Excel for Crash Reconstruction

2021 Annual Conference

09/28/21 – 10/01/21

Crown Plaza Conference Center

Springfield, IL

Collision Analytics

Topics

Case Applications

Excel Interface

Formula Basics

Excel Crash Recon Basics

Formatting

Conditional Formatting

Printing

Copying

Advanced Formulas

Collision Analytics

Case Applications

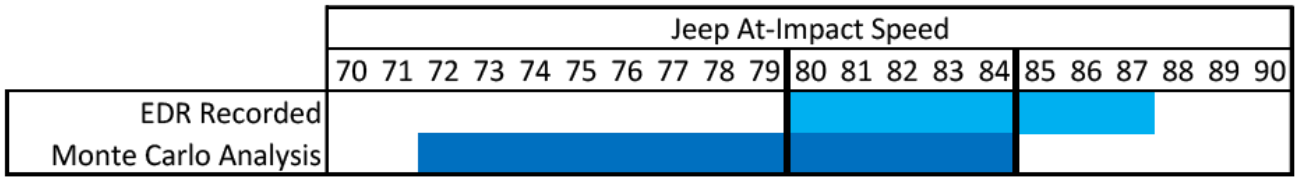
Excel for Crash Reconstruction

Collision Analytics

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



Collision Analytics

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
Coefficent of Friction	μ	0.822	-
Super-elevation	G	3.9%	-
Velocity	**v**	101.9	**ft/s**
Velocity	**v**	69.4	**mph**

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

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

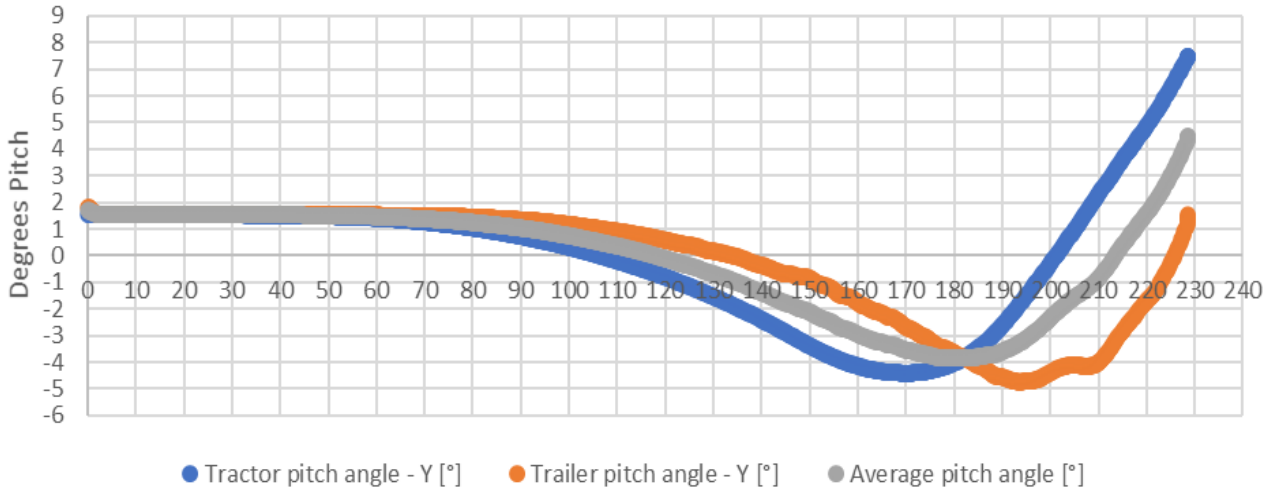
Reported Values								Calculated Values		
TRG 1 - Time	TRG 6 - Time	Vehicle Speed	Accelerator Pedal, % Full	Service Brake	ABS Control Status	Steering Input	Yaw Rate	Vehicle Speed	Acceleration	Drag Factor
-4.95 s		116.8 mph	89.5%	OFF	OFF	4.5° (Left)	0.00 deg/s	171.3 fps		
									0.0 fps²	0.00
-4.45 s		116.8 mph	89.5%	OFF	OFF	3.0° (Left)	-0.49 deg/s	171.3 fps		
									1.8 fps²	-0.05
-3.95 s		117.4 mph	80.5%	OFF	OFF	3.0° (Left)	-1.46 deg/s	172.2 fps		
									0.0 fps²	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 fps²	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 fps²	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 fps²	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 fps²	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 fps²	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 fps²	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 fps²	0.28
	-1.30 s	107.5 mph	0.0%	ON	OFF	52.5° (Left)	15.62 deg/s	157.7 fps		
									-51.1 fps²	1.59
	-0.80 s	90.1 mph	0.0%	ON	ON	12.5° (Left)	9.76 deg/s	132.2 fps		
									-18.2 fps²	0.56
	-0.30 s	83.9 mph	82.5%	ON	ON	127.5° (Left)	22.45 deg/s	123.1 fps		
									-82.2 fps²	2.55
IMPACT	0.00 s	67.1 mph	33.5%	ON	ON	133.5° (Left)	Invalid	98.4 fps		

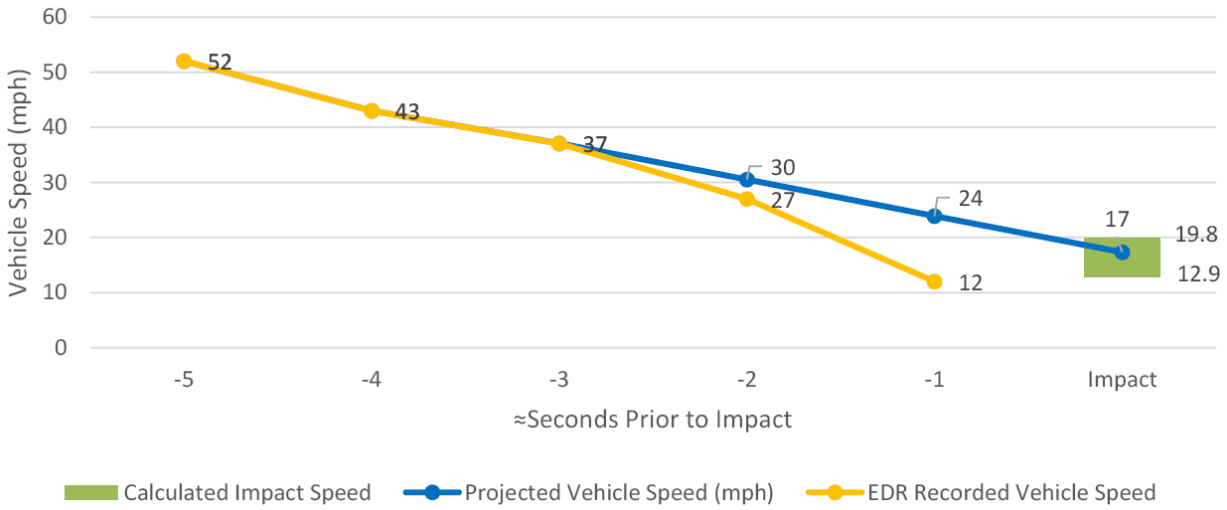
Create templates

		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)	*Δv - x*	**-11.7**	**10.1**	ft/s
Delta-v (y-direction earth based)	*Δv - 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	*ΔΘ*	**61.3**	**61.3**	degrees
Principal direction of force - earth based	*PDOF-Earth*	**241.3**	**61.3**	degrees
Principal direction of force - vehicle based	*PDOF-Vehicle*	**-61.3**	**28.7**	degrees
Principal direction of force - clock based	*PDOF-Vehicle*	**10:00**	**1:00**	clockface

Delta-v direction (longitudinal)	*Δv - x vehicle*	**Negative**	**Negative**	[SAE]
Delta-v direction (lateral)	*Δv - y vehicle*	**Positive**	**Negative**	[SAE]
Angle adjustment	*φ*	**118.7**	**-151.3**	degrees
Delta-v (longitudinal)	*Δv - x vehicle*	**-11.7**	**-18.4**	ft/s
Delta-v (lateral)	*Δv - y vehicle*	**21.5**	**-10.1**	ft/s
Delta-v (longitudinal)	*Δv - x vehicle*	**-8.0**	**-12.6**	mi/hr
Delta-v (lateral)	*Δv - y vehicle*	**14.6**	**-6.9**	mi/hr

Graph your findings





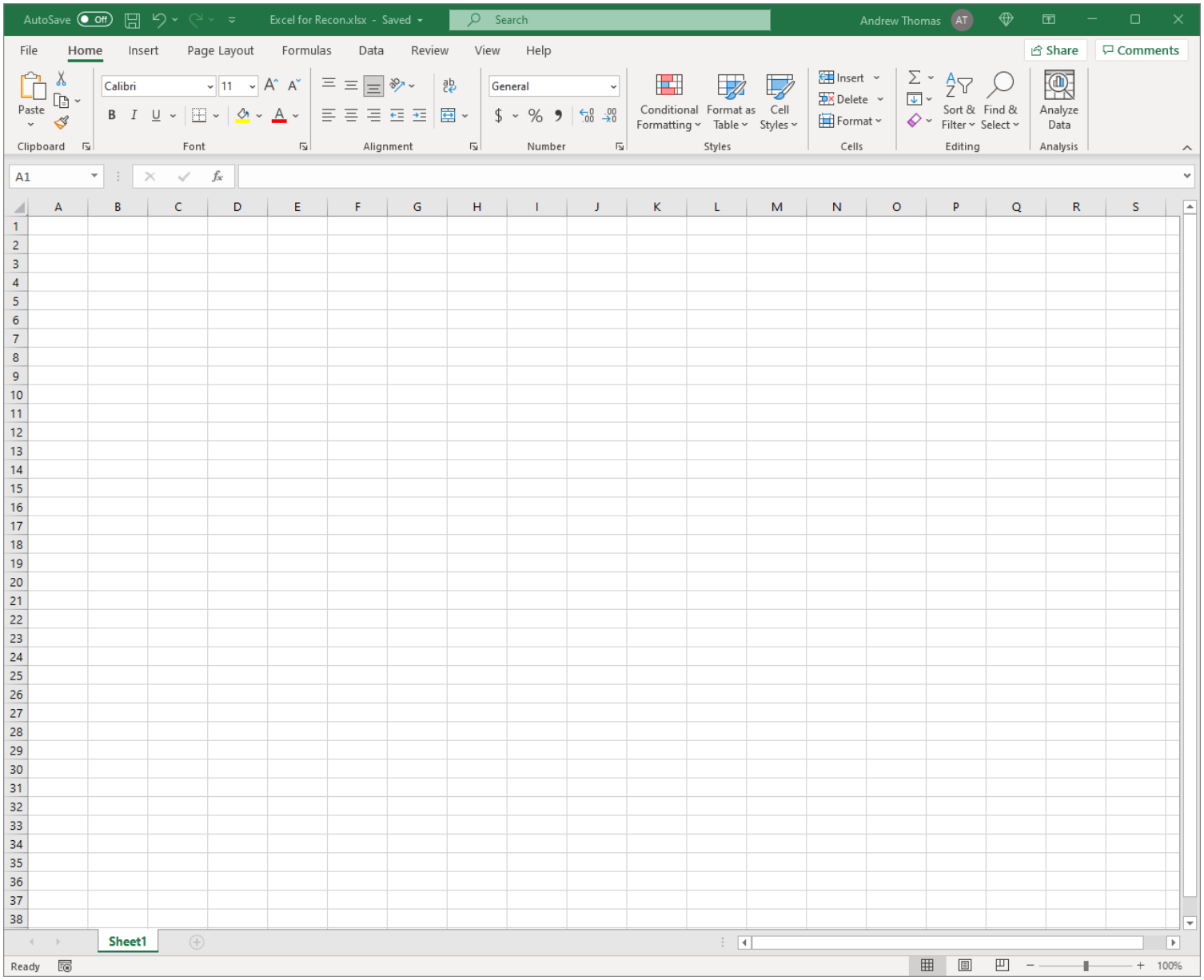
Collision Analytics

Excel Interface

Excel for Crash Reconstruction

Collision Analytics

Excel Interface



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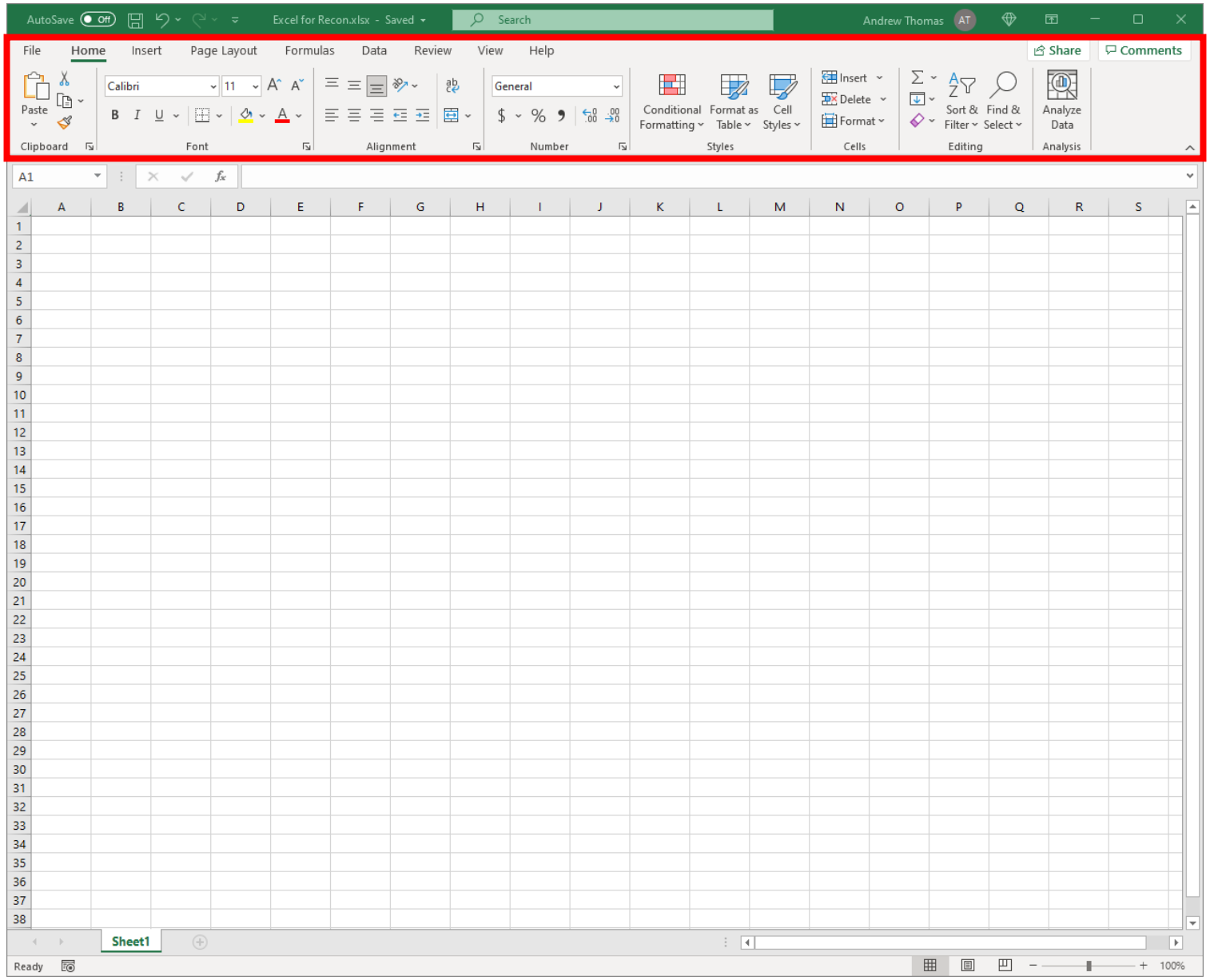

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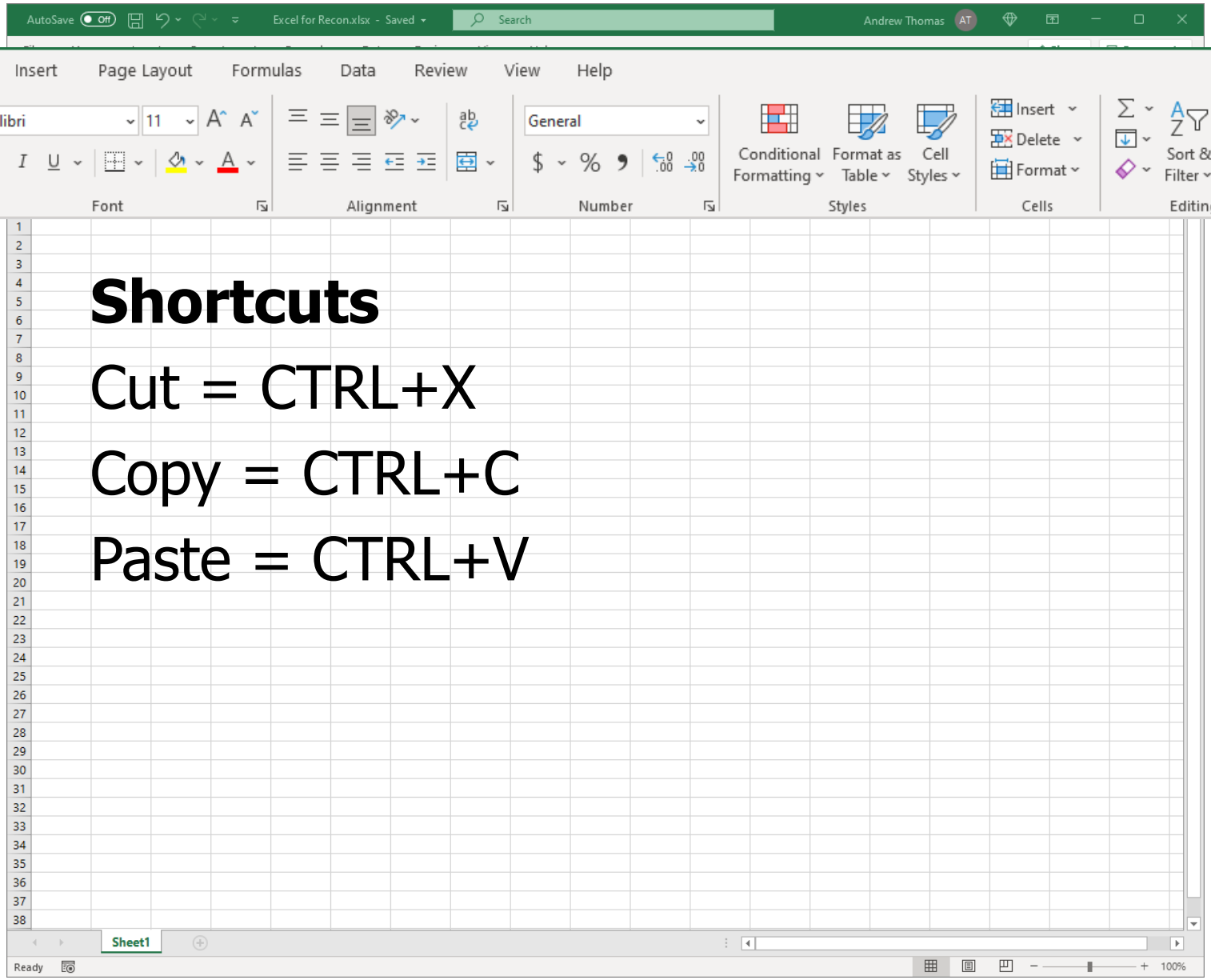

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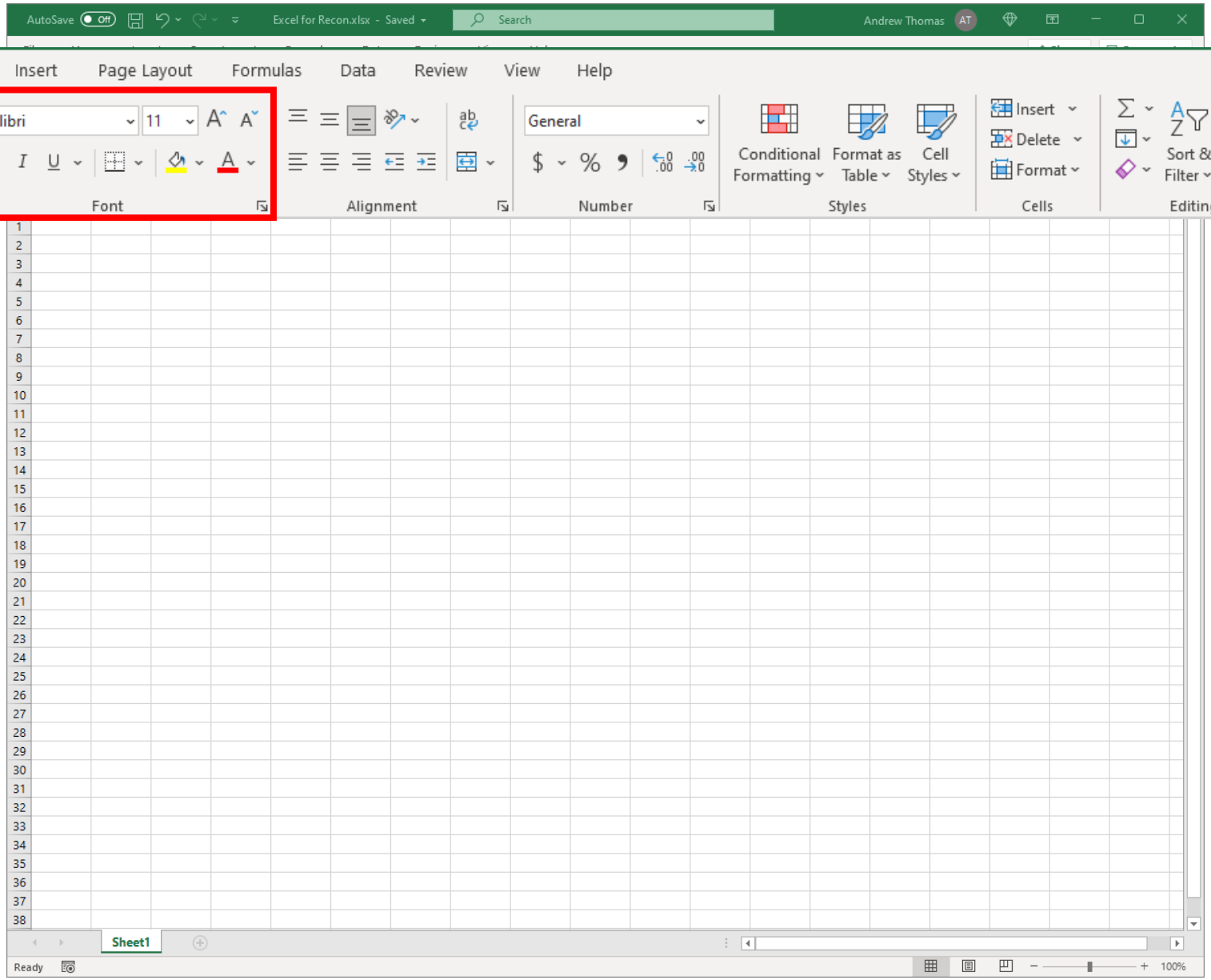

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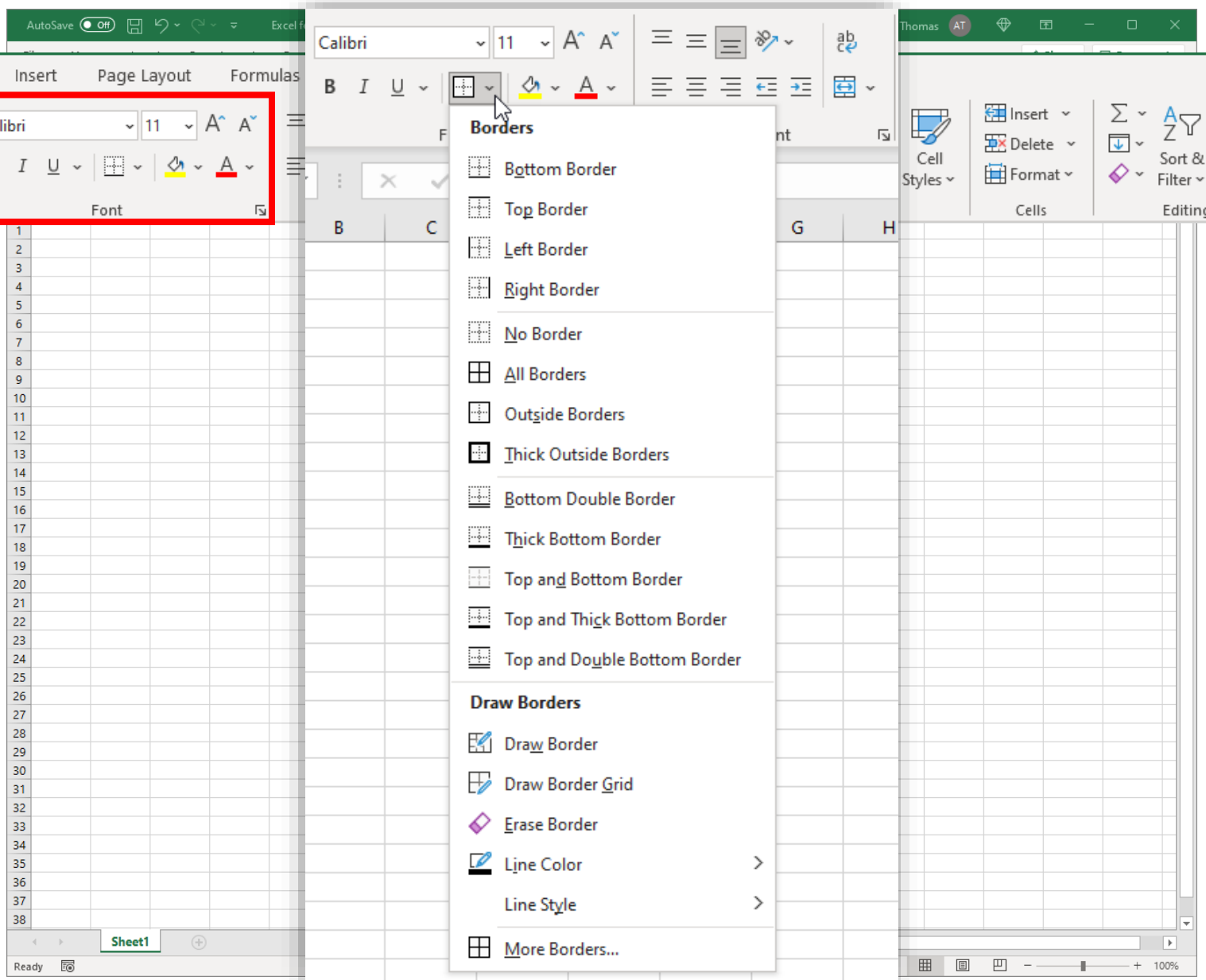

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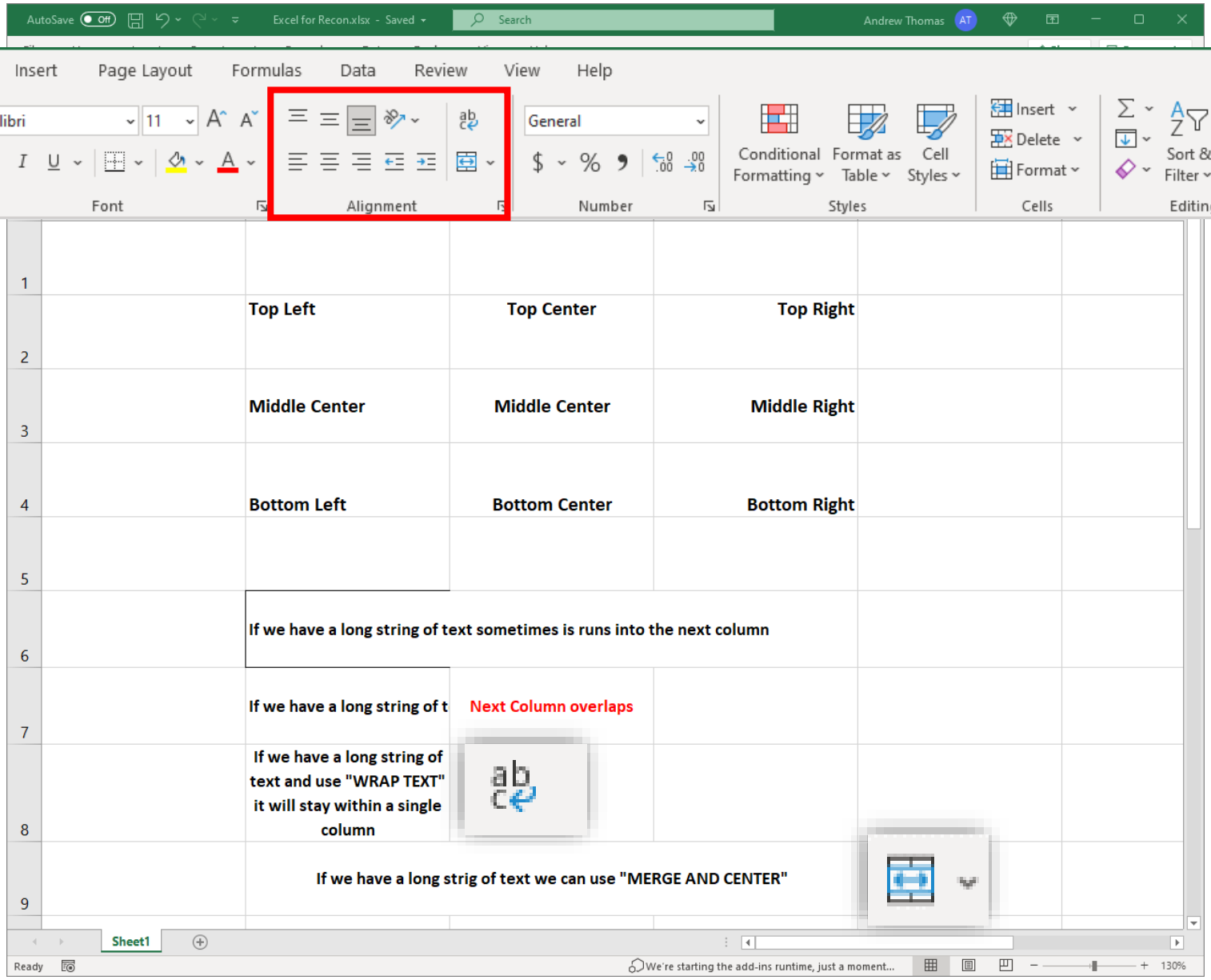

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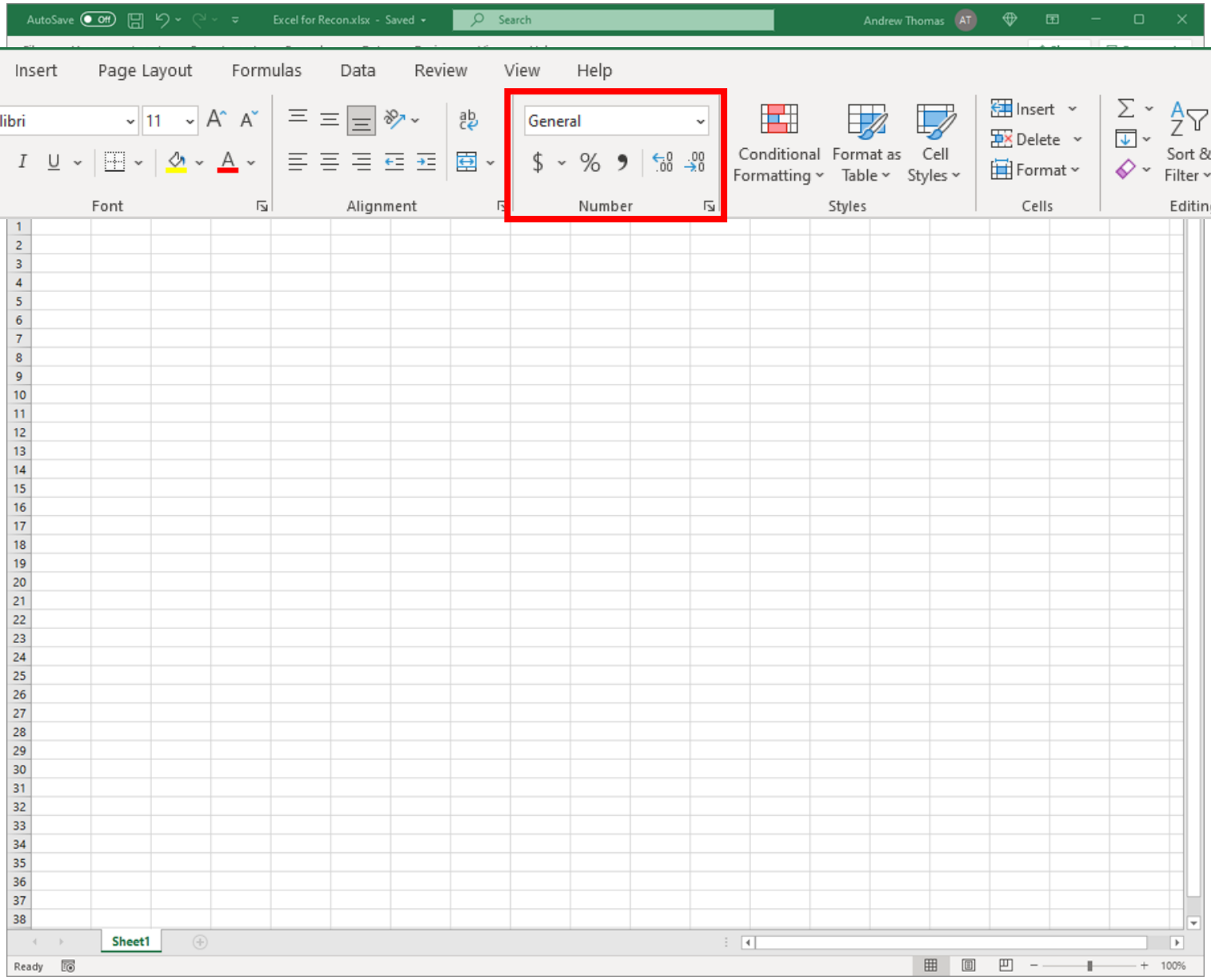

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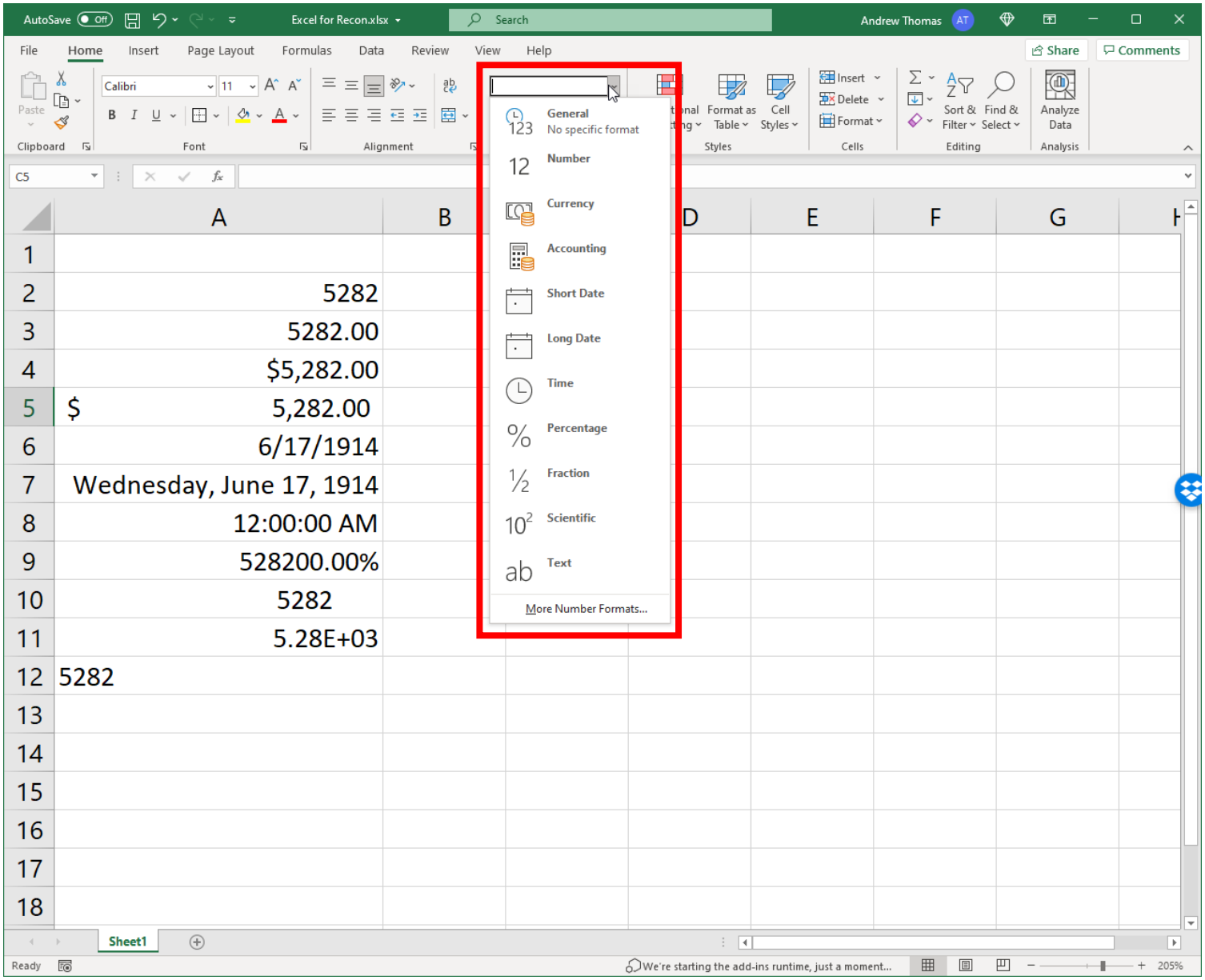

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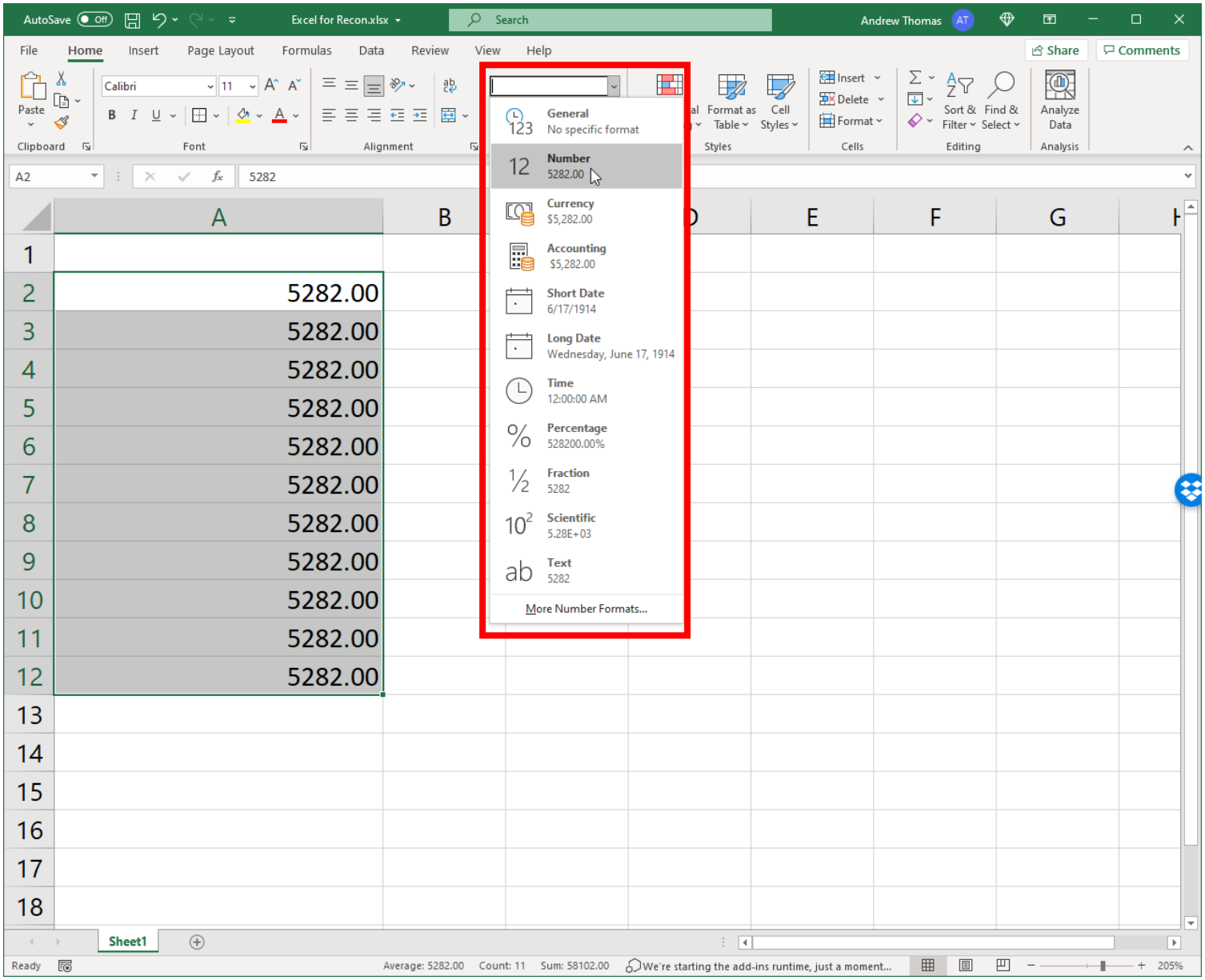

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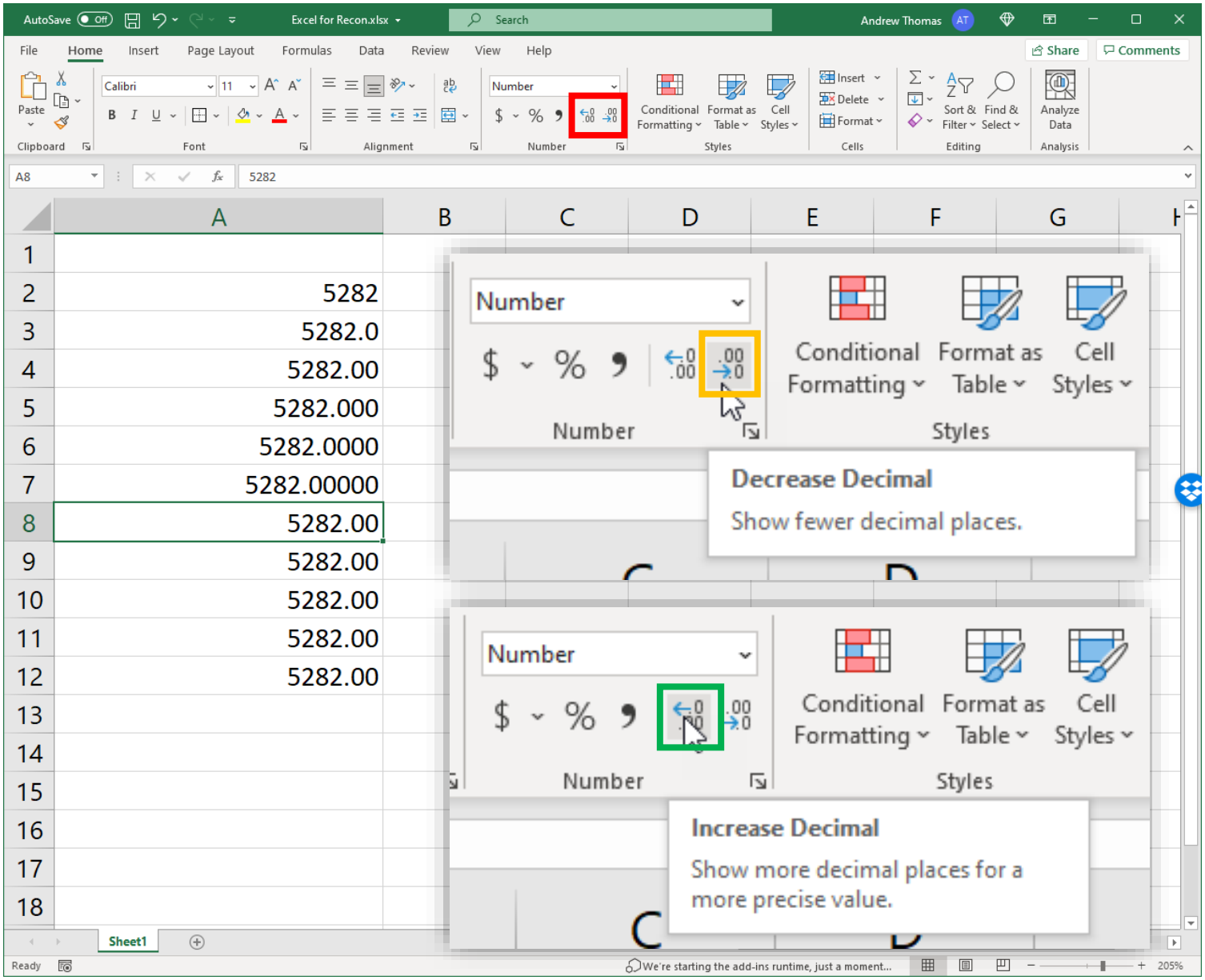

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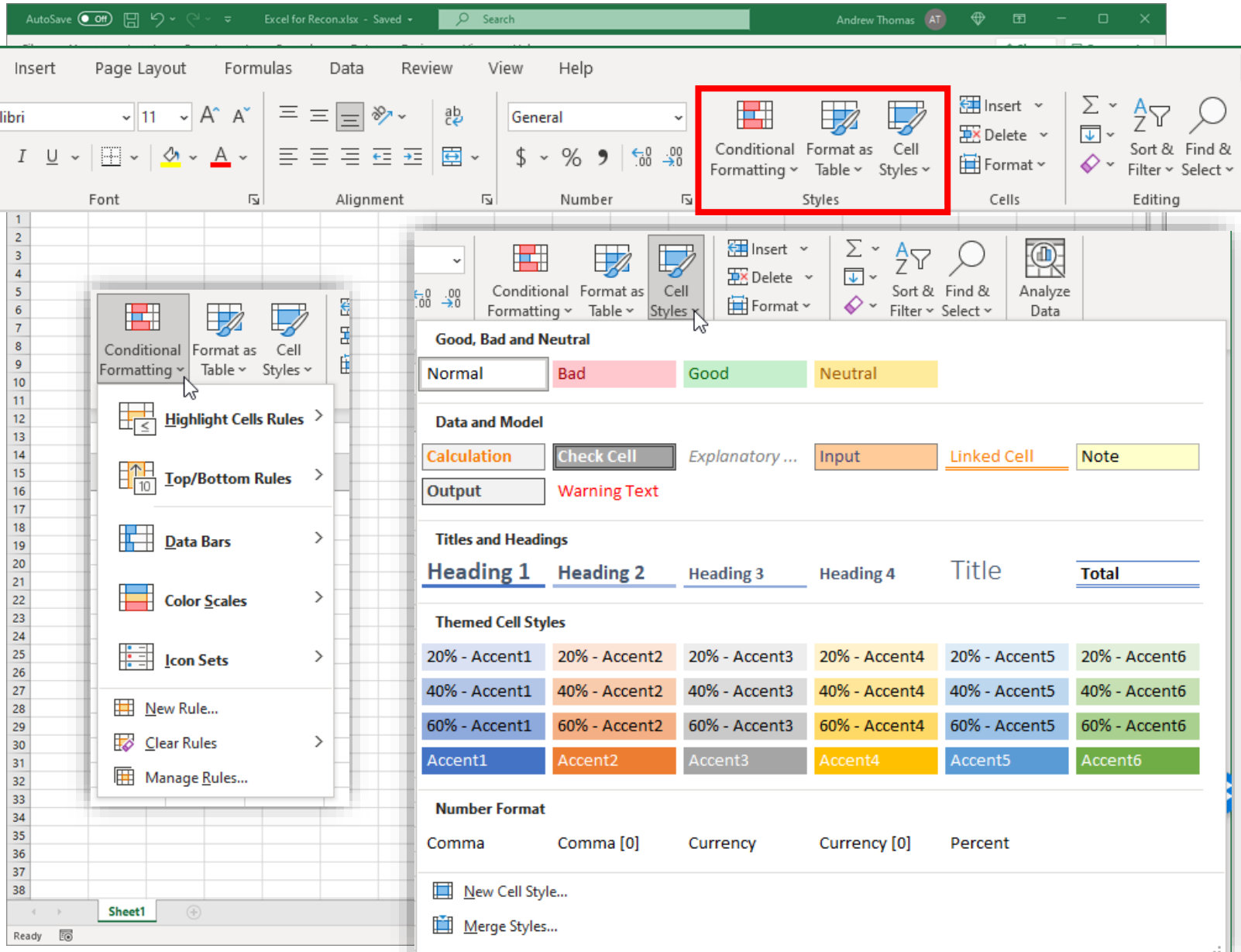

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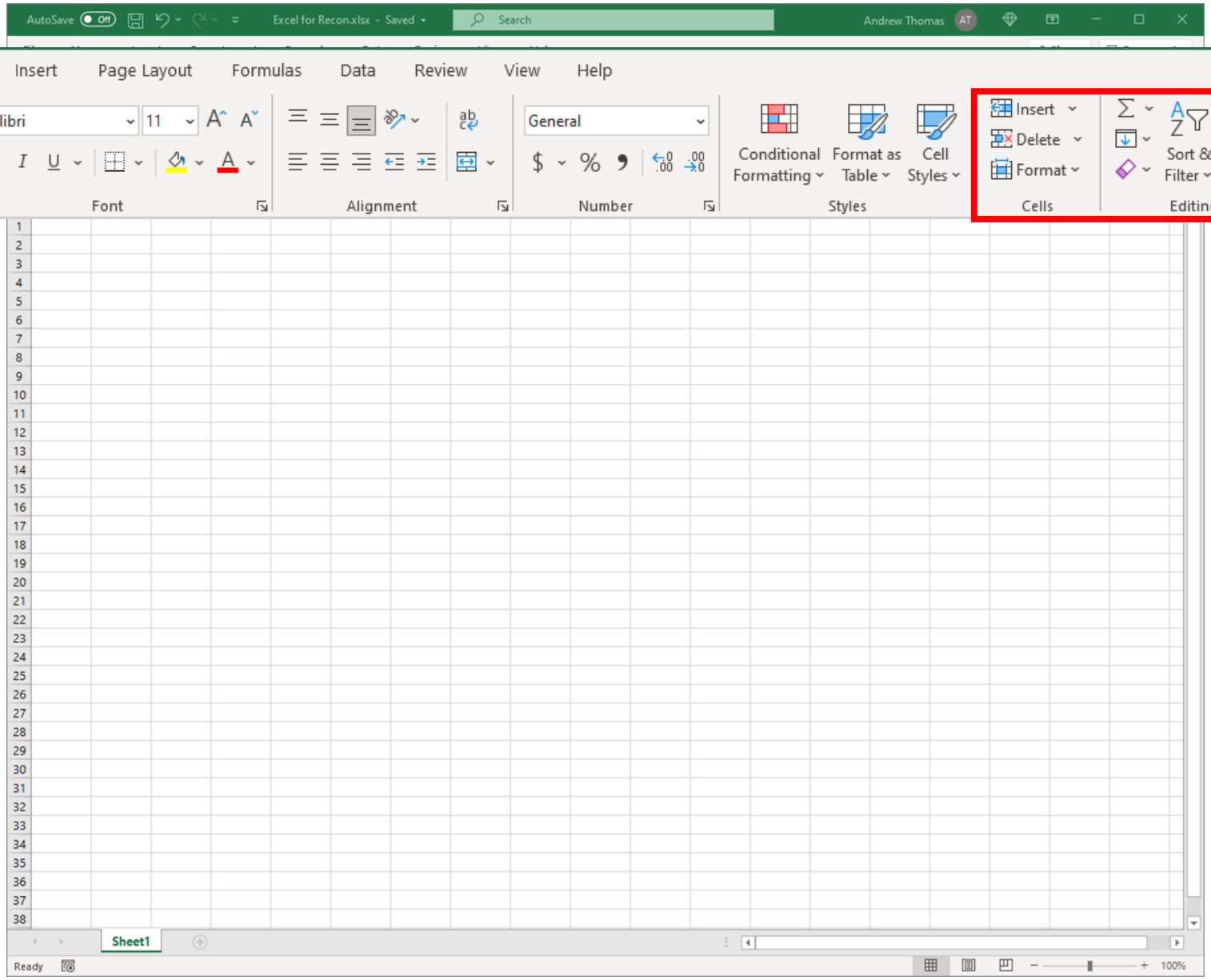

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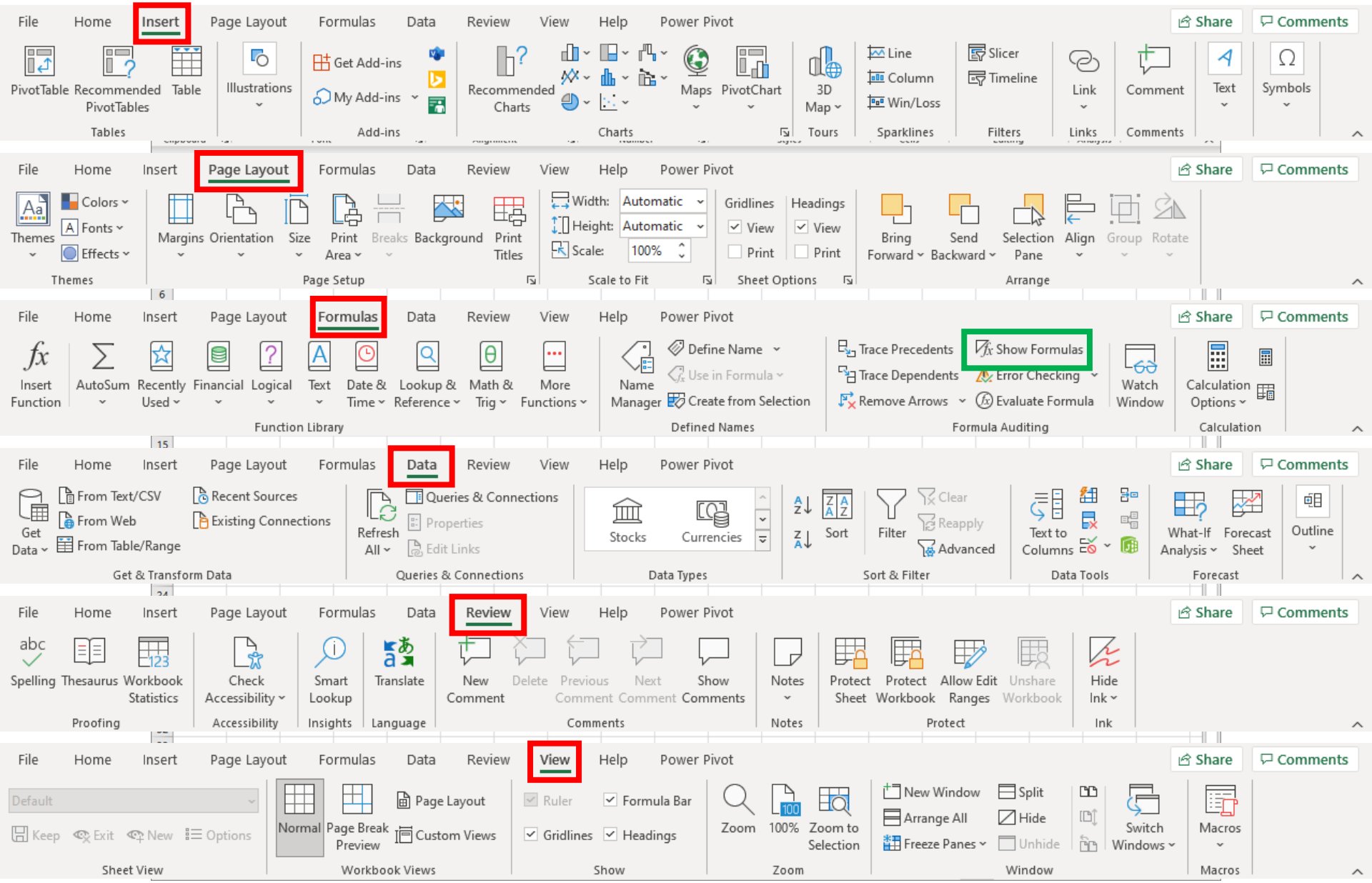

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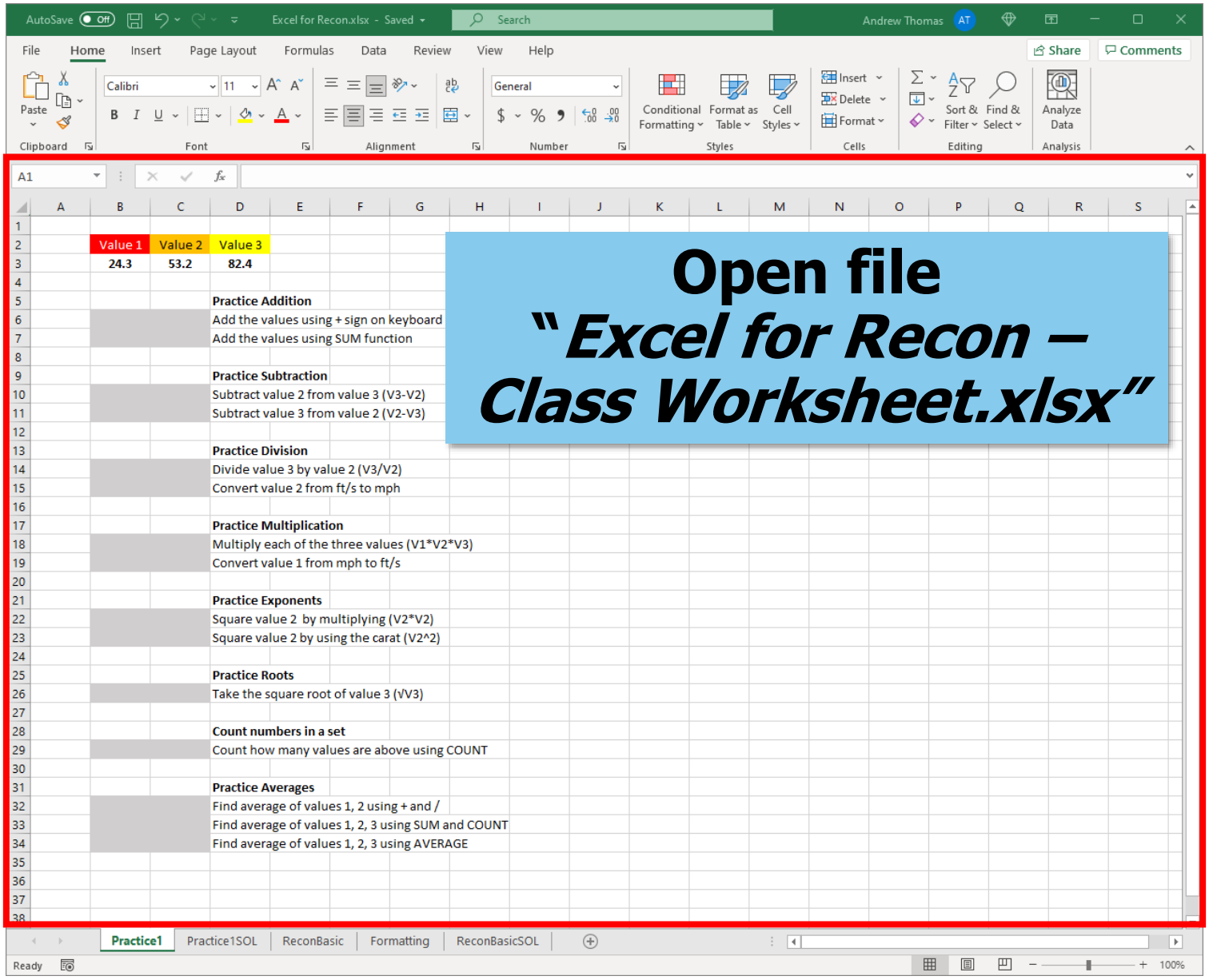
Excel Interface – Workspace



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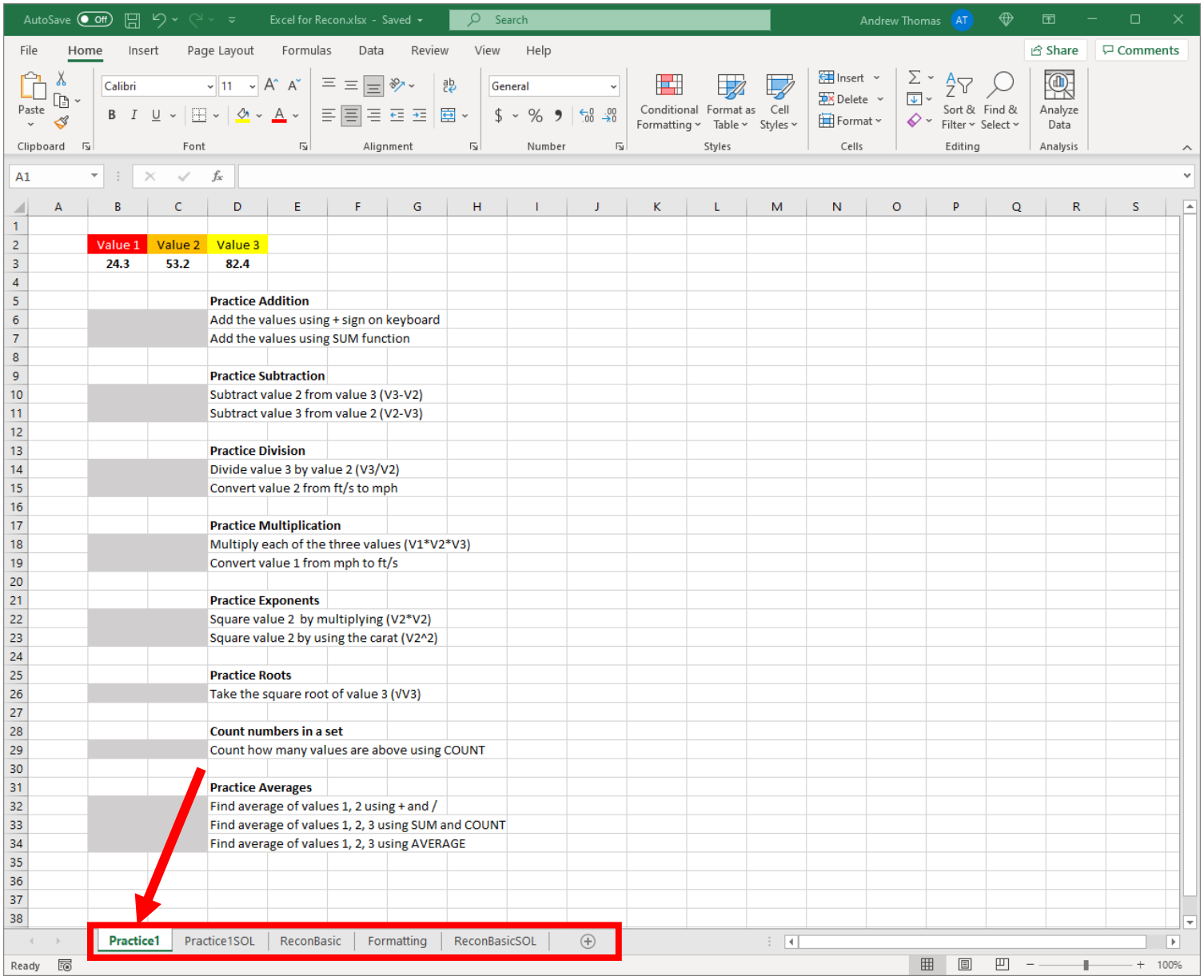

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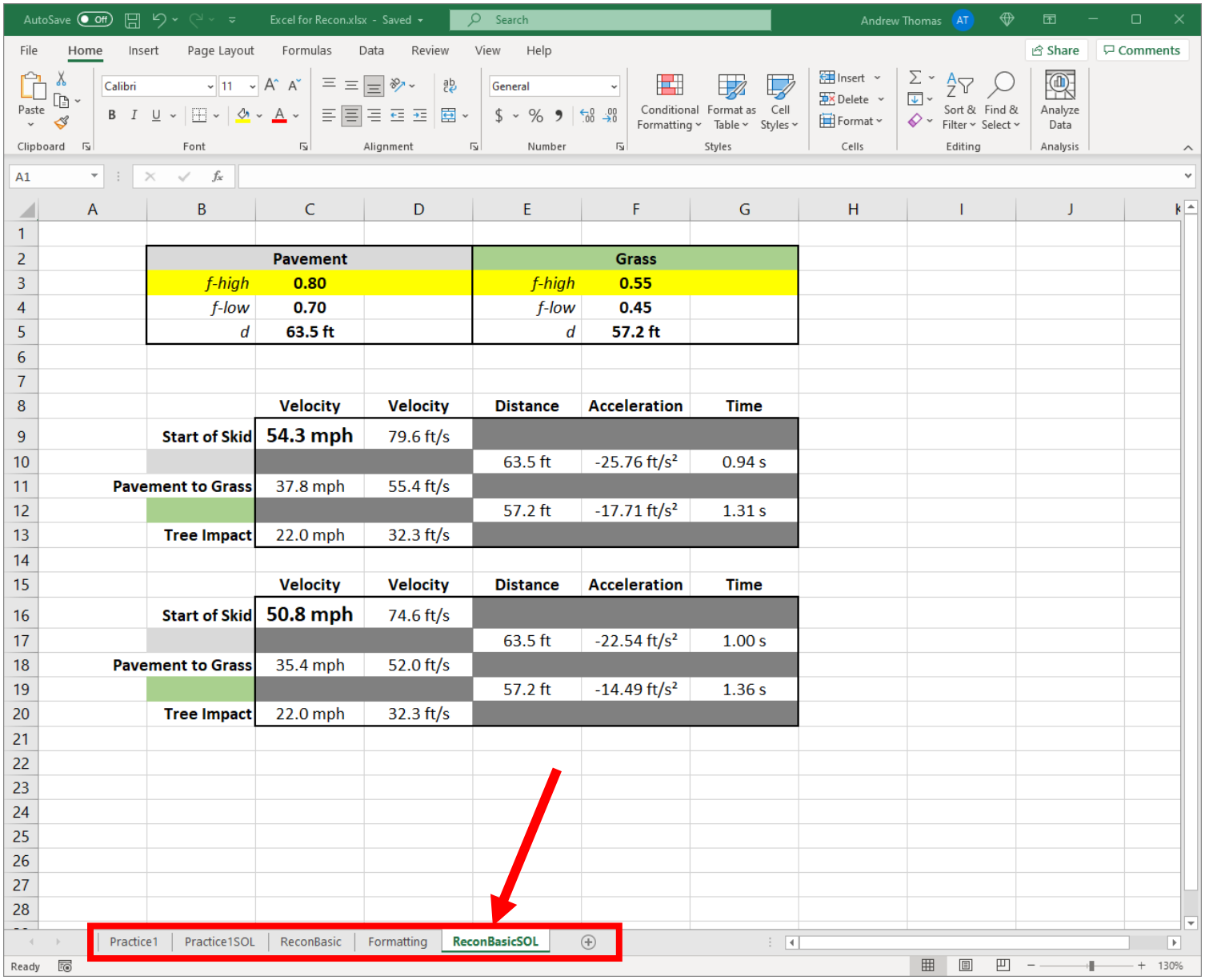

	Pavement		Grass	
f-high	0.80	*f-high*	0.55	
f-low	0.70	*f-low*	0.45	
d	63.5 ft	*d*	57.2 ft	

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	54.3 mph	79.6 ft/s			
			63.5 ft	-25.76 ft/s²	0.94 s
Pavement to Grass	37.8 mph	55.4 ft/s			
			57.2 ft	-17.71 ft/s²	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			
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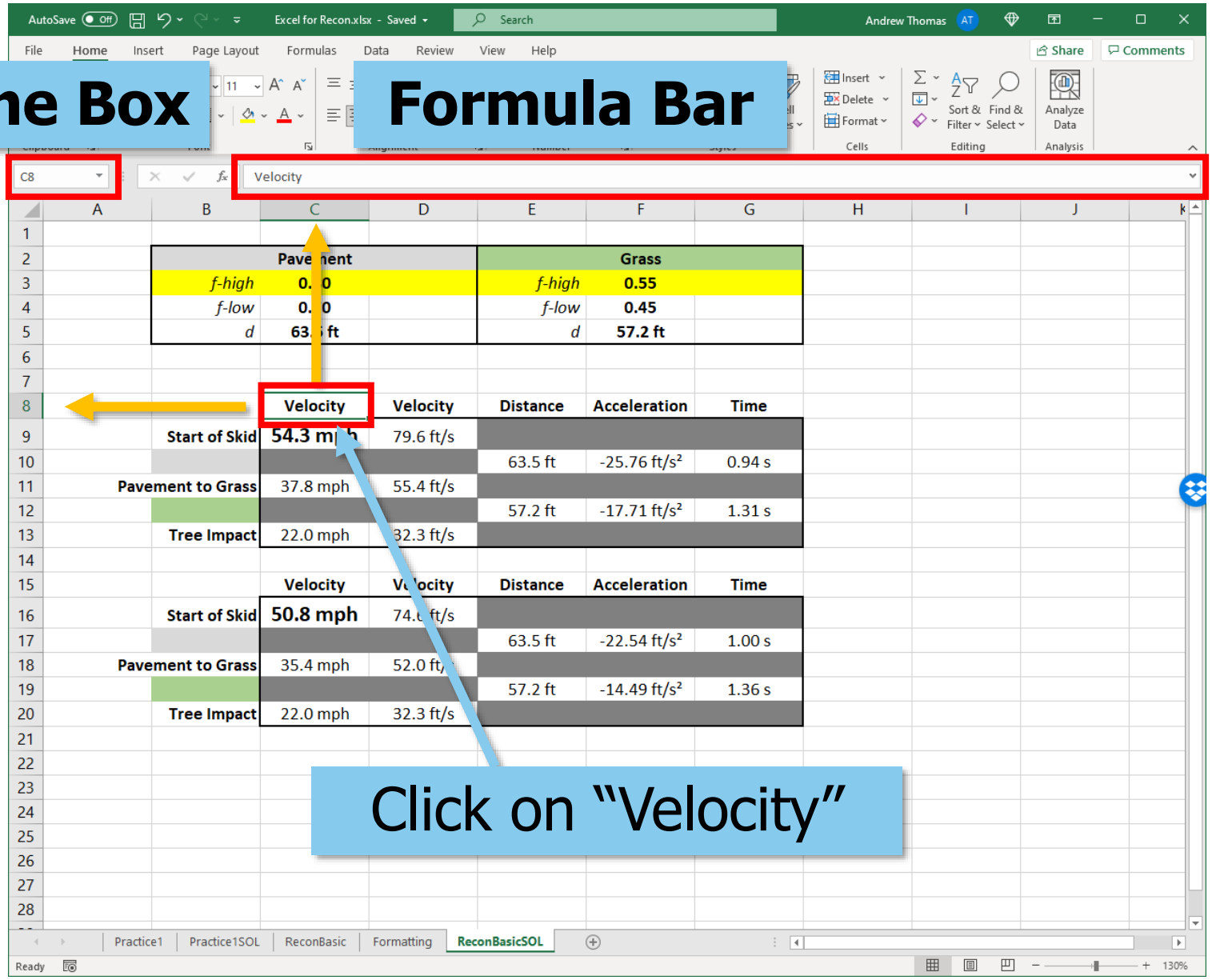

	Pavement	Grass
f-high	0.[illegible]0	0.55
f-low	0.[illegible]0	0.45
d	63.[illegible] ft	57.2 ft

	Velocity	Velocity	Distance	Acceleration	Time
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Collision Analytics

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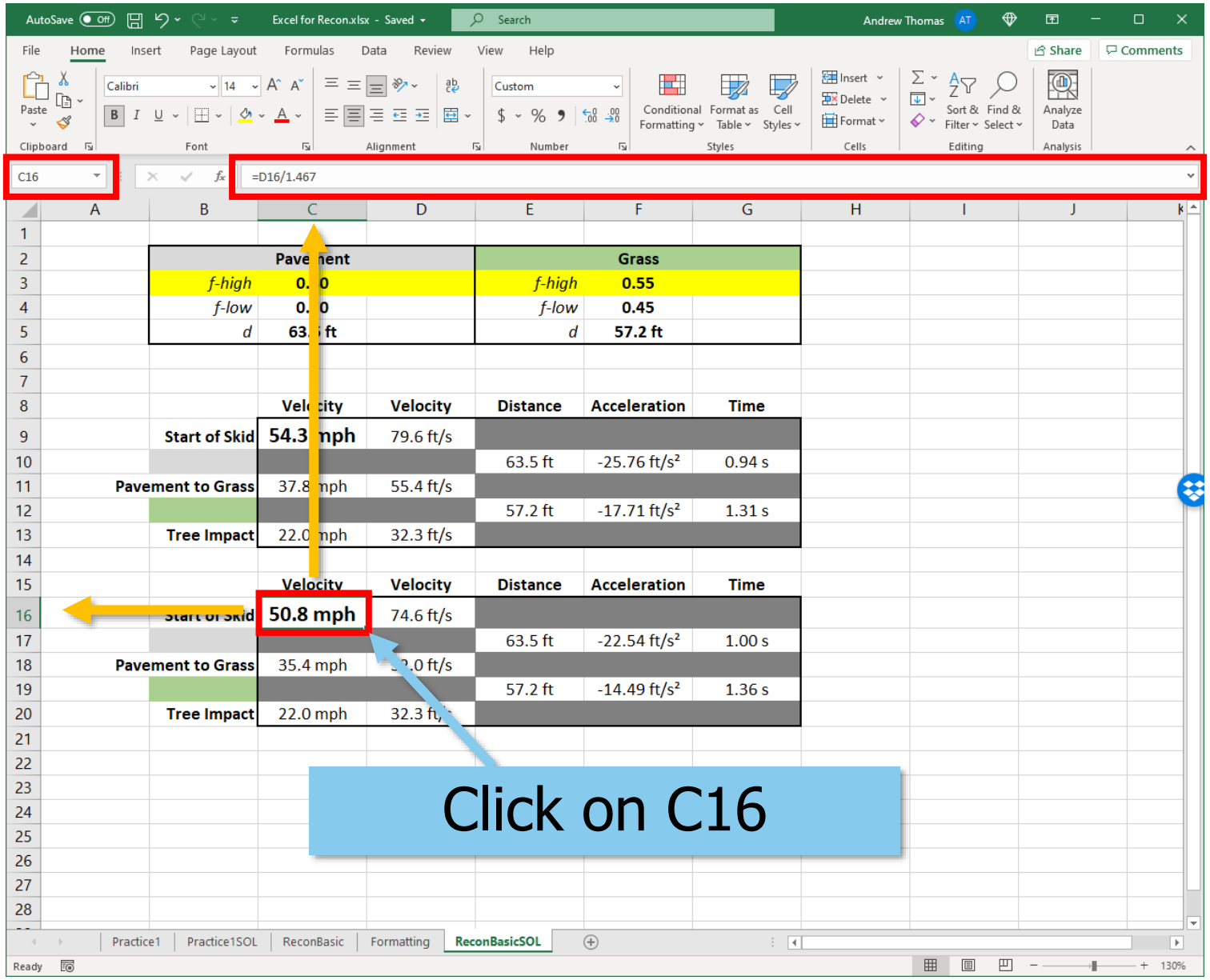

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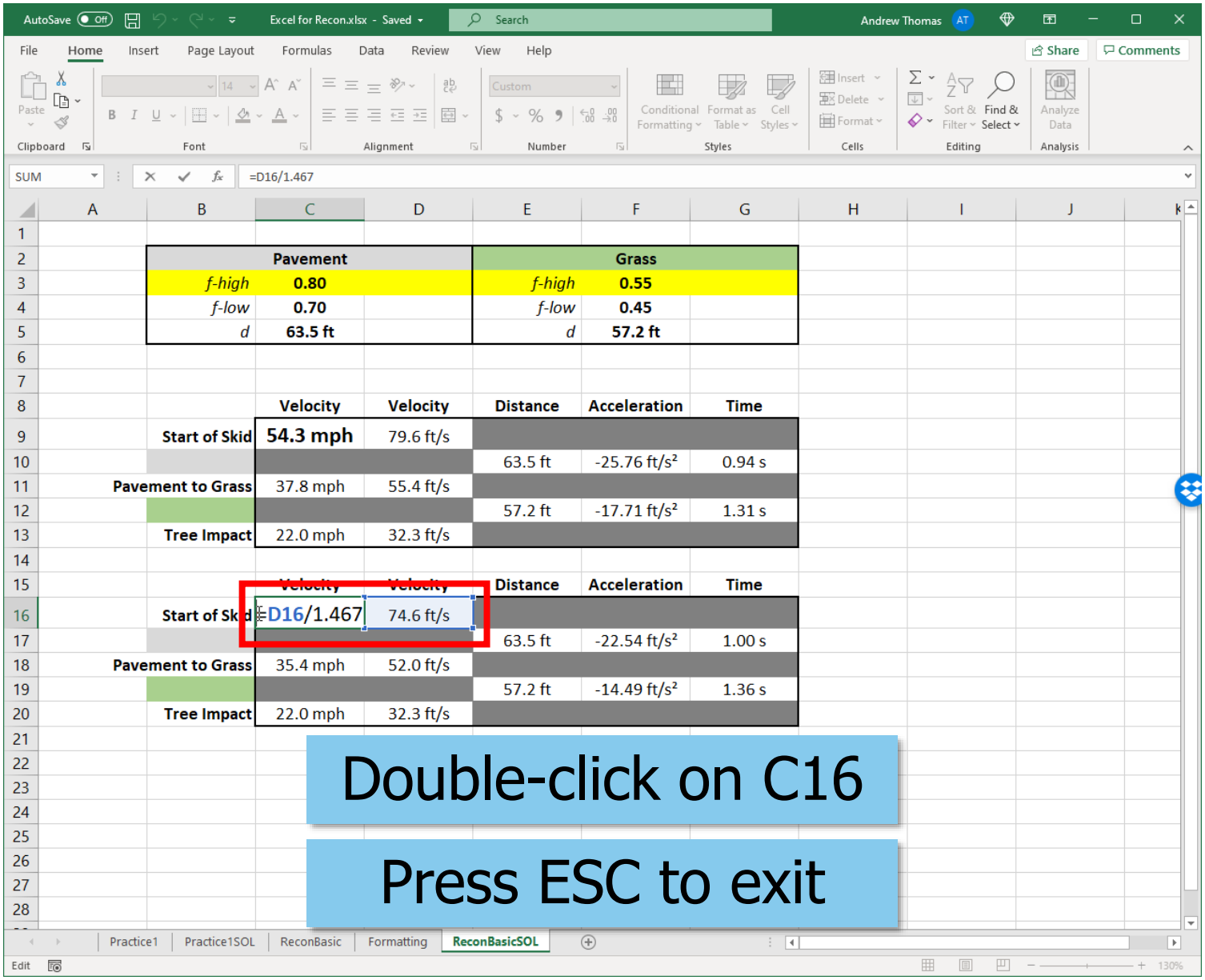

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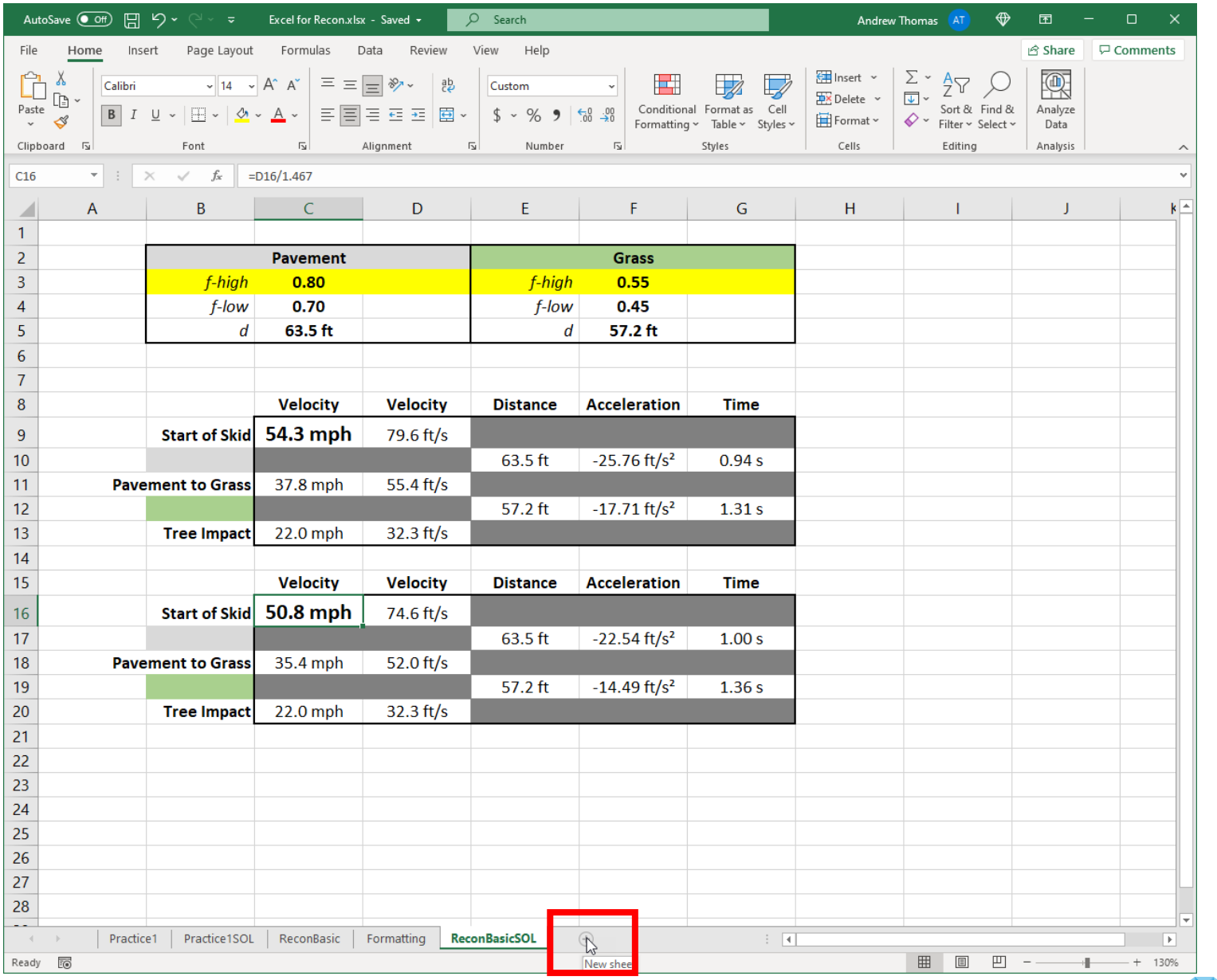

	Pavement		Grass	
f-high	**0.80**	*f-high*	**0.55**	
f-low	**0.70**	*f-low*	**0.45**	
d	**63.5 ft**	*d*	**57.2 ft**	

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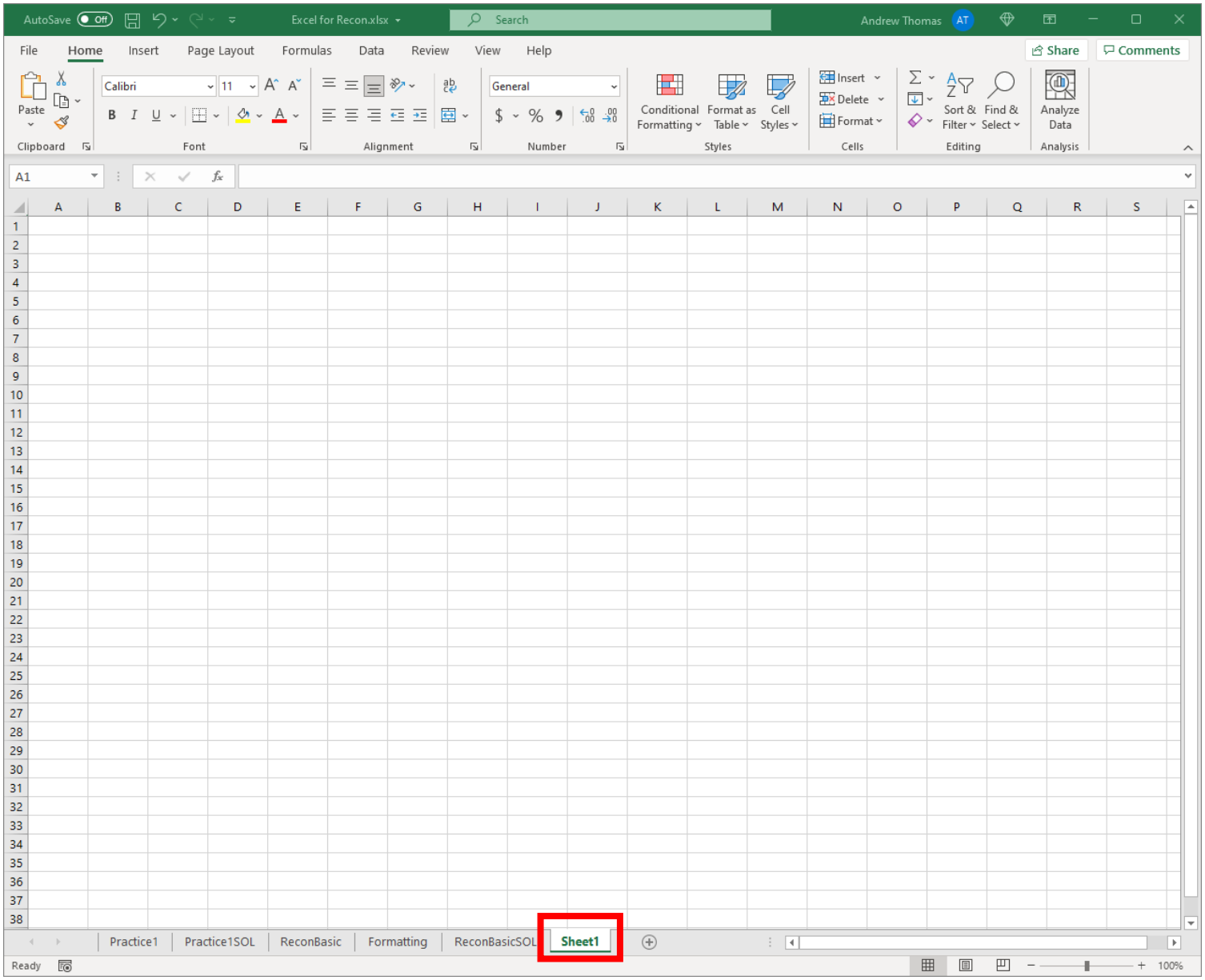

Collision Analytics

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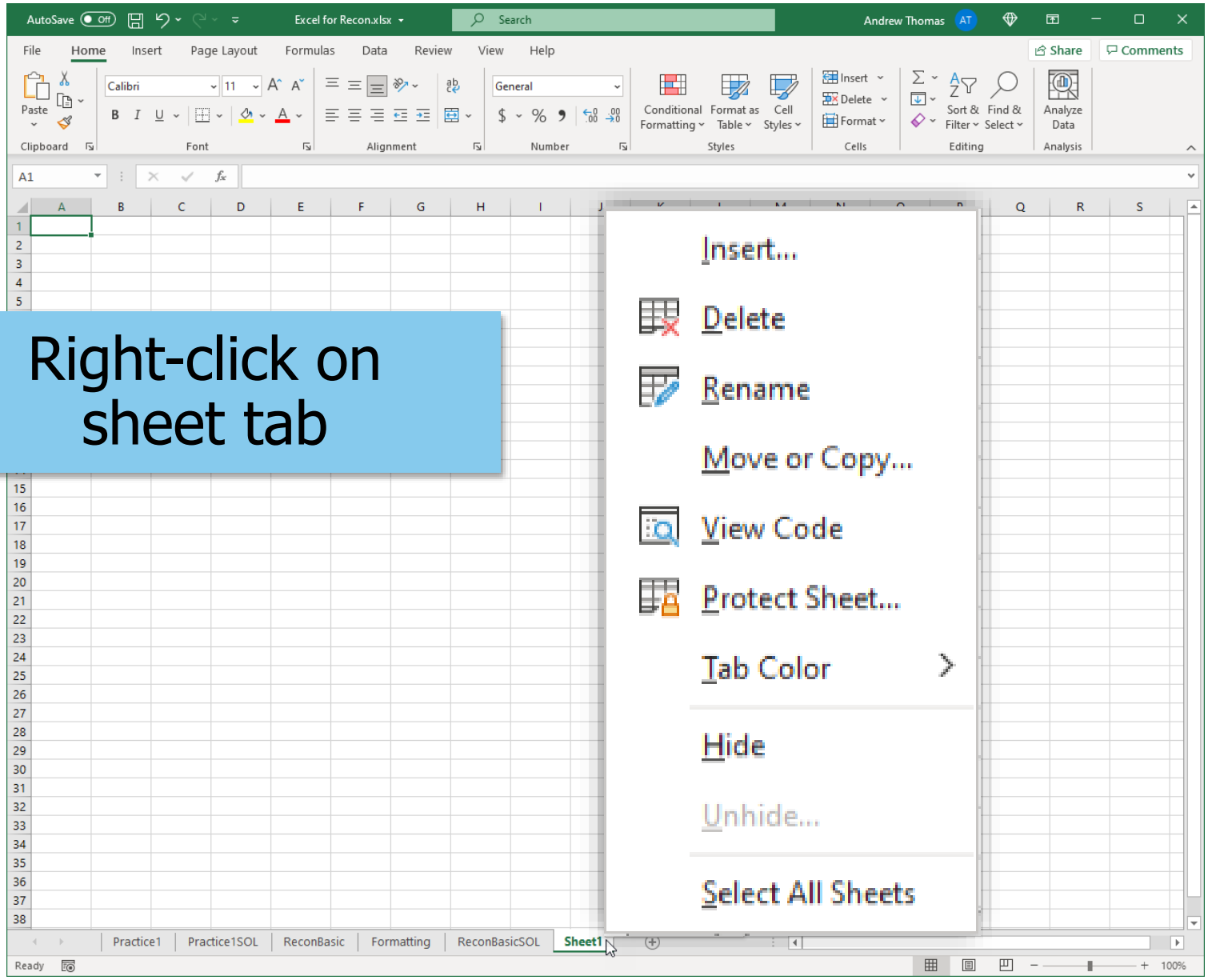

Right-click on sheet tab

Collision Analytics

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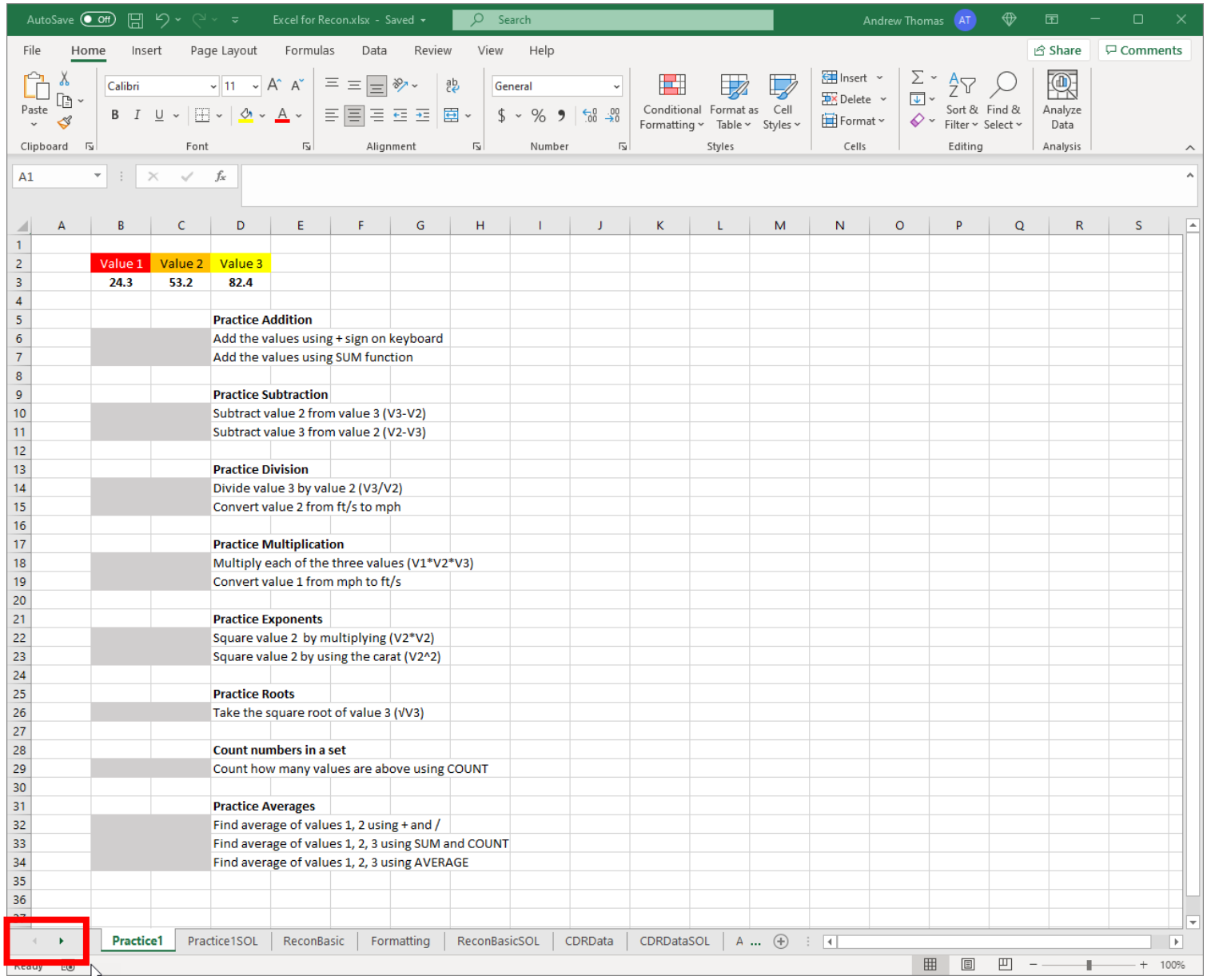


	B	C	D
2	Value 1	Value 2	Value 3
3	24.3	53.2	82.4
5			**Practice Addition**
6			Add the values using + sign on keyboard
7			Add the values using SUM function
9			**Practice Subtraction**
10			Subtract value 2 from value 3 (V3-V2)
11			Subtract value 3 from value 2 (V2-V3)
13			**Practice Division**
14			Divide value 3 by value 2 (V3/V2)
15			Convert value 2 from ft/s to mph
17			**Practice Multiplication**
18			Multiply each of the three values (V1*V2*V3)
19			Convert value 1 from mph to ft/s
21			**Practice Exponents**
22			Square value 2 by multiplying (V2*V2)
23			Square value 2 by using the carat (V2^2)
25			**Practice Roots**
26			Take the square root of value 3 (√V3)
28			**Count numbers in a set**
29			Count how many values are above using COUNT
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

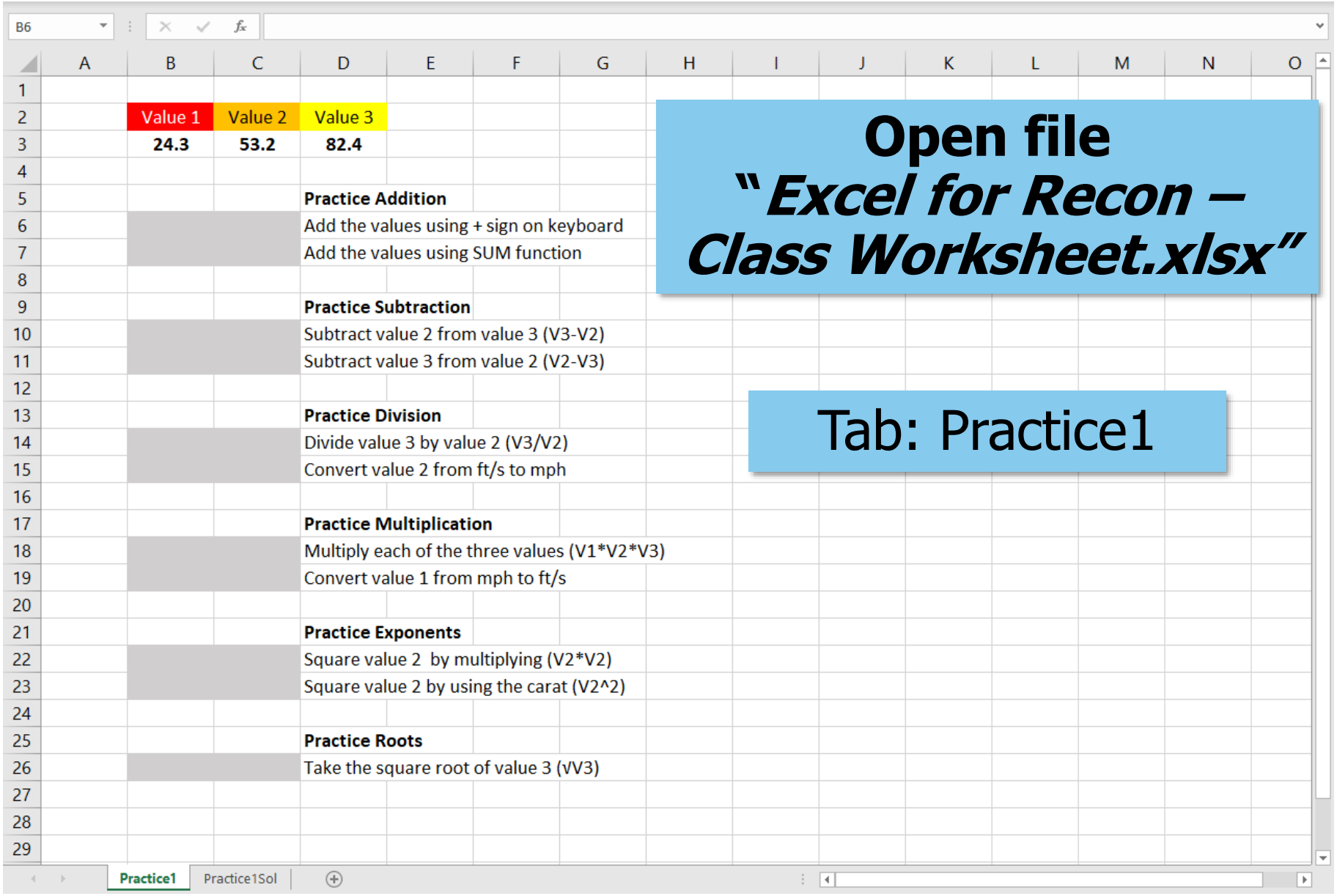
Collision Analytics

Formula Basics

Excel for Crash Reconstruction

Collision Analytics

Formula Basics



	Value 1	Value 2	Value 3
	24.3	53.2	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
- Square value 2 by multiplying (V2*V2)
- Square value 2 by using the carat (V2^2)

Practice Roots
- Take the square root of value 3 (√V3)

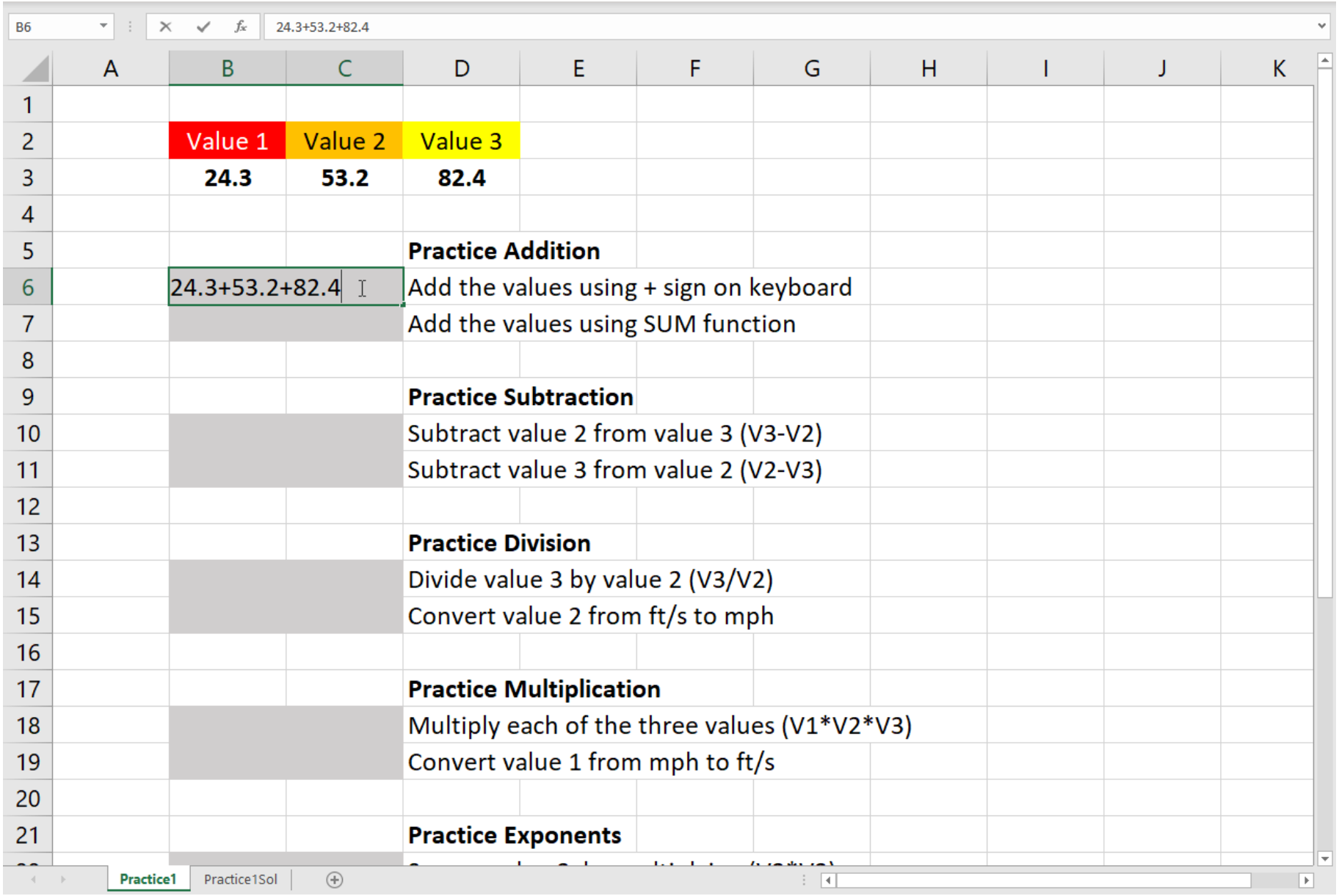
Practice1 | Practice1Sol

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

Tab: Practice1

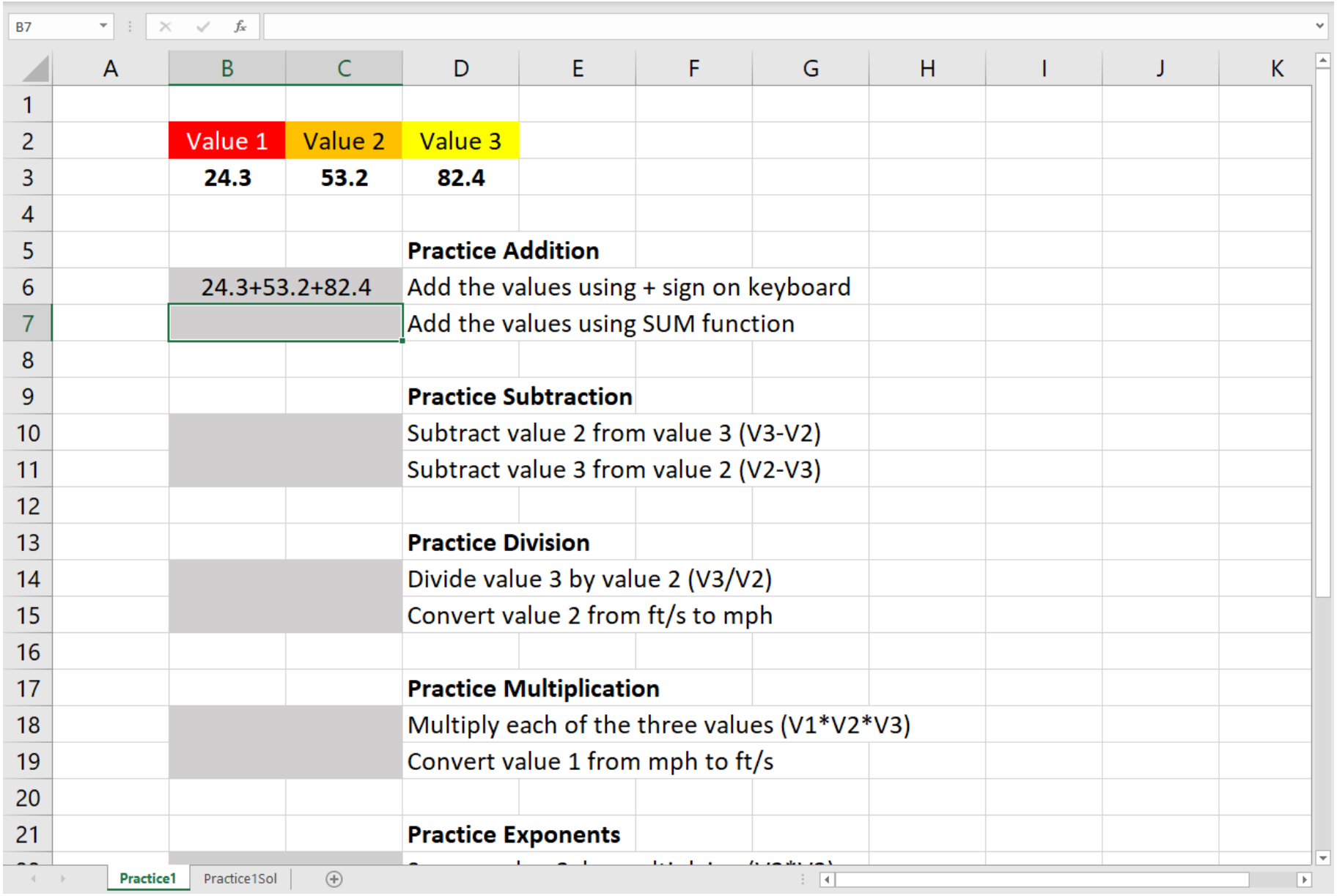
Collision Analytics

Formula Basics



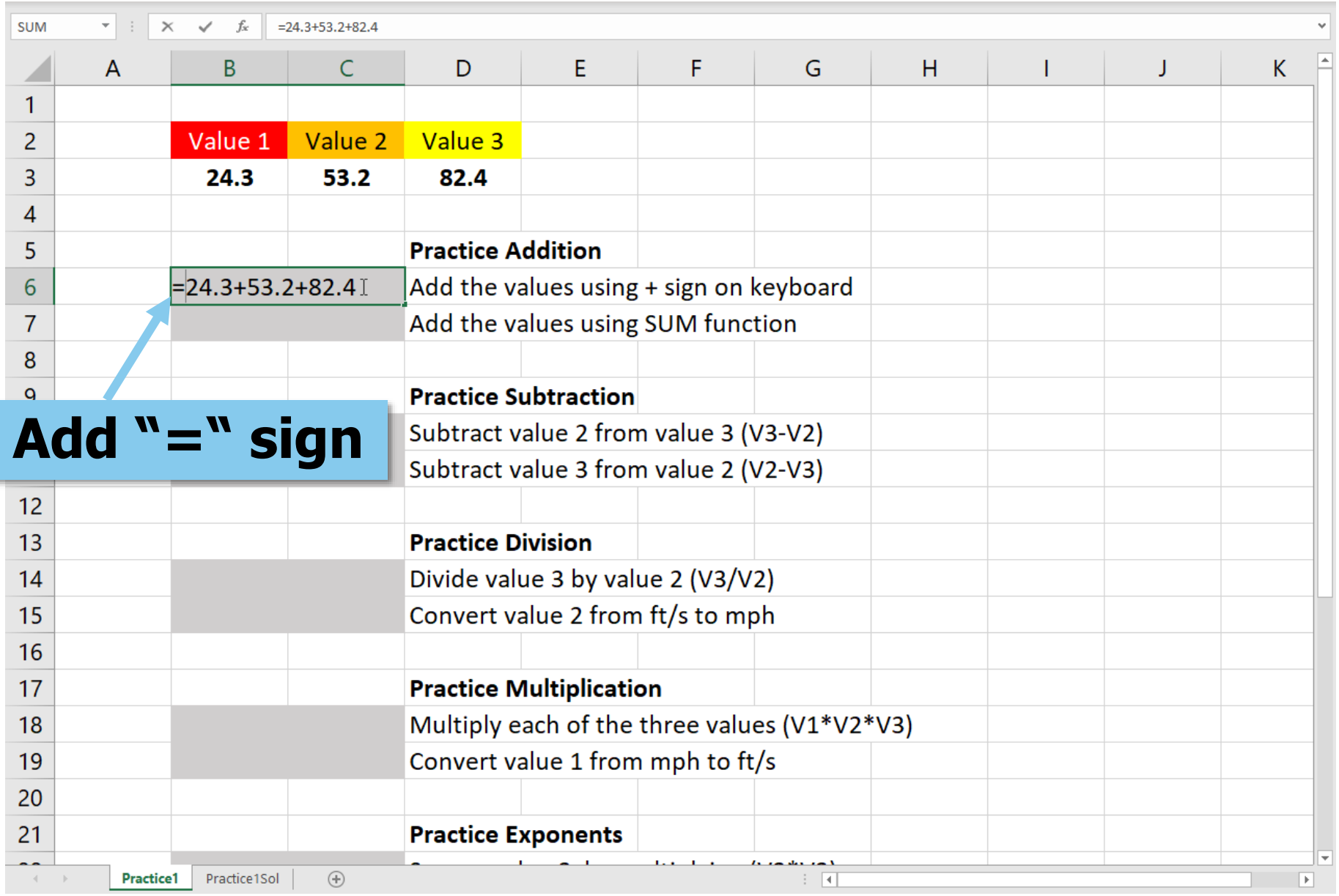
Collision Analytics

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**							

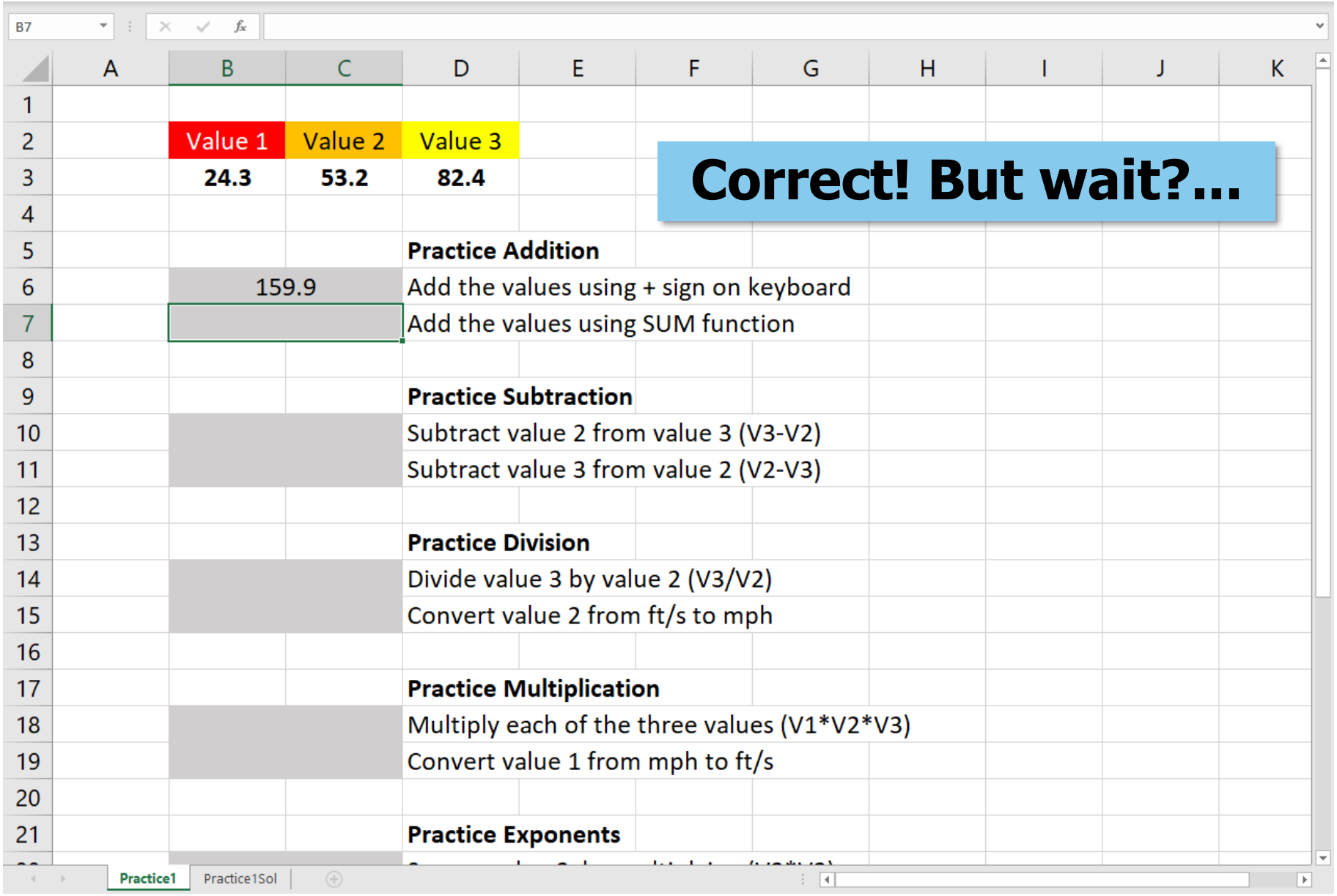
Formula Basics



Add "=" sign

Collision Analytics

Formula Basics

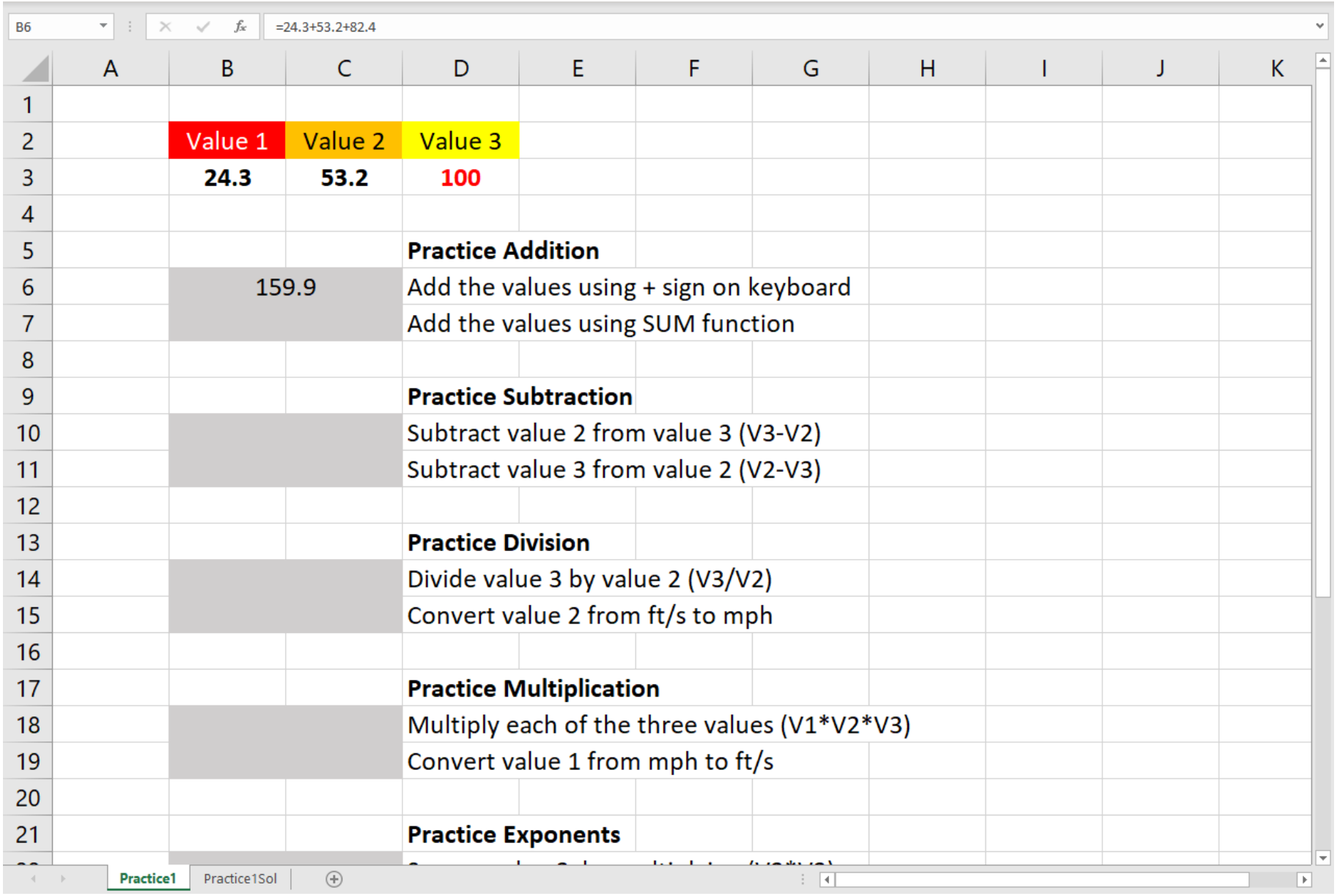


	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				Practice Addition							
6		159.9		Add the values using + sign on keyboard							
7				Add the values using SUM function							
8											
9				Practice Subtraction							
10				Subtract 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

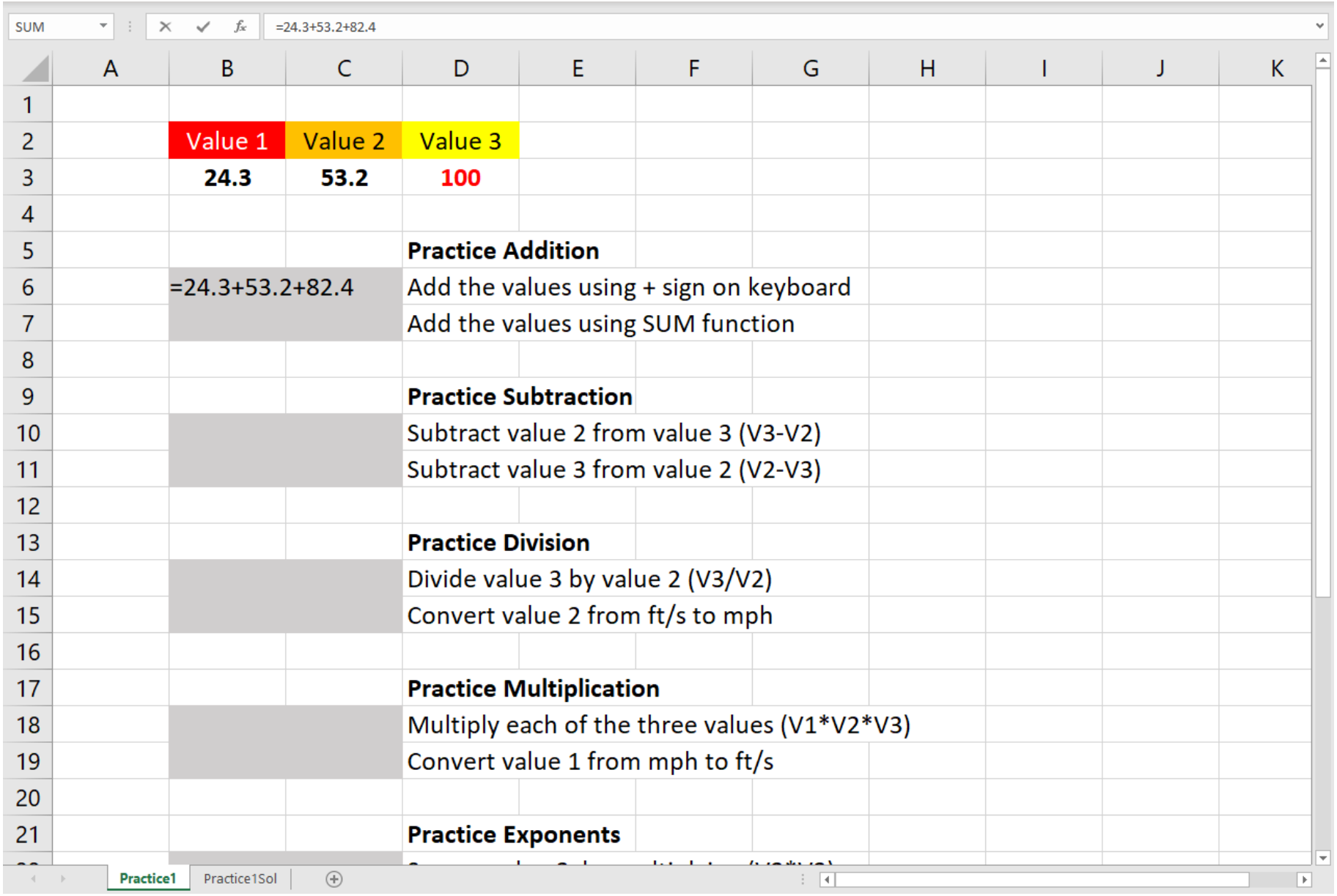
Correct! But wait?...

Formula Basics



Collision Analytics

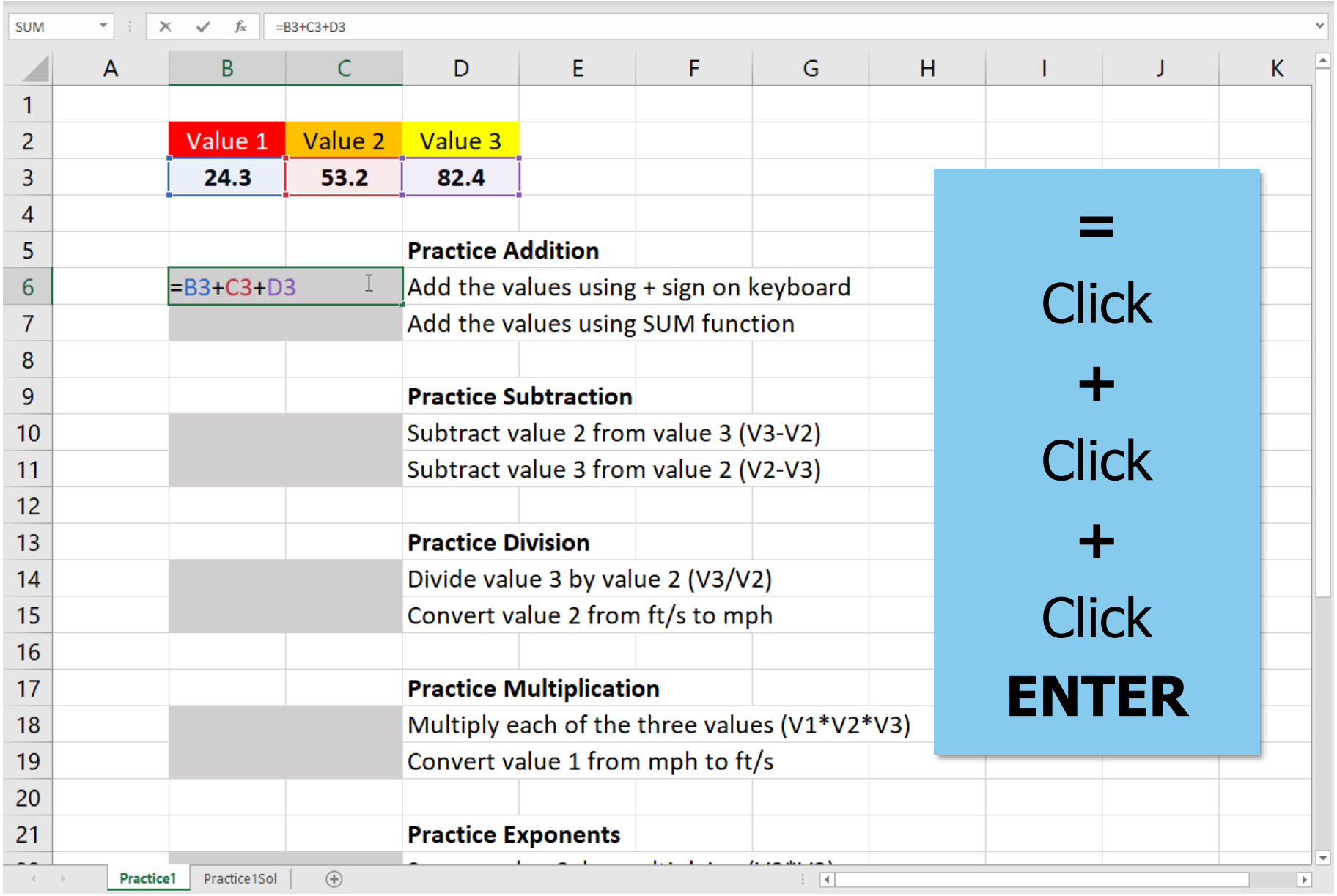
Formula Basics



Collision Analytics

Formula Basics

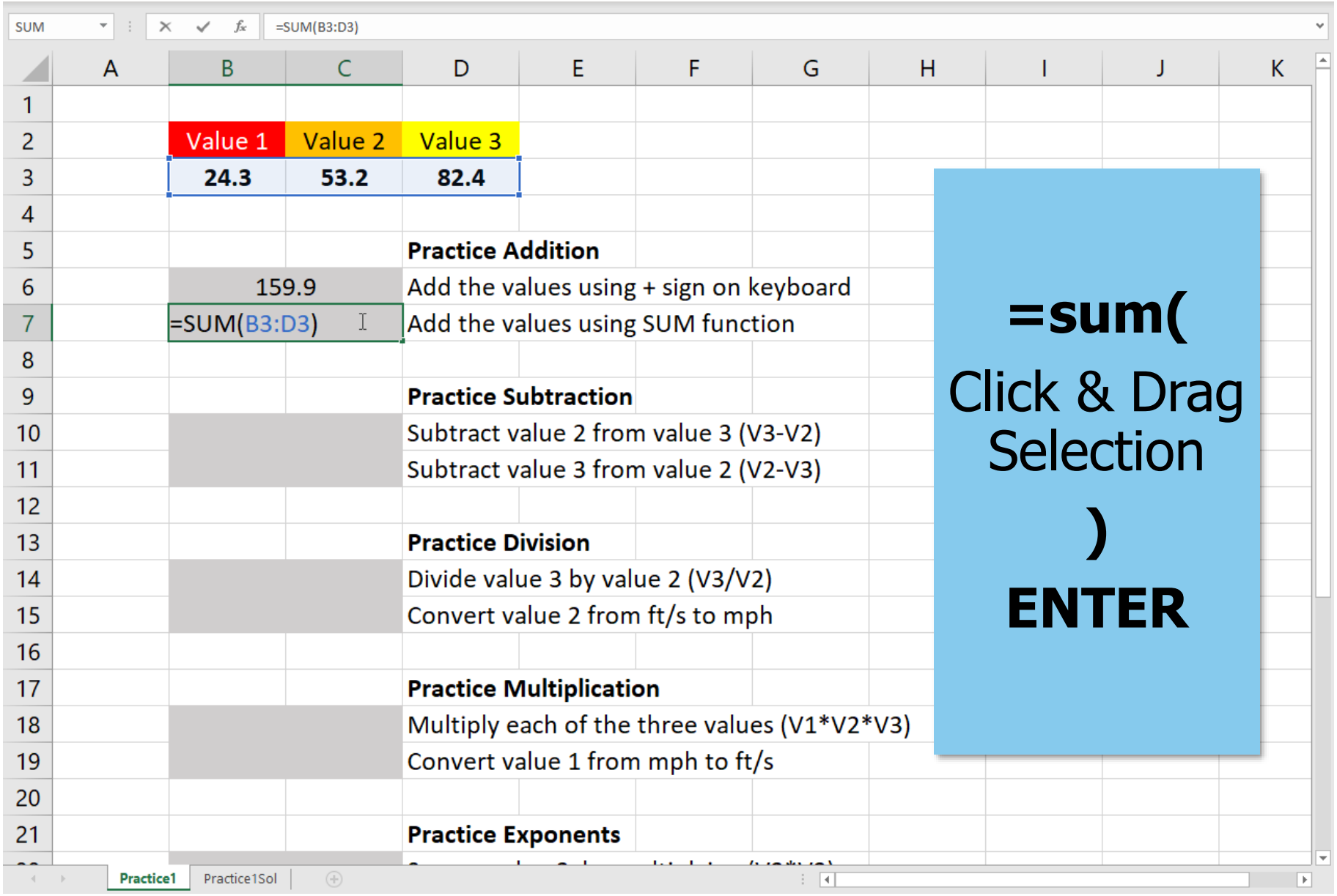
Formula Basics



Collision Analytics

Formula Basics

Formula Basics



=sum(

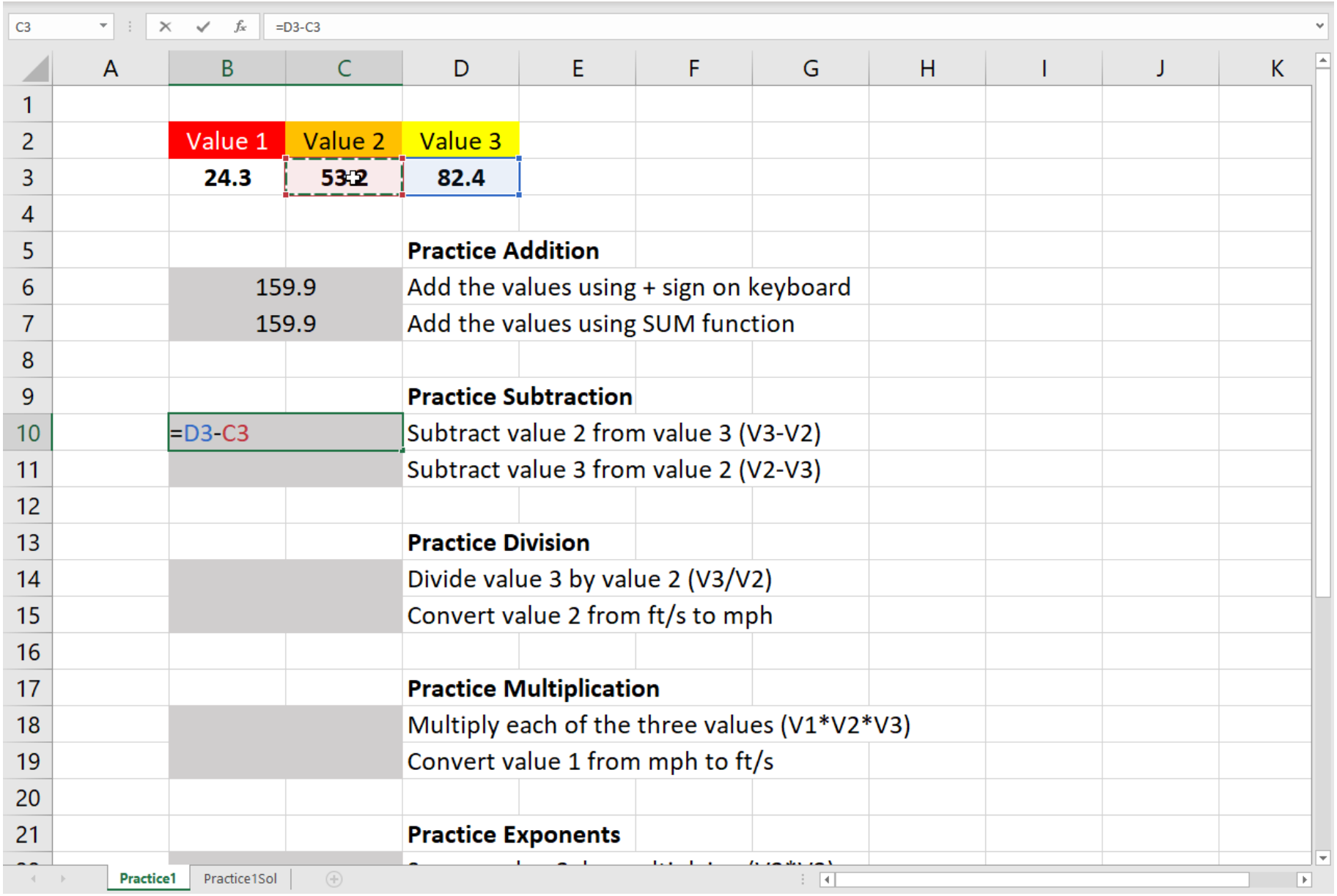
Click & Drag Selection

)

ENTER

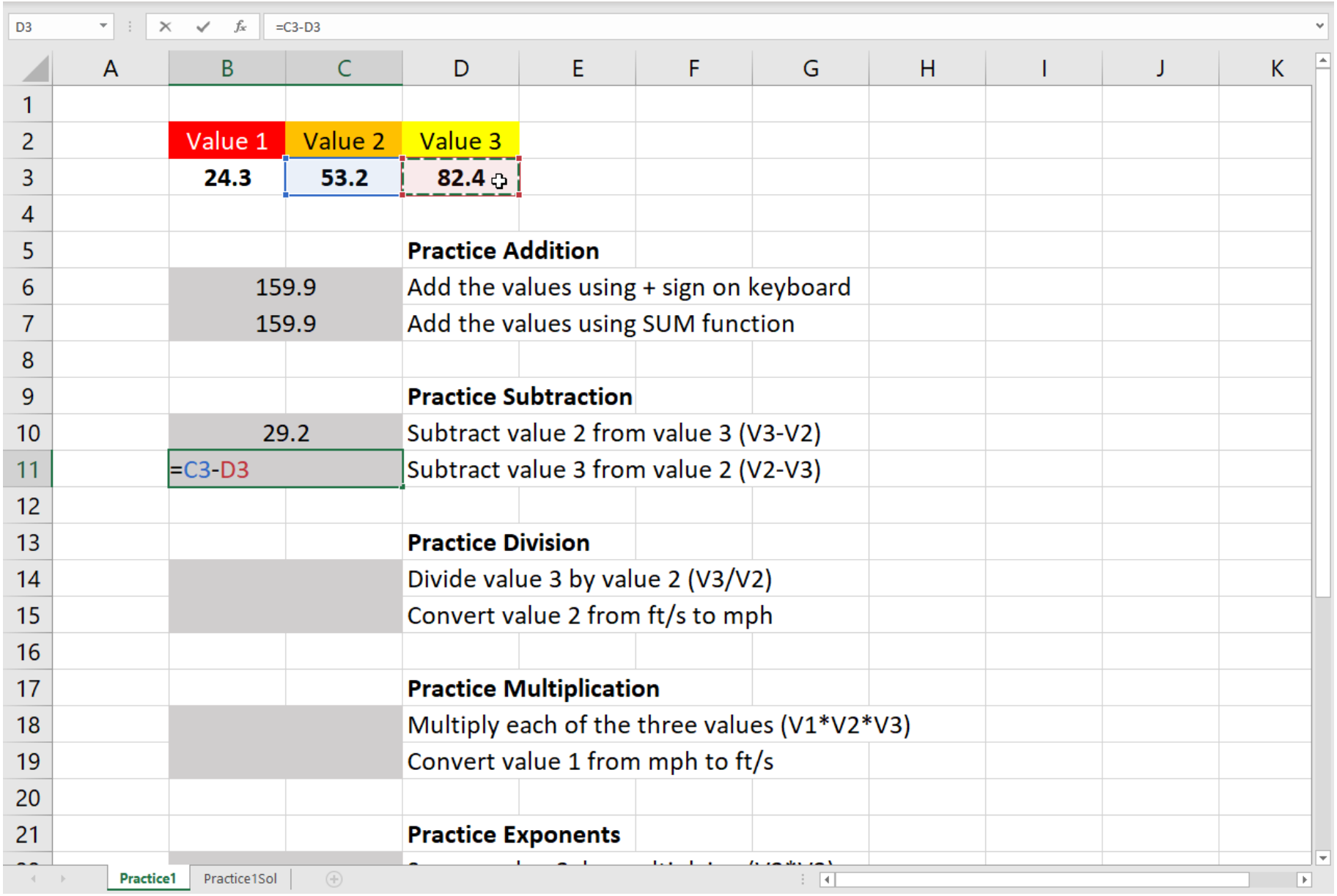
Collision Analytics

Formula Basics



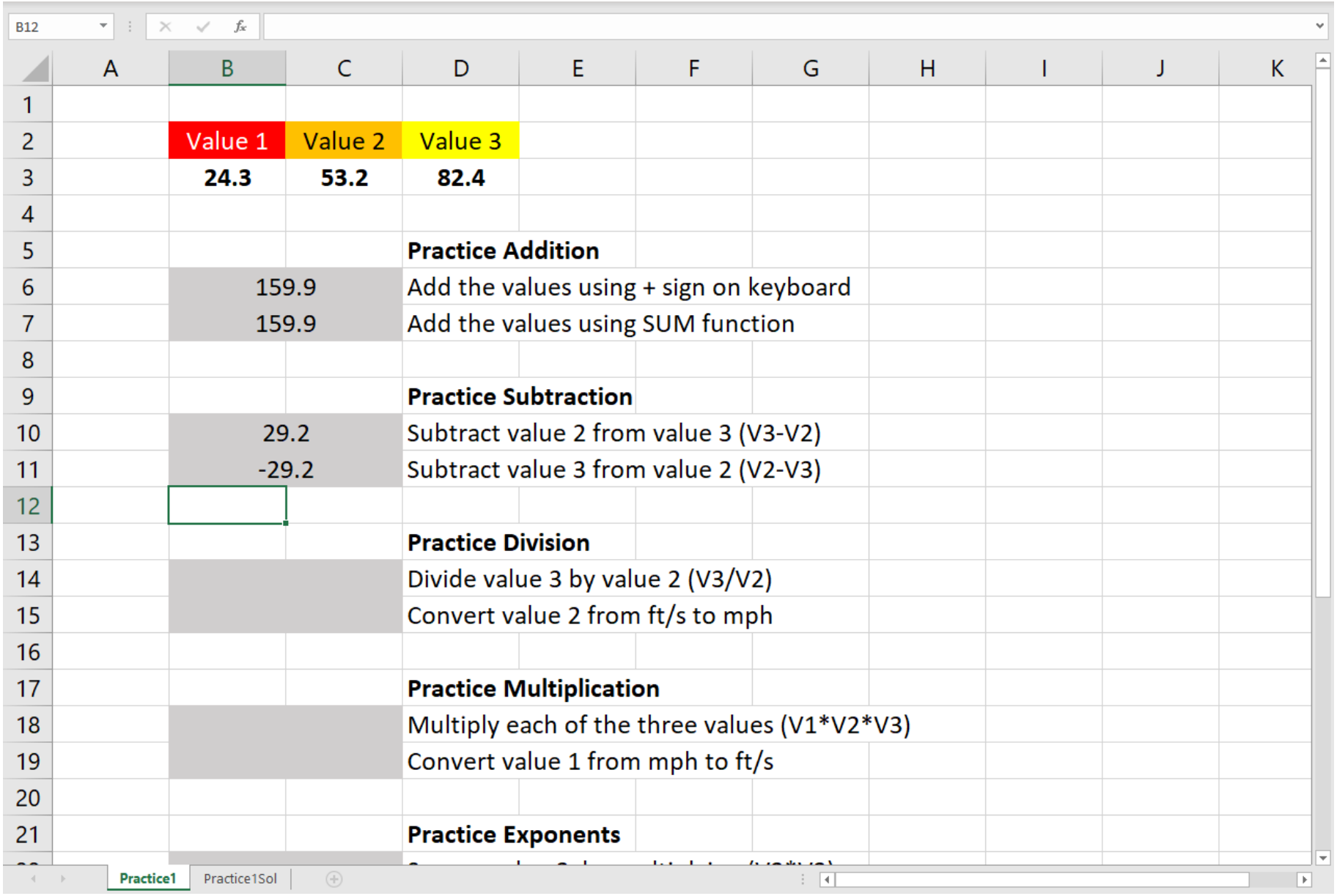
Collision Analytics

Formula Basics



Collision Analytics

Formula Basics



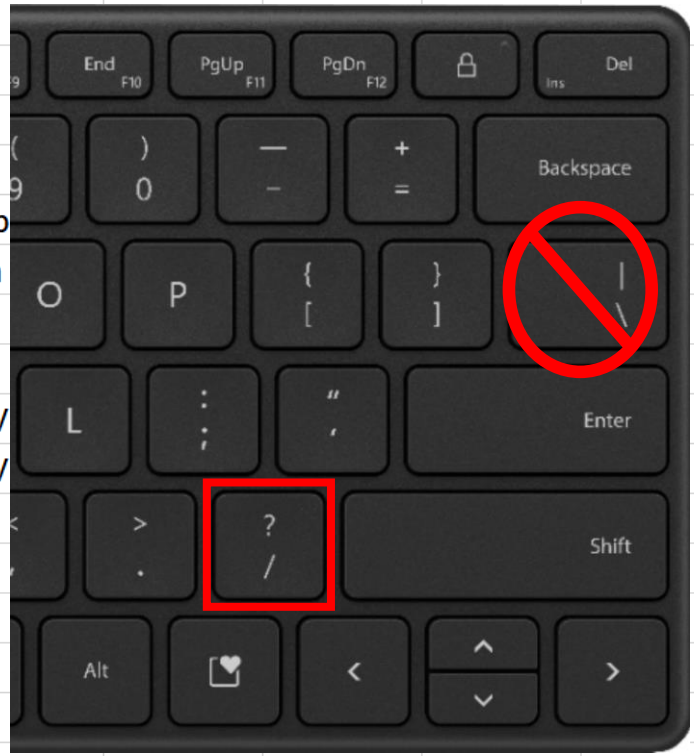
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		**24.3**	**53.2**	**82.4**							
4											
5				**Practice Addition**							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				**Practice Subtraction**							
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

C3 | =D3/C3

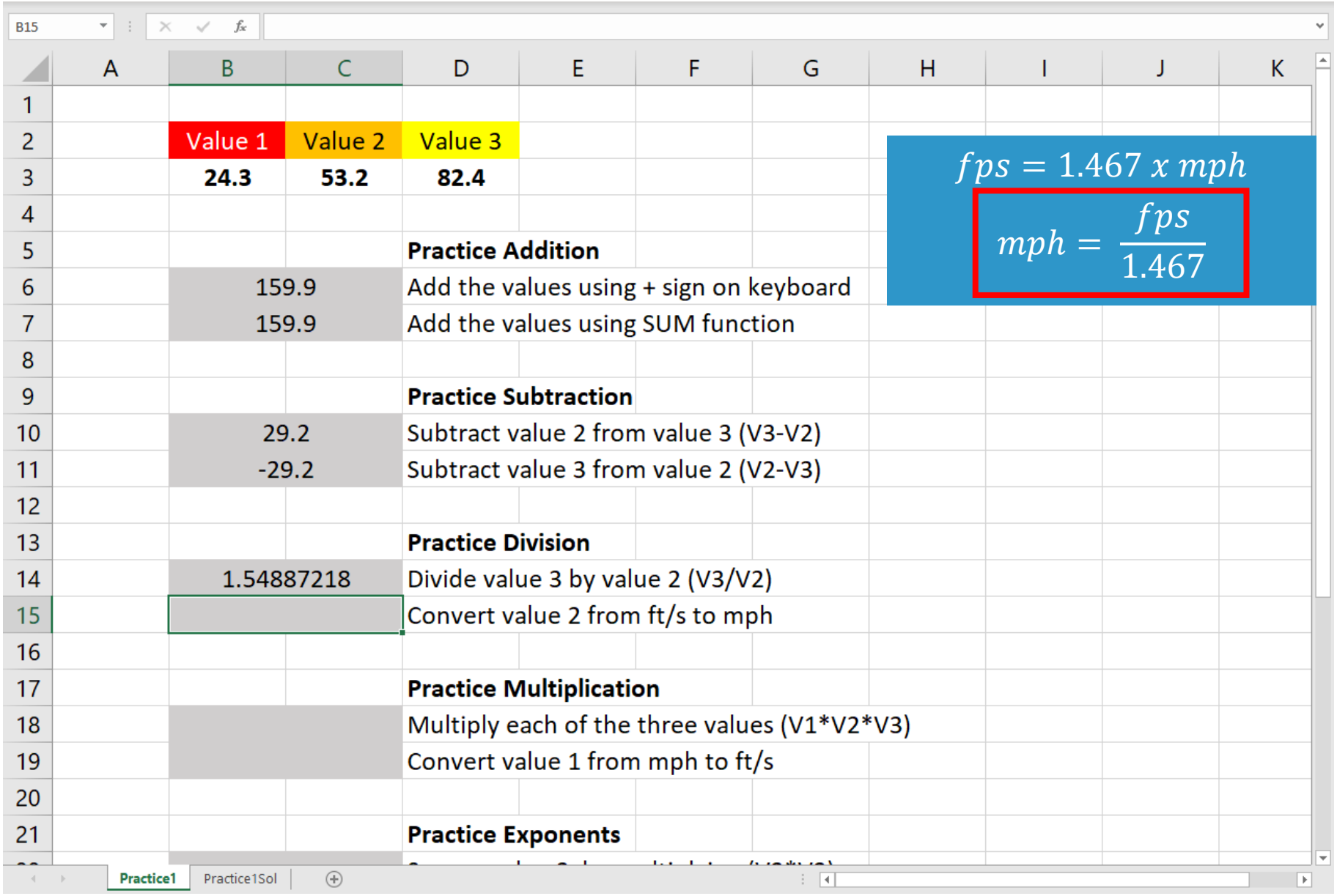
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		24.3	53.2	82.4							
4											
5				**Practice Addition**							
6		159.9		Add the values using + sign on keyb							
7		159.9		Add the values using SUM function							
8											
9				**Practice Subtraction**							
10		29.2		Subtract value 2 from value 3 (V3-V							
11		-29.2		Subtract value 3 from value 2 (V2-V							
12											
13				**Practice Division**							
14		=D3/C3		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



Collision Analytics

Formula Basics

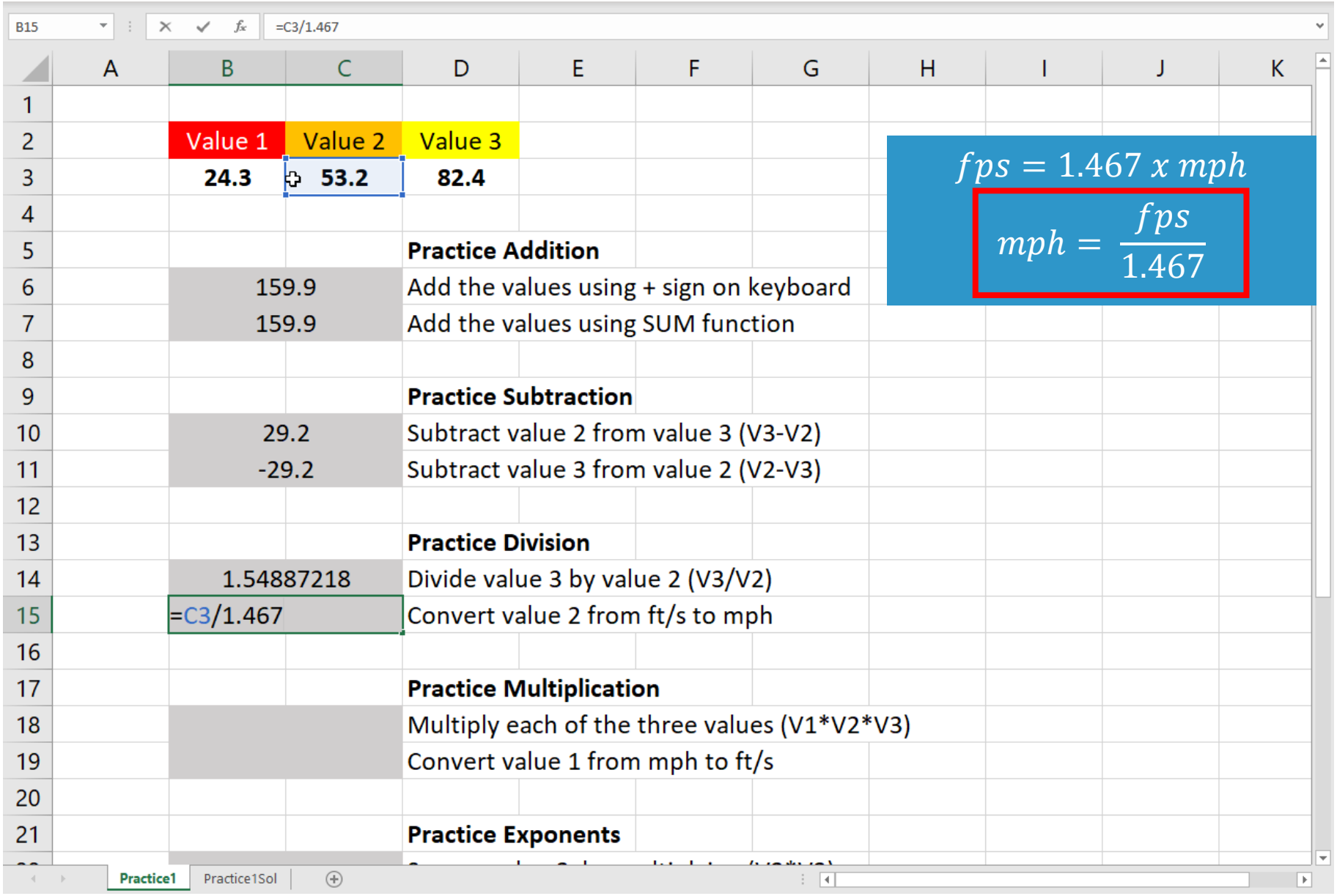


	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		**24.3**	**53.2**	**82.4**							
4											
5				**Practice Addition**							
6		159.9		Add the values using + sign on keyboard							
7		159.9		Add the values using SUM function							
8											
9				**Practice Subtraction**							
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**							

$$fps = 1.467\ x\ mph$$

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

Formula Basics



B15 =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							

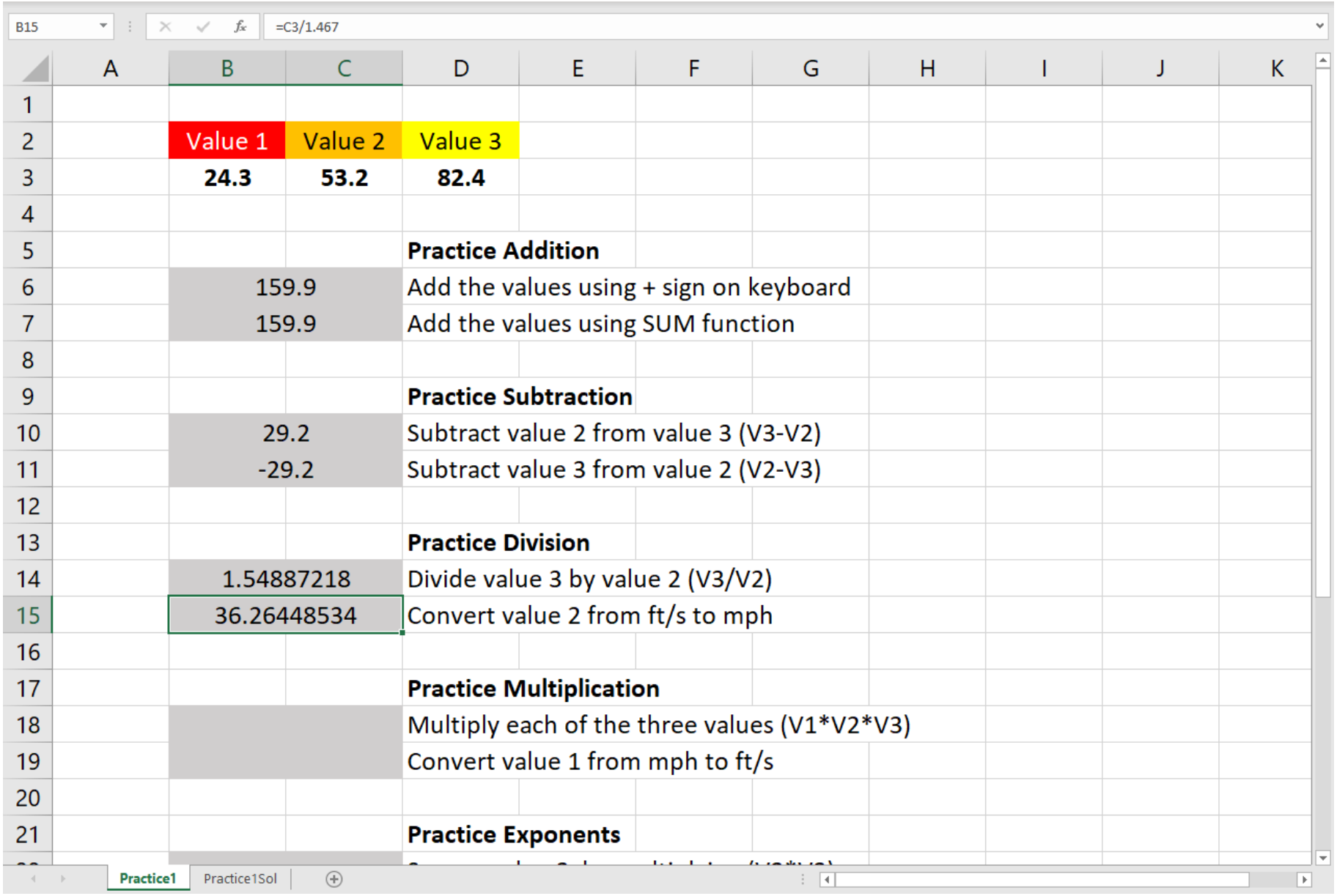
Practice1 | Practice1Sol

$$fps = 1.467\ x\ mph$$

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

Collision Analytics

Formula Basics



B15 =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		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

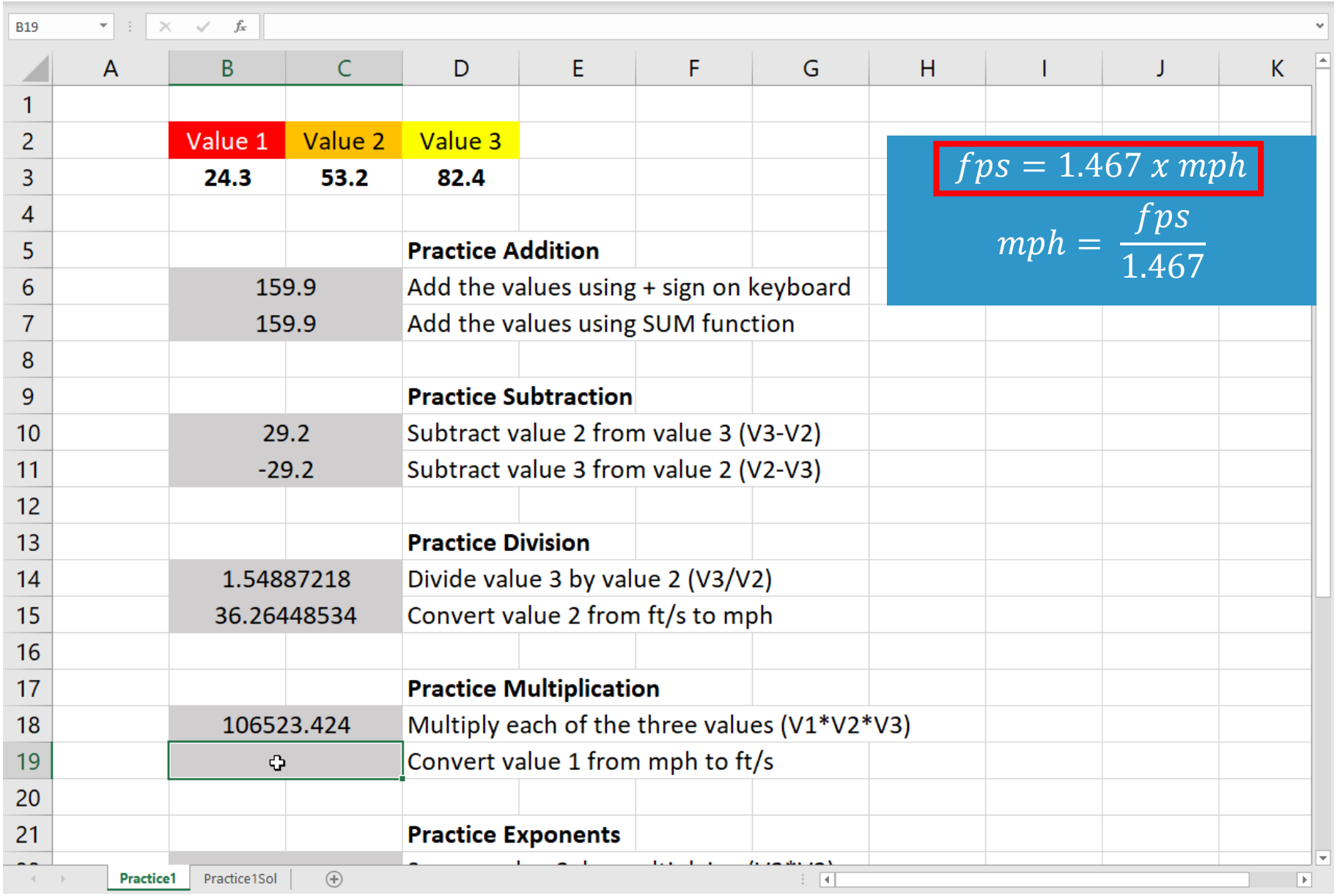
D3 | =B3*C3*D3

	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			159.9	Add the values using + sign on keyb							
7			159.9	Add the values using SUM function							
8											
9				**Practice Subtraction**							
10			29.2	Subtract value 2 from value 3 (V3-V							
11			-29.2	Subtract value 3 from value 2 (V2-V							
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**							

Practice1 | Practice1Sol

Collision Analytics

Formula Basics

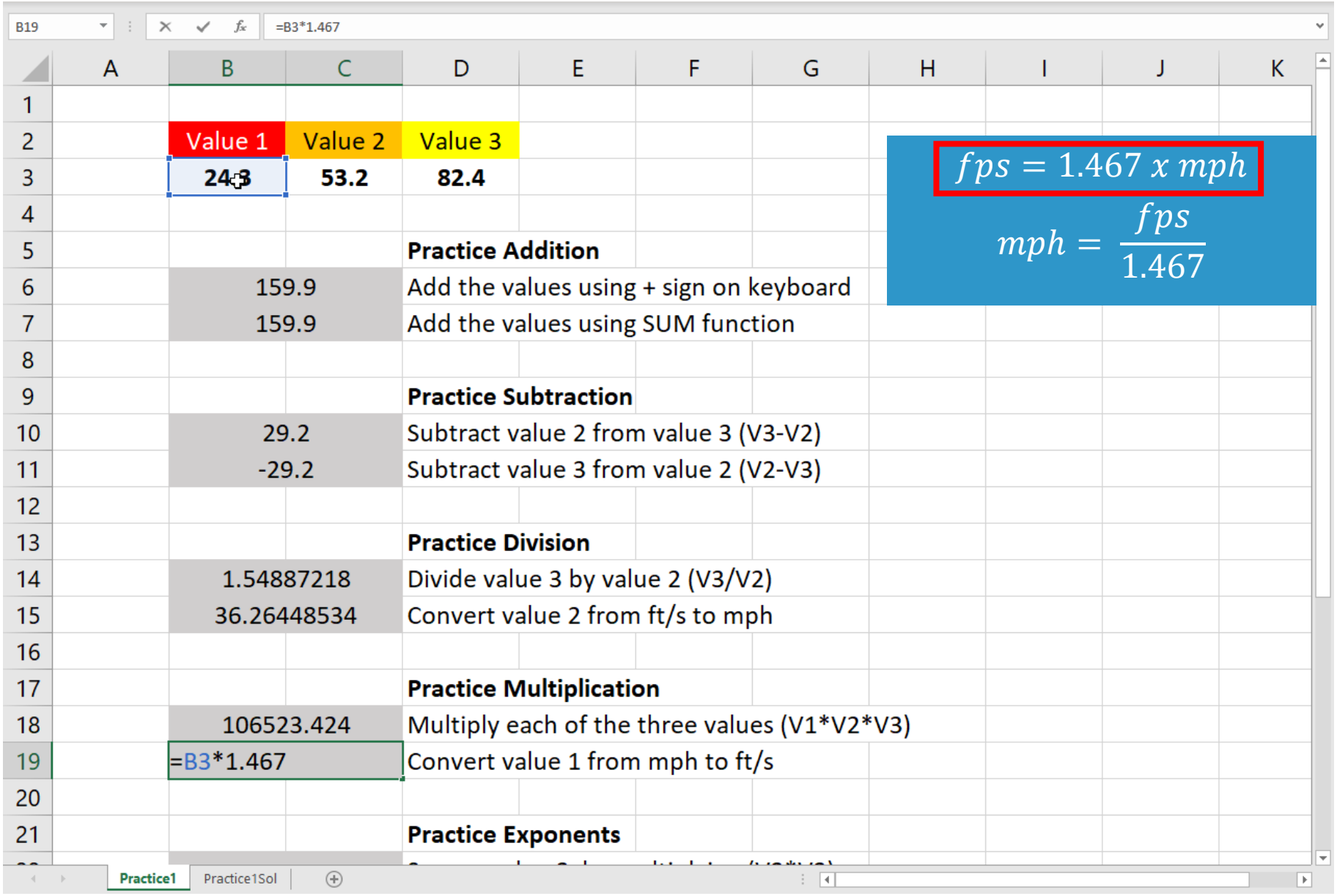


	B	C	D
2	Value 1	Value 2	Value 3
3	**24.3**	**53.2**	**82.4**
5			**Practice Addition**
6	159.9		Add the values using + sign on keyboard
7	159.9		Add the values using SUM function
9			**Practice Subtraction**
10	29.2		Subtract value 2 from value 3 (V3-V2)
11	-29.2		Subtract value 3 from value 2 (V2-V3)
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
17			**Practice Multiplication**
18	106523.424		Multiply each of the three values (V1*V2*V3)
19			Convert value 1 from mph to ft/s
21			**Practice Exponents**

$$fps = 1.467\ x\ mph$$

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

Formula Basics



B19 =B3*1.467

	A	B	C	D	E	F	G	H	I	J	K
1											
2		Value 1	Value 2	Value 3							
3		243	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		=B3*1.467		Convert value 1 from mph to ft/s							
20											
21				**Practice Exponents**							

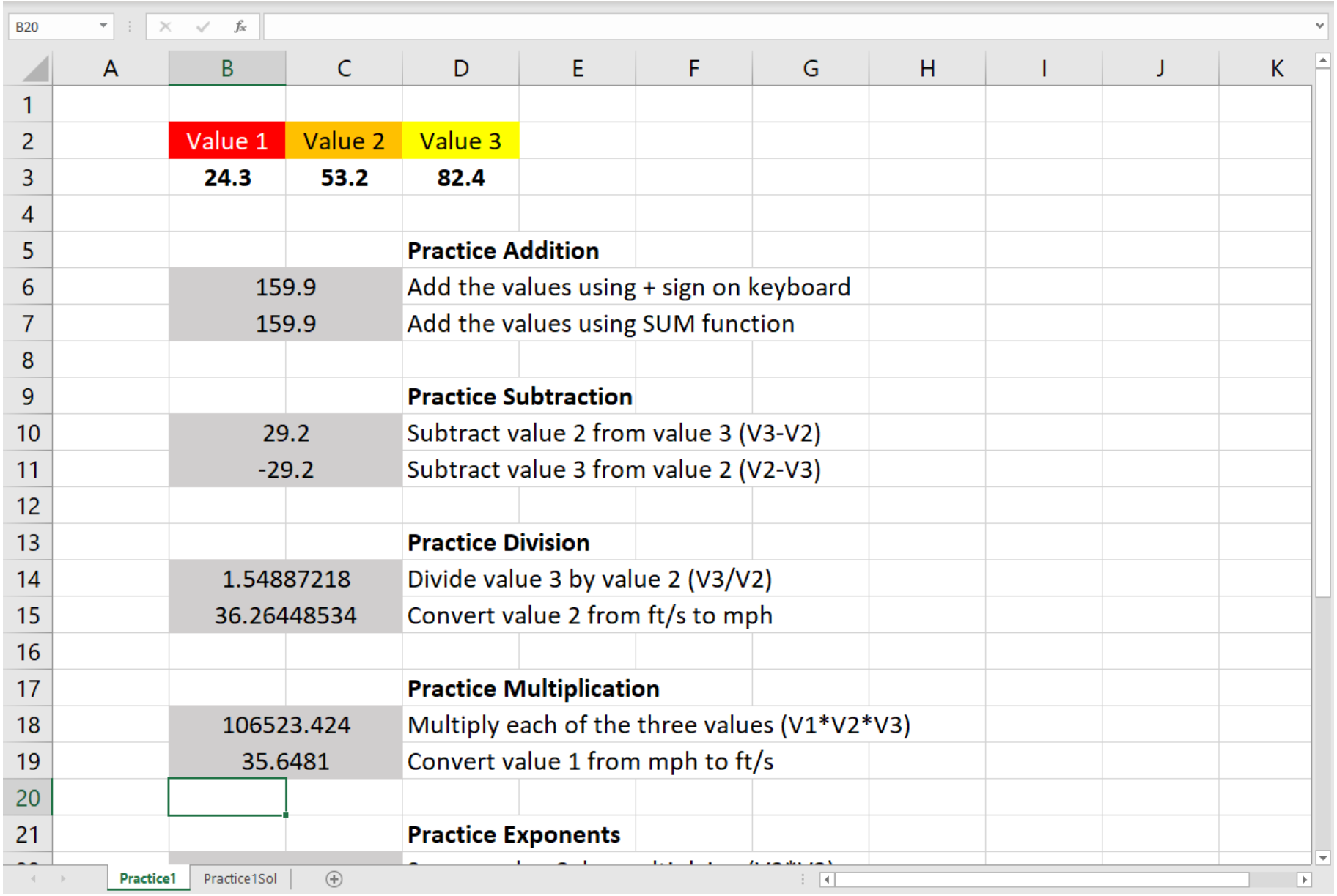
Practice1 | Practice1Sol

$$fps = 1.467\ x\ mph$$

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

Collision Analytics

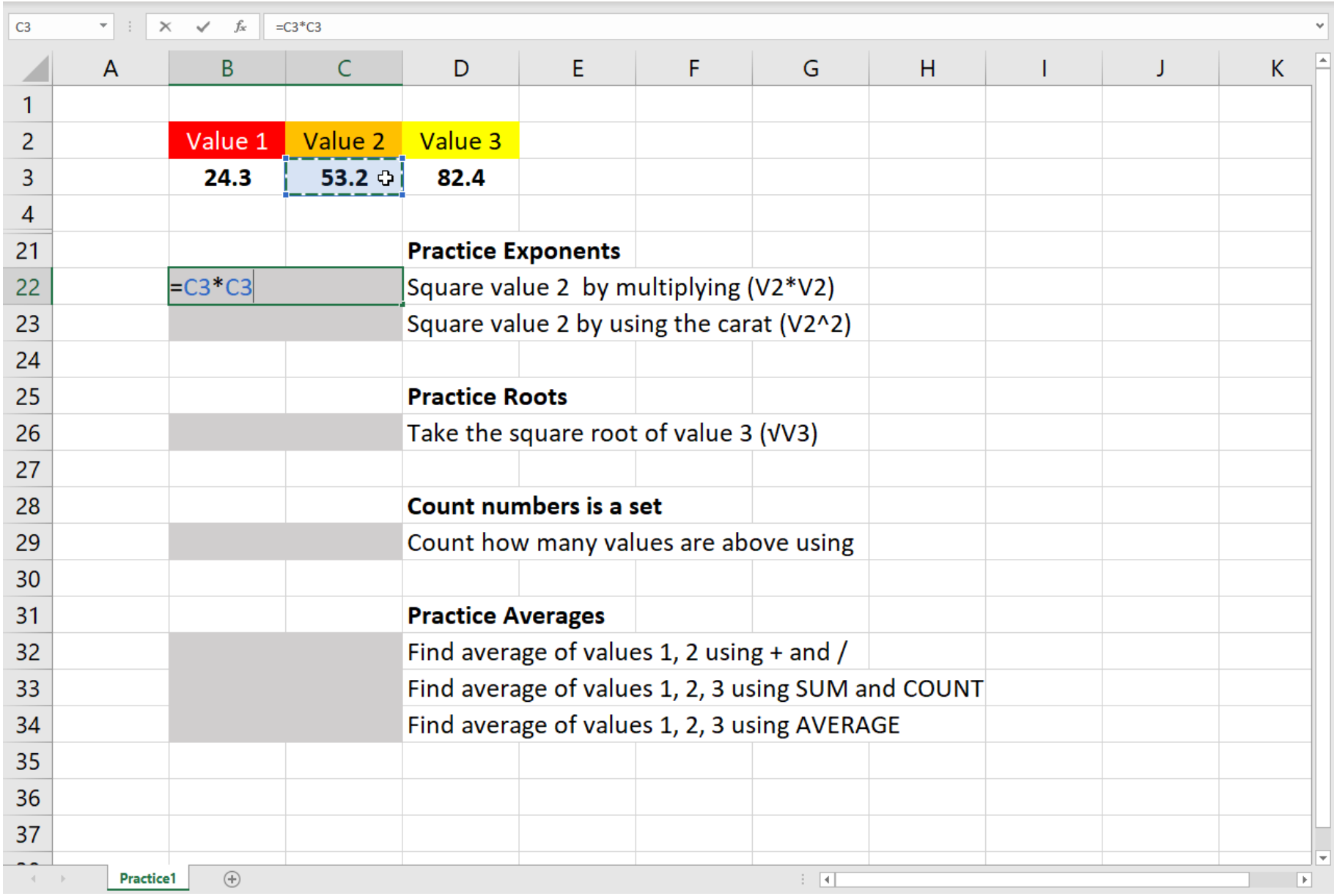
Formula Basics



	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**							

Collision Analytics

Formula Basics



Collision Analytics

Formula Basics

	Value 1	Value 2	Value 3
	24.3	53.2	82.4

Practice Exponents

2830.24

Square value 2 by multiplying (V2*

=C3^2

Square value 2 by using the carat (V

Practice Roots

Take the square root of value 3 (VV3

Count numbers is a set

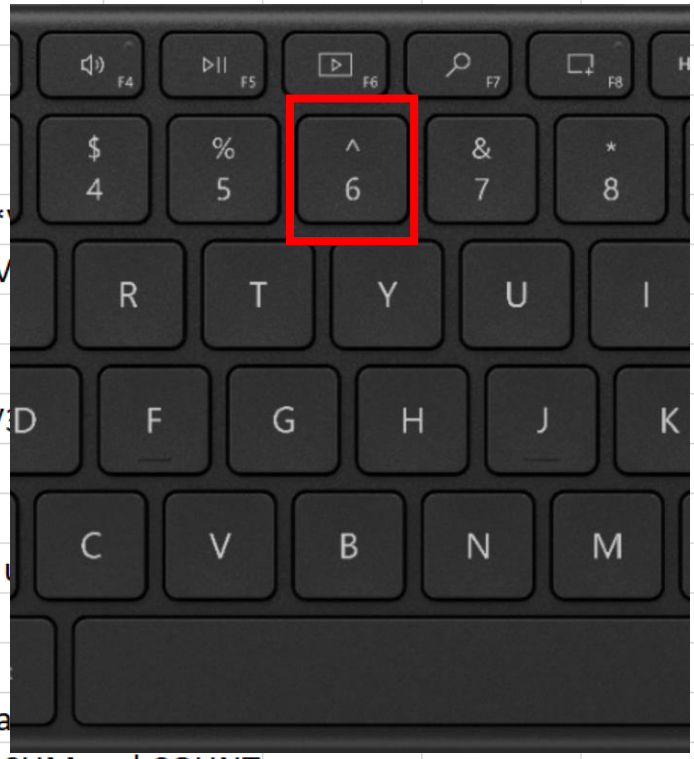
Count how many values are above

Practice Averages

Find average of values 1, 2 using + a

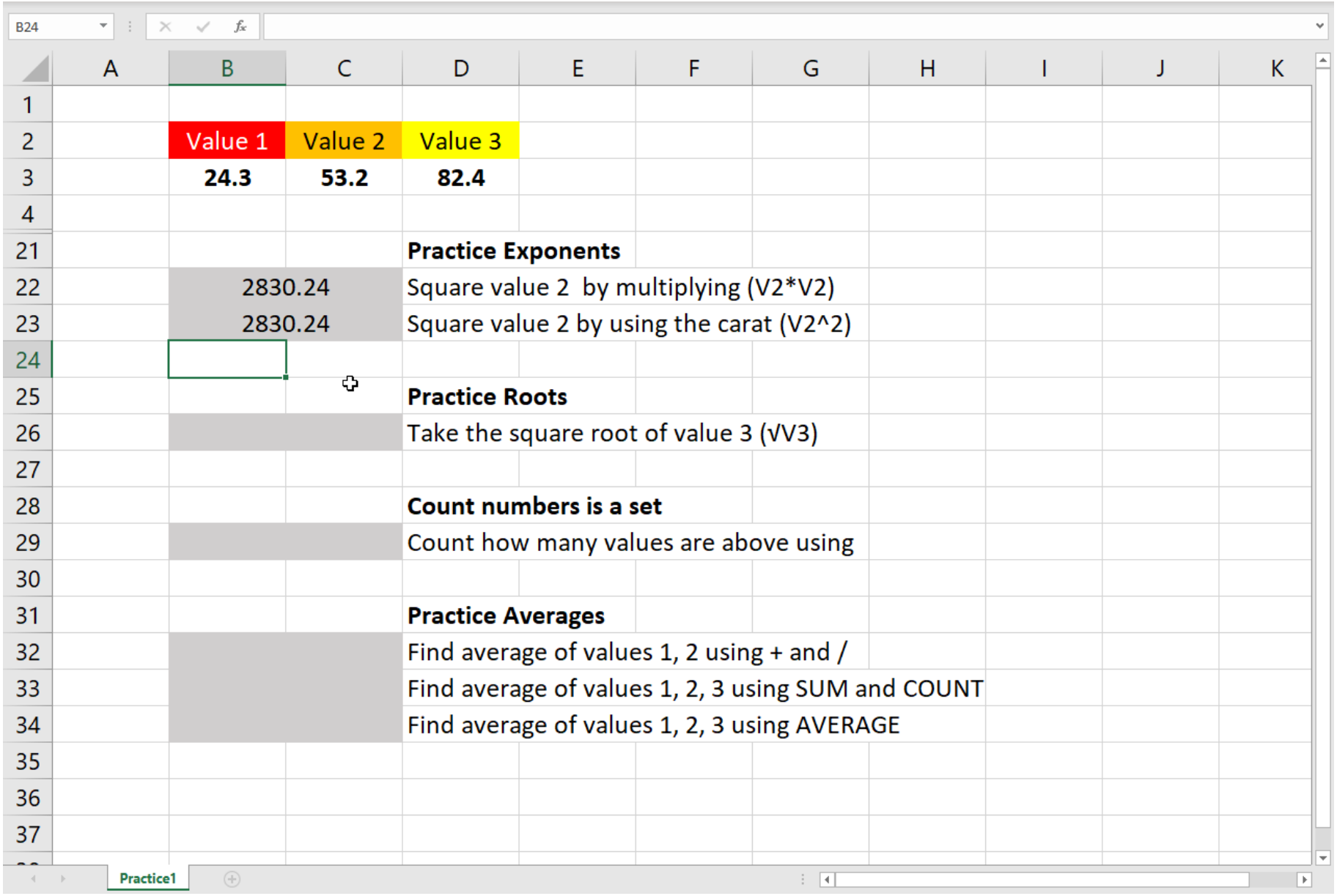
Find average of values 1, 2, 3 using SUM and COUNT

Find average of values 1, 2, 3 using AVERAGE



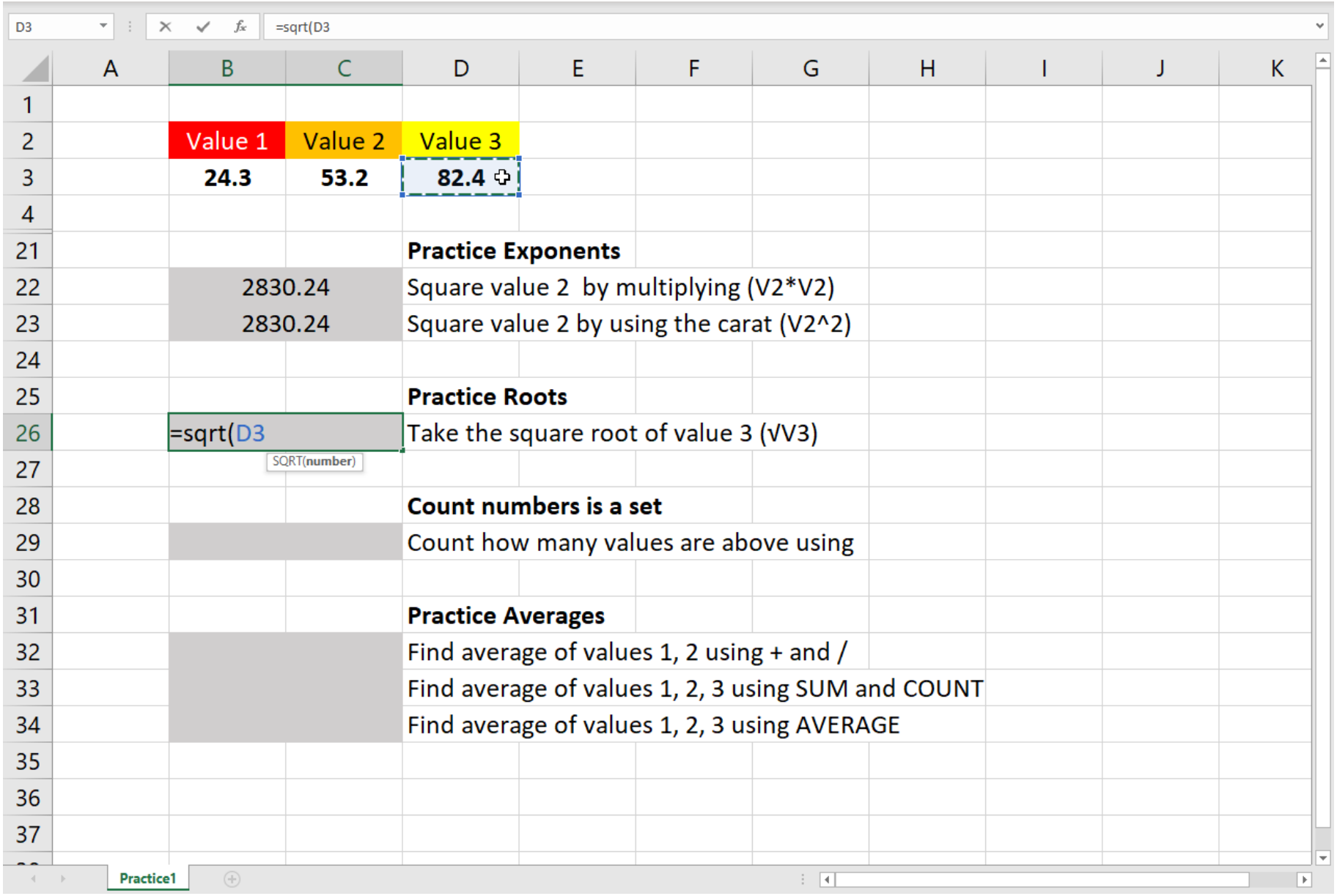
Collision Analytics

Formula Basics



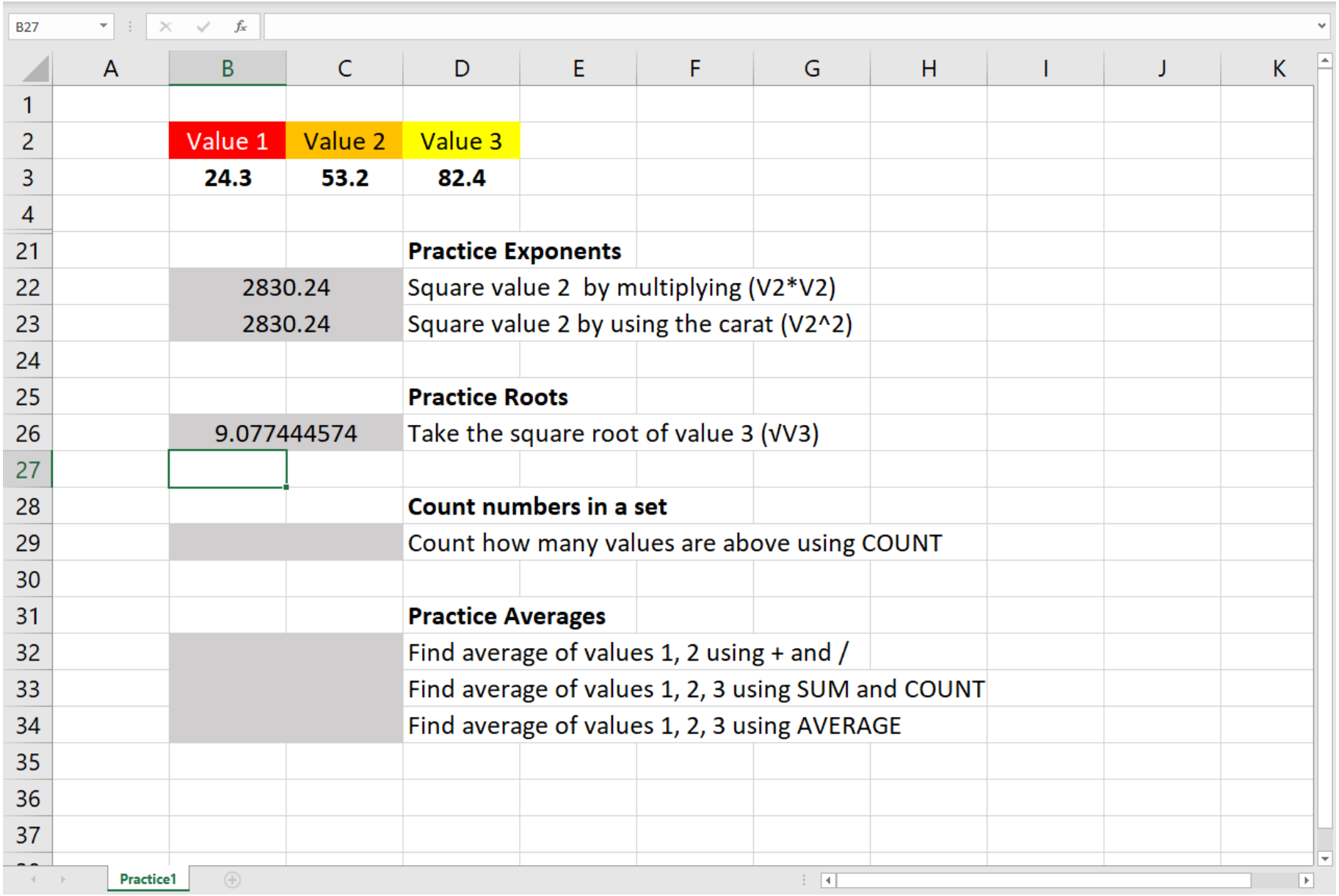
	B	C	D
2	Value 1	Value 2	Value 3
3	**24.3**	**53.2**	**82.4**
21			**Practice Exponents**
22	2830.24		Square value 2 by multiplying (V2*V2)
23	2830.24		Square value 2 by using the carat (V2^2)
24			
25			**Practice Roots**
26			Take the square root of value 3 (√V3)
28			**Count numbers is a set**
29			Count how many values are above using
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

Formula Basics



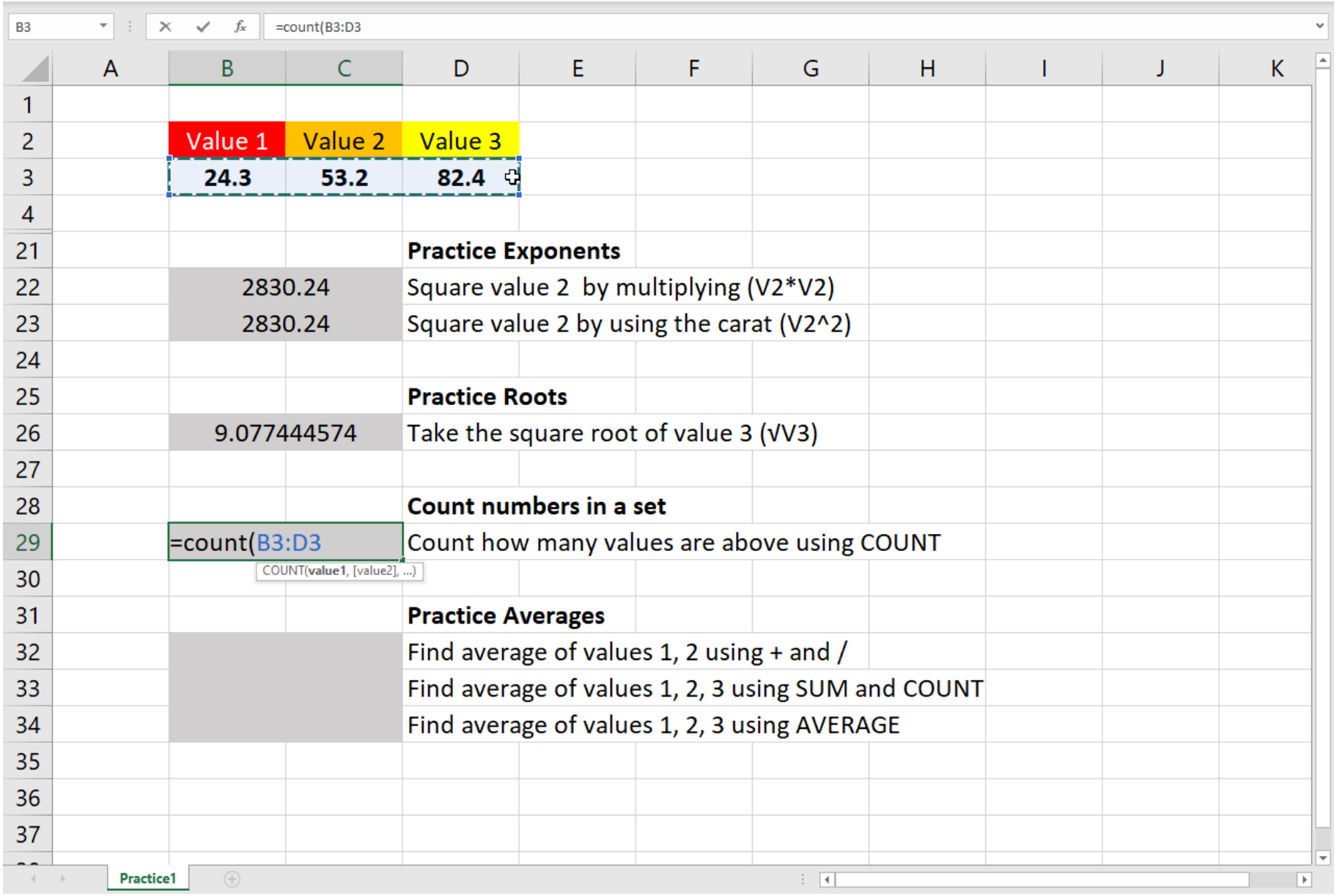
Collision Analytics

Formula Basics



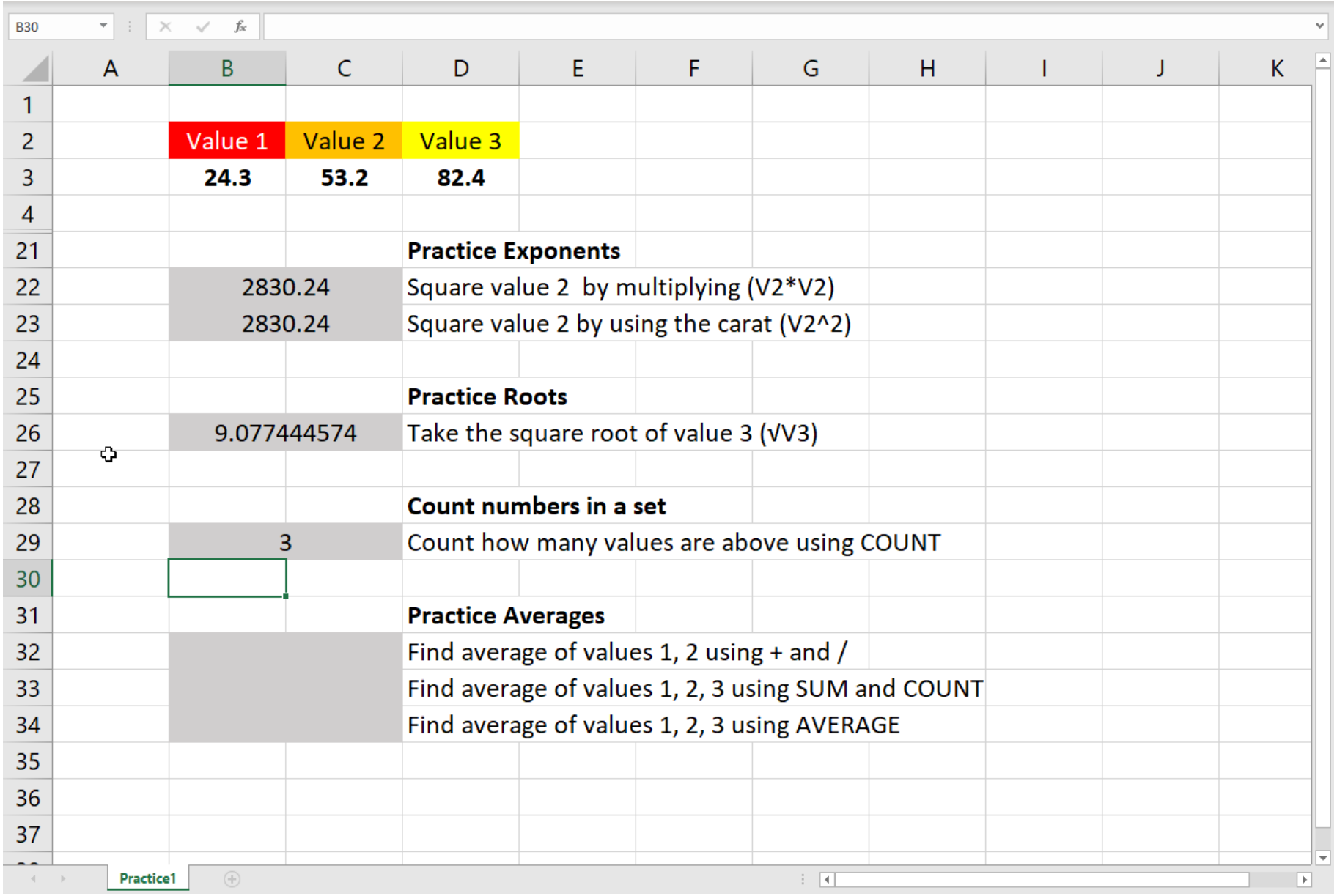
	B	C	D
2	Value 1	Value 2	Value 3
3	**24.3**	**53.2**	**82.4**
21			**Practice Exponents**
22	2830.24		Square value 2 by multiplying (V2*V2)
23	2830.24		Square value 2 by using the carat (V2^2)
25			**Practice Roots**
26	9.077444574		Take the square root of value 3 (√V3)
28			**Count numbers in a set**
29			Count how many values are above using COUNT
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

Formula Basics



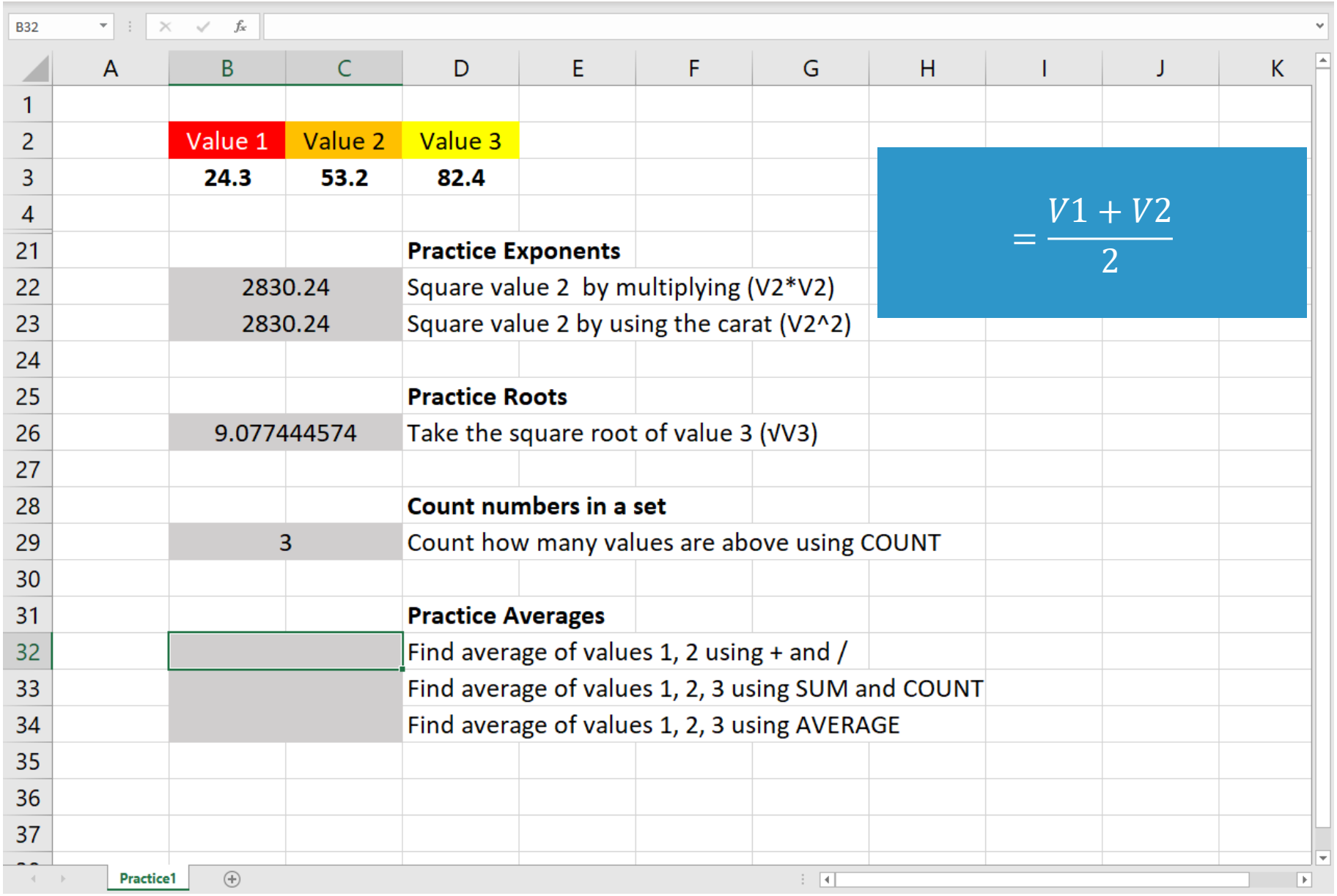
Collision Analytics

Formula Basics



	B	C	D
2	Value 1	Value 2	Value 3
3	**24.3**	**53.2**	**82.4**
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)
25			**Practice Roots**
26	9.077444574		Take the square root of value 3 (√V3)
28			**Count numbers in a set**
29	3		Count how many values are above using COUNT
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

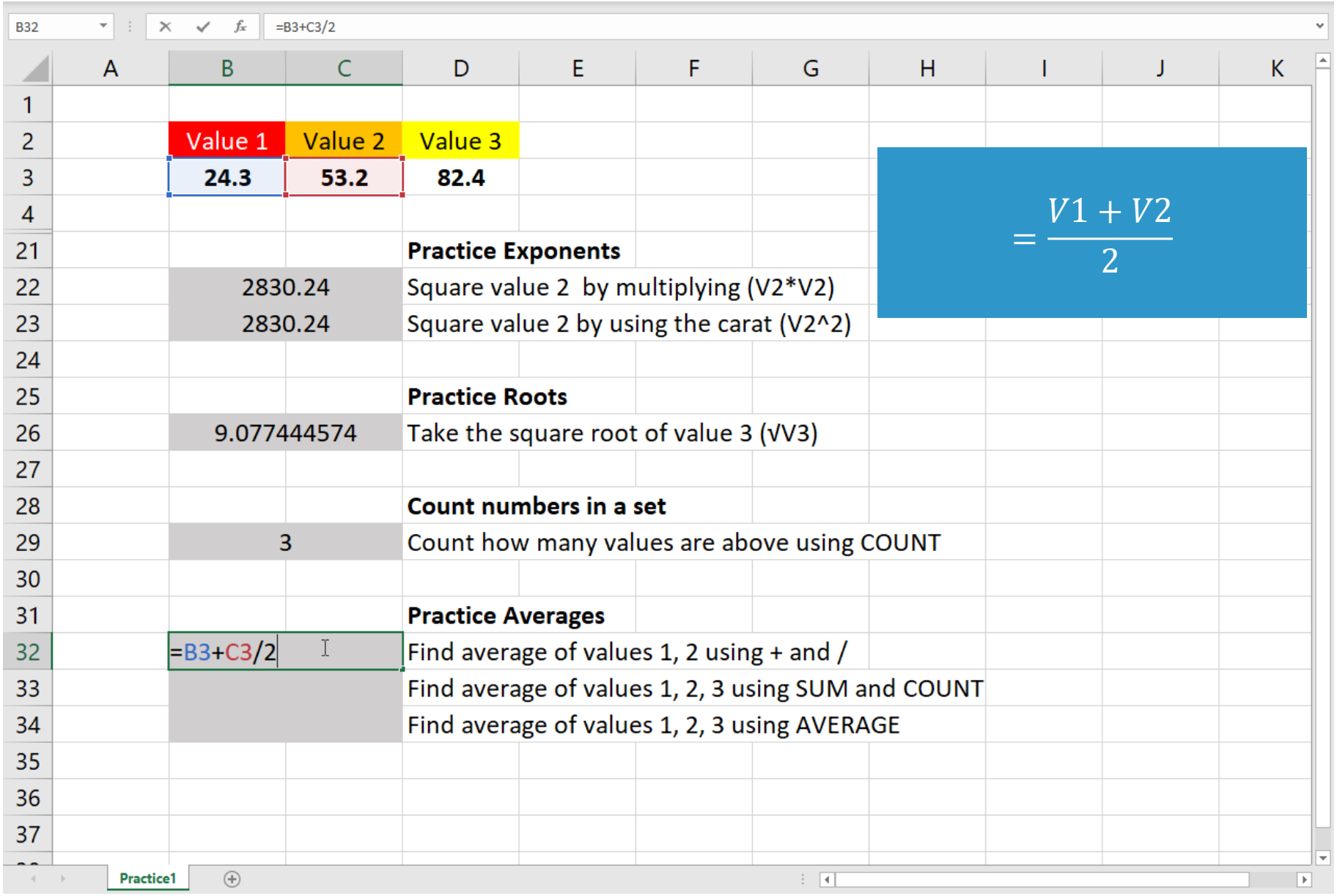
Formula Basics



	B	C	D
2	Value 1	Value 2	Value 3
3	**24.3**	**53.2**	**82.4**
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)
25			**Practice Roots**
26	9.077444574		Take the square root of value 3 (√V3)
28			**Count numbers in a set**
29	3		Count how many values are above using COUNT
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

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

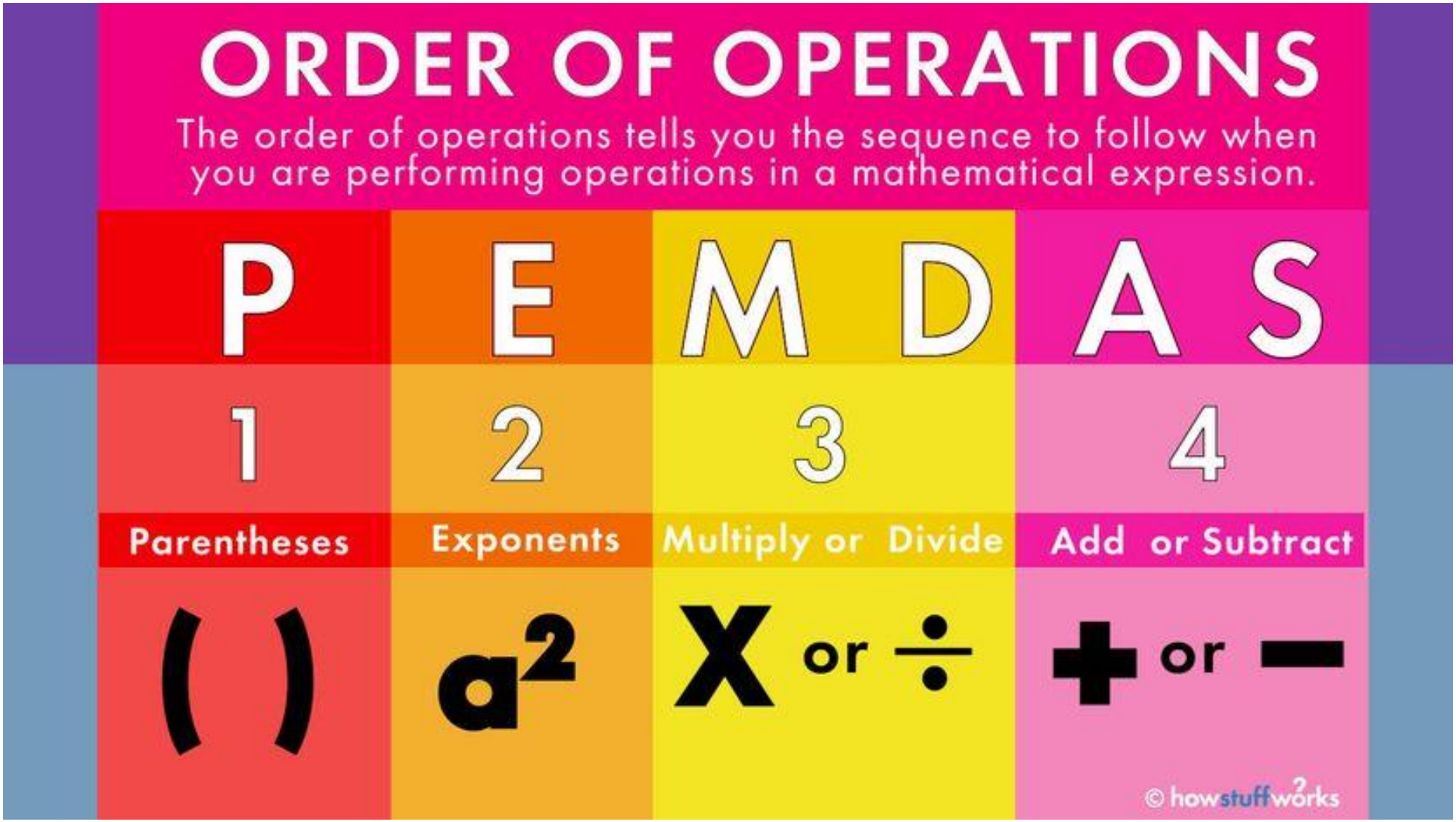
Formula Basics



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

Collision Analytics

Formula Basics



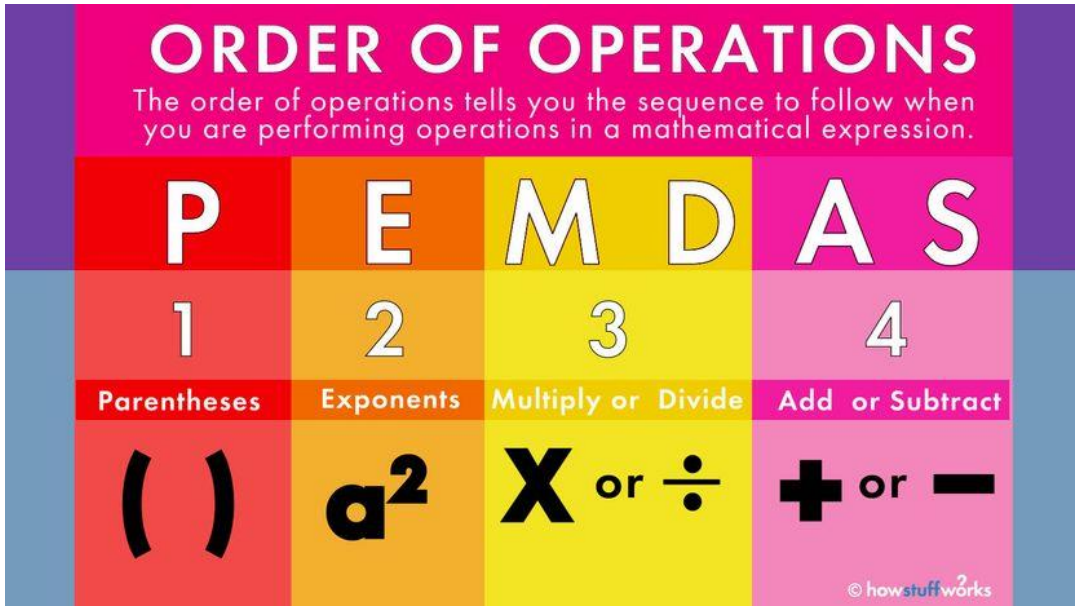
https://science.howstuffworks.com/math-concepts/PEMDAS.htm

Collision Analytics

Formula Basics

$$= V1 + V2/2$$

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



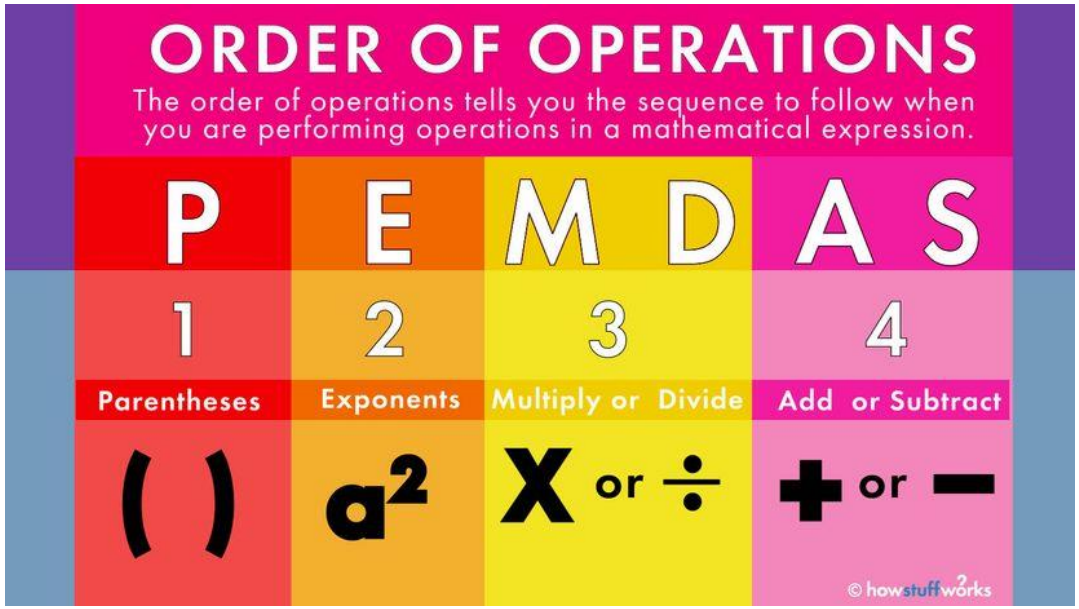
Collision Analytics

Formula Basics

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

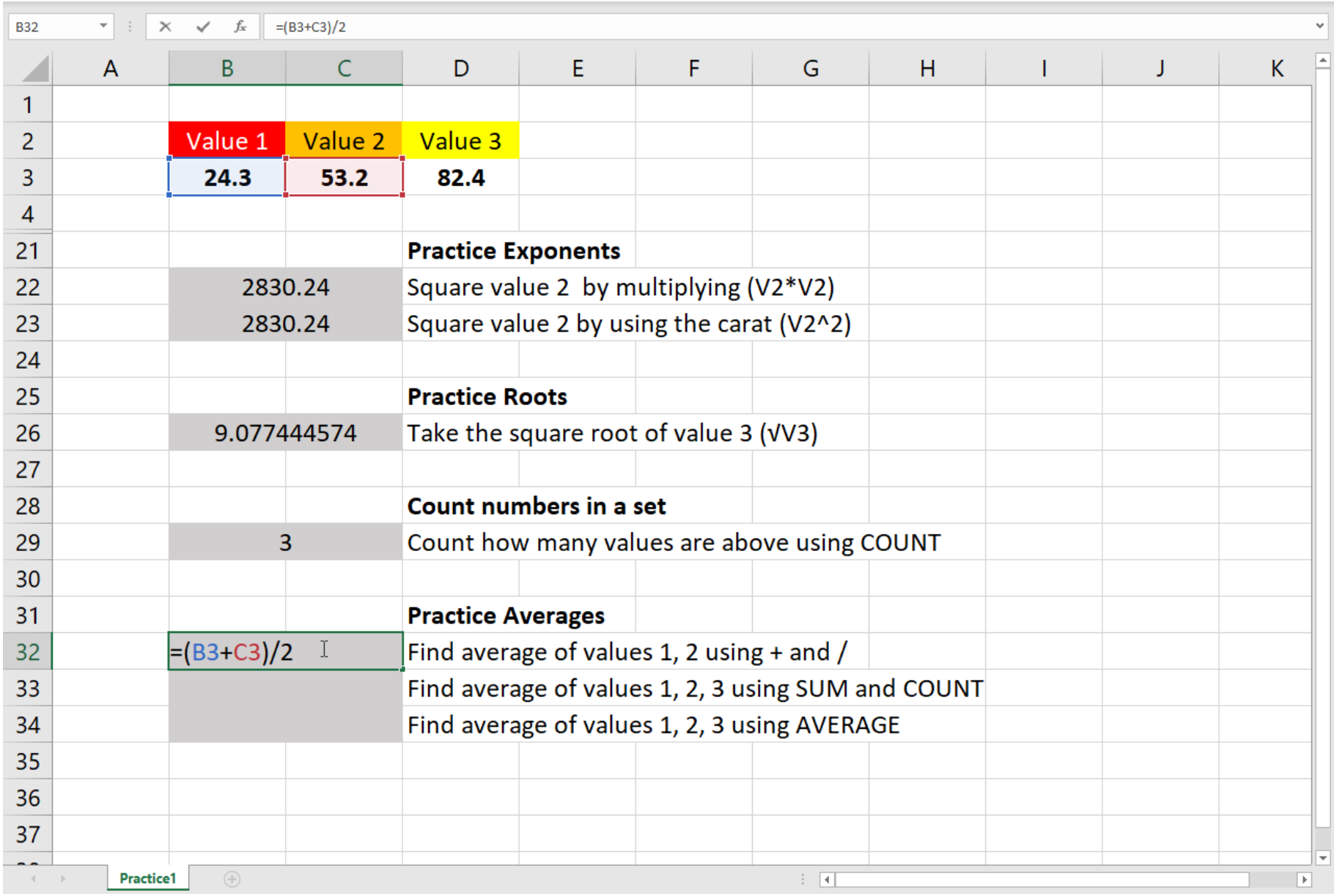
$$= \frac{(V1 + V2)}{2}$$

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



Collision Analytics

Formula Basics

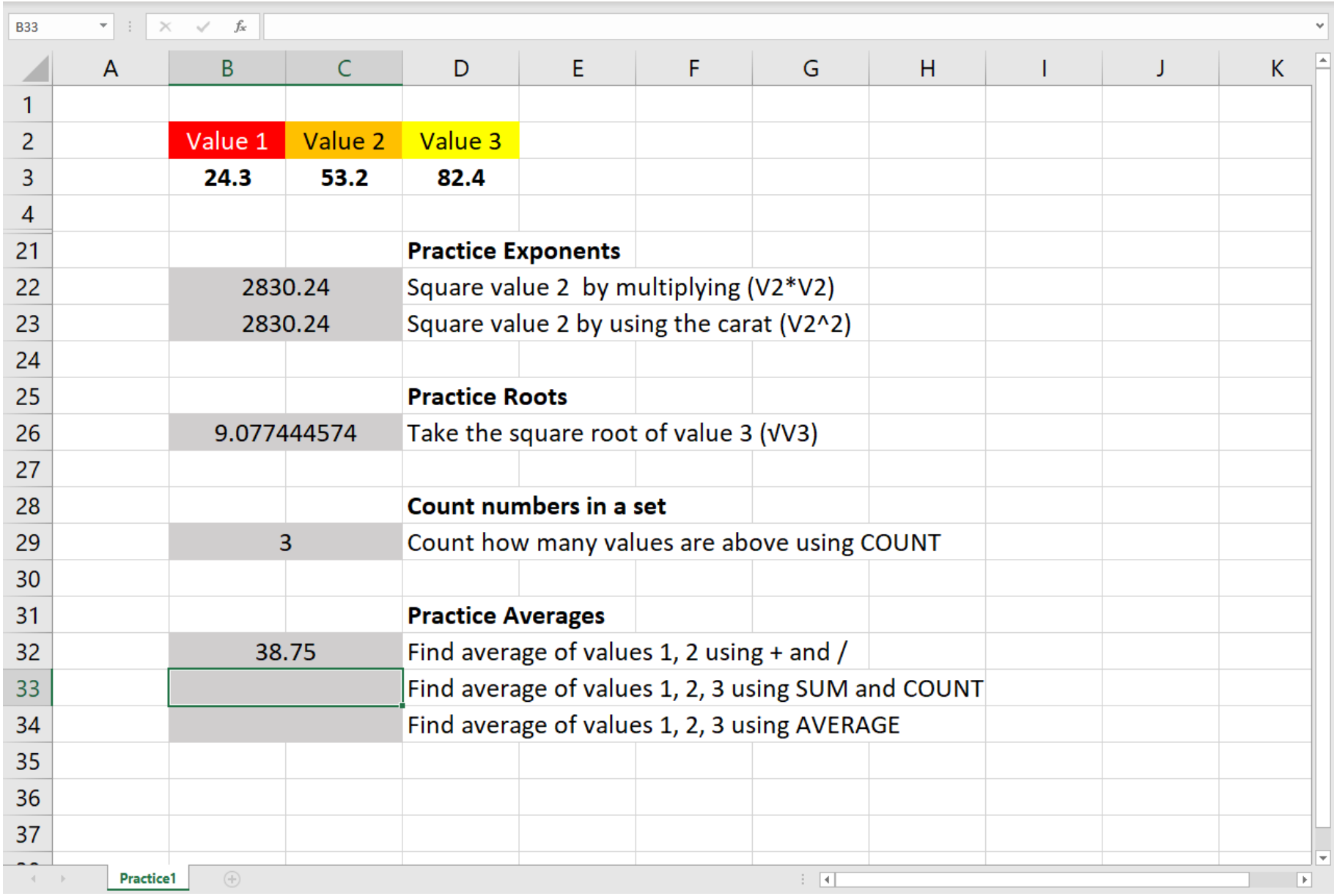


B32 | =(B3+C3)/2

	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											

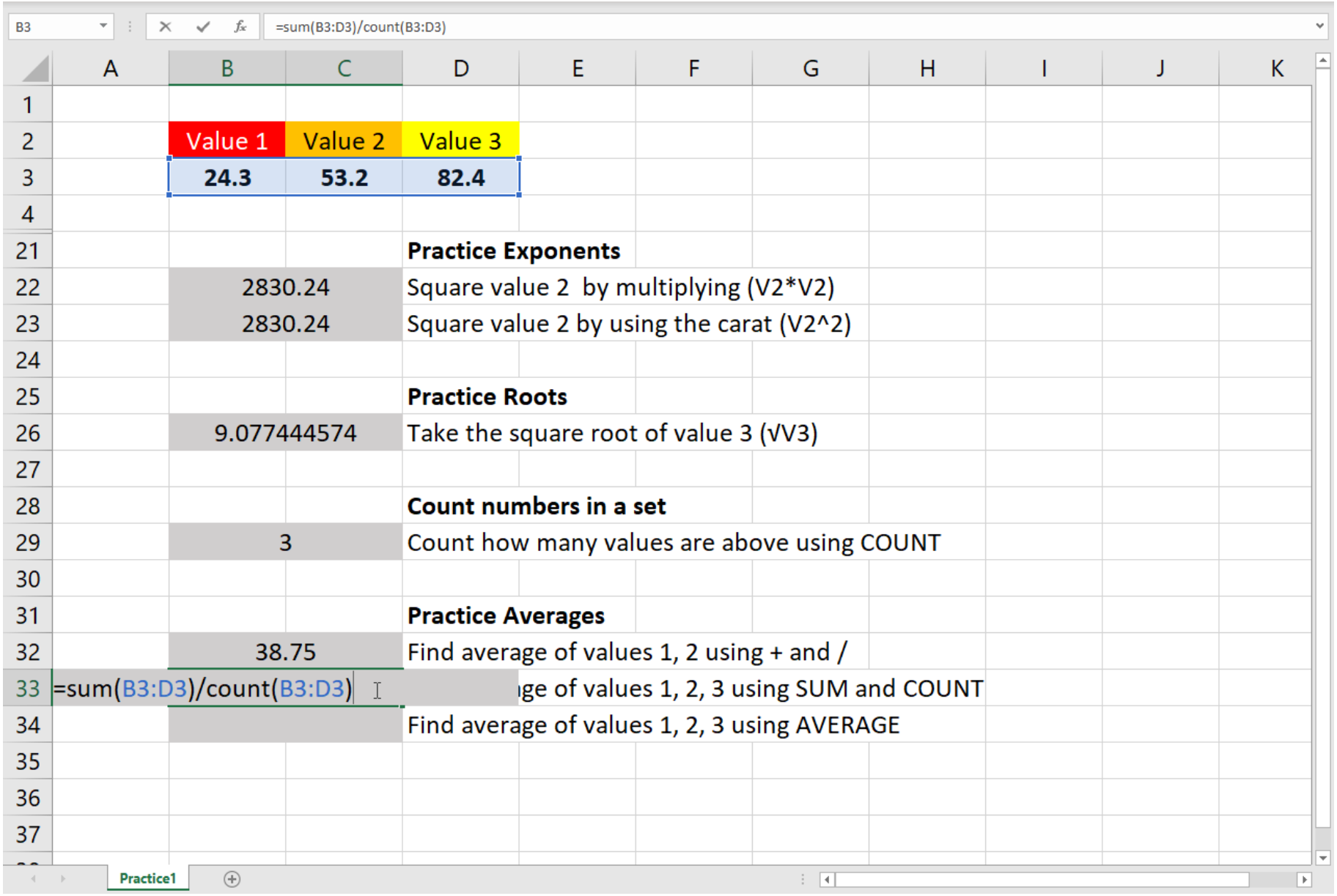
Practice1

Formula Basics



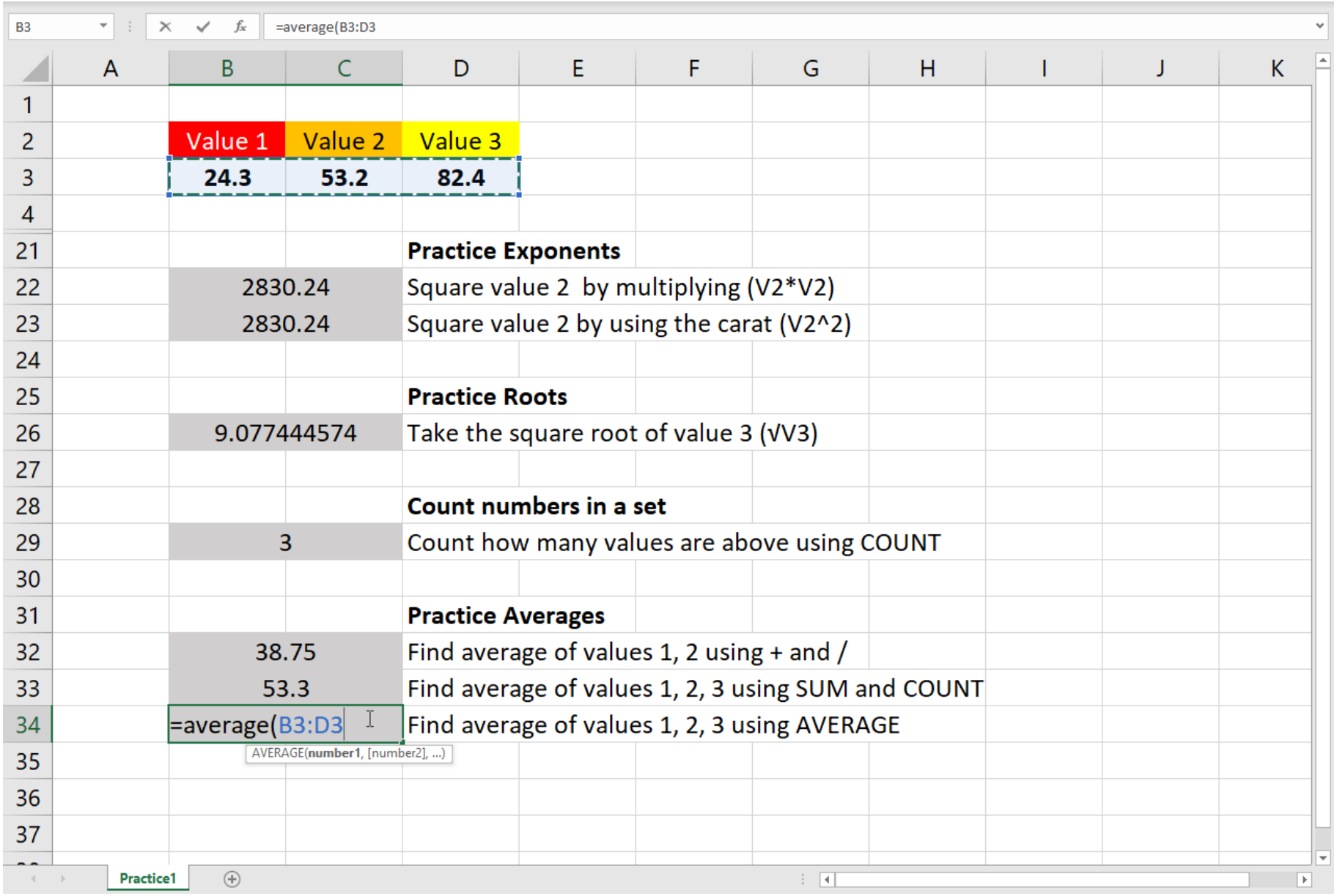
	B	C	D
2	Value 1	Value 2	Value 3
3	**24.3**	**53.2**	**82.4**
21			**Practice Exponents**
22	2830.24		Square value 2 by multiplying (V2*V2)
23	2830.24		Square value 2 by using the carat (V2^2)
25			**Practice Roots**
26	9.077444574		Take the square root of value 3 (√V3)
28			**Count numbers in a set**
29	3		Count how many values are above using COUNT
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

Formula Basics



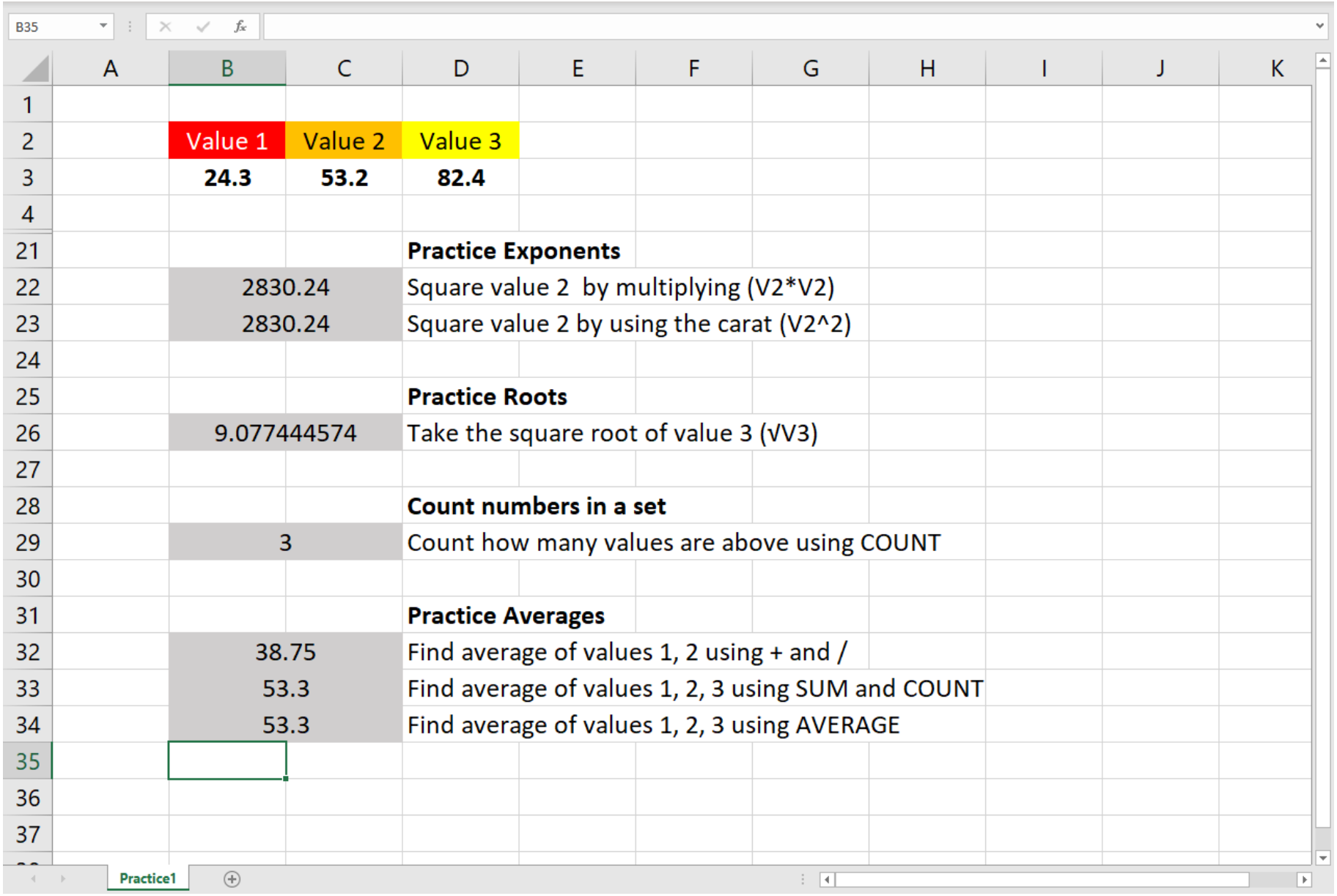
Collision Analytics

Formula Basics



Collision Analytics

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		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											

Excel Crash Reconstruction Basics

Excel for Crash Reconstruction

Collision Analytics

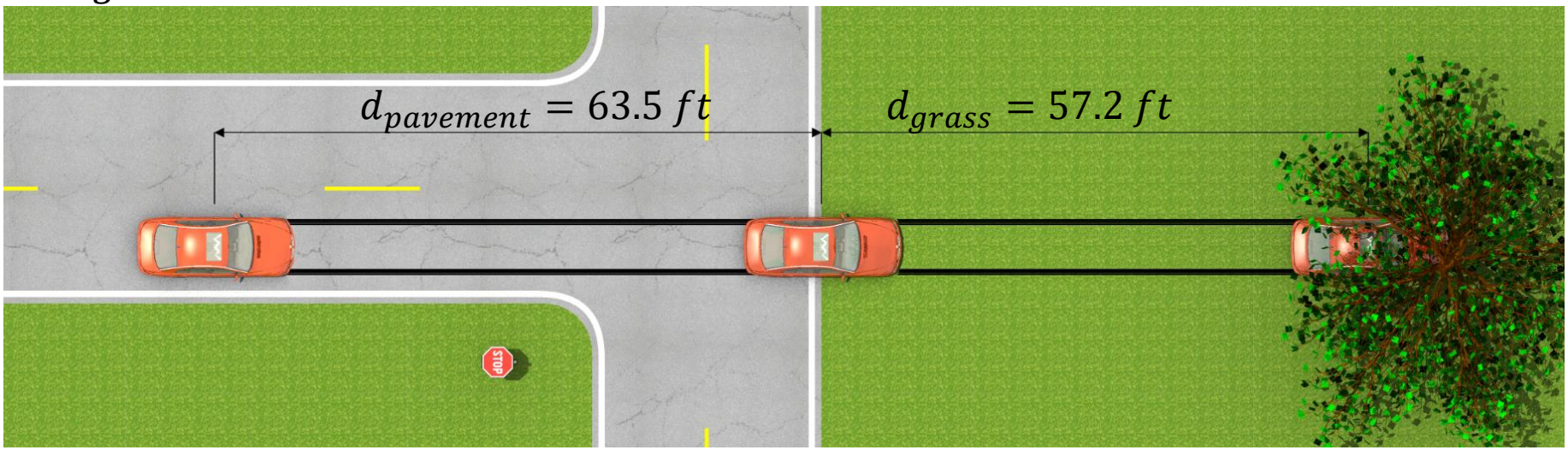
Scenario

The BMW slides through a T-intersection

It impacts a tree at 22 mph

$f_{pavement} = 0.70 \rightarrow 0.80$

$f_{grass} = 0.45 \rightarrow 0.55$

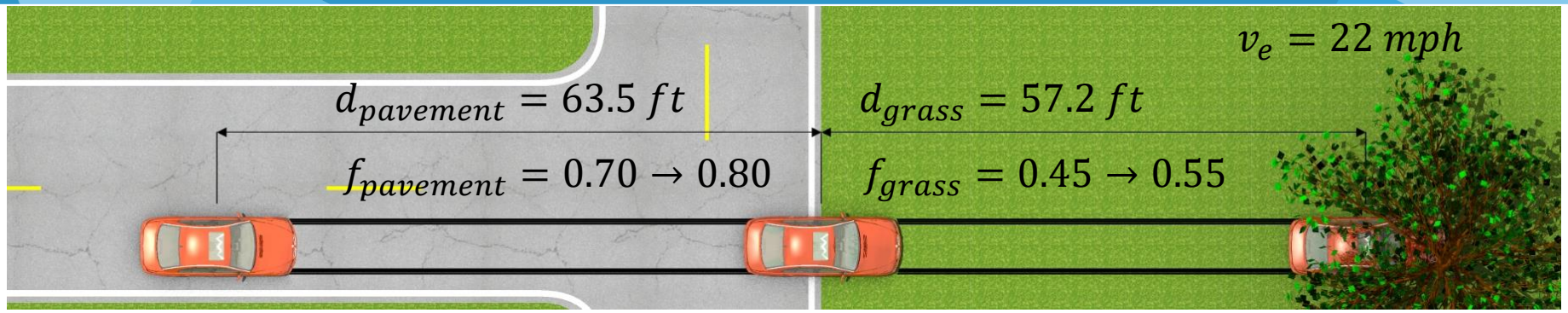


How fast was the BWM traveling when it left the pavement?

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

How long was the BMW skidding?

Excel Crash Recon Basics



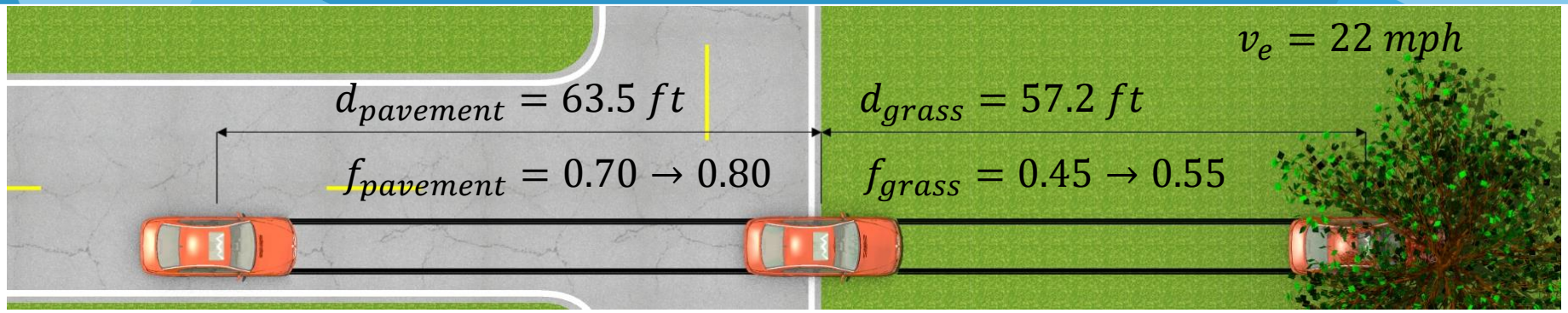
	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*			*f-high*		
4			*f-low*			*f-low*		
5			*d*	ft		*d*		ft
6								
7								
8			**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**	
9			*mph*	*ft/s*	*ft*	*ft/s/s*	*s*	
10		**Start of Skid**						
11								
12		**Pavement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

Practice1 | Practice1SOL | **ReconBasic** | ReconBasicSOL

Tab: ReconBasic

Collision Analytics

Excel Crash Recon Basics



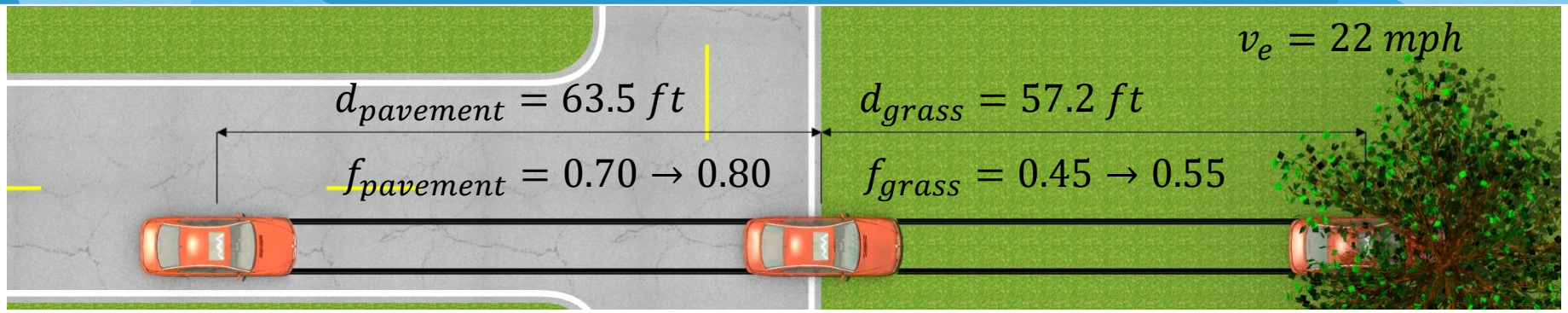
		Pavement			Grass		
	f-high	**0.8**		*f-high*	**0.55**		
	f-low	**0.7**		*f-low*	**0.45**		
	d	**63.5**	ft	*d*	**57.2**	ft	

	Velocity	Velocity	Distance	Acceleration	Time
	mph	*ft/s*	*ft*	*ft/s/s*	*s*
Start of Skid					
			63.5		
Pavement to Grass					
			57.2		
Tree Impact	22				

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics



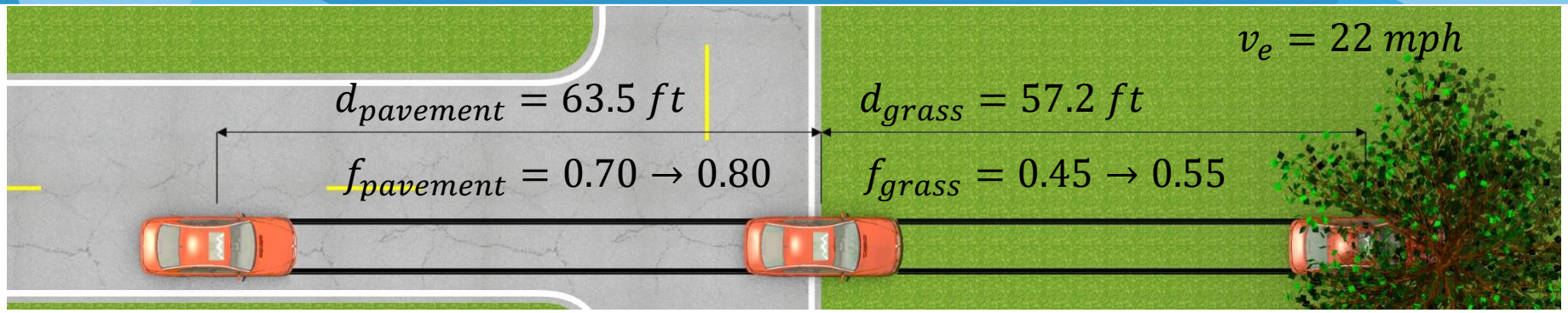
F11 =C3*-32.2

	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high* **0.8**			*f-high* **0.55**		
4			*f-low* **0.7**			*f-low* **0.45**		
5			*d* **63.5**	ft		*d* **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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics



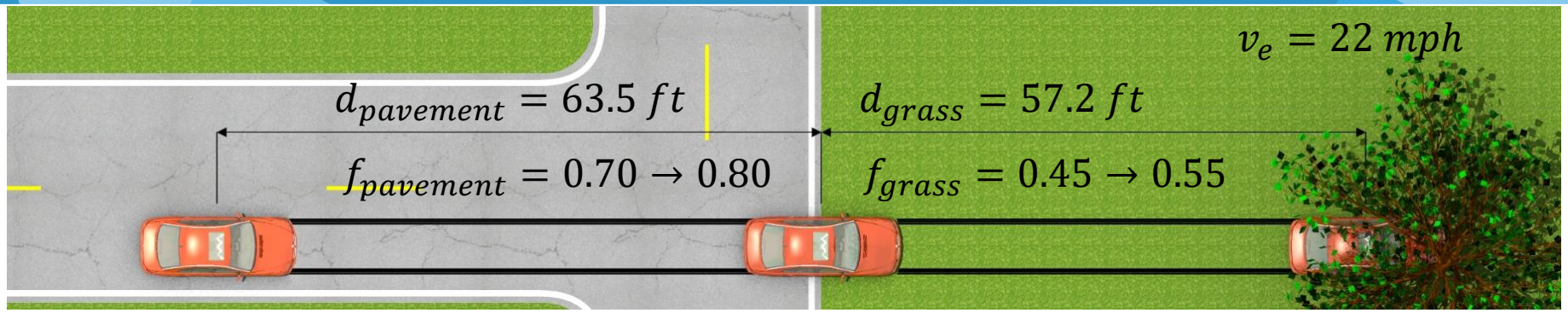
F13 =F3*-32.2

	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics

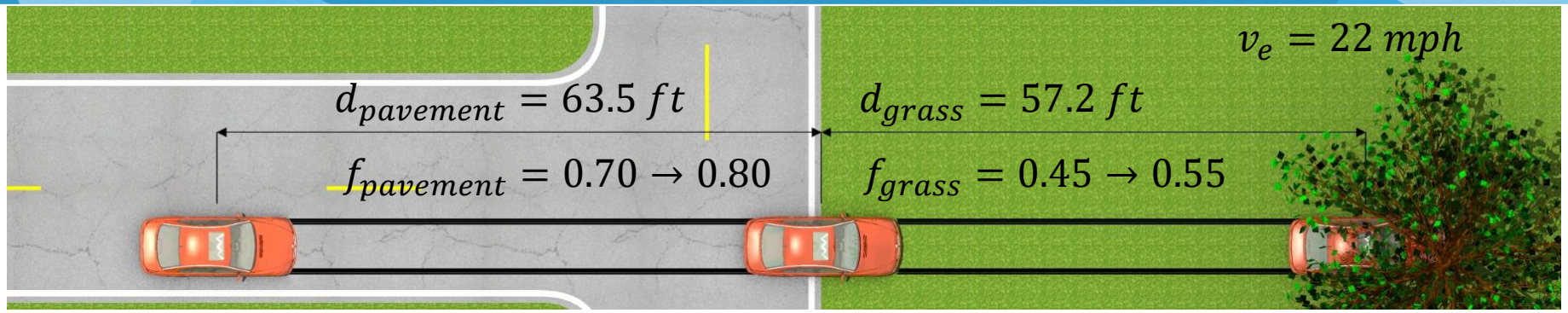


	Pavement			Grass		
f-high	**0.8**			*f-high*	**0.55**	
f-low	**0.7**			*f-low*	**0.45**	
d	**63.5**	ft		*d*	**57.2**	ft

	Velocity	Velocity	Distance	Acceleration	Time
	mph	*ft/s*	*ft*	*ft/s/s*	*s*
Start of Skid					
			63.5	-25.76	
Pavement to Grass					
			57.2	-17.71	
Tree Impact	22				

Collision Analytics

Excel Crash Recon Basics



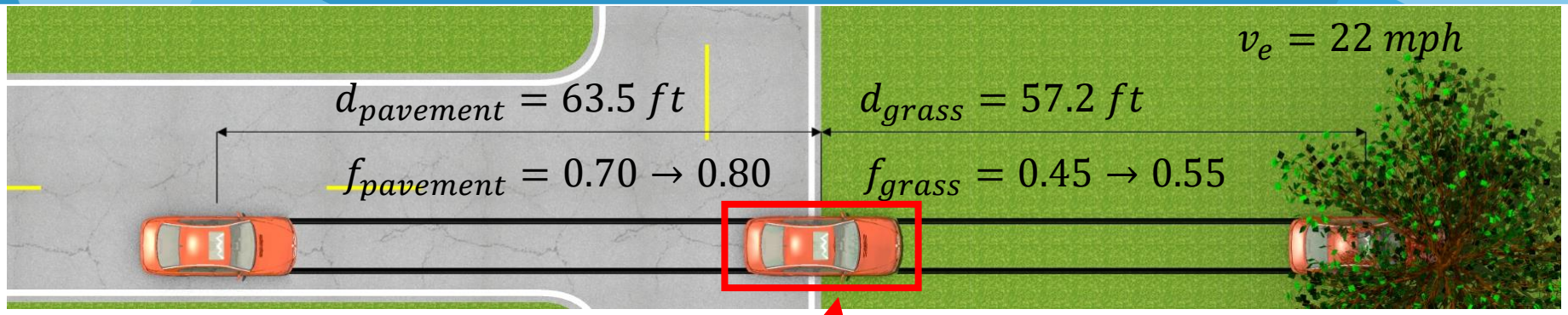
D14 =C14*1.467

	A	B	C	D	E	F	G	H
1								
2			Pavement			Grass		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics

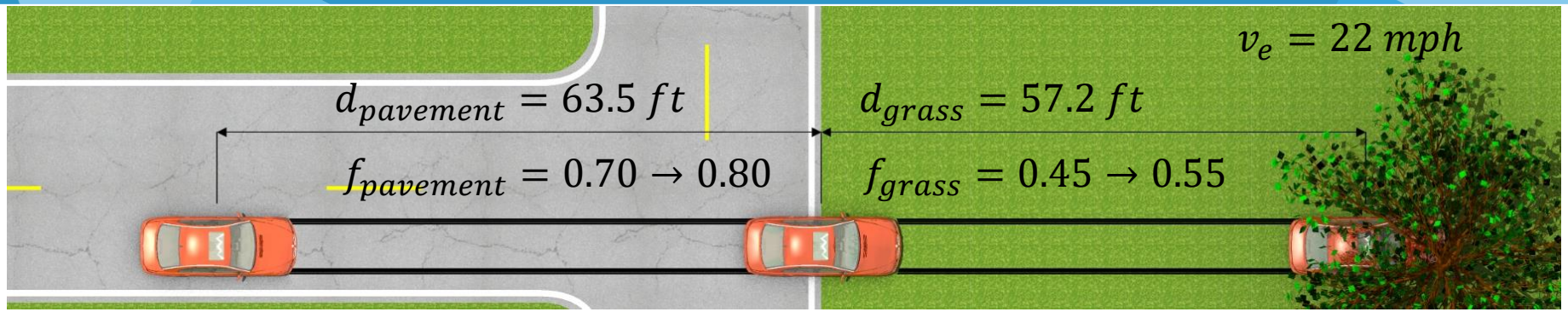


	Pavement			Grass		
f-high	**0.8**			*f-high*	**0.55**	
f-low	**0.7**			*f-low*	**0.45**	
d	**63.5**	ft		*d*	**57.2**	ft

	Velocity	Velocity	Distance	Acceleration	Time
	mph	*ft/s*	*ft*	*ft/s/s*	*s*
Start of Skid					
			63.5	-25.76	
Pavement to Grass					
			57.2	-17.71	
Tree Impact	22	32.274			

Collision Analytics

Excel Crash Recon Basics



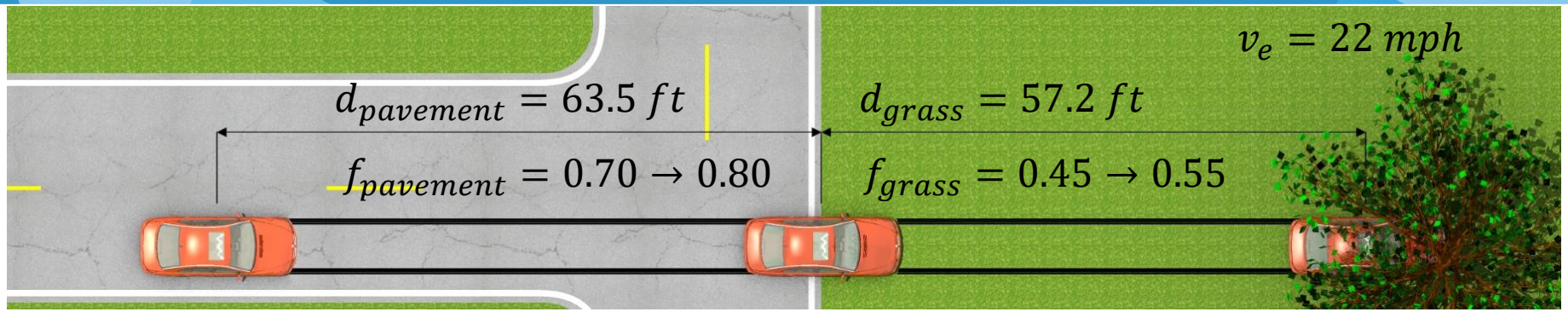
$$v_i = \sqrt{v_e^2 - 2ad}$$

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

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

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

Excel Crash Recon Basics

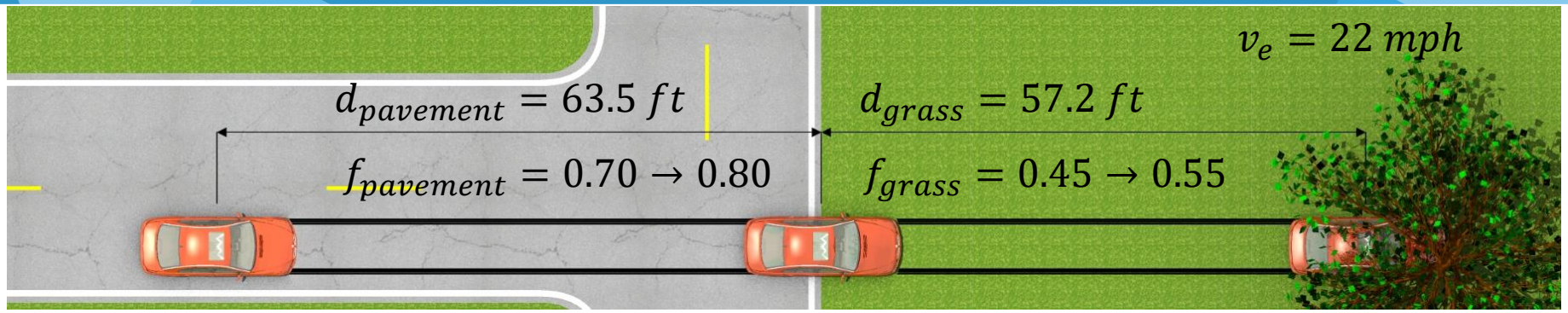


YouTube

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

Collision Analytics

Excel Crash Recon Basics



=SQRT((D14^2)-(2*F13*E13))

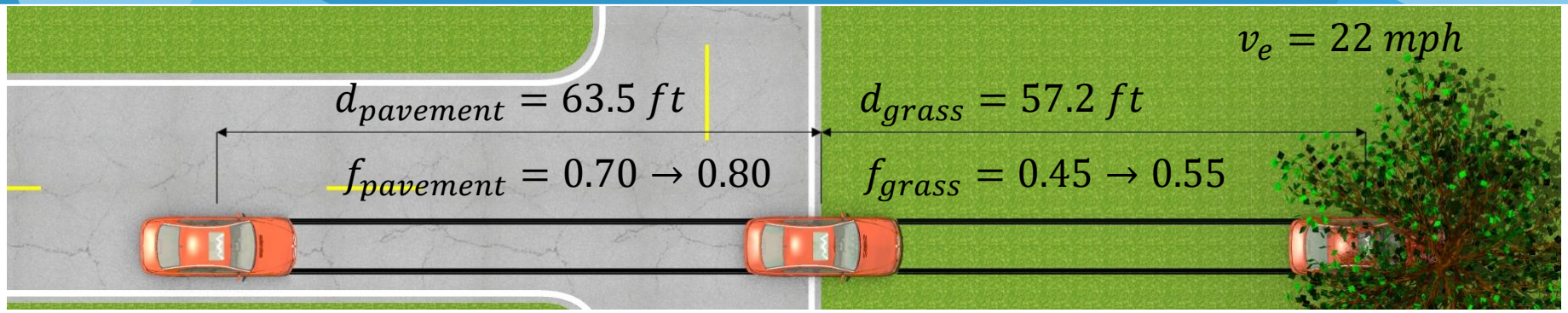
	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**57.2**	ft
6								
7								
8			**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**	
9			*mph*	*ft/s*	*ft*	*ft/s/s*	*s*	
10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

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

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

Collision Analytics

Excel Crash Recon Basics



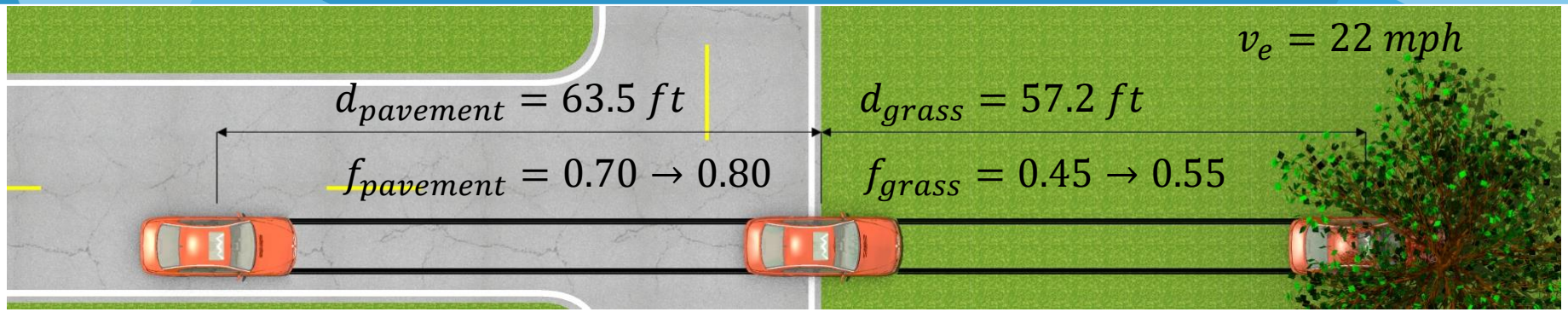
D12 =SQRT((D14^2)-(2*F13*E13))

	A	B	C	D	E	F	G	H
1								
2			Pavement			Grass		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**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**		55.38623544				
13					57.2	-17.71		
14		**Tree Impact**	22	32.274				
15								
16								
17								
18								
19								
20								
21								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

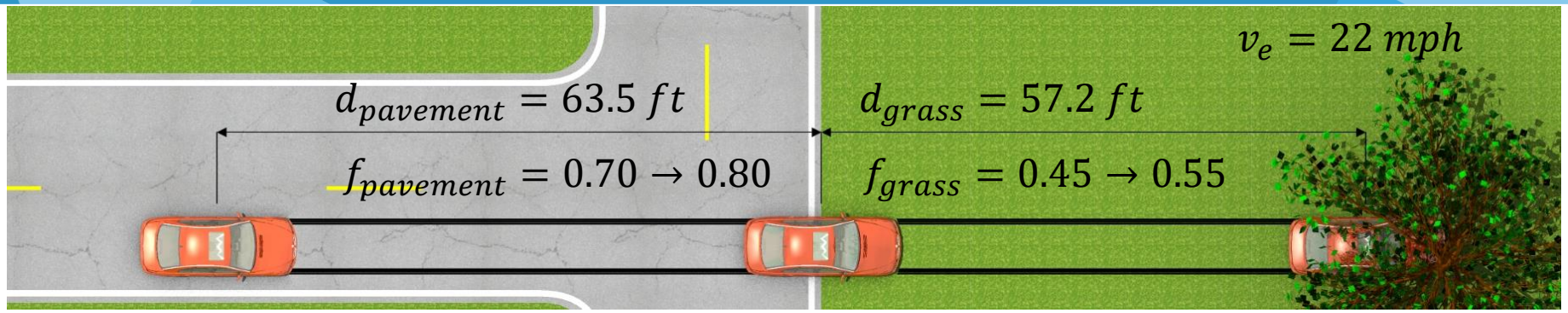
Excel Crash Recon Basics



YouTube

Collision Analytics

Excel Crash Recon Basics



=SQRT((D12^2)-(2*F11*E11))

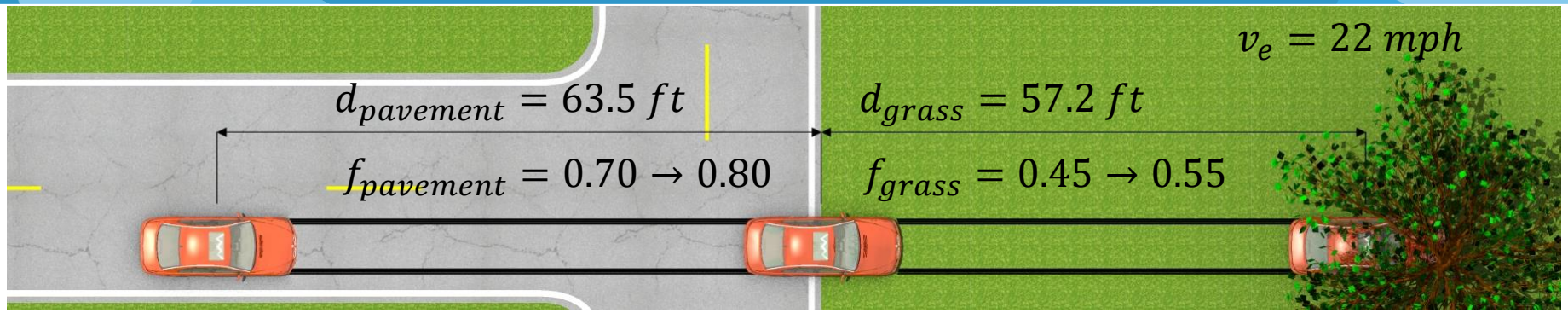
	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**57.2**	ft
6								
7								
8			**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**	
9			*mph*	*ft/s*	*ft*	*ft/s/s*	*s*	
10		**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

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

Collision Analytics

Excel Crash Recon Basics



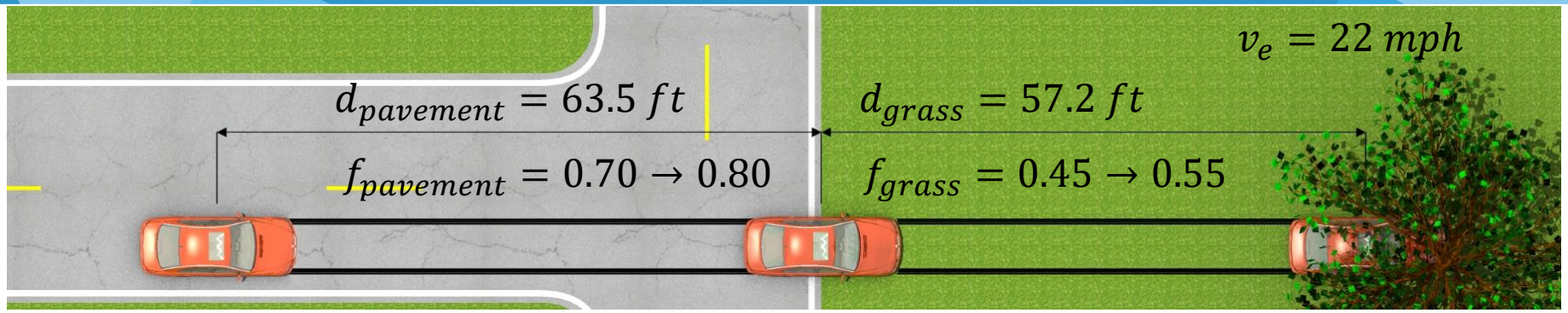
D10 =SQRT((D12^2)-(2*F11*E11))

	A	B	C	D	E	F	G	H
1								
2			Pavement			Grass		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics



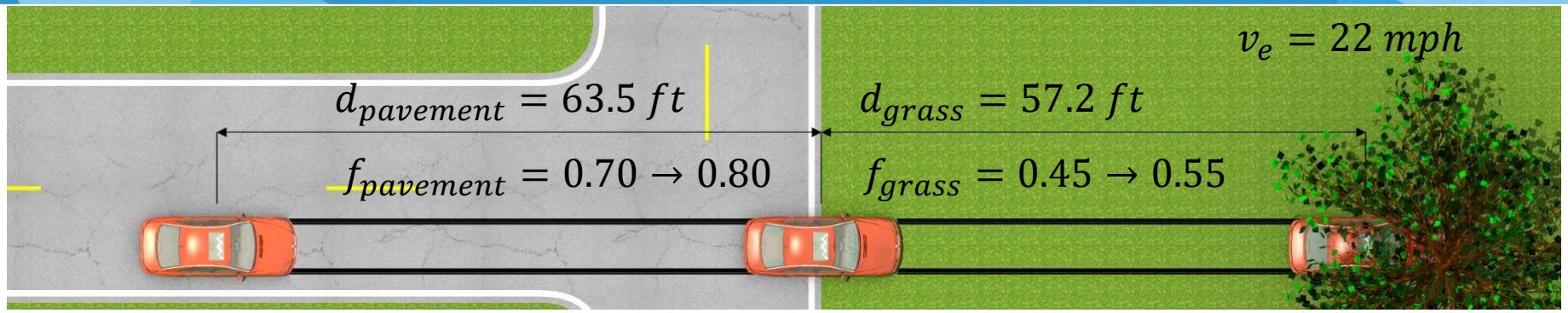
SUM | =D12/1.467

	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics

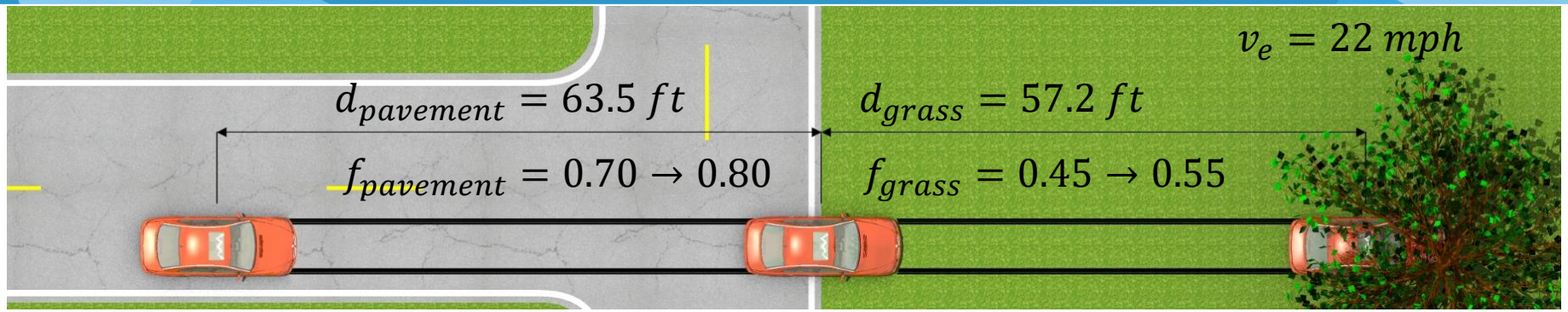


	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**57.2**	ft
6								
7								
8			**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**	
9			*mph*	*ft/s*	*ft*	*ft/s/s*	*s*	
10		**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								

Practice1 | Practice1SOL | **ReconBasic** | ReconBasicSOL

Collision Analytics

Excel Crash Recon Basics



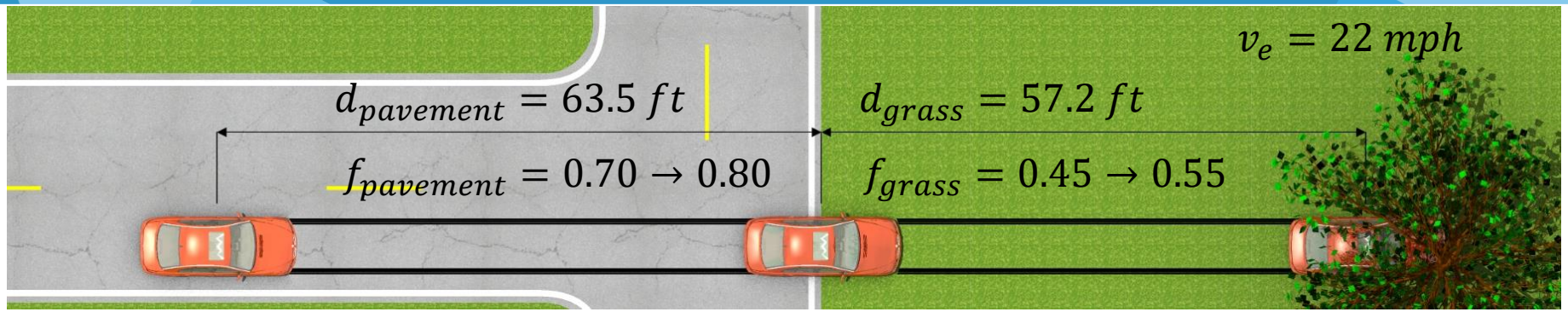
$$t = \frac{v_e - v_i}{a}$$

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

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

Collision Analytics

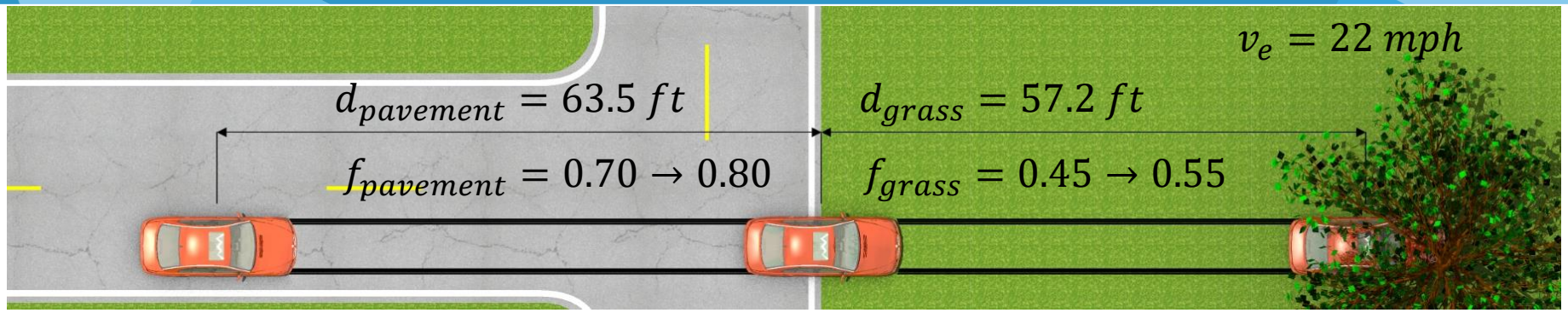
Excel Crash Recon Basics



YouTube

Collision Analytics

Excel Crash Recon Basics



SUM | =(D14-D12)/F13

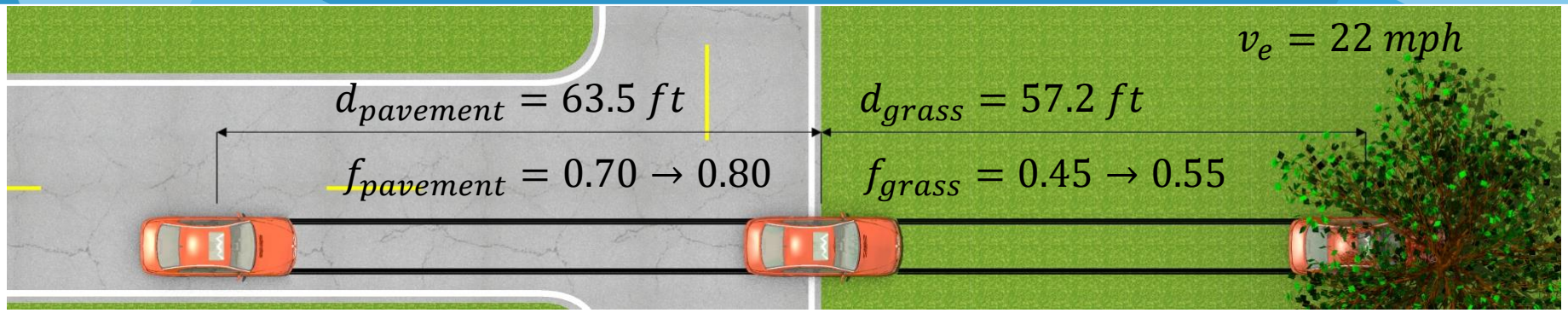
	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**57.2**	ft
6								
7								
8			**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**	
9			*mph*	*ft/s*	*ft*	*ft/s/s*	*s*	
10		**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

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

Collision Analytics

Excel Crash Recon Basics



SUM | =(D12-D10)/F11

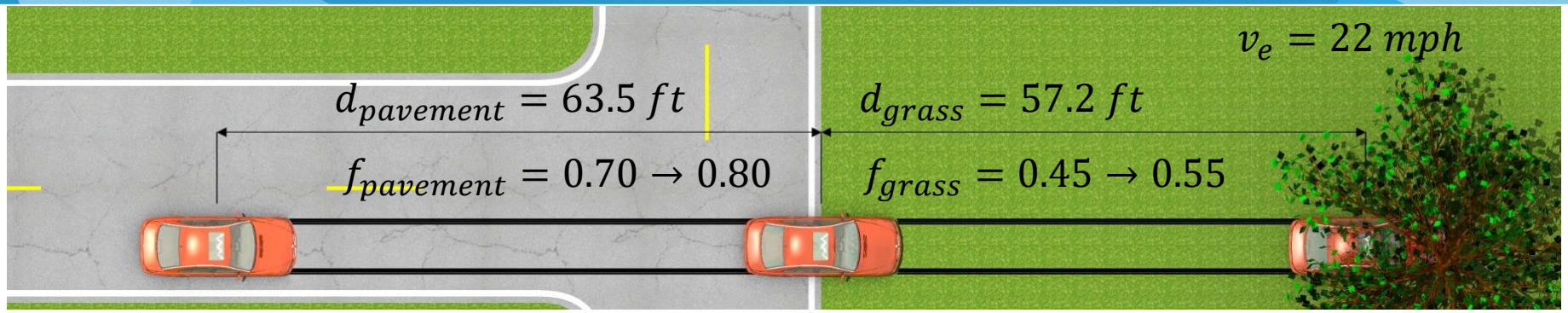
	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**57.2**	ft
6								
7								
8			**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**	
9			*mph*	*ft/s*	*ft*	*ft/s/s*	*s*	
10		**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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

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

Collision Analytics

Excel Crash Recon Basics



G11 =(D12-D10)/F11

	A	B	C	D	E	F	G	H
1								
2			**Pavement**			**Grass**		
3			*f-high*	**0.8**		*f-high*	**0.55**	
4			*f-low*	**0.7**		*f-low*	**0.45**	
5			*d*	**63.5**	ft	*d*	**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	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								

Practice1 | Practice1SOL | ReconBasic | ReconBasicSOL

Collision Analytics

Formatting & Conditional Formatting

Excel for Crash Reconstruction

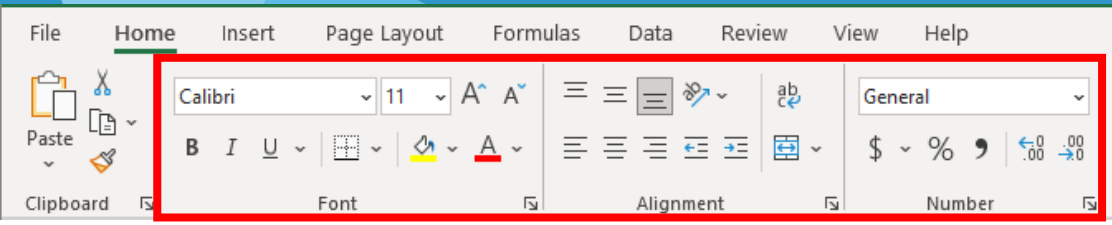
Collision Analytics

Why bother?

- Professional appearance
- Uniform number of decimals
- Simplification
- Readability

	A	B	C	D	E	F	G
1							
2			**Pavement**			**Grass**	
3			***f-high***	**0.8**		***f-high***	**0.55**	
4			***f-low***	**0.7**		***f-low***	**0.45**	
5			***d***	**63.5**	ft	***d***	**57.2**	ft
6								
7								
8				**Velocity**	**Velocity**	**Distance**	**Acceleration**	**Time**
9				***mph***	***ft/s***	***ft***	***ft/s/s***	***s***
10			Start of Skid	54.27321818	79.61881107			
11			**Start of Skid**	**54.273218**	79.61881107			
12						63.5	-25.76	0.940705576
13			Pavement to Grass	37.75476172	55.38623544			
14			**Pavement to Grass**	37.75476172	55.38623544			
15						57.2	-17.71	1.305038703
16			Tree Impact	22	32.274			
17			**Tree Impact**	22	32.274			

Formatting



Text size and color

Cell color

Borders

Alignment

Number formatting

Cell size

Collision Analytics

Formatting

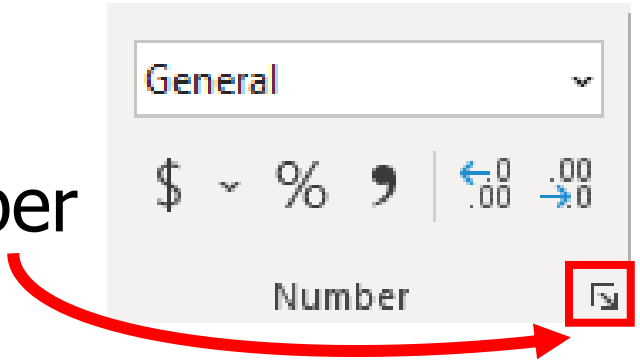
Tab: Formatting

Collision Analytics

Formatting

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”

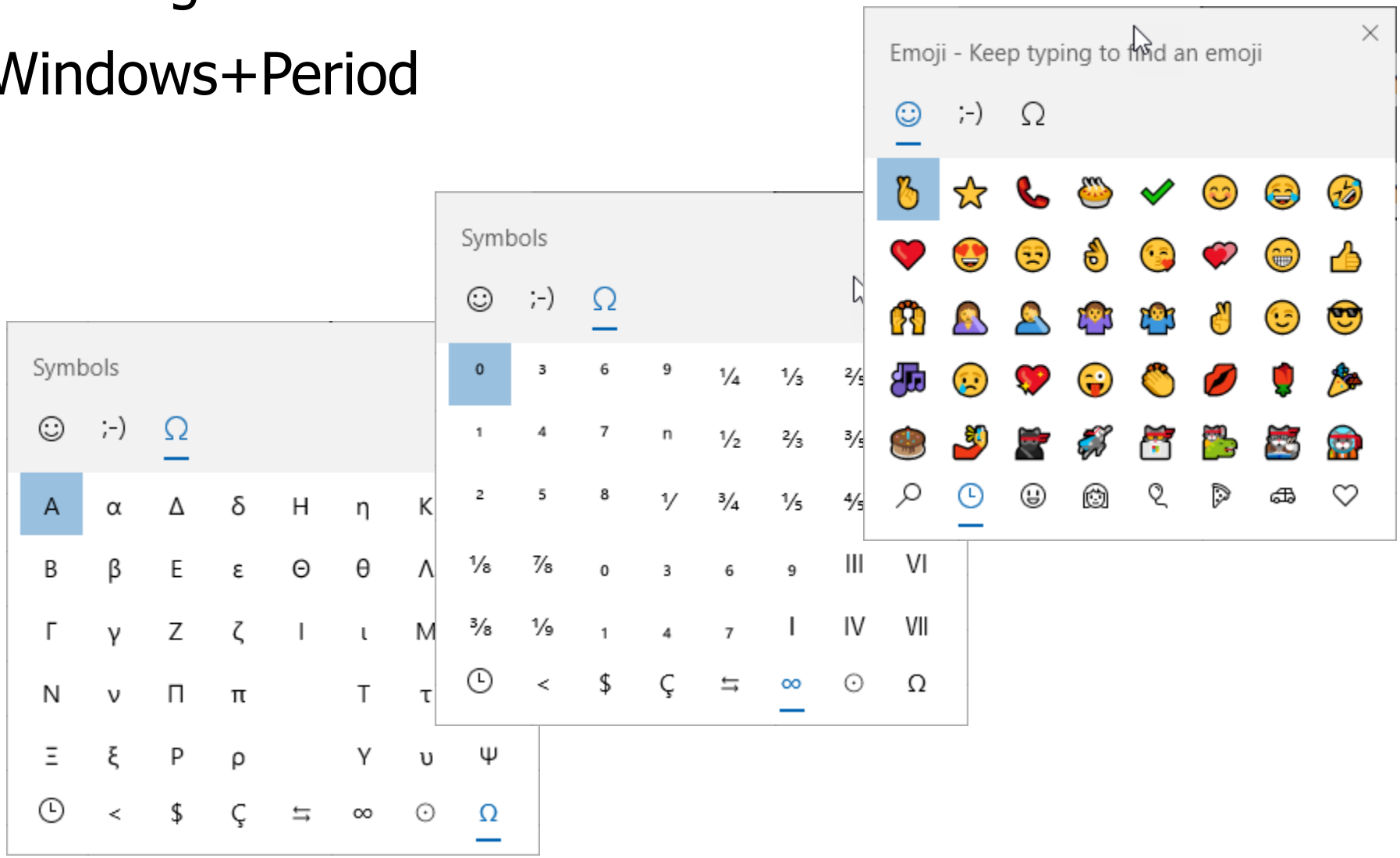
   2-decimals: 0.00 “s”
6. Select OK

Collision Analytics

Formatting

Entering custom characters:

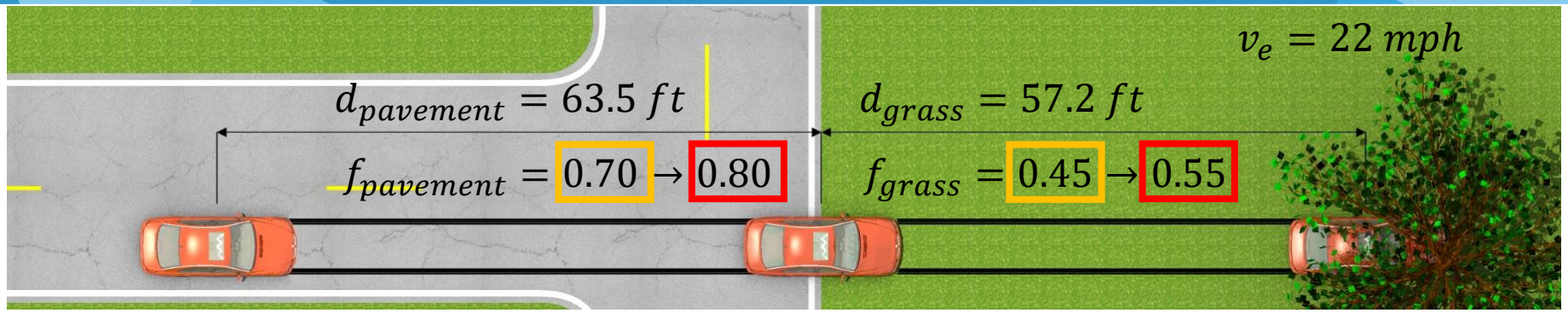
Windows+Period



Collision Analytics

Formatting

Formatting



	Pavement		Grass	
f-high	**0.80**	*f-high*	**0.55**
f-low	**0.70**	*f-low*	**0.45**
d	**63.5 ft**	*d*	**57.2 ft**

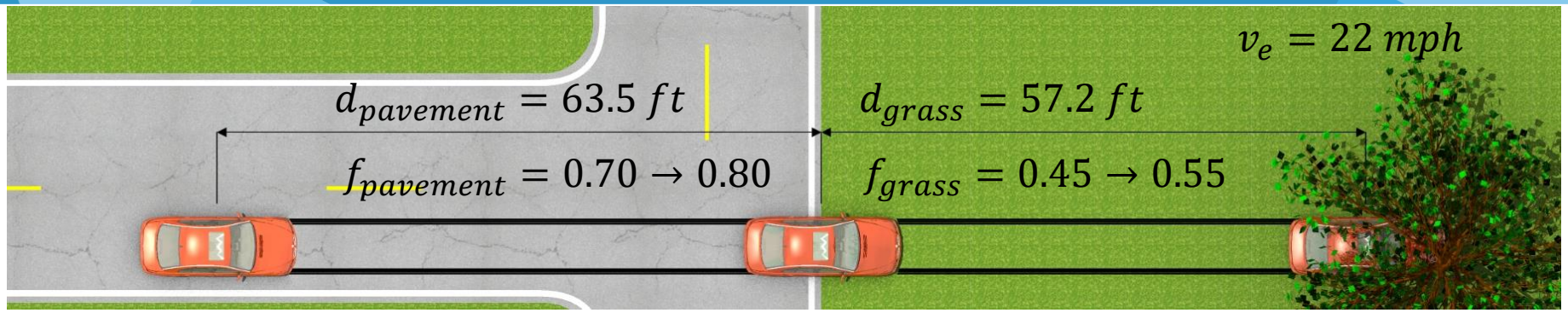
	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	**54.3 mph**	79.6 ft/s			
			63.5 ft	-25.76 ft/s²	0.94 s
Pavement to Grass	37.8 mph	55.4 ft/s			
			57.2 ft	-17.71 ft/s²	1.31 s
Tree Impact	22.0 mph	32.3 ft/s			

Practice1 | Practice1SOL | ReconBasic | **Formatting** | ReconBasicSOL

Collision Analytics

Formatting

Formatting



	Pavement		Grass	
f-high	**0.80**	*f-high*	**0.55**	
f-low	**0.70**	*f-low*	**0.45**	
d	**63.5 ft**	*d*	**57.2 ft**	

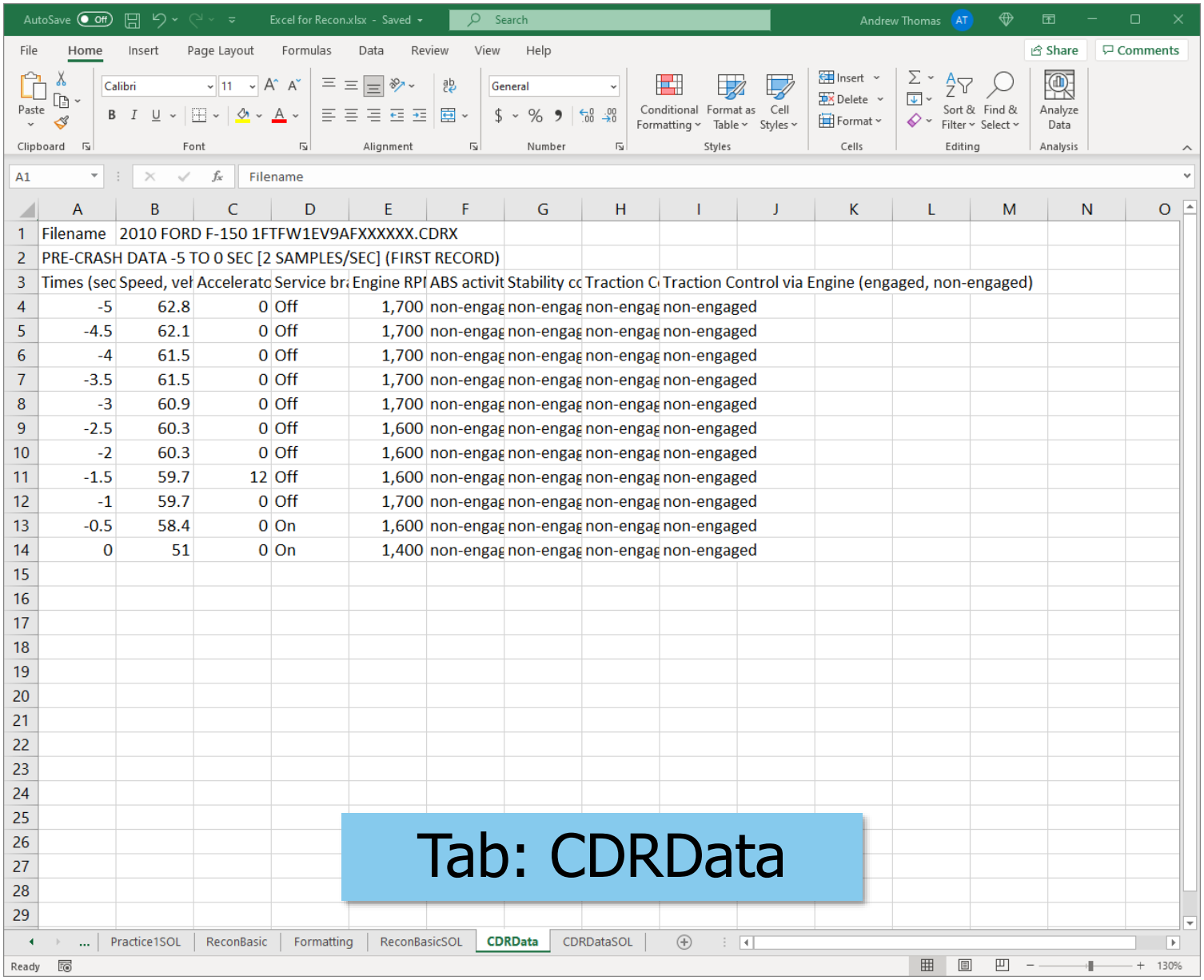
High	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	**54.3 mph**	79.6 ft/s			
			63.5 ft	-25.76 ft/s²	0.94 s
Pavement to Grass	37.8 mph	55.4 ft/s			
			57.2 ft	-17.71 ft/s²	1.31 s
Tree Impact	22.0 mph	32.3 ft/s			

Low	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	**50.8 mph**	74.6 ft/s			
			63.5 ft	-22.54 ft/s²	1.00 s
Pavement to Grass	35.4 mph	52.0 ft/s			
			57.2 ft	-14.49 ft/s²	1.36 s
Tree Impact	22.0 mph	32.3 ft/s			

Practice1 | Practice1SOL | ReconBasic | **Formatting** | ReconBasicSOL

Collision Analytics

Conditional Formatting

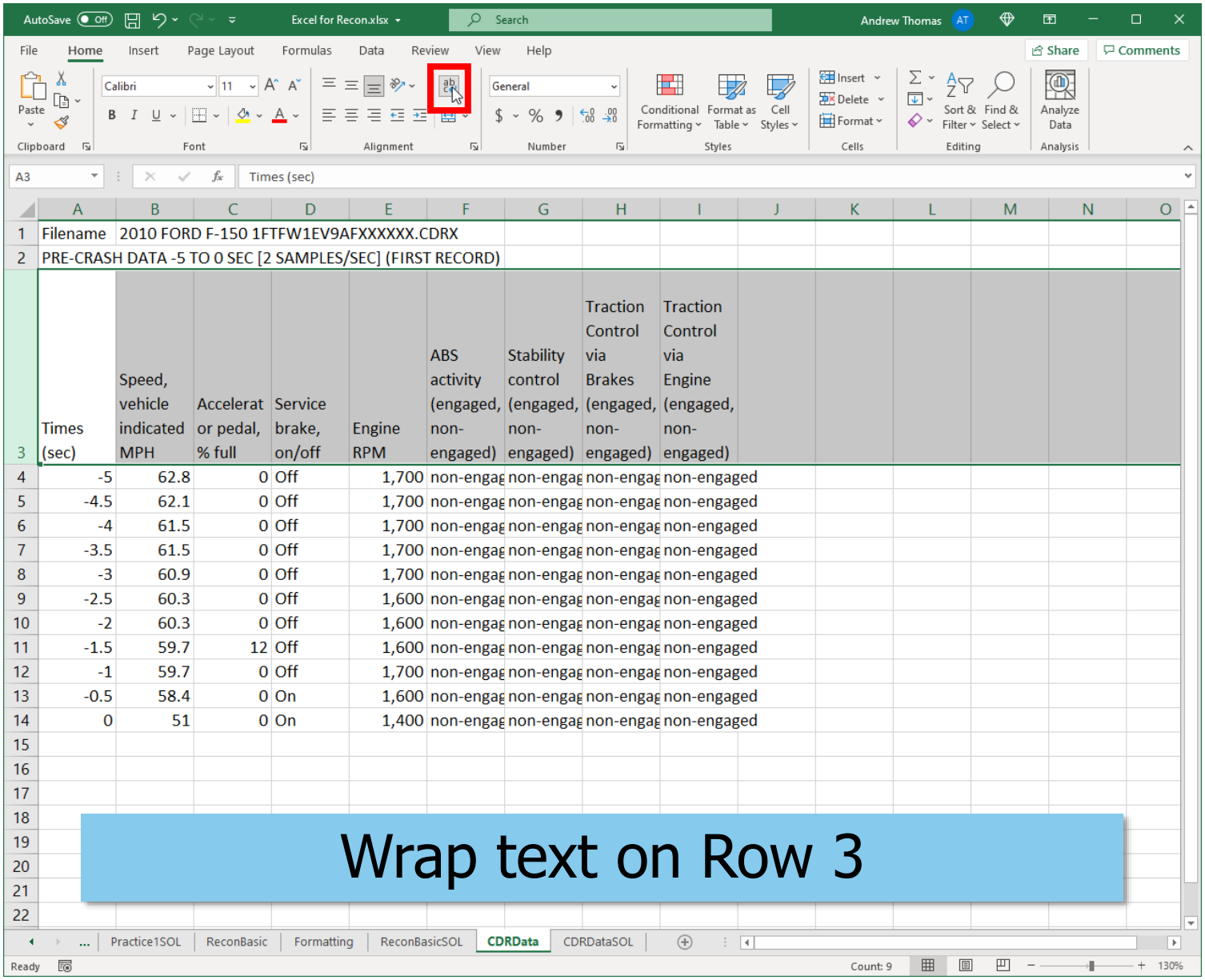


	A	B	C	D	E	F	G	H	I
1	Filename	2010 FORD F-150 1FTFW1EV9AFXXXXXX.CDRX							
2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)								
3	Times (sec	Speed, vel	Accelerato	Service bra	Engine RPI	ABS activit	Stability co	Traction C	Traction Control via Engine (engaged, non-engaged)
4	-5	62.8	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
5	-4.5	62.1	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
6	-4	61.5	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
7	-3.5	61.5	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
8	-3	60.9	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
9	-2.5	60.3	0	Off	1,600	non-engag	non-engag	non-engag	non-engaged
10	-2	60.3	0	Off	1,600	non-engag	non-engag	non-engag	non-engaged
11	-1.5	59.7	12	Off	1,600	non-engag	non-engag	non-engag	non-engaged
12	-1	59.7	0	Off	1,700	non-engag	non-engag	non-engag	non-engaged
13	-0.5	58.4	0	On	1,600	non-engag	non-engag	non-engag	non-engaged
14	0	51	0	On	1,400	non-engag	non-engag	non-engag	non-engaged

Tab: CDRData

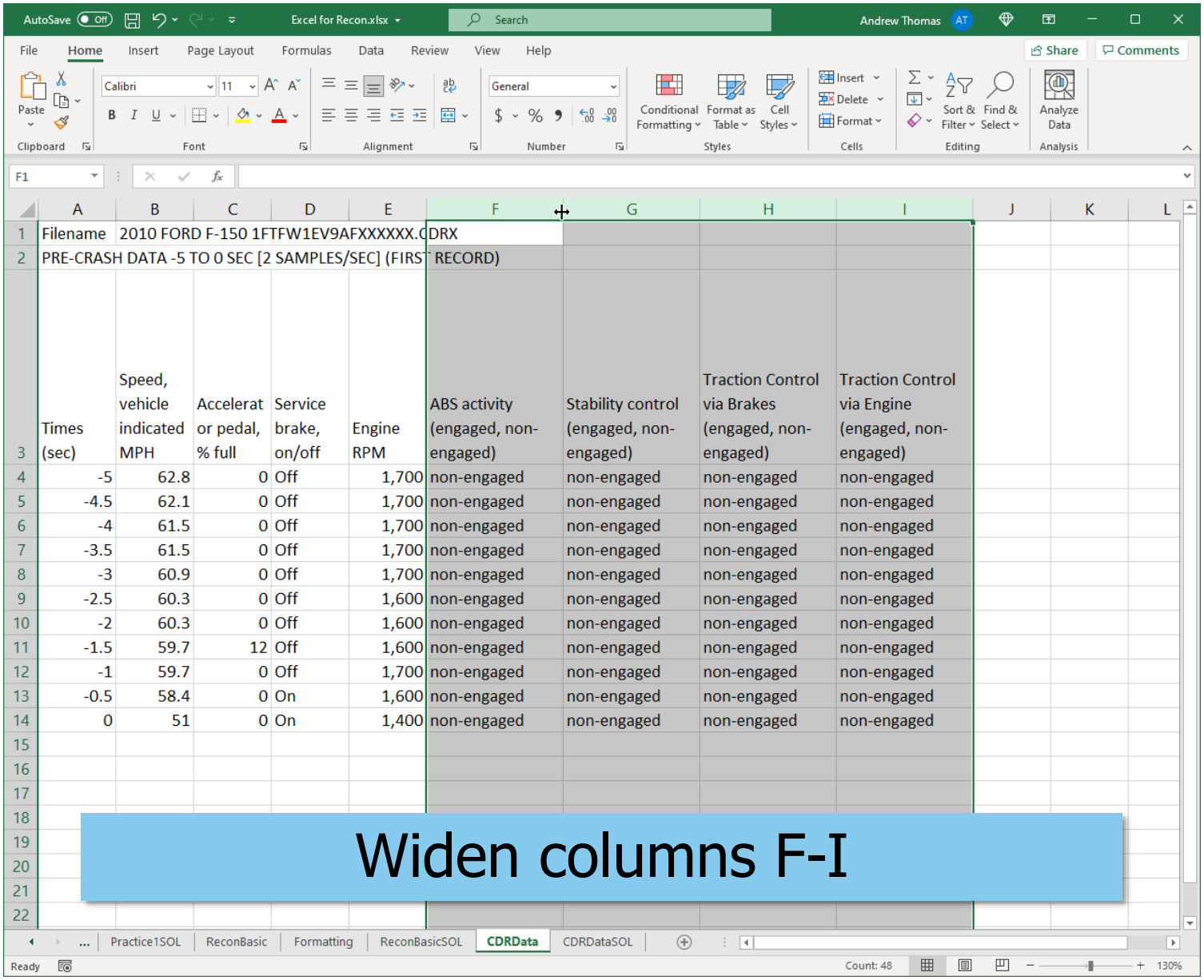
Collision Analytics

Conditional Formatting



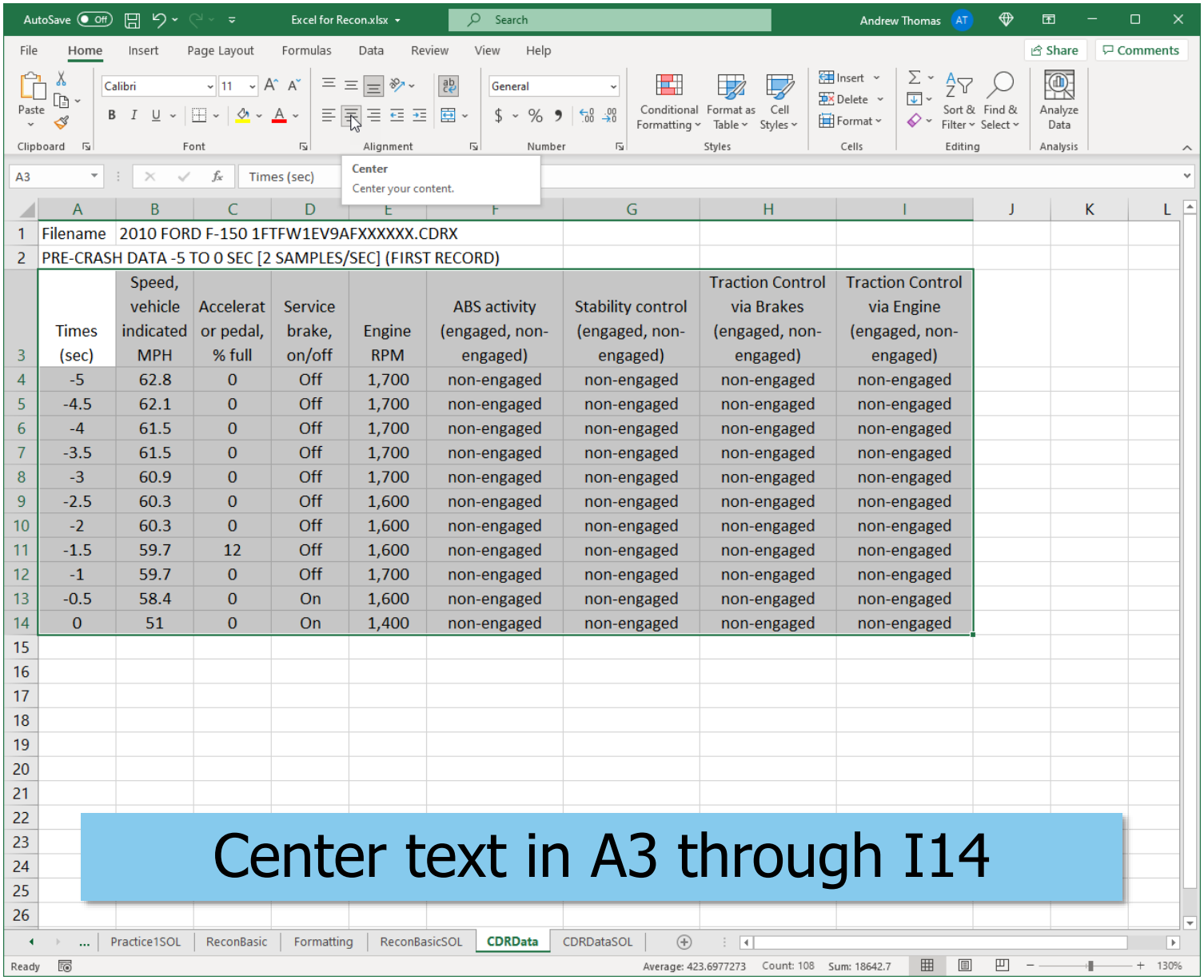
Collision Analytics

Conditional Formatting



Collision Analytics

Conditional Formatting



	A	B	C	D	E	F	G	H	I
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, 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)
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

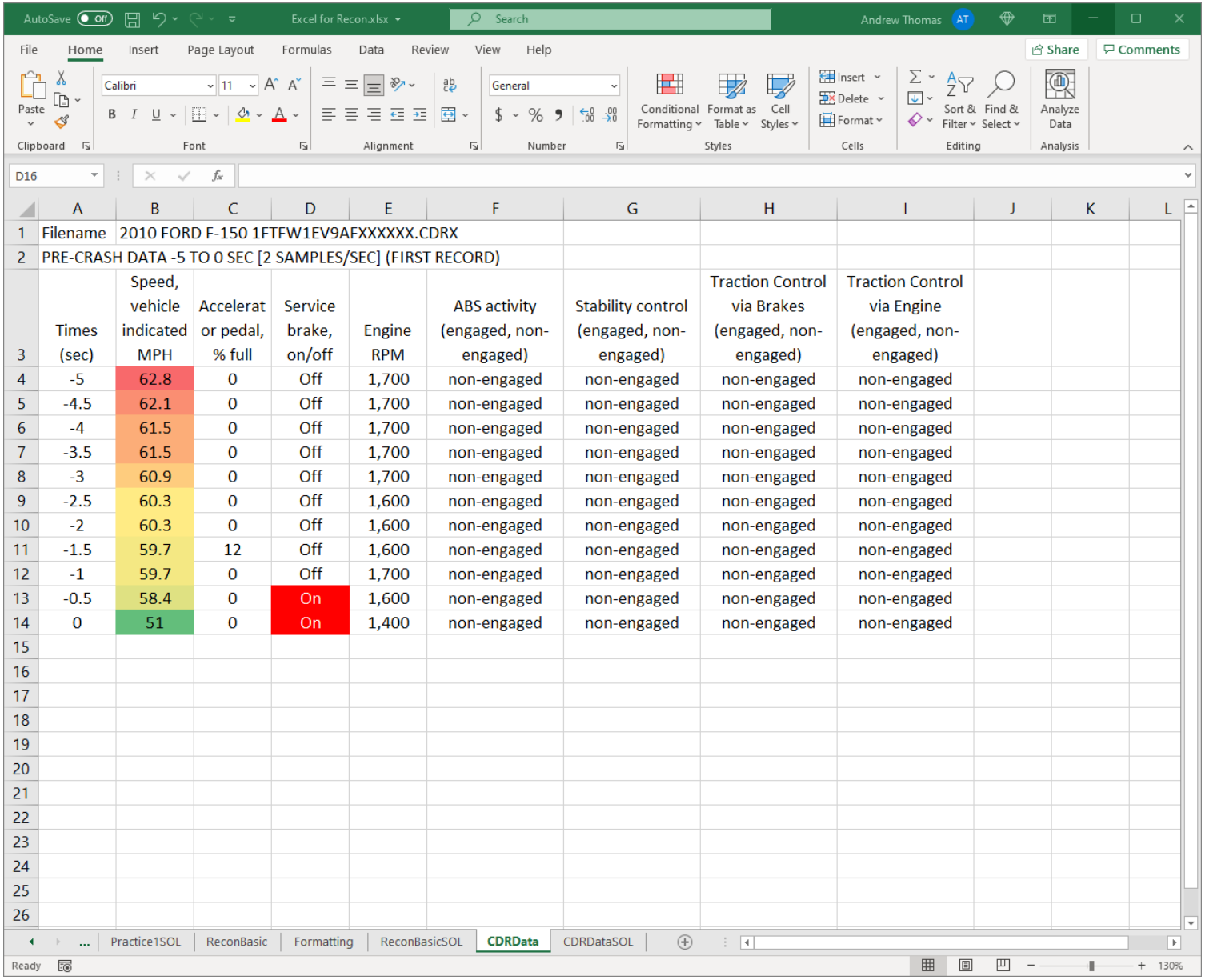
Collision Analytics

Conditional Formatting – Number Based

Collision Analytics

Conditional Formatting – Text Based

Conditional Formatting



	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)											
3	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)			
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			

Collision Analytics

Conditional Formatting

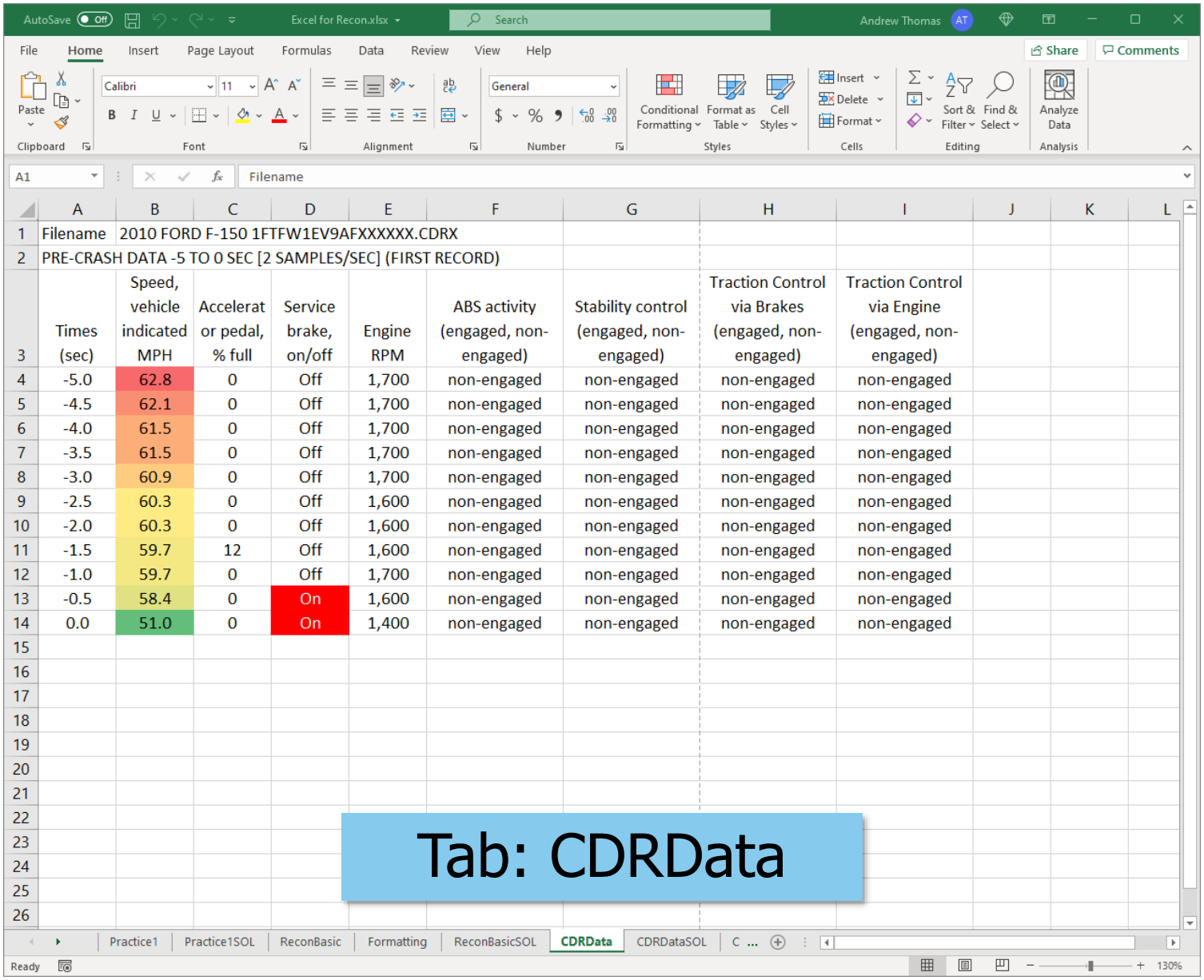
Reported Values								Calculated Values		
TRG 1 - Time	*TRG 6 - Time*	*Vehicle Speed*	*Accelerator Pedal, % Full*	*Service Brake*	*ABS Control Status*	*Steering Input*	*Yaw Rate*	*Vehicle Speed*	*Acceleration*	*Drag Factor*
-4.95 s		116.8 mph	89.5%	OFF	OFF	4.5° (Left)	0.00 deg/s	171.3 fps		
									0.0 fps²	0.00
-4.45 s		116.8 mph	89.5%	OFF	OFF	3.0° (Left)	-0.49 deg/s	171.3 fps		
									1.8 fps²	-0.05
-3.95 s		117.4 mph	80.5%	OFF	OFF	3.0° (Left)	-1.46 deg/s	172.2 fps		
									0.0 fps²	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 fps²	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 fps²	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 fps²	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 fps²	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 fps²	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 fps²	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 fps²	0.28
	-1.30 s	107.5 mph	0.0%	ON	OFF	52.5° (Left)	15.62 deg/s	157.7 fps		
									-51.1 fps²	1.59
	-0.80 s	90.1 mph	0.0%	ON	ON	12.5° (Left)	9.76 deg/s	132.2 fps		
									-18.2 fps²	0.56
	-0.30 s	83.9 mph	82.5%	ON	ON	127.5° (Left)	22.45 deg/s	123.1 fps		
									-82.2 fps²	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

Collision Analytics

Printing



	A	B	C	D	E	F	G	H	I
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, 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)
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

Tab: CDRData

Collision Analytics

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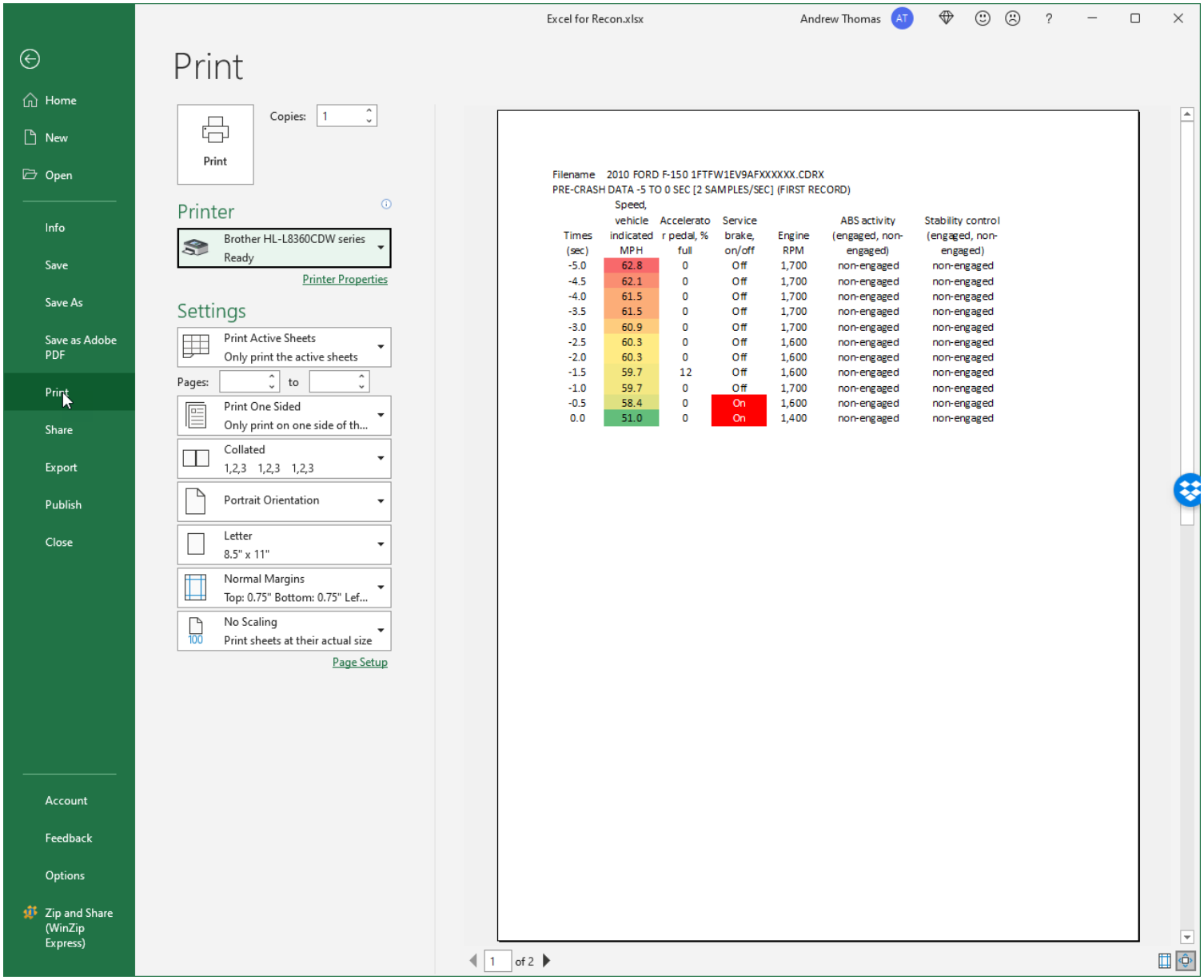

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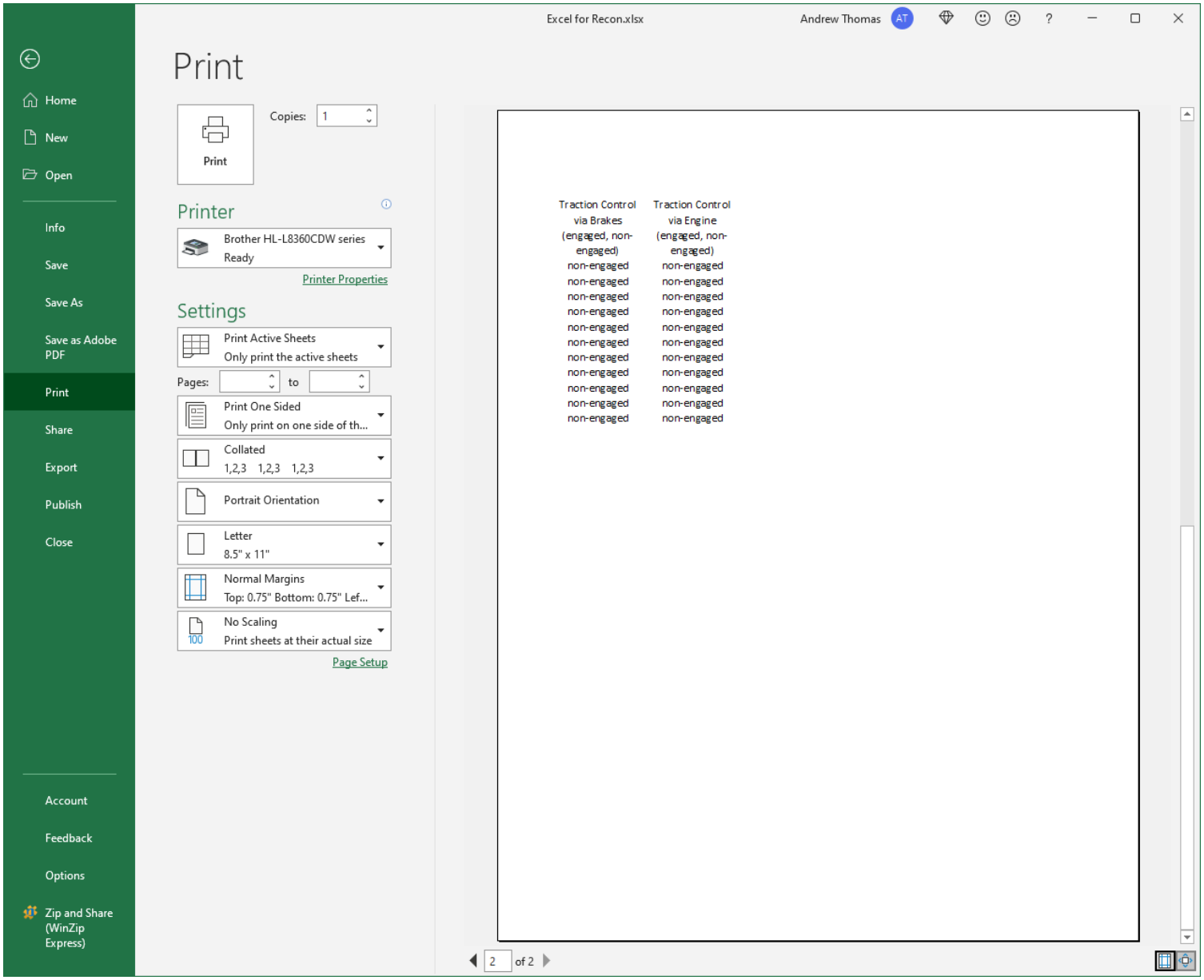

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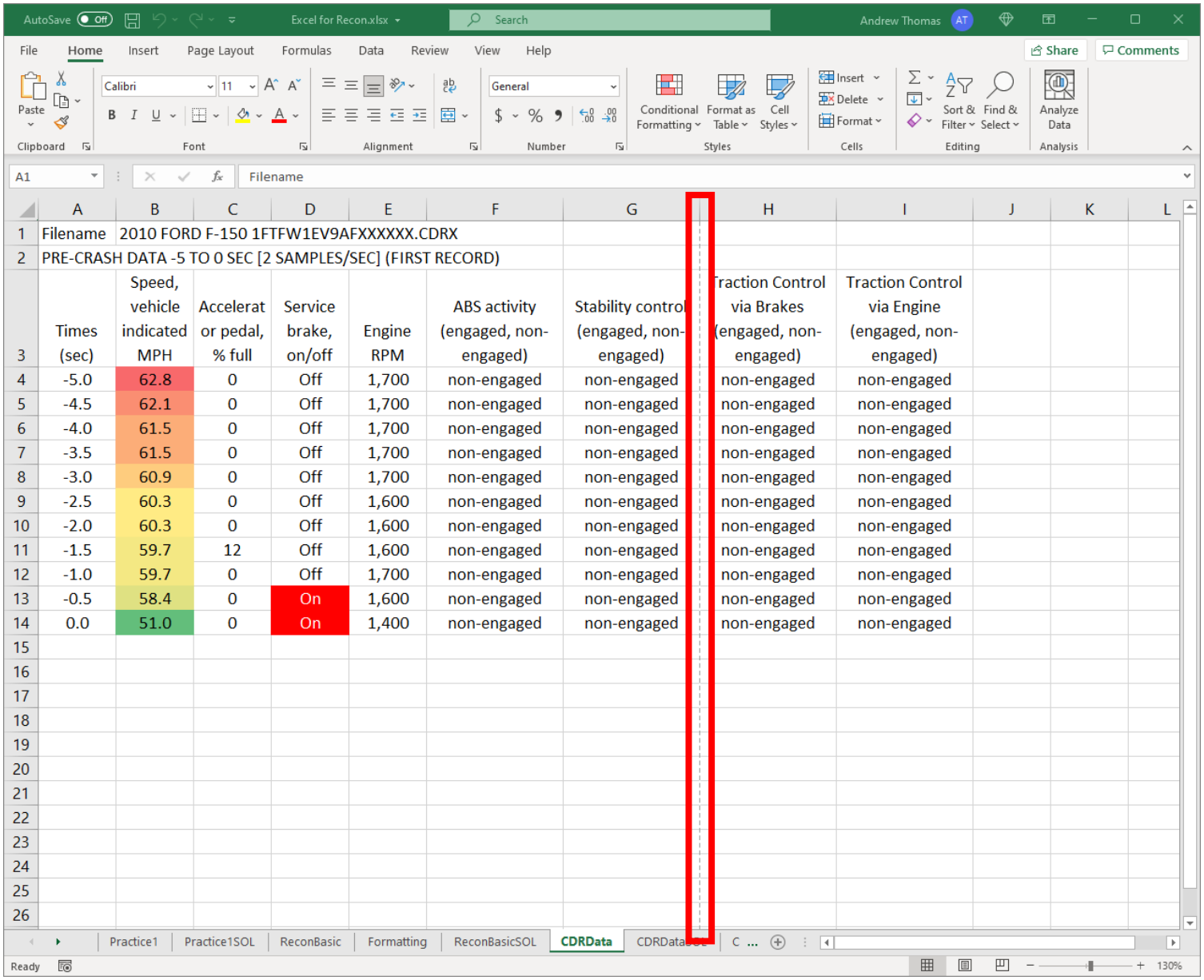

	A	B	C	D	E	F	G	H	I	J	K	L
1	Filename	2010 FORD F-150 1FTFW1EV9AFXXXXXX.CDRX										
2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)											
3	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)			
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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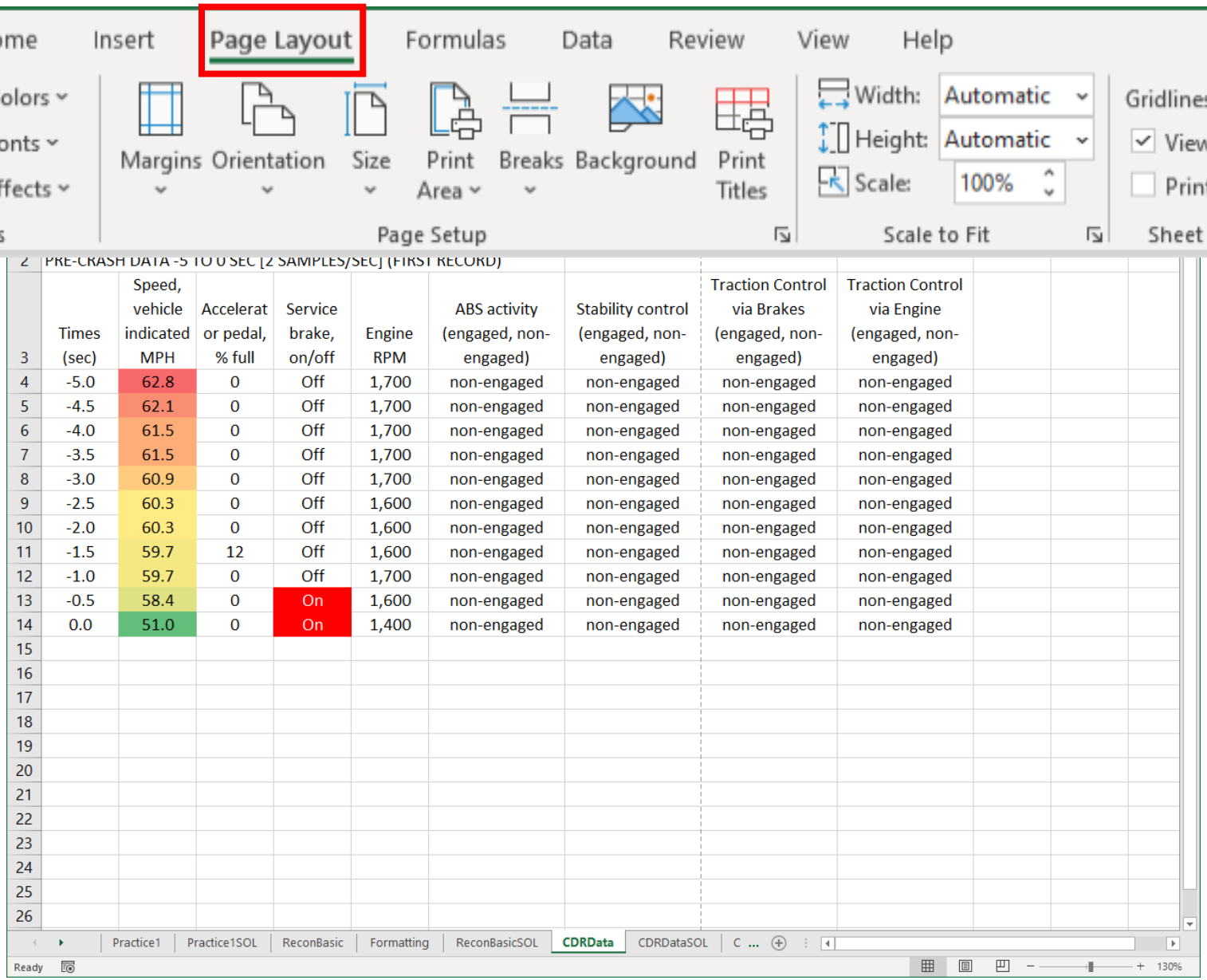

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3	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
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6	-4.0	61.5	0	Off	1,700	non-engaged	non-engaged	non-engaged	non-engaged
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14	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged
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Collision Analytics

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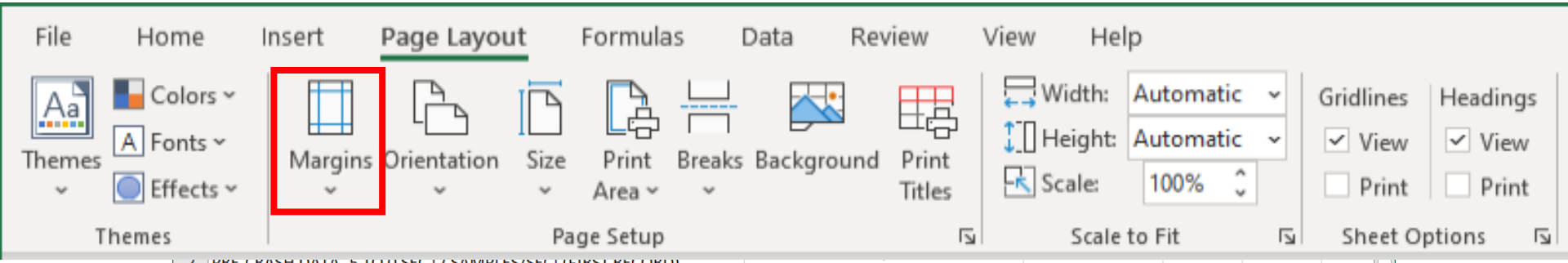

2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)								
3	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
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14	0.0	51.0	0	On	1,400	non-engaged	non-engaged	non-engaged	non-engaged
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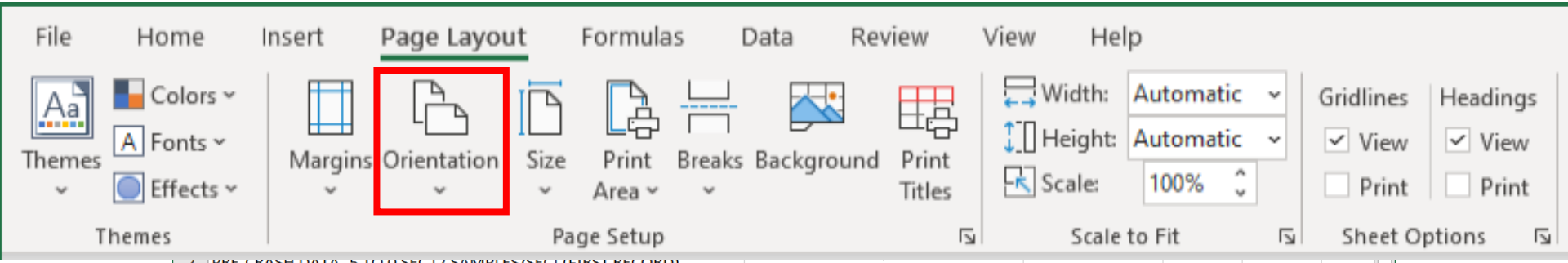

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3	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
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Collision Analytics

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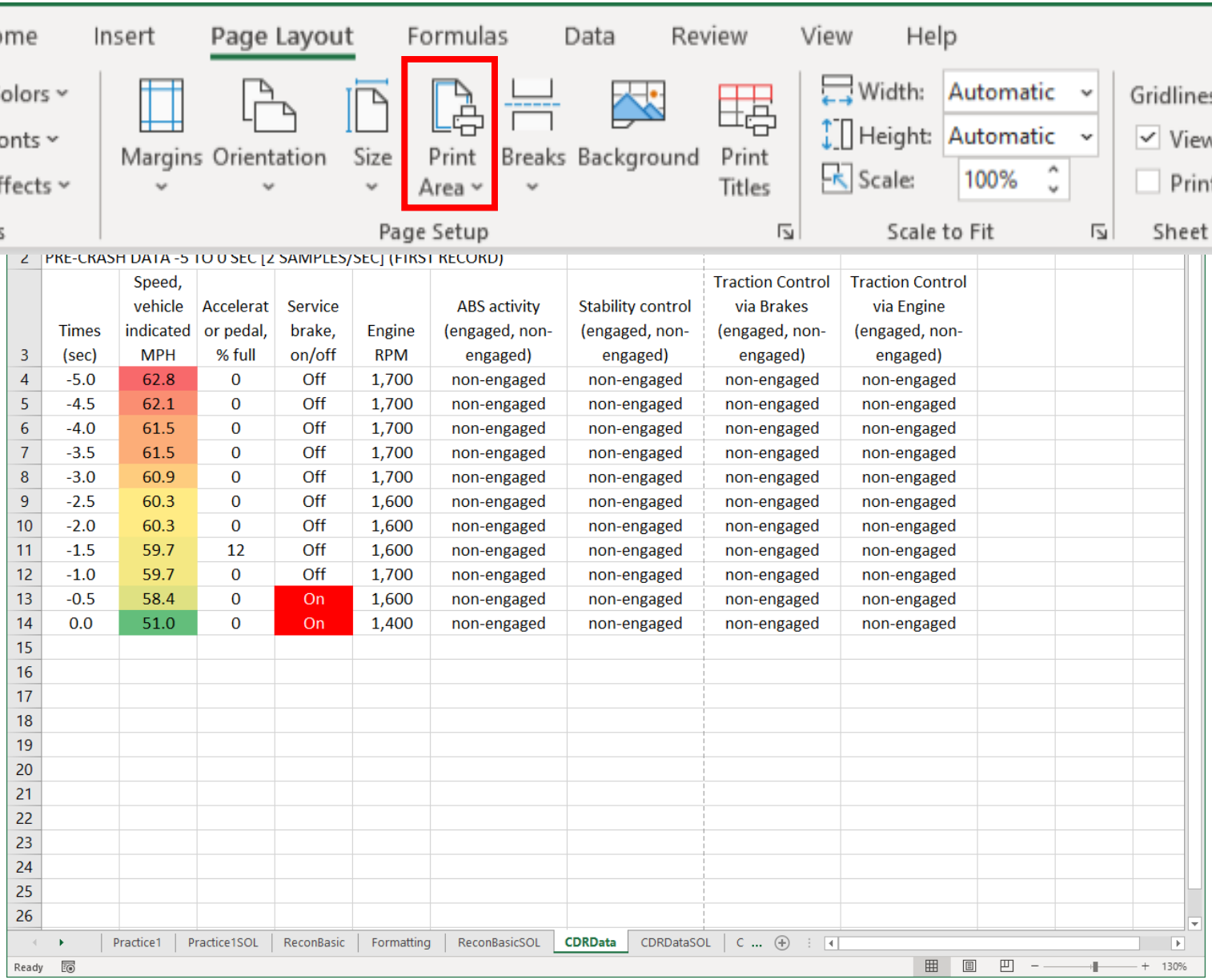

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3	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
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Collision Analytics

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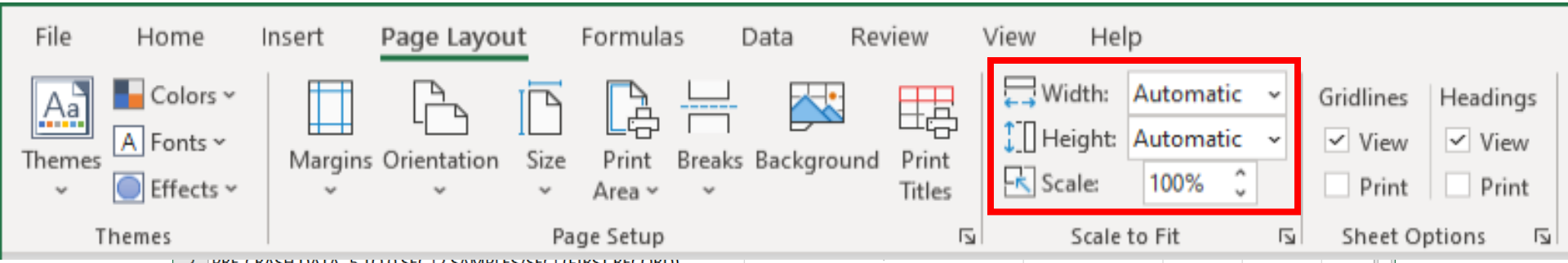

2	PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)								
3	Times (sec)	Speed, vehicle indicated MPH	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
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Collision Analytics

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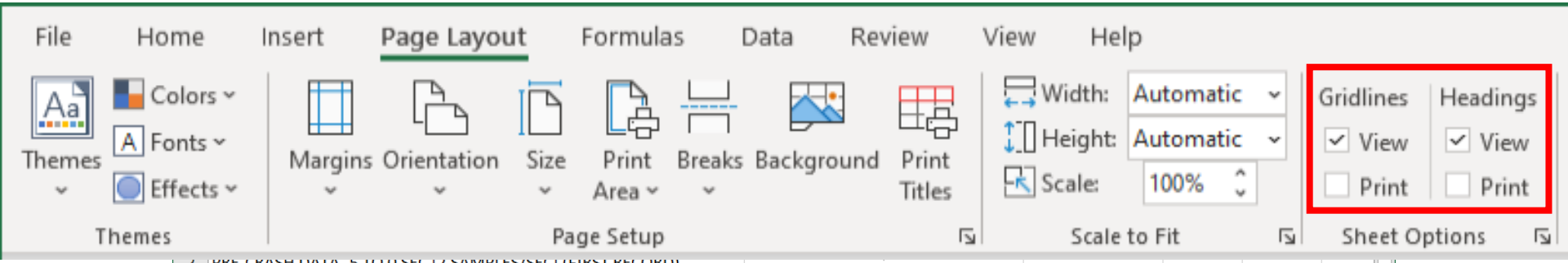

PRE-CRASH DATA -5 TO 0 SEC [2 SAMPLES/SEC] (FIRST RECORD)

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)
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Collision Analytics

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)
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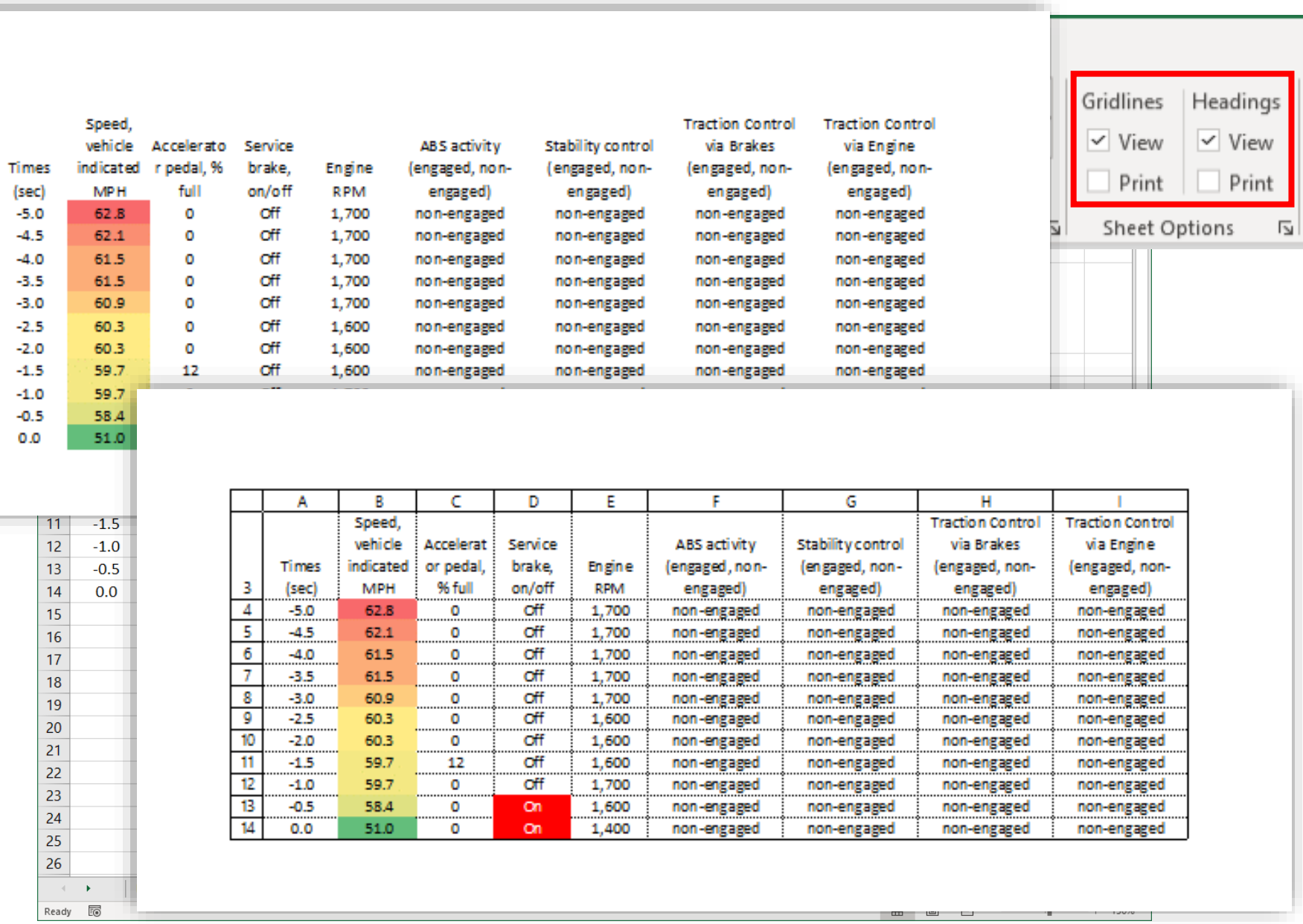
-1.0	59.7							
-0.5	58.4							
0.0	51.0							



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Collision Analytics

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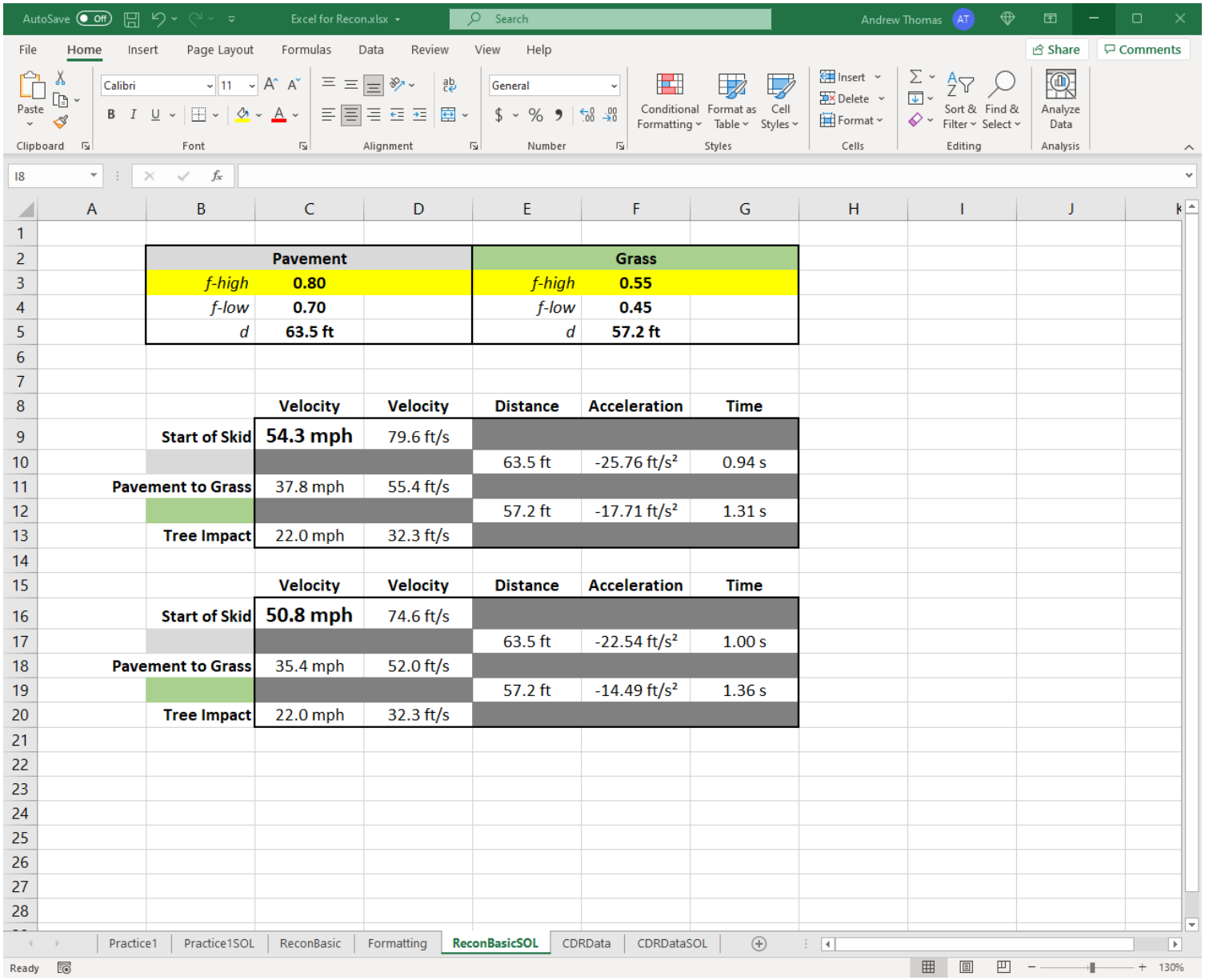

	Pavement		Grass	
f-high	0.80	*f-high*	0.55	
f-low	0.70	*f-low*	0.45	
d	63.5 ft	*d*	57.2 ft	

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	54.3 mph	79.6 ft/s			
			63.5 ft	-25.76 ft/s²	0.94 s
Pavement to Grass	37.8 mph	55.4 ft/s			
			57.2 ft	-17.71 ft/s²	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/s²	1.00 s
Pavement to Grass	35.4 mph	52.0 ft/s			
			57.2 ft	-14.49 ft/s²	1.36 s
Tree Impact	22.0 mph	32.3 ft/s			

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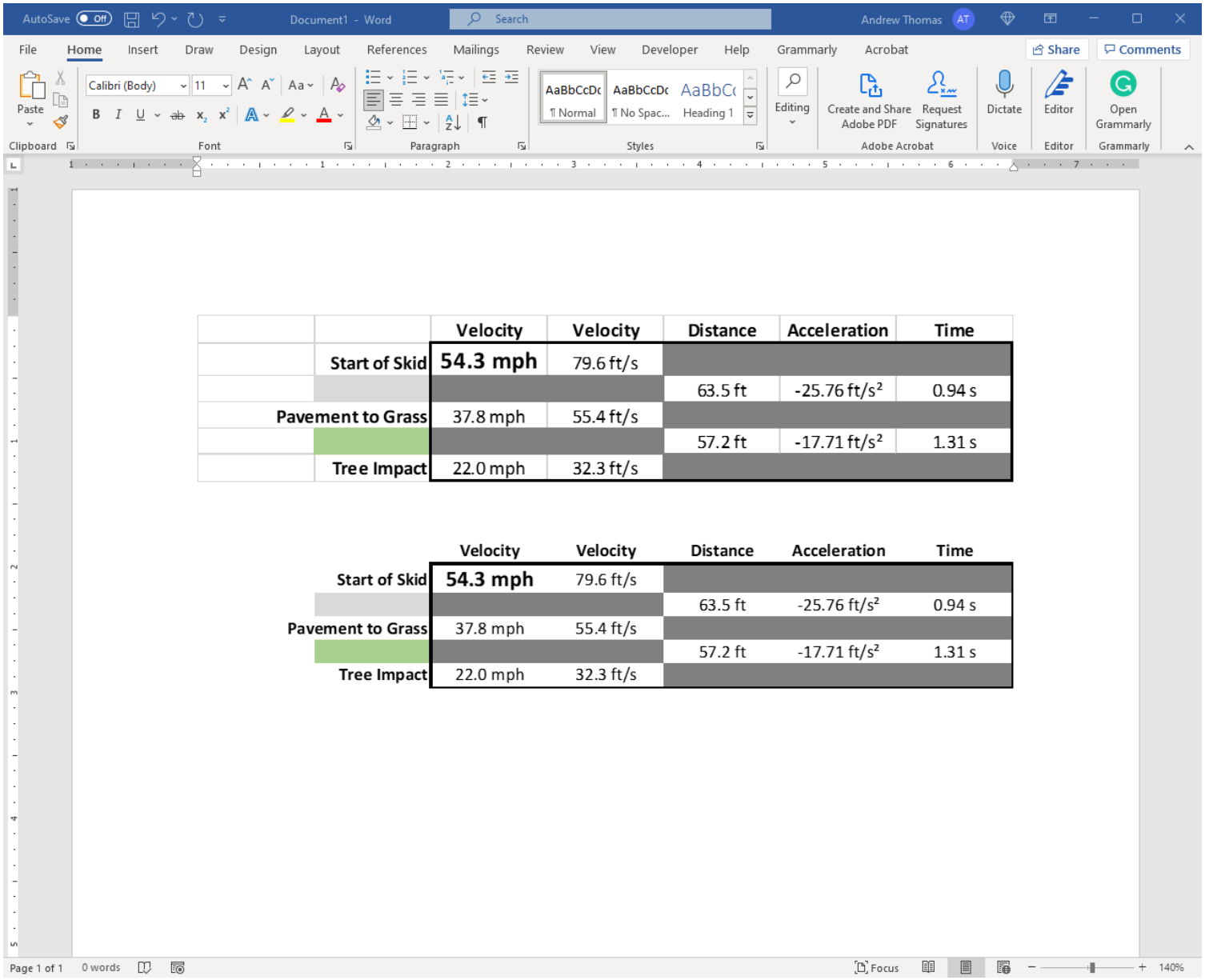


		Velocity	Velocity	Distance	Acceleration	Time
	Start of Skid	54.3 mph	79.6 ft/s			
				63.5 ft	-25.76 ft/s²	0.94 s
	Pavement to Grass	37.8 mph	55.4 ft/s			
				57.2 ft	-17.71 ft/s²	1.31 s
	Tree Impact	22.0 mph	32.3 ft/s			

	Velocity	Velocity	Distance	Acceleration	Time
Start of Skid	54.3 mph	79.6 ft/s			
			63.5 ft	-25.76 ft/s²	0.94 s
Pavement to Grass	37.8 mph	55.4 ft/s			
			57.2 ft	-17.71 ft/s²	1.31 s
Tree Impact	22.0 mph	32.3 ft/s			

Collision Analytics

Advanced Formulas

Excel for Crash Reconstruction

Collision Analytics

Advanced Formulas

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

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

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

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

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

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

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

$$l_f = \frac{w_r l}{w}$$

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

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

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

$$v_e = v_i + at$$

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

$$v_i = v_e - at$$

$$v_2 = \frac{w_1 v_1' \sin\theta_1' + w_2 v_2' \sin\theta_2'}{w_2 \sin\theta_2}$$

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

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

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

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

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

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

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

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

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

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

Advanced Formulas

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

$$v_2 = \frac{w_1 v_1' \sin\theta_1' + w_2 v_2' \sin\theta_2'}{w_2 \sin\theta_2}$$

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

Advanced Formulas

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

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

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

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

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

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

θ is measured in degrees

Excel only calculates trig functions in radians

$$\tan(\theta)$$

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

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

Advanced Formulas

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

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

```
E=W*(G+((A/2)*(C1+C2))+((B/6)*((C1^2)+(C2^2)+(C1 *C2))))*(1+((tan(radians(θ)))^2))
```

Advanced Formulas

	A	B	C	D
1				
2		**Crush Energy**		
3		*(2 Measurements)*		
4		A	265	lb/in
5		B	122	lb/in²
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		in-lbs
13		E		ft-lbs

Tab: AdvForm1

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

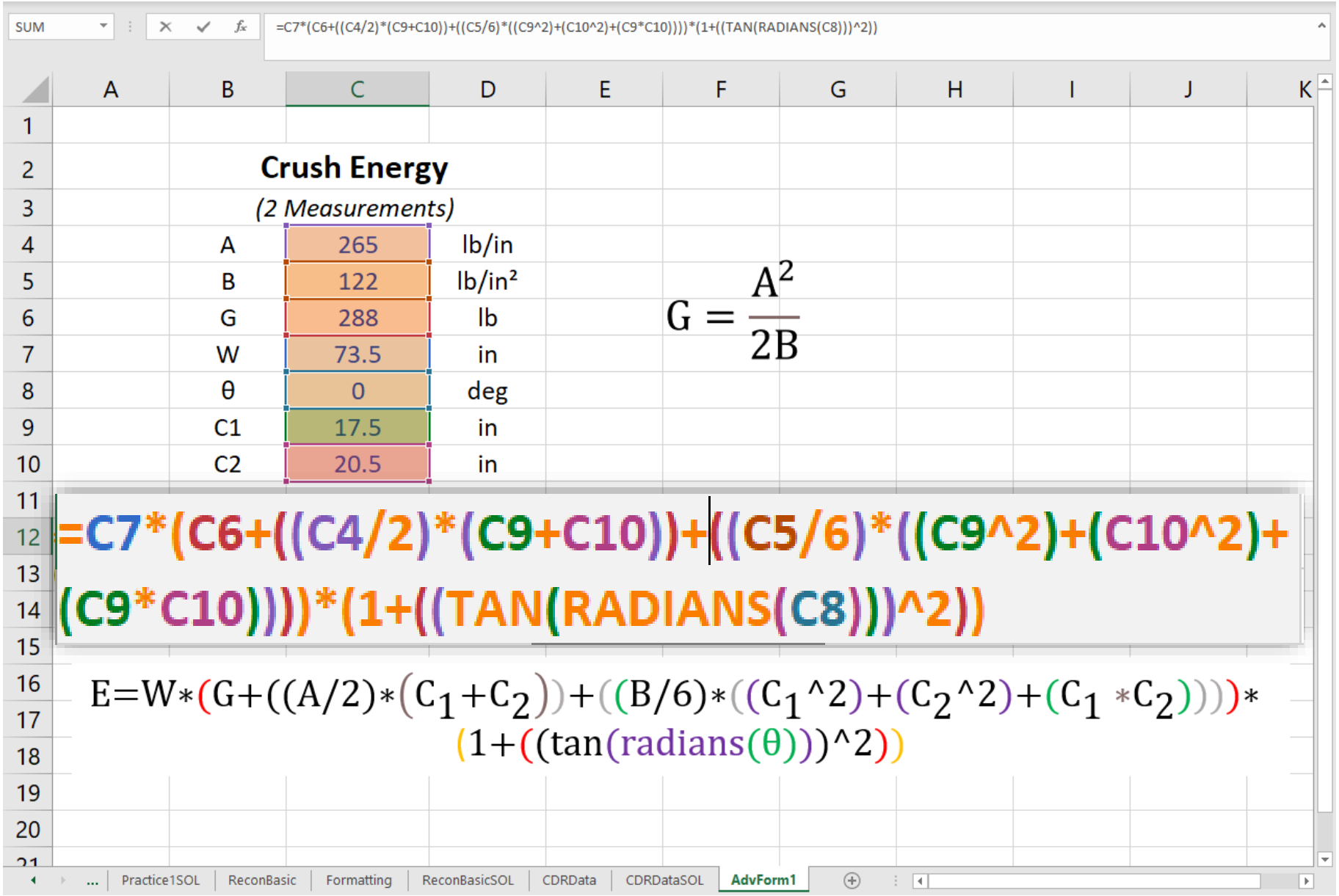
$$E=W*(G+((A/2)*(C_1+C_2))+((B/6)*((C_1\text{^}2)+(C_2\text{^}2)+(C_1*C_2))))*(1+((\tan(\text{radians}(\theta)))\text{^}2))$$

Practice1SOL | ReconBasic | Formatting | ReconBasicSOL | CDRData | CDRDataSOL | AdvForm1

Advanced Formulas

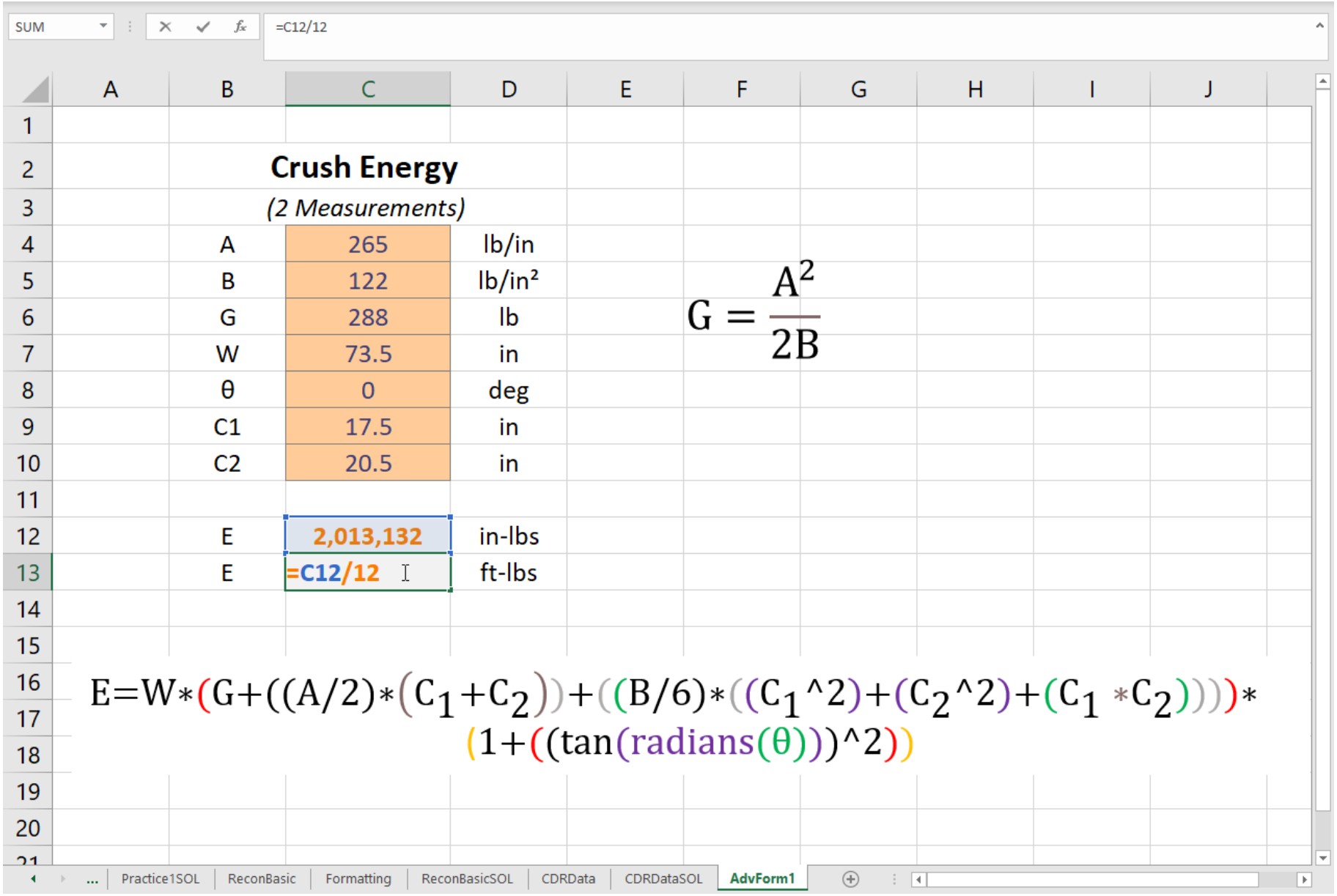
Collision Analytics

Advanced Formulas



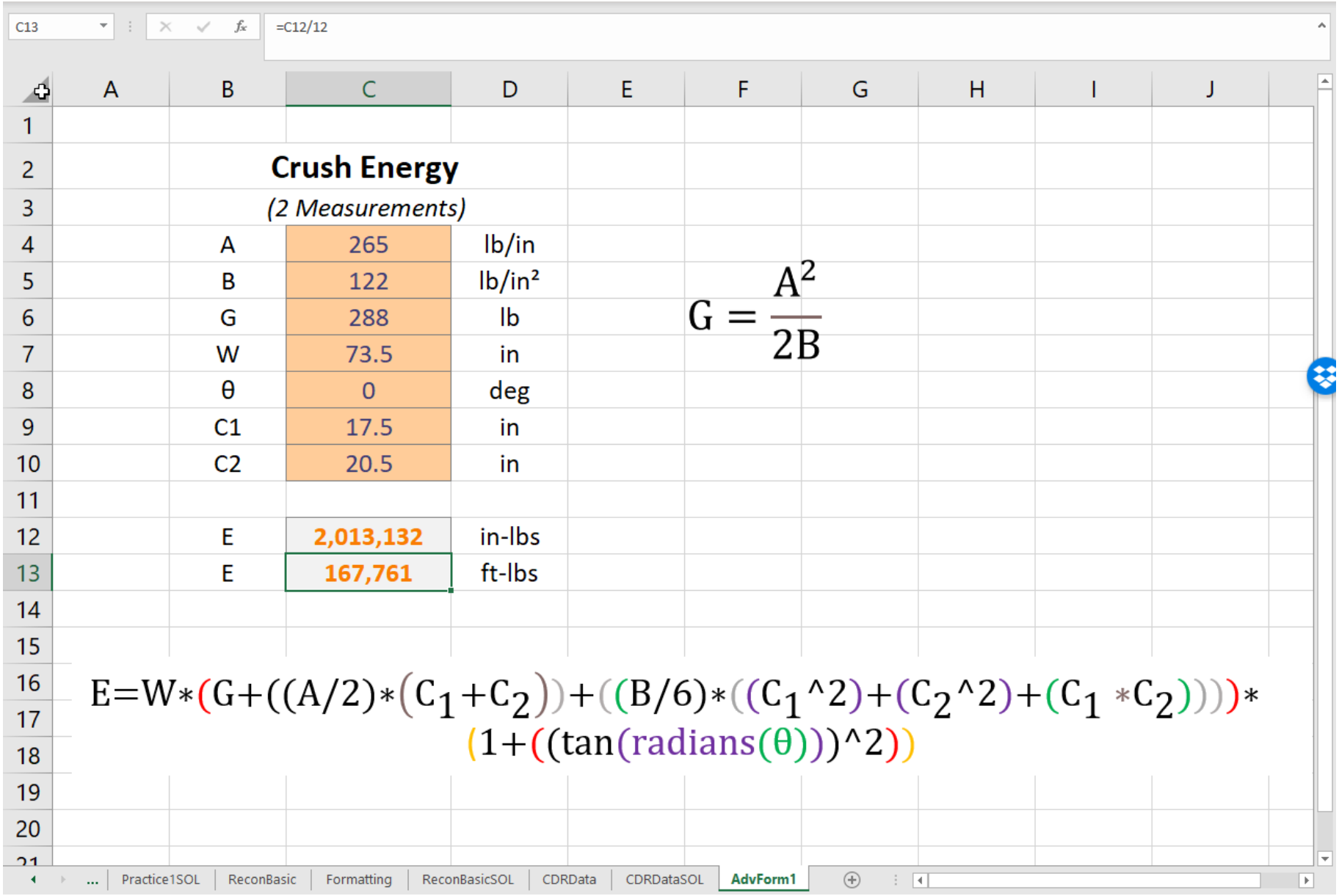
Collision Analytics

Advanced Formulas



Collision Analytics

Advanced Formulas



Collision Analytics

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

$$v_2 = \frac{w_1 v_1' \sin\theta_1' + w_2 v_2' \sin\theta_2'}{w_2 \sin\theta_2}$$

$$v_2 = ((w_1 * v_1' * (\sin(radians(\theta_1')))) + (w_2 * v_2' * (\sin(radians(\theta_2'))))) / (w_2 * (\sin(radians(\theta_2))))$$

Advanced Formulas

F7

	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														
22														
23														
24														
25														

Tab: AdvForm2

$$v_2 = ((w_1 * v_1' * (\sin(radians(\theta_1')))) + (w_2 * v_2' * (\sin(radians(\theta_2'))))) / (w_2 * (\sin(radians(\theta_2))))$$

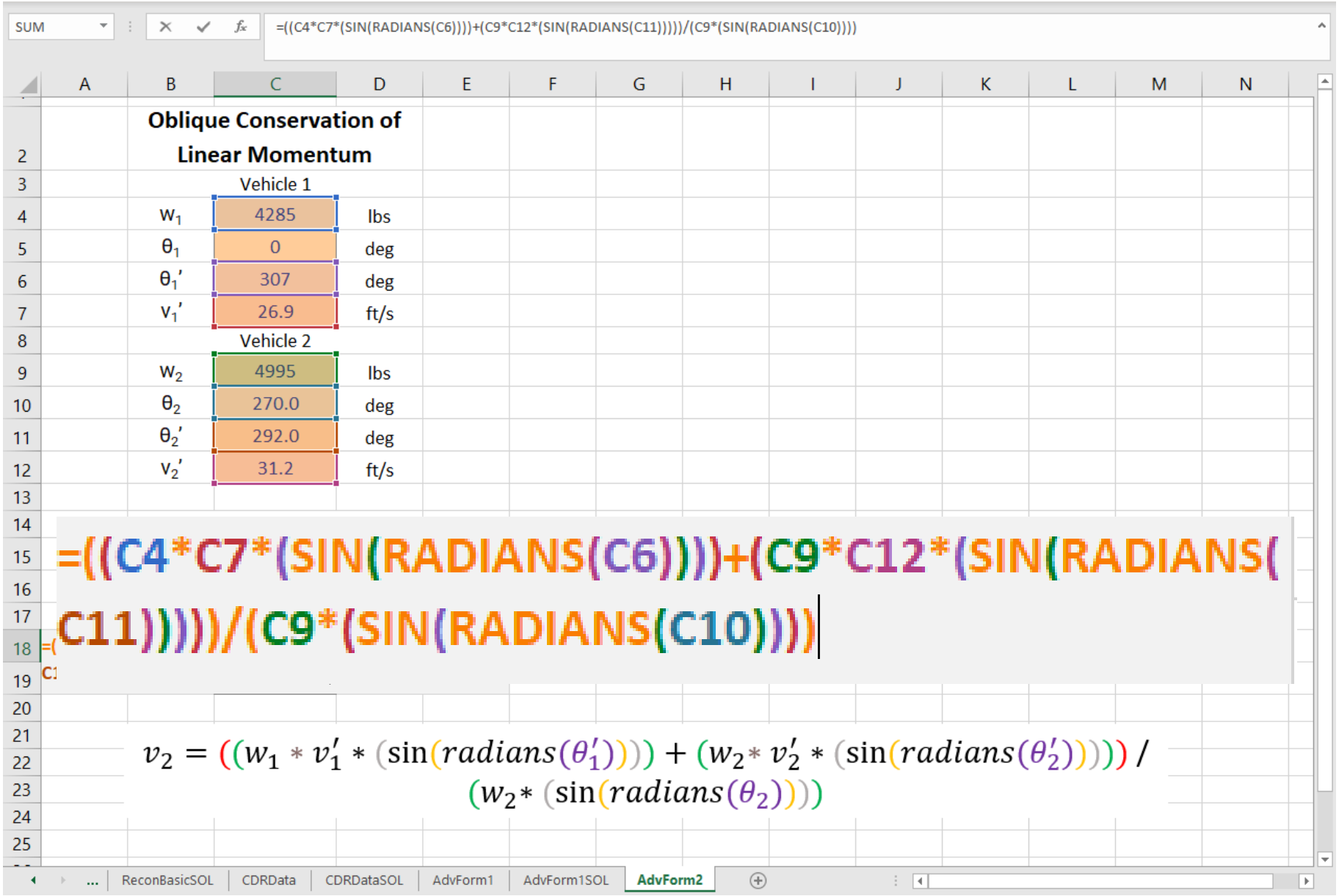
... | ReconBasicSOL | CDRData | CDRDataSOL | AdvForm1 | AdvForm1SOL | **AdvForm2**

Collision Analytics

Advanced Formulas

Collision Analytics

Advanced Formulas



$$v_2 = ((w_1 * v_1' * (\sin(radians(\theta_1')))) + (w_2 * v_2' * (\sin(radians(\theta_2'))))) / (w_2 * (\sin(radians(\theta_2))))$$

Collision Analytics

Advanced Formulas

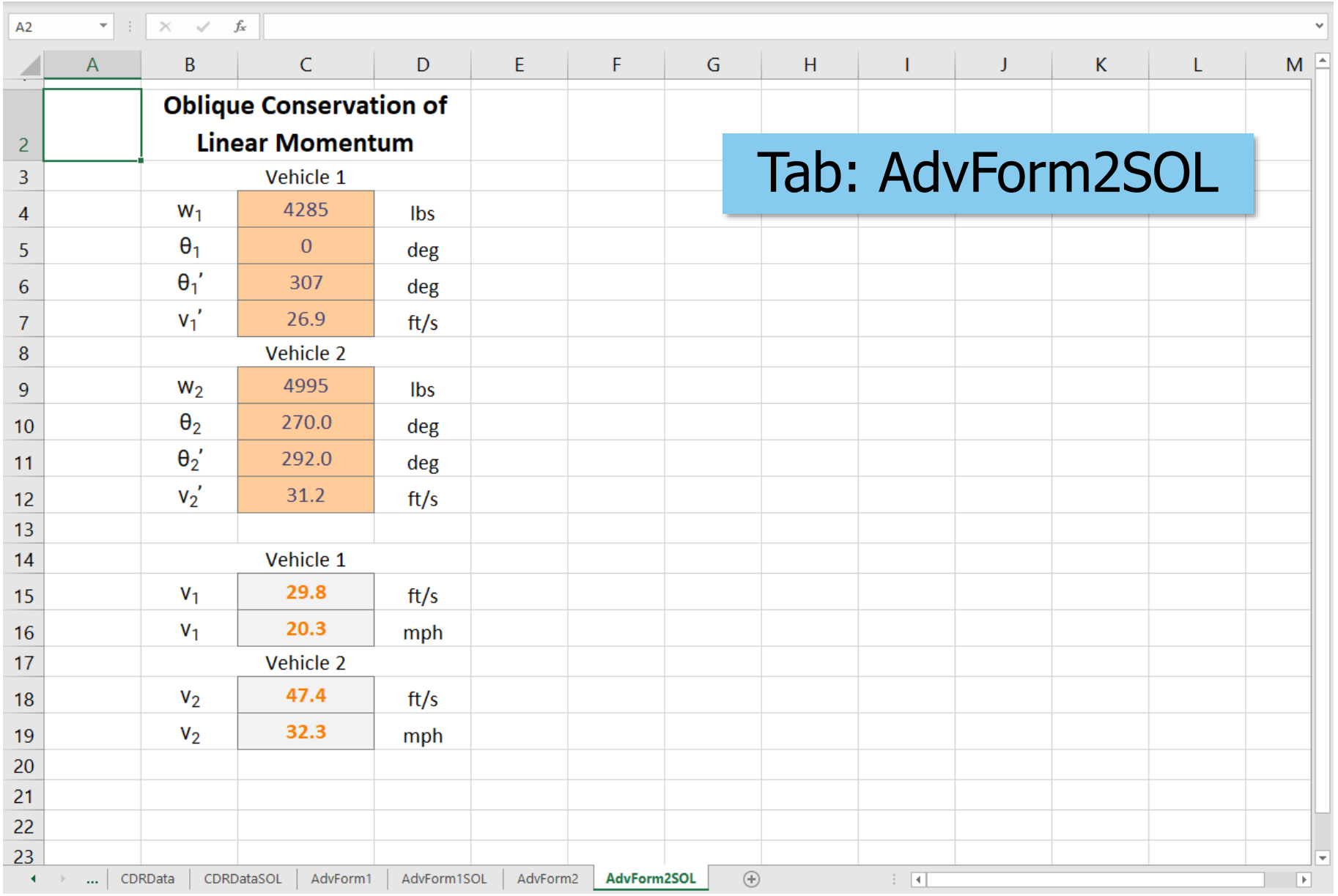
C18 =((C4*C7*(SIN(RADIANS(C6))))+(C9*C12*(SIN(RADIANS(C11)))))/(C9*(SIN(RADIANS(C10))))

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
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														
23														
24														
25														

$$v_2 = ((w_1 * v_1' * (\sin(radians(\theta_1')))) + (w_2 * v_2' * (\sin(radians(\theta_2'))))) / (w_2 * (\sin(radians(\theta_2))))$$

... | ReconBasicSOL | CDRData | CDRDataSOL | AdvForm1 | AdvForm1SOL | AdvForm2

Advanced Formulas



Oblique Conservation of Linear Momentum			
Vehicle 1			
w_1	4285	lbs	
θ_1	0	deg	
θ_1'	307	deg	
v_1'	26.9	ft/s	
Vehicle 2			
w_2	4995	lbs	
θ_2	270.0	deg	
θ_2'	292.0	deg	
v_2'	31.2	ft/s	
Vehicle 1			
v_1	29.8	ft/s	
v_1	20.3	mph	
Vehicle 2			
v_2	47.4	ft/s	
v_2	32.3	mph	

Disclaimer

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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