LESSON PLAN -SECONDARY

Teacher Candidate: Brianna Larmore

Grade Level: 8 Subject/Content: Math 8 Title: Scientific Notation

CONTEXTUAL FACTORS (e.g. ethnicity, gender, exceptionalities, ELL, GATE, etc.) which need differentiation in instruction and assessment.
Well-rounded classroom • Helpless hand-raisers (Leslie, Katelyn) • Blurters (Todd, Arik, Jon, Damick, Tyler) • Won't share/shy (Jesus, Jada, Maddi)

WALK-AWAY (what do I want students to know, understand, and be able to do?)	
Content Walk-Away: SWBAT: • Change numbers from expanded form to scientific notation • Explain the differences between negative and positive exponents for scientific notation • Understand the repercussions of 1 number difference with exponents Reading/Language Walk-Away: • Definition of scientific notation	

ASSESSMENT EVIDENCE (formative/summative checks for learning) **(Match the Content Walk-Away)**	**Modifications/Accommodations** (ELL, IEP, GATE, etc.)
10 problems from the worksheet that I edited off of mathgoodies.com 5 together in small groups (4 students: 1 high achiever, 1 low, and 2 middle) Second 5 done alone, before the end of class. >70% is considered proficient, each answer to problems 3 & 4 are worth 5%, loss of the negative means the entire problem in marked wrong (the difference between an atom and the universe was stressed) Informal assessment during collaborative work-time: • Did student do some of the work alone, or just copy? • Was student able to explain their reasoning when asked? • Did student show any interest/involvement in website information?	Try to encourage quieter students to show the others how one works. Arik, Jon, and Todd tend to take over and answer all the group's questions. They like to tell others what to do, see if they can listen and correct instead.

ACTIVE LEARNING PLAN	**Modifications/ Accommodations** (ELL, IEP, GATE, etc.)
Activate Prior Knowledge/Experiences Bell Work: You have four 3's. Develop an expression using all four 3's that is as large as possible. Focus Lesson ("I do it") Definition and example on the Smart Board Several examples on the white board • Write the 'original' problem in one color (black?) • Write the steps in a different color so students can see them • Positive exponents for BIG numbers & negative for LITTLE ones Show them what happens when one number changes $10^1 = 10,\ 10^2 = 100.$ Guided Instruction ("We do it") • Have the students walk teacher through several examples • Where would we use scientific notation? Or why? • Use website to show to show how it can be used. ▪ http:/htwins.net/scale2 Collaborative/Cooperative ("You do it together") • Have the students work together in groups of 4 • Have each group write the answer to one of the problems on the white board Independent ("You do it alone") • Have the students try to do the second half of the worksheet on their own. Summarization/Closure Is scientific notation important? Why? Does one number difference mean anything? BIG numbers have what kind of exponent? LITTLE numbers have what kind of exponent? P/N Rap Review of exponent rules: YouTube > WSHS math rap > Super Base	

NOTES TO TEACHER		
What do I need to remember to do?	*Materials to have ready?*	*Approximate time needed for lesson?*
• Label steps	• Load Scale 2	• 70 minutes
• PRINT	• Load YouTube	

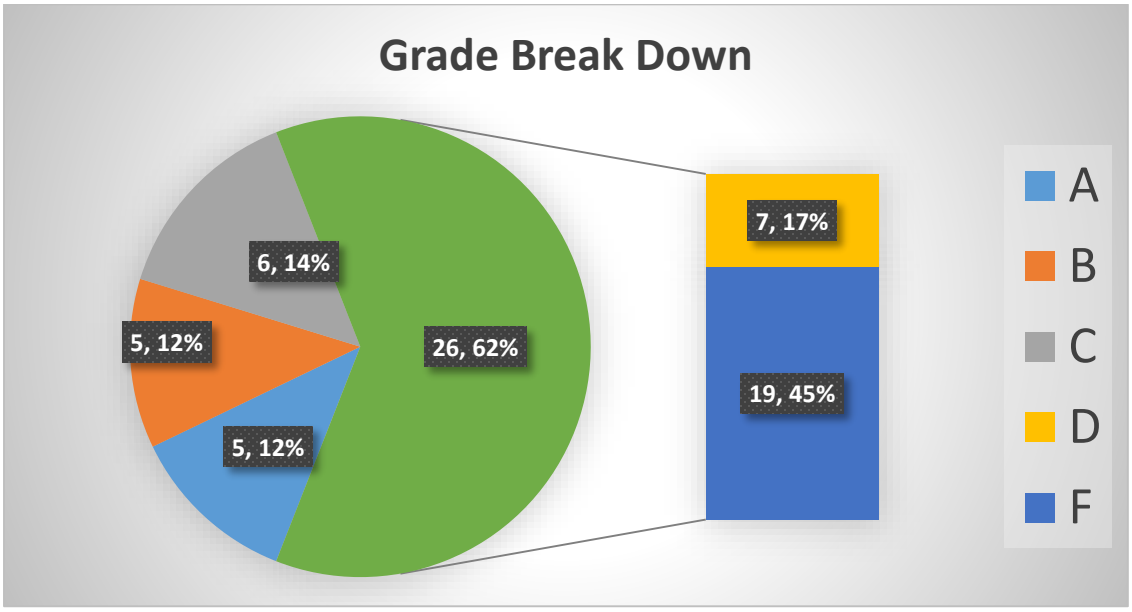
DATA OUTCOMES

Student	Percentage	Student	Percentage	Student	Percentage
Todd	100	Maddi	70	Jesus*	50
Jared	90	Caitlin	70	Sydnee	50
Conner	90	Andy	65	Chris	50
Arik	90	Jerome	60	Tyler	50
Kendra	90	Calvin	60	Joseph	45
Kiara+	80	Jon	60	Alex	40
Austen	80	Riley	60	Caitlyn *	40
Cameron	80	Jessika	60	Damick*	40
Jada+	80	Nick	60	Clayton*	30
Shaylee	80	Axel	55	Destiny	25
Leslie	75	Adree	55	Dallin	25
Katelyn	75	Jaden	50	London*	20
Jessica	70	Coltyn*	50	Jeffery	15
Brylei	70	Mallory*	50	Aubrey	10

*** Indicates students that did not attempt the second half of the assignment**

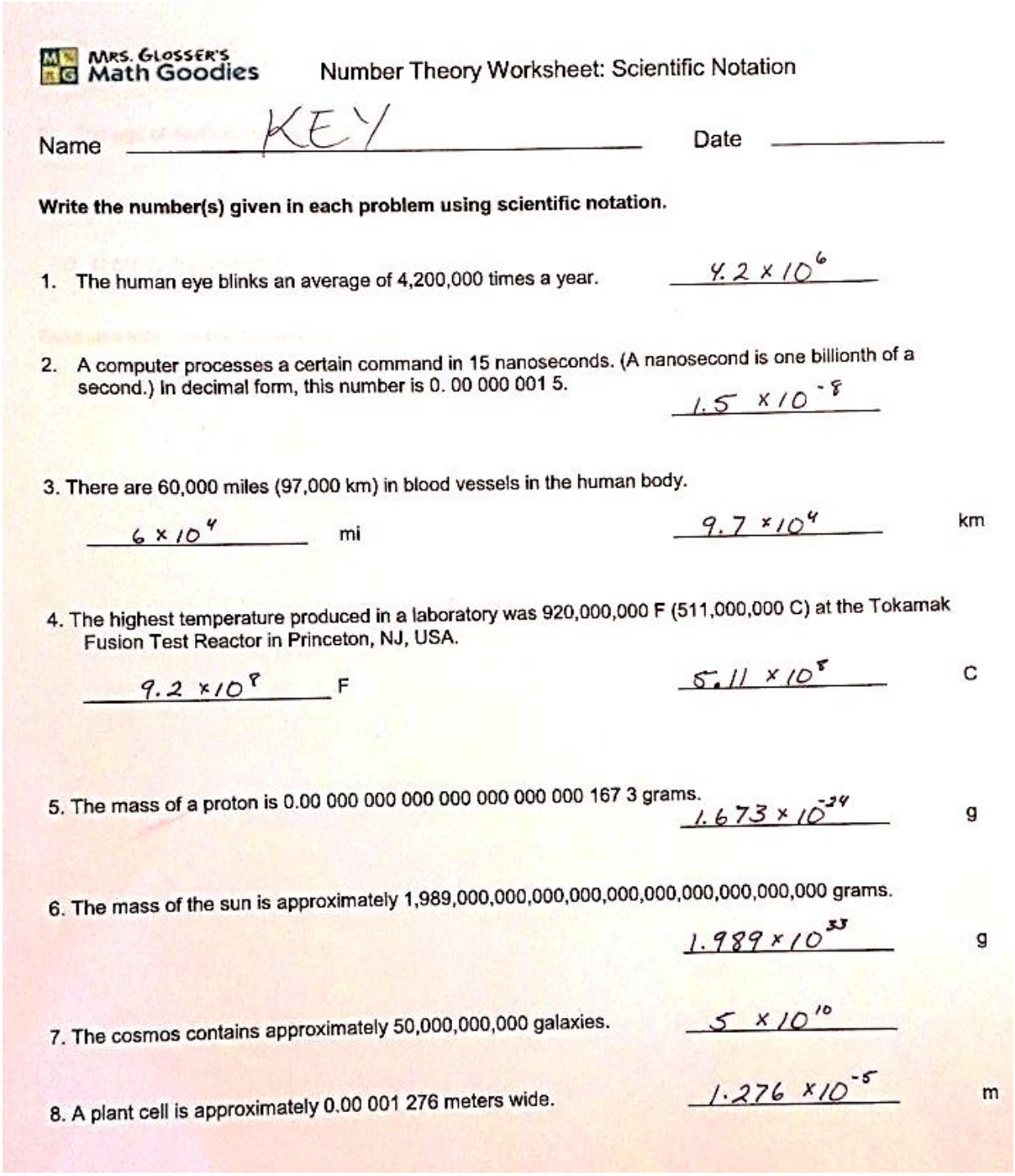
+ Indicates students which were struggling severely when I walked by, yet scored well on the assessment

Average Score 59%. 42 Students.



COPIES OF COMPLETED WORK AND SCORING GUIDE

Scoring Guide:



MRS. GLOSSER'S Math Goodies — Number Theory Worksheet: Scientific Notation

Name KEY Date _____

Write the number(s) given in each problem using scientific notation.

1. The human eye blinks an average of 4,200,000 times a year. 4.2×10^{6}

2. A computer processes a certain command in 15 nanoseconds. (A nanosecond is one billionth of a second.) In decimal form, this number is 0. 00 000 001 5. 1.5×10^{-8}

3. There are 60,000 miles (97,000 km) in blood vessels in the human body.

   6×10^{4} mi 9.7×10^{4} km

4. The highest temperature produced in a laboratory was 920,000,000 F (511,000,000 C) at the Tokamak Fusion Test Reactor in Princeton, NJ, USA.

   9.2×10^{8} F 5.11×10^{8} C

5. The mass of a proton is 0.00 000 000 000 000 000 000 000 167 3 grams. 1.673×10^{-24} g

6. The mass of the sun is approximately 1,989,000,000,000,000,000,000,000,000,000,000 grams. 1.989×10^{33} g

7. The cosmos contains approximately 50,000,000,000 galaxies. 5×10^{10}

8. A plant cell is approximately 0.00 001 276 meters wide. 1.276×10^{-5} m

Write the number(s) given scientific notation in standard form.

9. The age of earth is approximately 4.5×10^9 years. 4,500,000,000. yr

10. The weight of one atomic mass unit (a.m.u.) is 1.66×10^{-27} kg.

0.00000000000000000000000000166 kg

26 → 0's

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Example of Exemplary Work:

100%. -0 YAY!

MRS. GLOSSER'S Math Goodies

Number Theory Worksheet: Scientific Notation

Name Tara Date

Write the number(s) given in each problem using scientific notation.

1. The human eye blinks an average of 4,200,000 times a year. 4.2×10^6

2. A computer processes a certain command in 15 nanoseconds. (A nanosecond is one billionth of a second.) In decimal form, this number is 0. 00 000 001 5. 1.5×10^{-8}

3. There are 60,000 miles (97,000 km) in blood vessels in the human body.
   6×10^4 mi 9.7×10^4 km

4. The highest temperature produced in a laboratory was 920,000,000 F (511,000,000 C) at the Tokamak Fusion Test Reactor in Princeton, NJ, USA.
   9.2×10^8 F 5.11×10^8 C

5. The mass of a proton is 0.00 000 000 000 000 000 000 000 167 3 grams. 1.673×10^{-24} g

6. The mass of the sun is approximately 1,989,000,000,000,000,000,000,000,000,000 grams.
   1.989×10^{33} g

7. The cosmos contains approximately 50,000,000,000 galaxies. 5×10^{10}

8. A plant cell is approximately 0.00 001 276 meters wide. 1.276×10^{-5} m

Write the number(s) given scientific notation in standard form.

9. The age of earth is approximately 4.5×10^{9} years. 4500000000. yr

10. The weight of one atomic mass unit (a.m.u.) is 1.66×10^{-27} kg.

.000000000000000000000000001166 kg

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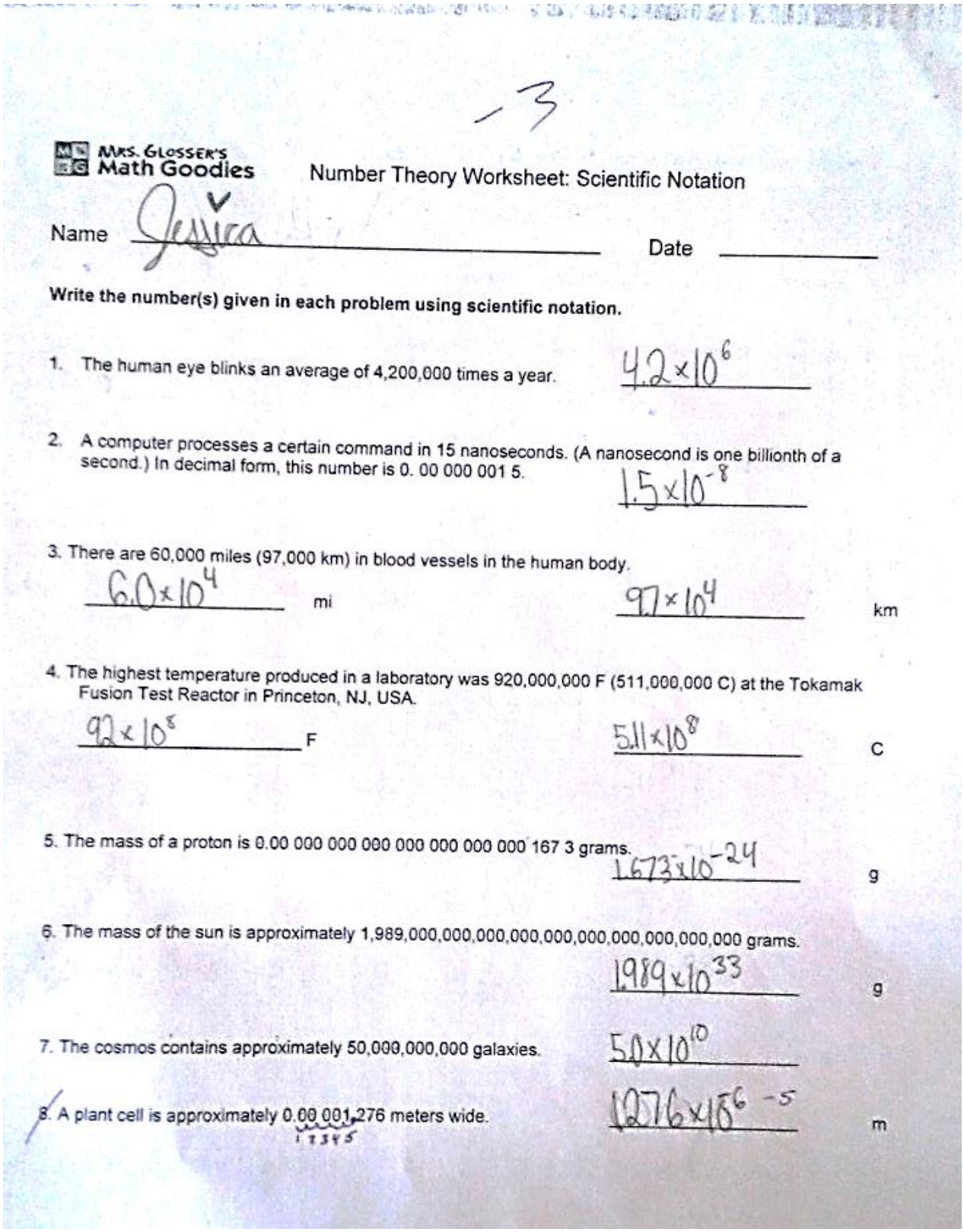
Example of Proficient Work:



-3

MRS. GLOSSER'S Math Goodies

Number Theory Worksheet: Scientific Notation

Name Jessica ✓ Date

Write the number(s) given in each problem using scientific notation.

1. The human eye blinks an average of 4,200,000 times a year. 4.2×10^6

2. A computer processes a certain command in 15 nanoseconds. (A nanosecond is one billionth of a second.) In decimal form, this number is 0. 00 000 001 5. 1.5×10^{-8}

3. There are 60,000 miles (97,000 km) in blood vessels in the human body.
   6.0×10^4 mi 9.7×10^4 km

4. The highest temperature produced in a laboratory was 920,000,000 F (511,000,000 C) at the Tokamak Fusion Test Reactor in Princeton, NJ, USA.
   9.2×10^8 F 5.11×10^8 C

5. The mass of a proton is 0.00 000 000 000 000 000 000 000 167 3 grams. 1.673×10^{-24} g

6. The mass of the sun is approximately 1,989,000,000,000,000,000,000,000,000,000,000 grams.
   1.989×10^{33} g

7. The cosmos contains approximately 50,000,000,000 galaxies. 5.0×10^{10}

8. A plant cell is approximately 0.00 001 276 meters wide. 1.276×10^{-5} m
   12345

Write the number(s) given scientific notation in standard form.

9. The age of earth is approximately 4.5×10^9 years. 4,500,000,000.

10. The weight of one atomic mass unit (a.m.u.) is 1.66×10^{-27} kg. .000000000000000000000001,66 kg

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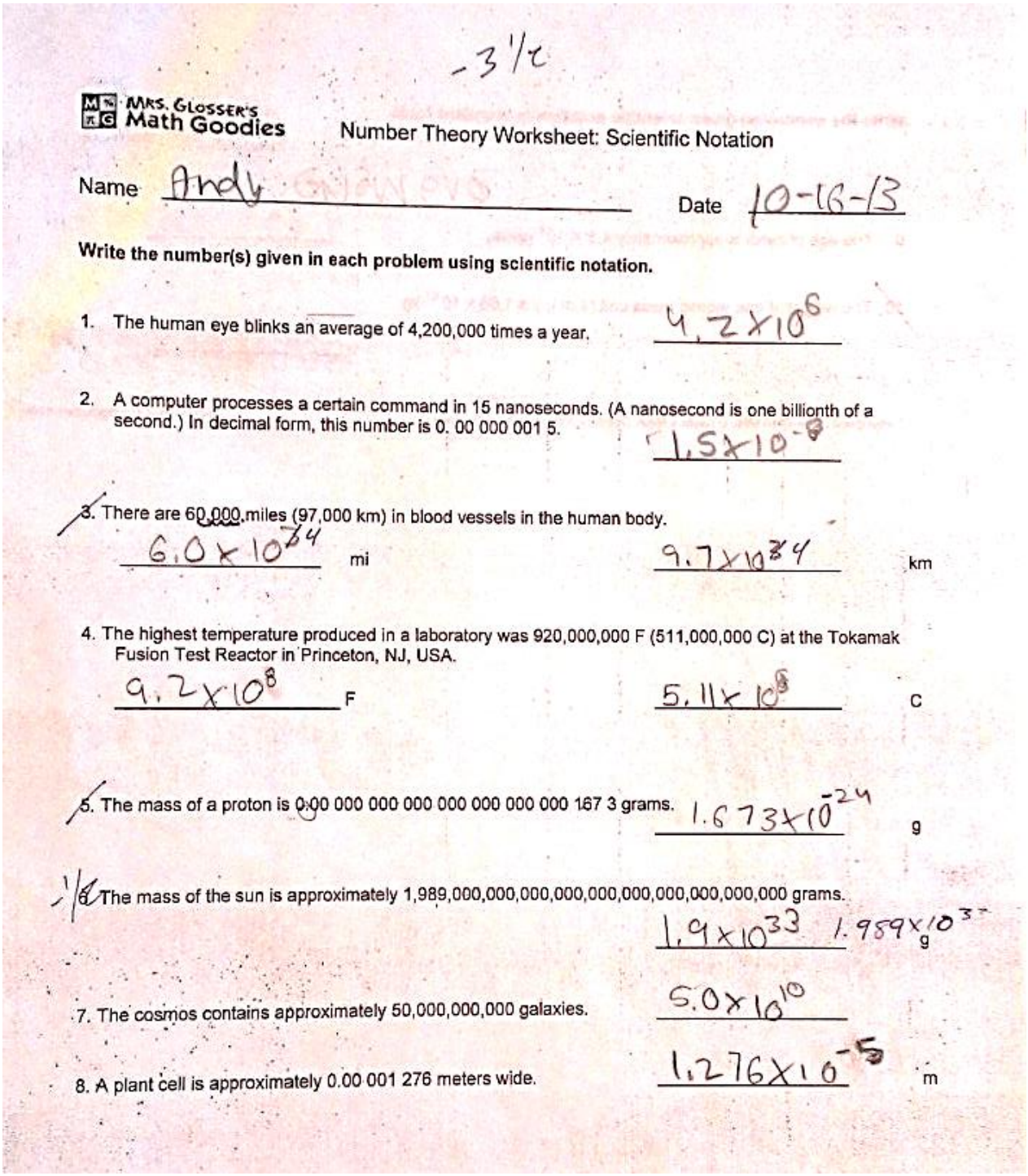
Example of Basic Work (about average):



-3 1/2

MRS. GLOSSER'S Math Goodies — Number Theory Worksheet: Scientific Notation

Name Andy — Date 10-16-13

Write the number(s) given in each problem using scientific notation.

1. The human eye blinks an average of 4,200,000 times a year. 4.2×10^6

2. A computer processes a certain command in 15 nanoseconds. (A nanosecond is one billionth of a second.) In decimal form, this number is 0. 00 000 001 5. 1.5×10^{-8}

3. There are 60,000 miles (97,000 km) in blood vessels in the human body.
6.0×10^4 mi 9.7×10^4 km

4. The highest temperature produced in a laboratory was 920,000,000 F (511,000,000 C) at the Tokamak Fusion Test Reactor in Princeton, NJ, USA.
9.2×10^8 F 5.11×10^8 C

5. The mass of a proton is 0.00 000 000 000 000 000 000 000 167 3 grams. 1.673×10^{-24} g

6. The mass of the sun is approximately 1,989,000,000,000,000,000,000,000,000,000,000 grams.
1.9×10^{33} 1.989×10^{33} g

7. The cosmos contains approximately 50,000,000,000 galaxies. 5.0×10^{10}

8. A plant cell is approximately 0.00 001 276 meters wide. 1.276×10^{-5} m

Write the number(s) given scientific notation in standard form.

9. The age of earth is approximately 4.5×10^9 years. 4,500,000,000 yr

10. The weight of one atomic mass unit (a.m.u.) is 1.66×10^{-27} kg.

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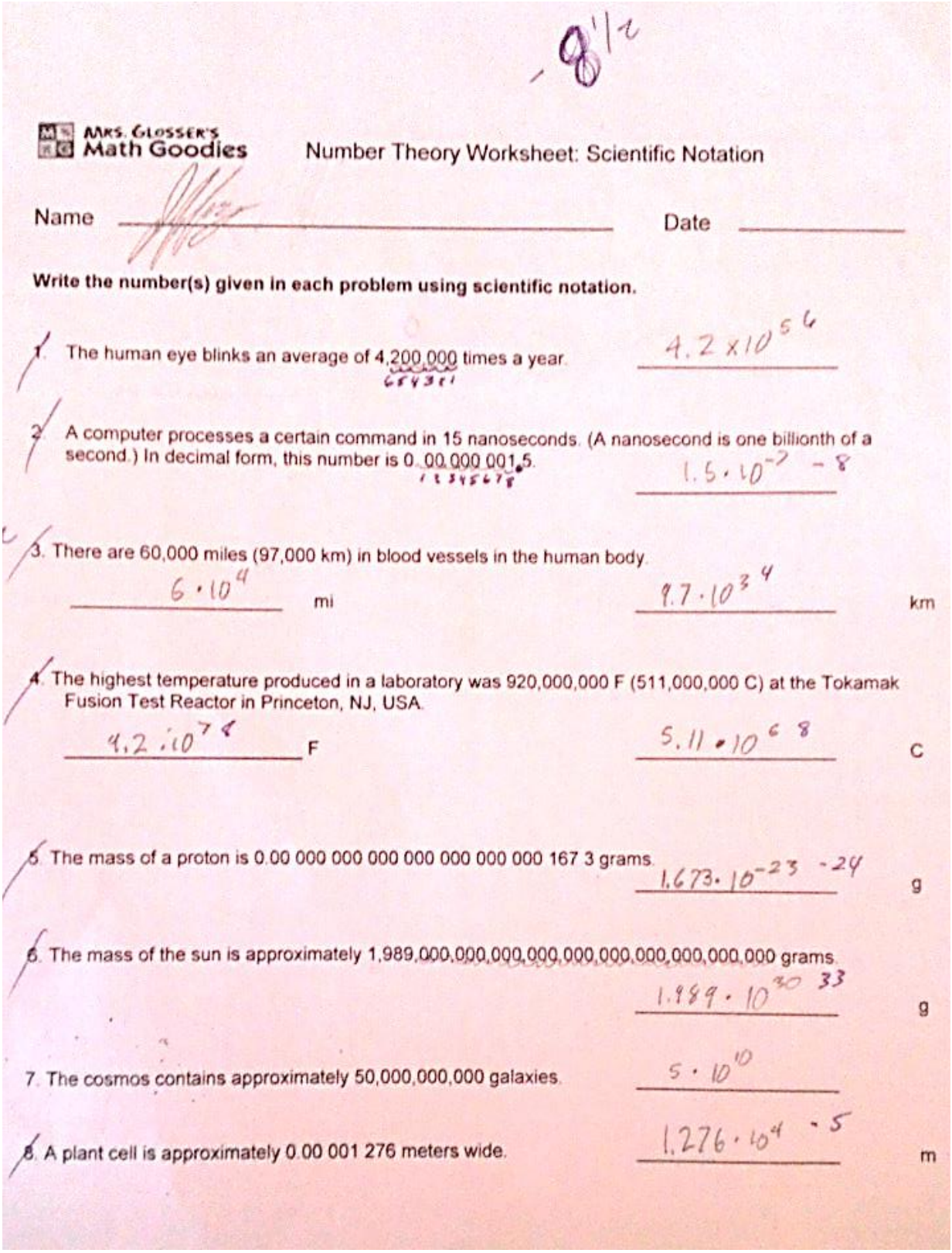
Example of Below Basic:



- 8 1/2

MRS. GLOSSER'S Math Goodies

Number Theory Worksheet: Scientific Notation

Name _____ Date _____

Write the number(s) given in each problem using scientific notation.

1. The human eye blinks an average of 4,200,000 times a year. 4.2×10^{56}

2. A computer processes a certain command in 15 nanoseconds. (A nanosecond is one billionth of a second.) In decimal form, this number is 0.00 000 001 5. $1.5 \cdot 10^{-7}$ -8

3. There are 60,000 miles (97,000 km) in blood vessels in the human body.
   $6 \cdot 10^{4}$ mi $9.7 \cdot 10^{34}$ km

4. The highest temperature produced in a laboratory was 920,000,000 F (511,000,000 C) at the Tokamak Fusion Test Reactor in Princeton, NJ, USA.
   $9.2 \cdot 10^{78}$ F $5.11 \cdot 10^{68}$ C

5. The mass of a proton is 0.00 000 000 000 000 000 000 000 167 3 grams. $1.673 \cdot 10^{-23}$ -24 g

6. The mass of the sun is approximately 1,989,000,000,000,000,000,000,000,000,000 grams.
   $1.989 \cdot 10^{30}$ 33 g

7. The cosmos contains approximately 50,000,000,000 galaxies. $5 \cdot 10^{10}$

8. A plant cell is approximately 0.00 001 276 meters wide. $1.276 \cdot 10^{4}$ -5 m

Write the number(s) given scientific notation in standard form.

9. The age of earth is approximately 4.5×10^{9} years. 4,500,000,000 yr

10. The weight of one atomic mass unit (a.m.u.) is 1.66×10^{-27} kg. 0.00000000000000000000000166 kg

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REFLECTION

On the fifteenth of October, I taught two periods of eighth grade math scientific notation, including when and how it is used. There were 24 male and 18 female students assessed. Class periods were 76 minutes long. My lesson plan was designed to take up the majority of the time. I was given a crash course in "lesson revision" when my mentor teacher informed me just before class that he needed 15-20 minutes of the class period in order to give the students an end of the quarter benchmark exam. Because of this, I shortened the amount of time that the students had to complete their worksheet. I feel that this is the major reason that many of the students received a poor score on the assessment.

I wish I could say that the students walked away knowing the material inside and out. However, I can't. Sixty-two percent of the students that turned in this assignment did not meet my proficiency grade of sixty percent on the paper portion of my assessment.

I had considered asking the students to finish their worksheets at home and return them to school the next class period. However, I decided not to. In part, this decision was made because the students 'everyday teacher' also gave a worksheet for them to complete for homework that evening. (This was another curve-ball to be thrown my way.) I did not think that it would be fair for them to have to complete both, especially since the other worksheet was over forty problems long and contained content they had not yet covered.

While shortening the time that the students were given to complete the worksheet I gave them might have lowered the achievement of proficiency, I feel that it was worth the cost in this case. It allowed me to keep the portion of the class period I had allotted to demonstrating a website intact. This website showed the students the difference that 1 number as an exponent can be, in the real world, in a very visual way.

I am thrilled to say that the interactive, web-based part of the class period went really well. Ninety-eight percent of the students were actively involved and asking questions. In the class where I did this at the end of the period, several students stayed after the bell to look at the project longer.

My mentor teacher had originally planned on continuing into multiplication and division using scientific notation the next class period. However, that was not the case. Several weeks later, when the students returned to scientific notation, it was easier to see that they had indeed retained some of the information which I had attempted to impart on them. More than once, a student corrected another on erroneous statements, such as "I was close. I was only one number off," with responses that like "That's the difference between an elephant and the Eiffel Tower!"