

Excel for Crash Reconstruction

2021 Annual Conference

09/28/21 – 10/01/21

Crown Plaza Conference Center
Springfield, IL



Case Applications

Excel Interface

Formula Basics

Excel Crash Recon Basics

Formatting

Conditional Formatting

Printing

Copying

Advanced Formulas



Case Applications

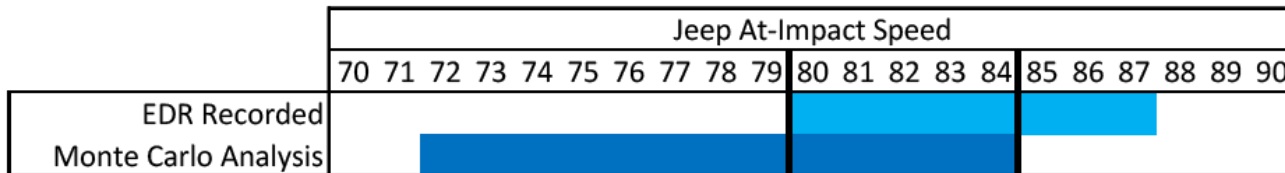
Excel for Crash Reconstruction



Report your test results

Run Number	29	30	31	33	34
Speed (mph)	42.2	41.7	43.9	43.4	43.9
Distance (ft)	74.0	71.5	76.2	78.0	80.2
Coefficient of Friction	0.823	0.813	0.873	0.828	0.823
Considered Values	0.823	0.813	-	0.828	0.823
Average Coefficient of Friction - μ	0.822				

Report and graph your findings



Complete basic calculations

Super-elevation at yaw

Change in Height	h	0.471	ft
Change in Distance	d	12.12	ft
Super-elevation	G	3.9%	-

$$G = \frac{\Delta h}{\Delta d}$$

Velocity of Mitsubishi at beginning of yaw

Low

Gravity constant	g	32.2	ft/s/s
Center of Gravity - Radius of Travel Path	r	362.4	ft
Coefficient of Friction	μ	0.822	-
Super-elevation	G	3.9%	-

$$v = \sqrt{\frac{gr(\mu + G)}{1 - \mu G}}$$

Velocity	v	101.9	ft/s
Velocity	v	69.4	mph

Duplicate difficult calculations

	Mercedes	BMW	Dodge	Average	
Max force per inch of damage width with no permanent damage:	A=	573.9	440.4	757.2	590.5 lb/in
Linear spring stiffness per inch of damage width:	B=	281.9	209.3	411.5	300.9 lb/in/in
Vehicle weight:	w=	5370	5370	5370	5370 lbs
Damage width:	W=	72.4	72.4	72.4	72.4 in
Angle of applied force:	θ =	40	40	40	40 degrees
Damage measurements:	C1=	2.7	2.7	2.7	2.7 in
Damage measurements:	C2=	25.4	25.4	25.4	25.4 in
Damage measurements:	C3=	25.5	25.5	25.5	25.5 in
Damage measurements:	C4=	22.5	22.5	22.5	22.5 in
Damage measurements:	C5=	12.8	12.8	12.8	12.8 in
Damage measurements:	C6=	2.7	2.7	2.7	2.7 in
Amount of energy dissipated with no permanent damage:	G=	584.2	463.3	696.7	579.4 lbs
Energy dissipated:	E=	7775569	5808091	11154328	8245751 in-lbs
Energy dissipated:		647964	484008	929527	687146 ft-lbs
Barrier equivalent velocity:	BEV=	88.2	76.2	105.6	90.8 ft/s
Barrier equivalent velocity:		60.0	51.8	71.8	61.8 mph

$$E = \frac{W}{5} \left[5G + \frac{A}{2} (C_1 + 2C_2 + 2C_3 + 2C_4 + 2C_5 + C_6) + \frac{B}{6} (C_1^2 + 2C_2^2 + 2C_3^2 + 2C_4^2 + 2C_5^2 + C_6^2 + C_1C_2 + C_2C_3 + C_3C_4 + C_4C_5 + C_5C_6) \right] (1 + (\tan \theta)^2)$$

$$G = \frac{A^2}{2B}$$

$$v = \sqrt{\frac{2gE}{w}}$$

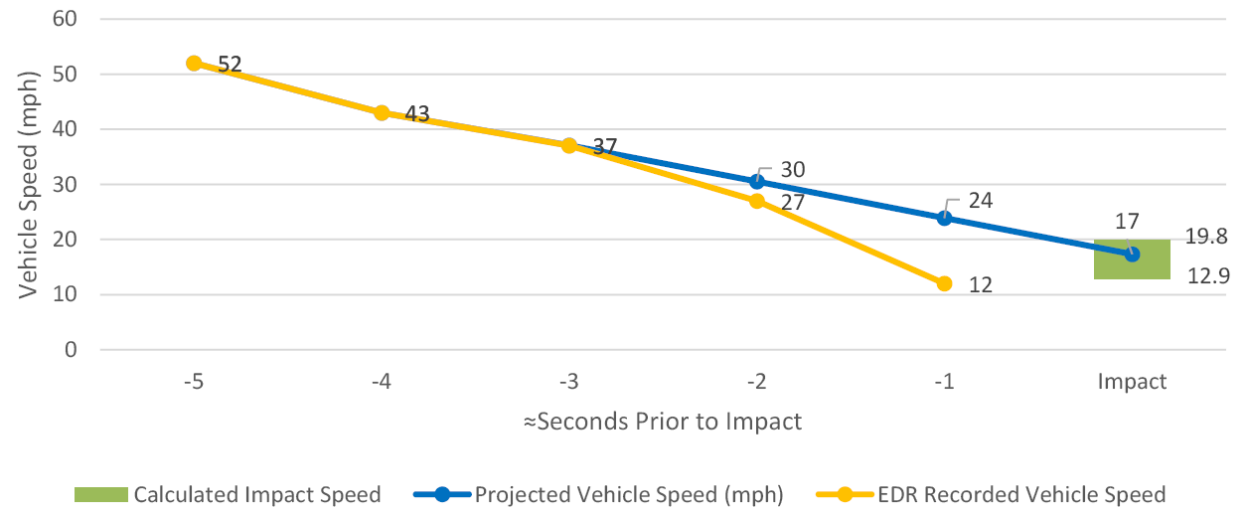
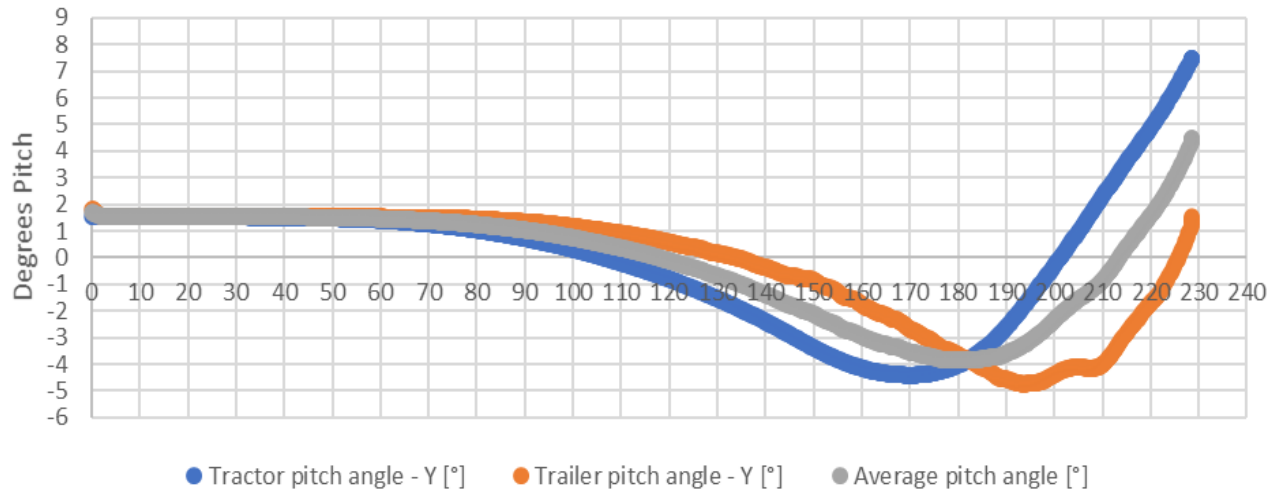
Depict and Analyze EDR data

Reported Values								Calculated Values		
TRG 1 - Time	TRG 6 - Time	Vehicle Speed	Accelerator Pedal, % Full	Service Brake	ABS Control Status	Steering Input	Yaw Rate	Vehicle Speed	Acceleration	Drag Factor
-4.95 s		116.8 mph	89.5%	OFF	OFF	4.5° (Left)	0.00 deg/s	171.3 fps	0.0 fps ²	0.00
-4.45 s		116.8 mph	89.5%	OFF	OFF	3.0° (Left)	-0.49 deg/s	171.3 fps	1.8 fps ²	-0.05
-3.95 s		117.4 mph	80.5%	OFF	OFF	3.0° (Left)	-1.46 deg/s	172.2 fps	0.0 fps ²	0.00
-3.45 s	-4.80 s	117.4 mph	49.5%	OFF	OFF	3.0° (Left)	-0.98 deg/s	172.2 fps	-3.5 fps ²	0.11
-2.95 s	-4.30 s	116.2 mph	0.0%	OFF	OFF	3.0° (Left)	-0.49 deg/s	170.5 fps	-3.5 fps ²	0.11
-2.45 s	-3.80 s	115.0 mph	0.0%	ON	OFF	3.0° (Left)	-0.49 deg/s	168.7 fps	-3.8 fps ²	0.12
-1.95 s	-3.30 s	113.7 mph	0.0%	ON	OFF	3.0° (Left)	-0.49 deg/s	166.8 fps	-3.5 fps ²	0.11
-1.45 s	-2.80 s	112.5 mph	0.0%	ON	OFF	6.0° (Left)	0.00 deg/s	165.0 fps	-3.8 fps ²	0.12
-0.95 s	-2.30 s	111.2 mph	0.0%	ON	OFF	12.0° (Left)	2.93 deg/s	163.1 fps	-1.8 fps ²	0.05
-0.45 s	-1.80 s	110.6 mph	0.0%	ON	OFF	24.0° (Left)	6.34 deg/s	162.3 fps	-9.1 fps ²	0.28
	-1.30 s	107.5 mph	0.0%	ON	OFF	52.5° (Left)	15.62 deg/s	157.7 fps	-51.1 fps ²	1.59
	-0.80 s	90.1 mph	0.0%	ON	ON	12.5° (Left)	9.76 deg/s	132.2 fps	-18.2 fps ²	0.56
	-0.30 s	83.9 mph	82.5%	ON	ON	127.5° (Left)	22.45 deg/s	123.1 fps	-82.2 fps ²	2.55
IMPACT	0.00 s	67.1 mph	33.5%	ON	ON	133.5° (Left)	Invalid	98.4 fps		

Create templates

		Chrysler	Ford	
Weight	w	4285	4995	lbs
Pre-impact velocity	v	27.9	43.4	ft/s
Pre-impact velocity	v	19.0	29.6	mi/hr
Post-impact velocity	v'	26.9	26.9	ft/s
Post-impact velocity	v'	18.3	18.3	mi/hr
Pre-impact momentum	P	119703	216637	(lb ft)/s
Post-impact momentum	P'	115267	134366	(lb ft)/s
Delta-v (x-direction earth based)	$\Delta v - x$	-11.7	10.1	ft/s
Delta-v (y-direction earth based)	$\Delta v - y$	-21.5	18.4	ft/s
Delta-v total	Δv	24.5	21.0	ft/s
Delta-v total	Δv	17	14	mi/hr
Pre-impact angle	θ	0.0	270.0	degrees
Post-impact angle	θ'	307.0	292.0	degrees
Direction change	$\Delta\theta$	61.3	61.3	degrees
Principal direction of force - earth based	<i>PDOF-Earth</i>	241.3	61.3	degrees
Principal direction of force - vehicle based	<i>PDOF-Vehicle</i>	-61.3	28.7	degrees
Principal direction of force - clock based	<i>PDOF-Vehicle</i>	10:00	1:00	clockface
Delta-v direction (longitudinal)	$\Delta v - x \text{ vehicle}$	Negative	Negative	[SAE]
Delta-v direction (lateral)	$\Delta v - y \text{ vehicle}$	Positive	Negative	[SAE]
Angle adjustment	ϕ	118.7	-151.3	degrees
Delta-v (longitudinal)	$\Delta v - x \text{ vehicle}$	-11.7	-18.4	ft/s
Delta-v (lateral)	$\Delta v - y \text{ vehicle}$	21.5	-10.1	ft/s
Delta-v (longitudinal)	$\Delta v - x \text{ vehicle}$	-8.0	-12.6	mi/hr
Delta-v (lateral)	$\Delta v - y \text{ vehicle}$	14.6	-6.9	mi/hr

Graph your findings

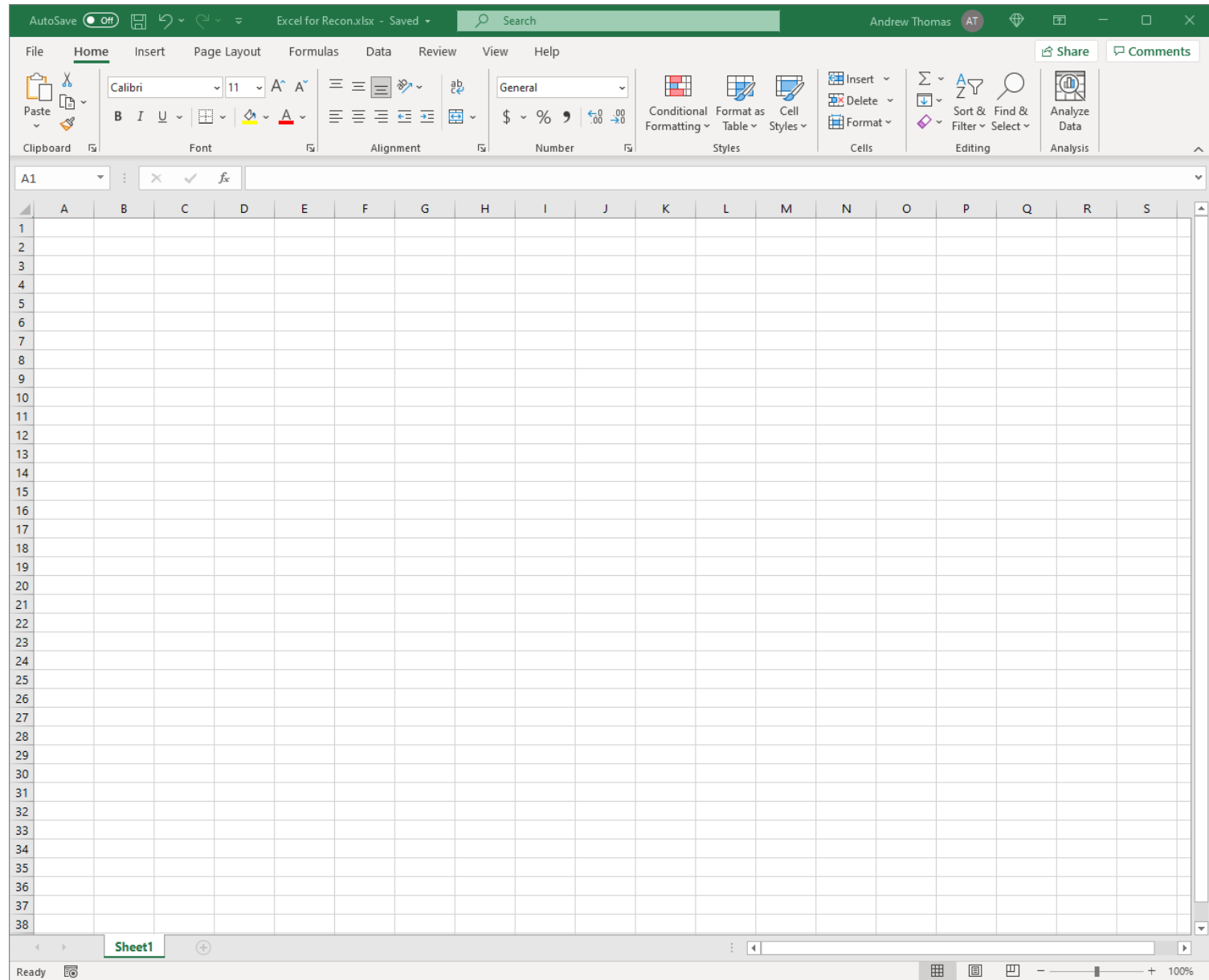


Excel Interface

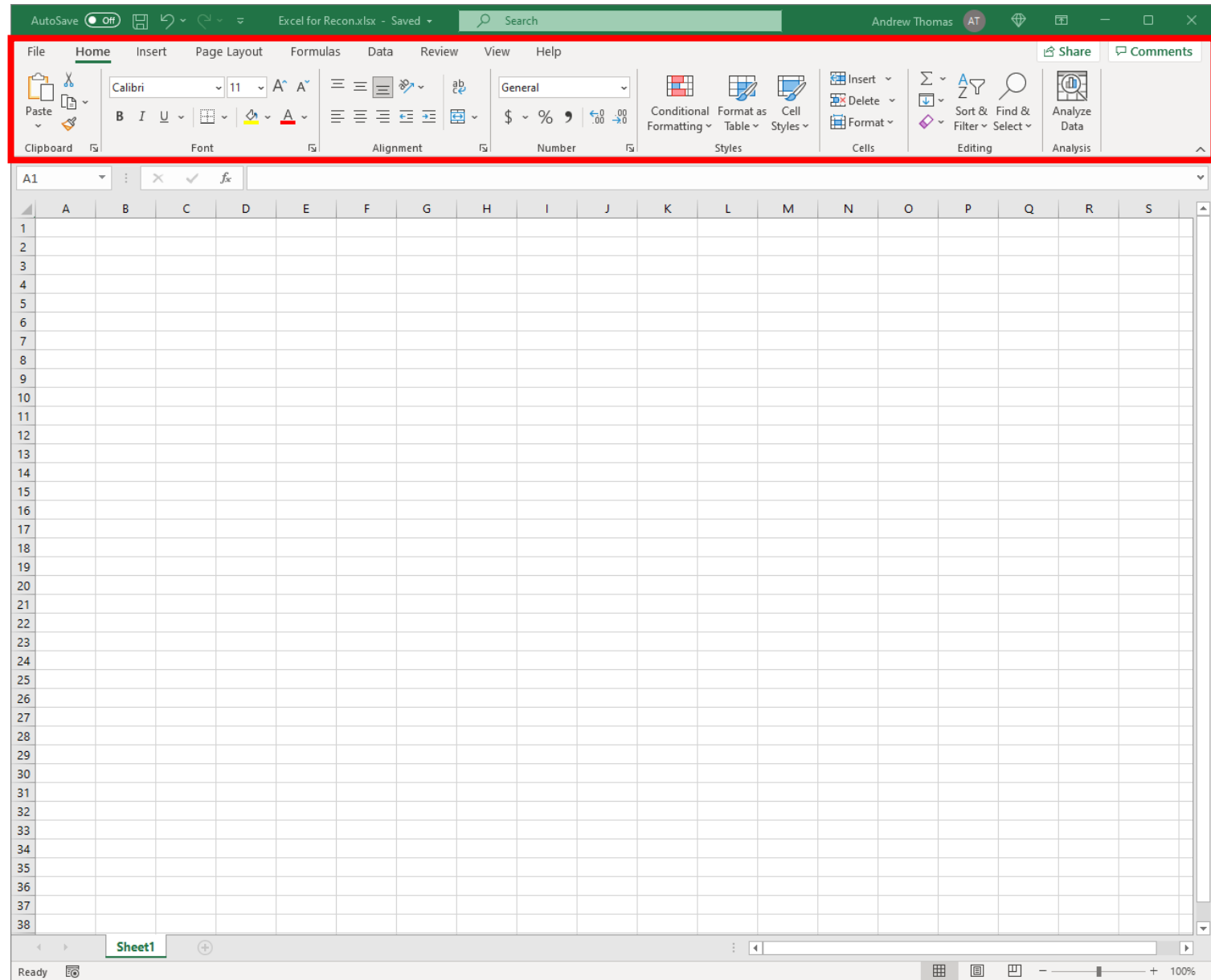
Excel for Crash Reconstruction



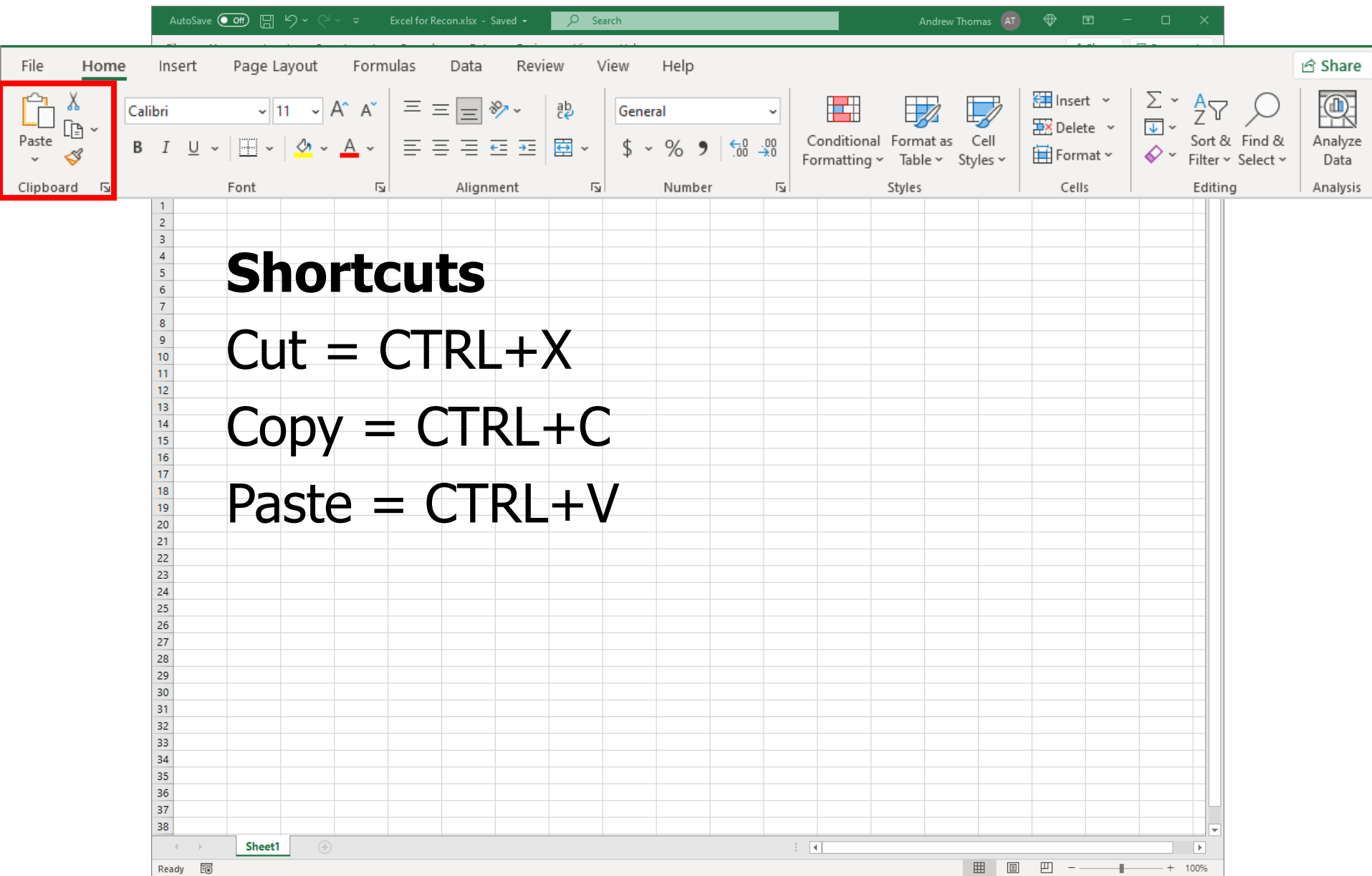
Excel Interface



Excel Interface – Ribbon



Excel Interface – Ribbon



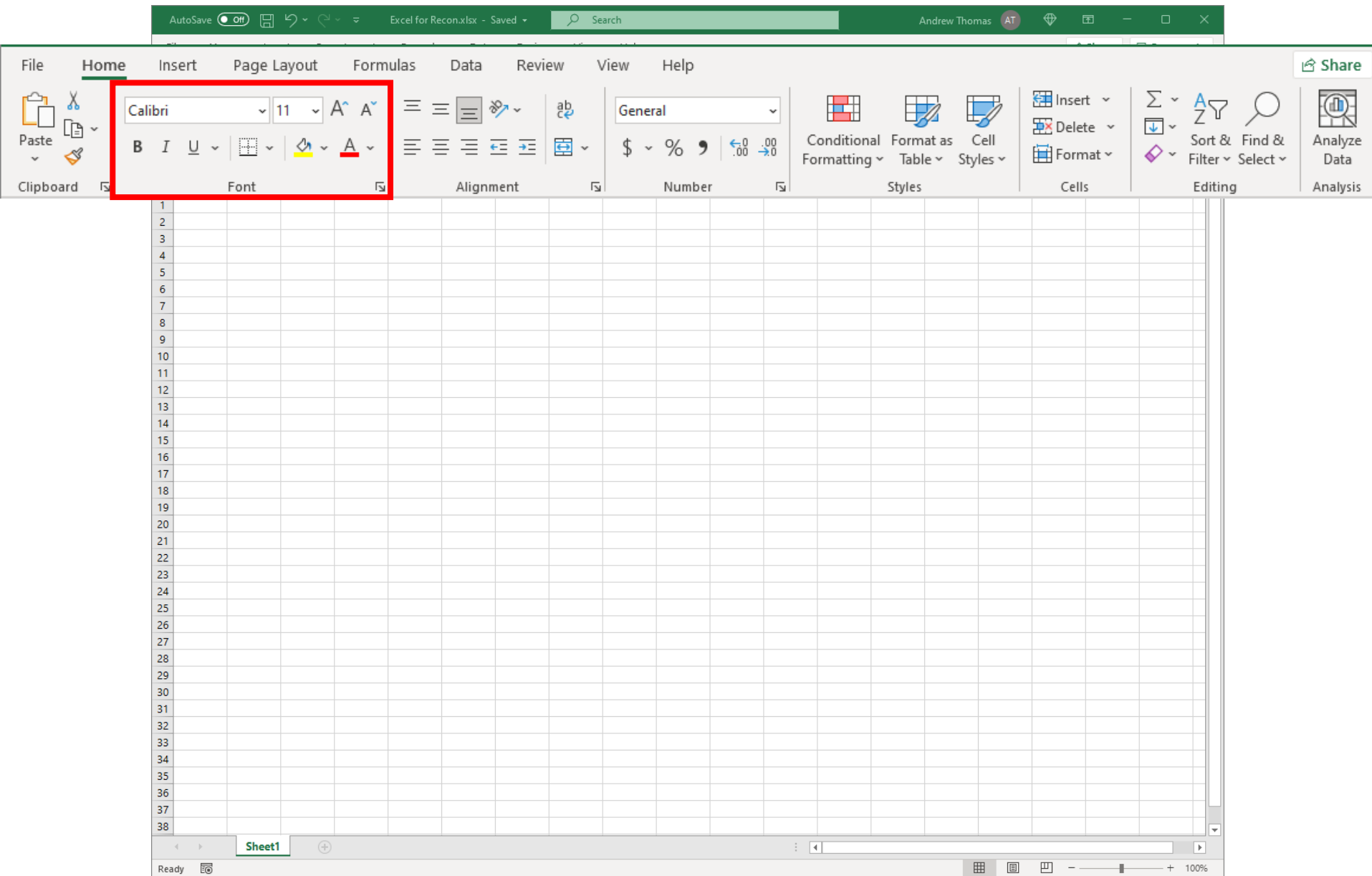
Shortcuts

Cut = CTRL+X

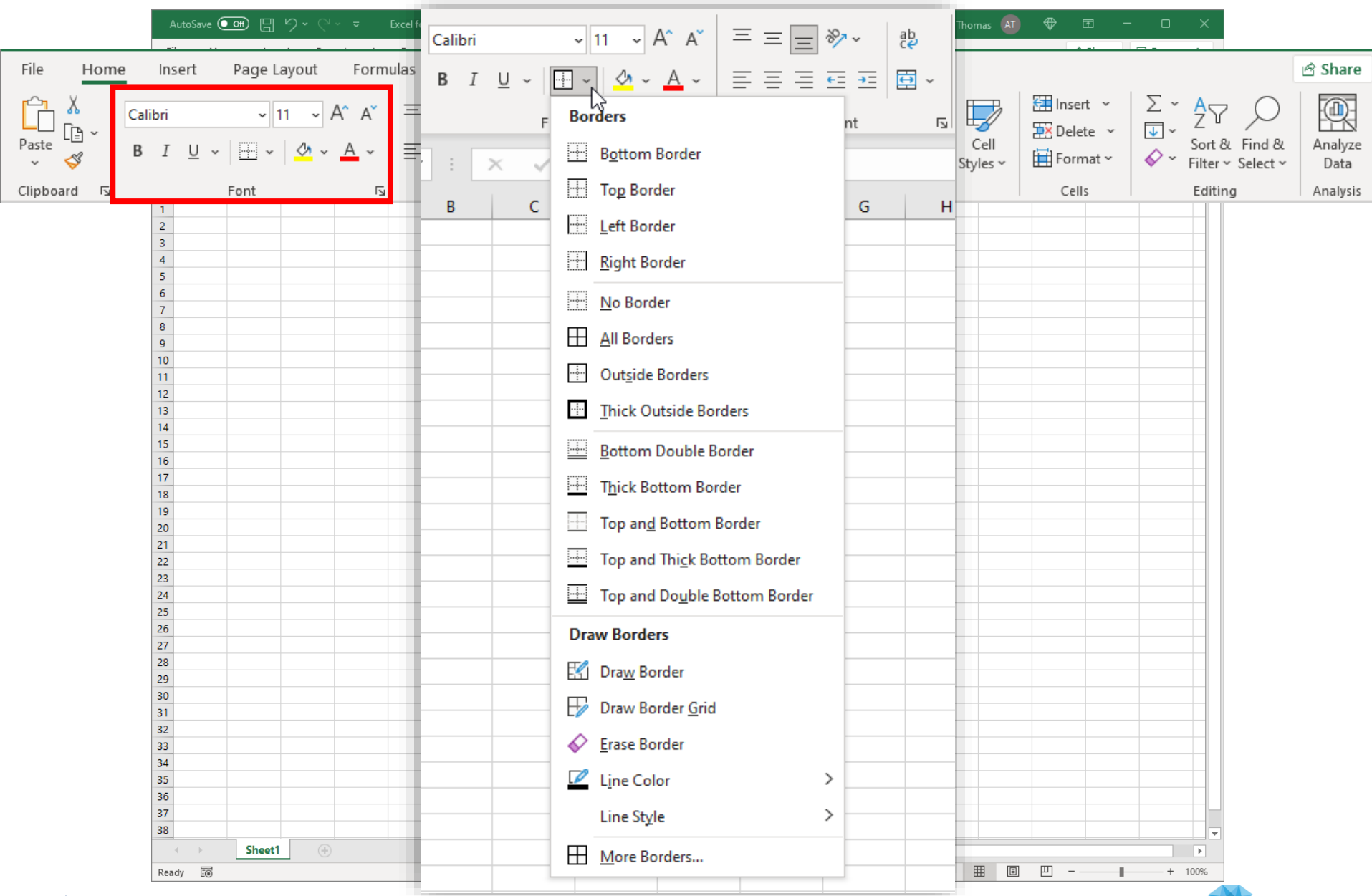
Copy = CTRL+C

Paste = CTRL+V

Excel Interface – Ribbon



Excel Interface – Ribbon

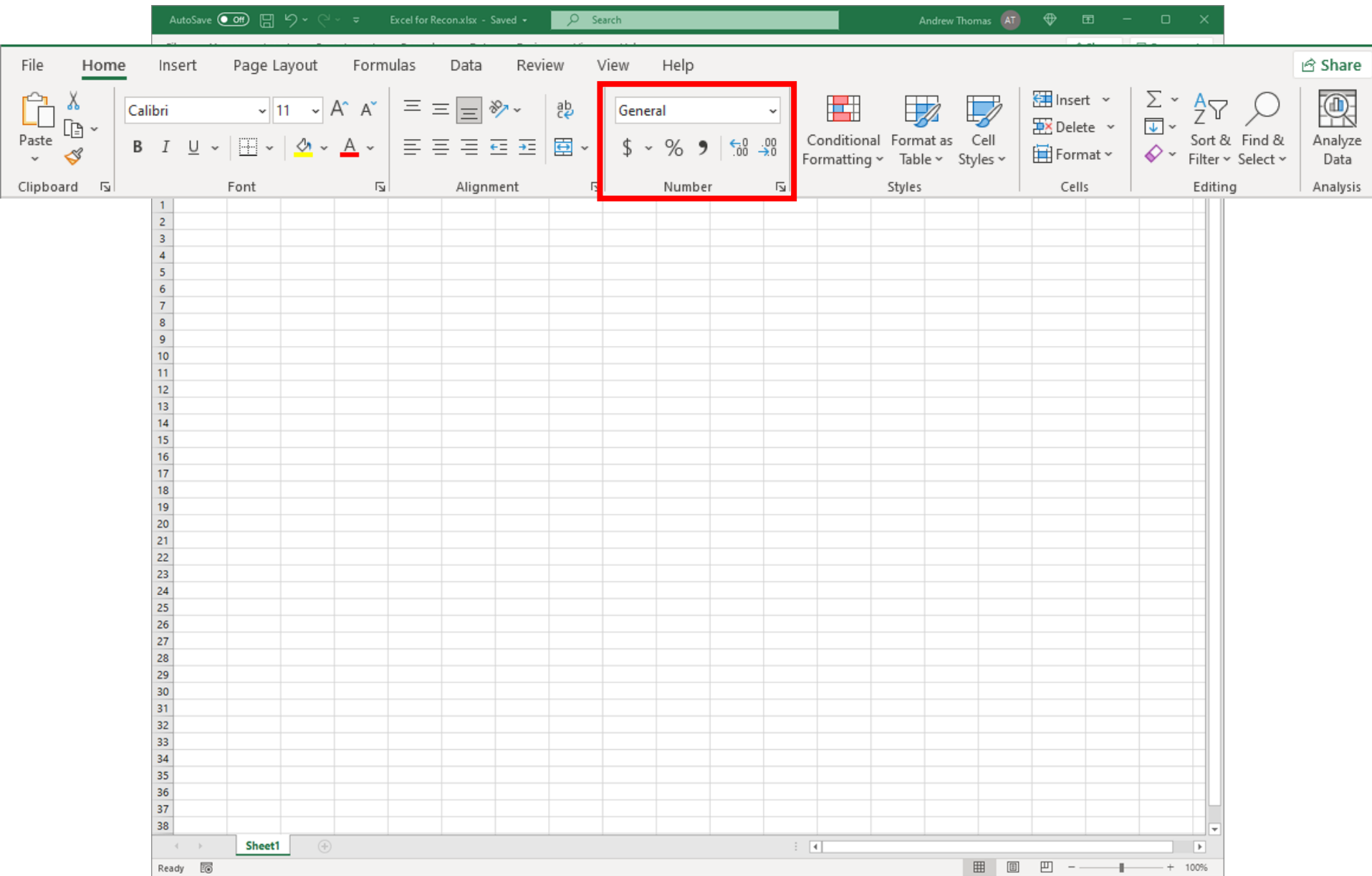


Excel Interface – Ribbon

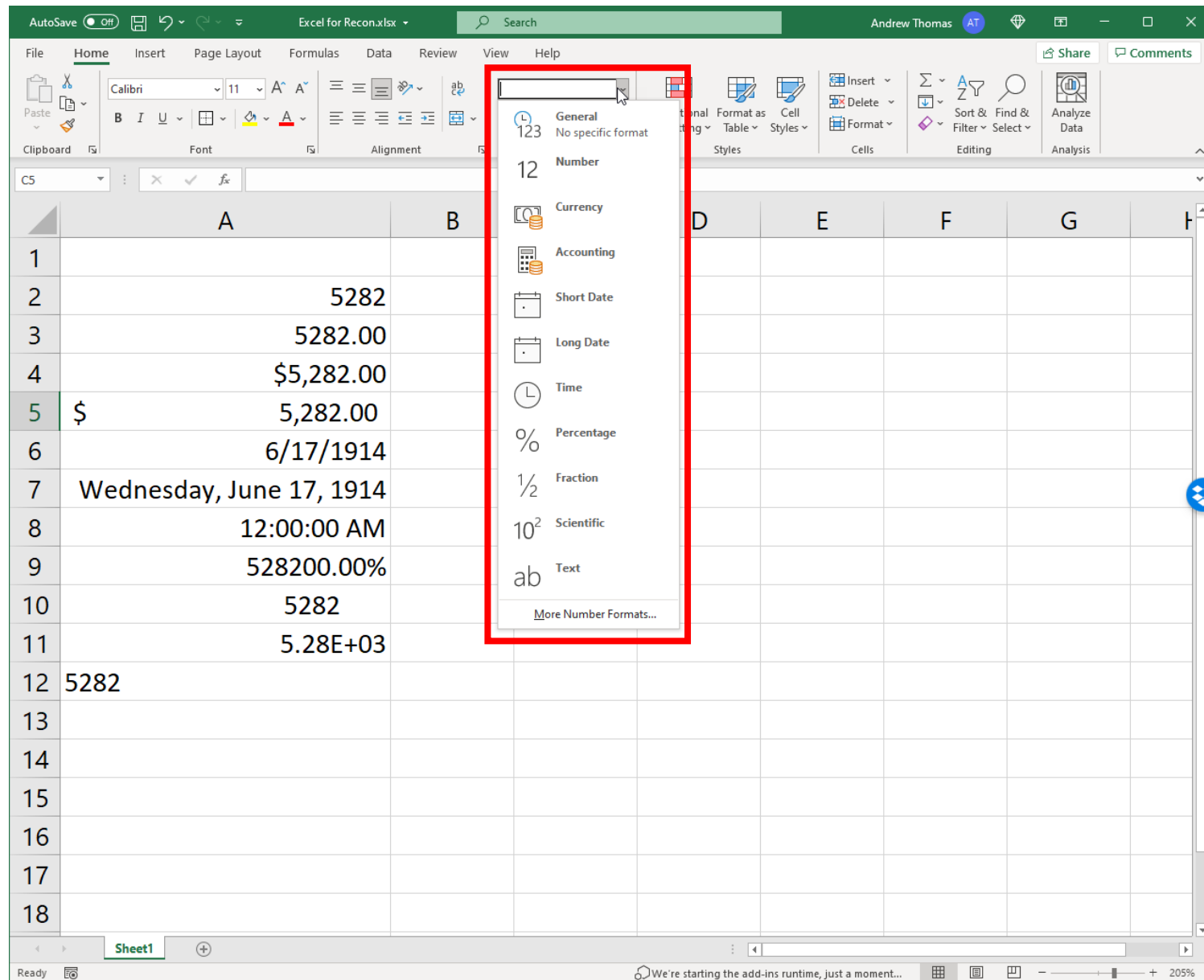
The screenshot displays the Microsoft Excel interface with the 'Home' tab selected on the ribbon. The 'Alignment' group is highlighted with a red box, showing icons for text alignment (left, center, right, justified), orientation (vertical, horizontal), and wrap text. The worksheet below illustrates various alignment options:

	Top Left	Top Center	Top Right
1			
2			
3	Middle Center	Middle Center	Middle Right
4	Bottom Left	Bottom Center	Bottom Right
5			
6	If we have a long string of text sometimes it runs into the next column		
7	If we have a long string of text	Next Column overlaps	
8	If we have a long string of text and use "WRAP TEXT" it will stay within a single column	ab ce	
9	If we have a long string of text we can use "MERGE AND CENTER"		

Excel Interface – Ribbon



Excel Interface – Ribbon



Excel Interface – Ribbon

The screenshot displays the Microsoft Excel application window. The title bar shows 'Excel for Recon.xlsx' and the user 'Andrew Thomas'. The ribbon is set to 'Home', with the 'Number' group selected. A dropdown menu is open, showing various number formats. The 'Number' option is highlighted. The background shows a spreadsheet with column A containing the value '5282' in rows 2 through 12.

AutoSave Off | Excel for Recon.xlsx | Search | Andrew Thomas | Share | Comments

File Home Insert Page Layout Formulas Data Review View Help

Clipboard | Font | Alignment | Styles | Cells | Editing | Analysis

123 No specific format

12 Number 5282.00

Currency \$5,282.00

Accounting \$5,282.00

Short Date 6/17/1914

Long Date Wednesday, June 17, 1914

Time 12:00:00 AM

Percentage 528200.00%

Fraction 5282

10² Scientific 5.28E+03

ab Text 5282

More Number Formats...

Sheet1 | Ready | Average: 5282.00 | Count: 11 | Sum: 58102.00 | We're starting the add-ins runtime, just a moment... | 205%

Excel Interface – Ribbon

The screenshot displays the Microsoft Excel ribbon interface, specifically the 'Number' group. The 'Decrease Decimal' button (represented by a left-pointing arrow and '.00') is highlighted with a yellow box, and a tooltip is visible over it, stating 'Decrease Decimal' and 'Show fewer decimal places.' The 'Increase Decimal' button (represented by a right-pointing arrow and '.00') is highlighted with a green box, and a tooltip is visible over it, stating 'Increase Decimal' and 'Show more decimal places for a more precise value.'

The spreadsheet shows a column of numbers with increasing decimal places, starting from 5282 and ending with 5282.000000. The 'Number' group on the ribbon includes options for currency, percentage, and decimal formatting.

Excel Interface – Ribbon

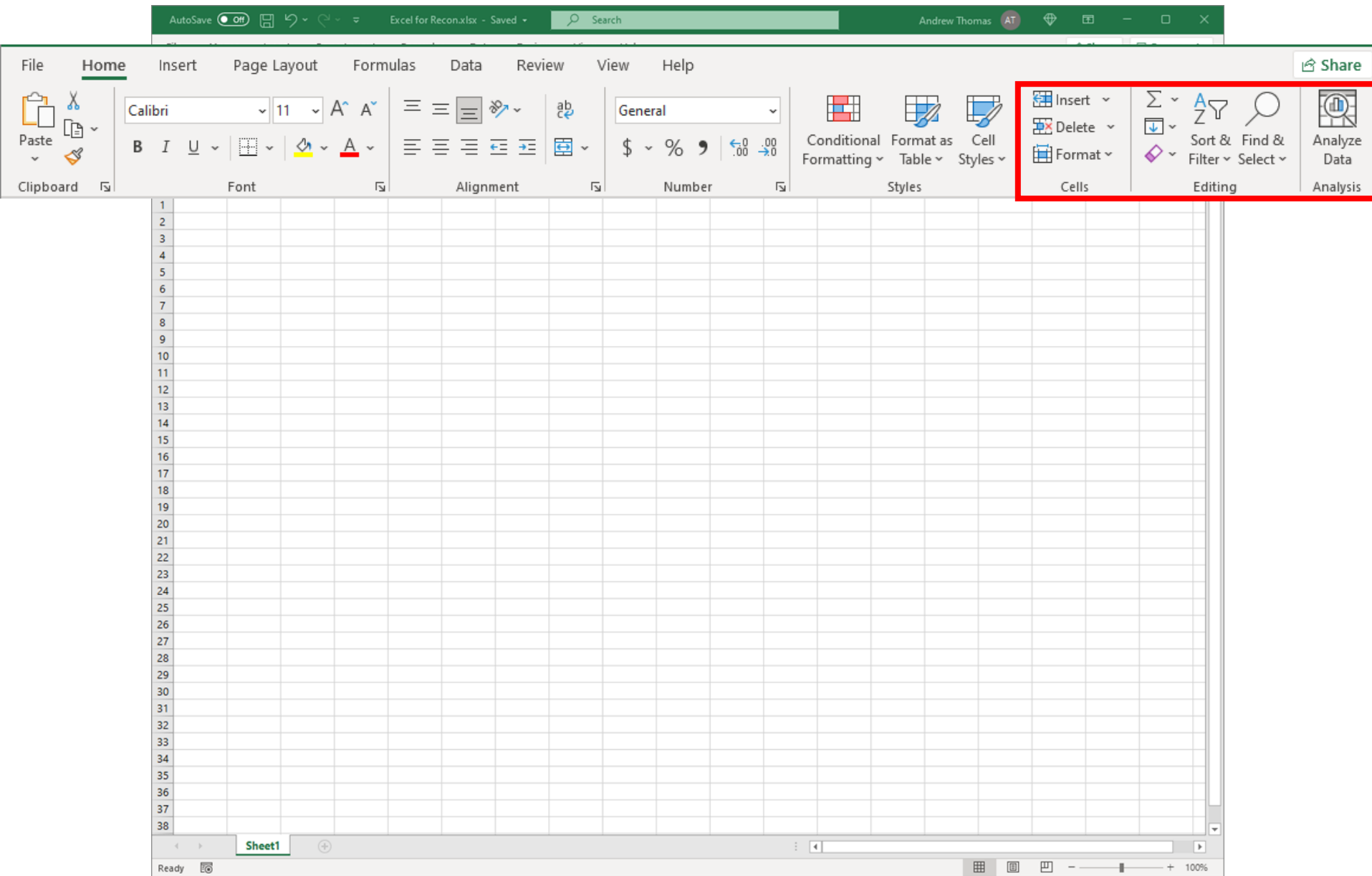
The screenshot displays the Microsoft Excel ribbon interface, specifically the Home tab. The ribbon is divided into several groups: Clipboard, Font, Alignment, Number, Styles, Cells, Editing, and Analysis. The Styles group is highlighted with a red box. A context menu is open for the 'Cell Styles' button, showing various style categories and options.

Styles Group Context Menu:

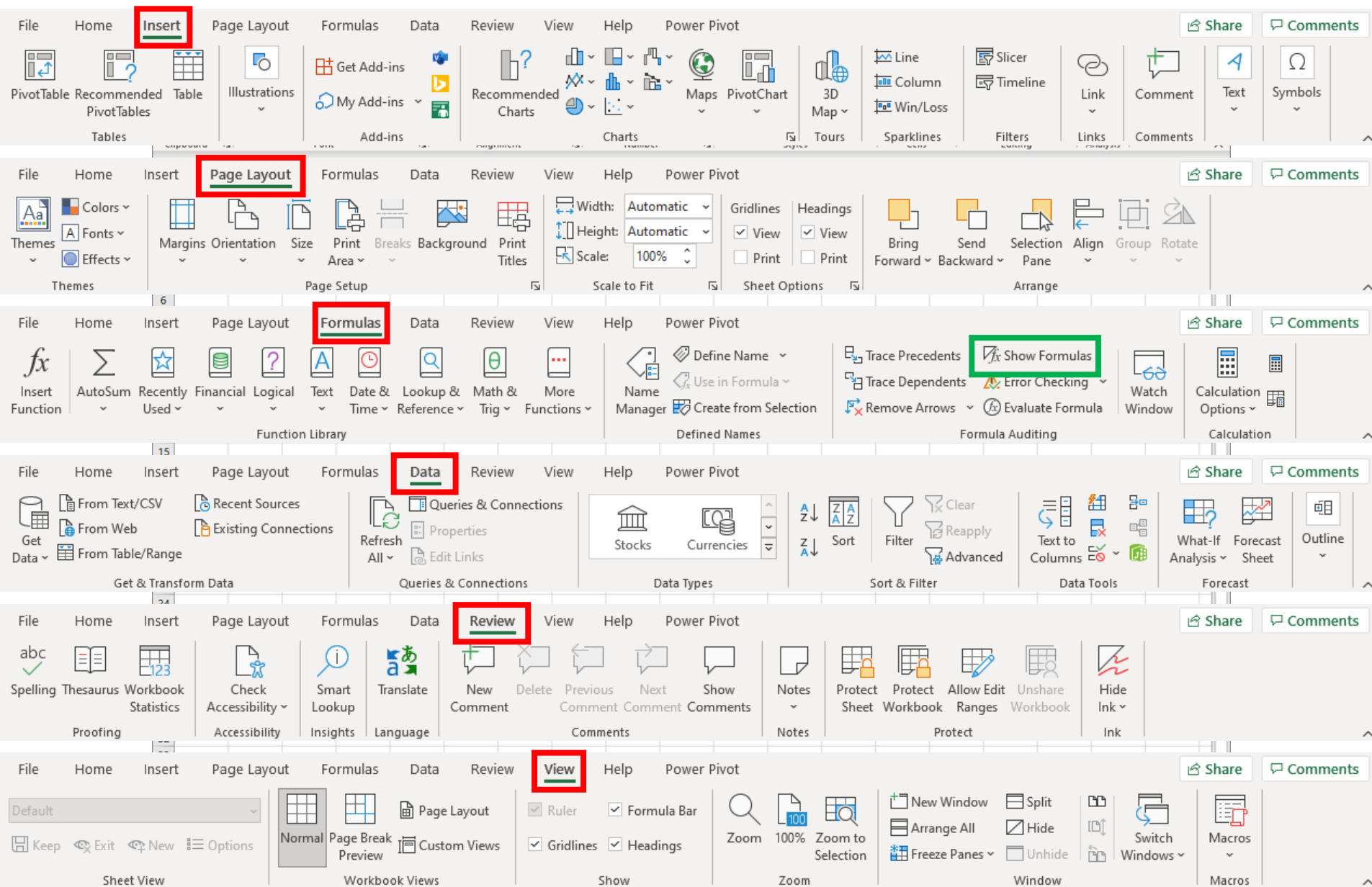
- Good, Bad and Neutral**
 - Normal
 - Bad
 - Good
 - Neutral
- Data and Model**
 - Calculation
 - Check Cell
 - Explanatory ...
 - Input
 - Linked Cell
 - Note
- Output**
 - Warning Text
- Titles and Headings**
 - Heading 1
 - Heading 2
 - Heading 3
 - Heading 4
 - Title
 - Total
- Themed Cell Styles**

20% - Accent1	20% - Accent2	20% - Accent3	20% - Accent4	20% - Accent5	20% - Accent6
40% - Accent1	40% - Accent2	40% - Accent3	40% - Accent4	40% - Accent5	40% - Accent6
60% - Accent1	60% - Accent2	60% - Accent3	60% - Accent4	60% - Accent5	60% - Accent6
Accent1	Accent2	Accent3	Accent4	Accent5	Accent6
- Number Format**
 - Comma
 - Comma [0]
 - Currency
 - Currency [0]
 - Percent
- Other Options:**
 - New Cell Style...
 - Merge Styles...

Excel Interface – Ribbon



Excel Interface – Ribbon



Excel Interface – Workspace

The screenshot displays the Microsoft Excel interface. The title bar shows 'Excel for Recon.xlsx - Saved'. The ribbon includes tabs for File, Home, Insert, Page Layout, Formulas, Data, Review, View, and Help. The Home tab is active, showing options for Clipboard, Font, Alignment, Number, Styles, Cells, Editing, and Analysis. The worksheet has columns A through S and rows 1 through 38. A large blue text box is overlaid on the right side of the worksheet, containing the text: 'Open file "Excel for Recon – Class Worksheet.xlsx"'. The worksheet content includes practice problems for Addition, Subtraction, Division, Multiplication, Exponents, Roots, Counting, and Averages. The status bar at the bottom shows 'Ready' and '100%' zoom.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1																			
2		Value 1	Value 2	Value 3															
3		24.3	53.2	82.4															
4																			
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38																			

Excel Interface – Workspace

The screenshot displays the Microsoft Excel interface. The title bar shows 'Excel for Recon.xlsx - Saved' and the user 'Andrew Thomas'. The ribbon includes tabs for File, Home, Insert, Page Layout, Formulas, Data, Review, View, and Help. The Home tab is active, showing options for Font, Alignment, Number, Styles, Cells, Editing, and Analysis. The worksheet 'Practice1' is open, showing a grid with columns A through S and rows 1 through 38. The data in the worksheet is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1																			
2		Value 1	Value 2	Value 3															
3		24.3	53.2	82.4															
4																			
5																			
6																			
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35																			
36																			
37																			
38																			

The worksheet tab bar at the bottom shows 'Practice1' selected, with other tabs 'Practice1SOL', 'ReconBasic', 'Formatting', and 'ReconBasicSOL' visible. A red arrow points to the 'Practice1' tab. The status bar at the bottom indicates 'Ready' and '100%' zoom.

Excel Interface – Workspace

The screenshot shows the Microsoft Excel interface with the following data tables:

Pavement		Grass	
<i>f-high</i>	0.80	<i>f-high</i>	0.55
<i>f-low</i>	0.70	<i>f-low</i>	0.45
<i>d</i>	63.5 ft	<i>d</i>	57.2 ft

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	54.3 mph	79.6 ft/s			
Pavement to Grass	37.8 mph	55.4 ft/s	63.5 ft	-25.76 ft/s ²	0.94 s
Tree Impact	22.0 mph	32.3 ft/s	57.2 ft	-17.71 ft/s ²	1.31 s

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	50.8 mph	74.6 ft/s			
Pavement to Grass	35.4 mph	52.0 ft/s	63.5 ft	-22.54 ft/s ²	1.00 s
Tree Impact	22.0 mph	32.3 ft/s	57.2 ft	-14.49 ft/s ²	1.36 s

A red arrow points to the 'ReconBasicSOL' tab in the bottom tab bar, which is highlighted with a red box.

Excel Interface – Workspace

Name Box

Formula Bar

The screenshot shows the Excel workspace with the following data:

	Pavement	Grass
<i>f-high</i>	0.0	<i>f-high</i> 0.55
<i>f-low</i>	0.0	<i>f-low</i> 0.45
<i>d</i>	63.5 ft	<i>d</i> 57.2 ft

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	54.3 mph	79.6 ft/s	63.5 ft	-25.76 ft/s ²	0.94 s
Pavement to Grass	37.8 mph	55.4 ft/s	57.2 ft	-17.71 ft/s ²	1.31 s
Tree Impact	22.0 mph	32.3 ft/s			

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	50.8 mph	74.6 ft/s	63.5 ft	-22.54 ft/s ²	1.00 s
Pavement to Grass	35.4 mph	52.0 ft/s	57.2 ft	-14.49 ft/s ²	1.36 s
Tree Impact	22.0 mph	32.3 ft/s			

Click on "Velocity"

Excel Interface – Workspace

Excel for Recon.xlsx - Saved

Andrew Thomas AT

File Home Insert Page Layout Formulas Data Review View Help

Clipboard Font Alignment Number Styles Cells Editing Analysis

C16 =D16/1.467

	Pavement	Grass
<i>f-high</i>	0.0	0.55
<i>f-low</i>	0.0	0.45
<i>d</i>	63.5 ft	57.2 ft

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	54.3 mph	79.6 ft/s			
Pavement to Grass	37.8 mph	55.4 ft/s	63.5 ft	-25.76 ft/s ²	0.94 s
Tree Impact	22.0 mph	32.3 ft/s	57.2 ft	-17.71 ft/s ²	1.31 s

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	50.8 mph	74.6 ft/s			
Pavement to Grass	35.4 mph	52.0 ft/s	63.5 ft	-22.54 ft/s ²	1.00 s
Tree Impact	22.0 mph	32.3 ft/s	57.2 ft	-14.49 ft/s ²	1.36 s

Click on C16

Practice1 Practice1SOL ReconBasic Formatting ReconBasicSOL

Ready 130%

Excel Interface – Workspace

AutoSave Off Excel for Recon.xlsx - Saved Search Andrew Thomas AT

File Home Insert Page Layout Formulas Data Review View Help

Paste B I U Font Alignment Number Styles Cells Editing Analysis

SUM X ✓ fx =D16/1.467

	A	B	C	D	E	F	G	H	I	J	K
1											
2			Pavement			Grass					
3		<i>f-high</i>	0.80		<i>f-high</i>	0.55					
4		<i>f-low</i>	0.70		<i>f-low</i>	0.45					
5		<i>d</i>	63.5 ft		<i>d</i>	57.2 ft					
6											
7											
8			Velocity	Velocity	Distance	Acceleration	Time				
9		Start of Skid	54.3 mph	79.6 ft/s							
10					63.5 ft	-25.76 ft/s ²	0.94 s				
11		Pavement to Grass	37.8 mph	55.4 ft/s							
12					57.2 ft	-17.71 ft/s ²	1.31 s				
13		Tree Impact	22.0 mph	32.3 ft/s							
14											
15			Velocity	Velocity	Distance	Acceleration	Time				
16		Start of Skid	D16/1.467	74.6 ft/s							
17					63.5 ft	-22.54 ft/s ²	1.00 s				
18		Pavement to Grass	35.4 mph	52.0 ft/s							
19					57.2 ft	-14.49 ft/s ²	1.36 s				
20		Tree Impact	22.0 mph	32.3 ft/s							
21											
22											
23											
24											
25											
26											
27											
28											

Double-click on C16

Press ESC to exit

Practice1 Practice1SOL ReconBasic Formatting ReconBasicSOL

Edit 130%

Excel Interface - Workspace

Excel for Recon.xlsx - Saved

Andrew Thomas AT

File Home Insert Page Layout Formulas Data Review View Help

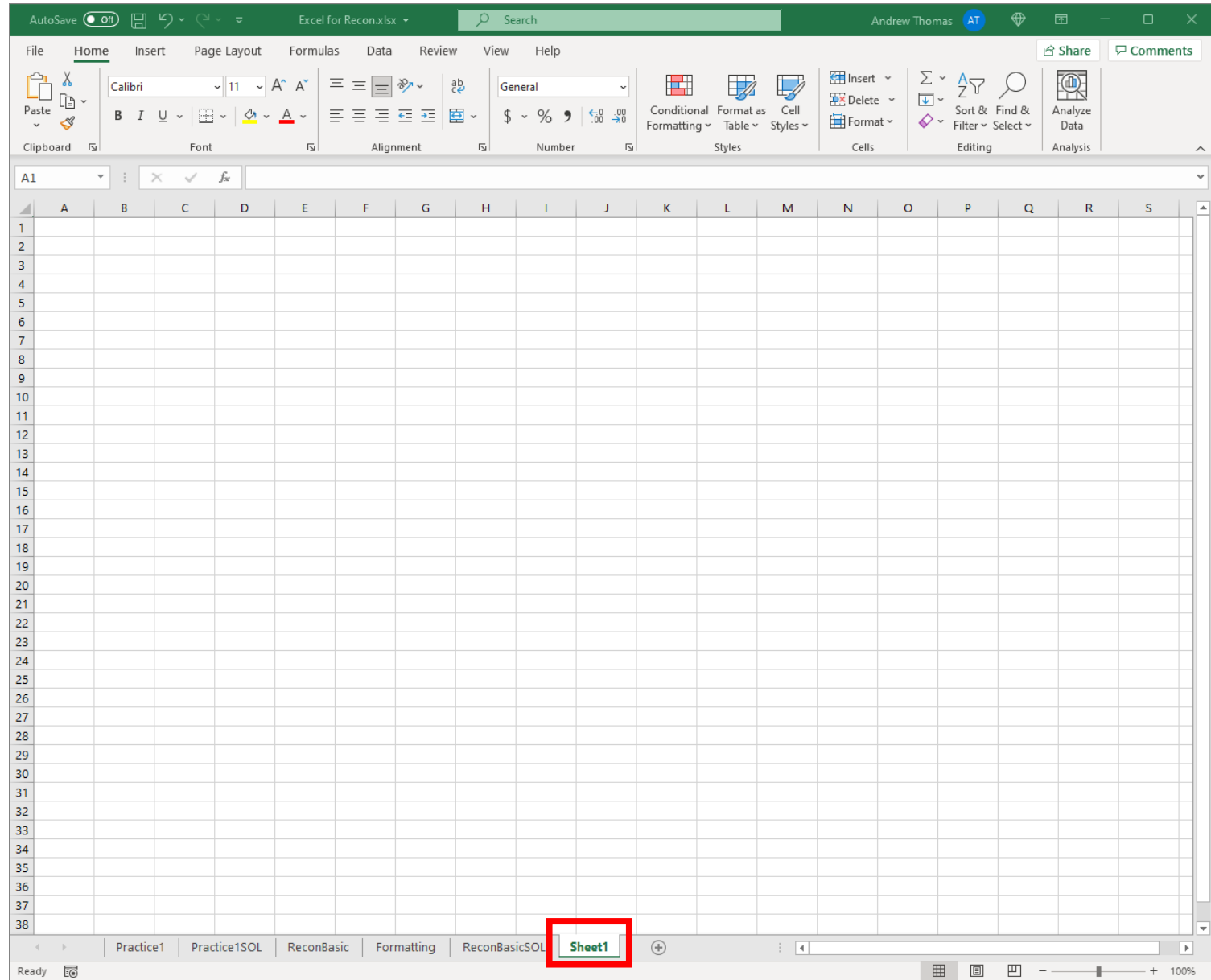
Clipboard Font Alignment Number Styles Cells Editing Analysis

C16 \times \checkmark f_x =D16/1.467

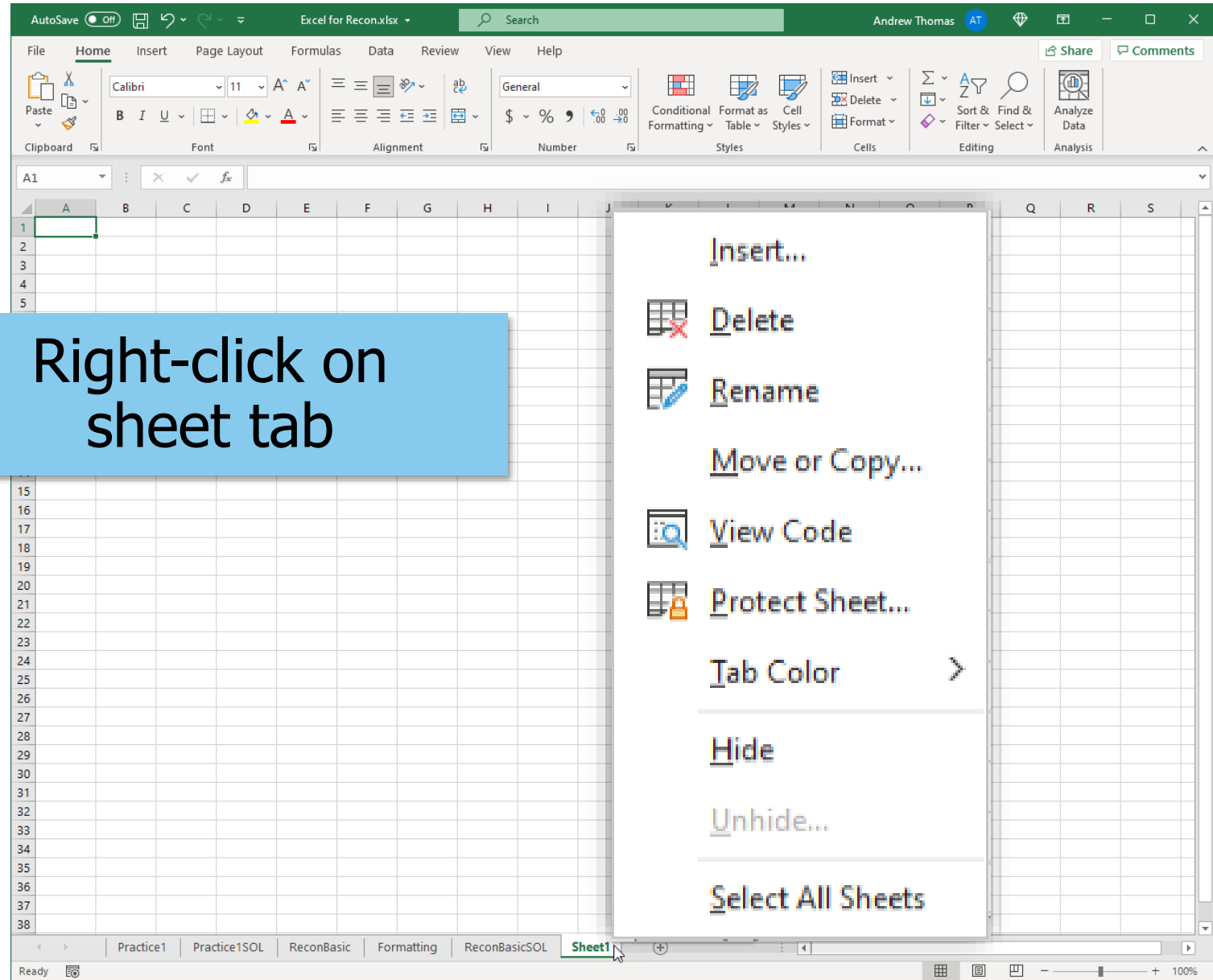
	A	B	C	D	E	F	G	H	I	J
1										
2			Pavement			Grass				
3		<i>f-high</i>	0.80			<i>f-high</i>	0.55			
4		<i>f-low</i>	0.70			<i>f-low</i>	0.45			
5		<i>d</i>	63.5 ft			<i>d</i>	57.2 ft			
6										
7										
8			Velocity	Velocity	Distance	Acceleration	Time			
9		Start of Skid	54.3 mph	79.6 ft/s						
10					63.5 ft	-25.76 ft/s ²	0.94 s			
11		Pavement to Grass	37.8 mph	55.4 ft/s						
12					57.2 ft	-17.71 ft/s ²	1.31 s			
13		Tree Impact	22.0 mph	32.3 ft/s						
14										
15			Velocity	Velocity	Distance	Acceleration	Time			
16		Start of Skid	50.8 mph	74.6 ft/s						
17					63.5 ft	-22.54 ft/s ²	1.00 s			
18		Pavement to Grass	35.4 mph	52.0 ft/s						
19					57.2 ft	-14.49 ft/s ²	1.36 s			
20		Tree Impact	22.0 mph	32.3 ft/s						
21										
22										
23										
24										
25										
26										
27										
28										

Ready Practice1 Practice1SOL ReconBasic Formatting ReconBasicSOL New sheet 130%

Excel Interface - Workspace



Excel Interface - Workspace



Excel Interface - Workspace

The screenshot displays the Microsoft Excel workspace. The title bar shows 'Excel for Recon.xlsx - Saved' and the user 'Andrew Thomas'. The ribbon includes tabs for File, Home, Insert, Page Layout, Formulas, Data, Review, View, and Help. The Home tab is active, showing groups for Clipboard, Font, Paragraph, Alignment, Number, Styles, Cells, Editing, and Analysis. The spreadsheet area shows columns A through S and rows 1 through 37. The data is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1																			
2		Value 1	Value 2	Value 3															
3		24.3	53.2	82.4															
4																			
5				Practice Addition															
6				Add the values using + sign on keyboard															
7				Add the values using SUM function															
8																			
9				Practice Subtraction															
10				Subtract value 2 from value 3 (V3-V2)															
11				Subtract value 3 from value 2 (V2-V3)															
12																			
13				Practice Division															
14				Divide value 3 by value 2 (V3/V2)															
15				Convert value 2 from ft/s to mph															
16																			
17				Practice Multiplication															
18				Multiply each of the three values (V1*V2*V3)															
19				Convert value 1 from mph to ft/s															
20																			
21				Practice Exponents															
22				Square value 2 by multiplying (V2*V2)															
23				Square value 2 by using the caret (V2^2)															
24																			
25				Practice Roots															
26				Take the square root of value 3 (V3)															
27																			
28				Count numbers in a set															
29				Count how many values are above using COUNT															
30																			
31				Practice Averages															
32				Find average of values 1, 2 using + and /															
33				Find average of values 1, 2, 3 using SUM and COUNT															
34				Find average of values 1, 2, 3 using AVERAGE															
35																			
36																			
37																			

The bottom of the window shows the taskbar with several tabs: Practice1 (selected), Practice1SOL, ReconBasic, Formatting, ReconBasicSOL, CDRData, CDRDataSOL, and A ... The status bar at the bottom indicates 'Ready' and '100%' zoom.

Formula Basics

Excel for Crash Reconstruction



Formula Basics

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2		Value 1	Value 2	Value 3											
3		24.3	53.2	82.4											
4															
5				Practice Addition											
6				Add the values using + sign on keyboard											
7				Add the values using SUM function											
8															
9				Practice Subtraction											
10				Subtract value 2 from value 3 (V3-V2)											
11				Subtract value 3 from value 2 (V2-V3)											
12															
13				Practice Division											
14				Divide value 3 by value 2 (V3/V2)											
15				Convert value 2 from ft/s to mph											
16															
17				Practice Multiplication											
18				Multiply each of the three values (V1*V2*V3)											
19				Convert value 1 from mph to ft/s											
20															
21				Practice Exponents											
22				Square value 2 by multiplying (V2*V2)											
23				Square value 2 by using the caret (V2^2)											
24															
25				Practice Roots											
26				Take the square root of value 3 (V3)											
27															
28															
29															

Open file
"Excel for Recon – Class Worksheet.xlsx"

Tab: Practice1

Formula Basics

B6 24.3+53.2+82.4

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		24.3+53.2+82.4		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1 Practice1Sol + < >

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		24.3+53.2+82.4		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1

Practice1Sol



Formula Basics

SUM \times \checkmark f_x $=24.3+53.2+82.4$

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		$=24.3+53.2+82.4$		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
				Subtract value 2 from value 3 (V3-V2)							
				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Add "=" sign

Practice1 Practice1Sol + < >

Formula Basics

B7

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6			159.9	Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Correct! But wait...

Practice1

Formula Basics

Excel interface showing a spreadsheet with columns A through K and rows 1 through 21. The formula bar at the top displays $=24.3+53.2+82.4$.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	100							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

The spreadsheet interface includes a formula bar at the top showing $=24.3+53.2+82.4$. The bottom status bar shows the active sheet is "Practice1".

Formula Basics

SUM \times \checkmark f_x =24.3+53.2+82.4

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	100							
4											
5				Practice Addition							
6		=24.3+53.2+82.4		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1 Practice1Sol + < >



Formula Basics

SUM \times \checkmark fx $=B3+C3+D3$

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		$=B3+C3+D3$		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1 Practice1Sol $+$

=
Click
+
Click
+
Click
ENTER



Formula Basics

SUM X ✓ fx =SUM(B3:D3)

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6			159.9	Add the values using + sign on keyboard							
7		=SUM(B3:D3)		Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1 Practice1Sol + < >

=sum(
Click & Drag
Selection
)
ENTER

Formula Basics

Excel spreadsheet showing formula basics practice.

Formula Bar: C3, $=D3-C3$

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		$=D3-C3$		Subtract value 2 from value 3 (V3-V2)							
11				Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Worksheet: Practice1

Formula Basics

D3											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		=C3-D3		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1

Practice1Sol

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		-29.2		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14				Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Formula Basics

Excel spreadsheet showing a formula in cell C3: `=D3/C3`.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											

Practice Addition
Add the values using + sign on keyboard
Add the values using SUM function

Practice Subtraction
Subtract value 2 from value 3 (V3-V2)
Subtract value 3 from value 2 (V2-V3)

Practice Division
Divide value 3 by value 2 (V3/V2)
Convert value 2 from ft/s to mph

Practice Multiplication
Multiply each of the three values (V1*V2*V3)
Convert value 1 from mph to ft/s

Practice Exponents

Keyboard overlay showing the division key (`/`) highlighted with a red box and the backspace key circled with a red 'X'.

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		-29.2		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14		1.54887218		Divide value 3 by value 2 (V3/V2)							
15				Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

$$fps = 1.467 \times mph$$

$$mph = \frac{fps}{1.467}$$

Formula Basics

B15 X ✓ fx =C3/1.467

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		-29.2		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14		1.54887218		Divide value 3 by value 2 (V3/V2)							
15		=C3/1.467		Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1 Practice1Sol + < >

$$fps = 1.467 \times mph$$

$$mph = \frac{fps}{1.467}$$

Formula Basics

B15											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		-29.2		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14		1.54887218		Divide value 3 by value 2 (V3/V2)							
15		36.26448534		Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18				Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1

Practice1Sol



Formula Basics

Excel spreadsheet showing formula basics with a keyboard overlay highlighting the asterisk key.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6			159.9	Add the values using + sign on keyboard							
7			159.9	Add the values using SUM function							
8											
9				Practice Subtraction							
10			29.2	Subtract value 2 from value 3 (V3-V2)							
11			-29.2	Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14			1.54887218	Divide value 3 by value 2 (V3/V2)							
15			36.26448534	Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18			=B3*C3*D3	Multiply each of the three values (V1*V2*V3)							
19				Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Keyboard overlay showing the asterisk (*) key highlighted in red.

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		-29.2		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14		1.54887218		Divide value 3 by value 2 (V3/V2)							
15		36.26448534		Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18		106523.424		Multiply each of the three values (V1*V2*V3)							
19		+		Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

$$fps = 1.467 \times mph$$

$$mph = \frac{fps}{1.467}$$

Formula Basics

Excel spreadsheet showing formula basics for converting mph to ft/s.

Value 1 (24.3), **Value 2** (53.2), **Value 3** (82.4)

Practice Addition
 Add the values using + sign on keyboard
 Add the values using SUM function

Practice Subtraction
 Subtract value 2 from value 3 (V3-V2)
 Subtract value 3 from value 2 (V2-V3)

Practice Division
 Divide value 3 by value 2 (V3/V2)
 Convert value 2 from ft/s to mph

Practice Multiplication
 Multiply each of the three values (V1*V2*V3)
 Convert value 1 from mph to ft/s

Practice Exponents

Formula Examples:

- $fps = 1.467 \times mph$
- $mph = \frac{fps}{1.467}$
- $=B3*1.467$

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				Practice Subtraction							
10		29.2		Subtract value 2 from value 3 (V3-V2)							
11		-29.2		Subtract value 3 from value 2 (V2-V3)							
12											
13				Practice Division							
14		1.54887218		Divide value 3 by value 2 (V3/V2)							
15		36.26448534		Convert value 2 from ft/s to mph							
16											
17				Practice Multiplication							
18		106523.424		Multiply each of the three values (V1*V2*V3)							
19		35.6481		Convert value 1 from mph to ft/s							
20											
21				Practice Exponents							

Practice1

Practice1Sol



Formula Basics

Excel spreadsheet showing formula basics. The active cell is C3, containing the formula $=C3*C3$.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		$=C3*C3$		Square value 2 by multiplying (V2*V2)							
23				Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26				Take the square root of value 3 ($\sqrt{V3}$)							
27											
28				Count numbers is a set							
29				Count how many values are above using							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

The image shows an Excel spreadsheet with the following data and formulas:

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		=C3^2		Square value 2 by using the carat (V2^V2)							
24											
25				Practice Roots							
26				Take the square root of value 3 (√V3)							
27											
28				Count numbers is a set							
29				Count how many values are above 50							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

A keyboard overlay is shown on the right side of the spreadsheet, with the '^' key (located above the '6' key) highlighted with a red box.

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26				Take the square root of value 3 (√V3)							
27											
28				Count numbers is a set							
29				Count how many values are above using							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

Excel spreadsheet showing formula basics. The active cell is D3, containing the formula `=sqrt(D3)`.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		<code>=sqrt(D3</code>		Take the square root of value 3 (√V3)							
27		<small>SQRT(number)</small>									
28				Count numbers is a set							
29				Count how many values are above using							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

B27											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29				Count how many values are above using COUNT							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

Excel interface showing a spreadsheet with the following data and formulas:

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		=count(B3:D3		Count how many values are above using COUNT							
30		COUNT(value1, [value2], ...)									
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Formula bar: B3, =count(B3:D3)

Sheet tab: Practice1

Formula Basics

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

B32											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32				Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

$$= \frac{V1 + V2}{2}$$

Practice1

Formula Basics

B32 \times \checkmark fx $=B3+C3/2$

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32		$=B3+C3/2$		Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

$$= \frac{V1 + V2}{2}$$

Formula Basics

ORDER OF OPERATIONS

The order of operations tells you the sequence to follow when you are performing operations in a mathematical expression.

P

1

Parentheses

()

E

2

Exponents

a²

M

3

Multiply or Divide

X or ÷

D

A S

4

Add or Subtract

+ or -

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Formula Basics

$$= V1 + V2/2$$

$$= V1 + \frac{V2}{2}$$

ORDER OF OPERATIONS			
The order of operations tells you the sequence to follow when you are performing operations in a mathematical expression.			
P	E	M D	A S
1	2	3	4
Parentheses	Exponents	Multiply or Divide	Add or Subtract
()	a²	X or ÷	+ or -

© howstuffworks

Formula Basics

$$= \frac{V1 + V2}{2}$$

$$= \frac{(V1 + V2)}{2}$$

$$= (V1 + V2)/2$$

ORDER OF OPERATIONS			
The order of operations tells you the sequence to follow when you are performing operations in a mathematical expression.			
P	E	M D	A S
1	2	3	4
Parentheses	Exponents	Multiply or Divide	Add or Subtract
()	a²	X or ÷	+ or -
© howstuffworks			

Formula Basics

B32											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32		=(B3+C3)/2		Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

B33											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32		38.75		Find average of values 1, 2 using + and /							
33				Find average of values 1, 2, 3 using SUM and COUNT							
34				Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Formula Basics

Excel spreadsheet showing formula basics. The active cell is B3, containing the formula `=sum(B3:D3)/count(B3:D3)`.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32		38.75		Find average of values 1, 2 using + and /							
33		<code>=sum(B3:D3)/count(B3:D3)</code>									
34				Find average of values 1, 2, 3 using SUM and COUNT							
35				Find average of values 1, 2, 3 using AVERAGE							
36											
37											

Practice1

Formula Basics

Excel interface showing a spreadsheet with columns A through K and rows 1 through 37. The formula bar at the top shows the formula `=average(B3:D3)` being entered in cell B3.

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32		38.75		Find average of values 1, 2 using + and /							
33		53.3		Find average of values 1, 2, 3 using SUM and COUNT							
34		<code>=average(B3:D3)</code>		Find average of values 1, 2, 3 using AVERAGE							
35				<small>AVERAGE(number1, [number2], ...)</small>							
36											
37											

The status bar at the bottom shows "Practice1" and a scroll bar.

Formula Basics

B35											
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
21				Practice Exponents							
22		2830.24		Square value 2 by multiplying (V2*V2)							
23		2830.24		Square value 2 by using the carat (V2^2)							
24											
25				Practice Roots							
26		9.077444574		Take the square root of value 3 (√V3)							
27											
28				Count numbers in a set							
29		3		Count how many values are above using COUNT							
30											
31				Practice Averages							
32		38.75		Find average of values 1, 2 using + and /							
33		53.3		Find average of values 1, 2, 3 using SUM and COUNT							
34		53.3		Find average of values 1, 2, 3 using AVERAGE							
35											
36											
37											

Practice1

Excel Crash Reconstruction Basics

**Excel for Crash
Reconstruction**



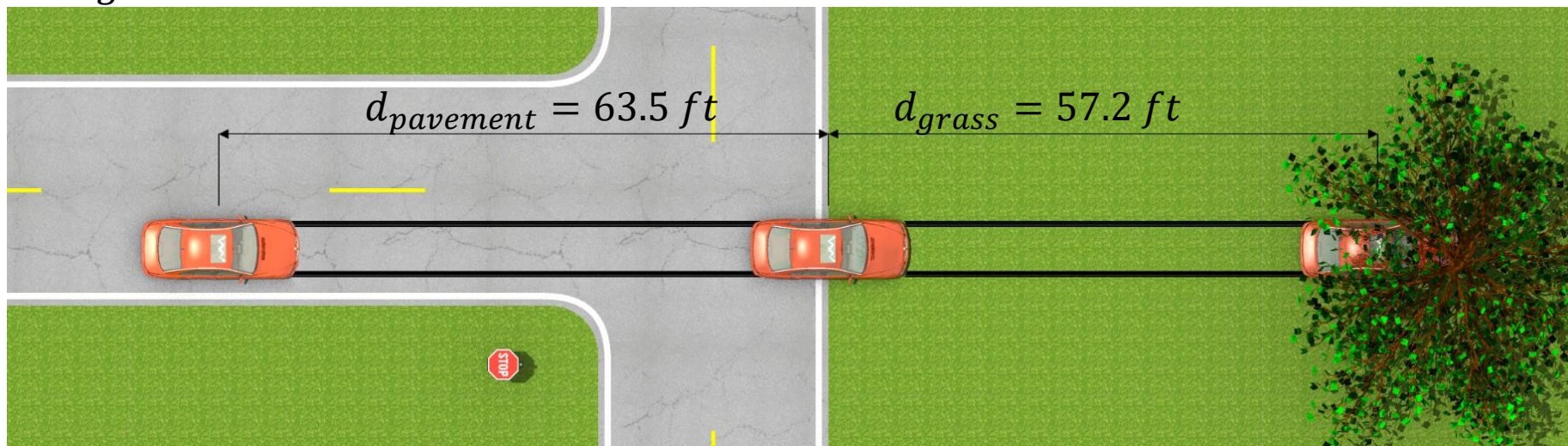
Scenario

The BMW slides through a T-intersection

It impacts a tree at 22 mph

$$f_{pavement} = 0.70 \rightarrow 0.80$$

$$f_{grass} = 0.45 \rightarrow 0.55$$

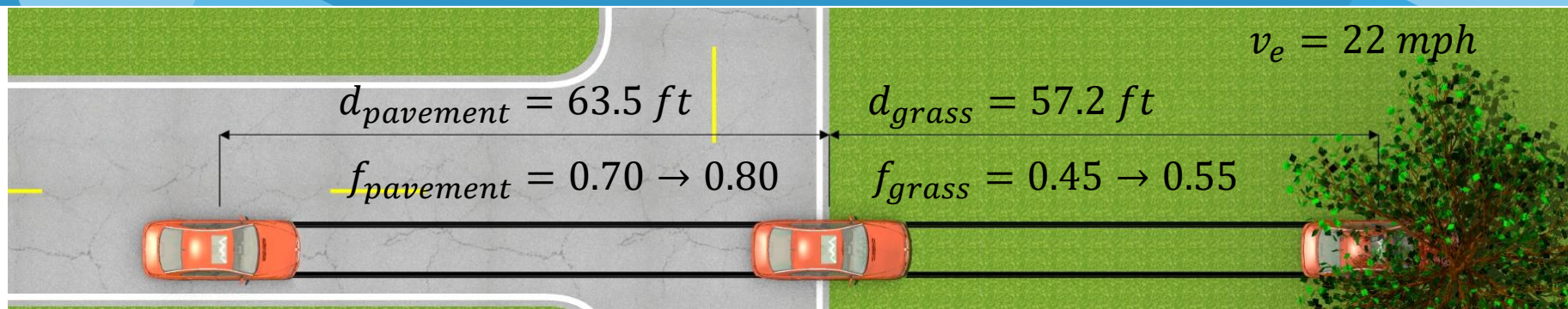


How fast was the BMW traveling when it left the pavement?

How fast was the BMW traveling at the start of the skid

How long was the BMW skidding?

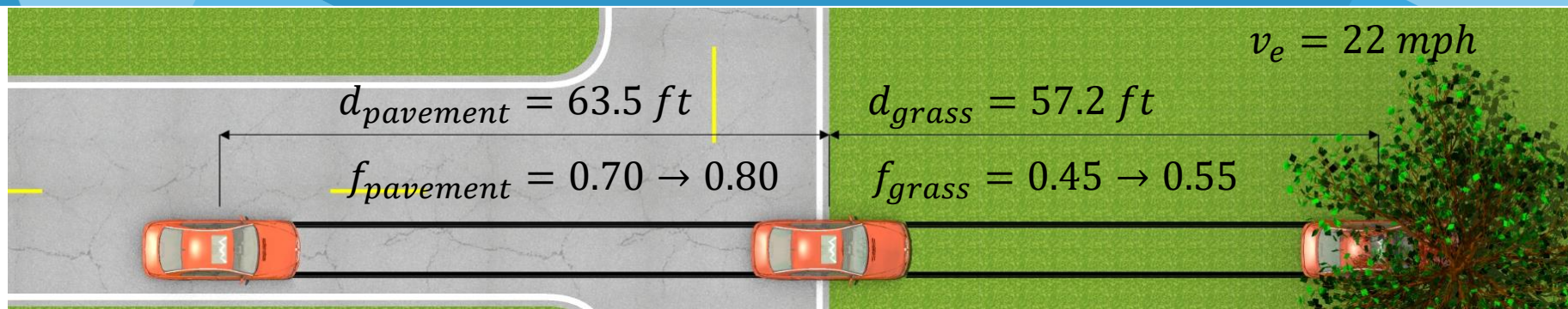
Excel Crash Recon Basics



	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>			<i>f-high</i>			
4		<i>f-low</i>			<i>f-low</i>			
5		<i>d</i>		ft	<i>d</i>		ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid						
11								
12		Pavement to Grass						
13								
14		Tree Impact						
15								
16								
17								
18								
19								
20								
21								

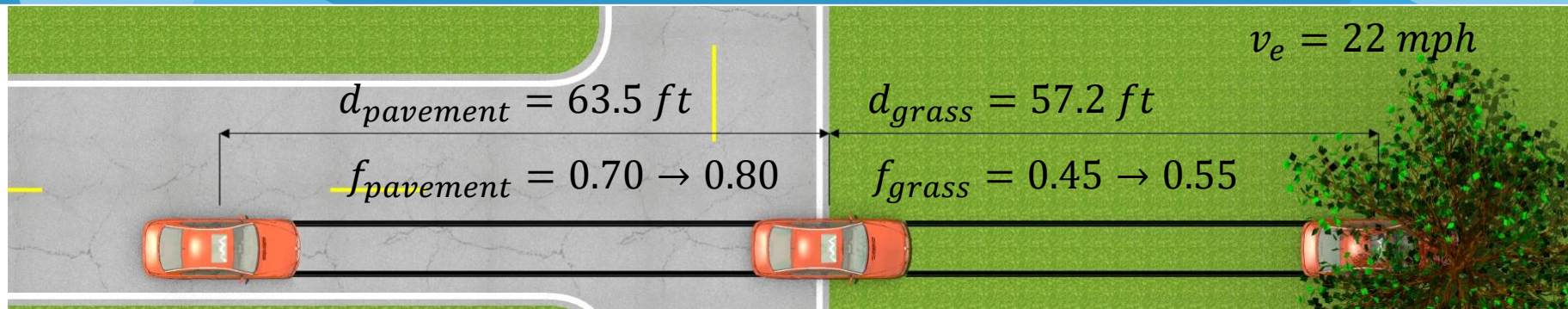
Tab: ReconBasic

Excel Crash Recon Basics



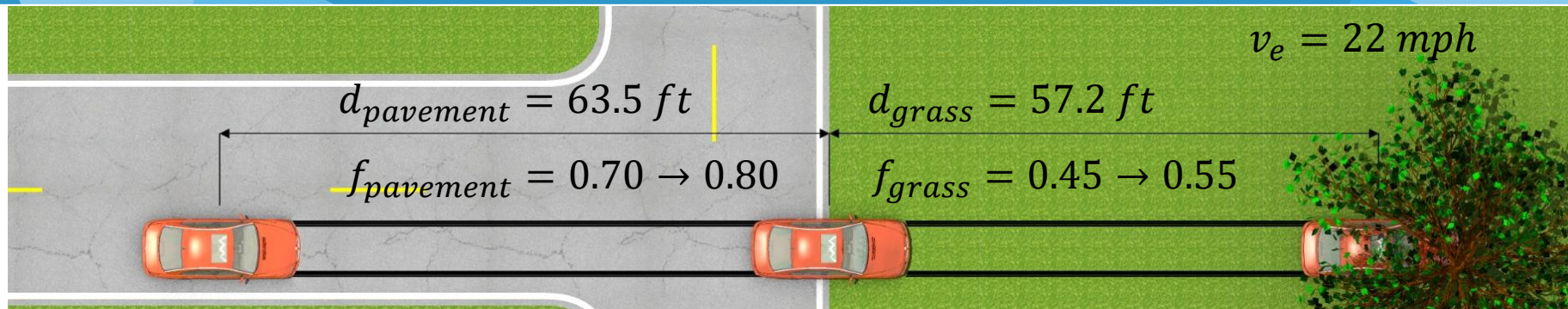
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid						
11					63.5			
12		Pavement to Grass						
13					57.2			
14		Tree Impact	22					
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



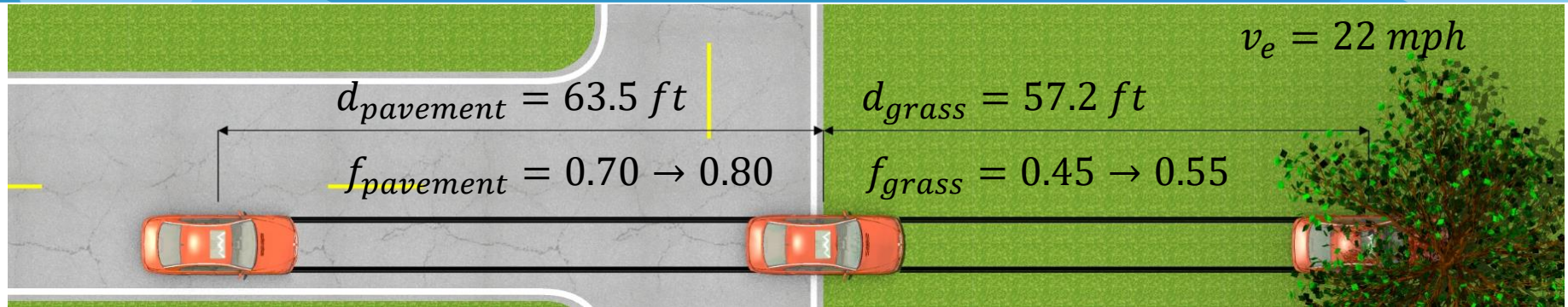
F11								
	A	B	C	D	E	F	G	H
1								
2			Pavement			Grass		
3		<i>f-high</i>	0.8			<i>f-high</i>	0.55	
4		<i>f-low</i>	0.7			<i>f-low</i>	0.45	
5		<i>d</i>	63.5	ft		<i>d</i>	57.2	ft
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid						
11					63.5	=C3*-32.2		
12		Pavement to Grass						
13					57.2			
14		Tree Impact	22					
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



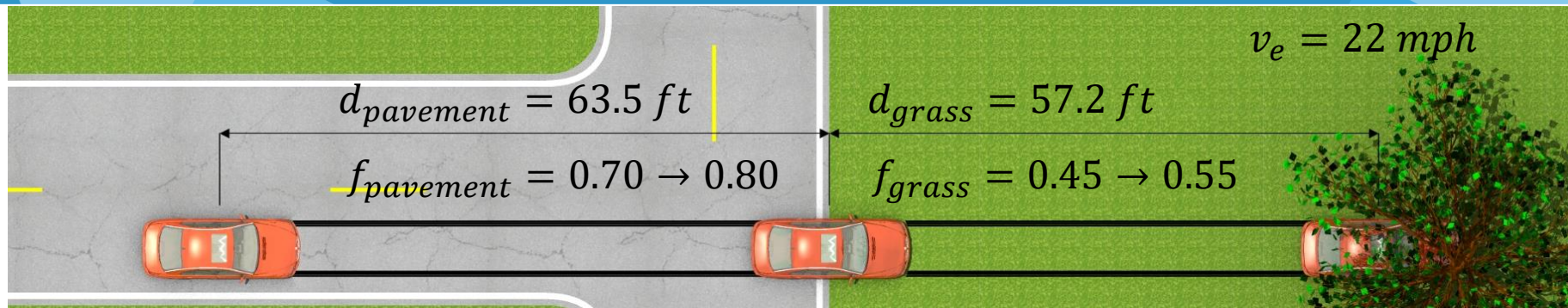
F13								
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid						
11					63.5	-25.76		
12		Pavement to Grass						
13					57.2	=F3*-32.2		
14		Tree Impact	22					
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



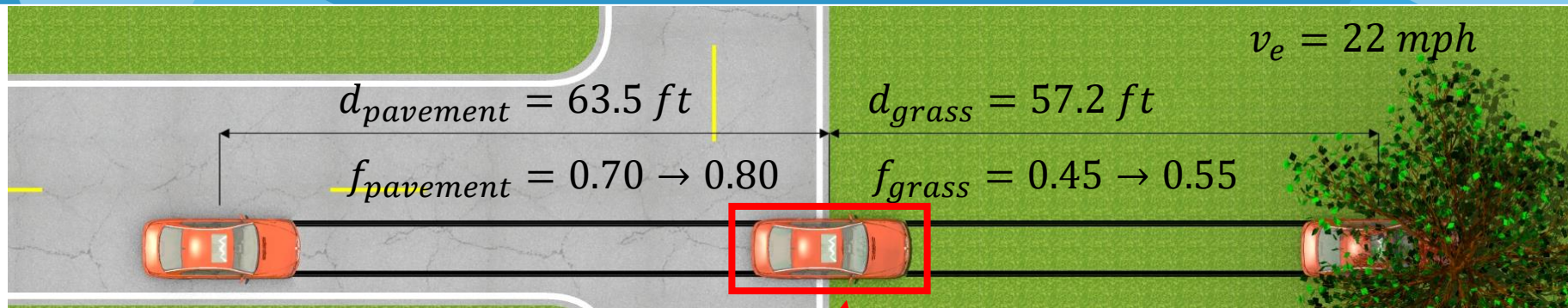
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			<i>mph</i>	<i>ft/s</i>	<i>ft</i>	<i>ft/s/s</i>	<i>s</i>	
10		Start of Skid						
11					63.5	-25.76		
12		Pavement to Grass						
13					57.2	-17.71		
14		Tree Impact	22					
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



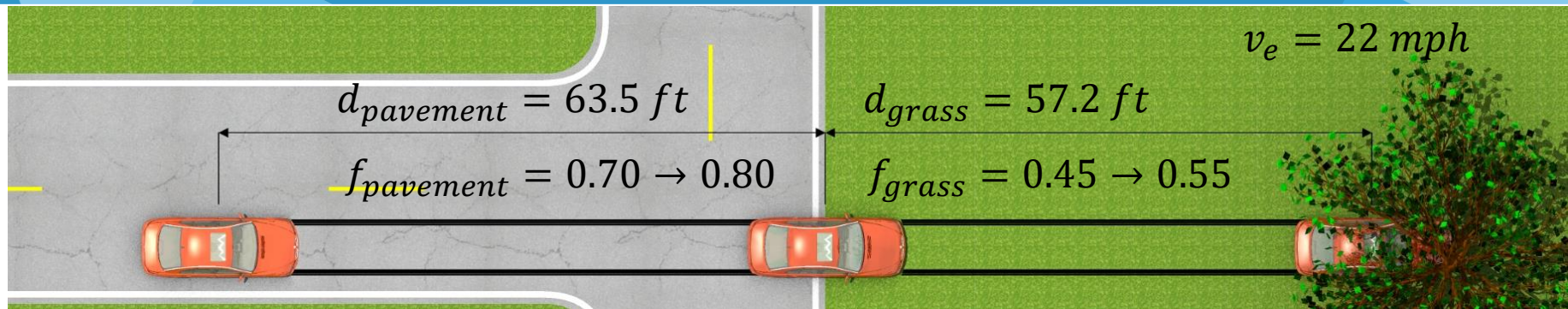
D14								
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid						
11					63.5	-25.76		
12		Pavement to Grass						
13					57.2	-17.71		
14		Tree Impact	22	=C14*1.467				
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid						
11					63.5	-25.76		
12		Pavement to Grass						
13					57.2	-17.71		
14		Tree Impact	22	32.274				
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



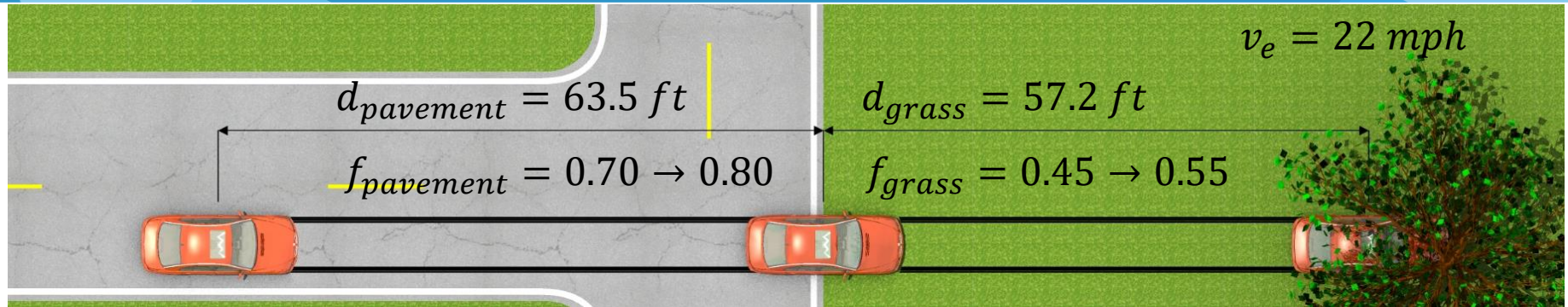
$$v_i = \sqrt{v_e^2 - 2ad}$$

$$v_i = \text{sqrt}(v_e^2 - 2ad)$$

$$v_i = \text{sqrt}((v_e^2) - (2ad))$$

$$v_i = \text{sqrt}((v_e^2) - (2ad))$$

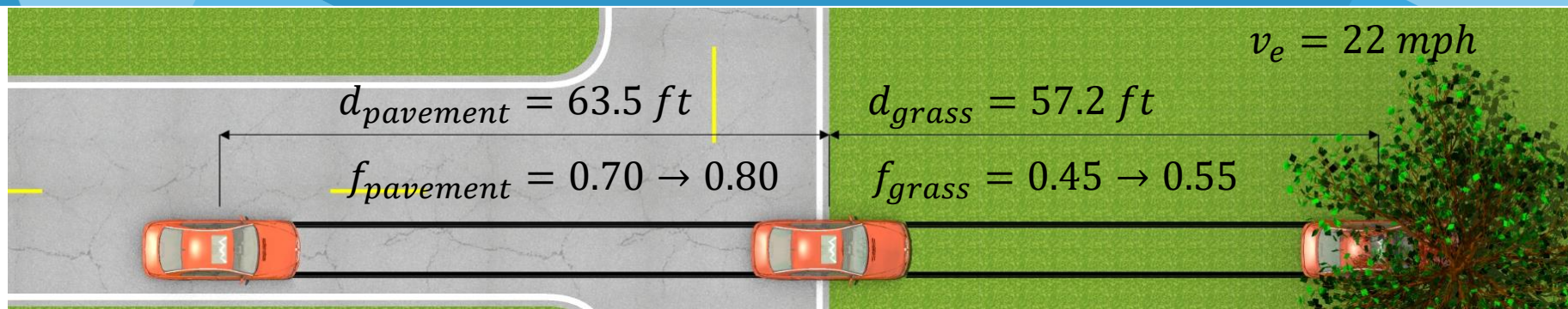
Excel Crash Recon Basics



$$v_i = \text{sqrt}((v_e^2) - (2ad))$$



Excel Crash Recon Basics

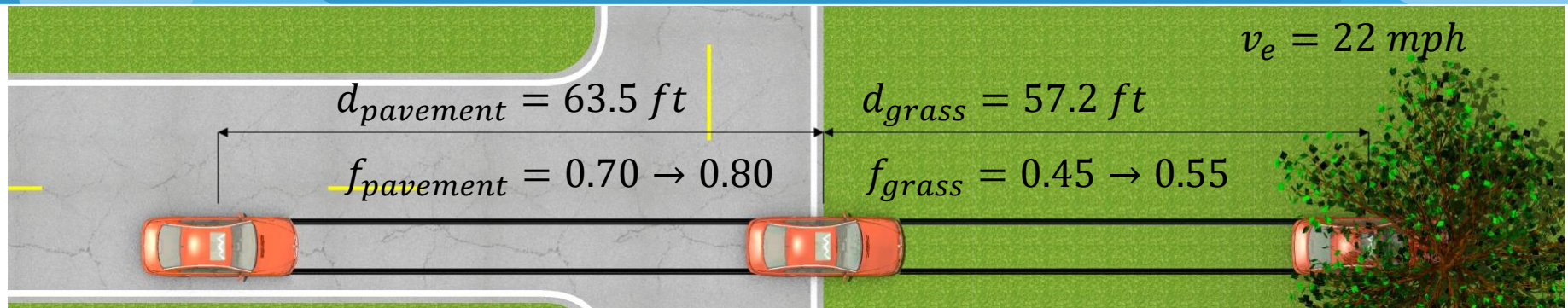


SUM X ✓ fx =SQRT((D14^2)-(2*F13*E13))								
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			<i>mph</i>	<i>ft/s</i>	<i>ft</i>	<i>ft/s/s</i>	<i>s</i>	
10		Start of Skid						
11					63.5	-25.76		
12		Pavement to Grass	=SQRT((D14^2)-(2*F13*E13))					
13					57.2	-17.71		
14		Tree Impact	22	32.274				
15								
16								
17								
18								
19								
20								
21								

$$v_i = \text{sqrt}((v_e^2) - (2ad))$$

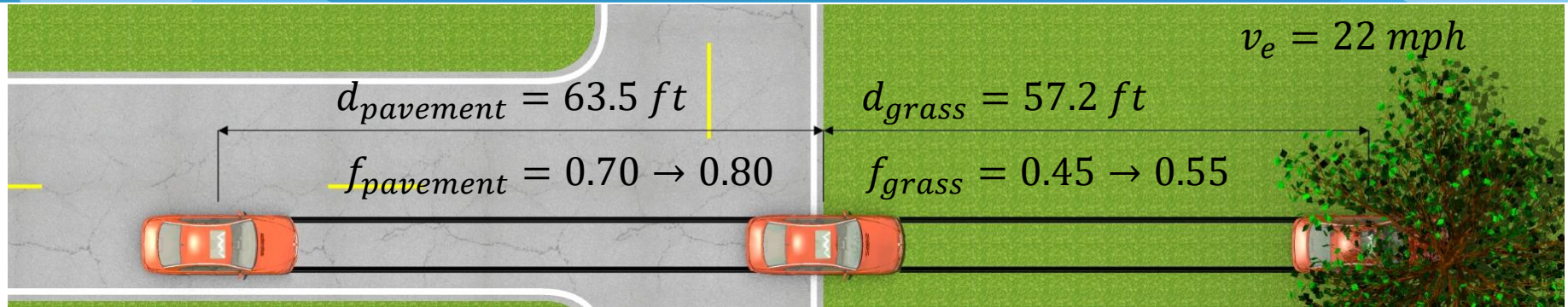
$$v_i = \text{sqrt}((v_e^2) - (2ad))$$

Excel Crash Recon Basics

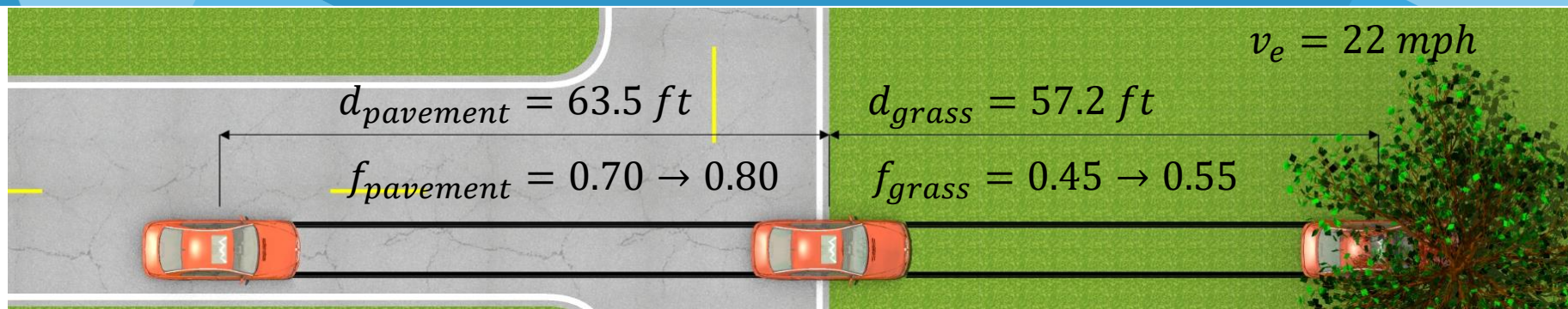


D12	:	X	✓	<i>fx</i>	=SQRT((D14^2)-(2*F13*E13))			
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			<i>mph</i>	<i>ft/s</i>	<i>ft</i>	<i>ft/s/s</i>	<i>s</i>	
10		Start of Skid						
11					63.5	-25.76		
12		Pavement to Grass		55.38623544				
13					57.2	-17.71		
14		Tree Impact	22	32.274				
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



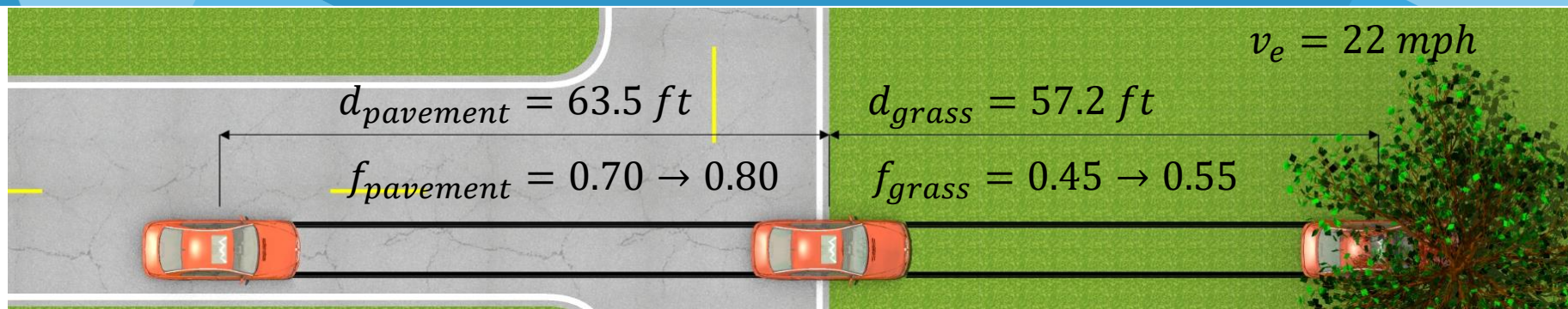
Excel Crash Recon Basics



SUM X ✓ fx =SQRT((D12^2)-(2*F11*E11))							
	A	B	C	D	E	F	G
1							
2		Pavement			Grass		
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55	
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45	
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft
6							
7							
8			Velocity	Velocity	Distance	Acceleration	Time
9			mph	ft/s	ft	ft/s/s	s
10		Start of Skid	=SQRT((D12^2)-(2*F11*E11))				
11					63.5	-25.76	
12		Pavement to Grass		55.38623544			
13					57.2	-17.71	
14		Tree Impact	22	32.274			
15							
16							
17							
18							
19							
20							
21							

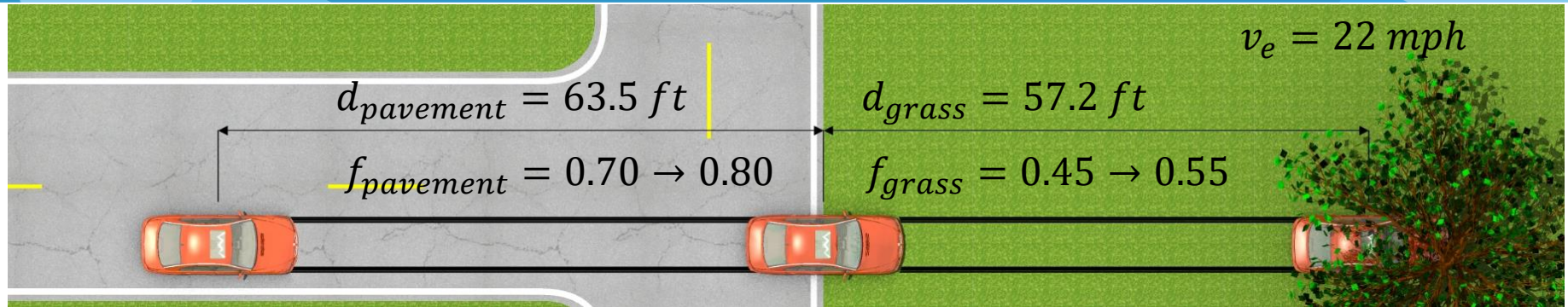
$$v_i = \text{sqrt}((v_e^2) - (2ad))$$

Excel Crash Recon Basics



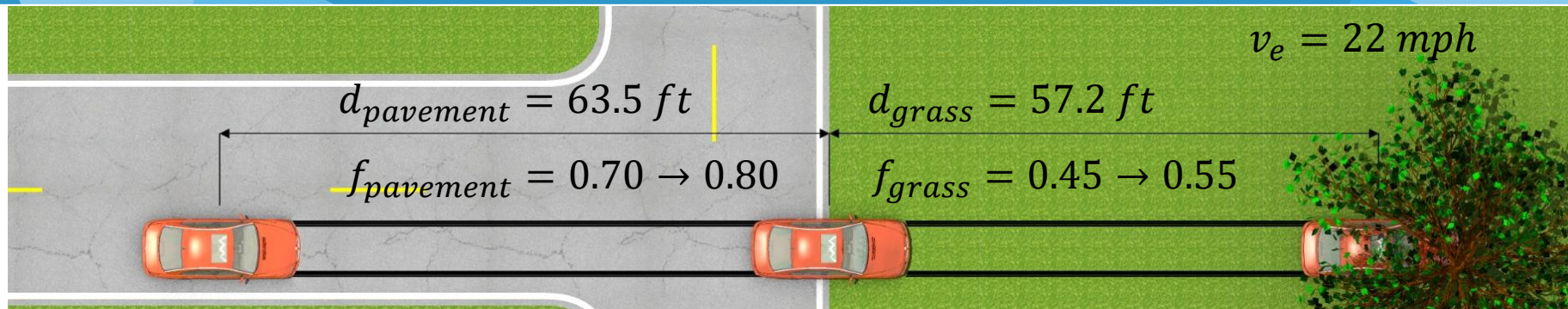
D10								
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid		79.61881107				
11					63.5	-25.76		
12		Pavement to Grass		55.38623544				
13					57.2	-17.71		
14		Tree Impact	22	32.274				
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics



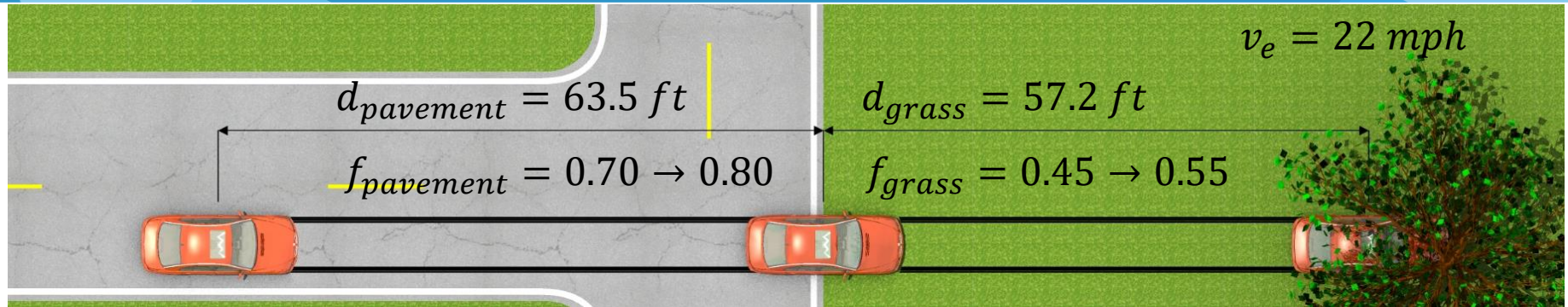
SUM							
	A	B	C	D	E	F	G
1							
2			Pavement			Grass	
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55	
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45	
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft
6							
7							
8			Velocity	Velocity	Distance	Acceleration	Time
9			mph	ft/s	ft	ft/s/s	s
10		Start of Skid	54.27322	79.61881107			
11					63.5	-25.76	
12		Pavement to Grass	=D12/1.467	55.38623544			
13					57.2	-17.71	
14		Tree Impact	22	32.274			
15							
16							
17							
18							
19							
20							
21							

Excel Crash Recon Basics



	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			mph	ft/s	ft	ft/s/s	s	
10		Start of Skid	54.27322	79.61881107				
11					63.5	-25.76		
12		Pavement to Grass	37.75476172	55.38623544				
13					57.2	-17.71		
14		Tree Impact	22	32.274				
15								
16								
17								
18								
19								
20								
21								

Excel Crash Recon Basics

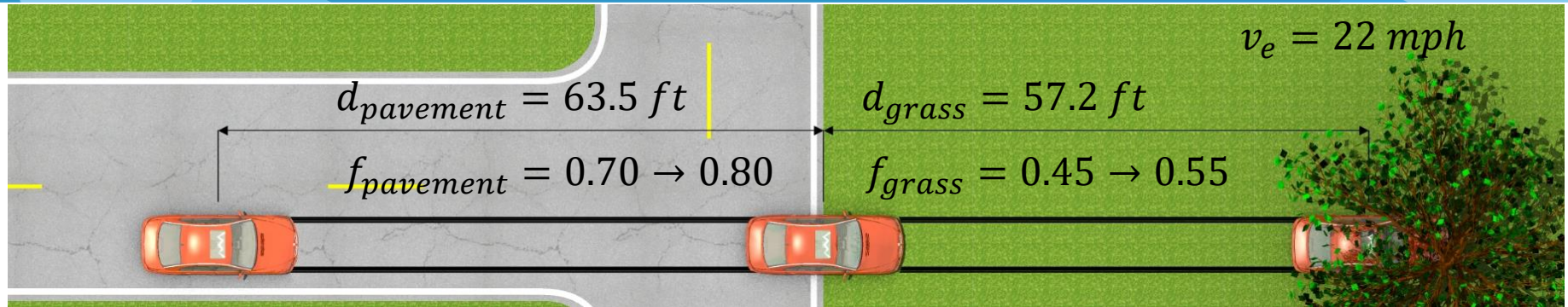


$$t = \frac{v_e - v_i}{a}$$

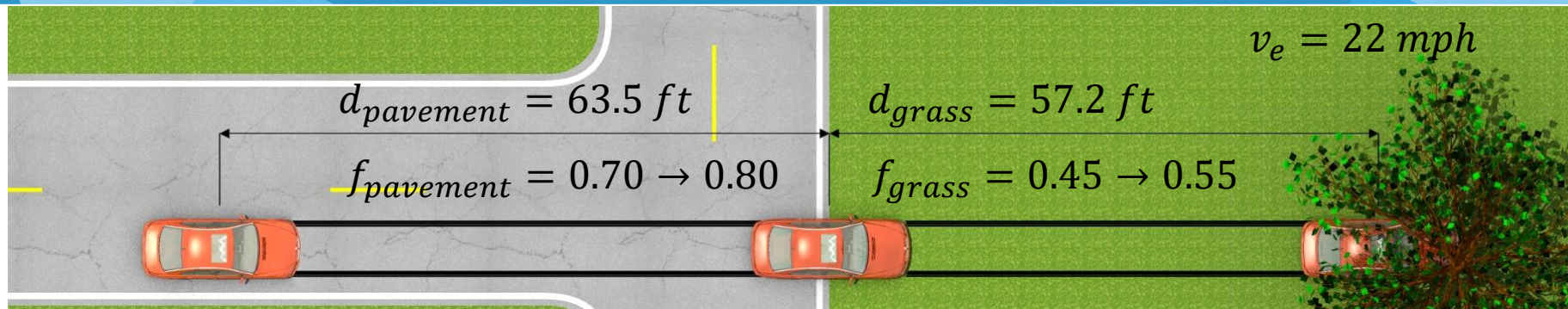
$$t = \frac{(v_e - v_i)}{a}$$

$$t = (v_e - v_i)/a$$

Excel Crash Recon Basics



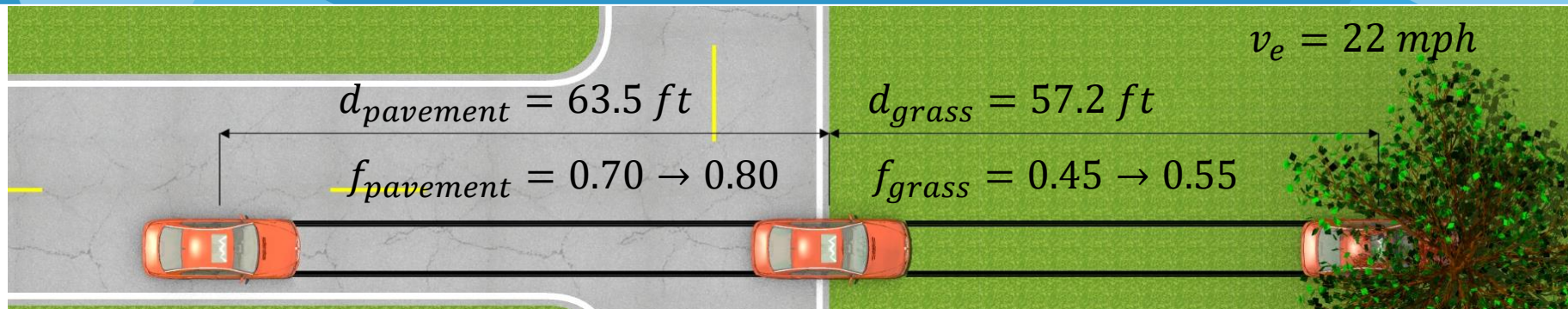
Excel Crash Recon Basics



SUM X ✓ fx =(D14-D12)/F13							
	A	B	C	D	E	F	G
1							
2		Pavement			Grass		
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55	
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45	
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft
6							
7							
8			Velocity	Velocity	Distance	Acceleration	Time
9			mph	ft/s	ft	ft/s/s	s
10		Start of Skid	54.27322	79.61881107			
11					63.5	-25.76	
12		Pavement to Grass	37.75476172	55.38623544			
13					57.2	= (D14-D12)/F13	
14		Tree Impact	22	32.274			
15							
16							
17							
18							
19							
20							
21							

$$t = (v_e - v_i)/a$$

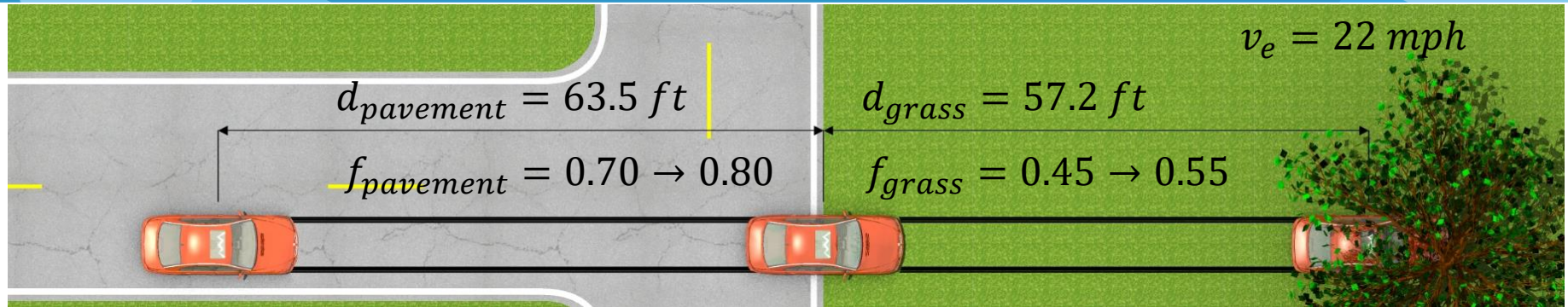
Excel Crash Recon Basics



SUM X ✓ fx =(D12-D10)/F11							
	A	B	C	D	E	F	G
1							
2		Pavement			Grass		
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55	
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45	
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft
6							
7							
8			Velocity	Velocity	Distance	Acceleration	Time
9			mph	ft/s	ft	ft/s/s	s
10		Start of Skid	54.27322	79.61881107			
11					63.5	= (D12-D10)/F11	
12		Pavement to Grass	37.75476172	55.38623544			
13					57.2	-17.71	1.305038703
14		Tree Impact	22	32.274			
15							
16							
17							
18							
19							
20							
21							

$$t = (v_e - v_i)/a$$

Excel Crash Recon Basics



G11 : X ✓ fx =(D12-D10)/F11								
	A	B	C	D	E	F	G	H
1								
2		Pavement			Grass			
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55		
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45		
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9			<i>mph</i>	<i>ft/s</i>	<i>ft</i>	<i>ft/s/s</i>	<i>s</i>	
10		Start of Skid	54.27322	79.61881107				
11					63.5	-25.76	0.940705576	
12		Pavement to Grass	37.75476172	55.38623544				
13					57.2	-17.71	1.305038703	
14		Tree Impact	22	32.274				
15								
16								
17								
18								
19								
20								
21								

Formatting & Conditional Formatting

Excel for Crash Reconstruction



Why bother?

Professional appearance

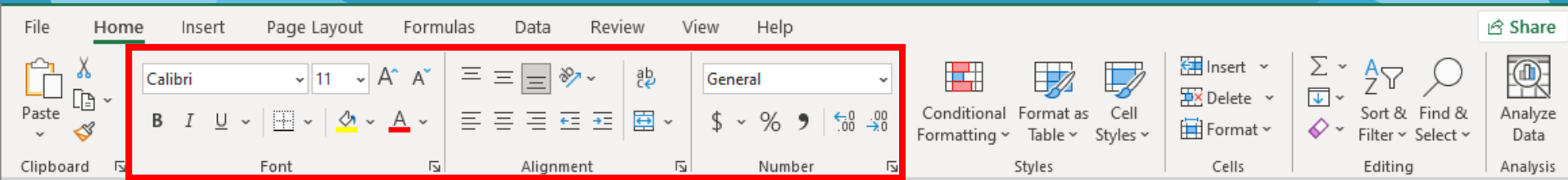
Uniform number of decimals

Simplification

Readability

	A	B	C	D	E	F	G
1							
2		Pavement			Grass		
3		<i>f-high</i>	0.8		<i>f-high</i>	0.55	
4		<i>f-low</i>	0.7		<i>f-low</i>	0.45	
5		<i>d</i>	63.5	ft	<i>d</i>	57.2	ft
6							
7							
8			Velocity	Velocity	Distance	Acceleration	Time
9			mph	ft/s	ft	ft/s/s	s
10		Start of Skid	54.273218	79.61881107			
11					63.5	-25.76	0.940703576
12		Pavement to Grass	37.75476172	55.38623544			
13					37.2	-17.71	1.305038703
14		Tree Impact	22	32.274			

Formatting



Text size and color

Cell color

Borders

Alignment

Number formatting

Cell size

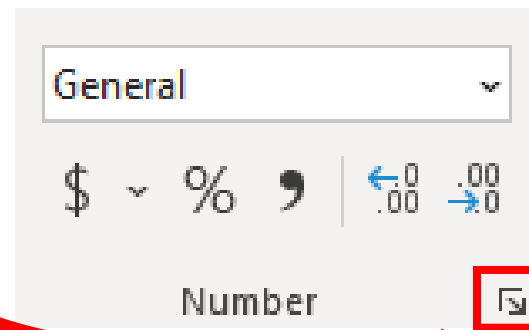


Tab: Formatting



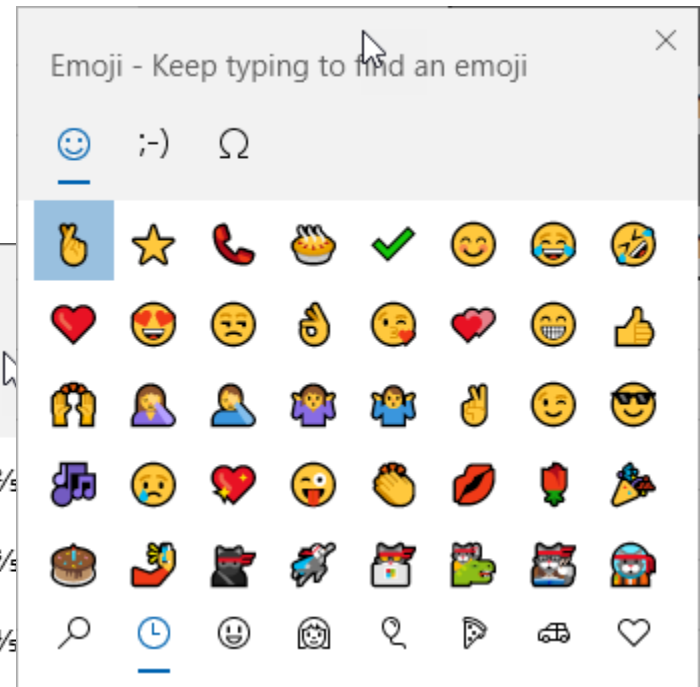
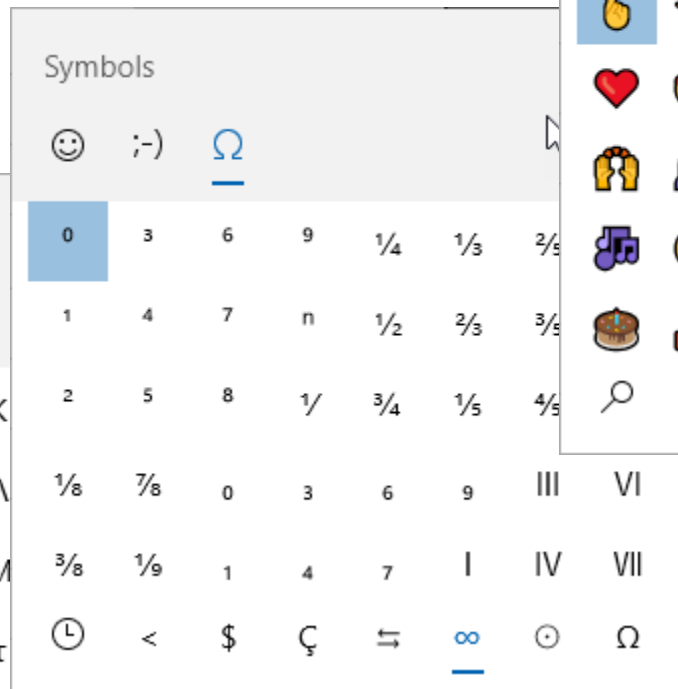
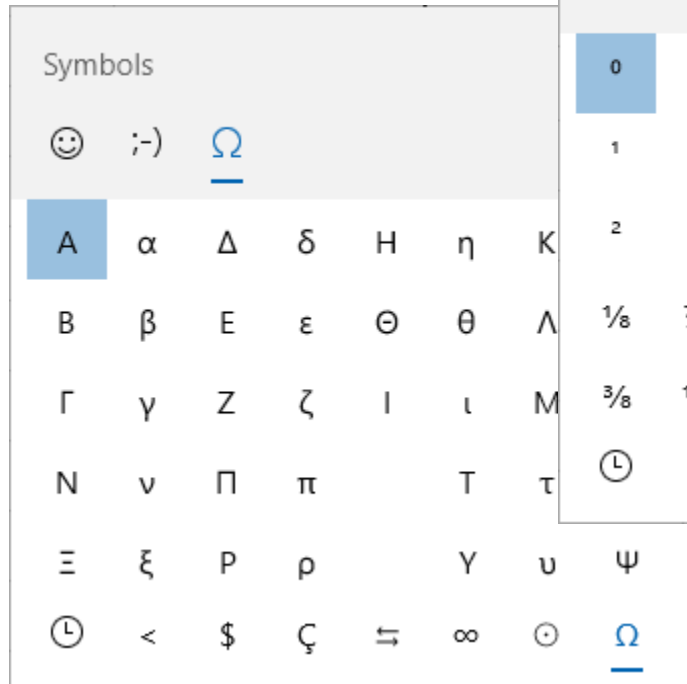
How to display units following the calculated value:

1. Select cells
2. Select the dropdown in Number
3. Select "Number" category
4. Then select "Custom" category
5. Enter your units in the following format:
0.0(space)(quote)(units)(quote)
1-decimal: 0.0 "mph"
2-decimals: 0.00 "s"
6. Select OK



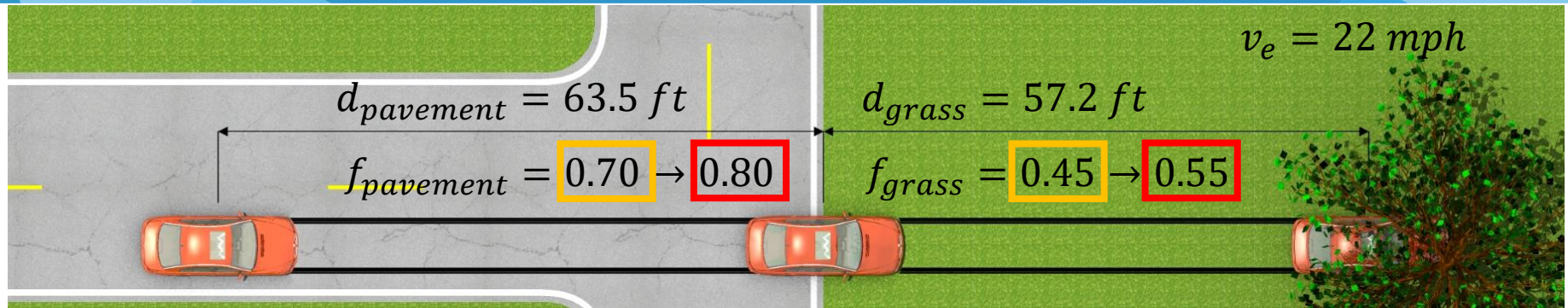


Entering custom characters: Windows+Period





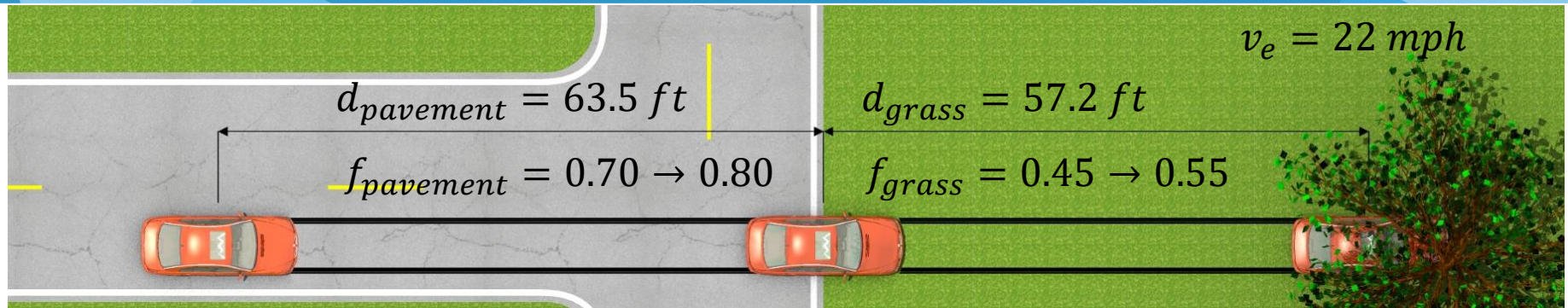
Formatting



	A	B	C	D	E	F	G	H
1								
2			Pavement			Grass		
3			<i>f-high</i>	0.80		<i>f-high</i>	0.55	
4			<i>f-low</i>	0.70		<i>f-low</i>	0.45	
5			<i>d</i>	63.5 ft		<i>d</i>	57.2 ft	
6								
7								
8			Velocity	Velocity	Distance	Acceleration	Time	
9		Start of Skid	54.3 mph	79.6 ft/s				
10					63.5 ft	-25.76 ft/s ²	0.94 s	
11		Pavement to Grass	37.8 mph	55.4 ft/s				
12					57.2 ft	-17.71 ft/s ²	1.31 s	
13		Tree Impact	22.0 mph	32.3 ft/s				
14								
15								
16								
17								
18								
19								
20								
21								



Formatting



	A	B	C	D	E	F	G	H
1								
2			Pavement			Grass		
3		<i>f-high</i>	0.80			<i>f-high</i>	0.55	
4		<i>f-low</i>	0.70			<i>f-low</i>	0.45	
5		<i>d</i>	63.5 ft			<i>d</i>	57.2 ft	
6								
7								
8		<u>High</u>	Velocity	Velocity	Distance	Acceleration	Time	
9		Start of Skid	54.3 mph	79.6 ft/s				
10					63.5 ft	-25.76 ft/s ²	0.94 s	
11		Pavement to Grass	37.8 mph	55.4 ft/s				
12					57.2 ft	-17.71 ft/s ²	1.31 s	
13		Tree Impact	22.0 mph	32.3 ft/s				
14								
15		<u>Low</u>	Velocity	Velocity	Distance	Acceleration	Time	
16		Start of Skid	50.8 mph	74.6 ft/s				
17					63.5 ft	-22.54 ft/s ²	1.00 s	
18		Pavement to Grass	35.4 mph	52.0 ft/s				
19					57.2 ft	-14.49 ft/s ²	1.36 s	
20		Tree Impact	22.0 mph	32.3 ft/s				
21								

Conditional Formatting

Excel for Recon.xlsx - Saved

Andrew Thomas

File Home Insert Page Layout Formulas Data Review View Help

Clipboard Font Alignment Number Styles Cells Editing Analysis

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General

Conditional Formatting

Format as Table

Cell Styles

Insert

Delete

Format

Sum

Sort & Filter

Find & Select

Analyze Data

Filename

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Filename	2010 FORD F-150 1FTFW1EV9AFXXXXXX.CDRX													
2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)														
3	Times (sec	Speed, vel	Accelerato	Service br	Engine RPI	ABS activit	Stability cc	Traction C	Traction Control via Engine (engaged, non-engaged)						
4	-5	62.8	0	Off	1,700	non-engag	non-engag	non-engag	non-engag						
5	-4.5	62.1	0	Off	1,700	non-engag	non-engag	non-engag	non-engag						
6	-4	61.5	0	Off	1,700	non-engag	non-engag	non-engag	non-engag						
7	-3.5	61.5	0	Off	1,700	non-engag	non-engag	non-engag	non-engag						
8	-3	60.9	0	Off	1,700	non-engag	non-engag	non-engag	non-engag						
9	-2.5	60.3	0	Off	1,600	non-engag	non-engag	non-engag	non-engag						
10	-2	60.3	0	Off	1,600	non-engag	non-engag	non-engag	non-engag						
11	-1.5	59.7	12	Off	1,600	non-engag	non-engag	non-engag	non-engag						
12	-1	59.7	0	Off	1,700	non-engag	non-engag	non-engag	non-engag						
13	-0.5	58.4	0	On	1,600	non-engag	non-engag	non-engag	non-engag						
14	0	51	0	On	1,400	non-engag	non-engag	non-engag	non-engag						
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															
28															
29															

Ready

Practice1SQL ReconBasic Formatting ReconBasicSQL CDRData CDRDataSQL

130%

Tab: CDRData

Conditional Formatting

The screenshot shows the Microsoft Excel interface with the 'Home' ribbon selected. The 'Conditional Formatting' button in the 'Styles' group is highlighted with a red box. The spreadsheet contains a table with the following data:

Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
-5	62.8	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
-4.5	62.1	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
-4	61.5	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
-3.5	61.5	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
-3	60.9	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
-2.5	60.3	0	Off	1,600	non-engag	non-engag	non-engag	non-engaged
-2	60.3	0	Off	1,600	non-engag	non-engag	non-engag	non-engaged
-1.5	59.7	12	Off	1,600	non-engag	non-engag	non-engag	non-engaged
-1	59.7	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
-0.5	58.4	0	On	1,600	non-engag	non-engag	non-engag	non-engaged
0	51	0	On	1,400	non-engag	non-engag	non-engag	non-engaged

A blue banner at the bottom of the spreadsheet reads "Wrap text on Row 3".

Conditional Formatting

Excel for Recon.xlsx

Andrew Thomas

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Clipboard Font Alignment Number Styles Cells Editing Analysis

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Calibri 11 A A

B I U

General

Conditional Formatting

Format as Table

Cell Styles

Insert

Delete

Format

Σ

Sort & Filter

Find & Select

Analyze Data

A3

Times (sec)

Center
Center your content.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Filename	2010 FORD F-150 1FTFW1EV9AFX000000.CDRX										
2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)											
3	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)			
4	-5	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
5	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
6	-4	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
7	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
8	-3	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
9	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
10	-2	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
11	-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
12	-1	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
13	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
14	0	51	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged			
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

Center text in A3 through I14

Practice1SQL ReconBasic Formatting ReconBasicSQL CDRData CDRDataSQL

Average: 423.6977273 Count: 108 Sum: 18642.7

Ready

130%





Conditional Formatting

AutoSave Off

Excel for Recon.xlsx

Andrew Thomas AT

File

Home

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Formulas

Data

Review

View

Help

Paste

Clipboard

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11

Font

General

Number

Conditional Formatting

Format as Table

Cell Styles

Styles

Insert

Delete

Format

Cells

Σ

Sort & Filter

Find & Select

Editing

Analyze Data

Analysis

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Comments

D16

	A	B	C	D	E	F	G	H	I	J	K	L
1	Filename	2010 FORD F-150 1FTFW1EV9AFXXXXXX.CDRX										
2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)											
		Speed, vehicle indicated	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non- engaged)	Stability control (engaged, non- engaged)	Traction Control via Brakes (engaged, non- engaged)	Traction Control via Engine (engaged, non- engaged)			
3	Times (sec)	MPH										
4	-5	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
5	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
6	-4	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
7	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
8	-3	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
9	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
10	-2	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
11	-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
12	-1	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
13	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
14	0	51	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged			
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Conditional Formatting

Reported Values								Calculated Values		
TRG 1 - Time	TRG 6 - Time	Vehicle Speed	Accelerator Pedal, % Full	Service Brake	ABS Control Status	Steering Input	Yaw Rate	Vehicle Speed	Acceleration	Drag Factor
-4.95 s		116.8 mph	89.5%	OFF	OFF	4.5° (Left)	0.00 deg/s	171.3 fps	0.0 fps ²	0.00
-4.45 s		116.8 mph	89.5%	OFF	OFF	3.0° (Left)	-0.49 deg/s	171.3 fps	1.8 fps ²	-0.05
-3.95 s		117.4 mph	80.5%	OFF	OFF	3.0° (Left)	-1.46 deg/s	172.2 fps	0.0 fps ²	0.00
-3.45 s	-4.80 s	117.4 mph	49.5%	OFF	OFF	3.0° (Left)	-0.98 deg/s	172.2 fps	-3.5 fps ²	0.11
-2.95 s	-4.30 s	116.2 mph	0.0%	OFF	OFF	3.0° (Left)	-0.49 deg/s	170.5 fps	-3.5 fps ²	0.11
-2.45 s	-3.80 s	115.0 mph	0.0%	ON	OFF	3.0° (Left)	-0.49 deg/s	168.7 fps	-3.8 fps ²	0.12
-1.95 s	-3.30 s	113.7 mph	0.0%	ON	OFF	3.0° (Left)	-0.49 deg/s	166.8 fps	-3.5 fps ²	0.11
-1.45 s	-2.80 s	112.5 mph	0.0%	ON	OFF	6.0° (Left)	0.00 deg/s	165.0 fps	-3.8 fps ²	0.12
-0.95 s	-2.30 s	111.2 mph	0.0%	ON	OFF	12.0° (Left)	2.93 deg/s	163.1 fps	-1.8 fps ²	0.05
-0.45 s	-1.80 s	110.6 mph	0.0%	ON	OFF	24.0° (Left)	6.34 deg/s	162.3 fps	-9.1 fps ²	0.28
	-1.30 s	107.5 mph	0.0%	ON	OFF	52.5° (Left)	15.62 deg/s	157.7 fps	-51.1 fps ²	1.59
	-0.80 s	90.1 mph	0.0%	ON	ON	12.5° (Left)	9.76 deg/s	132.2 fps	-18.2 fps ²	0.56
	-0.30 s	83.9 mph	82.5%	ON	ON	127.5° (Left)	22.45 deg/s	123.1 fps	-82.2 fps ²	2.55
IMPACT	0.00 s	67.1 mph	33.5%	ON	ON	133.5° (Left)	Invalid	98.4 fps		

Printing & Copying

Excel for Crash Reconstruction



Printing

AutoSave Off

Excel for Recon.xlsx

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Andrew Thomas AT

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Printing


Excel for Recon.xlsx Andrew Thomas AT

Print


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 Print


Printer


 Brother HL-L8360CDW series Ready [Printer Properties](#)


Settings


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Only print the active sheets


Pages: to


 Print One Sided
Only print on one side of th...

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 Portrait Orientation

 Letter
8.5" x 11"

 Normal Margins
Top: 0.75" Bottom: 0.75" Lef...

 No Scaling
Print sheets at their actual size [Page Setup](#)

	Speed, vehicle indicated MPH	Accelerato r pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non- engaged)	Stability control (engaged, non- engaged)
Filename 2010 FORD F-150 1FTFW1EV9AFXXXXX.CDRX PRE-CRASH DATA - 5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)						
Times (sec)						
-5.0	62.8	0	Off	1,700	non-engaged	non-engaged
-4.5	62.1	0	Off	1,700	non-engaged	non-engaged
-4.0	61.5	0	Off	1,700	non-engaged	non-engaged
-3.5	61.5	0	Off	1,700	non-engaged	non-engaged
-3.0	60.9	0	Off	1,700	non-engaged	non-engaged
-2.5	60.3	0	Off	1,600	non-engaged	non-engaged
-2.0	60.3	0	Off	1,600	non-engaged	non-engaged
-1.5	59.7	12	Off	1,600	non-engaged	non-engaged
-1.0	59.7	0	Off	1,700	non-engaged	non-engaged
-0.5	58.4	0	On	1,600	non-engaged	non-engaged
0.0	51.0	0	On	1,400	non-engaged	non-engaged

1 of 2

Printing

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Save as Adobe PDF

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Zip and Share
(WinZip Express)

Print

Copies: 1

Printer

Brother HL-L8360CDW series
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[Printer Properties](#)

Settings

Print Active Sheets
Only print the active sheets

Pages: 1 to 1

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Portrait Orientation

Letter
8.5" x 11"

Normal Margins
Top: 0.75" Bottom: 0.75" Lef...

No Scaling
Print sheets at their actual size

[Page Setup](#)

Traction Control
via Brakes
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2 of 2

Printing

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Filename

	A	B	C	D	E	F	G	H	I	J	K	L
1	Filename	2010 FORD F-150 1FTFW1EV9AFXXXXXX.CDRX										
2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)											
		Speed, vehicle indicated	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non- engaged)	Stability control (engaged, non- engaged)	Traction Control via Brakes (engaged, non- engaged)	Traction Control via Engine (engaged, non- engaged)			
3	Times (sec)	MPH										
4	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
5	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
6	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
7	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
8	-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
9	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
10	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
11	-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
12	-1.0	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged			
13	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged			
14	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged			
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Printing

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Print ☐

Headings View ☒
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PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)									
	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
4	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
5	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
6	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
7	-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
8	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
9	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
10	-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
11	-1.0	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
12	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged
13	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged
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PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)									
	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
4	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
5	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
6	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
7	-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
8	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
9	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
10	-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
11	-1.0	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
12	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged
13	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged
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Themes Page Setup Scale to Fit Sheet Options

PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)									
	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
4	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
5	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
6	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
7	-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
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9	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
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11	-1.0	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
12	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged
13	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged
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Print ☐

Headings View ☒
Print ☐

Page Setup Scale to Fit Sheet Options

PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)									
	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
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5	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
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8	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
9	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
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12	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged
13	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged
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Setting Print Area



Printing

File Home Insert **Page Layout** Formulas Data Review View Help

Themes Colors ▾ Fonts ▾ Effects ▾

Margins Orientation Size Print Breaks Background Print Titles

Page Setup

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Gridlines View ☒ Print ☐
Headings View ☒ Print ☐

Sheet Options

PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)									
	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
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5	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
6	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
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12	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged
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Adjusting Print Scale



Adjusting Print Width

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Themes Colors ▾ Fonts ▾ Effects ▾

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Scale to Fit

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☒ View ☒ View

☐ Print ☐ Print

Sheet Options

PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)									
	Times (sec)	Speed, vehicle indicated MPH	Accelerat or pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
4	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
5	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
6	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
7	-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
8	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
9	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
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Printing

Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
-1.0	59.7							
-0.5	58.4							
0.0	51.0							

Gridlines	Headings
<input checked="" type="checkbox"/> View	<input checked="" type="checkbox"/> View
<input type="checkbox"/> Print	<input type="checkbox"/> Print

Sheet Options

11	-1.5
12	-1.0
13	-0.5
14	0.0
15	
16	
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21	
22	
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24	
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26	

	A	B	C	D	E	F	G	H	I
	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
3									
4	-5.0	62.8	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
5	-4.5	62.1	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
6	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
7	-3.5	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
8	-3.0	60.9	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
9	-2.5	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
10	-2.0	60.3	0	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
11	-1.5	59.7	12	Off	1,600	non-engaged	non-engaged	non-engaged	non-engaged
12	-1.0	59.7	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
13	-0.5	58.4	0	On	1,600	non-engaged	non-engaged	non-engaged	non-engaged
14	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged

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Excel for Recon.xlsx

Andrew Thomas

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18

	A	B	C	D	E	F	G	H	I	J
1										
2			Pavement			Grass				
3		<i>f-high</i>	0.80			<i>f-high</i>	0.55			
4		<i>f-low</i>	0.70			<i>f-low</i>	0.45			
5		<i>d</i>	63.5 ft			<i>d</i>	57.2 ft			
6										
7										
8			Velocity	Velocity	Distance	Acceleration	Time			
9		Start of Skid	54.3 mph	79.6 ft/s						
10					63.5 ft	-25.76 ft/s ²	0.94 s			
11		Pavement to Grass	37.8 mph	55.4 ft/s						
12					57.2 ft	-17.71 ft/s ²	1.31 s			
13		Tree Impact	22.0 mph	32.3 ft/s						
14										
15			Velocity	Velocity	Distance	Acceleration	Time			
16		Start of Skid	50.8 mph	74.6 ft/s						
17					63.5 ft	-22.54 ft/s ²	1.00 s			
18		Pavement to Grass	35.4 mph	52.0 ft/s						
19					57.2 ft	-14.49 ft/s ²	1.36 s			
20		Tree Impact	22.0 mph	32.3 ft/s						
21										
22										
23										
24										
25										
26										
27										
28										

Practice1 Practice1SOL ReconBasic Formatting ReconBasicSOL CDRData CDRDataSOL

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Document1 - Word

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		Velocity	Velocity	Distance	Acceleration	Time
	Start of Skid	54.3 mph	79.6 ft/s			
				63.5 ft	-25.76 ft/s ²	0.94 s
	Pavement to Grass	37.8 mph	55.4 ft/s			
				57.2 ft	-17.71 ft/s ²	1.31 s
	Tree Impact	22.0 mph	32.3 ft/s			

		Velocity	Velocity	Distance	Acceleration	Time
	Start of Skid	54.3 mph	79.6 ft/s			
				63.5 ft	-25.76 ft/s ²	0.94 s
	Pavement to Grass	37.8 mph	55.4 ft/s			
				57.2 ft	-17.71 ft/s ²	1.31 s
	Tree Impact	22.0 mph	32.3 ft/s			

Page 1 of 1 0 words Focus 140%

Advanced Formulas

Excel for Crash Reconstruction



Advanced Formulas

$$\Delta v_{TOT} = \sqrt{\Delta v_x^2 + \Delta v_y^2}$$

$$a = \frac{v_e - v_i}{t}$$

$$v_1 = \frac{v'_1 w_1 + v'_2 w_2 - v_2 w_2}{w_1}$$

$$v = \sqrt{\frac{gr(\mu + G)}{1 - \mu G}}$$

$$t = \frac{(v_e - v_i)}{a}$$

$$v_e = \sqrt{v_i^2 + 2ad}$$

$$a = \frac{2d - 2v_i t}{t^2} \quad l_f = \frac{w_r l}{w}$$

$$a = \frac{v_e^2 - v_i^2}{2d} \quad v_1 = \frac{w_1 v'_1 \cos \theta'_1 + w_2 v'_2 \cos \theta'_2 - w_2 v_2 \cos \theta_2}{w_1 \cos \theta_1}$$

$$v_c = \sqrt{\frac{2E_d g (w_f + w_r)}{w_f w_r}}$$

$$v_e = v_i + at$$

$$l_r = \frac{w_f l}{w}$$

$$v_i = v_e - at$$

$$v_2 = \frac{w_1 v'_1 \sin \theta'_1 + w_2 v'_2 \sin \theta'_2}{w_2 \sin \theta_2}$$

$$d = \frac{v_e^2 - v_i^2}{2a}$$

$$l_z = \left(\frac{l \sqrt{l^2 - h^2} (w_h - w_f)}{hw} \right) + r$$

$$v_i = \frac{d}{t} - \frac{at}{2}$$

$$v_i = \sqrt{v_e^2 - 2ad}$$

$$v = d \sqrt{\frac{g}{2(dG - h)}}$$

$$v_r = v' + \left(\frac{w_f v_c}{w_f + w_r} \right)$$

$$d = v_i t + \frac{1}{2} at^2$$

$$t = \frac{-v_i + \sqrt{v_i^2 - 2a(-d)}}{a}$$

$$f_{eff} = \mu \sqrt{\sin(\beta)^2 + \left(\frac{f_{long}}{\mu} \right)^2 \cos(\beta)^2}$$

$$d = \frac{t(v_i + v_e)}{2}$$

Advanced Formulas

$$E = W \left[G + \frac{A}{2} (C_1 + C_2) + \frac{B}{6} (C_1^2 + C_2^2 + C_1 C_2) \right] (1 + (\tan \theta)^2)$$

$$v_2 = \frac{w_1 v'_1 \sin \theta'_1 + w_2 v'_2 \sin \theta'_2}{w_2 \sin \theta_2}$$

$$v_1 = \frac{w_1 v'_1 \cos \theta'_1 + w_2 v'_2 \cos \theta'_2 - w_2 v_2 \cos \theta_2}{w_1 \cos \theta_1}$$

Advanced Formulas

$$E=W \left[G+\frac{A}{2} (C_1+C_2)+\frac{B}{6} (C_1^2+C_2^2+C_1C_2) \right] (1+(\tan\theta)^2)$$

$$E=W(G+\frac{A}{2} (C_1+C_2)+\frac{B}{6} (C_1^2+C_2^2+C_1C_2))(1+(\tan\theta)^2)$$

$$E=W(G+(\frac{A}{2})(C_1+C_2)+(\frac{B}{6})(C_1^2+C_2^2+C_1C_2))(1+(\tan\theta)^2)$$

$$E=W(G+(A/2)(C_1+C_2)+(B/6)(C_1^2+C_2^2+C_1C_2))(1+(\tan\theta)^2)$$

$$E=W*(G+((A/2)*(C_1+C_2))+((B/6)*(C_1^2+C_2^2+(C_1 *C_2)))*(1+(\tan\theta)^2)$$

$$E=W*(G+((A/2)*(C_1+C_2))+((B/6)*((C_1^2)+(C_2^2)+(C_1 *C_2))))*(1+((\tan\theta)^2))$$

θ is measured in degrees

Excel only calculates trig functions in radians

$\tan(\theta)$

$\tan(\text{radians}(\theta))$

$$E=W*(G+((A/2)*(C_1+C_2))+((B/6)*((C_1^2)+(C_2^2)+(C_1 *C_2))))*(1+((\tan(\text{radians}(\theta)))^2))$$

Advanced Formulas

$$E=W \left[G + \frac{A}{2} (C_1 + C_2) + \frac{B}{6} (C_1^2 + C_2^2 + C_1 C_2) \right] (1 + (\tan \theta)^2)$$

$$G = \frac{A^2}{2B}$$

$$E=W*(G+((A/2)*(C_1+C_2))+((B/6)*((C_1^2)+(C_2^2)+(C_1*C_2))))*(1+((\tan(\text{radians}(\theta)))^2))$$

Advanced Formulas

Excel spreadsheet showing a table of measurements and a complex formula for calculating Energy (E).

Crush Energy (2 Measurements)

Measurement	Value	Unit
A	265	lb/in
B	122	lb/in ²
G	288	lb
W	73.5	in
θ	0	deg
C1	17.5	in
C2	20.5	in
E		in-lbs
E		ft-lbs

Formula:

$$E = W * \left(G + \left(\frac{A}{2} \right) * (C_1 + C_2) \right) + \left(\frac{B}{6} \right) * \left((C_1^2) + (C_2^2) + (C_1 * C_2) \right) * \left(1 + \left(\tan(\text{radians}(\theta)) \right)^2 \right)$$

Tab: AdvForm1



Advanced Formulas

SUM X ✓ fx =C7*(C6+((C4/2)*(C9+C10))+((C5/6)*((C9^2)+(C10^2)+(C9*C10))))*(1+(TAN(RADIANS(C8)))^2))

	A	B	C	D	E	F	G	H	I	J	K
1											
2			Crush Energy								
3			<i>(2 Measurements)</i>								
4		A	265	lb/in							
5		B	122	lb/in ²							
6		G	288	lb							
7		W	73.5	in							
8		θ	0	deg							
9		C1	17.5	in							
10		C2	20.5	in							
11											
12			$G = \frac{A^2}{2B}$								
13			$E = W * (G + ((A/2) * (C_1 + C_2)) + ((B/6) * ((C_1^2) + (C_2^2) + (C_1 * C_2)))) * (1 + ((\tan(\text{radians}(\theta)))^2))$								
14			$E = W * (G + ((A/2) * (C_1 + C_2)) + ((B/6) * ((C_1^2) + (C_2^2) + (C_1 * C_2)))) * (1 + ((\tan(\text{radians}(\theta)))^2))$								
15											
16											
17											
18											
19											
20											
21											

Practice1SOL ReconBasic Formatting ReconBasicSOL CDRData CDRDataSOL AdvForm1

Advanced Formulas

SUM X ✓ fx =C12/12

	A	B	C	D	E	F	G	H	I	J
1										
2			Crush Energy							
3			<i>(2 Measurements)</i>							
4		A	265	lb/in						
5		B	122	lb/in ²						
6		G	288	lb						
7		W	73.5	in						
8		θ	0	deg						
9		C1	17.5	in						
10		C2	20.5	in						
11										
12		E	2,013,132	in-lbs						
13		E	=C12/12	ft-lbs						
14										
15										
16		$E = W * (G + ((A/2) * (C_1 + C_2)) + ((B/6) * ((C_1^2) + (C_2^2) + (C_1 * C_2))) * (1 + ((\tan(\text{radians}(\theta)))^2)))$								
17										
18										
19										
20										
21										

Practice1SOL ReconBasic Formatting ReconBasicSOL CDRData CDRDataSOL AdvForm1

Advanced Formulas

Excel spreadsheet showing a calculation for Crush Energy (E) based on various measurements (A, B, G, W, θ, C1, C2).

Crush Energy (2 Measurements)

Measurement	Value	Unit
A	265	lb/in
B	122	lb/in ²
G	288	lb
W	73.5	in
θ	0	deg
C1	17.5	in
C2	20.5	in
E	2,013,132	in-lbs
E	167,761	ft-lbs

Formula:

$$E = W * \left(G + \left(\frac{A}{2} * (C_1 + C_2) \right) + \left(\frac{B}{6} * ((C_1^2) + (C_2^2) + (C_1 * C_2)) \right) * (1 + ((\tan(\text{radians}(\theta)))^2)) \right)$$

The formula is entered in cell E13, resulting in the value 167,761 ft-lbs.

Advanced Formulas

$$v_2 = \frac{w_1 v'_1 \sin \theta'_1 + w_2 v'_2 \sin \theta'_2}{w_2 \sin \theta_2}$$

$$v_2 = \frac{(w_1 v'_1 \sin \theta'_1 + w_2 v'_2 \sin \theta'_2)}{(w_2 \sin \theta_2)}$$

$$v_2 = (w_1 v'_1 \sin \theta'_1 + w_2 v'_2 \sin \theta'_2) / (w_2 \sin \theta_2)$$

$$v_2 = ((w_1 v'_1 \sin \theta'_1) + (w_2 v'_2 \sin \theta'_2)) / (w_2 \sin \theta_2)$$

$$v_2 = ((w_1 * v'_1 * \sin \theta'_1) + (w_2 * v'_2 * \sin \theta'_2)) / (w_2 * \sin \theta_2)$$

$$v_2 = ((w_1 * v'_1 * (\sin \theta'_1)) + (w_2 * v'_2 * (\sin \theta'_2))) / (w_2 * (\sin \theta_2))$$

$$(radians(\theta'_1))$$

$$v_2 = ((w_1 * v'_1 * (\sin(radians(\theta'_1)))) + (w_2 * v'_2 * (\sin(radians(\theta'_2))))) / (w_2 * (\sin(radians(\theta_2))))$$

Advanced Formulas

$$v_2 = \frac{w_1 v'_1 \sin \theta'_1 + w_2 v'_2 \sin \theta'_2}{w_2 \sin \theta_2}$$

$$v_2 = ((w_1 * v'_1 * (\sin(\text{radians}(\theta'_1)))) + (w_2 * v'_2 * (\sin(\text{radians}(\theta'_2))))) / (w_2 * (\sin(\text{radians}(\theta_2))))$$

Advanced Formulas

Excel spreadsheet showing data for Oblique Conservation of Linear Momentum. The spreadsheet is titled "Tab: AdvForm2".

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
2		Oblique Conservation of Linear Momentum												
3		Vehicle 1												
4		w_1	4285	lbs										
5		θ_1	0	deg										
6		θ_1'	307	deg										
7		v_1'	26.9	ft/s										
8		Vehicle 2												
9		w_2	4995	lbs										
10		θ_2	270.0	deg										
11		θ_2'	292.0	deg										
12		v_2'	31.2	ft/s										
13														
14		Vehicle 1												
15		v_1		ft/s										
16		v_1	0	mph										
17		Vehicle 2												
18		v_2		ft/s										
19		v_2	0	mph										
20														
21		$v_2 = ((w_1 * v_1' * (\sin(\text{radians}(\theta_1')))) + (w_2 * v_2' * (\sin(\text{radians}(\theta_2')))) /$												
22		$(w_2 * (\sin(\text{radians}(\theta_2'))))$												
23														
24														
25														

Tab: AdvForm2



Advanced Formulas

SUM X ✓ fx `=((C4*C7*(SIN(RADIANS(C6))))+(C9*C12*(SIN(RADIANS(C11))))/(C9*(SIN(RADIANS(C10))))`

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
			Oblique Conservation of Linear Momentum											
2														
3			Vehicle 1											
4		w ₁	4285	lbs										
5		θ ₁	0	deg										
6		θ ₁ '	307	deg										
7		v ₁ '	26.9	ft/s										
8			Vehicle 2											
9		w ₂	4995	lbs										
10		θ ₂	270.0	deg										
11		θ ₂ '	292.0	deg										
12		v ₂ '	31.2	ft/s										
13														
14														
15			$=((C4*C7*(SIN(RADIANS(C6))))+(C9*C12*(SIN(RADIANS(C11))))/(C9*(SIN(RADIANS(C10))))$											
16														
17														
18														
19														
20														
21														
22			$v_2 = ((w_1 * v_1' * (\sin(\text{radians}(\theta_1')))) + (w_2 * v_2' * (\sin(\text{radians}(\theta_2')))) /$											
23			$(w_2 * (\sin(\text{radians}(\theta_2'))))$											
24														
25														

ReconBasicSQL CDRData CDRDataSQL AdvForm1 AdvForm1SQL **AdvForm2**

Advanced Formulas

Formula Bar: $=((C4*C7*(\text{SIN}(\text{RADIANS}(C6))))+(C9*C12*(\text{SIN}(\text{RADIANS}(C11))))/(C9*(\text{SIN}(\text{RADIANS}(C10))))$

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
2		Oblique Conservation of Linear Momentum												
3		Vehicle 1												
4		w_1	4285	lbs										
5		θ_1	0	deg										
6		θ_1'	307	deg										
7		v_1'	26.9	ft/s										
8		Vehicle 2												
9		w_2	4995	lbs										
10		θ_2	270.0	deg										
11		θ_2'	292.0	deg										
12		v_2'	31.2	ft/s										
13														
14		Vehicle 1												
15		v_1		ft/s										
16		v_1	0.0	mph										
17		Vehicle 2												
18		v_2	47.4	ft/s										
19		v_2	32.3	mph										
20														
21														
22		$v_2 = ((w_1 * v_1' * (\sin(\text{radians}(\theta_1')))) + (w_2 * v_2' * (\sin(\text{radians}(\theta_2')))) /$												
23		$(w_2 * (\sin(\text{radians}(\theta_2'))))$												
24														
25														

Worksheet Tab: AdvForm2

Advanced Formulas

A2															
	A	B	C	D	E	F	G	H	I	J	K	L	M		
2		Oblique Conservation of Linear Momentum													
3		Vehicle 1													
4		w_1	4285	lbs											
5		θ_1	0	deg											
6		θ_1'	307	deg											
7		v_1'	26.9	ft/s											
8		Vehicle 2													
9		w_2	4995	lbs											
10		θ_2	270.0	deg											
11		θ_2'	292.0	deg											
12		v_2'	31.2	ft/s											
13															
14		Vehicle 1													
15		v_1	29.8	ft/s											
16		v_1	20.3	mph											
17		Vehicle 2													
18		v_2	47.4	ft/s											
19		v_2	32.3	mph											
20															
21															
22															
23															

Tab: AdvForm2SOL

CDRDataCDRDataSOLAdvForm1AdvForm1SOLAdvForm2AdvForm2SOL

Tab: AdvForm2SOL

Check your calculations!

Use training material

Hand crunch your numbers

Be cautious of recon software

Keep learning

Recon classes

Recon Excel classes

Community College

Internet Videos





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