lesson twenty-eight - student resource sheet

Lesson Objective: Draw a scatter plot from given data; find the line of best fit and make predictions or decisions.

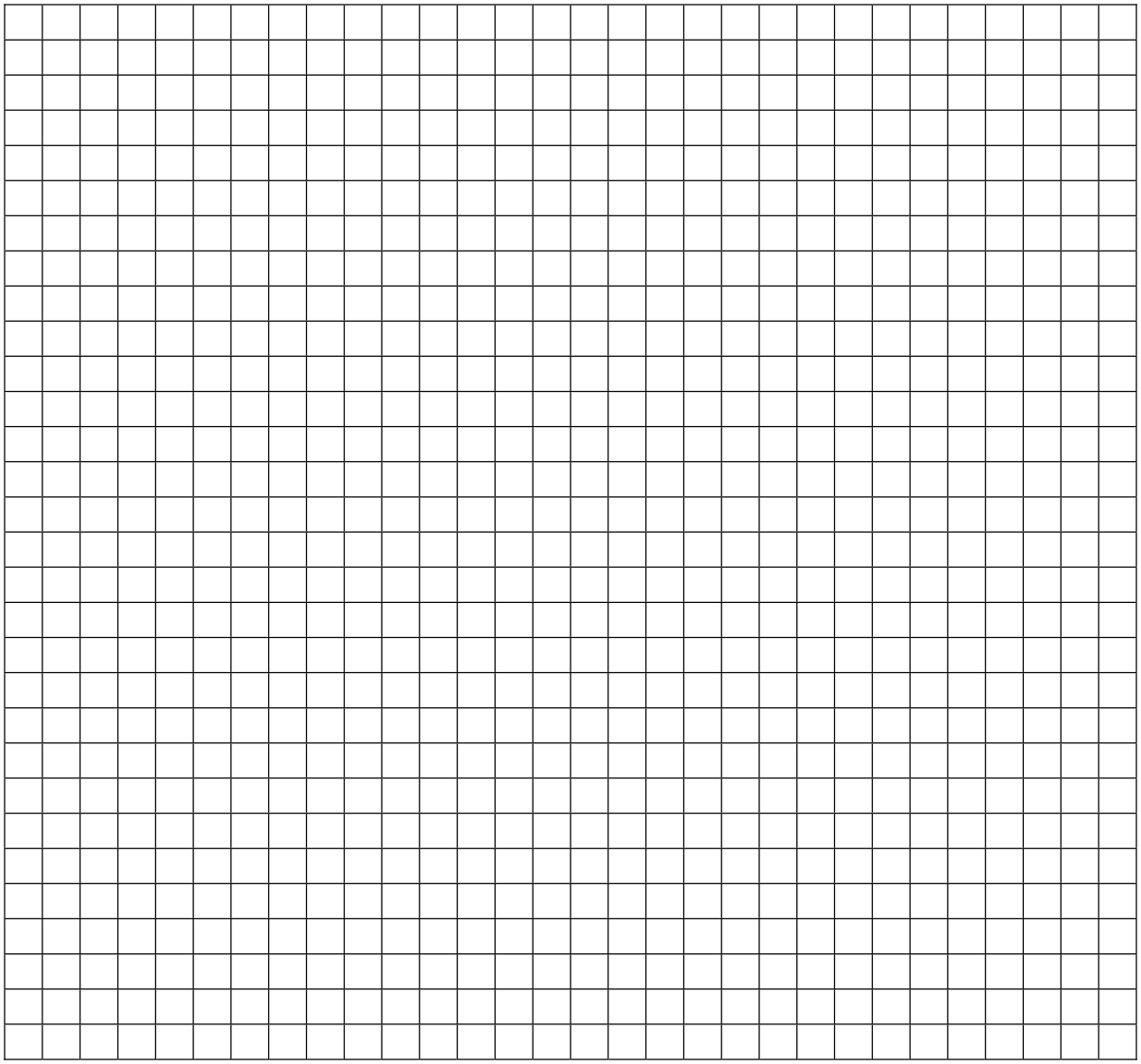
Vocabulary Box

scatter plot – A graph with two sets of data plotted as ordered pairs on a coordinate plane.

line of best fit – A line that lies as close as possible to the points in a scatter plot.

interpolate – Estimate values that lie between two known values.

extrapolate – Estimate values that lie beyond a known set of values.

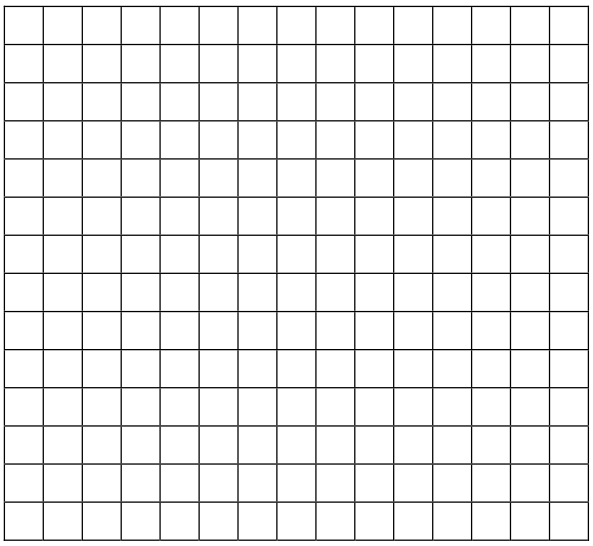


Independent Practice

Complete the following practice problems on your own. Your teacher will review the answers.

Directions: Complete the following for the table below.

Eliza's Age (in years)	**Time Eliza Needed to Run Around Her House** (in seconds)
3	54
4	51
5	48
6	42
7	35
9	29
12	23
14	21



1. Write ordered pairs for the values in the table.

2. Choose an appropriate scale and graph the ordered pairs.

3. Draw a line of best fit for the data.

4. Find an equation for your line of best fit.

5. Approximate how long Eliza would've taken to run around her house when she was 10 years old.

6. Approximate how long Eliza will take to run around her house when she is 18 years old.

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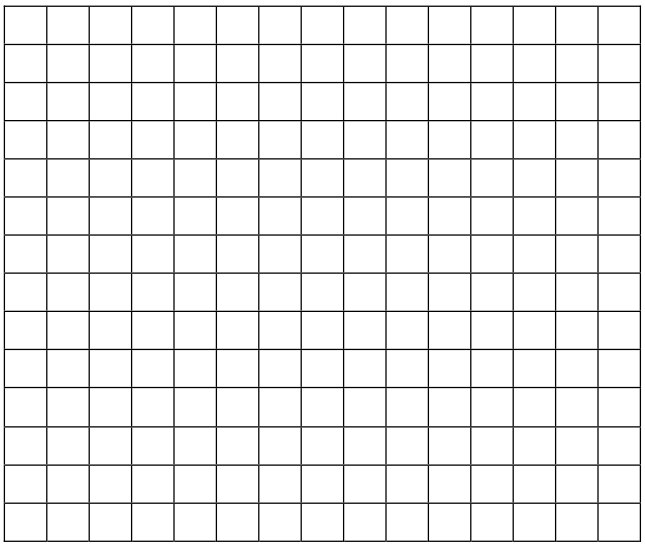
Directions: Complete the following for the table below.

Person's Weight (in kg)	**Person's Preferred Setting on an Adjustable Air Mattress**
45	25
50	35
60	50
75	45
80	60
90	70
100	70
115	85



7. Write ordered pairs for the values in the table.

8. Choose an appropriate scale and graph the ordered pairs.

9. Draw a line of best fit for the data.

10. Find an equation for your line of best fit.

11. Approximate the preferred setting for a person who weighs 70 kg.

12. Approximate the preferred setting for a person who weighs 35 kg.

BONUS?

Directions: Answer the following questions.

A. In the exercises about Eliza, suppose that we found that Eliza took 32 seconds when she was 10 years old. Is this reasonable. Why or why not?

B. In the exercises about Eliza, could we use our line of best fit to approximate Eliza's time when she will be 20 years old? Discuss how this relates to using scatter plots and lines of best fit.

Problem Solving

Directions: Match each real-world situation with its scatter plot on the following pages. Then find an equation of a line of best fit for each real-world situation.

Real-world Situations (y as a function of x)

1. Percentage (in %) of successful tennis serves as a function of the speed (in mph) of the serve

2. Time (in minutes) needed to mow a lawn as a function of the area (in acres) of the lawn

3. Height (in inches) of a person as a function of the person's arm span (in inches) from left middle fingertip to right middle fingertip with arms extended

4. Number of times the crowd in a football stadium does "the wave" as a function of the number of points the home team scores

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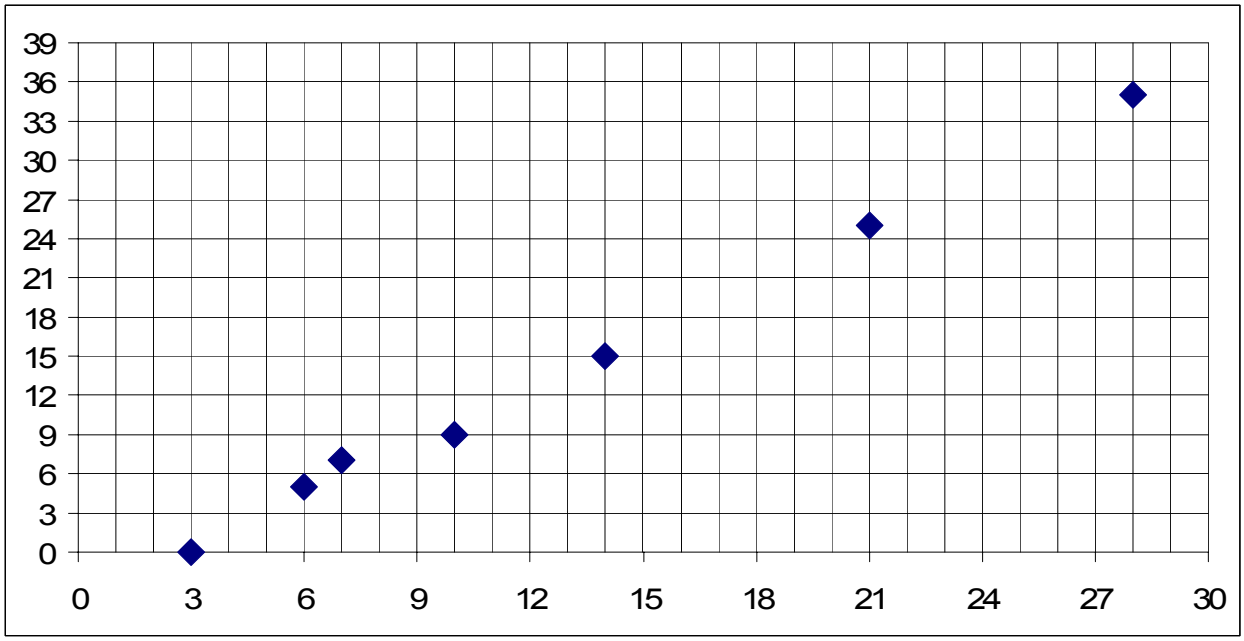
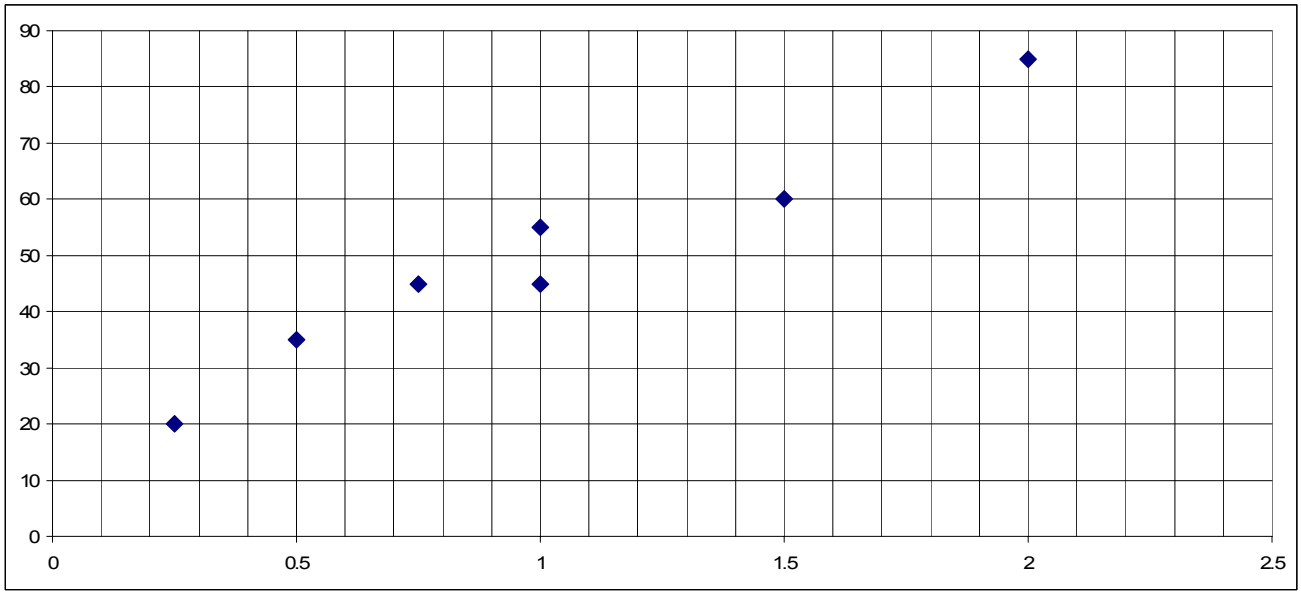
Scatter Plots

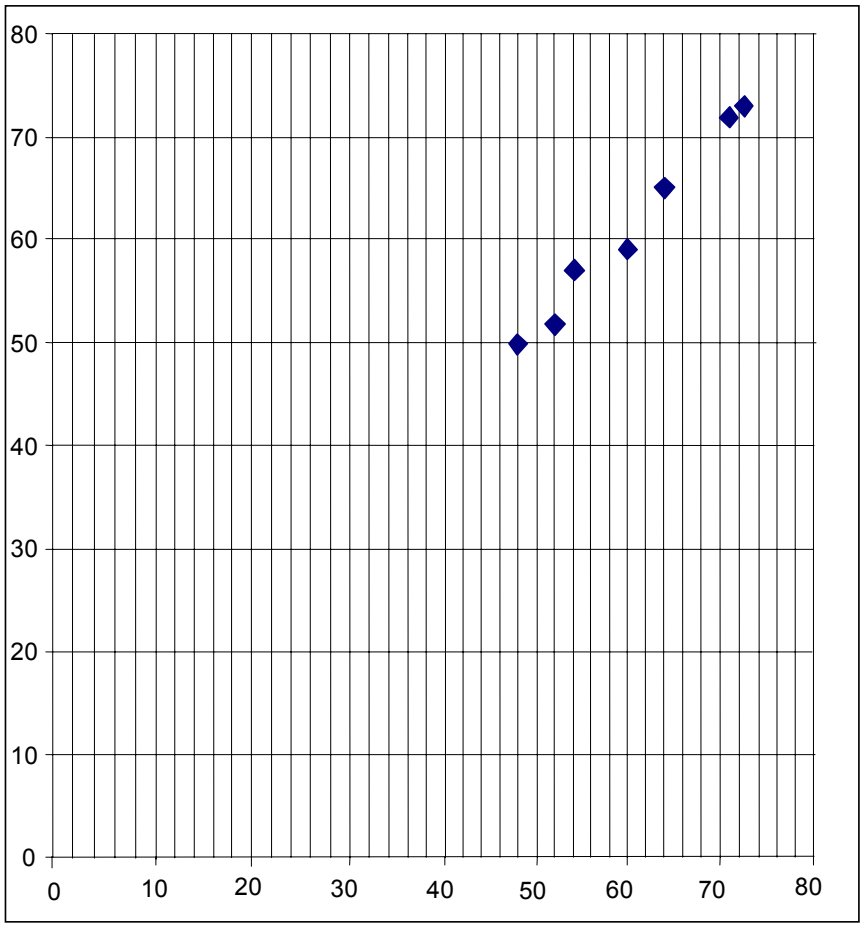
A.



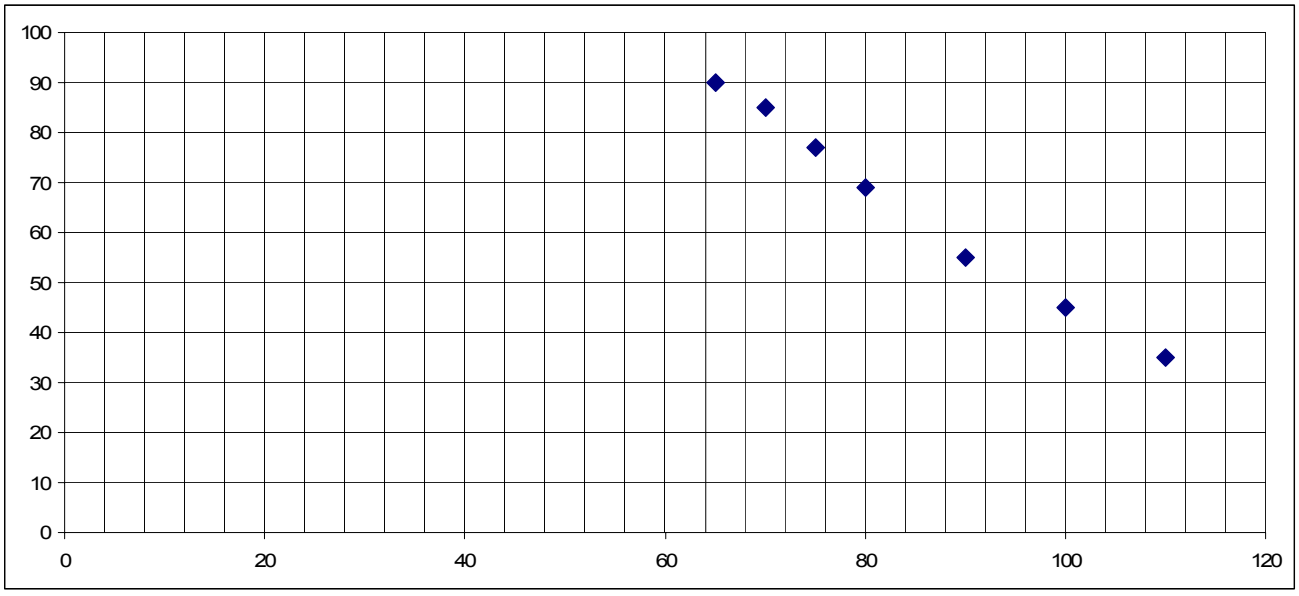
B.



C.


80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80

D.


100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

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Directions: Complete each exercise for the following ordered pairs: (3, 8), (4, 10), (4, 11), (5, 11), (7, 15), (8, 19), (9, 21).

1. Graph the ordered pairs and draw a line of best fit.

2. Find an equation of your line of best fit.

3. Approximate the value of y when x = 6 and when x = 12.

lesson twenty-nine - student resource sheet

Lesson Objective: Use patterns to generate laws of exponents and apply them in problem solving situations. (Include $a^m \cdot a^n$; $(a^m)^n$; $(a \cdot b)^m$; $\frac{a^m}{b^m}$; $\left(\frac{a}{b}\right)^m$; zero and negative exponents.)

Vocabulary Box

product of powers property – When multiplying powers with the same base, add the exponents. Example: $a^m \cdot a^n = a^{m+n}$.

quotient of powers property – When dividing powers with the same base, subtract the exponents. Example: $\frac{a^m}{a^n} = a^{m-n}$.

power of a product property – To find the power of a product, find the power of each factor and multiply. Example: $(a \cdot b)^m = a^m \cdot b^m$.

power of a quotient property – To find the power of a quotient, find the power of the numerator and the power of the denominator, and then divide. Example: $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$.

power of a power property – To find the power of a power, multiply the exponents. Example: $(a^m)^n = a^{mn}$.

Guided Practice

You will complete the following practice problems with your partner. Then your teacher will review the answers.

Directions: Simplify the following expressions.

1. $n^4 \cdot n^8$

2. $\frac{p^7}{p}$

3. $\frac{q^4}{q^{12}}$

4. r^{-6}

5. $\frac{4}{u^{-6}}$

6. v^0

7. $(w^4)^8$

8. $(7x^7y)^2$

9. $\left(\frac{3}{2z^2}\right)^5$

Summary/Closure

A. Vocabulary Words
Directions: Match each property with its example.

1. product of powers property
2. quotient of powers property
3. power of a power property
4. power of a product property
5. power of a quotient property

A. $a^m \cdot a^n = a^{m+n}$

B. $\frac{a^m}{a^n} = a^{m-n}$

C. $(a \cdot b)^m = a^m \cdot b^m$

D. $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

E. $(a^m)^n = a^{mn}$

B. Summarize What We Learned Today
Directions: Write an example of each of the five properties we studied today. Then simplify these expressions. Then write one example about negative exponents and one example about the zero exponent. Then explain how you use each property. You will use this explanation as a personal reference sheet.

lesson thirty - student resource sheet

Lesson Objective: Use patterns to generate laws of exponents and apply them in problem solving situations. (Include $a^m \cdot a^n$; $(a^m)^n$; $(a \cdot b)^m$; $\frac{a^m}{b^m}$; $\left(\frac{a}{b}\right)^m$; zero and negative exponents.)

Vocabulary Box

product of powers property – When multiplying powers with the same base, add the exponents. Example: $a^m \cdot a^n = a^{m+n}$.

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power of a power property – To find the power of a power, multiply the exponents. Example: $(a^m)^n = a^{mn}$.

Independent Practice

Please complete the following practice problems on your own. Your teacher will review the answers.

Directions: Simplify each expression.

1. $m^7 \cdot m \cdot m^5$

2. $\frac{n^9}{n^{11}}$

3. $\frac{3k^5}{6k^2}$

4. $(p^5)^4$

5. $(7j^7r)^3$

6. $\left(\frac{4h^4}{5u}\right)^2$

7. $(9g^4v^2gv^5)^2$

8. $\left(\frac{18f^9w}{12f^6w^7}\right)^4$

9. d^{-6}

10. $\frac{2x^{-5}}{5c^{-1}}$

11. b^0

12. yz^0

lesson thirty - student resource sheet

Directions: Solve each problem.

1. A scientist checked a Petri dish and found approximately 10^5 bacteria. Later, he checked the dish again and found approximately 10^7 times as many bacteria as before. Approximately how many bacteria did he find the second time? Express your answer as a power of 10.

2. A certain star is approximately 10^{14} miles from Earth. Another star is approximately the square of that distance from the Earth. Approximately how far is the second star from Earth?

3. A rancher owns a large square plot of land. Each side of the square measures $(2.1 \cdot 10^5)$ feet. What is the area, in square feet, of the plot?

Directions: Simplify each expression.

A. $6a^4b^2ce^5 \cdot 4a^3b^9d^4e$

B. $(8w^8x^3)^2 \cdot (wx)^5$

C. $\left(\frac{4m^{-4}n^{-2}p^3}{12m^{-3}n^7p^{-7}}\right)^6$

Problem Solving

Exploded Exponential Equations

Edgy Eddie eagerly exploded eleven exponential equations.

Help him reconstruct his equations. Work with a partner to reconstruct as many as you can.

Directions: Rearrange the numbers and symbols to create a true equation. Some numbers may be part of a base, and other numbers may be part of an exponent. Use the lines as fraction bars.

1. 4 n • • 9 n 14 n = n

2. n 10 n = 5 (2)

3. 7 ___ n ___ 2 1 n n 9 =

4. 1 2 4 6 = ___ n n n

5. ( ) ___ ___ = 4 4 4 m m 16 81
   n n 2 3

lesson thirty - student resource sheet

Directions: Rearrange the numbers as above, except that Eddie has lost all of the symbols, so you will have include your own.

1. y 2 y 4 8

2. y 2 y 4 6 y

3. y y 5 –5 1

4. y z 0 0 z z

5. 2 2 3 3 y y z z 6 9

6. y y y 2 3 4 5 6 z z z

Directions: Simplify each expression.

1. $(4y^4z)^2$

2. $\left(\frac{w^5wx^9}{w^7x^7}\right)^3$

3. $a^{-3}b^0c^3$