NAME(S):_____
DATE:_____
SECTION:_____
ASSIGNMENT: _____

Over the next several class periods, we will: research, design, construct and test mouse trap racers. This is a pretty involved project in comparison to CO2 dragster. While the majority of the work and research will be completed in the classroom and lab, students are encouraged to continue their exploration at home.

TASK 3: I have identified six (6) design variables for the mousetrap vehicle. There are likely more, but these are the ones on which we will focus in this *pre-design* phase.

Part A - Before you start considering these variables, it might be a good idea to decide your performance goal. Will you design a vehicle for speed or distance? Our team will be designing a vehicle built for:

SPEED DISTANCE

Take your choice into consideration when you design your vehicle. Your performance goal should dictate the choices you make with the design variables.

Part B – Below are the design variables we will consider. Any engineer worth his or her salt will test variables and collect some sort of data before making an informed decision about his or her design.

Read each variable, then make a list of ways we could test these variables and collect some data.

VARIABLE	METHOD OF TESTING
size of wheels	
size (diameter) of drive axle	
length of vehicle	
length of lever arm	
mass of vehicle	
number/type of trap(s)	

***Experimental design* is something I know you all have worked on in your science classes. Think**

like a scientist here!

TASK 4: As and after we investigate the six design variables we've identified, take notes on each. A pro/con chart for each should be satisfactory, but you may use the space below any way you choose.

Size of Wheels

OPTION	PROs	CONs

Size (Diameter) of Drive Axle

OPTION	PROs	CONs

Length of Vehicle

OPTION	PROs	CONs

Length of Lever Arm

OPTION	PROs	CONs

Mass of Vehicle

OPTION	PROs	CONs

Number/Type of Trap(s)

OPTION	PROs	CONs

TASK 5: Now that we have explored and tested each design variable, it's time to make some decisions about how you will design your vehicle. For each variable below, indicate the choice you will incorporate into your design, then provide a brief rationale for your choice. Remember, your performance goal should dictate the choices you make. It matters!

VARIABLE	CHOICE	RATIONALE
size of wheels		
size (diameter) of drive axle		
length of vehicle		
length of lever arm		
mass of vehicle		
number/type of trap(s)		

TASK 6: Your final pre-design task is to brainstorm and decide on the materials you will use. Please ask if you are unsure whether or not you'll be able to use a certain construction material.

PART	MATERIALS		
wheels			
axles			
string			

tires			
arm			
frame/body			
mousetrap			
other			

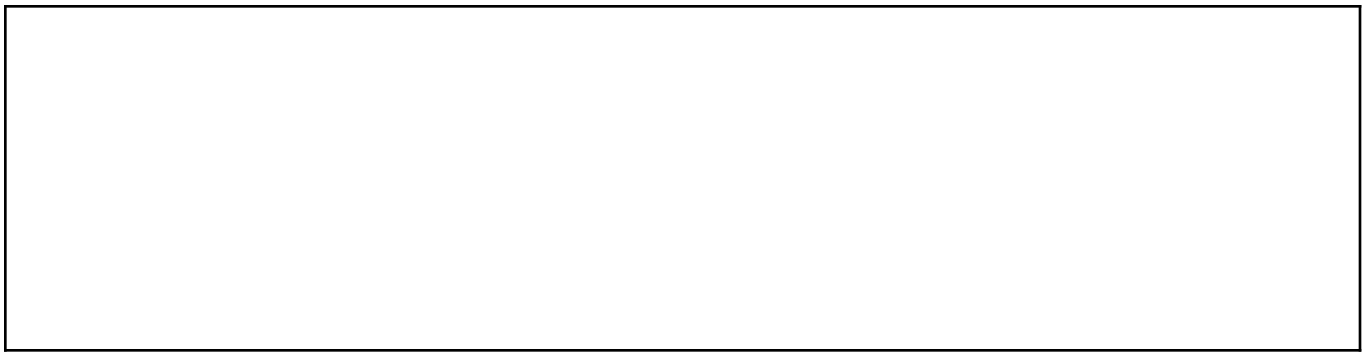
TASK 7: From this point forward, you should plan with your performance goal and design & material choices in mind. On a piece of blank or loose-leaf paper, sketch out some possible designs. Then choose the two you and your partner like best. Complete rough sketches in the spaces below. Be sure to draft both top and side views.

IDEA #1

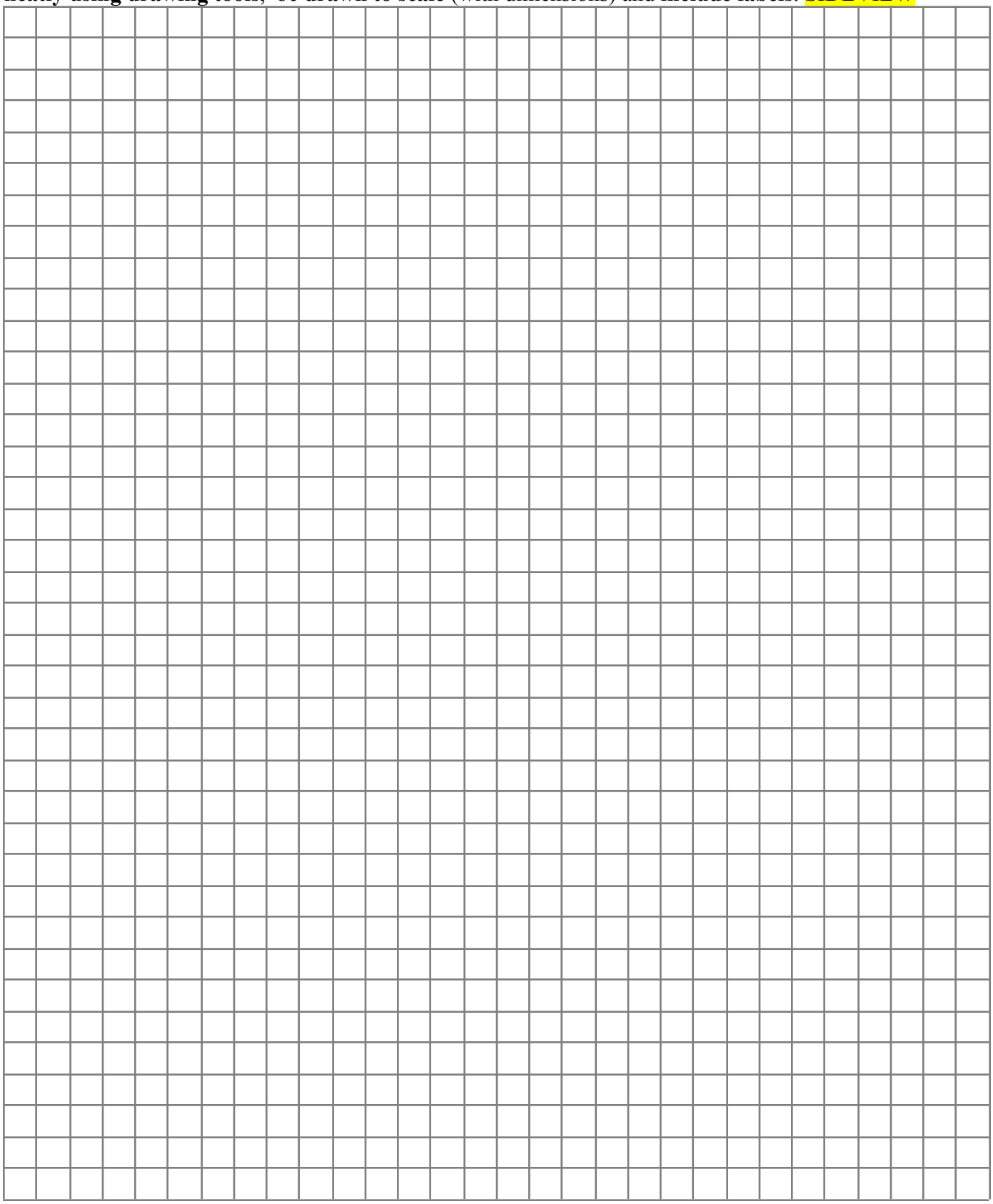
SIDE VIEW
TOP VIEW

IDEA #2

SIDE VIEW
TOP VIEW

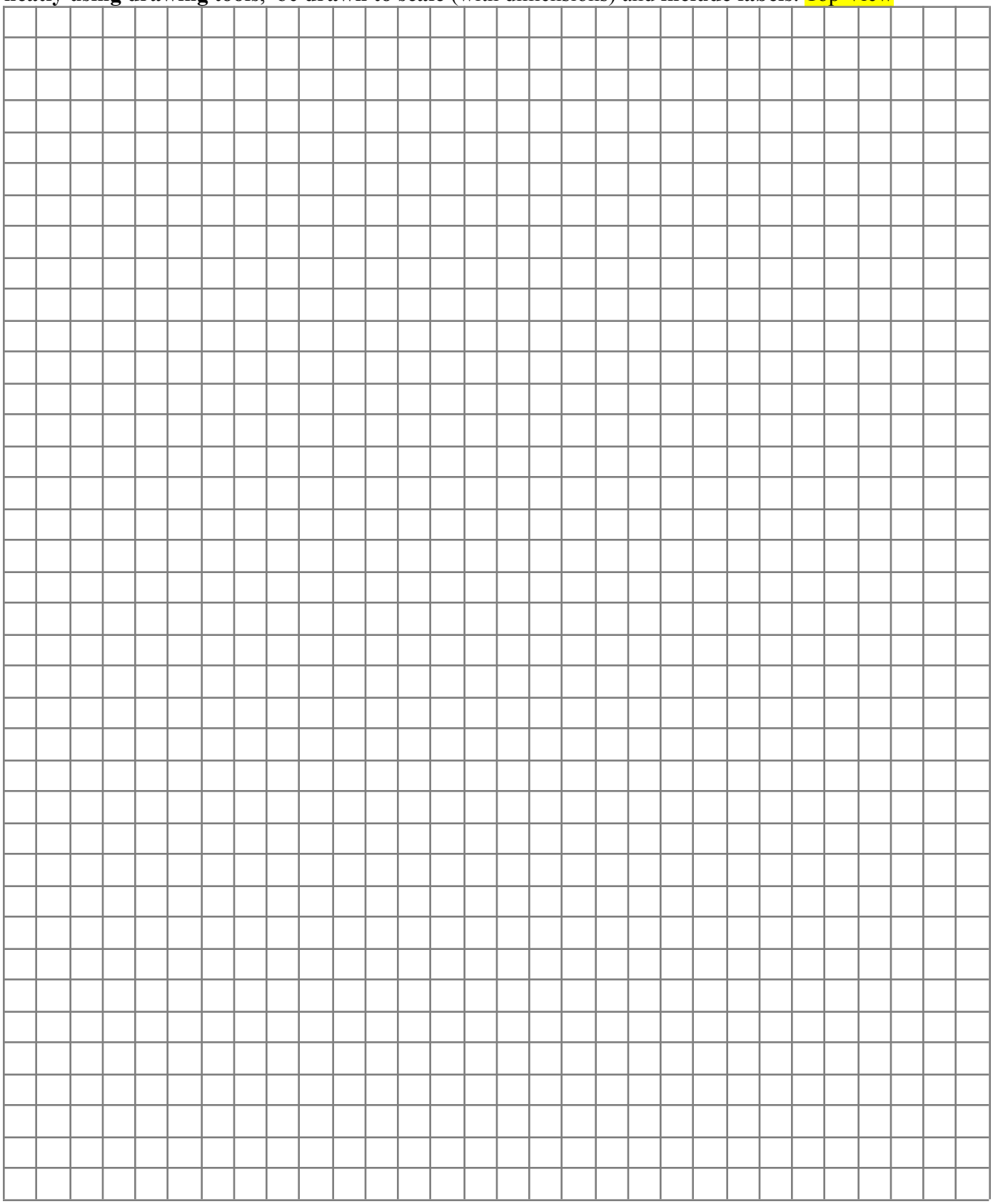


TASK 8a: In the space below, draw the side-view of your entire design. This sketch should be done **neatly using drawing tools**, be **drawn to scale** (with dimensions) and **include labels**. SIDEVIEW



DURING THIS AND ALL OTHER PROJECTS, SAFETY IS EVERYONE'S RESPONSIBILITY!

TASK 8b: In the space below, draw the top-view of your entire design. This sketch should be done **neatly using drawing tools**, be **drawn to scale** (with dimensions) and **include labels**. Top View



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RESPONSIBILITY!

TASK 9: Get your plans approved, gather materials and start planning out the steps you will need to follow to construct your vehicle. In the space below, make a numbered list of the steps you will need to complete to build your vehicle. You might consider assigning tasks (*or logging tasks completed*) to ensure the workload is shared equally.

TASK	PERSON RESPONSIBLE
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
TEST VEHICLE & COLLECT DATA	**BOTH**
DRAFT PROJECT RATIONALE & EVALUATION	**BOTH**

TASK 10: Record your final testing data and your observations below. Use this data in your project evaluation.

DISTANCE TRAVELLED	20 FT. COURSE TIME ELAPSED	OBSERVATION & COMMENTS
1		

TRIAL			
	2		
	3		

TASK 11: Complete the attached *Project Rationale & Evaluation* sheet. If you choose to handwrite the sheet, you will likely need to continue both sections on loose-leaf paper and attach them to the back of this packet.

For those who wish to word-process the rationale and evaluation, an electronic copy of the same form can be found in our folder on the student drive.

TESTING: Testing methods will be as follow:

RUN FOR DISTANCE:

- Vehicles will be placed at a designated start line centered at the end of the Main Street hallway.
- Operators will start the vehicles, as prescribed in the project *constraints*.
- Vehicles will run until their forward momentum stops or until the vehicle comes in contact with a wall.
- Runs will be recorded to the last whole foot traveled (ex – 24’ 6” will earn a score of 24’).
- Each vehicle will be given at least two runs, with the longest run counting toward the final score.

RUN FOR SPEED:

- Vehicles will be placed at a designated start line centered at the end of the Main Street hallway.
- Operators will start the vehicles, as prescribed in the project *constraints*.
- Vehicles will be timed from the 5 foot line to the 25 foot line.
- Vehicles that do not cover the course or collide with a wall will earn a rating of "1."
- Each vehicle will be given at least two runs, with the fastest run counting toward the final score.

PERFORMANCE SCORE:

- After all runs have been completed, each category of vehicles will be divided into thirds.
- Performance points will be awarded as follows:
    - *Top third* – earn a rating of "**4**," worth **20/20 points**.
    - *Middle third* – earn a rating of "**3**," worth **17.4/20 points**.
    - *Bottom third* – earn a rating of "**2**," worth **14.8/20 points**.
    - *Cars that do not complete the course* (for speed), *have a construction violation as detailed in the constraints or do not run at all* – earn a rating of "**1**," which is worth **12.2/20 points**.

NAME: _____
DATE: _____
SECTION: _____
PROJECT: Mouse Trap Vehicle

Respond to the prompts below in the form of brief, well-developed paragraphs. The responses you draft will be used to determine your score in "Category 3: Communicate Clearly, Effectively and With Reason" on the *FCPS CTE Career Ready Practices Rubric* on the reverse side of this sheet.

RATIONALE – Fully explain your design for this project. Be sure to describe each unique feature of your design and the rationale for each. Use any concepts and vocabulary we covered in the preparation for this project in your descriptive and rationale statements.

EVALUATION – Evaluate the effectiveness of your design/solution. Be sure to consider: any data you collected (**required**, qualitative or quantitative), your successes, your short-comings, what you might do differently the next time you're given a similar challenge and related explanations of any of the above.

The use of *Standard English* conventions and neatness are expected!!

RUBRIC SCORE: ___ / 60 **PERFORMANCE GRADE: ___/ 20**