_

## Racing Laps – Example

The data table will show where every car finished on each lap. When the race is over, add the column of lap finishes for each car and divide by the total number of laps raced. The car with the lowest average (highest average finish) wins.

Lap #	Car #	Car #	Car #	Car #	Car #	Car #
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						



# Racing Rules

Place cars on the same incline and make sure they are lined up evenly on the appropriate starting line. \*If using larger cars, you may need to use two inclines in order to have enough room for all of the cars. Make sure both inclines are being held at exactly the same angle.

Release all of the cars at the same time. Let the cars roll and come to a stop. Record the finishing order of the cars.

Repeat the process and race for as many laps as you would like.

When the race is over, add up the lap finishes for each car and divide it by the number of laps raced.

The car with the lowest average (highest average finish) is the winner.

A fast car will benefit a player or team. However, it does not guarantee victory. Racing down the incline will involve cars bumping and perhaps wrecking. These pitfalls could affect the finishing order of the cars on any lap.

## Racing Laps – Example

The data table will show where each car finished on each lap. When the race is over, add the column of lap finishes for each car and divide by the number of laps raced.

Lap #	Car #78	Car #87	Car #25	Car #13	Car #01
1	5	4	2	3	1
2	4	5	3	2	1
3	3	4	5	1	2
4	4	3	2	5	1
5	5	3	4	1	2
<b>Total Lap Finishes</b>	<b>21</b>	<b>19</b>	<b>16</b>	<b>12</b>	<b>7</b>

## Top Finishers – Example

Finishing Place	Car #	Average Lap Finish	Lowest Lap Finish	Highest Lap Finish	Range Low-High =
1	01	$7 / 5 = 1.4$	2	1	1
2	13	$12 / 5 = 2.4$	5	1	4
3	25	$16 / 5 = 3.2$	5	2	3
4	87	$19 / 5 = 3.8$	5	3	2
5	78	$21 / 5 = 4.2$	5	3	2

# Track Index

The track type will determine the starting line.  
 The track's banking will determine the angle of the incline.

## Type

<b>Super Speedway (SS)</b>	<b>Intermediate Track (INT)</b>	<b>Short Track (ST)</b>
Three-Inch Starting Line	Two-Inch Starting Line	One-Inch Starting Line

## Track Selections

<b>Track</b>	<b>Type</b>	<b>Banking</b>
Atlanta	INT	25°
Bristol	ST	35°
Charlotte	INT	25°
Chicagoland	INT	20°
Darlington	INT	25°
Daytona	SS	30°
Dover	ST	25°
Fontana	SS	15°
Homestead	INT	20°
Indianapolis	SS	10°
Kansas City	INT	15°
Las Vegas	INT	20°
Martinsville	ST	10°
Michigan	SS	20°
New Hampshire	INT	10°
Phoenix	ST	10°
Pocono	SS	15°
Richmond	ST	15°
Talladega	SS	35°
Texas	INT	25°

RACING  
WITH  
MATH

*QUALIFYING*

NAME \_\_\_\_\_

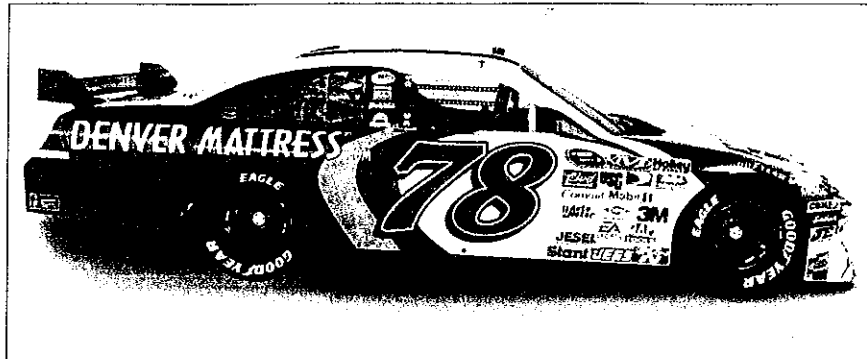
DATE \_\_\_\_\_

CONTENTS

1. Measurement
2. Statistical Analysis
3. Qualifying Sheets (5)
4. Positioning Polygons

# Measurement

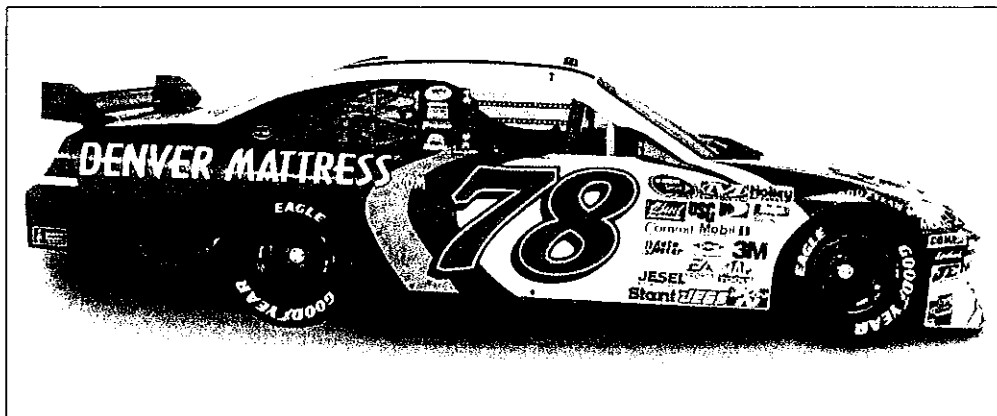
Measure each car from bumper to bumper to the nearest  $\frac{1}{4}$  inch and  $\frac{1}{2}$  centimeter.



Circle the correct answer.

$4\frac{1}{4}$     $4\frac{3}{4}$    5    $5\frac{1}{2}$    inches

10.5   11   11.5   12.5   centimeters

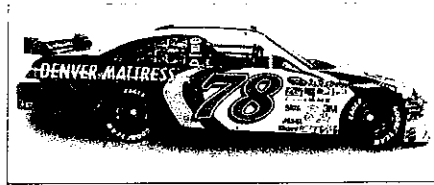


Circle the correct answer.

$4\frac{1}{4}$     $4\frac{3}{4}$    5    $5\frac{1}{2}$    inches

10.5   11   11.5   12.5   centimeters

A **spoiler** is an automotive aerodynamic device whose intended design function is to 'spoil' unfavorable air movement across a body of a vehicle in motion. In this picture it looks like a black wing attached to the back end of the car.



Measure the length of each spoiler to the nearest  $\frac{1}{4}$  inch and  $\frac{1}{2}$  centimeter.



Circle the correct answer.

1  $\frac{1}{4}$  1  $\frac{3}{4}$  2 2  $\frac{1}{2}$  inches

3 3.5 4 5 centimeters



Circle the correct answer.

1  $\frac{1}{4}$  1  $\frac{3}{4}$  2 2  $\frac{1}{2}$  inches

3 3.5 4 5 centimeters

# Tire Production

## Key Vocabulary

**diameter** – a straight line that goes from one side to the other of a circle and crosses through the center of the circle

**radius** – any line going straight from the center to the outside edge of a circle

## Here is how to draw a circle with a compass.

First, draw a straight line to the desired length. This will be the diameter of the circle. Then place the anchor of the compass in the middle of the line. Place the pencil point of the compass at one end of the line and completely rotate the compass one time. This will give you a perfectly round circle.

Use a compass to draw a tire with a diameter of 4 centimeters.

What is the radius of this tire? \_\_\_\_\_ centimeters

Use a compass to draw a tire with a diameter of 3 inches.

What is the radius of this tire? \_\_\_\_\_ inches

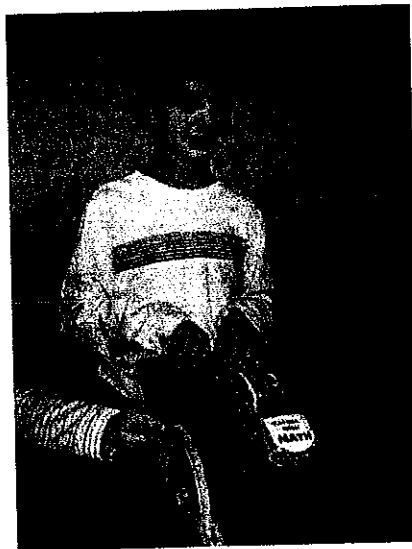
# Statistical Analysis

Teamwork will be the key to success in this section. Here is what will need to be done to complete a proper statistical analysis.

1. Select the number of racing teams, student groups.
2. Select team sizes of two to five students.
3. Provide a minimum of two cars per team.
4. Assign a job to each team member. \*Some students will need to do more than one job depending on the size of the team.

Here are the jobs:

- a. **incline holder**-someone who holds and adjusts the incline to the desired angle
- b. **driver**- someone who holds a car at the proper starting line and releases it by lifting his/her hand (no pushing) at the command of the angle reader



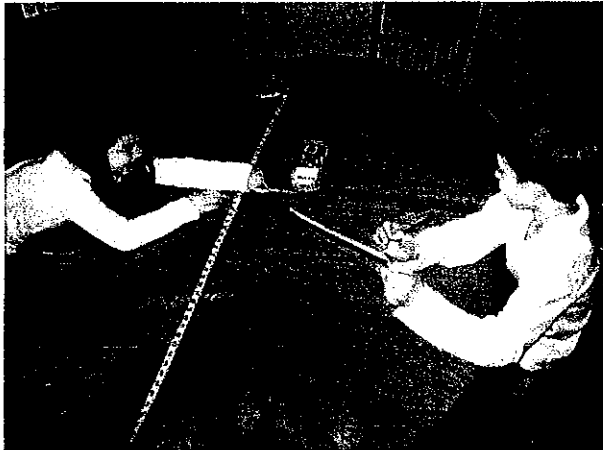
- c. **angle reader**- someone who holds the protractor at the correct angle and tells the driver when to release the car



- d. **distance measurer**-someone who measures the car's traveled distance



- e. **statistic recorder**- someone who records the car's traveled distance



5. Complete a qualifying sheet for each car.
6. After all of the data is collected, compare the statistics of each car, and determine which one is the best.
7. Here are some important reminders for the statistical analysis section.
  - a. Draw three lines on your incline. The first line should be one inch from the bottom of the board. This is a short track starting line. The second line should be two inches from the bottom the board. This is an intermediate track starting line. The final line should be three inches from the bottom of the board. This is a super speedway starting line.  
\*These lines will be used during the racing and track testing packets.  
\*Qualifying has a predetermined starting line (one inch) and incline angle ( $20^\circ$ ).
  - b. Remind the students that they are a team. Real pit crews work together and value each other's input. Students should do the same.
  - c. The selection of their best car should be based on the collected math data only. It should make mathematical sense.
  - d. Instructors should observe and encourage each team. Enjoy it!

# Qualifying Sheet

Car # \_ \_

## Qualifying Attempts

Starting Line: 1 inch Incline: 20°

Attempt #	Distance
1	
2	
3	
4	
5	

List the distances of all the qualifying attempts from least to greatest:

---

\*Use this list to complete the statistical analysis table.

## Statistical Analysis of Qualifying Attempts

Category	Distance
Maximum	
Minimum	
Range	
Mode	
Median	
Mean	

**Maximum** – the longest attempt distance

**Minimum** – the shortest attempt distance

**Range** – subtract the minimum from the maximum

**Mode** – the most-appearing attempt distance

\*If all of the distances are different, there is no mode.

**Median** – number in the middle of all the attempt distances listed from least to greatest

**Mean** – add all of the attempt distances together and divide by the number of attempts

## STATISTICAL ANALYSIS

### Qualifying

**\*Each team must qualify a minimum of two cars. Therefore, each of the following items should have two checks, one for each car.**

- List car # \_\_\_\_\_
- Release car at one-inch line \_\_\_\_\_
- Set incline at  $20^\circ$  for each release \_\_\_\_\_
- List distances for attempts one through five \_\_\_\_\_
- List distances from least to greatest \_\_\_\_\_
- List minimum \_\_\_\_\_
- List maximum \_\_\_\_\_
- List range \_\_\_\_\_
- List mode \_\_\_\_\_
- List median \_\_\_\_\_
- List mean \_\_\_\_\_

### POSITIONING POLYGONS - Car Design

- Use only polygons to draw a car \_\_\_\_\_
- Color the car \_\_\_\_\_
- Use more than four different types of polygons \_\_\_\_\_
- Use more than four different colors \_\_\_\_\_
- Neatness \_\_\_\_\_
- Creativity \_\_\_\_\_

Your signature indicates that you have completed every requirement of the qualifying section.

---

(Student signature)

Your friend's signature indicates that he/she confirms that every requirement of your qualifying section is complete.

---

(Friend's signature)

# Teacher Evaluation Sheet

Student Name \_\_\_\_\_

Date \_\_\_\_\_

Scoring Index: 1 (Satisfactory) 0 (Unsatisfactory)

Measurement - \_\_\_\_\_ / 12  
Statistical Analysis - \_\_\_\_\_ / 22  
Positioning Polygons - \_\_\_\_\_ / 6

Total Score - \_\_\_\_\_ / 40 Percentage Score - \_\_\_\_\_ %

## MEASUREMENT

### Bumper to Bumper

Circle inch answer of first car \_\_\_\_\_  
Circle centimeter answer of first car \_\_\_\_\_  
Write inch answer of second car \_\_\_\_\_  
Write centimeter answer of second car \_\_\_\_\_

### Spoiler

Circle inch answer of first spoiler \_\_\_\_\_  
Circle centimeter answer of first spoiler \_\_\_\_\_  
Circle inch answer of second spoiler \_\_\_\_\_  
Circle centimeter answer of second spoiler \_\_\_\_\_

### Tire Production

Draw first tire \_\_\_\_\_  
Label first tire \_\_\_\_\_  
Draw second tire \_\_\_\_\_  
Label second tire \_\_\_\_\_

### Measurement

Total points: \_\_\_\_\_ / 12

## STATISTICAL ANALYSIS

**\*Each team must qualify a minimum of two cars. Therefore, the statistics of two cars will be required for evaluation.**

### Qualifying (Car #1)

List car # \_\_\_\_\_  
Release car at one-inch line \_\_\_\_\_  
Set incline at 20° for each release \_\_\_\_\_  
List distances for attempts one through five \_\_\_\_\_  
List distances from least to greatest \_\_\_\_\_  
List minimum \_\_\_\_\_  
List maximum \_\_\_\_\_  
List range \_\_\_\_\_  
List mode \_\_\_\_\_  
List median \_\_\_\_\_  
List mean \_\_\_\_\_

### Qualifying (Car #2)

List car # \_\_\_\_\_  
Release car at one-inch line \_\_\_\_\_  
Set incline at 20° for each release \_\_\_\_\_  
List distances for attempts one through five \_\_\_\_\_  
List distances from least to greatest \_\_\_\_\_  
List minimum \_\_\_\_\_  
List maximum \_\_\_\_\_  
List range \_\_\_\_\_  
List mode \_\_\_\_\_  
List median \_\_\_\_\_  
List mean \_\_\_\_\_

### Statistical Analysis

Total points: \_\_\_\_\_ / 22

### POSITIONING POLYGONS - Car Design

Use only polygons to draw a car \_\_\_\_\_  
Color the car \_\_\_\_\_  
Use more than four different types of polygons \_\_\_\_\_  
Use more than four different colors \_\_\_\_\_  
Neatness \_\_\_\_\_  
Creativity \_\_\_\_\_

### Positioning Polygons

Total points: \_\_\_\_\_ / 6

# Positioning Polygons

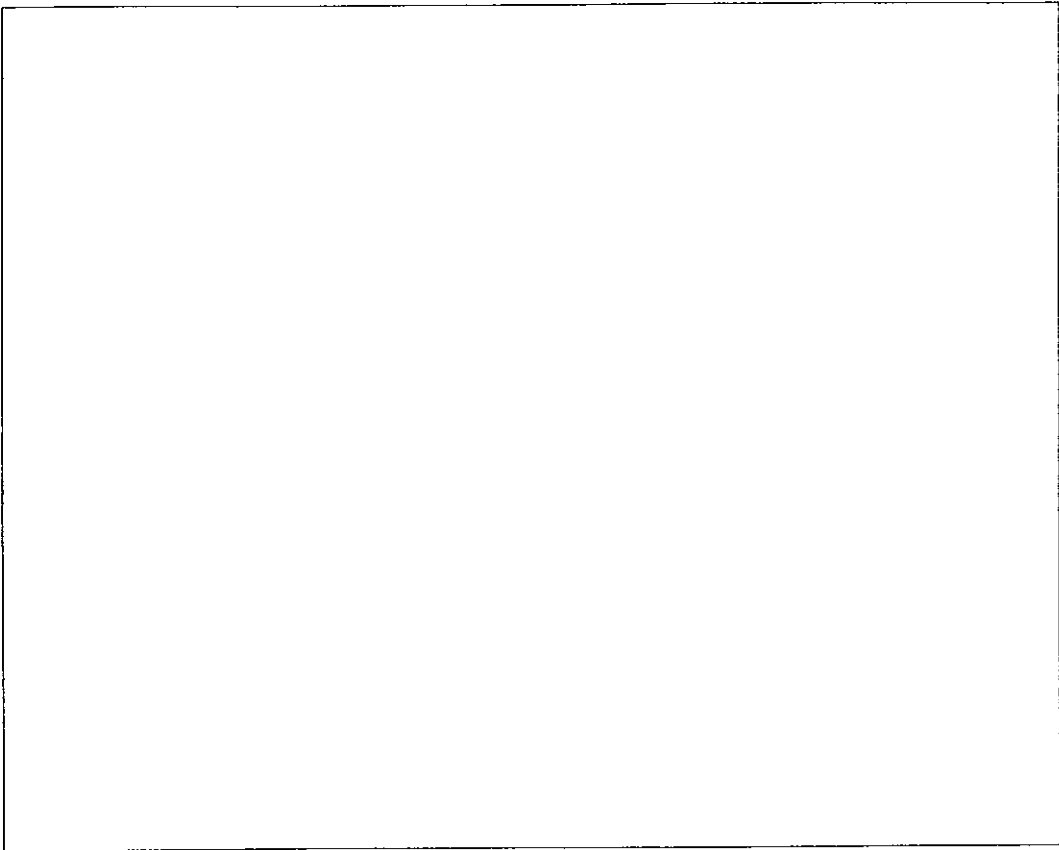
## Car Design

Draw a racecar using only polygons.

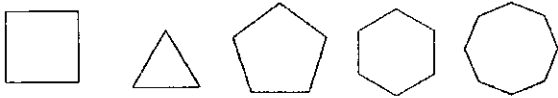
A polygon is a flat, two-dimensional figure made up of at least three sides.

The sides must be straight, completely connected, and not cross.

Don't forget to use a ruler or straightedge and color your car.



### Polygon Examples



# Final Inspection Sheet

Final inspections are very important to racing teams. It is their way of making sure that everything is in place and ready to race.

Make sure that you have everything ready to go by placing a checkmark beside each completed item.

After completing your final inspection checklist, hand in your qualifying section to your teacher for an official evaluation. After receiving a satisfactory score, you may advance to the racing section and begin racing.

## MEASUREMENT

### Bumper to Bumper

Circle inch answer of first car \_\_\_\_\_

Circle centimeter answer of first car \_\_\_\_\_

Circle inch answer of second car \_\_\_\_\_

Circle centimeter answer of second car \_\_\_\_\_

### Spoiler

Circle inch answer of first spoiler \_\_\_\_\_

Circle centimeter answer of first spoiler \_\_\_\_\_

Circle inch answer of second spoiler \_\_\_\_\_

Circle centimeter answer of second spoiler \_\_\_\_\_

### Tire Production

Draw first tire \_\_\_\_\_

Label first tire \_\_\_\_\_

Draw second tire \_\_\_\_\_

Label second tire \_\_\_\_\_

# RACING WITH MATH

*TRACK TESTING*

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## CONTENTS

1. Track Testing Table
2. Track Index
3. Track Testing Sheets (20)

# RACING WITH MATH

*TRACK TESTING*

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## CONTENTS

1. Track Testing Table
2. Track Index
3. Track Testing Sheets (20)

**\*This section should be used as an enrichment or extra-credit activity. Allow a pair or group of high-performing students to test a car at each track. This activity will be time consuming and should be completed outside of class.**

## Track Testing Table

Individual Car - Track Comparison

Car # \_\_\_\_\_

Track	Maximum	Minimum	Range	Mode	Median	Mean
Atlanta						
Bristol						
Charlotte						
Chicagoland						
Darlington						
Daytona						
Dover						
Fontana						
Homestead						
Indianapolis						
Kansas City						
Las Vegas						
Martinsville						
Michigan						
New Hampshire						
Phoenix						
Pocono						
Richmond						
Talladega						
Texas						

# Track Index

The track type will determine the starting line.  
The track's banking will determine the angle of the incline.

## Type

Super Speedway (SS)	Intermediate Track (INT)	Short Track (ST)
Three-Inch Starting Line	Two-Inch Starting Line	One-Inch Starting Line

## Track Selections

Track	Type	Banking
Atlanta	INT	25°
Bristol	ST	35°
Charlotte	INT	25°
Chicagoland	INT	20°
Darlington	INT	25°
Daytona	SS	30°
Dover	ST	25°
Fontana	SS	15°
Homestead	INT	20°
Indianapolis	SS	10°
Kansas City	INT	15°
Las Vegas	INT	20°
Martinsville	ST	10°
Michigan	SS	20°
New Hampshire	INT	10°
Phoenix	ST	10°
Pocono	SS	15°
Richmond	ST	15°
Talladega	SS	35°
Texas	INT	25°

# Track Testing Sheet

Car # \_\_\_\_\_

Selected Track: \_\_\_\_\_ Type: ST INT SS

Banking \_\_\_\_\_°

## Testing Attempts

Starting Line: \_\_\_\_\_ Incline: \_\_\_\_\_

Attempt #	Distance
1	
2	
3	
4	
5	

List distances from least to greatest \_\_\_\_\_

\*Use this list to complete the statistical analysis table.

## Statistical Analysis of Testing Attempts

Category	Distance
Maximum	
Minimum	
Range	
Mode	
Median	
Mean	

**Maximum** – the longest attempt distance

**Minimum** – the shortest attempt distance

**Range** – subtract the minimum from the maximum

**Mode** – the most-appearing attempt distance

\*If all of the distances are different, there is no mode

**Median** – the number in the middle of all attempt distances listed from least to greatest

**Mean** – add all of the attempt distances together and divide by the number of attempts

**\*Don't forget to record the results on your Track Testing Table.**