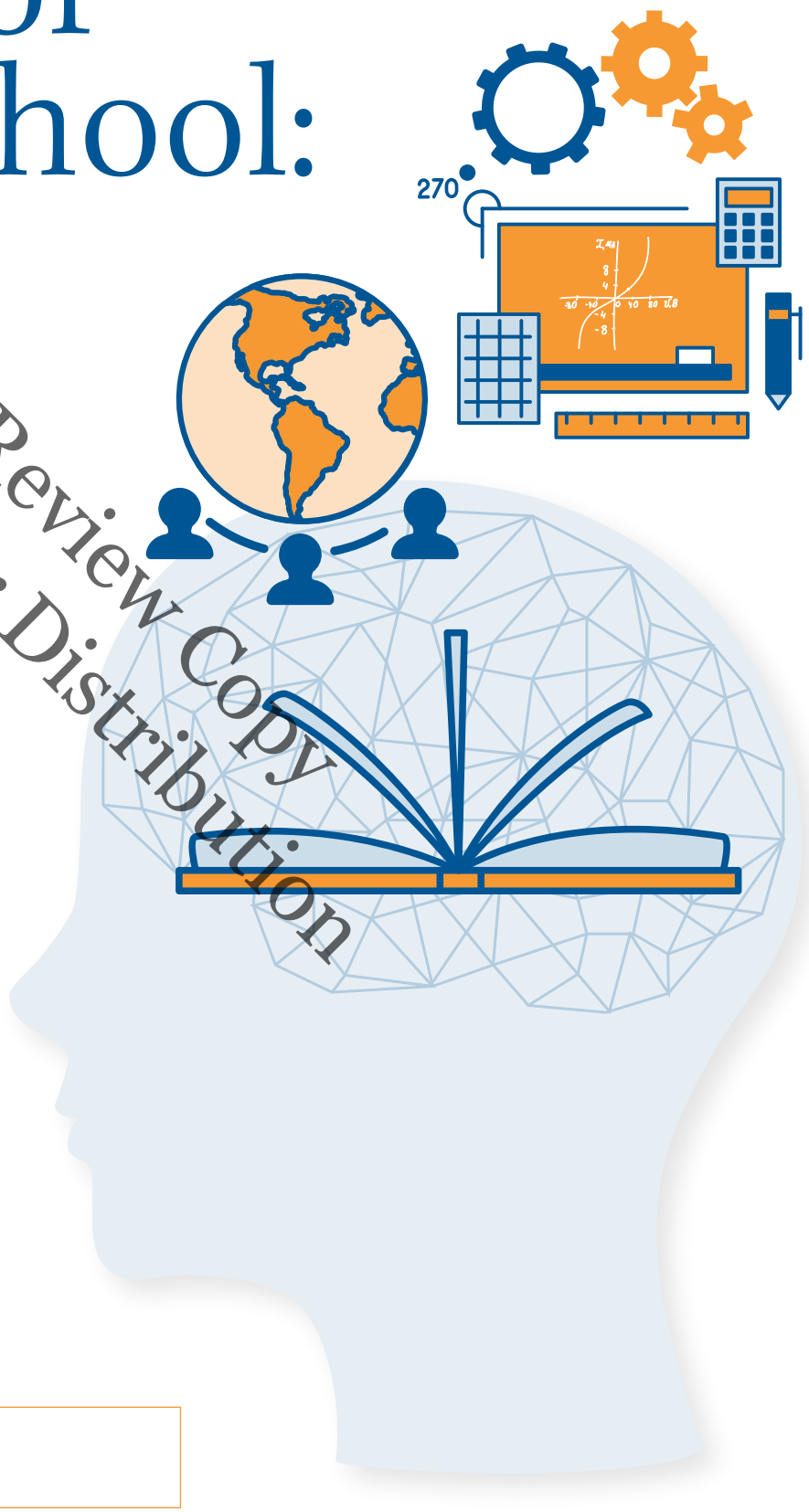
SREB Readiness Courses

Ready for High School: Math

Student Manual

Math Unit 1/2

Fractions



Name

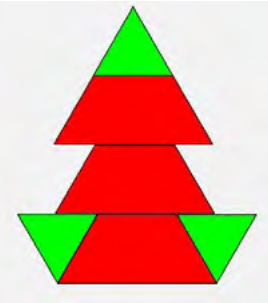
Unit 1/2 . The Number System

Contents

Task #1: Mosaic Models

Work in pairs for this activity. Arrange your pattern blocks to design a "mosaic" area model. The area of your "mosaic" will be used for reference to answer parts a thru e.

Here is an example of a "mosaic" area model.



Return the unused pattern blocks to their container. Answer the following questions in pairs.

The mosaic you have created is the whole. For each fraction below, find the pieces of the mosaic and draw it on your paper.

a. $\frac{1}{2}$ mosaic

b. $1\frac{1}{3}$ mosaics

c. 2 mosaics

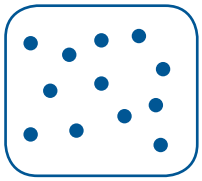
d. $\frac{1}{4}$ mosaic

e. $\frac{2}{3}$ mosaic

Task #2: Here's Your Part...

1. If this rectangle is one-third, what could the whole look like? Show your thinking.

2. If 12 counters are **three-fourths**, of a set, how many counters are in the full set? Show your thinking.



Task #3: Fabricating Estimates

Refer to the stadium seating to answer the following questions. Do not attempt to count the seats and use simple fractions.

	Estimate		"Actual"
1. About what fraction of the seating is light blue?			
2. About what fraction represents the amount of green seats?			
3. Estimate the fraction representing red seats.			
4. Estimate the fraction representing special seating (dark blue, purple and yellow) areas.			
5. Estimate the fraction representing VIP and wheelchair areas.			

6. Compare each of your estimates with the ones provided (<, >, =)

7. Draw an area model in the spaces below to represent the comparison between each of your estimates and the ones provided.

(1) (2) (3) (4)

7. (Line a)

(Line B)

Task #4: Waiting in Line

You're attending a concert with five friends but each of you arrived at the venue at different times. The fractions below tell how much of the distance they have already moved since they got in line. (Think about fractions as area models if you need some help!)

You $\frac{3}{4}$ Andrea $\frac{1}{2}$ Bart $\frac{4}{5}$ Camden $\frac{7}{8}$ Drake $\frac{3}{7}$ Ethan $\frac{2}{3}$

1. a. Who do you know is not going to get in the gate first?

b. How do you know?

3. Place each person on the number line below to show where they are between the start and finish.

Who is getting in the gate first?

Task #5: What's in the Deck

	Area	Set	Length	What fraction is represented?
1. What fraction of colors in a deck of cards is red?				
2. What fraction of suits in a deck of cards is spades?				
3. What fraction of the heart suit in a deck of cards is king(s)?				
4. What fraction of the heart suit in a deck of cards is face cards?				
5.				
6.				

Task #6: Humane Fractions

1. The Humane Society tracked the number of times the cats used the doggy/kitty door in a day. This weekend it was used 200 times. The cats used it $\frac{1}{5}$ of the times and dogs used it $\frac{8}{10}$ of the times. How many times did the cats use the door? How many times did dogs use the door? Choose and draw a model (area, set, length) and explain how you figured it out.

2. During a weekend adoption event, $\frac{3}{8}$ of the animals adopted were birds, $\frac{3}{16}$ were dogs. The remaining adoptions were cats. What fraction of the animals adopted were cats? Draw a different model than used in problem number one to show your thinking and explain how you found the answer.

Task #7: Estimation Proclamation

Each fraction will be displayed for only 10 seconds. DO NOT draw or calculate, only estimate!

1. _____

2. _____

3. _____

4. _____

5. _____

Task #8: Salad Dressing

Aunt Barb's Salad Dressing Recipe

- $\frac{1}{3}$ cup olive oil
- $\frac{1}{6}$ cup balsamic vinegar
- a pinch of herbs
- a pinch of salt

Makes 6 servings

a. How many cups of salad dressing will this recipe make? Write an equation to represent your thinking. Assume that the herbs and salt do not change the amount of dressing.

b. If this recipe makes 6 servings, how much dressing would there be in one serving? Write a number sentence to represent your thinking.

Source: https://www.illustrativemathematics.org/content-standards/5/NF/A/2/tasks/1172

Task #9: The Swim Meet

Estimate your answers first. Draw a model to show your thinking and write the equation that goes with the problem.

1. Thunder was heard causing the swim meet to be stopped in the middle of a heat. The blue team completed $3\frac{3}{4}$ laps. The red team completed $2\frac{1}{6}$ laps. How many laps did they complete altogether?

2. Mr. Left and Mrs. Right took the 3 leftover pizzas home from the concession stand after a swim meet.

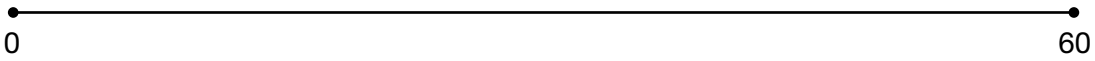
   He ate $\frac{7}{8}$ of a pizza and she ate $\frac{2}{6}$ of a pizza. How much pizza is left for their kids?

Task #10: Desmos Number Sense: Multiplying and Dividing Fractions

1. Show problem #1

   a. What do you notice? How would you begin?

   b. Identify the location representing $\frac{1}{2}$ of 30

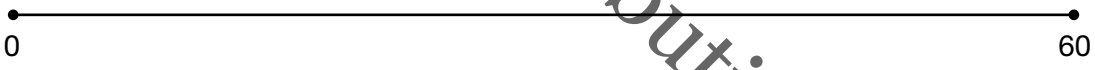
   

   c. Write an equivalent expression showing the division performed

2. Show problem #2

   a. How is this problem different from the first?

   b. Identify the location representing $\frac{3}{2}$ of 30

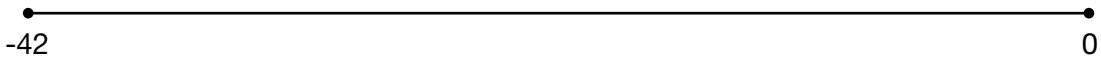
   

   c. Write an equivalent expression showing the division performed

3. Show problem #3

   a. How is this problem different from the last two? What makes it seem more difficult/easier?

   b. Identify the location representing $-\frac{1}{3}$ of 21

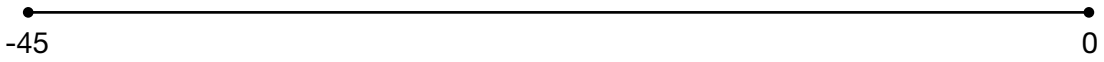
   

   c. Write an equivalent expression showing the division performed

4. Show problem #4

a. How would you use subdivision to help you solve this problem?

b. Identify the location representing $-\frac{3}{5}$ of 45

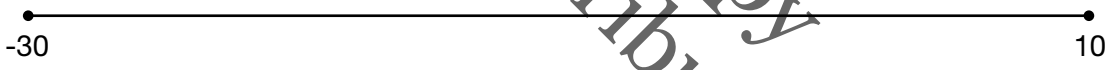


c. Write an equivalent expression showing the division performed

5. Show problem #5

a. What is different about the information given in this problem?

b. Identify the location representing $\frac{1}{4}$ of -20

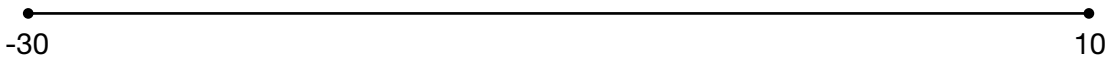


c. Write an equivalent expression showing the division performed

6. Show problem #6

a. How can you use this answer to check your answer to number 5?

b. Identify the location representing $\frac{5}{4}$ of -20

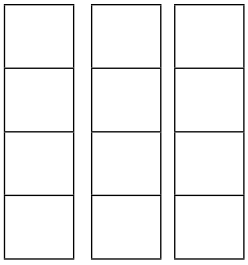


c. Write an equivalent expression showing the division performed

Task #11: Using Rectangles for Multiplying and Dividing Fractions

Shade the rectangle(s) to show each problem, and then use mathematics symbols to show the algorithms for multiplying and dividing.

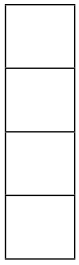
1a. $\frac{1}{4} \times 3$



(How much is _____

added _____ times?)

1b. $\frac{3}{4} \div \frac{1}{4}$



(How many times can _____

be subtracted from _____ ?)

Source: http://www.uen.org/Lessonplan/downloadFile.cgi?file=23394-2-29223-Using_Rectangles.pdf&filename=Using_Rectangles.pdf

Task #12: Using Fraction Tiles for Multiplying and Dividing Fractions

Use the Fraction Tiles, sketches, mathematics symbols, and words to model each problem. Write words in the blank parentheses to represent those problems.

1a. $\frac{1}{4}$ x 3 (How much is _____ added _____ times?)

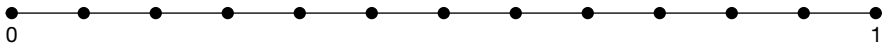
1b. $\frac{3}{4} \div \frac{1}{4}$ (How many times can _____ be subtracted from _____ ?))

Source: http://www.uen.org/Lessonplan/downloadFile.cgi?file=23394-2-29222-Using_Fraction_Tiles.pdf&filename=Using_Fraction_Tiles.pdf

Task #13: Multiplying and Dividing Fractions on a Number Line

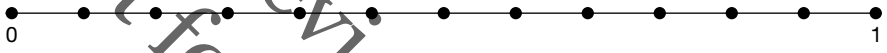
Place a large point on the number line to represent the first number in each problem. Shade the number lne to model the problem and show the answer. Then, use math symbols to set up the problem and find the answer.

1. $\frac{1}{3} \times 3$



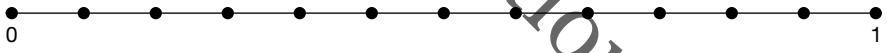
How much is 1/3 added three times?

2. $\frac{1}{3} \times \frac{1}{4}$



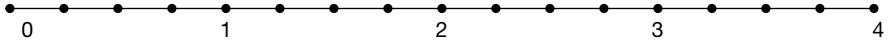
How much is $\frac{1}{3}$ added $\frac{1}{4}$ time?

3. $\frac{5}{6} \times \frac{1}{2}$



How much is $\frac{5}{6}$ added $\frac{1}{2}$ time?

4. $1\frac{1}{2} \times 1\frac{1}{2}$



How much is $2\ \frac{1}{2}$ added $1\frac{1}{2}$ times?

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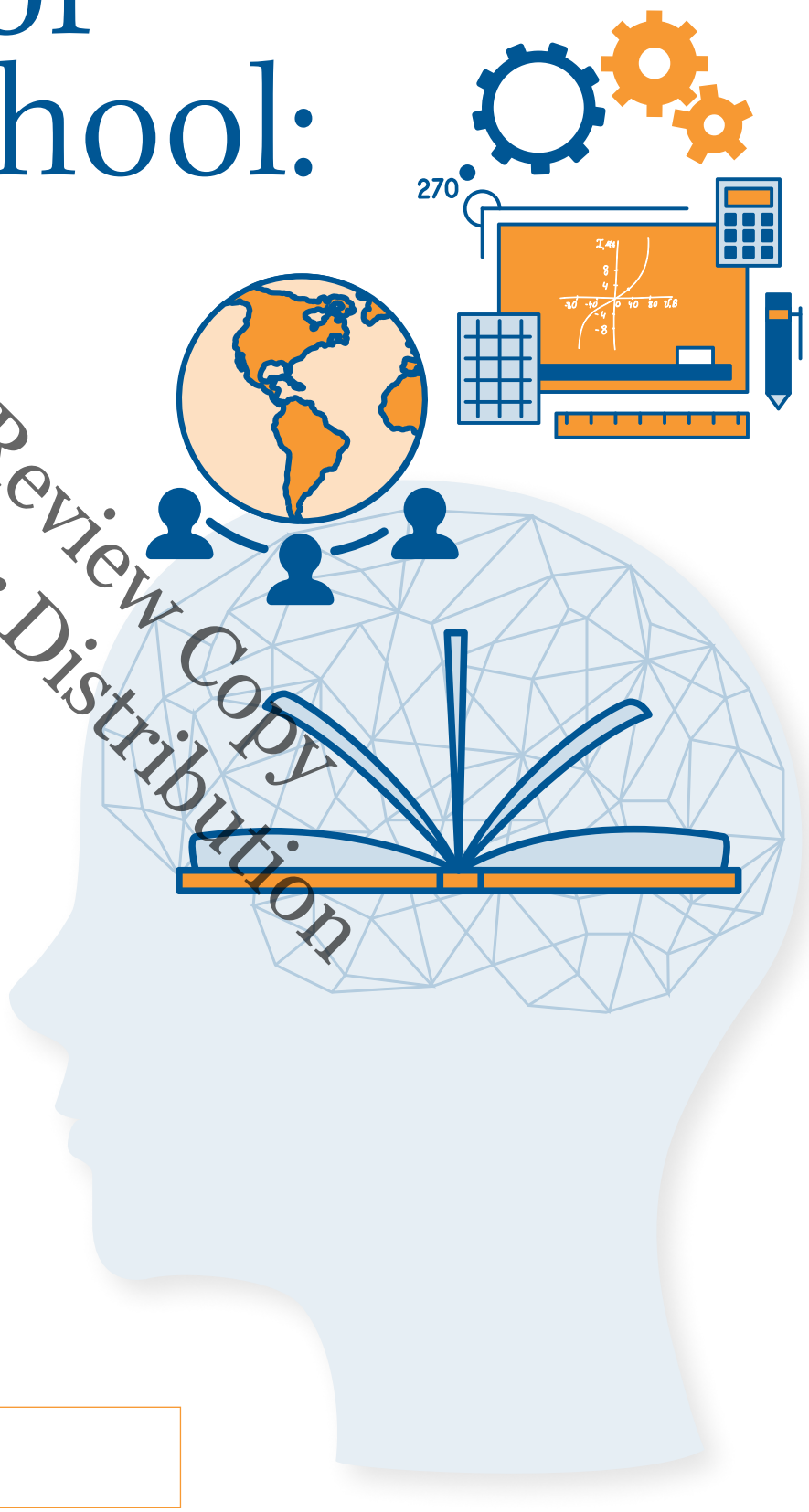
Student Manual

Math Unit 1

The Number System



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Unit 1 . The Number System

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Task #1: Written Response Form

Write the numbers on your cards in the space below:

Order the numbers from least to greatest:

How did you determine which number was the largest?

How did you determine which number was the smallest?

How did you determine the order of the other numbers?

Lesson 1 Exit Slip

Using what you have learned today, put the following numbers in order from least to greatest:

$-\frac{1}{2}, \frac{2}{3}$, 0.66, 1.3, $\sqrt{3}$, -0.25, -0.5

Task #2: Multiple Representations

1. Find the fraction and percent form of each decimal number:

   0.5

   0.75

   0.2

   0.8

   1.25

2. Find the decimal and percent form of each fraction:

   $\frac{1}{3}$

   $\frac{1}{2}$

   $\frac{2}{3}$

   $\frac{5}{8}$

3. Find the decimal and fraction form of each percent:

   50%

   35%

   110%

   15%

4. Answer the following questions on notebook paper:

   - Which numbers are the most difficult to convert to decimals? Why?
   - Which numbers are the most difficult to convert to fractions? Why?
   - Which numbers are the most difficult to convert to percents? Why?

Task #3: Different Representations

Complete the table, filling in the missing numbers.

Fraction	Decimal	Percent
$\frac{1}{2}$		
	0.05	
		85%

Place all nine numbers from the table onto the number line.

How can you determine if your answers are correct?

Task #4: How I Spent My Summer Daze

List your activities on a typical summer day in the first column. In the second column, estimate the number of whole hours you spend on this activity in a day. Then, complete each row of the table by converting the number of hours per day to a fraction in lowest terms, a decimal, a percent, and the number of degrees this represents in a circle. Use the values you calculated to create a pie chart that represents your Summer Daze.

Daily Activity	Hours	Fraction	Decimal	Percent	Degrees
Total					

Task #5: Gross Domestic Product Data

1. What is the difference between the GDP of the United States and each of the three countries you chose?

2. If you added up the GDP of the three countries you chose, how much is the difference between that amount and the United States?

3. Put the GDP of the three countries in order from least to greatest.

GDP Data

Country Name	2012	2013	2014
Afghanistan	$ 20,536,542,736.73	$ 20,458,939,155.27	$ 20,038,215,159.39
Albania	$ 12,319,784,787.14	$ 12,781,029,643.42	$ 13,211,513,725.59
Arab World	$ 2,753,999,680,390.12	$ 2,827,557,148,210.97	$ 2,845,788,040,651.82
United Arab Emirates	$ 373,429,543,907.42	$ 387,192,103,471.75	$ 399,451,327,433.63
Argentina	$ 604,378,456,915.58	$ 614,383,517,369.50	$ 537,659,972,702.09
Armenia	$ 10,619,320,048.59	$ 11,121,465,767.41	$ 11,644,438,422.98
Antigua and Barbuda	$ 1,204,713,111.11	$ 1,200,587,518.52	$ 1,220,976,011.11
Australia	$ 1,537,477,830,480.51	$ 1,563,950,959,269.52	$ 1,454,675,479,665.84
Austria	$ 407,373,026,611.61	$ 428,698,577,647.39	$ 436,887,543,466.95
Azerbaijan	$ 68,730,906,313.65	$ 73,560,484,384.96	$ 75,198,010,965.19
Burundi	$ 2,472,384,907.00	$ 2,714,505,634.53	$ 3,093,647,226.81
Belgium	$ 497,780,014,247.47	$ 521,402,393,365.01	$ 531,546,586,178.58
Benin	$ 8,117,100,933.53	$ 9,110,800,744.88	$ 9,575,356,734.73
Burkina Faso	$ 11,166,061,507.80	$ 12,110,243,992.07	$ 12,542,221,941.86
Bangladesh	$ 133,355,749,482.48	$ 149,990,451,022.29	$ 172,886,567,164.18
Bulgaria	$ 53,576,670,827.86	$ 55,626,359,256.24	$ 56,717,054,673.72
Bahrain	$ 30,756,462,765.96	$ 32,897,606,382.98	$ 33,851,063,829.79
Bahamas, The	$ 8,234,470,000.00	$ 8,431,750,000.00	$ 8,510,500,000.00
Bosnia and Herzegovina	$ 16,906,005,781.11	$ 17,841,444,572.67	$ 18,286,273,232.94
Belarus	$ 63,615,445,566.85	$ 73,097,619,636.82	$ 76,139,250,364.52
Belize	$ 1,573,867,300.00	$ 1,624,294,250.00	$ 1,699,154,132.06
Bolivia	$ 27,084,497,539.80	$ 30,659,338,929.09	$ 32,996,187,988.42
Brazil	$ 2,413,135,528,134.76	$ 2,392,082,463,707.62	$ 2,346,076,315,118.55
Barbados	$ 4,313,000,000.00	$ 4,281,000,000.00	$ 4,354,500,000.00
Brunei Darussalam	$ 16,953,505,121.64	$ 16,110,693,734.02	$ 17,104,656,669.30
Bhutan	$ 1,823,692,109.62	$ 1,798,333,725.84	$ 1,958,803,866.95
Botswana	$ 14,792,386,725.47	$ 14,979,304,170.78	$ 15,813,364,345.32
Central African Republic	$ 2,169,706,564.06	$ 1,537,740,105.46	$ 1,722,529,061.42
Canada	$ 1,832,715,597,431.65	$ 1,838,964,175,409.41	$ 1,785,386,649,602.19
Central Europe and the Baltics	$ 1,349,251,615,979.45	$ 1,419,383,888,513.92	$ 1,457,322,987,324.99
Switzerland	$ 665,408,300,271.74	$ 684,919,206,141.13	$ 701,037,135,966.05
Chile	$ 265,231,582,107.40	$ 276,673,695,234.34	$ 258,061,522,886.53
China	$ 8,461,623,162,714.07	$ 9,490,602,600,148.49	$ 10,354,831,729,340.40
Cote d'Ivoire	$ 27,040,562,587.18	$ 31,292,560,974.45	$ 34,253,607,832.41
Cameroon	$ 26,472,056,037.77	$ 29,567,504,655.49	$ 32,050,817,632.96
Congo, Rep.	$ 13,677,930,123.59	$ 14,085,852,120.48	$ 14,177,440,494.82
Colombia	$ 369,659,700,375.52	$ 380,063,456,192.64	$ 377,739,622,865.84
Comoros	$ 550,476,566.06	$ 598,925,539.67	$ 623,751,049.73
Cabo Verde	$ 1,751,888,561.73	$ 1,837,908,563.30	$ 1,871,187,071.00
Costa Rica	$ 45,300,669,857.48	$ 49,236,710,394.45	$ 49,552,580,683.15
Caribbean small states	$ 66,505,519,500.70	$ 69,287,048,038.15	$ 71,288,024,078.60
Cyprus	$ 24,940,600,822.11	$ 24,057,251,748.56	$ 23,226,158,986.17
Czech Republic	$ 206,441,578,342.49	$ 208,328,435,108.82	$ 205,269,709,743.47
Germany	$ 3,539,615,377,794.51	$ 3,745,317,149,399.13	$ 3,868,291,231,823.77
Djibouti	$ 1,353,632,941.52	$ 1,455,416,073.51	$ 1,589,026,157.88
Dominica	$ 485,185,185.19	$ 506,666,666.67	$ 524,074,074.07
Denmark	$ 322,276,544,469.31	$ 335,877,548,363.83	$ 342,362,478,767.51
Dominican Republic	$ 60,595,109,805.12	$ 61,366,326,096.19	$ 64,137,819,040.49
Algeria	$ 209,047,389,599.67	$ 209,703,529,364.33	$ 213,518,488,688.12
East Asia & Pacific (developing only)	$ 10,649,494,095,547.20	$ 11,729,395,514,462.00	$ 12,609,716,376,487.10
East Asia & Pacific (all income levels)	$ 20,643,769,618,337.50	$ 20,846,726,977,065.70	$ 21,452,948,649,513.30
Europe & Central Asia (developing only)	$ 1,750,766,182,639.54	$ 1,879,644,696,323.62	$ 1,817,225,993,582.48
Europe & Central Asia (all income levels)	$ 22,006,778,830,664.60	$ 22,949,899,696,925.60	$ 23,182,545,677,138.90

Country Name	2012	2013	2014
Ecuador	$ 87,924,544,000.00	$ 94,776,170,000.00	$ 100,917,372,000.00
Egypt, Arab Rep.	$ 262,824,255,567.60	$ 271,972,822,883.38	$ 286,538,047,765.90
Euro area	$ 12,636,217,395,544.50	$ 13,188,775,741,580.40	$ 13,410,232,162,147.30
Spain	$ 1,339,946,773,437.24	$ 1,369,261,671,179.00	$ 1,381,342,101,735.68
Estonia	$ 23,135,266,649.13	$ 25,246,787,741.95	$ 26,485,161,115.94
Ethiopia	$ 43,310,721,414.08	$ 47,648,211,133.22	$ 55,612,228,233.52
European Union	$ 17,248,798,723,694.40	$ 17,987,465,273,840.30	$ 18,514,155,872,554.50
Fragile and conflict affected situations	$ 722,861,462,233.95	$ 731,558,071,200.60	$ 723,672,091,148.52
Finland	$ 256,706,466,091.09	$ 269,190,106,004.86	$ 272,216,575,502.25
Fiji	$ 3,977,652,382.81	$ 4,196,100,792.87	$ 4,531,817,940.97
France	$ 2,681,416,108,537.39	$ 2,810,249,215,589.07	$ 2,829,192,039,171.84
Micronesia, Fed. Sts.	$ 325,835,160.29	$ 315,725,616.96	$ 318,071,978.58
Gabon	$ 17,171,447,372.33	$ 17,590,716,232.49	$ 18,179,717,776.16
United Kingdom	$ 2,630,472,981,169.65	$ 2,712,296,271,989.99	$ 2,988,893,283,565.20
Georgia	$ 15,846,474,595.77	$ 16,140,047,012.14	$ 16,529,963,187.40
Ghana	$ 41,939,728,978.73	$ 47,805,069,494.91	$ 38,616,536,131.65
Guinea	$ 5,667,229,758.99	$ 6,231,725,484.56	$ 6,624,068,015.50
Guinea-Bissau	$ 958,857,944.22	$ 946,629,755.79	$ 1,022,371,991.53
Equatorial Guinea	$ 18,011,041,667.13	$ 17,135,584,684.64	$ 15,529,729,676.69
Greece	$ 245,670,666,639.05	$ 239,509,850,570.45	$ 235,574,074,998.31
Grenada	$ 799,882,130.00	$ 842,571,332.22	$ 911,803,790.37
Guatemala	$ 50,388,460,222.63	$ 53,851,148,431.93	$ 58,827,085,046.95
Guyana	$ 2,851,149,182.59	$ 2,982,036,493.73	$ 3,096,747,286.98
High income	$ 51,595,926,314,026.60	$ 52,256,187,329,042.10	$ 52,812,577,414,531.50
Hong Kong SAR, China	$ 262,629,441,493.48	$ 275,742,650,850.95	$ 290,895,784,165.80
Honduras	$ 18,528,601,901.32	$ 18,496,438,641.48	$ 19,385,314,718.41
Heavily indebted poor countries (HIPC)	$ 551,529,245,465.13	$ 598,851,845,291.30	$ 630,954,045,632.17
Croatia	$ 56,485,301,967.42	$ 57,770,884,728.65	$ 57,113,389,357.45
Haiti	$ 7,890,216,507.69	$ 8,452,718,010.08	$ 8,713,041,022.95
Hungary	$ 127,176,184,359.09	$ 134,401,774,737.92	$ 138,346,669,914.95
Indonesia	$ 917,869,913,364.92	$ 910,478,729,099.04	$ 888,538,201,025.35
India	$ 1,831,781,515,472.09	$ 1,861,801,615,477.85	$ 2,048,517,438,873.54
Ireland	$ 224,652,132,155.01	$ 238,259,956,626.79	$ 250,813,607,686.11
Iran, Islamic Rep.	$ 587,209,369,682.67	$ 511,620,875,086.78	$ 425,326,068,422.88
Iraq	$ 218,000,986,222.64	$ 232,497,236,277.87	$ 223,508,094,682.68
Iceland	$ 14,194,519,025.26	$ 15,376,604,281.45	$ 17,036,097,481.81
Israel	$ 259,613,579,190.33	$ 292,408,330,563.86	$ 305,674,837,195.00
Italy	$ 2,074,631,555,455.23	$ 2,133,539,300,229.70	$ 2,141,161,325,367.43
Jamaica	$ 14,746,420,946.17	$ 14,187,446,660.71	$ 13,891,359,467.72
Jordan	$ 30,937,277,605.63	$ 33,593,843,661.97	$ 35,826,925,774.65
Japan	$ 5,954,476,603,961.52	$ 4,919,563,108,372.50	$ 4,601,461,206,885.08
Kazakhstan	$ 203,517,198,088.69	$ 231,876,282,133.87	$ 217,872,250,221.41
Kenya	$ 50,410,164,013.55	$ 54,930,813,987.92	$ 60,936,509,777.96
Kyrgyz Republic	$ 6,605,139,933.41	$ 7,335,027,591.92	$ 7,404,412,710.31
Cambodia	$ 14,038,383,450.19	$ 15,449,630,418.55	$ 16,777,820,332.71
Kiribati	$ 174,984,468.83	$ 168,951,535.05	$ 166,756,805.48
St. Kitts and Nevis	$ 731,919,906.04	$ 787,290,366.87	$ 852,203,083.88
Korea, Rep.	$ 1,222,807,195,712.49	$ 1,305,604,981,271.91	$ 1,410,382,988,616.48
Kosovo	$ 6,500,321,212.90	$ 7,073,021,773.77	$ 7,386,758,657.29
Kuwait	$ 174,070,025,008.93	$ 174,161,495,063.47	$ 163,612,438,510.19
Latin America & Caribbean (developing only)	$ 4,655,107,670,668.17	$ 4,761,014,358,771.96	$ 4,774,530,077,043.51
Lao PDR	$ 9,359,185,244.25	$ 11,192,471,435.44	$ 11,997,062,176.69
Lebanon	$ 43,205,095,854.06	$ 44,352,418,120.46	$ 45,730,945,273.63

Country Name	2012	2013	2014
Liberia	$ 1,735,500,000.00	$ 1,946,500,000.00	$ 2,013,000,000.00
Libya	$ 81,905,365,776.33	$ 65,509,594,212.02	$ 41,142,722,414.34
St. Lucia	$ 1,311,133,139.59	$ 1,334,385,778.15	$ 1,404,430,563.81
Latin America & Caribbean (all income levels)	$ 6,121,616,478,548.56	$ 6,269,874,859,706.83	$ 6,181,225,663,720.57
Least developed countries: UN classification	$ 768,195,368,163.27	$ 816,890,155,603.36	$ 888,054,229,547.29
Low income	$ 342,556,331,364.33	$ 372,061,684,704.11	$ 398,567,364,161.38
Sri Lanka	$ 68,434,422,593.76	$ 74,317,814,502.32	$ 78,823,610,056.93
Lower middle income	$ 5,270,833,310,432.87	$ 5,473,342,620,945.17	$ 5,765,816,087,352.00
Low & middle income	$ 22,596,490,522,207.20	$ 24,011,494,861,267.10	$ 25,063,122,781,869.40
Lesotho	$ 2,384,043,848.96	$ 2,218,102,350.05	$ 2,181,300,505.86
Lithuania	$ 42,852,204,396.45	$ 46,412,093,986.46	$ 48,353,937,110.26
Luxembourg	$ 55,986,712,367.80	$ 61,794,506,555.51	$ 64,873,963,098.49
Latvia	$ 28,023,276,371.58	$ 30,241,650,059.78	$ 31,286,809,075.23
Macao SAR, China	$ 42,991,714,539.61	$ 51,313,531,848.85	$ 55,501,734,046.15
Morocco	$ 98,266,306,615.36	$ 107,316,974,437.74	$ 110,009,040,838.42
Moldova	$ 7,284,686,576.28	$ 7,985,349,731.46	$ 7,962,423,551.54
Madagascar	$ 9,919,780,071.29	$ 10,613,473,832.74	$ 10,593,147,380.73
Maldives	$ 2,514,041,557.49	$ 2,790,659,901.12	$ 3,061,829,144.68
Middle East & North Africa (all income levels)	$ 3,536,261,119,467.85	$ 3,562,279,554,744.38	$ 3,496,997,634,326.72
Mexico	$ 1,184,499,844,413.23	$ 1,258,773,797,056.06	$ 1,294,689,733,233.03
Marshall Islands	$ 184,439,555.47	$ 190,180,248.29	$ 186,716,625.75
Middle income	$ 22,251,429,741,874.90	$ 23,637,119,652,152.10	$ 24,662,352,613,439.10
Macedonia, FYR	$ 9,745,251,126.01	$ 10,767,448,426.89	$ 11,323,769,141.48
Mali	$ 10,340,795,746.54	$ 10,942,822,487.19	$ 12,037,229,619.42
Middle East & North Africa (developing only)	$ 1,690,104,537,680.94	$ 1,640,224,832,654.45	$ 1,541,137,033,404.35
Montenegro	$ 4,087,725,812.67	$ 4,464,260,488.58	$ 4,587,928,884.17
Mongolia	$ 12,292,770,631.23	$ 12,545,217,934.42	$ 12,015,944,336.55
Mozambique	$ 14,534,278,446.31	$ 16,018,848,990.67	$ 15,938,468,562.50
Mauritania	$ 4,845,165,274.16	$ 5,057,754,938.61	$ 5,061,180,371.05
Mauritius	$ 11,445,657,237.94	$ 11,931,866,299.26	$ 12,630,332,836.95
Malawi	$ 4,240,491,999.39	$ 3,883,521,174.80	$ 4,258,033,615.30
Malaysia	$ 314,442,825,692.83	$ 323,342,854,422.55	$ 338,103,822,298.27
North America	$ 18,001,411,134,431.70	$ 18,612,590,885,409.40	$ 19,210,139,300,922.00
Namibia	$ 13,016,447,844.09	$ 12,754,875,754.78	$ 12,995,241,138.15
Niger	$ 6,942,209,594.55	$ 7,683,045,042.91	$ 8,168,695,869.87
Nigeria	$ 460,953,836,444.36	$ 514,964,650,436.05	$ 568,508,262,377.80
Nicaragua	$ 10,460,339,389.38	$ 10,850,733,052.08	$ 11,805,641,286.80
Netherlands	$ 828,946,812,396.79	$ 864,169,242,952.93	$ 879,319,321,494.64
High income: nonOECD	$ 6,175,491,995,936.56	$ 6,369,893,151,799.64	$ 6,111,980,956,657.77
Norway	$ 509,704,856,037.82	$ 522,349,106,382.98	$ 499,817,138,323.20
Nepal	$ 18,851,513,891.07	$ 19,271,168,018.48	$ 19,769,642,122.58
High income: OECD	$ 45,452,373,870,790.80	$ 45,927,311,632,922.50	$ 46,711,200,072,078.80
OECD members	$ 47,425,862,079,709.50	$ 48,009,763,073,164.40	$ 48,804,675,844,961.70
Oman	$ 76,341,482,444.73	$ 78,182,574,772.43	$ 81,796,618,985.70
Other small states	$ 98,381,559,591.03	$ 99,004,463,561.96	$ 100,552,408,034.02
Pakistan	$ 224,646,134,571.40	$ 231,086,513,914.87	$ 243,631,917,866.48
Panama	$ 37,956,200,000.00	$ 42,648,100,000.00	$ 46,212,600,000.00
Peru	$ 192,679,697,094.17	$ 201,848,484,663.51	$ 202,596,307,719.12
Philippines	$ 250,092,093,547.53	$ 271,927,428,132.55	$ 284,777,093,019.07
Palau	$ 215,815,865.59	$ 228,567,644.08	$ 250,625,562.79
Papua New Guinea	$ 15,391,629,871.38	$ 15,413,232,345.73	$ 16,928,577,232.47
Poland	$ 500,227,851,988.33	$ 524,059,039,422.89	$ 544,966,555,714.06
Portugal	$ 216,368,178,659.45	$ 226,073,492,966.50	$ 230,116,912,513.59

Country Name	2012	2013	2014
Paraguay	$ 24,611,039,786.13	$ 29,078,927,134.81	$ 30,880,859,579.51
Pacific island small states	$ 7,986,838,125.01	$ 8,227,972,578.75	$ 8,699,784,931.29
Qatar	$ 190,289,835,164.84	$ 201,885,439,560.44	$ 210,109,065,934.07
Romania	$ 172,043,567,268.32	$ 191,587,217,163.98	$ 199,043,652,215.45
Russian Federation	$ 2,016,112,133,645.48	$ 2,079,024,782,973.32	$ 1,860,597,922,763.44
Rwanda	$ 7,219,657,132.22	$ 7,522,006,198.23	$ 7,890,190,336.75
South Asia	$ 2,301,943,612,414.63	$ 2,361,515,495,718.04	$ 2,588,688,024,254.73
Saudi Arabia	$ 733,955,733,333.33	$ 744,335,733,333.33	$ 746,248,533,333.33
Sudan	$ 62,688,889,672.54	$ 66,480,141,187.35	$ 73,814,947,340.90
Senegal	$ 14,045,681,414.37	$ 14,951,667,193.55	$ 15,657,551,477.20
Singapore	$ 289,935,584,540.29	$ 302,245,904,259.57	$ 307,859,758,503.67
Solomon Islands	$ 1,025,124,684.36	$ 1,059,690,062.43	$ 1,158,183,053.76
Sierra Leone	$ 3,740,395,424.17	$ 4,838,115,453.12	$ 4,837,512,587.35
El Salvador	$ 23,813,600,000.00	$ 24,350,900,000.00	$ 25,163,700,000.00
Serbia	$ 40,742,313,861.14	$ 45,519,650,911.41	$ 43,866,423,166.94
Sub-Saharan Africa (developing only)	$ 1,563,441,527,310.93	$ 1,649,422,075,764.72	$ 1,729,214,909,241.65
South Sudan	$ 10,368,813,559.32	$ 13,257,635,693.01	$ 13,282,084,041.62
Sub-Saharan Africa (all income levels)	$ 1,582,711,920,242.48	$ 1,668,119,248,410.01	$ 1,746,140,688,213.95
Small states	$ 172,873,917,216.74	$ 176,519,484,178.87	$ 180,546,705,730.21
Sao Tome and Principe	$ 265,592,759.79	$ 305,632,896.59	$ 337,413,478.15
Suriname	$ 4,980,000,000.00	$ 5,130,909,090.91	$ 5,210,303,030.30
Slovak Republic	$ 93,049,721,684.12	$ 98,033,841,689.22	$ 100,248,607,784.10
Slovenia	$ 46,239,992,124.66	$ 47,675,804,618.00	$ 49,491,440,620.37
Sweden	$ 543,880,647,757.40	$ 578,742,001,487.57	$ 571,090,480,171.00
Swaziland	$ 4,912,817,411.96	$ 4,562,432,045.38	$ 4,412,891,830.03
Seychelles	$ 1,134,239,543.20	$ 1,411,035,753.70	$ 1,422,608,276.10
Chad	$ 12,368,070,168.97	$ 12,949,853,281.25	$ 13,922,224,560.79
Togo	$ 3,915,776,459.27	$ 4,338,575,823.82	$ 4,518,443,476.63
Thailand	$ 397,471,809,439.86	$ 420,166,569,029.49	$ 404,823,952,117.93
Tajikistan	$ 7,633,036,366.04	$ 8,506,615,265.14	$ 9,241,627,840.61
Turkmenistan	$ 35,164,210,526.32	$ 41,012,982,456.14	$ 47,931,929,824.56
Timor-Leste	$ 1,295,000,000.00	$ 1,319,000,000.00	$ 1,417,000,000.00
Tonga	$ 457,244,315.21	$ 432,893,161.19	$ 434,380,116.96
Trinidad and Tobago	$ 24,580,844,842.60	$ 27,257,473,690.75	$ 28,882,663,253.84
Tunisia	$ 45,131,250,400.15	$ 46,920,723,825.94	$ 48,612,652,412.09
Turkey	$ 788,863,301,670.38	$ 823,242,587,404.14	$ 798,429,233,036.33
Tuvalu	$ 39,875,750.67	$ 38,322,359.53	$ 37,859,550.40
Tanzania	$ 39,087,748,240.44	$ 44,384,603,619.54	$ 48,056,680,982.15
Uganda	$ 23,236,898,742.13	$ 24,662,957,430.38	$ 26,998,477,288.85
Ukraine	$ 175,781,379,051.43	$ 183,310,146,378.08	$ 131,805,126,738.29
Upper middle income	$ 16,972,931,446,091.30	$ 18,155,014,821,574.90	$ 18,887,373,566,891.70
Uruguay	$ 51,384,870,651.20	$ 57,524,653,093.51	$ 57,471,030,095.37
United States	$ 16,163,158,000,000.00	$ 16,768,053,000,000.00	$ 17,419,000,000,000.00
Uzbekistan	$ 51,183,443,224.99	$ 56,795,656,324.58	$ 62,643,953,021.76
St. Vincent and the Grenadines	$ 692,933,757.41	$ 720,636,189.63	$ 729,309,384.44
Vietnam	$ 155,820,001,920.49	$ 171,222,025,390.00	$ 186,204,652,922.26
Vanuatu	$ 781,702,874.11	$ 801,787,555.86	$ 814,954,306.97
West Bank and Gaza	$ 11,262,141,134.37	$ 12,473,235,848.01	$ 12,737,613,125.02
World	$ 74,154,982,300,295.00	$ 76,236,796,175,538.20	$ 77,845,107,169,905.00
Samoa	$ 804,163,067.66	$ 795,753,602.49	$ 800,418,989.62
South Africa	$ 397,386,418,270.40	$ 366,243,783,486.35	$ 350,085,020,840.25
Congo, Dem. Rep.	$ 27,463,220,379.99	$ 30,014,905,126.10	$ 33,121,070,959.39
Zambia	$ 24,939,314,028.71	$ 26,820,806,278.84	$ 27,066,230,009.10
Zimbabwe	$ 12,392,715,461.99	$ 13,490,227,100.00	$ 14,196,912,534.63

Task #6: Diameters of Planets

Work with a partner to compare each set of numbers and determine which is larger. Provide a written explanation for each problem.

1. 1.39822×10^8 m or 5.0724×10^7 m

2. 4.9248×10^7 m or 1.16464×10^8 m

3. 2.4×10^6 m or 4.878×10^6 m

4. 1.392684×10^9 m or 1.39822×10^8 m

5. 6.78×10^6 m or 5.0724×10^7 m

6. 1.2756×10^7 m or 1.2104×10^7 m

Task #7: Size Matters: An Examination of Planets and Stars

Below are the planets in our solar system (including Pluto) in alphabetical order. The numbers beside each planet name is the diameter of the planet in meters. Rearrange the order of the planets so that they arranged from the smallest diameter to the largest diameter.

Earth: 1.28×10^7

Mars: 6.79×10^6

Mercury: 4.88×10^6

Jupiter: 1.43×10^8

Neptune: 4.95×10^7

Pluto: 2.37×10^6

Saturn: 1.21×10^8

Uranus: 5.11×10^7

Venus: 1.21×10^7

Task #8: Ant and Elephant

1. An ant has a mass of approximately $4x10^{-3}$ grams and an elephant has a mass of approximately 8 metric tons. How many ants does it take to have the same mass as an elephant? (Note: 1 kg = 1000 grams, 1 metric ton = 1000 kg, 1m = 100 cm, 1km = 1000 m)

2. An ant is 10^{-1} cm long. If you put all these ants from your answer to part (a) in a line (front to back), how long would the line be?

3. Find two cities in the United States that are a similar distance apart to illustrate this length.

Task #9: Scientific Notation Problems

Working in pairs, create your own scientific notation practice problems. Here are the requirements for the problems:

1. There must a scenario for each problem. Hint: Use information from the video.
2. Each group must create one problem using large numbers and one problem using small numbers.
3. Each group must have at least one problem using addition or subtraction and one problem using multiplication or division.
4. Each group must create an accurate answer key.
5. Each group will trade problems with another group (decided by the teacher) and then collect the answers from the other group.
6. Submit work to the teacher.

Task #10: Choosing Appropriate Units

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1. A computer has 128 gigabytes of memory. One gigabyte is $1x10^9$ bytes. A floppy disk, used for storage by computers in the 1970's, holds about 80 kilobytes. There are 1000 bytes in a kilobyte. How many kilobytes of memory does a modern computer have? How many gigabytes of memory does a floppy disk have? Express your answers both as decimals and using scientific notation.

2. George told his teacher that he spent over 21,000 seconds working on his homework. Express this amount using scientific notation. What would be a more appropriate unit of time for George to use? Explain and convert to your new units.

3. A certain swimming pool contains about $3x10^7$ teaspoons of water. Choose a more appropriate unit for reporting the volume of water in this swimming pool and convert from teaspoons to your chosen units.

4. A helium atom has a diameter of about 62 picometers. There are one trillion picometers in a meter. The diameter of the sun is about 1,400,000 km. Express the diameter of a helium atom and of the sun in meters using scientific notation. About many times larger is the diameter of the sun than the diameter of a helium atom?

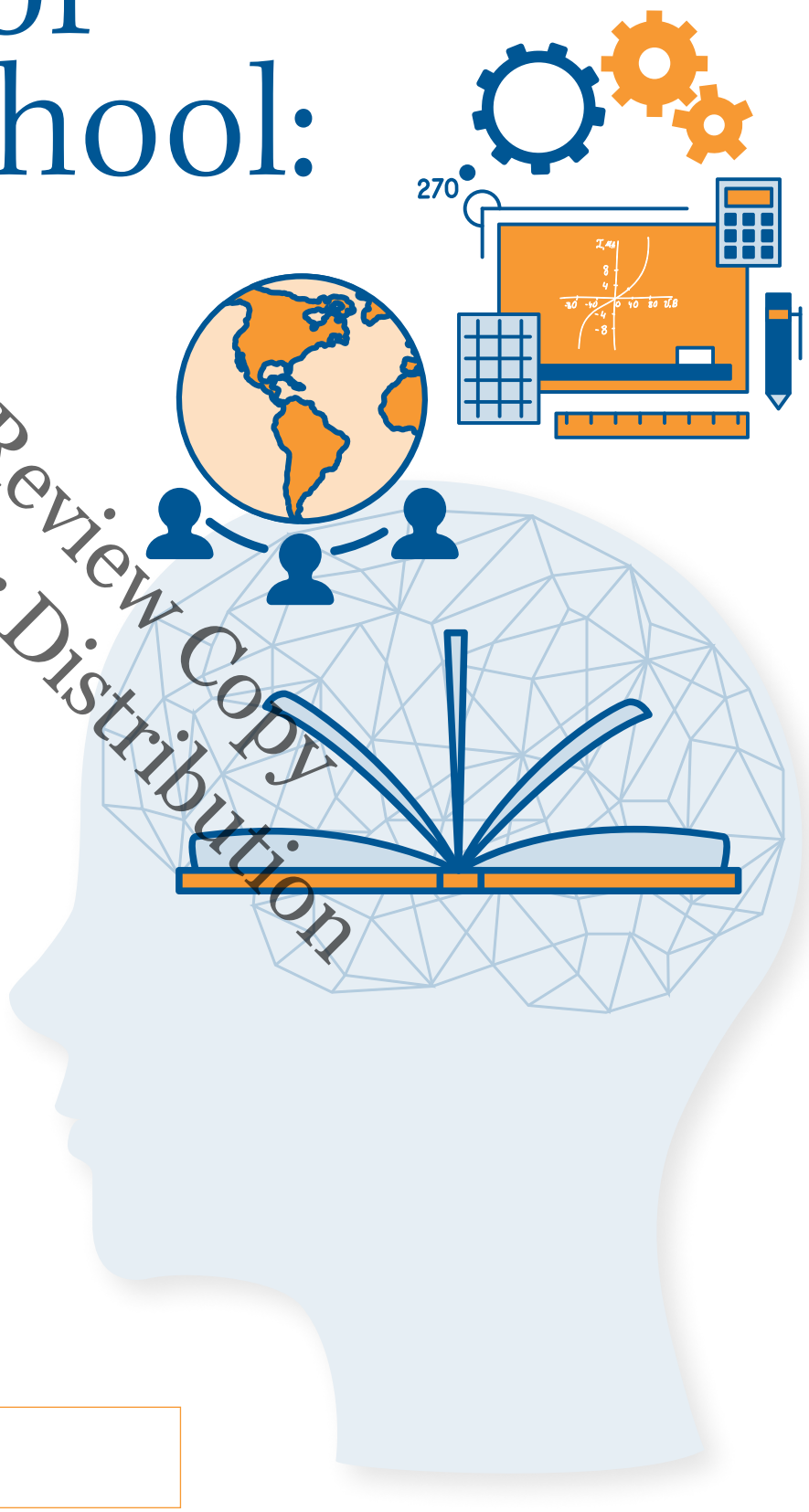
SREB Readiness Courses

Ready for High School: Math

Student Manual

Math Unit 2

Ratio and Proportional Relationships



Name

Unit 2 . Ratio and Proportional Relationships

Contents

Task #1: Clue Activity Sheets

Clue Sheet

Dear Detective,

Someone has robbed the National Bank of Illuminations in Washington D.C. It is your job to use the clues left by the perpetrators to locate and apprehend the robber. Your tools will be your power of deduction and your mathematical knowledge. Good luck cracking this case!

Sincerely,
Captain P. Thagoras

CLUES:

- The perpetrator is _____cm tall in the security camera image.
- _____pounds of quarters were stolen.
- The getaway car was a silver 1989 HN Cosine which travels _____miles per gallon of gas.

Clues Sheet

NAME_____

Dear Detective,

Someone has robbed the National Bank of Illuminations in Washington D.C. It is your job to use the clues left by the perpetrators to locate and apprehend the robber. Your tools will be your power of deduction and your mathematical knowledge. Good luck cracking this case!

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Clue 1

1. One surveillance camera was able to capture the image on the next page. The image shows the thief standing next to the door. In real life the door measures 84 inches but it is only 16.8 centimeters in the picture. If the person in the photo is _____cm tall, how tall is suspect in real life? Report the height in feet and inches.

Clue 2

2. The robber stole only _____pounds of quarters out of the coin machine. Quarters are weighed in ounces. If there are 16 ounces in 1 pound, how many ounces of quarters were stolen?

3. Each quarter weighs 0.2 ounces. How much money has been stolen from the bank?

Clue 3

4. A witness at the bank saw the getaway car stop at a nearby gas station. The gas station attendant said that the thief's tank was practically empty, and that he filled it completely. Luckily, he was also able to find the thief's receipt. Determine how many gallons of gas the thief purchased.

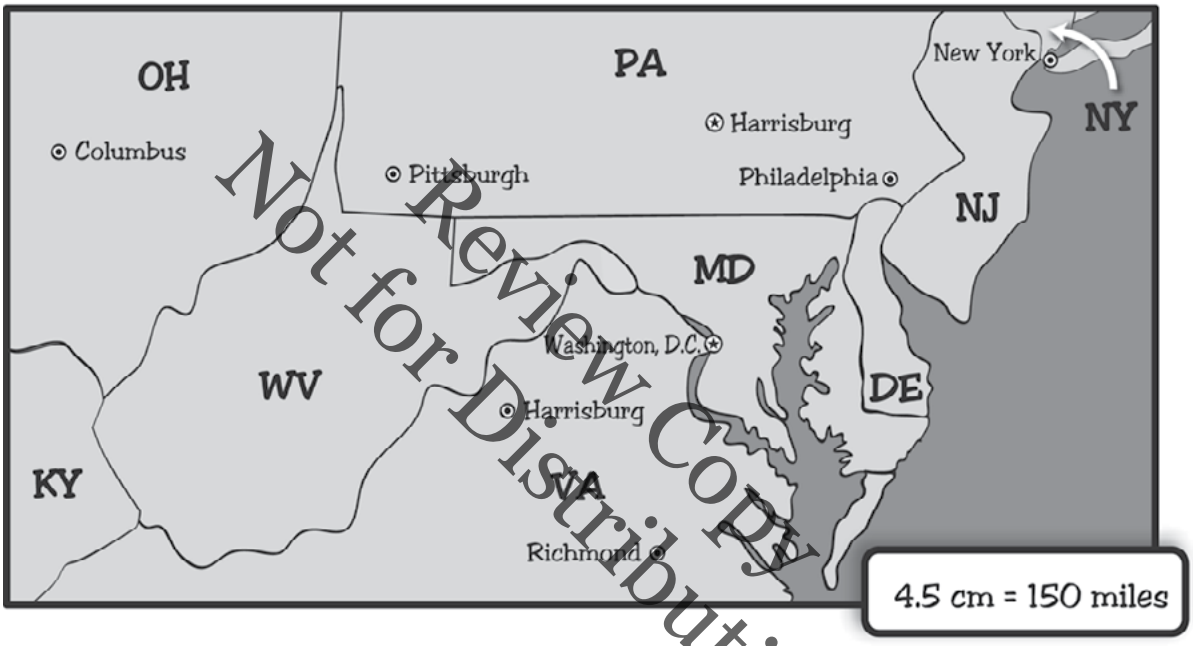

Welcome
Sales Receipt 0098 7T

Date: 07/28/07 11:28 am
Invoice #000001
Auth#
PIN USED
DEBIT ACCOUNT: XXX XXX X
PRODUCT: REGULAR GAS
$2.44/gal
FUEL TOTAL: $31.72

5. The getaway car was a silver 1989 HN Cosine. The car gets _____miles per gallon of gas. If the car continued until it ran out of gas again, how far could it go?

Clue 4

6. Using only one tank of gas, what is the farthest city that the thief can reach?



Task #2: Suspect List Activity Sheet

Suspect List

NAME _____

1. Below is a list of possible suspects, their heights, where they were arrested, and how much stolen money they had. Use the answers from the Clue Sheet to select the culprit.

 ROY G. BIV APPREHENDED IN PITTSBURGH, PA WITH $500 HEIGHT: 6'3"	 JEN ERIC APPREHENDED IN PHILADELPHIA, PA WITH $500 HEIGHT: 5'6"	 MATTHEW MATICS APPREHENDED IN RICHMOND, VA WITH $640 HEIGHT: 6'3"
 POLLY HEDRON APPREHENDED IN HARRISBURG, PA WITH $640 HEIGHT: 5'6"	 EVAN NUMBER APPREHENDED IN COLUMBUS, OHIO WITH $500 HEIGHT: 5'6"	 AL T. TUDE APPREHENDED IN NEW YORK CITY WITH $640 HEIGHT: 6'3"

2. Write a letter to the Captain explaining who you think is the thief. Make sure to justify your answer by explaining how you came to your decision.

Dear Captain,
Using the clues you have given me, I have deduced that _____
is the person that robbed the bank.

Task #3: Lesson 1 - Exit Ticket

1. What methods/strategies did you and your partner use to solve this problem?

2. Summarize what you learned in this lesson.

3. How are the skills you used/learned in this lesson helpful in the real-world? Explain.

Task #4: The Proper Mixture

Johnny and Fred are the managers for their high school football team. The head coach of the team, Coach Grenade, fired last year's managers because they didn't know how to make the sports drink taste very good. It was always too sweet or too watery. The sports drink is made by mixing powder with water. Since the boys were just freshmen and they wanted to be managers next year, they decided to test some of their mixtures to see which one the players liked the best.

The boys mixed up four different recipe combinations:

Mix 1 1 cup power 4 cups water	**Mix 2** 2 cups power 3 cups water
Mix 3 3 cups power 5 cups water	**Mix 4** 3 cups power 6 cups water

1. Which mix will make the drink that is the sweetest? Explain.

2. Which mix will make the drink that is the least sweet? Explain.

3. Assume that each football player will drink 1 cup of sports drink. For each mix, how much powder and how much water are needed to make the sports drink for 75 football players? Explain.

Task #5: Lesson 2 - Exit Ticket

1. Summarize what you learned in this lesson.

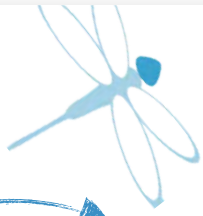
2. How is this skill helpful in the real-world? Explain.

3. Would this skill have helped you in the opening activity, “Highway Robbery?” Explain.

Task #6: Basic Dragonfly Prompt

HANDOUT 1

Basic Dragonfly Prompt



A common green dragonfly, the fastest insect in the world, can fly a distance of 50 feet in 2 seconds.

1. Use a diagram, table, chart or other method to show this situation.

2. Write the question that you are going to try to answer using this information, and then show your work on that question.

Your question:

_____

_____

work area

Task #7: Three More Dragonfly Questions

1. How long does it take a dragonfly to fly 375 feet?

2. How far can it fly in 20 seconds?

3. How fast is it going?

Task #8: The Frog Problem

HANDOUT 3

The Frog Problem

A frog can hop at a maximum speed of about 60 feet every 4 seconds.

How far can the frog go in 30 seconds? Show your work on this problem using two or three of the methods that were discussed in the dragonfly problem.

work area

Task #9: Lesson 3 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

3. Would this skill have helped you in the opening activity, “Highway Robbery?” Explain.

Task #10: The Printer Problem

HANDOUT 4

The Printer Problem

A printer can print 3 high-quality photographs in 2 minutes.

How long will it take that printer to print 14 photos? Show 2 or 3 methods that you can use to understand and solve this problem.

work area

Task #11: Making Punch Worksheet

PBS LearningMedia

Making Punch Worksheet

Key


= Ginger ale


= Juice

1. Carl makes a punch using the following recipe:

Give two other recipes that would taste exactly the same.

2. Look at the following recipes. Would each pair (a and b) taste the same? If not, which punch would taste more like plain juice? Use proportional reasoning, ratios, and graphs to help. Explain your reasoning for each.

a.  **b.** 	**a.**  **b.** 
a.  **b.** 	**a.**  **b.** 
a.  **b.** 	**a.**  **b.** 

3. Write a punch recipe that uses at least five cups total of juice and ginger ale. Record the recipe below.

a. Write a recipe that is proportional (one that tastes the same) to the one you just created.

b. Write a recipe that is *less* juicy. What makes this recipe less juicy?

c. Write a recipe that is *more* juicy. What makes this recipe more juicy?

Task #12: Lesson 4 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

3. Would this skill have helped you in the opening activity, “Highway Robbery?” Explain.

Task #13: Mammoth Mouthfuls

You are planning on opening your own large burger grill named "Mammoth Mouthfuls." You will create huge burgers that can be cut up and shared by large groups. You will need to determine how much you will need of each ingredient and how much the burger should cost. A 4-pound total weight burger will cost $12.00. Complete the table by reasoning your way from the 270-pound burger to get to the quantities of the 30-, 10- and 4-pound burgers.

Original weight of beef in pounds	Final weight of cooked beef in pounds	Weight of bun in pounds	Weight of cheese in pounds	Combined weight of top-pings	Total pounds of burger (final weight of beef, bun cheese and toppings)	Cost
270	180	100	20	60	360	
						$12

Task #14: Paper Clip Comparisons

Object Measured	Jumbo Clips Long	Standard Clips Long

Students will make a coordinate graph of their data and answer the questions on the task.

- What is the independent variable for the coordinate graph?

- What is the dependent variable?

- What patterns do you see? (Be sure to use mathematical language.)

- How could you use that pattern to determine something in standard clips if you knew how long it was in jumbo clips?

Task #15: Proportion Practice

1. Each of the data sets represents points on a line. In which table is one variable directly related to the other? Fill in the missing entry in each table.

x	y
0	4
10	19
16	

x	y
0	0
10	15
16	

Plot the data from the tables in the previous question on the same set of axes and use a ruler to draw a line through each set of points. By looking at the graph, how could you recognize the direct variation? What similarities and differences are there between the two lines drawn?

2. Create a proportion from each set of numbers. Only use 4 numbers from each set of numbers.

1. 6, 2, 9, 3	2. 4, 2, 32, 1, 8
3. 12, 24, 5, 10	4. 13, 12, 20, 4, 39

Task #16: Lesson 6 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

3. Would this skill have helped you in the opening activity, "Highway Robbery?" Explain.

Task #17: Mixing Paint

1. Bobby was mixing blue paint and yellow paint in the ratio of 2:3 to make green paint. He wants to make 45 liters of green paint. He began to make a table to help him think about the problem but is unsure of what to do next.

Liters of Blue Paint	Liters of Yellow Paint	Liters of Green Paint
2	3	5
4	6	10

a.) Explain how to continue to add values to the table.

b.) Write an explanation to Mark about how he can use his table to find how many liters of blue paint and how many liters of yellow paint will he need to make 45 liters of green paint.

c.) Mark decides to buy 15 liters of blue paint. He still wants to mix blue paint and yellow paint in the ratio of 2:3 to make green paint. How many liters of yellow paint should he buy, and how many gallons of green paint he can make?

Use mathematical reasoning to justify your answer.

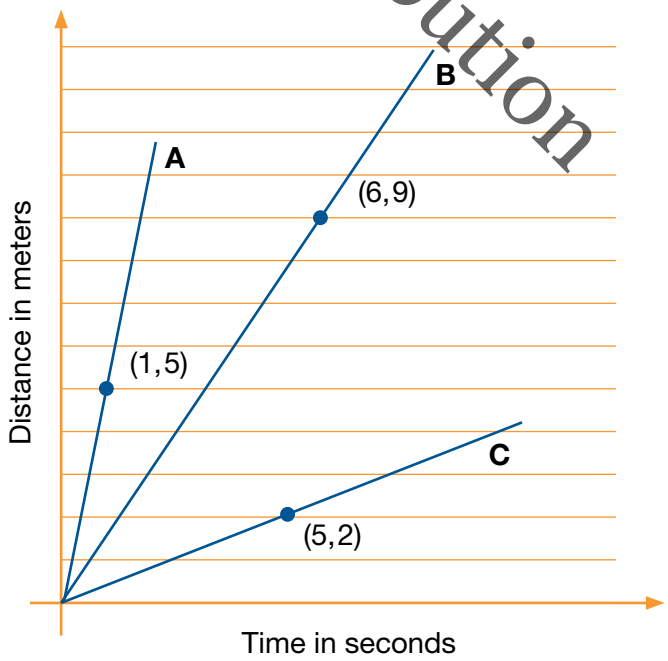
Task #18: Racing Robots

1. Carli's class built some solar-powered robots. They raced the robots in the parking lot of the school. The graphs below are all line segments that show the distance d, in meters, that each of three robots traveled after t seconds.

   a.) Each graph has a point labeled. What does the point tell you about how far that robot has traveled?

   b.) Carli said that the ratio between the number of seconds each robot travels and the number of meters it has traveled is constant. Is she correct? Explain.

   c.) How fast is each robot traveling? How did you compute this from the graph?



Task #19: Triangles

1. How could you group these triangles based on similar characteristics? Explain your grouping strategy using words.

2. Complete the tables for the Group 1 triangles.

	Triangle 1a	Triangle 1b	Ratio of side b to side a (to the nearest cm)
Length of corresponding sides			
Length of corresponding side			
Length of corresponding side			

a. What do you notice about the ratio of each of the corresponding side lengths?

b. Do you think this will always happen with similar triangles?

3. Complete the tables for the Group 2 triangles.

	Triangle 2a	Triangle 2b	Ratio of side b to side a (to the nearest cm)
Length of corresponding side			
Length of corresponding side			
Length of corresponding side			

	Triangle 2c	Triangle 2d	Ratio of side b to side a (to the nearest cm)
Length of corresponding side			
Length of corresponding side			
Length of corresponding side			

a. Did the same pattern hold true for the triangles in Group 2 as it did for the triangles in Group 1?

b. What do we call the ratio of the corresponding side lengths?

c. If you know the scale factor of a similar figure and the side lengths of one triangle, how could you determine the side lengths of the similar figure?

4. Without a ruler, complete the tables for the Group 3 Triangles.

	Triangle 3a	Triangle 3b	Ratio of side b to side a (to the nearest cm)
Length of corresponding side	2.6 cm		$\frac{3}{2}$
Length of corresponding side	2.6 cm		$\frac{3}{2}$
Length of corresponding side	4.5 cm		$\frac{3}{2}$

	Triangle 3c	Triangle3d	Ratio of side b to side a (to the nearest cm)
Length of corresponding side		3.1 cm	$\frac{5}{4}$
Length of corresponding side		3.1 cm	$\frac{5}{4}$
Length of corresponding side		5 cm	$\frac{5}{4}$

a. What strategy did you use to complete the table for Triangles 3a and 3b?

b. How was your strategy for the table with Triangles 3c and 3d different?

c. Why couldn't you use the exact same steps for both tables?

Task #20: Vocabulary

Write the definition of the following vocabulary terms in your own words.

- Similar figures

- Corresponding sides

- Scale factor

List three things you learned about similar figures.

Task #21: Lesson 7 - Exit Slip

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

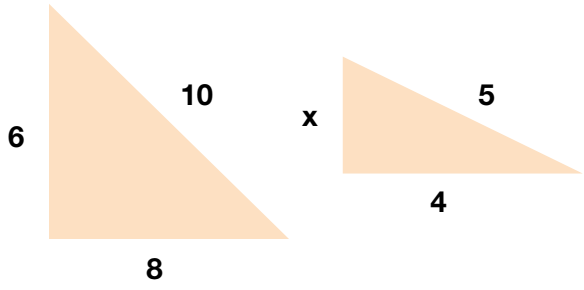
3. Would this skill have helped you in the opening activity, "Highway Robbery?" Explain.

Task #22: Similar Figures and Triangles

Each problem can be solved using the concepts of similar triangles that you have worked on in class.

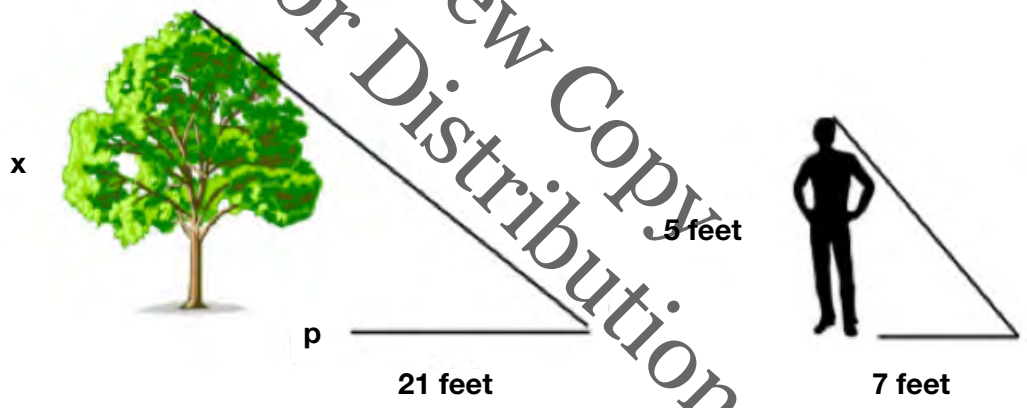
Set up the proportions and solve for the missing side of the triangle. Show your work and draw pictures if necessary to help you.

1.



x= _____

2. You are standing out in front of a large tree. The sun is casting a shadow from both you and the tree. Your friend measures your shadow and records the measurements in the diagram below. Use similar triangles to determine the height of the tree.

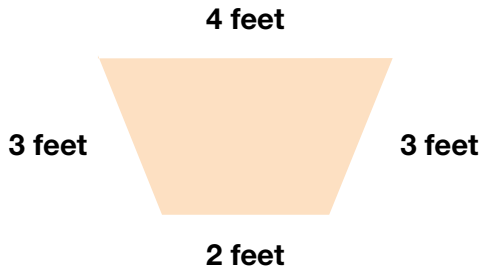


x= _____

3. Now it's your turn. You and a friend need to find a tree (or a flagpole or building – some tall object that is casting a shadow that you can measure). The tree or object needs to be too big for you to measure the height of it. Using the example set up in the picture above, determine the height of the object by using the shadows and the concepts of similar triangles. Illustrate your problem below, indicating recorded measurements, unknown measurements (x) and then solve the problem.

Height of your object _____

4. The following figures are similar. Fill in the lengths of the sides for the second figure if the scale factor is ¾ .



Task #23: Sore Throats, Variation 2

Nia and Trey both had a sore throat so their mom told them to gargle with warm salt water.

Nia mixed 1 teaspoon salt with 3 cups of water.
Trey mixed ½ teaspoon salt with 1 ½ cups of water.

Nia tasted Trey's salt water. She said, "I added more salt so I expected that mine would be more salty, but they taste the same."

a. Explain why the salt water mixtures taste the same.

b. Find an equation that relates s, the number of teaspoons of salt, with w, the numbers of cups of water, for both of these mixtures.

c. Draw the graph of your equation from part b.

d. Your graph in part c should be a line. Interpret the slope as a unit rate.

Task #24: Who Has the Best Job?

Kell works at an after-school program at an elementary school. The table below shows how much money he earned every day last week.

Time worked	1.5 hours	2.5 hours	4 hours
Money earned	$12.60	$21.00	$33.60

Mariko has a job mowing lawns that pays $7 per hour.

a. Who would make more money for working 10 hours? Explain or show work.

b. Draw a graph that represents, the amount of money Kell would make for working hours, assuming he made the same hourly rate he was making last week.

c. Using the same coordinate axes, draw a graph that represents, the amount of money Mariko would make for working hours.

d. How can you see who makes more per hour just by looking at the graphs? Explain.

Task #25: Stuffing Envelopes

Anna and Jason have summer jobs stuffing envelpes for two different companies. Anna earns $14 for every 400 envelopes that she finishes. Jason earns $9 for every 300 envelopes that he finishes.

a. Draw graphs and write equations that show the earnings, y as functions of the number of envelopes stuffed, n for Anna and Jason.

b. Who makes more from stuffing the same number of envelopes? How can you tell this from the graph?

c. Suppose Anna has savings of $100 at the beginning of the summer and she saves all her earnings from her job. Graph her savings as a function of the number of envelopes she stuffed, n. How does this graph compare to her previous earnings graph? What is the meaning of the the slope in each case?

Task #26: Lesson 8 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

3. Would this skill have helped you in the opening activity, "Highway Robbery?" Explain.

Task #27: Act One: Meaty Yum

1 Below are prices for a medium 2-topping pizza and a medium 4-topping pizza from Domino's in Washington, DC. Plot them on your graph and use the information to answer the following questions.

ITEM	PRICE
 **Medium (12") Hand Tossed Pizza** **Whole:** Pepperoni, Green Peppers	$13.97

ITEM	PRICE
 **Medium (12") Hand Tossed Pizza** **Whole:** Bacon, Premium Chicken, Green Peppers, Mushrooms	$16.95

a. Based on the information above, how much do you think Domino's is charging for each topping?	b. A medium 3-topping pizza costs $15.46. What would it mean if it cost *more* than this, e.g. $16?
c. For the 2-topping pizza, how much in total are you spending *on toppings*? For the 4-topping pizza?	d. If you wanted to order a medium cheese pizza, how much would you expect to spend? Explain.
e. Now write an equation for the price of a medium pizza, and explain what the equation means.	f. Does a pizza with 12 toppings cost twice as much as a pizza with 6 toppings? Why or why not?

Task #28: Act Two: Pizza Tracker

2 Below are the prices for two small pizzas and two large pizzas from Domino's. Write an equation to calculate the cost of each size based on the number of toppings you order.

ITEM	PRICE
 **Small (10") Hand Tossed Pizza** **Whole:** Pepperoni	$9.99
 **Small (10") Hand Tossed Pizza** **Whole:** Premium Chicken, Black Olives, Jalapeno Peppers	$11.99

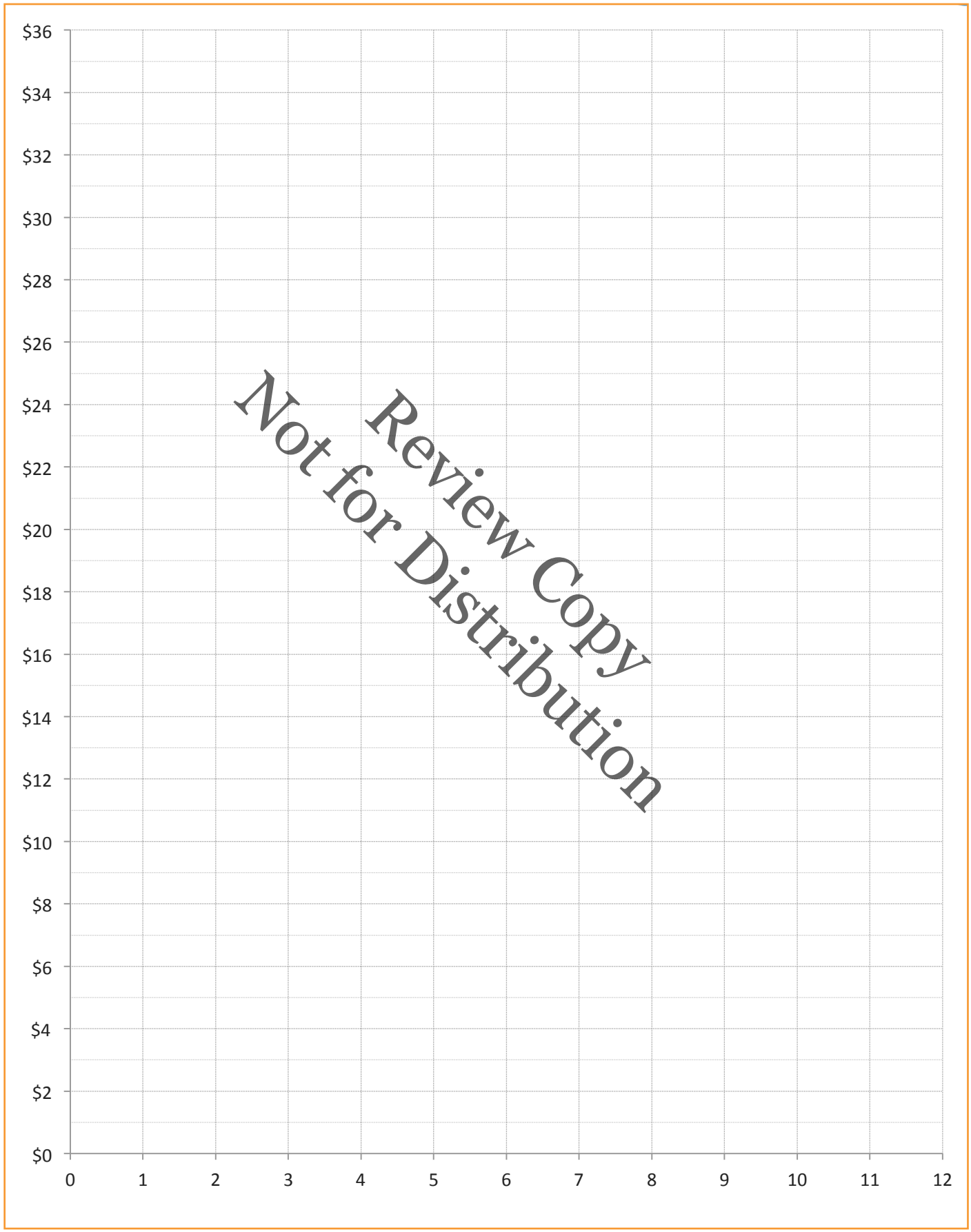
ITEM	PRICE
 **Large (14") Hand Tossed Pizza** **Whole:** Sliced Italian Sausage, Green Peppers, Roasted Red Peppers, Mushrooms	$19.75
 **Large (14") Hand Tossed Pizza** **Whole:** Philly Steak	$14.68

3 Now graph the equation for each pizza size, and answer the following:

a. Which graph – small, medium, or large – is the steepest, and why do you think this is?

b. Which graph has the lowest starting value, and is this what you'd expect? Explain.

4 Look at the graph of how much Domino's *really* charges for pizza in Washington, DC. How is the actual situation different than what you expected…and why do you think Domino's does this?



Task #29: Lesson 9 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

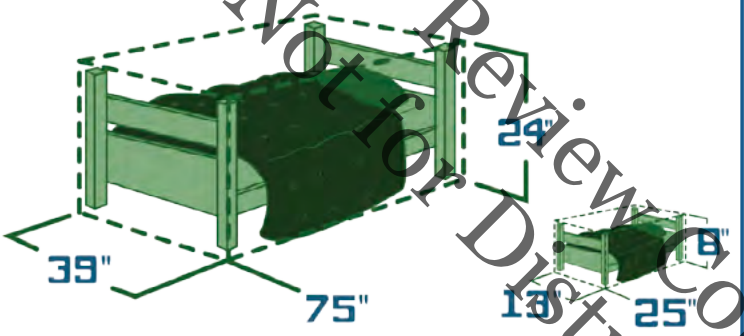
3. Would this skill have helped you in the opening activity, “Highway Robbery?” Explain.

Task #30: Scale Ella

Scale Ella
Learner Guide

Watch the animation, *Scale Ella*, and complete these activities. The animation and an instructor guide are available on iTunes U (search "Math Snacks") and at **mathsnacks.org**

The regular size of a twin bed is 39" wide, 75" long and 24" high. Scaleo has scaled your bed to this size: 13"wide, 25" long and 8" high.



1. What can Scale Ella do so that you can sleep comfortably tonight?

2. Scaleo has now scaled you to be bigger by a scale factor of 7. What is your new height?

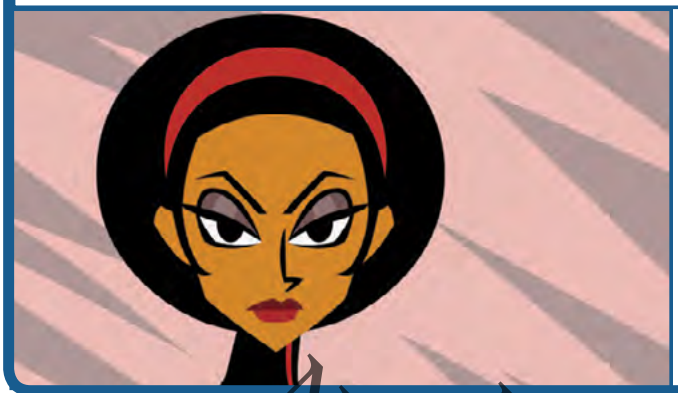
☐ x 7 = ☐

Your Height x Scale Factor = Your New Height

A. Will you fit on a regular-sized bed?

B. If you can't, what can Scale Ella do to help you?

3. You have been given Scale Ella's powers, but before you scale items you have to practice by scaling numbers. Pick a scale factor that will increase the numbers and enter it into box 1. Pick a scale factor that will decrease the numbers and enter it into box 2. Once you pick your scale factors, complete the table by applying the scale factors to increase and decrease the numbers.



Numbers	Scale Up By 1 ☐	Scale Down By 2 ☐
.05		
1/2		
7		
13		
25		
102		

4. If you could scale **up** three things in your life by a factor of 5,

A. What would you scale up?	Why?

5. If you could scale **down** three things in your life by a factor of ⅕,

B. What would you scale down?	Why?

Task #31: Lesson 10 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

3. Would this skill have helped you in the opening activity, “Highway Robbery?” Explain.

Task #32: Growing Rectangles

Imagine a rectangle with an area of 20cm2

What could its length and width be? List at least five different combinations.

Imagine enlarging each of your rectangles by a scale factor of 2:

List the dimensions of your enlarged rectangles and work out their areas.

What do you notice?

Try starting with rectangles with a different area and enlarge them by a scale factor of 2.

What happens now?

Can you explain what's going on?

What happens to the area of a rectangle if you enlarge it by a scale factor of 3? Or 4? Or 5 ...?

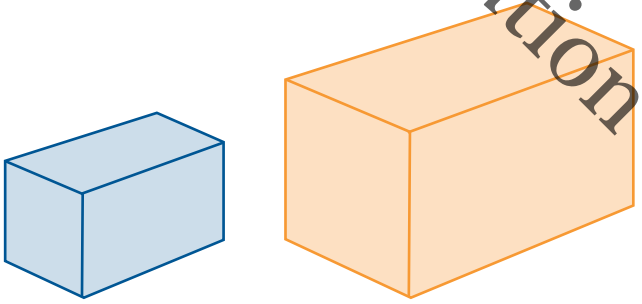
What happens to the area of a rectangle if you enlarge it by a fractional scale factor?

What happens to the area of a rectangle if you enlarge it by a scale factor of k?

Explain and justify any conclusions you come to.

Do they apply to plane shapes other than rectangles?

Now explore what happens to the surface area and volume of different cuboids when they are enlarged by different scale factors. Explain and justify any conclusions you come to.



Do your conclusions apply to solids other than cuboids?

Task #33: Lesson 12 - Exit Ticket

1. Summarize what you learned in this lesson.

2. How has your understanding of ratios and proportions changed? Explain.

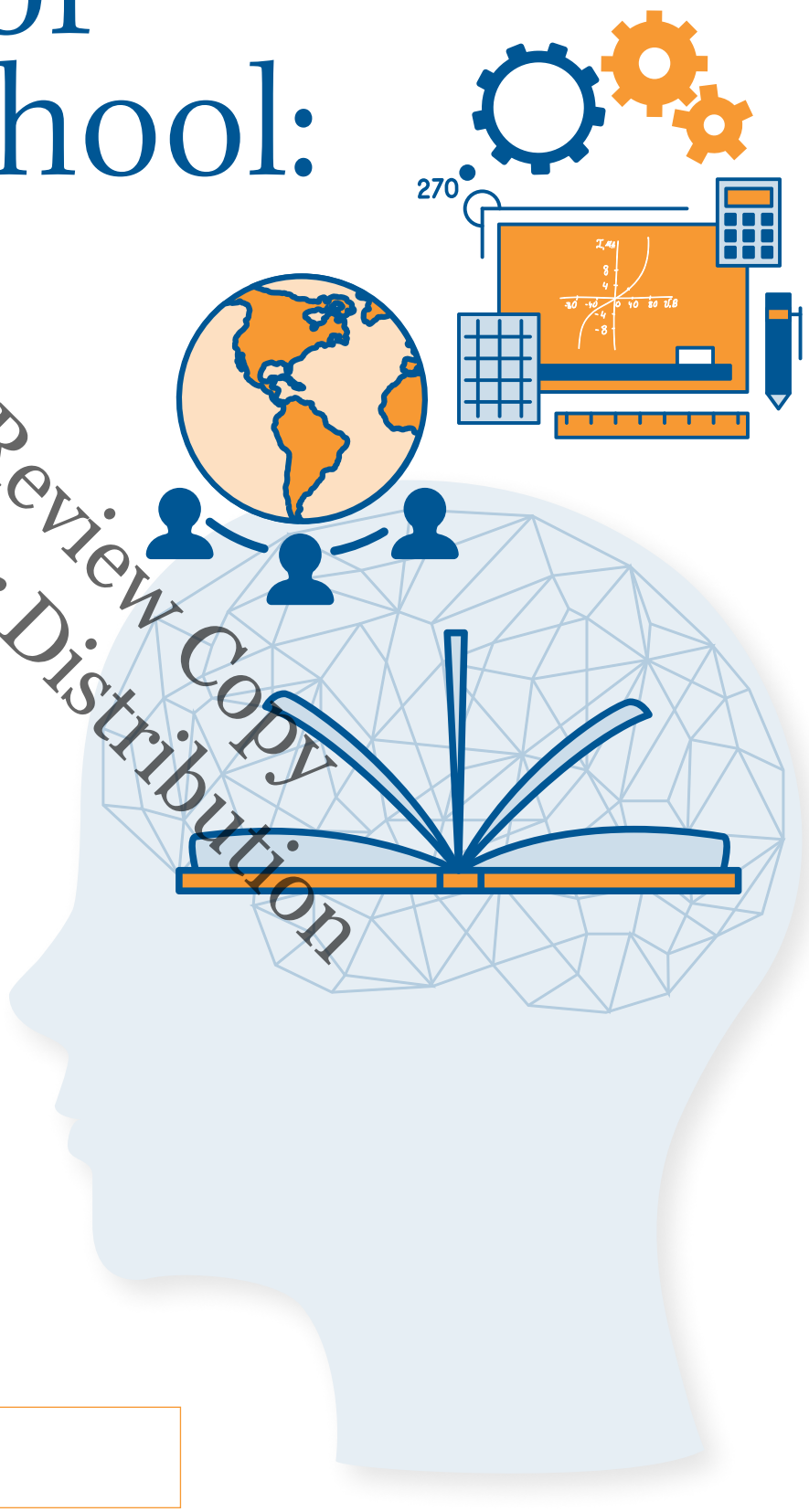
SREB Readiness Courses

Ready for High School: Math

Student Manual

Math Unit 3

Probability and One-Variable Statistics



Name

Unit 3 . Probability and One-Variable Statistics

Contents

Task #1: Fair Promotions?

Researchers conducted a study in which 48 male bank supervisors were each randomly assigned a personnel file and asked to judge whether the person should be promoted to a branch manager job that was described as "routine" or whether the person's file should be held and other applicants interviewed. The files were all identical except that half of the supervisors had files labeled "male" while the other half had files labeled "female". Of the 48 files reviewed, 35 were recommended for promotion.

DIRECTIONS: Complete the tables by selecting numbers that would show no gender discrimination, strong evidence of gender discrimination, or not enough evidence to determine gender discrimination.

No Discrimination by Gender

	Recommended for Promotion	Not Recommended for Promotion	Total
Male			24
Female			24
Total	35	13	48

Strong Evidence of Discrimination against Women

	Recommended for Promotion	Not Recommended for Promotion	Total
Male			24
Female			24
Total	35	13	48

Not Enough Evidence to Draw Conclusions

	Recommended for Promotion	Not Recommended for Promotion	Total
Male			24
Female			24
Total	35	13	48

Task #2: Finding Probabilities in the Discrimination Study

Actual Results of the Discrimination Study

	Recommended for Promotion	Not Recommended for Promotion	Total
Male	21	3	24
Female	14	10	24
Total	35	13	48

1. What is the probability that a file selected represents a female recommended for promotion?

2. What is the probability that a file selected represents a male not recommended for promotion?

3. What percentage of files represents those not recommended for promotion?

4. Given a file recommended for promotion, what percentage was male?

5. What is the probability that a file not recommended for promotion is female?

6. Of the files representing women in the study, what percent were recommended for promotion?

Task #3: Lesson 1 - Exit Ticket

One hundred people were surveyed about their use of smartphones. The results from the survey in the table below are incomplete. Complete the table and then answer the following questions:

Smartphone Use and Age

	Use Smartphone	Do Not Use Smartphone	Total
Under 40 Years of Age	40		45
40 Years of Age or Older			
Total		25	100

1. What is the probability that one of the people surveyed uses a smartphone?

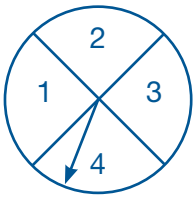
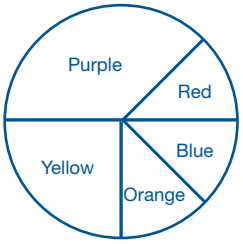
2. What is the probability that one of the people surveyed was under 40 years of age and does not use a smartphone?

3. Given that a person surveyed is over 40 years old, what is the probability that person uses a smartphone?

Task #4: Theoretical Probability Exploration

When you flip a fair coin, the theoretical probability of getting tails is 50% and the theoretical probability of getting a heads is 50%. These two outcomes are equally likely to occur.

DIRECTIONS: Determine whether the outcomes in each experiment in the table are all equally likely to occur.

	Equally Likely	Not Equally Likely	Explanation
			
			
			
			

Task #5: What Are My Chances?

What Are My Chances?

You will be evaluating games of chance to help you understand probability. For each game of chance, predict what will be the most frequent outcome. Then run the experiment 10 times. For each trial, record the actual outcome in the Result row. If this matches your predicted outcome, put a check mark in the Prediction row.

1. Flip a Coin
Prediction for most frequent outcome: Heads Tails

RESULT									
PREDICTION									

2. Roll 1 Die
Prediction for most frequent outcome: 1 2 3 4 5 6

RESULT									
PREDICTION									

3. Pick a Card Color
Prediction for most frequent outcome: Red Black

RESULT									
PREDICTION									

4. Pick a Card Suit
Prediction for most frequent outcome: Clubs (♣) Spades (♠) Diamonds (♦) Hearts (♥)

RESULT									
PREDICTION									

5. Pick an Exact Card
Prediction for most frequent outcome: _____ (e.g., 3♥)

RESULT									
PREDICTION									

6. In which game of chance were your predictions most accurate?

7. Complete the table below with the probability for each event. Use the results from your experiments above to calculate the experimental probabilities.

Game of Chance	Event	Experimental Probability	Theoretical Probability
Flip a Coin	Heads		
Roll 1 Die	6		
Pick a Card Color	Red		
Pick a Card Suit	Diamonds		
Pick an Exact Card	5 of Diamonds		

8. Compare the theoretical and experimental probabilities for each game of chance. Were you close in any of the experiments?

9. Collect data from the entire class for the probability of an event matching the predicted event (**Note:** This works even if different groups predicted different outcomes.) Record the number of correctly predicted trials and the experimental probability of each. Since each group performed 10 trials for each game, the number of trials will be 10 × the number of groups.

Game of Chance	# of Correct Predictions	Experimental Probability
Flip a Coin		
Roll 1 Die		
Pick a Card Color		
Pick a Card Suit		
Pick an Exact Card		

10. Are the experimental probability different in Questions 7 and 9? Why or why not?

11. How do the theoretical probabilities in Question 7 compare to the experimental probabilities in Question 9? What do you think would happen if even more trials were added?

Task #6: Experimental and Theoretical Probability

Amanda used a standard deck of 52 cards and selected a card at random. She recorded the suit of the card she picked, and then replaced the card. The results are in the table below.

Diamonds	𝍸 ||
Hearts	𝍸 ||||
Spades	𝍸 𝍸 |
Clubs	|||

1. Based on her results, what is the experimental probability of selecting a heart?

2. What is the theoretical probability of selecting a heart?

3. Based on her results, what is the experimental probability of selecting a diamond or a spade?

4. What is the theoretical probability of selecting a diamond or a spade?

5. Compare these results, and describe your findings.

6. Dale conducted a survey of the students in his classes to observe the distribution of eye color. The table shows the results of his survey.

Eye color	Blue	Brown	Green	Hazel
Number	12	58	2	8

a. Find the experimental probability distribution for each eye color.

P (blue) = _____ P (brown) = _____ P (green) = _____ P (hazel)= _____

b. Based on the survey, what is the experimental probability that a student in Dale's class has blue or green eyes?

c. Based on the survey, what is the experimental probability that a student in Dale's class does not have green or hazel eyes?

d. If the distribution of eye color in Dale's grade is similar to the distribution in his classes, about how many of the 360 students in his grade would be expected to have brown eyes?

7. Your sock drawer is a mess! You just shove all of your socks in the drawer without worrying about finding matches. Your aunt asks how many pairs of each color you have. You know that you have 32 pairs of socks, or 64 individual socks in four different colors: white, blue, black, and tan. You do not want to count all of your socks, so you randomly pick 20 individual socks and predict the number from your results.

Color of sock	White	Blue	Black	Tan
Number of socks	12	1	3	4

A. Find the experimental probability of each:

P (white) = _____ P (blue) = _____ P (black) = _____ P (tan) =_____

B. Based on your experiment, how many socks of each color are in your drawer? Show your work!

White = _____ Blue = _____ Black = _____ Tan = _____

C. Based on your results, how many pairs of each sock are in your drawer?

White = _____ Blue = _____ Black = _____ Tan = _____

D. Your drawer actually contains 16 pairs of white socks, 2 pairs of blue socks, 6 pairs of black socks, and 8 pairs of white socks. How accurate was your prediction?

Task #7: Lesson 2 - Exit Ticket

In Jean's computer programming class she learns to program her computer to randomly change the background color to green, yellow, or red every minute. Provide percentages that represent the likelihood of a yellow background for each scenario.

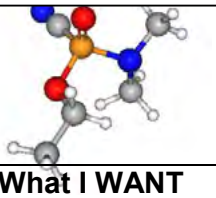
1. Assume the chance of a getting a green, yellow, or red color is equally likely. What is the theoretical probability of getting a yellow background?

2. Complete the table by providing possible values of the number of yellow backgrounds from the given number of trials. Then, calculate the percentage for each number of trials and explain why you chose these numbers.

No. of Trials	No. of Yellow	Percent of Yellow	Explanation
10			
50			
200			
1,000			

Task #8: KWL

Today I will learn….



What I KNOW About Compound Events	What I WANT to know about Compound Events	What I LEARNED About Compound Events
What is a *compound*? Where do I see or use *compounds* in real life?		

Task #9: Ice Cream Shop

When you go to get ice cream with friends there are many choices for you to make. What flavor ice cream, what kind of topping you want, and what color sprinkles. How many different sundaes can you make when you order one flavor of ice cream, one topping, and one color of sprinkles from the chart below?

Ice Cream Flavor	Topping	Sprinkles
Chocolate Vanilla Strawberry	Fudge Marshmallow	Chocolate Rainbow

1. Show all the possible outcomes in a **tree diagram**.

2. Use the tree diagram to list the **Sample Space** of all possible ice cream sundaes.

3. Use the information above to calculate the following probabilities.

   a. P(Chocolate Ice Cream) = _____ b. P(Vanilla Ice Cream) = _____

   P(Fudge) = _____ P(Rainbow) = _____

   P(Chocolate Ice Cream and Fudge) = _____ P(Vanilla Ice Cream and Rainbow) = _____

   c. P(Chocolate Ice Cream and Fudge and Rainbow) = _____

   d. P(Vanilla Ice Cream or Strawberry Ice Cream) = _____

4. Create an example of a simple event.

5. Create an example of a compound event.

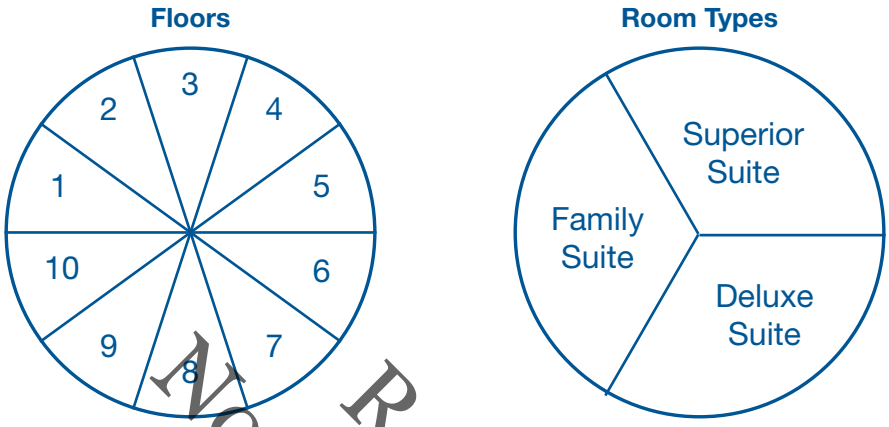
**Adapted from Ice Cream Shop at https://ilearn.marist.edu/access/content/user/10026480@marist.edu/edTPA/Lesson%20Plan%20_2.pdf*

Task #10: Rolling Twice

A fair six-sided die is rolled twice. What is the theoretical probability that the first number that comes up is greater than or equal to the second number?

Task #11: Lesson 3 - Exit Ticket

1. A hotel building has 10 floors; each floor has three different types of rooms (Family suite, Superior suite, and Deluxe suite). Carrie made a spinner as a probability model for randomly choosing one hotel room. Carrie spins both spinners below.



a. What is the probability that she chooses the family suite that's above the 8th floor?

Fraction: _____ Decimal: _____ Percent: _____

b. What is the probability that she chooses the Superior Suite below the 5th floor?

Fraction: _____ Decimal: _____ Percent: _____

2. Create a simulation of a compound event. Describe in words. You may also need to draw a picture. Then create two problems about compound probability using your simulation. Be sure to provide answer key and justify your reasoning for each problem. (HINT: Possible simulation options include spinners, dice, and coins.)

Simulation	Problem 1	Problem 2

Task #12: Yellow Starbursts, Act 1
Adapted from Andrew Stadel

ACT 1

What did/do you notice?

What questions come to your mind?

Main Question:

Estimate the result of the main question. Explain.

Place an estimate that is too high and too low on the number line

Low estimate | Place an “x” where your estimate belongs | High estimate

Task #13: Yellow Starbursts, Acts 2 & 3
Adapted from Andrew Stadel

ACT 2

What information would you like to know or do you need to solve the MAIN question?

Record the given information (measurements, materials, etc.…)

If possible, give a better estimate using this information:

Use this area for your work, tables, calculations, sketches, and final solution.

ACT 3

What was the result?

Which Process Readiness Indicators did you use?

- ☐ Make sense of problems and persevere in solving through reasoning and exploration.
- ☐ Attend to precision.
- ☐ Reason abstractly and quantitatively by using multiple forms of representations to make sense of and understand mathematics.
- ☐ Look for and make use of patterns and structure.
- ☐ Describe and justify mathematical understandings by constructing viable arguments, critiquing the reasoning of others and engaging in meaningful mathematical discourse.
- ☐ Look for and express regularity in repeated reasoning.
- ☐ Contextualize mathematical ideas by connecting them to real-world situations. Model with mathematics.
- ☐ Demonstrate flexible use of strategies and methods while reflecting on which procedures seem to work best for specific types of problems.
- ☐ Use appropriate tools strategically to support thinking and problem solving.
- ☐ Reflect on mistakes and misconceptions to improve mathematical understanding.

Task #14: Starburst Simulation

Using the simulator provided by your teacher (spinner, die, virtual spinner), complete 20 trials by "opening" two packs of Starburst candies and record the colors in the chart below. Then find a total for the number of 0, 1, and 2 yellow Starburst combinations.

Trial	Starburst #1 Color	Starburst #2 Color
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

1. How many times did you get 0 yellow Starbursts?

2. How many times did you get 1 yellow Starburst?

3. How many times did you get 2 yellow Starbursts?

4. How do your initial guesses compare to the actual answers?

5. How did the class simulation data compare to the answers provided in the video?

6. How might the information gained from this experiment be useful to a consumer who does or does not like yellow Starburst?

Task #15: Probability Practice

DIRECTIONS: Answer the questions below. Use words, calculations, and/or diagrams to justify your reasoning.

1. How many times would one expect to get “heads” if a fair coin was tossed 26 times?

2. About how many times would a number greater than 4 come up if a 6 sided number cube was rolled 20 times?

3. If 16 cards were randomly pulled from a standard deck of playing cards, about how many would be spades? A red card?

4. A bag contains 5 green marbles, 7 blue marbles, and some black marbles. The probability of drawing a green marble is 25%. How many black marbles are in the bag?

5. John caught 15 fish last weekend, 10 of which were too small to keep. If John wants to keep 7 fish today, about how many should he try to catch?

Task #16: What is a Statistical Question?

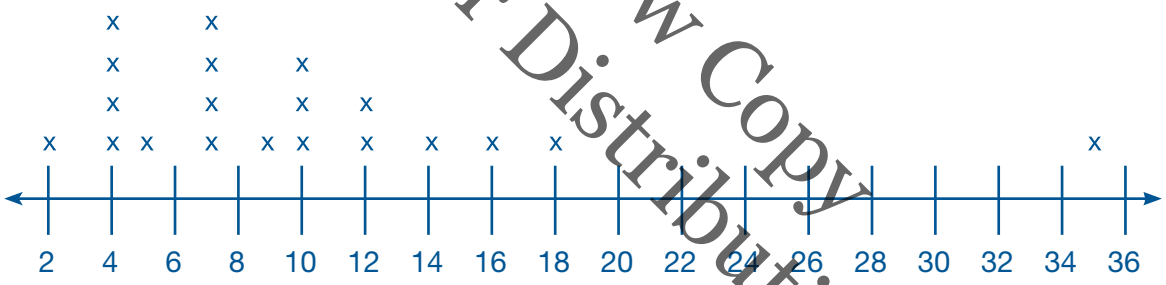
Jerome, a 9th grader at Central High School, is a huge baseball fan. He loves to collect baseball cards. He has cards of current players and players from past baseball seasons. With his teacher's permission, Jerome brought a sample of his baseball card collection to school. Each card has a picture of a current or past Major League Baseball player, along with information about the player. When he placed his cards out for the other students to see, they asked Jerome all sorts of questions about his cards. Some asked:

- How many cards does Jerome have altogether?
- What is the typical cost of a card in Jerome's collection?
- Where did Jerome get the cards?

A *statistical question* is one that can be answered by collecting data and where there will be variability in that data.

1. Which of the questions above do you think might be a statistical question?

The dot plot below shows the value of the baseball cards Jerome brought to school.



Value of Baseball Cards

2. What observations can you make about the data?

Task #17: Statistical Questions Part 1

Last night, Jennifer and her family went out for dinner. The questions below came up on their way to the restaurant or during the meal. Decide whether or not each question is a statistical question, and justify your decision.

a. How far are we from the restaurant?

b. How long will it be until we get there?

c. Would Jennifer rather have burgers or pizza?

d. What is the most frequently ordered dish on Saturday nights?

e. Do customers at the restaurant like pizza?

f. What is a typical bill for tables at this restaurant?

g. On average, how many people were sitting at each table this evening?

Task #18: Creating Statistical Questions

Rewrite each of the following questions as a statistical question.

1. How many pets does your teacher have?

2. How many points did the high school soccer team score in its last game?

3. Can I do a handstand?

4. How old is the principal at my school?

Task #19: Lesson 6 - Exit Ticket

Determine if each question is a statistical question. For each question, explain your mathematical thinking. If it is not a statistical question, rewrite the question so that it is.

1. How many hours each day does a typical student in my class play video games?

2. How many miles does my teacher drive to school each day?

Task #20: Buttons: Statistical Questions

Zeke likes to collect buttons and he keeps them in a jar. Zeke can empty the buttons out of the jar, so he can see all of his buttons at once.

1. Which of the following are statistical questions that someone could ask Zeke about his buttons? For each question, explain why it is or is not a statistical question.

a. What is a typical number of holes for the buttons in the jar?

b. How many buttons are in the jar?

c. How large is the largest button in the jar?

d. If Zeke grabbed a handful of buttons, what are the chances that all of the buttons in his hand are round?

e. What is a typical size for the buttons in the jar?

f. How are these buttons distributed according to color?

2. Write another statistical question related to Zeke's button collection.

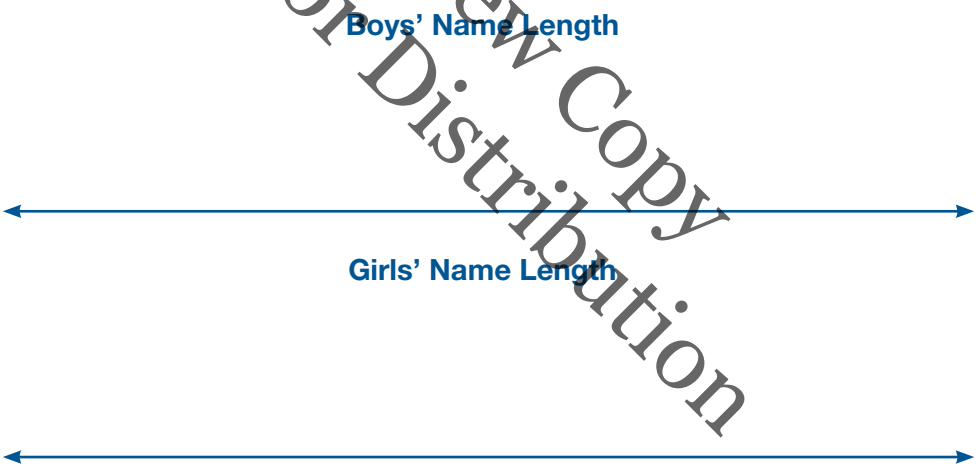
Task #21: Human Box Plot

Part 1: Dot and Box Plot Construction

1. Record the name lengths for all the students in the class here.

Boys	Girls

On the number line below, create a dot plot for the class name length data. Use an appropriate scale to label your number line so that you will be able to fit your minimum and maximum heights on the graph. Then record each name length on your plot with some mark above the value such as a dot or an x.



3. Find the statistics for the class data.

Boys' Name Length:

minimum:	maximum:
mean:	median:
mode:	range:
Q1:	Q3:

Girls' Name Length:

minimum:	maximum:
mean:	median:
mode:	range:
Q1:	Q3:

4. Use the information from #3 to create a box plot for the class data.

Boys' Name Length

Girls' Name Length

Part 2: Mean Absolute Deviation

1. In the table below, record the boys' and girls' name lengths and each mean you calculated earlier. Then subtract to find the distance of each name length from its mean.

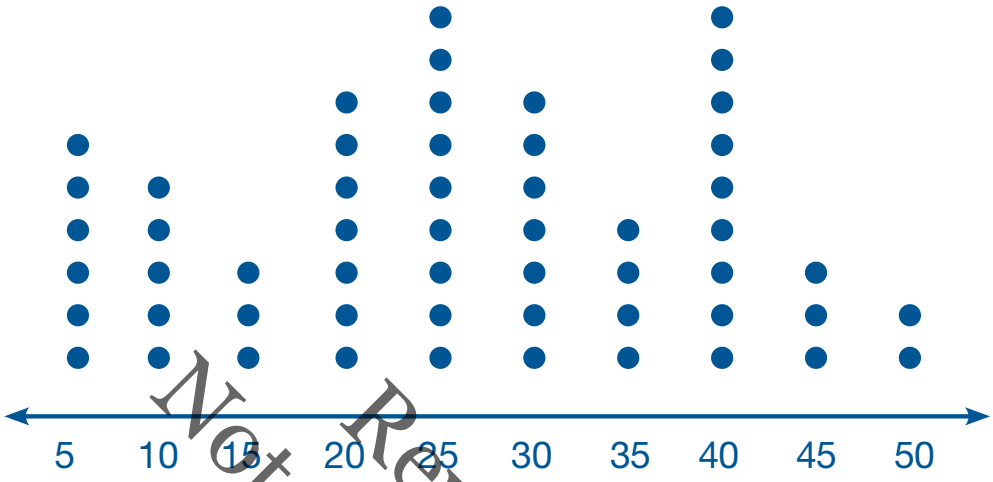
boys' name length mean =		girls' name length mean =	
boys' name lengths	distance from the mean	girls' name lengths	distance from the mean

2. Now, find the mean of the distances from the mean for the boys' and girls' name lengths.

boys' name length mean absolute deviation	girls' name length mean absolute deviation

Task #22: Compare and Analyze Data

Use the information in the plots to answer the questions. For each question, justify your reasoning.



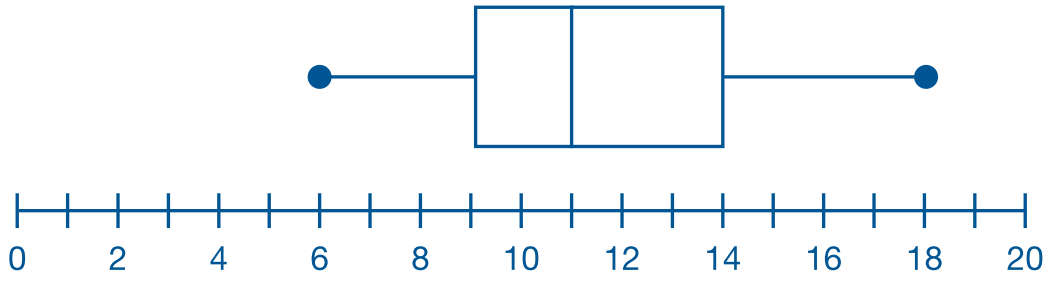
1. What is the mode of the data?

2. What is the median of the data?

3. What is the mean of the data?

4. What is the range of the data?

5. Which measure of center best describes this set of data?



6. What is the minimum value?

7. What is the maximum value?

8. What is the median?

9. What is the range?

10. What is the interquartile range?

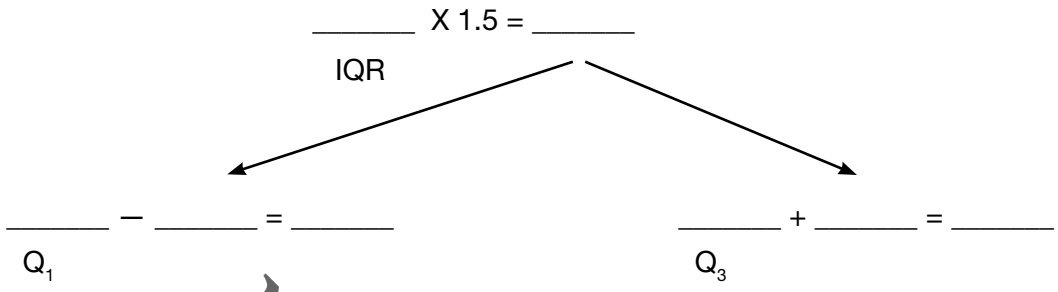
Task #23: Chrysanthemum Joins the Class

1. Use this space to record the new girls name length data set, including Chrysanthemum.

2. Find the summary statistics for the new girls name length data and record in the right column. From the previous lesson, record the summary statistics for girls name length data (before adding Chrysanthemum).

	Original Girls Name Length Data (w/o Chrysanthemum)	New Girls Name Length Data (w/ Chrysanthemum)
Minimum		
Quartile 1		
Median		
Quartile 3		
Maximum		
Mean		
Mode		
Range		
Interquartile Range		
Mean Absolute Deviation		

3. Before creating the box plots, we first need to determine whether or not our data sets contain outliers. One definition of an outlier is any data point that is more than 1.5 times the length of the box away from either the lower or the upper quartiles. First determine if there are outliers in the new data set.

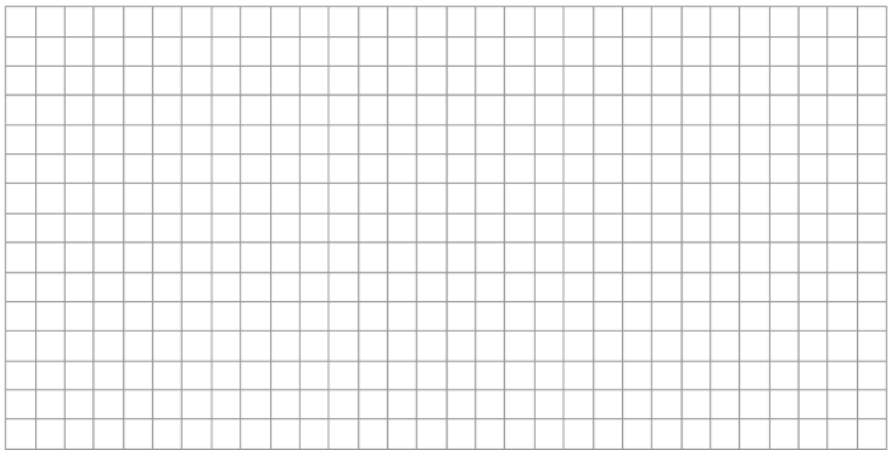


Any data less than this value is an outlier. Any data greater than this value is an outlier.

a). Does the new data contain any outliers? If so, which one(s)?

b). Use this same process to check for outliers in the original data.

4. Create parallel box plots (box plots that display two different sets of data on the same number line) in order to compare the original data to the new data.



Task #24: Lesson 8 - Exit Ticket

Discrimination in the workplace is not always gender discrimination. Former employees of a manufacturing plant have filed a lawsuit against the company claiming they were laid off from their jobs because of age discrimination. The set of data below show the ages of employees who have been laid off from the company in the last year:

28	25	55	64	60
55	56	55	60	59

1. Are any outliers present in the data? Show your mathematical work.

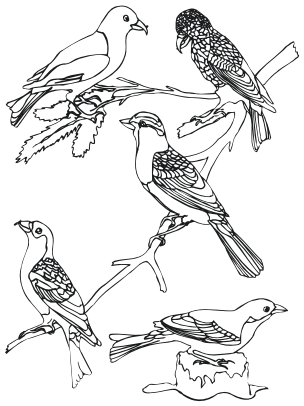
2. How might your results from question #1 help to determine if age discrimination played a role in the company layoffs?

Task #25: Capture-Recapture

Population Estimation with Capture and Recapture

The idea behind capture and recapture is:

- Capture and tag some birds in a forest, allowing each of them to go free after being tagged.
- Recapture a set of birds from the forest, and count how many from that set are tagged.
- Use the ratio of tagged birds in your set to generate a proportion. Use the proportion to estimate the total population of birds in the forest.



1. From the cup, CAPTURE a handful of beans. Count the number of beans that you've captured. Mark each of them with a marker. How many beans did you mark? (This number will be important for Questions 8 and 9.)

2. Put the marked beans back in the cup and shake up the cup.

3. From the cup, RECAPTURE a new handful of beans.

How many total beans are in your new handful? _____

How many marked beans are in your new handful? _____

4. Write a ratio representing

$$\frac{\text{marked beans (in handful)}}{\text{total beans (in handful)}} : \_\_\_\_\_$$

5. Fill in the three labeled columns in the first row (across) of the table, using your answers from Questions 3 and 4. (For now, leave the grey column blank; you will fill it in for Question 9.)

Trial Number	Number of Marked Beans	Total Number of Beans	Ratio of Marked to Total	
1				
2				
3				
4				
5				
6				

Return the beans to the cup, and then take a new handful as another trial. Record your numbers in the table. Repeat for a total of six trials.

6. Remember, the goal of these trials is to determine _____ .

$$\frac{\text{marked beans (in handful)}}{\text{total beans (in handful)}} = \frac{\text{total marked beans (in cup)}}{\text{total number of beans (in cup)}}$$

7. **Using the data from the first trial** and the formula above, write and solve a proportion that can be used to calculate the total number of beans in the cup.

$$\frac{\qquad}{\qquad} = \frac{\qquad}{x}$$

Now, solve this proportion to determine the value of x.

8. Label the grey column in the table of Question 5 with the title **Estimated Total**. Using each of your other trials (handfuls), **write a proportion and solve it** to estimate the total number of beans in the cup. Each time you calculate a result, enter the value in the grey column of the table in Question 5.

9. Based on your trials, how many beans do you think are in the cup? Why?

10. How does this bean-counting exercise simulate the determination of a population of birds in a forest?

11. What relationship exists between the ratios that appear in the Estimated Total column in the data table of Question 5?

What is a *reasonable* estimate?

12. Based on your estimate (your answer to #9 on the last page), what do you think is a reasonable range for the trials? Explain why you chose your range.

13. In the space below, perform enough more experiments so that you have a total of 20 experiments, including the 6 from the first page.

Trial Number	Number of Marked Beans	Total Number of Beans	Ratio of Marked to Total	

14. Based on what you decided was a reasonable range for the estimates in question #12, look at which of the 20 experiments you did would you consider 'good'? How many experiments are 'good'? What percent of your experiments are 'good'?

15. How many experiments would you think are necessary to assure an accurate overall estimate for the number of robins in the forest? Why?

Task #26: More Practice on Random Sampling

1. Roxanne wants to estimate the total number of candies in a 1-pound (16 ounce) bag to determine the number of bags she needs to buy for a party. In a 2.5 ounce bag of the same type of candy Roxanne counted 15 candies.

   a. Estimate the number of candies in a 1-pound bag. Explain your mathematical thinking.

   b. If Roxanne wants each guest to have 4 pieces of candy and she plans on having about 30 guests, how many 1-pound bags of candy does she need to purchase?

2. A group of biologists wanted to estimate the number of deer in a forest. To begin their study, the tagged and released 100 deer. Later, the captured 800 deer and found that 40 of them were tagged. What is your estimate of the deer population in the forest? Show the work that leads to your answer.

3. Jules studies birds in a nature preserve. To estimate the population of one species of birds, Jules captured and placed a band around the legs of 20 birds. Then, Jules observed 17 banded birds out of a total of 260 birds. Use this information to estimate the population of this bird species in the nature preserve.

4. According to a 2014 survey, 60% of high school students report that they regularly use a smart phone. Based on this survey, how many students would you expect to regularly use a smart phone in a class of 28 students?

5. Anna would like to find out what students in her school think of the new dress code policy. A friend suggests that she set up a survey on a website and invite students to visit the site and answer the questions. Would this be an example of random sampling? Justify your reasoning.

Task #27: Simulating the Discrimination Case

Using a deck of cards, let 24 black cards represent the male candidates for promotion and 24 red cards represent the females (remove 2 red cards and 2 black cards from the deck). This will simulate the 48 folders, half of which were labeled male and the other half female.

1. Shuffle the 48 cards thoroughly to insure that the cards counted out are from a random process. You are simulating what can happen with random variation where no discrimination is being practiced.
2. Count out the top 35 cards. These cards represent the applicants recommended for promotion to bank manager. (You may wish to count out 13 cards that will not be considered for a quicker count).
3. Of the 35 cards, count the number of black cards (representing the males).
4. On the number line below, create a dot plot by recording the number of black cards of the 35 counted (the number of men recommended for promotion if there were no discrimination present).
5. Repeat steps 1 – 4 nine more times for a total of 10 simulations.

Number of Men Promoted

6. Combine data from your 10 simulations with data from two other groups. Record the data on your dot plot above for a total of 30 data.
7. Work with your small group to analyze the data. You should use the dot plot to report on the shape, center, and variability of the distribution of the data. After interpreting the results of your analysis, be sure to draw conclusions by revisiting the statistical question being studied: Is there gender discrimination of female applicants by bank supervisors?

Task #28: Haircut Costs

Seventy-five female college students and 24 male college students reported the cost (in dollars) of her or his most recent haircut. The resulting data are summarized in the following table.

	Females	Males
No. of Observations	75	24
Minimum	0	0
Maximum	150	35
1st Quartile	20	9.25
Median	31	17
3rd Quartile	75	20
Mean	52.53	20.13

a. Using the minimum, maximum, quartiles, and median, sketch two side-by-side box plots to compare the hair cut costs between males and females in this student's school.

b. How would you describe the difference in haircut costs between males and females? Be sure you discuss differences/similarities in shape, center, and spread.

Task #29: Lesson 11 - Exit Ticket

	What I understand about...	What questions I still have about...
Shape		
Center		
Spread		

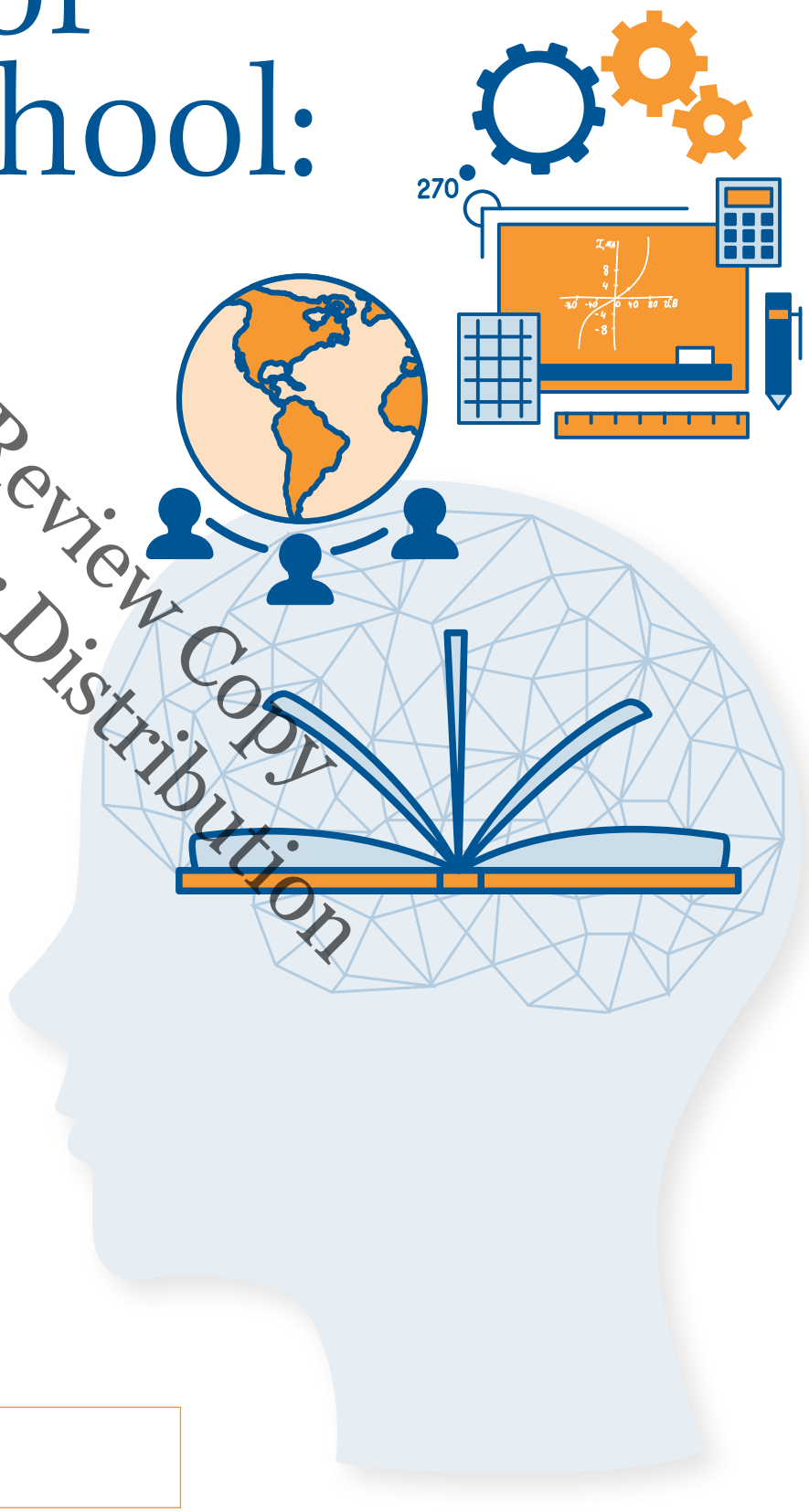
SREB Readiness Courses

Ready for High School: Math

Student Manual

Math Unit 4

Expressions, Equations and Inequalities



Name

Unit 4 . Expressions, Equations and Inequalities

Contents

Task #1: Sam's Diner

Ticket order #1: G + H + S

What did the customer order?

Green Eggs	$2.25
Regular Eggs	$2.00
Ham	$1.50
Bacon	$1.25
Small Drink	$0.75
Large Drink	$1.00
Today's Special	$4.25

How do you know?

How much is his order?

How did you find the sum mentally?

Did anyone do it a different way?

Ticket order #2: 2G + B = ?

Ticket order #3: E + 3H + 2L = ?

Ticket order #4: X + G + S = ?

Ticket order #5: 2(G + H) = ?

Ticket order #6: (G + S) + 2H = ?

Ticket order #7: X + 3(E + L) = ?

Ticket order #8: 3(E + B + L) + 2X = ?

Task #2: Closing Activity and Independent Practice

1. Describe a scenario that could be represented by each of the following expressions:

a. $x - 3$

b. $2x + 3$

c. $5x + 2y$

2. Write your own scenario and provide an expression that could be used to represent it.

Task #3: Sam's Diner, Part 2

Ticket #9:  (E + L) = $6.00

Ticket #10: X + 3  = $6.50

Ticket #11:  G + H = $10.50

Ticket #12:  + G + B = $5.50

Task #4: Closing Activity and Independent Practice

Write a real-world scenario that involves an equation.

Set up and solve an equation that represents the following scenario:

Jesse and his brother Michael went to Burger Hut to order dinner for the family. They ordered 8 cheeseburgers ($3 each), 6 Cokes ($2 each), a strawberry shake ($2.50) and some fries ($1.30 each). If their total bill was $45.00, how many orders of fries did they have?

Task #5: Counting Tiles

If blue boxes represent one positive unit (1), use the patterns below to consider what the 4th figure, 10th figure, 20th figure, 100th figure, and eventually the nth figure would look like.

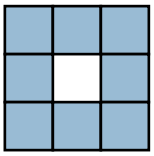


fig 1

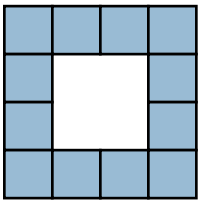


fig 2

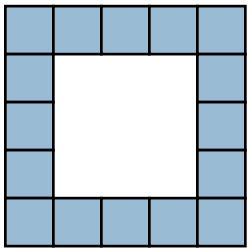
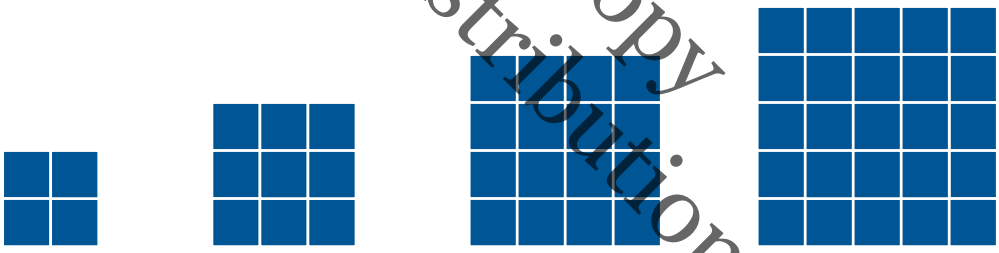


fig 3

Task #6: Independent Practice

1. 

2. 

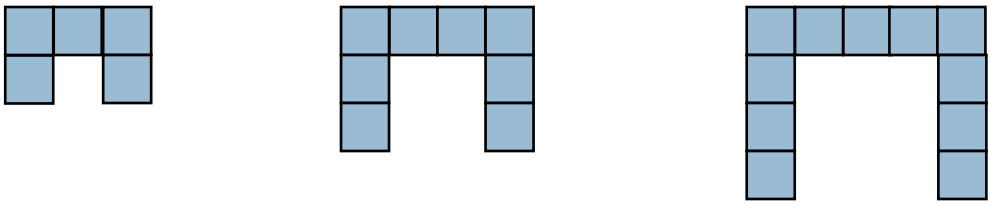
3. 

4. 

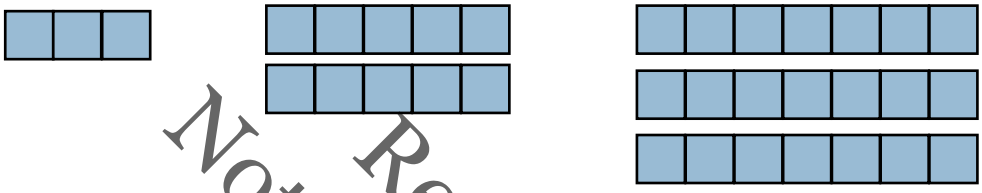
Task #7: Practicing Patterns

Practice patterns for creating expressions:

1



2.



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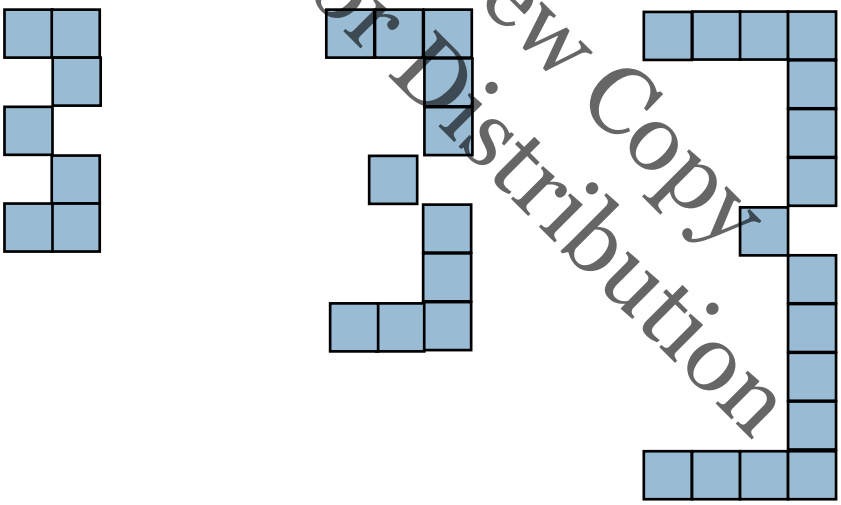


a. Describe in words only what the 20th figure will look like so that someone could draw or make it if they had the grid paper or tiles.

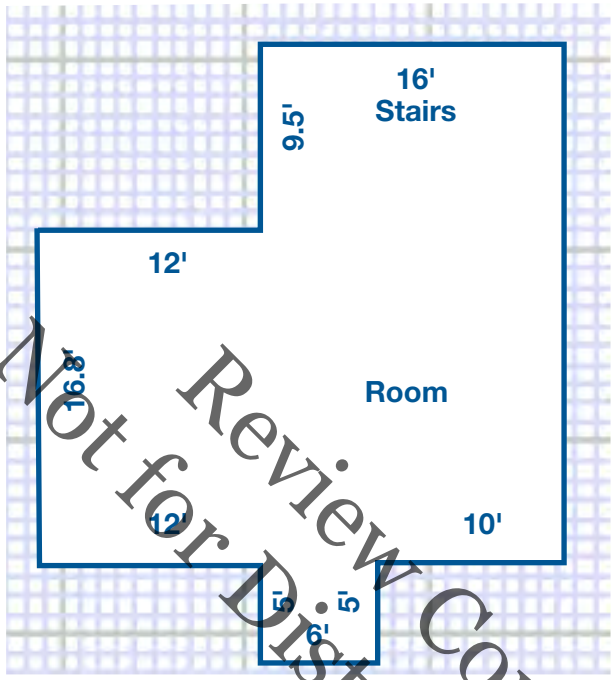
b. How many tiles would you need to build the 20th figure? Draw a sketch of the 20th figure.

c. Write an expression for the nth figure and explain why you chose that expression? Write a different expression for the nth figure.

d. Using ¼ inch grid paper, graph the number of tiles used for the first several arrangements.

Task #8: Sam's Diner

This is a floor plan for Sam's Diner. The city needs to know the total square footage to calculate the maximum capacity for fire and safety regulations. What is the total area, in square feet, of Sam's Diner?



Task #9: Algebraic Expressions – Practice Together

I. Write an algebraic expression to represent the area of each figure. You will compare your group's strategy with another group. Prepare to explain and justify your expressions.

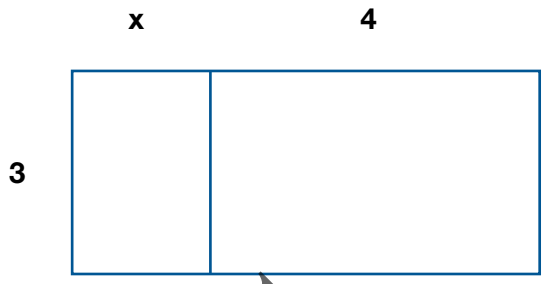


Figure 1

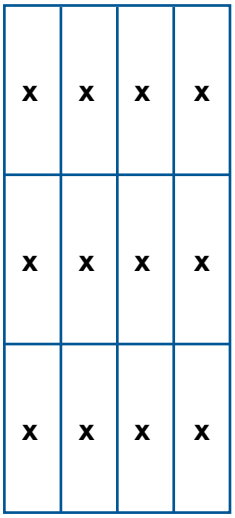


Figure 2

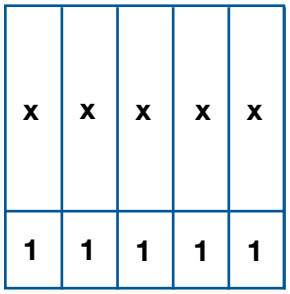


Figure 3

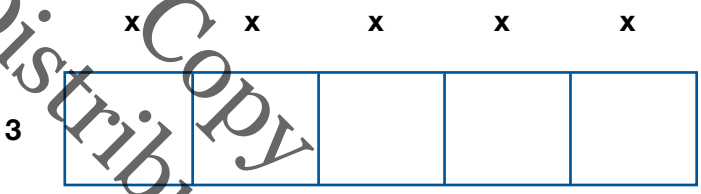


Figure 4

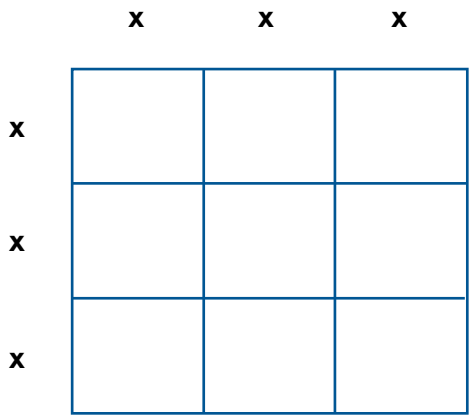


Figure 5

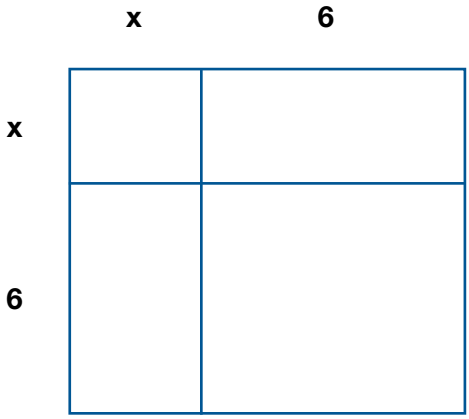


Figure 6

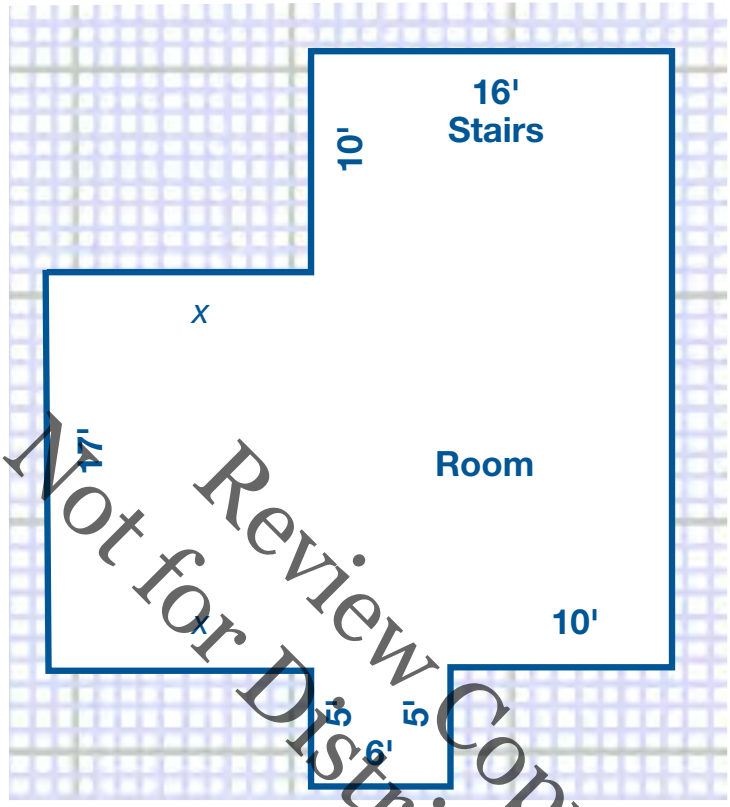
Task #10: Sorting Algebraic Expressions — Practice Together

Sort the following expressions into the quadrants below based on equivalence. Justify your matches with area models or calculations.

$4x^2$	$16x^2$
(4x) (4x)	4x + 16
4(x + 4)	$x^2 + x^2 + x^2 + x^2$
4x + 4	(x +1) + (x +1) + (x +1) + (x +1)

Equivalent Expressions

Task #11: Closing Activity



Two students formed the following expressions to represent the area of floor plan above. How did they form the expressions? Are they both correct? How do you know?

160 + 17 (x + 16) + 30 216 + 17x

Task #12: Equation Scenarios — Explore and Closing Activity

Scenario #1

Beth received $50 for babysitting her little cousin. She goes shopping with her friends and wants to get a new phone case that costs $25. She then wants to download some music to her phone. About how many songs can Beth download if they cost $1.29 each?

a. How is this scenario different from taking orders scenario?

b. Write an equation to represent the scenario.

c. Can she purchase 19.4 songs? How many can she purchase?

Scenario #2

Beth wants a new cell phone. The phone costs $240 dollars. Beth can clean the house for her parents and get paid $5.00 an hour. It takes Beth 6 hours per week to clean the house. How many weeks does Beth need to clean the house to afford her new phone?

a. Write and explain an equation to represent the scenario above.

b. Solve the equation. Show all your work and be able to explain what you did to solve the equation.

c. Does your answer from part b give you a feasible answer to the scenario?

d. What if we did not know how much Beth wanted to spend on the phone?

e. How different would the problem be if the total was not known?

f. What would the new equation look like?

g. Would a table of values or a graph help us solve this new scenario? Which would be best and why?

Task #13: Equations (Practice Together, Closing Activity and Independent Practice)

Solve the following equations using any method:

a. $2x + 2 = 10$

b. $\frac{1}{2}(m + 4) = -4$

To keep the equation balanced, what steps do you need to take?

$3(2n + 1) - 4n = -1$

David went to Lenox Mall and purchased 3 shirts, all the same price, as well as a hat for $15. If he spent $47.50 at the mall, set up an equation and a bar diagram model that could be used to determine the cost of each shirt.

Solve the equation for the cost of each shirt, and explain each step used to determine the solution.

Task #14: Literal Equations (Practice Together)

Solve for the indicated variable in the parenthesis.

1. $P = IRT$ for T

2. $A + 2(L+W)$ for W

3. $y = 5x - 6$

4. $2x - 3y = 8$ for y

5. $A = \frac{1}{2} h(b + c)$ for b

6. $V = LWH$ for L

7. $A = 4\pi r^2$ for r^2

8. $S = 2(lw + lh + wh)$ for w

9. $P = 2(l + w)$ for l

10. $A = 2\pi r^2 + 2\pi rh$ for h

11. $y - y_1 = m(x-x_1)$ for x

Task #15: Inequalities (Practice Together and Evaluate Understanding)

Scenario #1:

The cash prize at BINGO is $240, and there were three winners in round one. If each winner receives the same amount of money, what amount could each winner receive?

Write an equation to represent the situation and determine a solution.

Suppose we know that each participant paid $3 for 4 BINGO cards, and the cash prize went up to $500. If each winner is to receive $50, how many winners could they have at BINGO next week?

Scenario #2:

Erica went in the store to buy a loaf of bread and gallon of milk. The milk costs $2.99 a gallon. Her mom only gave her $5 to spend.

Write an inequality to represent the situation.

What is a possible cost of the loaf of bread?

Is there more than one possible value? Why or why not?

Create a scenario similar to the ones discussed in our lesson today.

Task #16: Closing Activity and Independent Practice

Andrew bought a tie and dress shirt and didn't spend over $45. If the shirt cost $30, how much was the tie?

How could you represent this situation?

What could the cost of the tie be?

Is there more than one possible value? Why or why not?

Set up and solve an inequality that represents the following:

You and a friend are looking online for a summer job. There are two jobs that you are interested in. The first one pays $20 per hour, but you have to pay $160 for the company uniform. The second job requires no uniform but only pays $12 per hour. Your friend doesn't want to pay for the uniform, but you would like to make more money per hour. How might you convince your friends to take the first job with you?

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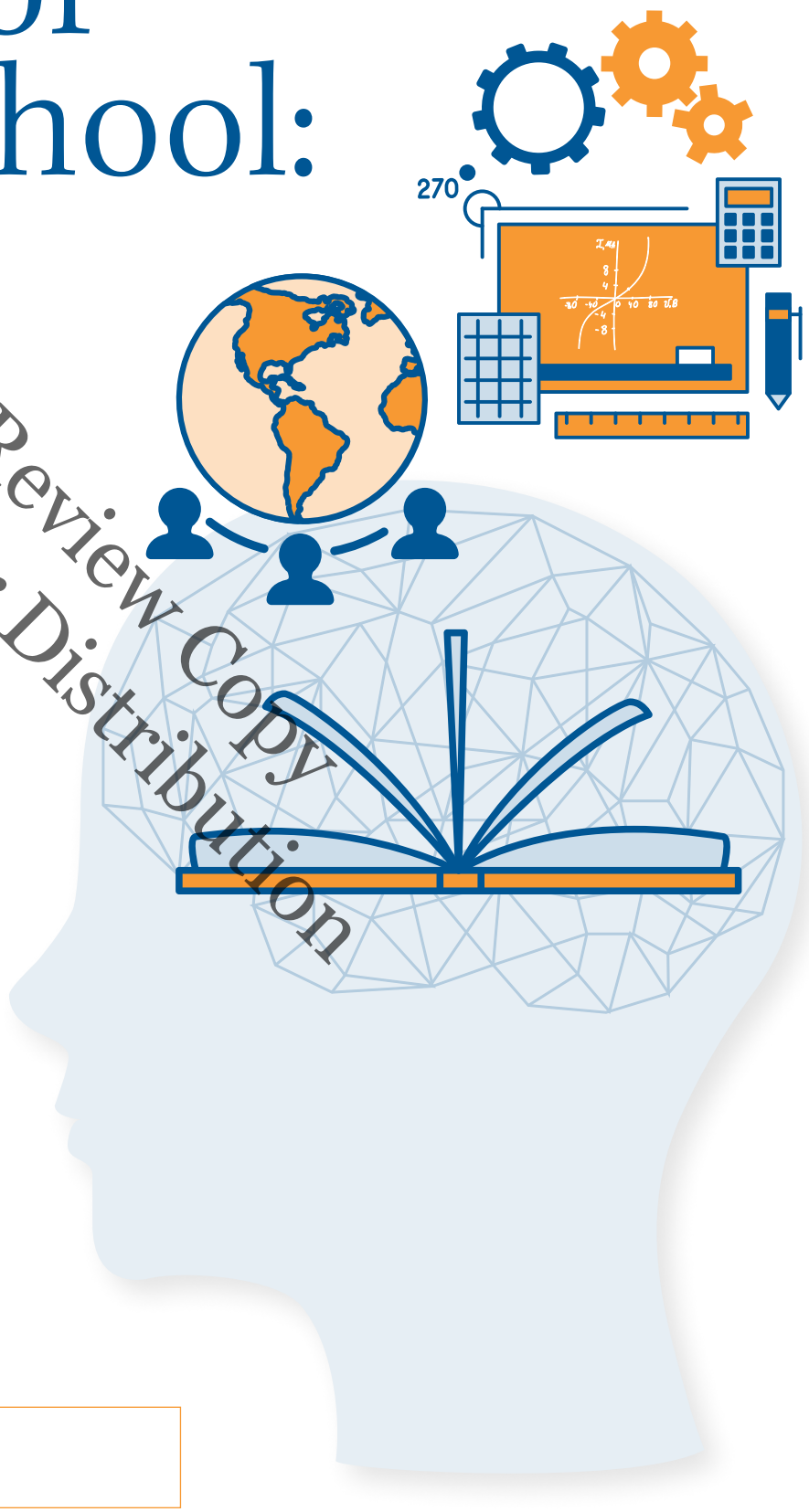
Math Unit 5

Geometry

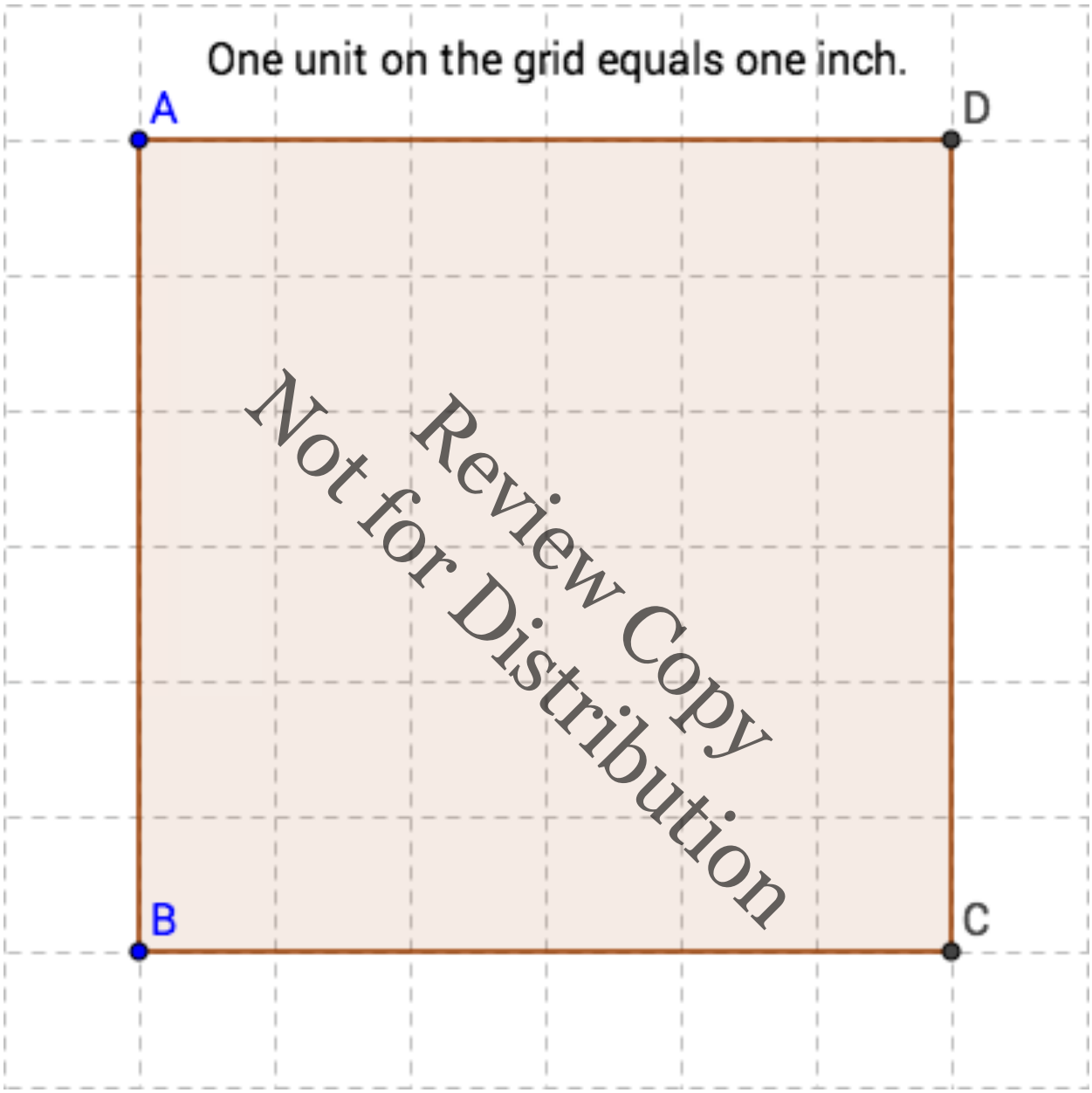


Name

Unit 5 . Geometry

Contents

Task #1: How Much Wrapping Paper Can You Save?"



Task #1: How Much Wrapping Paper Can You Save?

You were given two rectangular prisms with which you will explore and compare Sara Santos' method for wrapping boxes to a more traditional wrapping method.

Box #1

1. Using Sara Santos' formula, calculate the dimensions and square inches of paper that you will need for wrapping a present with her diagonal method.
   a. Dimensions: Length = _____ Width = _____ Height = _____
   b. Square wrapping paper area required: _____
2. Use the amount of wrapping paper you calculated, wrap the present. Did you have enough wrapping paper using the Sara Santos' method and formula?

3. Calculate the amount of wrapping paper necessary for wrapping the same box in the more traditional way.

4. Can you figure out a general way (like a formula) for calculating the amount of wrapping paper necessary for this traditional method of wrapping?

Box #2

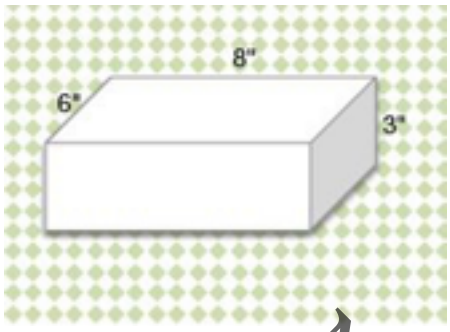
5. Calculate the following for the second box:
   a. Dimensions: Length = _____ Width = _____ Height = _____
   b. Square wrapping paper required using:
      1. Traditional method: _____ 2. Sara Santos method: _____
6. Use the amount of wrapping paper calculated for the second box and then wrap your present. Did you have enough wrapping paper using each method and formula?

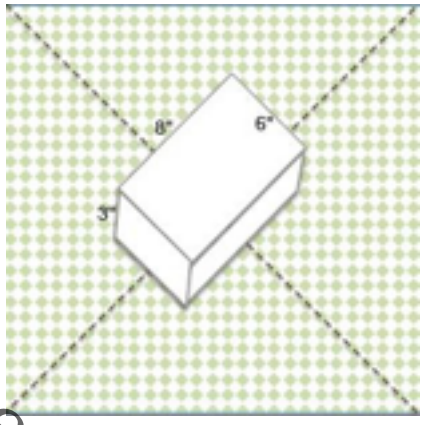
7. What percent of paper does wrapping using the unconventional method save over the traditional method?

Task #2: Let's Experiment

Most packages do not have a square face. Do you think this method will work if our box has different dimensions?

Traditional **Unconventional/Diagonal**





1. What size wrapping paper will you need to wrap this box traditionally?
   a. Dimensions:

      Length = _____ Width = _____ Height = _____

   b. Square wrapping paper required _____
2. What size wrapping paper will you need to wrap the present using the Unconventional/Diagonal method?
   a. Dimensions:

      Length = _____ Width = _____ Height = _____

   b. Square wrapping paper required _____
3. Show your calculations to demonstrate whether the unconventional method will actually cover the package.

   _____

   _____

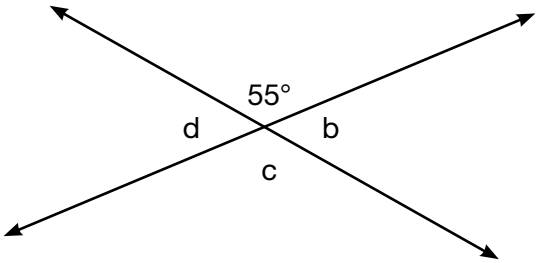
   _____
4. What percent of wrapping paper would be saved using the unconventional/diagonal method?

   _____
5. Why does the diagonal method work?

   _____

Task #3: Special Angles Intro Bellwork Questions

Special Angles Intro Bellwork Questions: Use the diagram to answer questions 1 – 4.



1. What is the relationship between angles b and d?

2. What is the relationship between c and d?

3. What is the measure of angle d?

4. What is the measure of angle c?

Task #4: Special Angles Vocabulary Graphic Organizer

Vocabulary	Sketch	Angle Relationship	Definition
Parallel Lines			
Perpendicular Lines			
Vertex			
Transversal			

Vocabulary	Sketch	Angle Relationship	Definition
Complementary Angles			
Supplementary Angles			
Vertical Angles			
Corresponding Angles			

Vocabulary	Sketch	Angle Relationship	Definition
Alternate Exterior Angles			
Alternate Interior Angles			
Same Side Exterior Angles			
Same Side Interior Angles			

Task #5 Special Angle Pair Investigation

Put a dot on the top left margin. On the right count down 5 lines and put a dot. Connect the two dots with a straight line. From the dot on the top left, count down 5 lines and put a dot. From the right margin dot, count down 5 lines and put a dot. Connect these two dots with a straight line. From the top left margin count down 10 lines put a dot. Connect this dot to the top right margin. Label the angles and the lines as you see on the projector.

On the lines below explain how you know the first two lines are parallel.

Do you think the angles formed by the transversal (intersecting line) have a relationship? Explain.

Using the pieces in your plastic bag, identify the relationship between the angles formed when parallel lines are cut by a transversal. Write the angle pair in the correct column (use the word "and" between the angles).

Congruent	Supplementary	No Relationship

When you have finished identifying all of the angle relationships, there should be 28, check your findings with your group. When you have reached group consensus (agreement), please let me know.

Write a definition for each word.

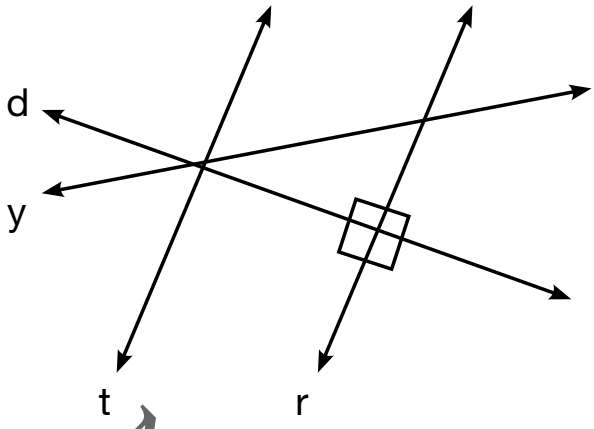
Vocabulary Word	Definition
Corresponding	
Interior	
Exterior	
Alternate	
Same side	

When you have completed your definitions please ask for the special angles your group will be investigating.

Discuss the meanings of the words and identify the angles that your group believes match the special angles given. Be prepared to defend your choices as you present your findings to the class. Use the space below to help develop your presentation. Include in your presentation the degree relationship the angles share.

Task #6: Working with Parallel lines Cut by a Transversal

Use the following figure to answer questions 1–4.



1. Is line d a transversal? Why or why not?

2. Is line y a transversal? Why or why not?

3. Is line t a transversal? Why or why not?

4. Is line r a transversal? Why or why not?

State whether the following statements are true or false. _____

5. Perpendicular lines always form multiple right angles. _____

6. The symbol “ ” means parallel. _____

7. Transversals must always be parallel. _____

8. Perpendicular lines can be formed by intersecting or nonintersecting lines.

Complete the sentences with the correct word: always, sometimes, or never.

9. Parallel lines are _____ the same distance apart.

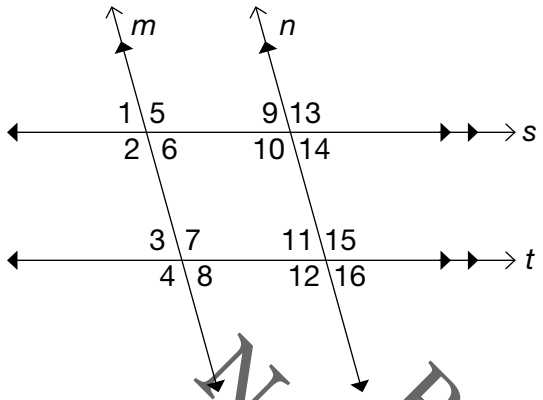
10. Parallel line _____ intersect.

11. Parallel lines are _____ cut by a transversal.

12. Parallel lines that are cut by a transversal _____ form right angles.

Part Two

In the following figure, *m* ll *n* and *s* ll *t*. For questions 1-6, (a) state the special name for each pair of angles then (b) tell if the angles are congruent or supplementary.



1. ∠2 and ∠10

   a. _____ b. _____

2. ∠6 and ∠7

   a. _____ b. _____

3. ∠13 and ∠15

   a. _____ b. _____

4. ∠11 and ∠14

   a. _____ b. _____

5. List all angles that are equal to ∠1.

   _____

   _____

6. List all angles that are supplementary to ∠11.

   _____

   _____

For questions 7-10, use the measure of the given angle to find the missing angle. State the special name for the angles. Use the diagram above.

7. $m\angle 2 = 100°$, so m $\angle 7 =$ _____ _____

8. $m\angle 8 = 71°$, so m $\angle 12 =$ _____ _____

9. $m\angle 5 = 110°$, so m $\angle 7 =$ _____ _____

10. $m\angle 2 = 125°$, so m $\angle 11 =$ _____ _____

Complete the statement for practice problems 11-16.

11. Alternate interior angles are similar to corresponding angles because

_____.

12. Alternate interior angles differ from corresponding angles because

_____.

13. Same-side interior angles are similar to alternate interior angles because

_____.

14. Same-side interior angles differ from alternate interior angles because

_____.

15. Same-side interior angles are similar to corresponding angles because

_____.

16. Same-side interior angles differ from corresponding angles because

_____.

Task #7: Lesson 2 Reflection

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

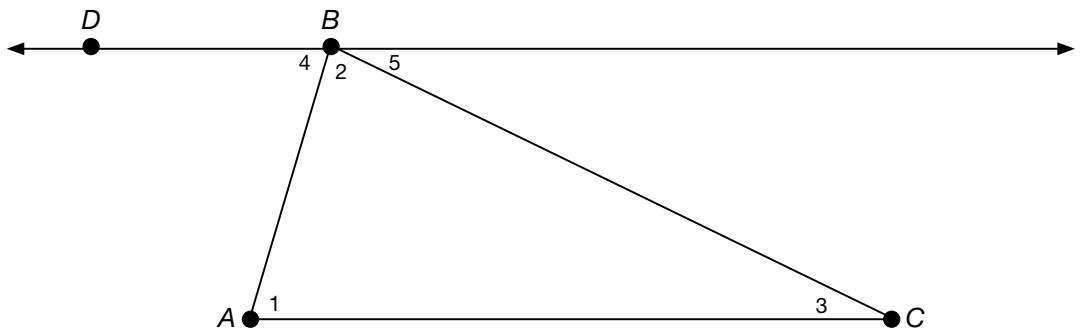
Task #8: Parallel Lines Summative Assignment

1. As you worked with the angle pieces, what relationships exist between the angles formed by the parallel lines cut by the transversal?

2. Describe how you can find the measure of all the angles formed when parallel lines are cut by a transversal given one angle measure.

Task #9: Triangle Sum Proof Worksheet

The diagram below shows $\triangle ABC$ in which $\overleftrightarrow{AC}$ is parellel to line $\overleftrightarrow{BD}$.



In the space below prove that the sum of the interior angles of $\triangle ABC$ is 180°, that is, prove that $m\angle 1 + m\angle 2 + m\angle 3 = 180°$.

Task #10: Triangle Sum Proof Worksheet

1. Move the slider around until the two transversals are where you would like them.
2. In this diagram, we are using transversals and parallel lines to construct a triangle. Do you see it? When you are ready, click “show triangle.”
3. There are five angles, labeled as angle 1, 2, 3, 4, and 5. What do you know must be true about angles 1, 2, and 3?

   Explain.

   Move the slider. Does this still hold true for angles 1, 2, and 3?

   Explain.

4. How are angles 4 and 5 related to angles 1 and 3?

   Explain.

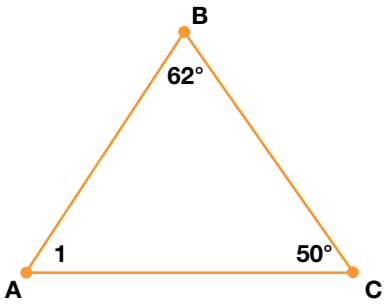
5. Check your thinking in the previous questions by clicking “show angles.”
6. What appears to be the sum of the interior angles of a triangle?

   How can we use the angles given in this module to argue or prove this?

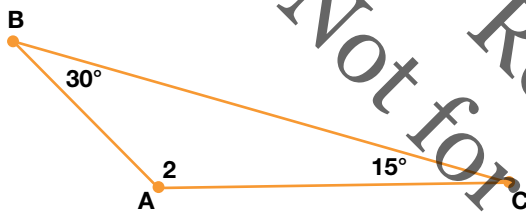
7. Move the slider. Do your discoveries still hold true?

Task #11: Finding Interior Angles of Triangles

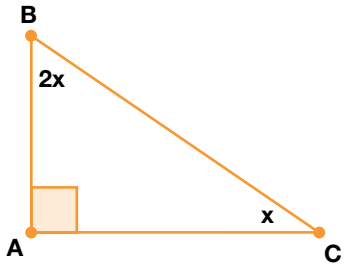
Example A: m ∠1 = _____



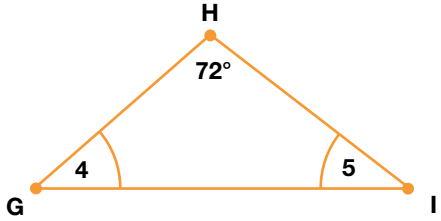
Example B: m ∠2 = _____



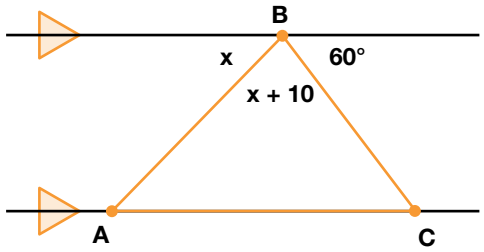
Example C: m ∠B = _____, m ∠C = _____



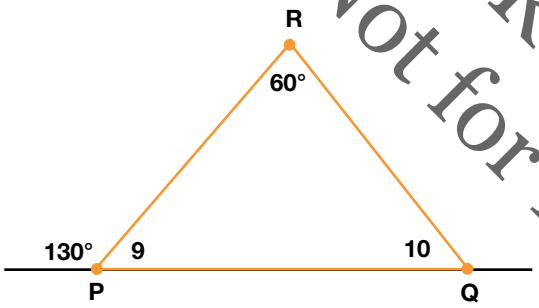
Example D: m ∠4 = _____, m ∠5 = _____



Example E: m ∠ BAC = _____, m ∠ BCA = _____, m ∠ ABC= _____



Example F: m ∠ 9 = _____, m ∠ 10 = _____,



Task #12: Lesson 3 Reflection

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

3. To reinforce writing skills, students will write a paragraph consisting of 5-7 sentences that includes the following information:
   - An introductory sentence
   - A sentence stating the Triangle Angle Sum Theorem (The sum of the measures of the interior angles of any triangle is 180.)
   - One or two sentences that summarize student's findings in the Geogebra Activity relating special angles and the Triangle Angle Sum Theorem. *(students should describe how they utilized special angle pairs to discover the Triangle Angle Sum Theorem)*
   - One or two sentences that explain how the paper folding model exhibits the Triangle Angle Sum Theorem. *(students should describe how the angles aligned to form a straight line or 180 degrees)*
   - A conclusion. (A sentence that should restate the main idea or introductory sentence.)

Task #13: Parallelogram Properties Sort

Four right angles

Four right angles

Both pairs of opposite sides are parallel

Both pairs of opposite sides are parallel

Both pairs of opposite sides are parallel

Both pairs of opposite sides are parallel

Diagonals are congruent

Diagonals are congruent

Opposite sides are congruent

Opposite sides are congruent

Opposite sides are congruent

Opposite sides are congruent

Diagonals bisect a pair of opposite angles

Diagonals bisect a pair of opposite angles

Opposite angles are congruent

These quadrilateral properties are for parallelograms, squares, rhombi, and rectangles. They are all jumbled up. Cut them out, along with the shape names, and sort them into four piles. There is EXACTLY the amount of properties you need.

PARALLELOGRAM

RECTANGLE

Opposite angles are congruent

Opposite angles are congruent

Opposite angles are congruent

Diagonals are perpendicular

Diagonals are perpendicular

Consecutive angles are supplementary

Consecutive angles are supplementary

Consecutive angles are supplementary

Consecutive angles are supplementary

Four congruent sides

Four congruent sides

Diagonals bisect each other

Diagonals bisect each other

Diagonals bisect each other

Diagonals bisect each other

RHOMBUS

SQUARE

Task #14: Parallelogram Properties Sort Checklist

Property	Rectangle	Rhombus	Square	All Parallelograms
The Sides				
Both pairs of opposite sides are parallel.				
Opposite sides are congruent.				
All sides are congruent.				
The Angles				
Sum of the angles is 360°.				
Opposite angles are congruent.				
All four angles are right angles.				
Consecutive angles are supplementary.				
All four angles are right angles.				
The Diagonals				
Diagonals bisect each other.				
Diagonals are congruent.				
Diagonals are perpendicular.				
Diagonals bisect opposite angles.				

Task #15: "Geometrica Fights Back" and "Suspect Figures"

Geometrica Fights Back

Mystery of the Guilty Quadrilateral

Once upon a time long, long ago in a far, far away land known as Geometrica there occurred an unspeakable crime. On a dark and dreary night as the Circular family lay sleeping in their soft, round beds and dreaming of their favorite dessert, pi, a violent criminal murdered them. Their neighbor, Mrs. Equi Angular said that she and her husband, Mr. Tri Angular, heard the awful blood curdling screams. So, they sprang from their bed to see what was the matter, and what to their wandering eyes did appear (not eight tiny reindeer) but a strange four-sided figure leaping from the Circular's upstairs window. Well, the Angulars gave a description of the terrible beast and so did many other Geometrica residents. However, to this day, the mystery remains. Therefore, Detective Pentagonal Walsh of Geometrica's Most Wanted has asked for your assistance in solving this crime. Below you will find descriptions that tipsters have given the authorities. Your job is to list the suspects from your line-up of twelve figures (numbered shapes) that meet each set of criteria.

1. Four-sided figure and convex

   Suspects: _____

2. Four-sided figure with two sets of parallel sides

   Suspects: _____

3. Four-sided figure with four right angles

   Suspects: _____

4. Four-sided figure with all sides equal

   Suspects: _____

5. Four-sided figure whose diagonals bisect each other

   Suspects: _____

6. Four-sided figure whose opposite angles are congruent

   Suspects: _____

7. Four-sided figure with only one set of parallel sides

   Suspects: _____

8. Four-sided figure whose consecutive angles are supplementary

   Suspects: _____

9. Four-sided figure whose diagonals are congruent

   Suspects: _____

10. Four-sided figure whose diagonals are perpendicular

    Suspects: _____

11. Four-sided figure with all equal sides and four right angles

    Suspects: _____

12. Four-sided figure with all equal sides and perpendicular diagonals

    Suspects: _____

13. Four-sided figure with all equal sides and congruent diagonals

    Suspects: _____

14. Four-sided figure whose legs are congruent

    Suspects: _____

15. Four-sided figure whose opposite sides are congruent

    Suspects: _____

16. Four-sided figure and concave

    Suspects: _____

17. Four-sided figure with exactly one pair of opposite angels that are congruent

    Suspects: _____

18. Four-sided figure with no parallel sides

    Suspects: _____

19. Four-sided figure with two right angles

    Suspects: _____

20. Four-sided figure with no equal sides (scalene)

    Suspects: _____

21. Suspect might be a parallelogram.

    Suspects: _____

22. Suspect might be a trapezoid.

    Suspects: _____

Who killed the Circulars? The guilty quad is the one whose number appears the most in the above list. Suspect number _____ is the criminal.

Task #16: Lesson 4 Reflection

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

Task #17: Always, Sometimes, Never

For each of the following, reply with always, sometimes, or never.

1. The diagonals of a parallelogram are _____ equal.
2. Both pairs of opposite angles of a kite are _____ equal.
3. The diagonals of a rectangle are _____ perpendicular.
4. The diagonals of a rhombus are _____ equal.
5. The diagonals of a trapezoid are _____ equal.
6. Trapezoids are _____ kites.
7. Two pairs of consecutive sides of a rhombus are _____ equal.
8. The diagonals of a trapezoid are _____ perpendicular.
9. Both pairs of opposite angles of a rectangle are _____ bisected.
10. The angles of a rhombus are _____ right angles.
11. The diagonals of a rhombus _____ bisect each-other.
12. Kites _____ have one pair of congruent opposite angles.
13. Both pairs of opposite angles of a kite are _____ bisected by diagonals.
14. Trapezoids are _____ isosceles.
15. Parallelograms are _____ squares.

Task #18: Can You Cut It? Slicing Three-Dimensional Figures

1. The Cube

- Using modeling clay or play-doh, each student creates a model of a cube.
- With your group, predict the type of shapes you could see by cutting the cube at different places and different angles. Do not actually make any cuts, but envision what they would look like and write your predictions below:

Description of "slice" made:	Prediction of shape formed (cross-section):

- Using a plastic knife or dental floss, slice through the middle of the model cube in a direction perpendicular to the base.

To the right, sketch, describe, and name the figure formed by the cross-section.	

If the slice was made in a different area (but still perpendicular to the base), would the shape of the cross-section be the same or different? Explain your thinking in the box to the right.	

- Put your model back together again before continuing.
- Slice through the middle of the model cube in a direction parallel to the base.

To the right, sketch, describe, and name the figure formed by the cross-section.	

If the slice was made in a different area (but still perpendicular to the base), would the shape of the cross-section be the same or different? Explain your thinking in the box to the right.	

- What do you notice about all the cross-sections formed by the intersection of a plane that is either parallel or perpendicular to the base of a cube?

- Put the cube back together and create a cross-section that would make a triangle shape. Describe what you did and how you did it.

- Compare and contrast your group's triangles to other group's triangles. Are the cross-sections the same? Explain.

- Create other cross-sections with as many two-dimensional shapes as you can. List and explain your steps.

- Are there any two-dimensional shapes that you cannot create from the model? Explain why.

- Can you make a hexagon from a cube with just one slice? Explain.

2. Rectangular Prisms

- Using modeling clay or play-doh, create a right rectangular prism that is not a cube.
- With your group, predict the type of shapes you could see by cutting the prism at different places and different angles. Do not actually make any cuts, but envision what they would look like and write your predictions below:

Description of "slice" made:	Prediction of shape formed (cross-section):

- Using a plastic knife or dental floss, slice through the middle of the model prism in a direction that is perpendicular to the base (and parallel to the faces).

To the right, sketch, describe, and name the figure formed by the cross-section.	

If the slice was made in a different area (but still perpendicular to the base), would the shape of the cross-section be the same or different? Explain your thinking in the box to the right.	

- Put your model back together again before continuing.
- Slice through the middle of the model prism in a direction parallel to the base.

To the right, sketch, describe, and name the figure formed by the cross-section.	

If the slice was made in a different area (but still perpendicular to the base), would the shape of the cross-section be the same or different? Explain your thinking in the box to the right.	

- What do you notice about all the cross-sections formed by the intersection of a plane that is either parallel or perpendicular to the base of a prism?

- Put the cube back together and create a cross-section that would make a triangle shape. Describe what you did and how you did it.

- Compare and contrast your group's triangles to other group's triangles. Are the cross-sections the same? Are different types of triangles created? Would you classify these triangles by their angles or sides?

- Create other cross-sections in the shapes of pentagons, hexagons, and parallelograms. List and explain your steps.

- Can you create more or less shapes with a rectangular prism than a cube? Explain your answer.

3. Right Rectangular Pyramids

- Using modeling clay or play-doh, create a right rectangular pyramid.
- With your group, predict the type of shapes you could see by cutting the pyramid at different places and different angles. Do not actually make any cuts, but envision what they would look like and write your predictions below:

Description of "slice" made:	Prediction of shape formed (cross-section):

- Using a plastic knife or dental floss, slice through the middle of the model pyramid in a direction that is perpendicular to the base (and slices through the vertex).

To the right, sketch, describe, and name the figure formed by the cross-section.	

If the slice was made in a different area (but still perpendicular to the base), would the shape of the cross-section be the same or different? Explain your thinking in the box to the right.	

- Put your model pyramid back together again before continuing.
- Slice through the middle of the model pyramid in a direction parallel to the base.

To the right, sketch, describe, and name the figure formed by the cross-section.	

If the slice was made in a different area (but still perpendicular to the base), would the shape of the cross-section be the same or different? Explain your thinking in the box to the right.	

- Put your pyramid back together and slice through the pyramid in a direction that is neither parallel nor perpendicular to the base. Sketch and describe the figure(s) formed.

Task #19: Cross Sections Practice

For problem 1, choose all of the possible shapes that can be made by intersecting a rectangular prism.

For problems 2-8, draw the cross section formed when the plane indicated intersects the shape.

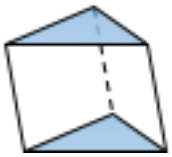
1.

a a square
b. an equilateral triangle
c. a rectangle (not a square)
d. a triangle (not equilateral)
e. a pentagon
f. a hexagon
g. an octagon
h. a parallelogram (not a rectangle)
i a circle

1.	2.
3.	4.
5.	6.
7.	8.

Task #20: Can You Cut It? Slicing Three Dimensional Figures

Select four (4) of the figures below and describe the two dimensional figure(s) created from cross section after cuts made that are parallel to the base and perpendicular to the base.

Figure	Parallel Cut	Perpendicular Cut
		
		
		
		
		

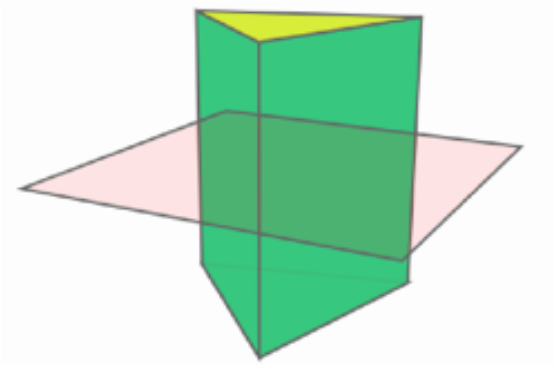
Task #21: Lesson 6 Reflection

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

Task #22: Independent Practice for Lesson 6

1. The figure below shows a prism whose base is an equilateral triangle.

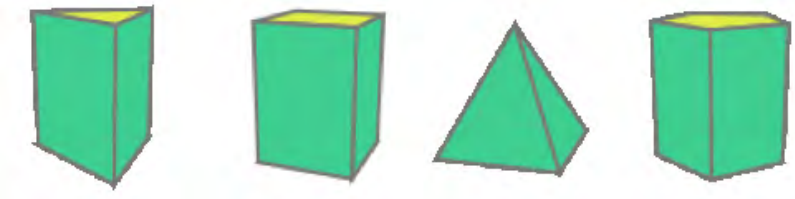


Which shape does the pink slice of the green prism look like?

Please choose from one of the following options.

2. A vertical slice through a three-dimensional solid produces a two-dimensional shape.
   Which one of the following solids can produce this two-dimensional shape when sliced vertically?

Please choose from one of the following options.



Task #23: Transformations on a Geoboard

Original Triangle Coordinates	Image Triangle Coordinates	Are lengths the same?	Are angle measures the same?	If points are collinear, are their images collinear?	If a point is a midpoint of a segment, is its image a midpoint (of the image segment)?	Is the orientation the same if read clockwise?
A(-1, 1) B(-2, 1) C(0,2)						
A(-1, 1) B(-2, 1) C(0,2)						
A(-1, 1) B(-2, 1) C(0,2)						
A(-1, 1) B(-2, 1) C(0,2)						
A(-1, 1) B(-2, 1) C(0,2)						

Task #24: Translations, Reflections, and Rotations

What defines a right triangle?

What is the area of a square?

How are the angles and the sides opposite them related?

How are the blue squares related?

How are the two non-right angles related?

How are the sides related in a right triangle?

Task #25: Transformation Golf

1. Read the instructions of how to play the game.

2. Select to play all 9 holes.

3. Play each hole. You goal is to make par or stay below par on each hole. You want to make as few moves as possible.

4. After you have completed 9 holes, click view your score card and have a teacher mark down your score and initial your menu.

Points	10	9	8	7	6
Game Score	Score at or below par.	Score 14 over par.	Score 58 over par.	Score 912 over par.	Score
Points	**10**	**9**	**8**	**7**	**6**
Game Score	Score at or below par	Score 14 over par.	Score 58 over par.	Score 912 over par.	Score

Task #26: TransmoGrapher Exploration Questions

1. Pick a partner and each of you translate, reflect, and rotate a triangle as much as you want making sure you keep track of the transformations you used. Now switch computers and see if you can get your partners triangle back to its home position (also keeping track of the transformations you made). Now compare the translations you made to move the triangle with your partner's moves to get it back to its original position. Are they the same? Explain.

2. Pick a partner and each of you translate, reflect, and rotate a square as much as you want keeping track of the transformations you used. Now switch computers and see if you can get your partner's square back into its home position (also keeping track of the transformations you used). Now compare the moves you did to move the square with your partner's moves to get it back. Are they the same? Explain.

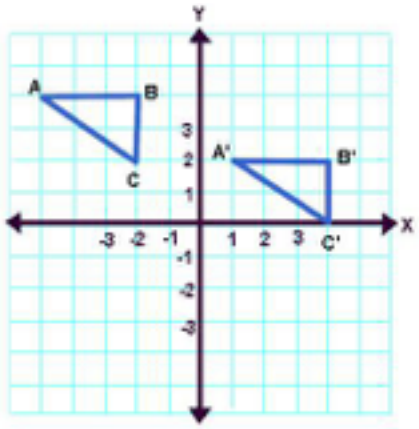
3. Pick a partner and each of you translate, reflect, and rotate a parallelogram as much as you want and keeping track of the transformations you used. Now switch computers and see if you can get your partners parallelogram back in to its home position also keeping track of the transformations you used). Now compare the moves you did to move the parallelogram with your partner's moves to get it back. Are they the same? Explain.

Task #27: Lesson 7 Reflection

1. Summarize what you learned in this lesson.

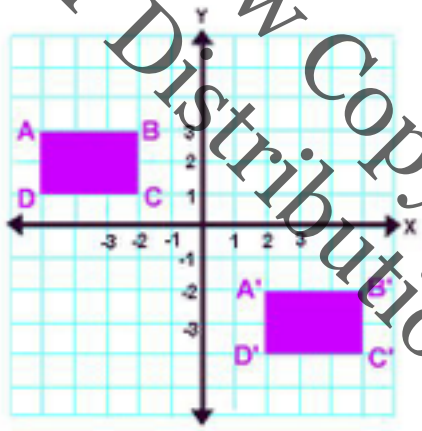
2. How is this skill helpful in the real-world? Explain.

Task #28: Let's Show What We Know

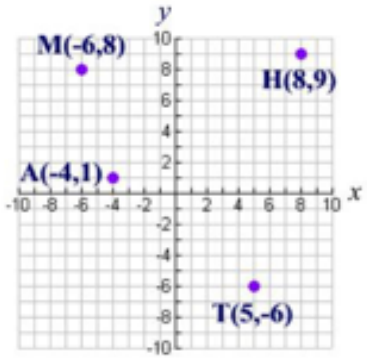


1. This graph illustrates a translation of (6, -2). True or false?

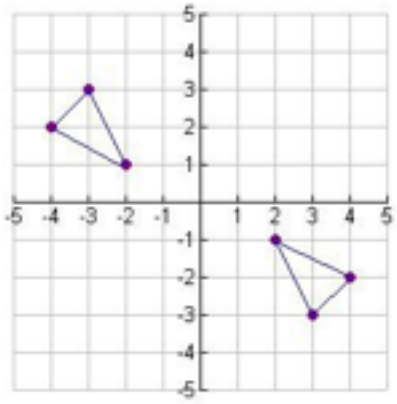
2. Under a translation of 5 units up and 2 units to the left, the point (3,4) will become (8,6). True or false?



3. Describe the translation that will move rectangle *ABCD* onto Rectangle *A'B'C'D'*.



4. A translation maps the origin to the point (-3,1). Graph the images of the points *M*, *A*, *T* and *H* under this same translation.



5. Which of the following transformations is illustrated by the graph at the above?
   - ☐ a. dilation
   - ☐ b. reflection in $y = x$
   - ☐ c. translation
   - ☐ d. reflection in the origin

6. A positive angle of rotation turns a figure
   ☐ 1. clockwise ☐ 2. counterclockwise

7. What are the coordinates of point origin? *T'*, the image of point *T*(-2,5) after a reflection in the origin?
   ☐ 1. (2,5) ☐ 2. (2,-5) ☐ 3. (-2,-5) ☐ 4. (5,-2)

8. The translation image of a segment is a segment _____ and _____ to the original segment.

Task #29: Squaring the Triangles

1. What defines a right triangle?

2. What is the area of a square?

3. How are the angles and the sides opposite them related?

4. How are the blue squares related?

5. How are the two non-right angles related?

6. How are the sides related in a right triangle?

Task #29: Squaring the Triangles

1. What defines a right triangle?

2. What is the area of a square?

3. How are the angles and the sides opposite them related?

Task #30: Scenario One

There has been a break in at the local museum. Valuable artifacts have been stolen. Two windows have been breached and it is suspected that the perpetrator used a very tall ladder to enter or leave the museum through these windows. The authorities are hoping that learning more about this unusual ladder will provide clues to identify a suspect. Near the first window, two indentations were found on the ground 16 feet away from the base of the building. It is suspected that the feet of a ladder created these indentations. The first breached window is 30 feet high off of the ground. Investigators need to determine approximately how tall the ladder was.

Have you ever seen a ladder that tall?

Are they common?

What else may be involved with this scenario?

Are there other ideas or things to consider?

Jot down other questions you may have.

Task #1: Use this information to sketch and label a diagram of the crime scene and find the length of the suspected ladder used.

Assumption #1: It is assumed that the wall of the building is "plumb" and rises perpendicular to the ground.

Why do you think this assumption is given? State what makes it relevant to the scenario.

Task #31: Scenario Two

Investigators have determined that the second window breached at the museum was 33 feet off of the ground. No obvious indentations were found on the ground near the second window and we are not quite sure yet where the foot of the ladder was located.

Task #2: Use this information to sketch and label a diagram of the crime scene and consider the length of the suspected

Task #3: Based on the same assumption as before, discuss the circumstances with your partner, then individually answer the following questions on your paper:

Is it possible that the same ladder was used to breach the second window?

If not, explain your reasoning.

If so, approximately where on the ground could we look for evidence of the where the ladder was based? (Your answer should be expressed in feet and inches.)

How could this information possibly lead us to conclusions about the suspect entering and exiting the museum?

Task #32: Lesson 9 Reflection

1. Summarize what you learned in this lesson.

2. How is this skill helpful in the real-world? Explain.

Task #33: Scenario Three

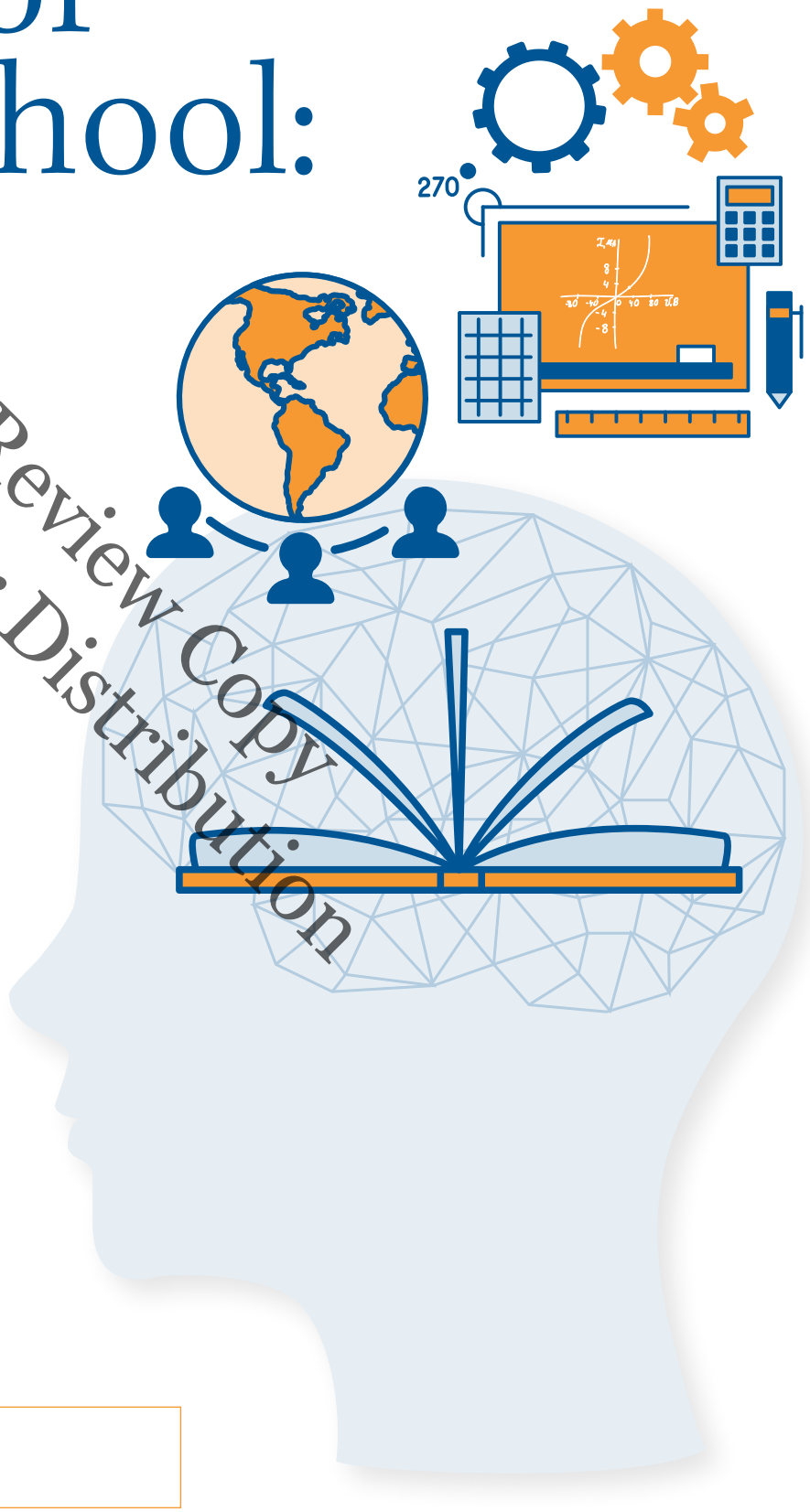
The authorities have received an anonymous phone call. The caller left the following information: The curator was seen getting into a vehicle immediately after leaving the coffee shop where he got his morning coffee, but before he got to the museum.

After being picked up, the vehicle drove three blocks, turned left, drove another four blocks, and then stopped. The curator is still alive. The caller refused to give any further detail and hung up immediately after relaying this information. The authorities want you to remember that the curator has not been seen since disappearing.

Looking at the map, locate possible places as to where this holding place might be located. Also, using the coffee shop as a starting point, determine the area in which this location could be. Answer the questions on the investigation sheet.

SREB Readiness Courses

Ready for High School: Math



Student Manual

Math Unit 6

Functions and Linear Relationships

Name

Unit 6 . Functions and Linear Relationships

Contents

Task #1: Frayer Map

Definitions		Characteristics
Examples	Function	Non-Examples

Task #2: The Customers

A certain business keeps a database of information about its customers. In the table below, *C* represents the customer name and *P* represents the home phone numbers of the customers.

a. Let *P* be the rule which assigns to each phone number in the table above, the customer name(s) associated with it. Is *P* a function of *C*? Explain your reasoning.

***C*, Customer Name**	*P, Home Phone Number*
Heather Baker	(310) 510-0091
Mike London	(310) 520-0256
Sue Green	(323) 413-2598
Bruce Swift	(323) 413-2598
Michelle Metz	(213) 806-1124

b. Let *C* be the rule that assigns to each customer shown in the table her or his home phone number. Is *C* a function of *P*? Explain your reasoning.

c. Explain why a business would want to use a person's social security number as way to identify a particular customer instead of their phone number.

Task #3: Foxes and Rabbits

Given below is a table that gives the populations of foxes and rabbits in a national park over a 12 month period. Note that each value of t corresponds to the beginning of the month.

t, month	1	2	3	4	5	6	7	8	9	10	11	12
R, number of rabbits	1000	750	567	500	567	750	1000	1250	1433	1500	1433	1250
F, number of foxes	150	143	125	100	75	57	50	57	75	100	125	143

a. According to the data in the table, is *F* a function of *R*? Is *R* a function of *F*? Explain.

b. Are either *R* or *F* functions of *t*? Explain?

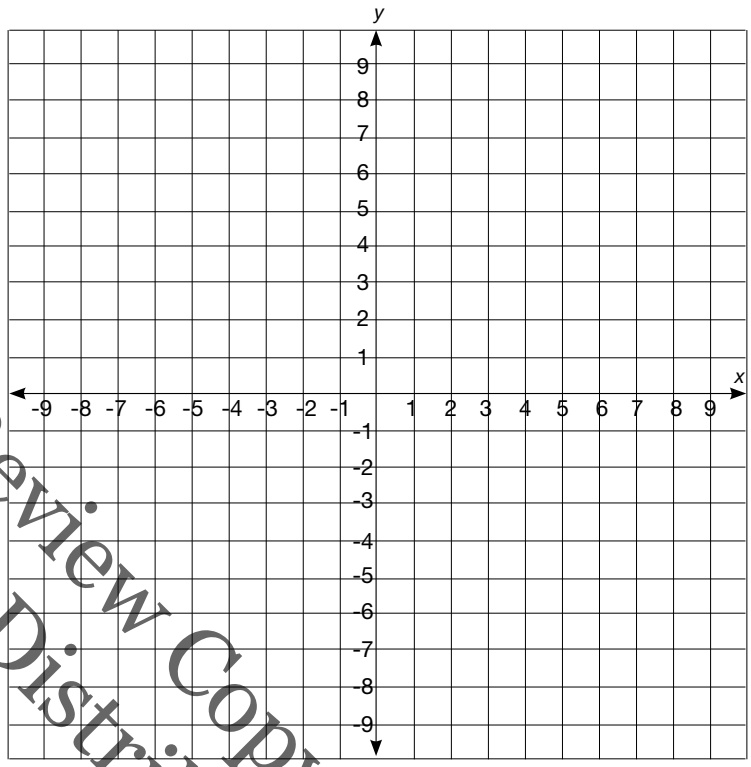
Task #4: Identifying Linear Functions

Complete the table using the given input values and then plot the points on the graph. State whether the function is linear or nonlinear and justify your reasoning.

1. $y = x - 3$

x	$x - 3$	y
-1	(-1)-3	-4
0		
1		
2		

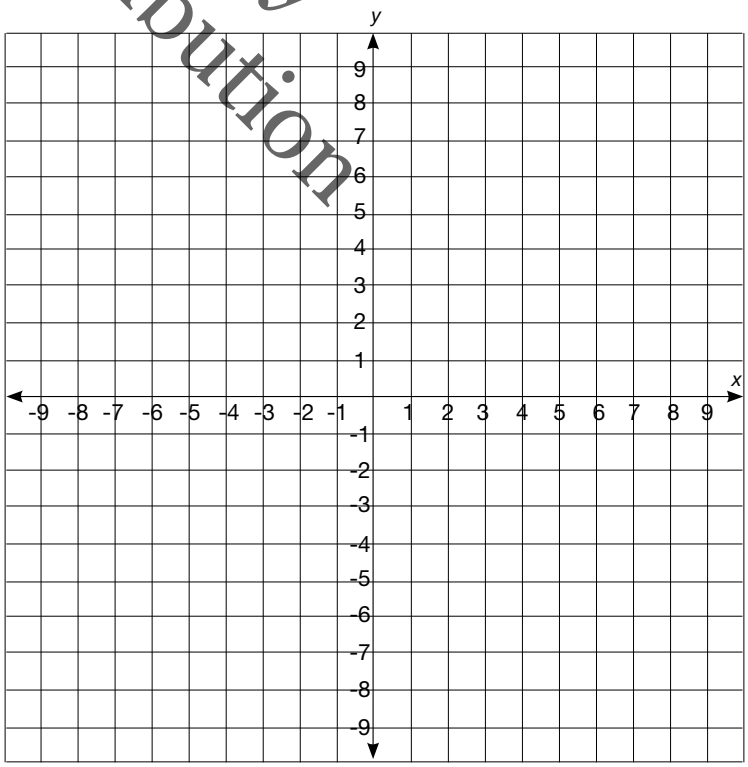
Give evidence as to whether or not this is a linear function.



2. $y = x^2 - 3$

x	$x^2 - 3$	y
-2		
-1		
0		
1		
2		

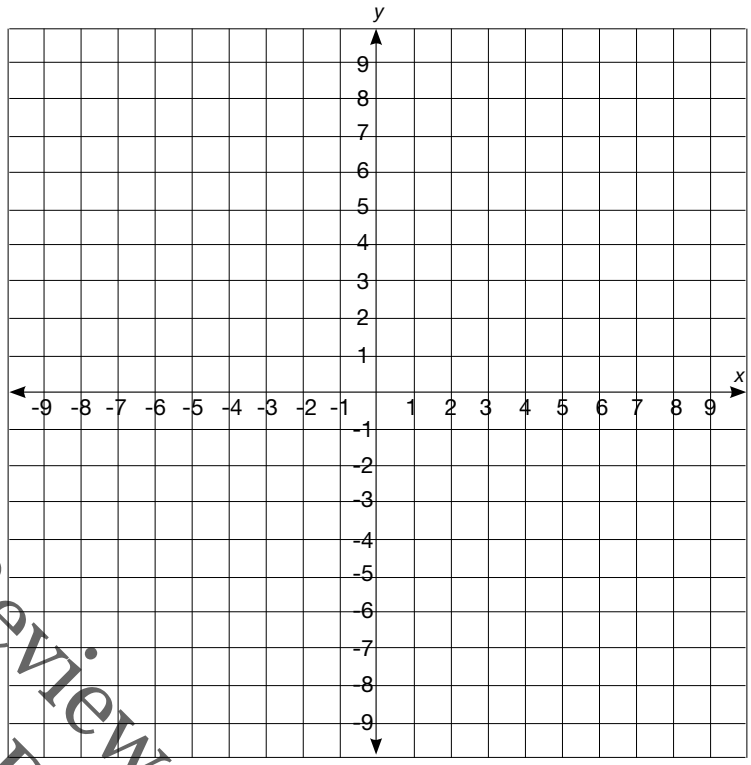
Give evidence as to whether or not this is a linear function.



3. $y = -2x$

x	$-2x$	y
-2		
-1		
0		
1		
2		

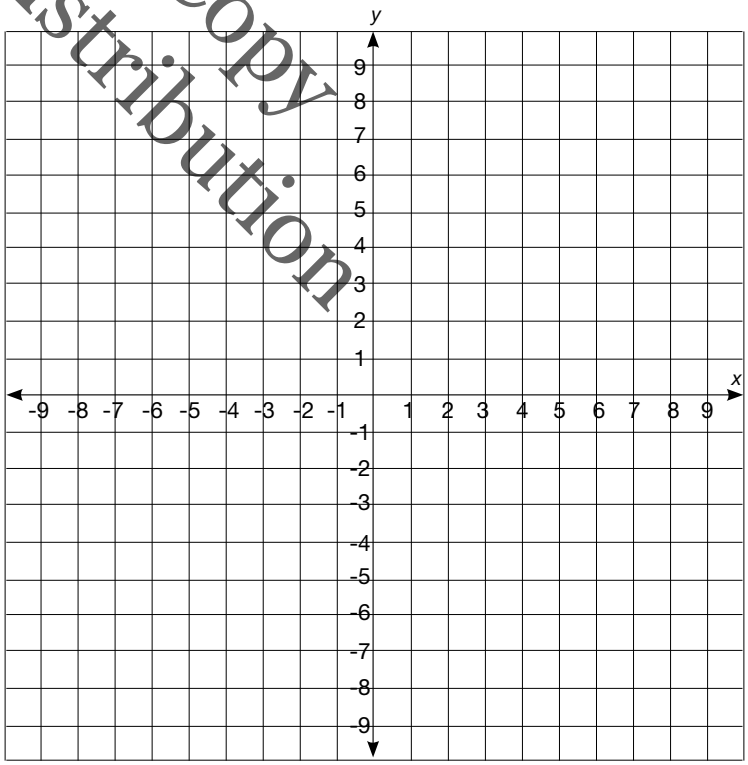
Give evidence as to whether or not this is a linear function.



4. $y = \frac{1}{2}x$

x	$\frac{1}{2}x$	y
-4		
-2		
0		
2		
4		

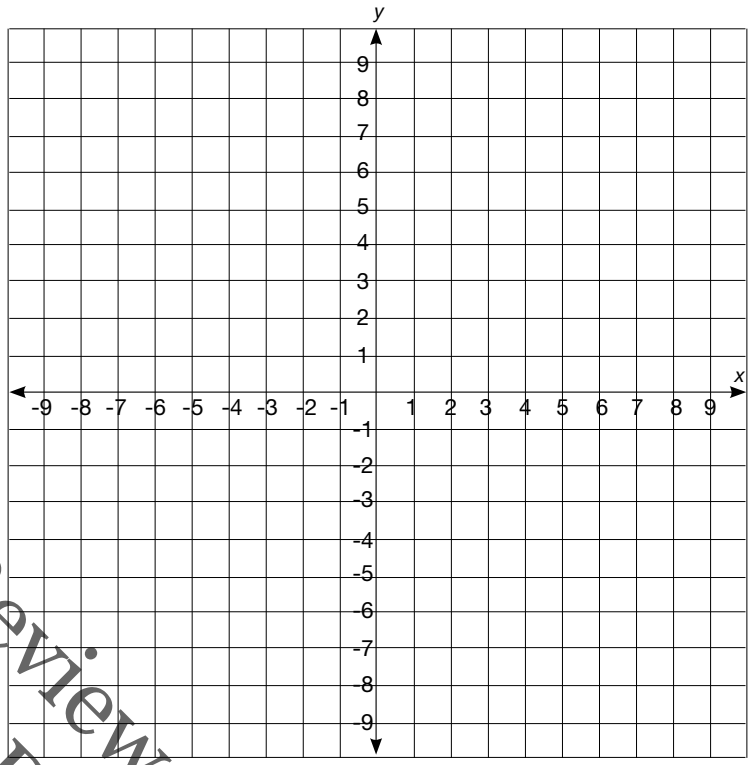
Give evidence as to whether or not this is a linear function.



5. $y = 2^x$

x	2^x	y
-1		
0		
1		
2		
3		

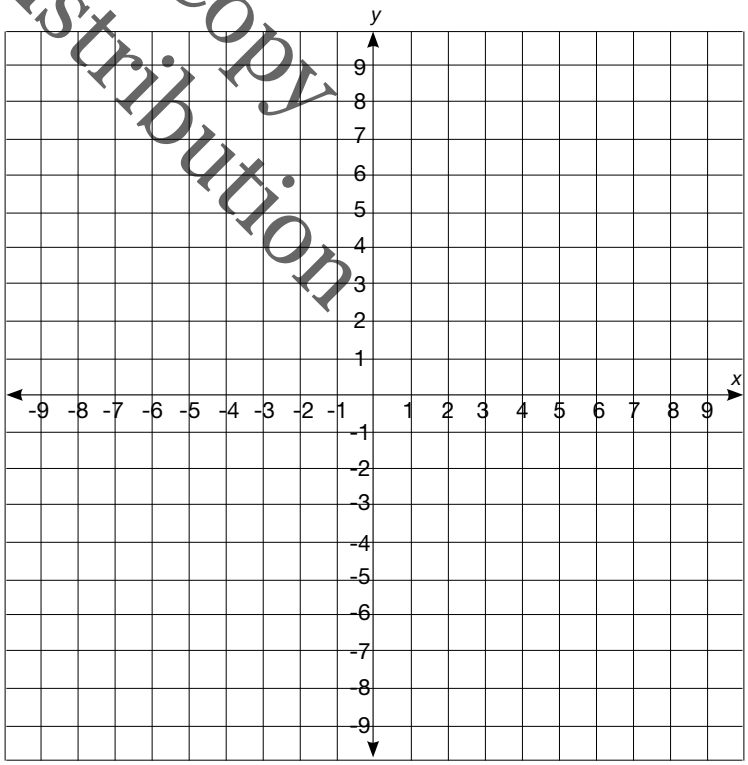
Give evidence as to whether or not this is a linear function.



6. $y = \frac{3}{2}x + 1$

x	$\frac{3}{2}x + 1$	y
0		
2		
4		
6		

Give evidence as to whether or not this is a linear function.



Task #5: Identifying Linear Functions Practice

Part 1: Without graphing, determine whether or not each of the tables represents a linear function and then justify your reasoning.

a)

x	*y*
3	3
4	5
5	7
6	9

Is this a linear function? ☐ Yes ☐ No

How do you know?

b)

x	*y*
-1	1
0	0
1	1
2	4

Is this a linear function? ☐ Yes ☐ No

How do you know?

c)

x	*y*
-3	5
-2	1
-1	-3
0	-7

Is this a linear function? ☐ Yes ☐ No

How do you know?

d)

x	*y*
0	5
1	5
2	5
3	5

Is this a linear function? ☐ Yes ☐ No

How do you know?

e)

x	*y*
-4	4
-4	8
-4	13
-4	19

Is this a linear function? ☐ Yes ☐ No

How do you know?

f)

x	*y*
1	-3
2	-7
3	-10
4	-13

Is this a linear function? ☐ Yes ☐ No

How do you know?

Part 2: For each equation, determine if the function is linear. If so, then find the slope and y-intercept. If not, explain how you know.

a) $y = 3x + 5$

Is this function linear? ☐ Yes ☐ No

If the function is linear…

What is the slope? _____

What is the y-intercept? _____

If it is not a linear function, how do you know?

b) $y = 2x^2 + 1$

Is this function linear? ☐ Yes ☐ No

If the function is linear…

What is the slope? _____

What is the y-intercept? _____

If it is not a linear function, how do you know?

c) $y = 5 - \frac{4}{5}x$

Is this function linear? ☐ Yes ☐ No

If the function is linear…

What is the slope? _____

What is the y-intercept? _____

If it is not a linear function, how do you know?

d) $y = \frac{5}{x} + 2$

Is this function linear? ☐ Yes ☐ No

If the function is linear…

What is the slope? _____

What is the y-intercept? _____

If it is not a linear function, how do you know?

e) $x = 10$

Is this function linear? ☐ Yes ☐ No

If the function is linear…

What is the slope? _____

What is the y-intercept? _____

IIf it is not a linear function, how do you know?

f) $y = 3$

Is this function linear? ☐ Yes ☐ No

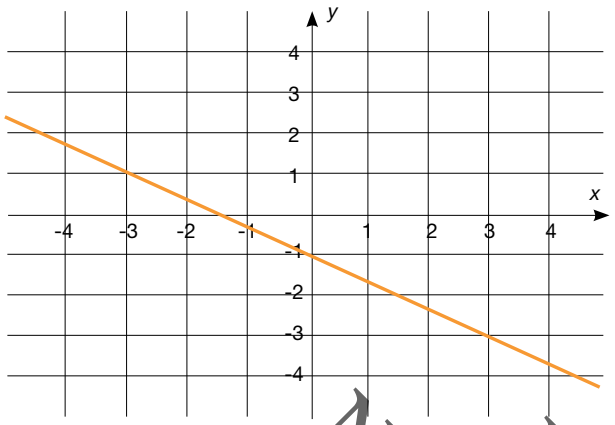
If the function is linear…

What is the slope? _____

What is the y-intercept? _____

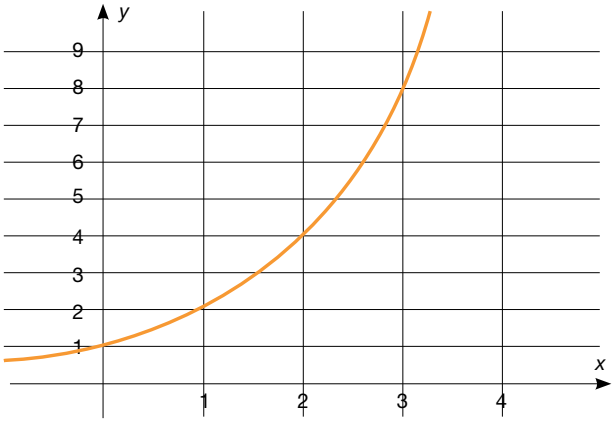
If it is not a linear function, how do you know?

Part 3: For each graph, determine whether or not it represents a linear function. Then, explain your reasoning.



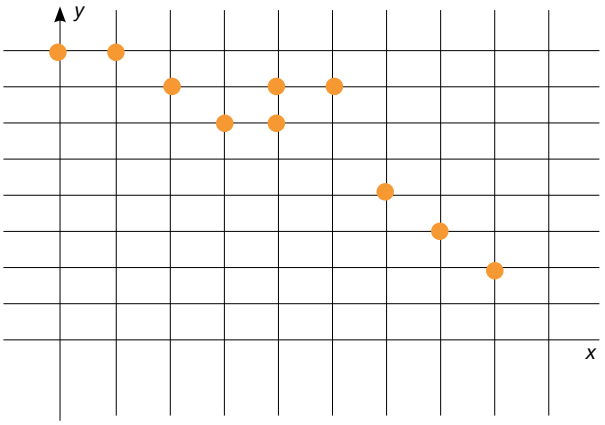
Is this function linear? ☐ Yes ☐ No

Explain your reasoning.



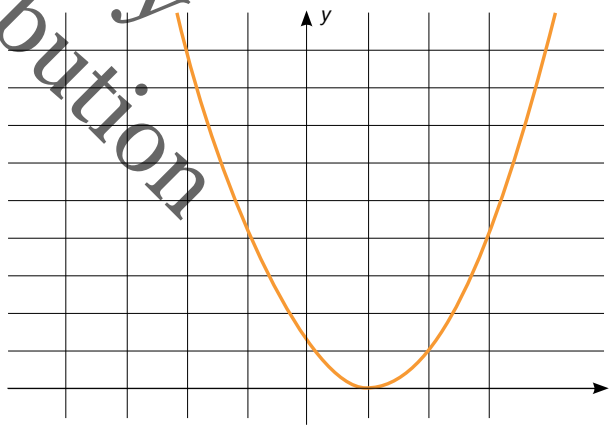
Is this function linear? ☐ Yes ☐ No

Explain your reasoning.



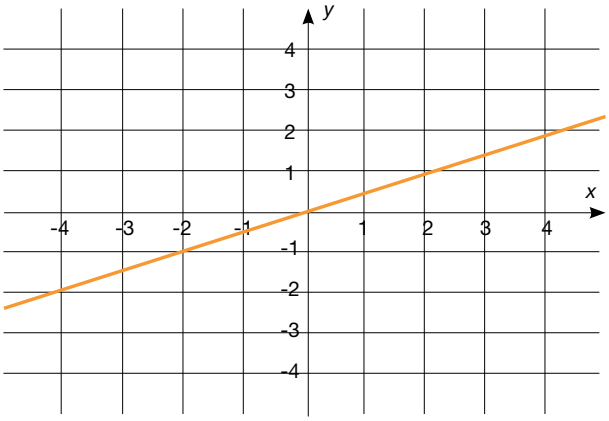
Is this function linear? ☐ Yes ☐ No

Explain your reasoning.



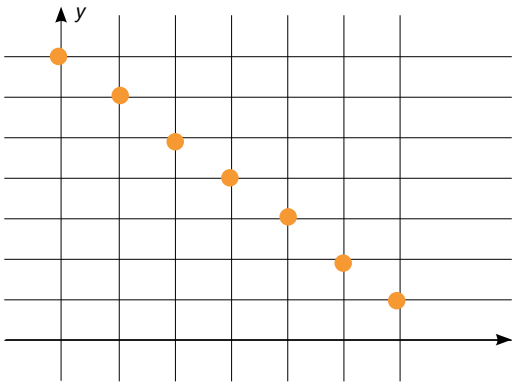
Is this function linear? ☐ Yes ☐ No

Explain your reasoning.



Is this function linear? ☐ Yes ☐ No

Explain your reasoning.

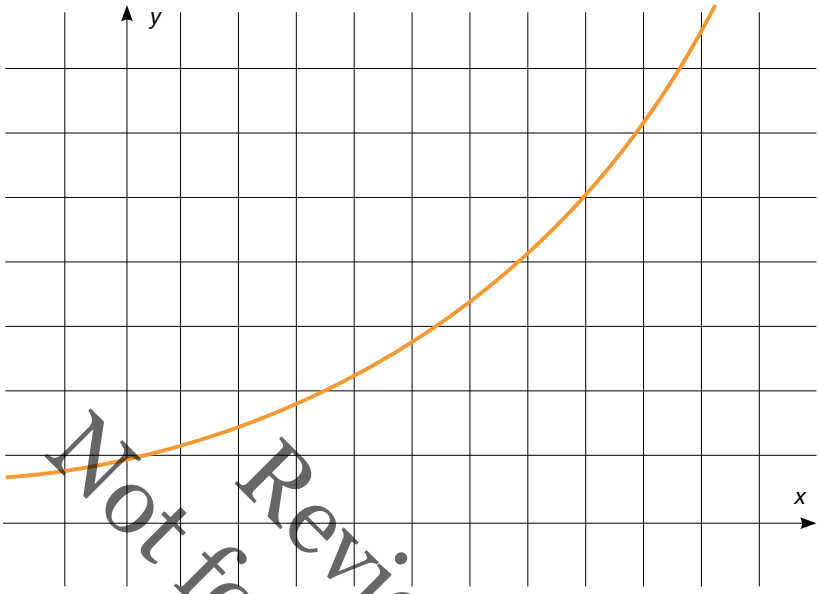


Is this function linear? ☐ Yes ☐ No

Explain your reasoning.

Task #6: Lesson 2 Exit Ticket

1) Explain why the graphed function does NOT represent a linear relationship.



2) Determine whether the table of values is a linear function or not.

Is this function linear? ☐ Yes ☐ No

Explain your reasoning.

x	*y*
0	20
2	10
4	0
6	-10

Task #7: Yard Work

Your parents are trying to get your little sister to help with the yard work. They offer her $4.50 for every bag she fills with leaves.

number of bags, *n*	1	2	3	5	8
Amount Paid ($), *A*					

a. Complete the table.

b. What is the rate of pay?

c. What equation could you write to calculate your little sister's earnings?

d. Is the relationship of your little sister's earnings, *A*, to the number of bags she fills, *n*, a proportional relationship? Explain how you know.

Task #8: Music Downloads

Nadia is comparing two online music download services. Nadia began to record the cost to download music from Company A in the first table below. She knows that Company B offers music downloads for $0.49 per song after a $20.00 membership fee. To help her determine the better deal, Nadia also created a table for Company B in order to compare costs.

Complete the tables below.

Company A

Number of Songs	Process	Cost to Download	Final Cost per Song
5	5(.99)	$4.95	$0.99
10	10(.99)	$9.90	$0.99
15			
20			
25			
30			
35			
40			

Company B

Number of Songs	Process	Cost to Download	Final Cost per Song
5	20+5(.49)	$22.45	$4.49
10			
15			
20			
25			
30			
35			
40			

Use the tables for Company A and Company B to answer the following questions.

1. For Company A:

   a. How can you find the cost of downloading any number of songs?

   b. What is the equation that relates *y*, the cost to download, to *x*, the number of songs?

   c. What do you notice about the final cost per song?

   d. Is the relationship proportional? How do you know?

2. For Company B:

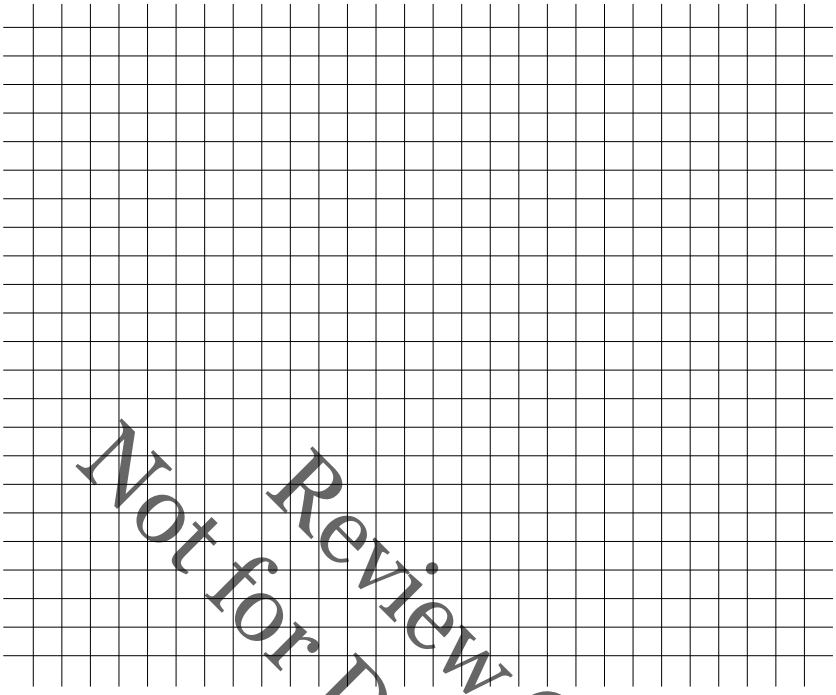
   a. How can you find the cost of downloading any number of songs?

   b. What is the equation that relates y, the cost to download, to *x*, the number of songs?

   c. What do you notice about the final cost per song?

   d. Is the relationship proportional? How do you know?

3. Graph both relationships on the same coordinate grid.



4. What similarities and differences do you notice between the equation that represents a proportional relationship and the equation that represents a non-proportional relationship?

5. What similarities and differences do you notice between the graph that represents a proportional relationship and the graph that represents a non-proportional relationship?

6. What similarities and differences do you notice between the table that represents a proportional relationship and the table that represents a non-proportional relationship?

Task #9: Comparing Functions

Comparing Functions

Name: _____
Date: _____ Period: ____

8.F.2: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

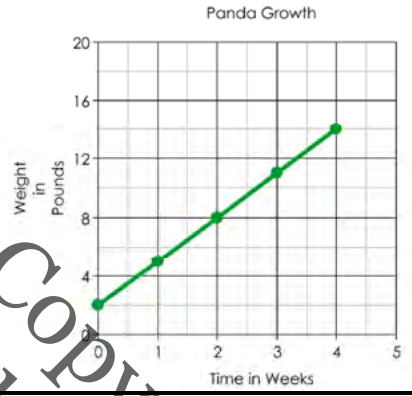
Read each situation, then answer the questions by analyzing and comparing the different linear situations.

1. The Metropolis Zoo recently celebrated the birth of two new baby pandas!

Mochi the panda cub has been measured and weighed each week since she was born.

Weeks	Weight
0	1
1	5
2	9
3	13

Mochi's brother is **Kappa**. His weight has been charted on the graph below.



- Which panda was heavier when they were born?
- Which panda is growing faster?
- Which panda will weigh more at five weeks?

2. Two contestants on Biggest Loser are Valerie and Oscar. Their weight loss progress is shown below.

Valerie's weight loss is shown by this function, where W is her weight in pounds and t is the time in weeks.

$$W = 235 - 2.5t$$

Oscar's weight loss is tracked in the table below.

Weeks	0	2	5	6
Weight	247	243	237	235

- Who weighed more at the beginning of the show?
- Who is losing weight faster?

-Jessica Wilkerson 2013-

3. Mr. Rich recently planted a crop of money trees in his garden.

A.

The first tree was five inches tall when planted. It has grown four inches every month since being planted.

B.

Measurements were taken of the second tree and given below:

Months	0	2	3	5
Height	3	12	16.5	25.5

C.

- Which of the trees is growing the fastest?
- Which tree was the tallest when it was first planted?
- Challenge: Which tree is the tallest after 6 months?

4. Tony is the best pizza deliveryman in the city. He has been offered jobs by all the best pizza places.

Bombinoes' Pizza is offering $56 per shift and $2.50 in commission for each pizza delivered.

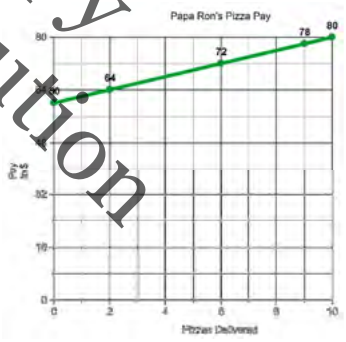
Little Squeezer's showed Tony a table of salaries.

Pizzas	0	2	4	10
Salary	48	54	60	78

Pizza Tent has given Tony his pay options in the following function. S represents Tony's salary, and p represents the number of pizzas he delivers.

$$S = 2.75p + 52$$

Papa Ron's made their offer in the form of this graph.



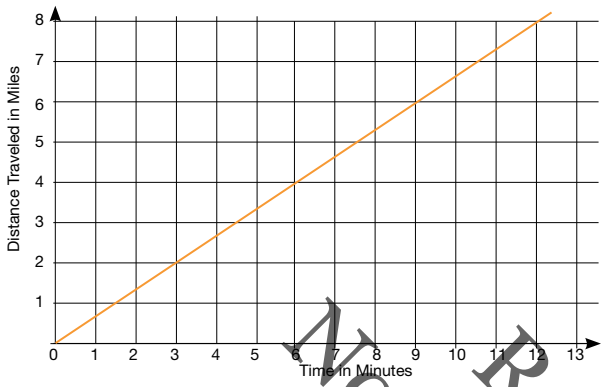
- Which company pays the best pay per shift?
- Which company pays the most per pizza?
- Challenge: If Tony is going to deliver at least 20 pizzas every night, which company should he work for?

-Jessica Wilkerson 2013-

Task #10: Lesson 3 Exit Ticket

1. The graph below represents the distance *d*, Car A travels in *t*, minutes. The table represents the distance *d*, Car B travels in *t*, minutes. Which car is traveling at a greater speed? How do you know?

Car A:



Car B:

t, Time in minutes	*d*, Distance in miles
15	12.5
30	25
45	37.5

2. How can you determine whether the relationship between time and distance for Car A is proportional or not? Be sure to thoroughly explain your reasoning.

3. How can you determine whether the relationship between time and distance for Car B is proportional or not? Be sure to thoroughly explain your reasoning.

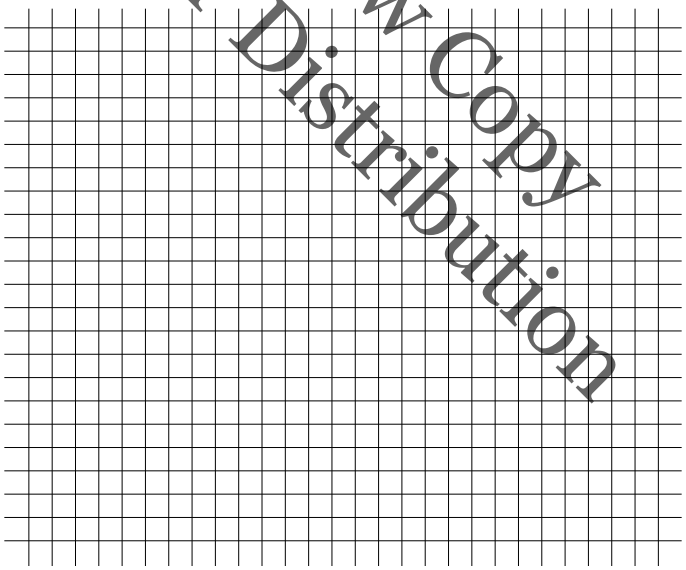
Task #11: Rental Trucks Part 1

The table below shows the charge to rent a moving truck from Economy Rentals and Reliable Rentals for various numbers of miles.

miles	Economy Rentals	Reliable Rentals
10	$15	$60
30	$45	$70
50	$75	$80

1. Based on the information given in the table, explain how you might find the charge for 20 miles driven with each rental company.

2. Create a graph relating number of miles driven and rental cost for each company on the coordinate plane.



3. Which company do you think would be the better choice for a 100 mile trip?

4. Describe the relationship between number of miles and the rental charges as seen in the graphs.

5. Use the graph to give an estimate for the numbers of miles that would give a $135 charge for each company.

6. What is the rental charge per mile for each company? How/where do you see the rental charge per mile in the graph?

7. Where does each graph intersect the vertical axis? Are they the same? Why or why not?

8. Write an equation for each company that could be used to determine the rental charge for any number of miles driven.

9. Where do you see the rental charge per mile in the equations?

10. What is the meaning of each y-intercept in the context of the situation?

11. Use your equations to calculate the rental charges for 100 miles for each company. Do the answers support what you predicted in #3?

Task #12: Rental Trucks Part 2

Janet and Marcus each rented a moving truck from Regal Rentals on the same day. Janet was charged $29 for a 10 mile trip and Marcus was charged $69 for a 30 mile trip.

1. What information is needed to write an equation to model the rental charge for any amount of miles for Regal Rentals?

2. List at least two ways to find that information.

3. Now, write an equation to model the rental charge for any amount of miles for Regal Rentals.

4. Use your equation to find the charge for a 150 mile trip.

5. What does the y-intercept in your equation mean in the context of the situation?

6. What does the slope in your equation mean in the context of the situation?

Task #13: Writing Equations Practice

1. Write an equation for the line with a y-intercept of -5 and a slope of $-\frac{1}{3}$.

2. Identify the slope and y-intercept for each linear equation.

   a. $y = 2x - 5$

   b. $y = x + 3$

   c. $y = -\frac{2}{5}x$

   d. $2x - y = 8$ (Hint: rewrite in slope-intercept form $y = mx + b$ by solving for y.)

Use the table for #3 - 5.

x	y
-2	7
1	1
2	-1

3. Calculate the rate of change or slope for the data in the table above.

4. What is the value for y when $x = 0$ in the table?

5. Write an equation in slope-intercept form for the data in the table.

6. Write the slope -intercept form of the equation of the line passing through the points (4, -3) and (-6, -8).

Task #14: Comparing Prices

Complete the table and find the best price for a 350 mile trip. Show all your work **and justify your reasoning** for the method you used.

miles	Economy Rentals	Reliable Rentals	Regal Rentals
10	$15	$60	$29
30	$45	$70	$69
350			

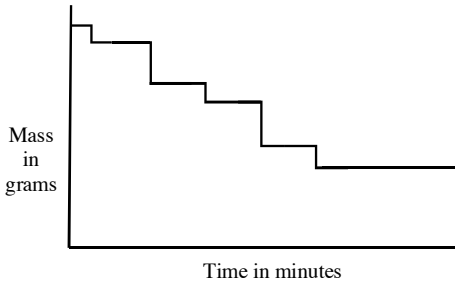
Task #15: Vincent's Graphs

Vincent's Graphs

This problem gives you the chance to:
- interpret graphs
- draw a graph

Vincent is eating a packet of raisins.

This graph shows the changes in the mass of raisins in the packet as time passes.



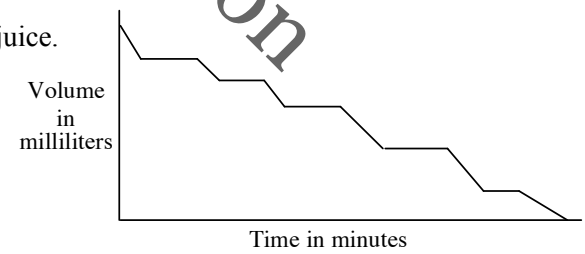
1.a. What is Vincent doing when there is a vertical line on the graph?

b. Why are the vertical lines of different lengths?

c. Did Vincent eat all the raisins? _____
Explain how you know.

2. Ellie is drinking with a straw from a box of fruit juice.

The graph shows the volume of juice in the box as time passes.

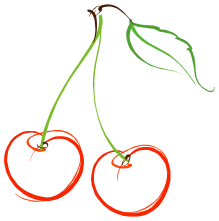


a. What is happening when the line on the graph is horizontal?

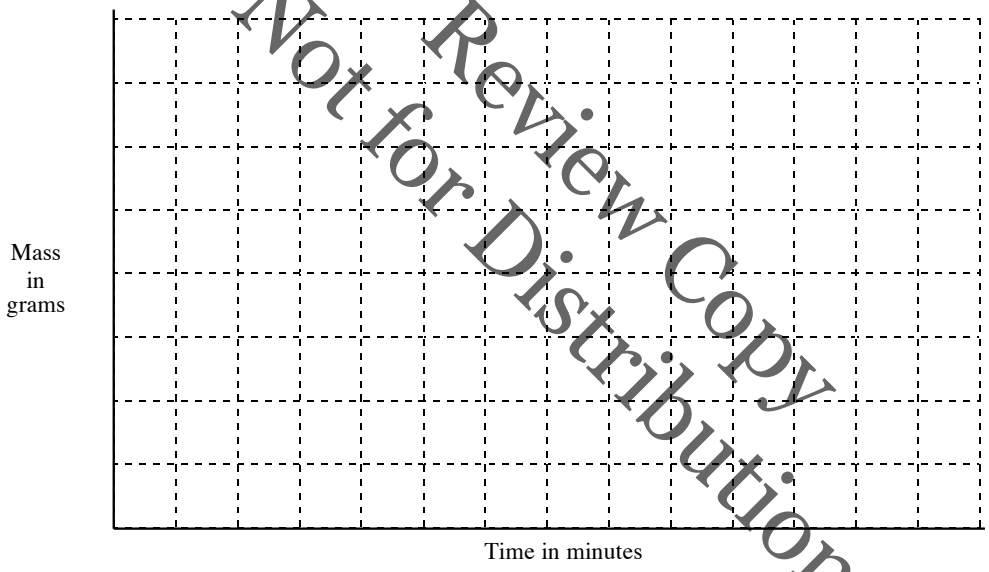
b. Why do the lines going downwards on this graph go at an angle?

3. Ralph is eating cherries from a bag.

After eating a cherry he puts the stone back into the bag before taking out the next cherry.



On the grid draw a graph to show the changes in the mass of the bag of cherries as time passes.



Task #16: Student Temperature Data

Directions: Over the next several days, record the temperature in degrees Fahrenheit and Celsius at different times throughout the day and night. Set up two different outdoor thermometers to collect your data—one to measure degrees Celsius and one for degrees Fahrenheit. Do not use a weather app on a smartphone, computer, or tablet.

Date	Time	°C	°F

Task #17: Analyzing the Temperature Graph

1. Describe your graph. Could you connect some or many of the points in a familiar way? What would this look like?

2. Do the points increase or decrease as you move from left to right across the horizontal axis?

3. How could this graph be used to predict conversion values for temperatures that are not represented by points on your graph?

4. Use your graph to estimate a conversion for the temperatures below.

17°C = _____

30°C = _____

82°F = _____

0°F = _____

Task #18: Line of Best Fit and Linear Model

1. Use a ruler and draw a line of best fit that best represents the middle of your data and ignore any outlying data points.

2. Where does your line cross the vertical axis?

   $0°C$ = _____ $°F$

3. Find two points and calculate the rate of change for your graph.

   $$m = \frac{\textit{difference } °F}{\textit{difference } °C}$$

4. Use your answers from questions 2 and 3 to write a linear model for your data. Use slope-intercept form ($y = mx + b$).

   $°F$ = _____ $°C$ + _____

5. Use your formula to convert the following temperatures.

   $17°C$ = _____ $82°F$ = _____

   $30°C$ = _____ $0°F$ = _____

6. Compare your estimations in question 4 of the *Analyzing the Temperature Graph* task to the answers you found in the question above.

Task #19: Lesson 8 Exit Ticket

The actual formula used in science to convert degrees Celsius to Fahrenheit is:

$$F = \frac{9}{5}C + 32$$

Write a paragraph comparing your equation from question 4 in the Line of Best Fit and Linear Model task to the formula above. Discuss any similarities or differences in the equations. What might cause the two equations to be slightly or even greatly different?

Task #20: U.S. Population

Part 1: The table below provides some U.S. Population data from 1982 to 1988:

Year	Population *(in thousands)*	Change in Population *(in thousands)*
1982	231,664	….
1983	233,792	233,792 – 231,664 = 2,128
1984	235,825	2,033
1985	237,924	2,099
1986	240,133	2,209
1987	242,289	2,156
1988	244,499	2,210

a. If we were to model the relationship between the U.S. population and the year, would a linear function be appropriate? Explain why or why not.

b. Mike decides to use a linear function to model the relationship. He chooses 2,139, the average of the values in the 3rd column, for the slope. What meaning does this value have in the context of this model?

c. Create an equation that Mike could have used to model the relationship between years since 1982 and population. Explain what the values in the equation mean in the context of this problem.

d. Use Mike's model to predict the U.S. population in 1990. The actual population in 1990 was approximately 248,709,873. How well would Mike's model have predicted the actual population? Explain your mathematical thinking.

e. How well will Mike's model predict the current U.S. population? Visit http://www.census.gov/popclock/ to find the current U.S. population.

Part 2: The table below provides some U.S. Population data from 1800 to 2010.

U.S. Population 1800-2010	
Year	Population (in thousands)
1800	5,308
1810	7,239
1820	9,638
1830	12,866
1840	17,069
1850	23,191
1860	31,443
1870	38,558
1880	50,189
1890	62,979
1900	76,212
1910	92,228
1920	106,021
1930	123,202
1940	132,164
1950	151,325
1960	179,323
1970	203,302
1980	226,542
1990	248,709
2000	281,421
2010	307,745
2020	
2030	
2040	
2050	
2060	
2070	
2080	

a. Plot the data in the table on a coordinate grid (or using a graphing utility). You will need to leave additional room on both axes in order to make predictions.

b. Use your graph to predict the population for the missing data in the table. Plot these points on the graph and record their values in the table. (To distinguish between the real data and your predictions, you may want to mark your new points using a different colored pencil or a symbol, such as a star.)

c. We now want to see how well Mike's model fits the population data over a greater length of time. Because Mike's model considered years since 1982 and we are now looking at data from 1800, his original equation needs to be adjusted. We know that he used a slope of 2,139 (in thousands) and the population in 1982 was 213,664 (in thousands).

   Use this slope and the point (1982, 213664) to rewrite Mike's equation for our graph. If you are using a graphing utility, graph your equation on top of your data to compare.

d. How well does Mike's model fit the US population data from 1800-2010? How close does Mike's model come to your predicted values for 2020-2080?

e. Using Mike's equation from c., predict the US population in the year 2080. How close is this value to your predicted value in the table? Is this what you expected?

f. According to Mike's model in c., when will the U.S. population reach half-a-billion? (Remember, population is represented in thousands).

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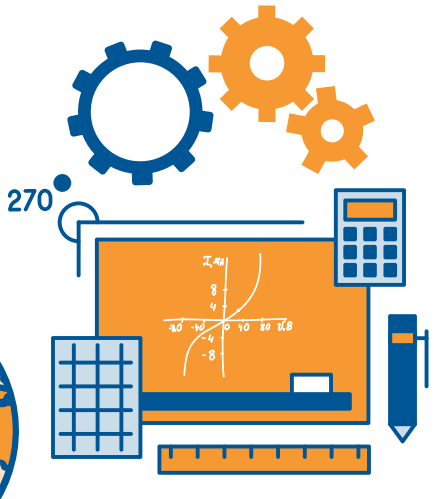
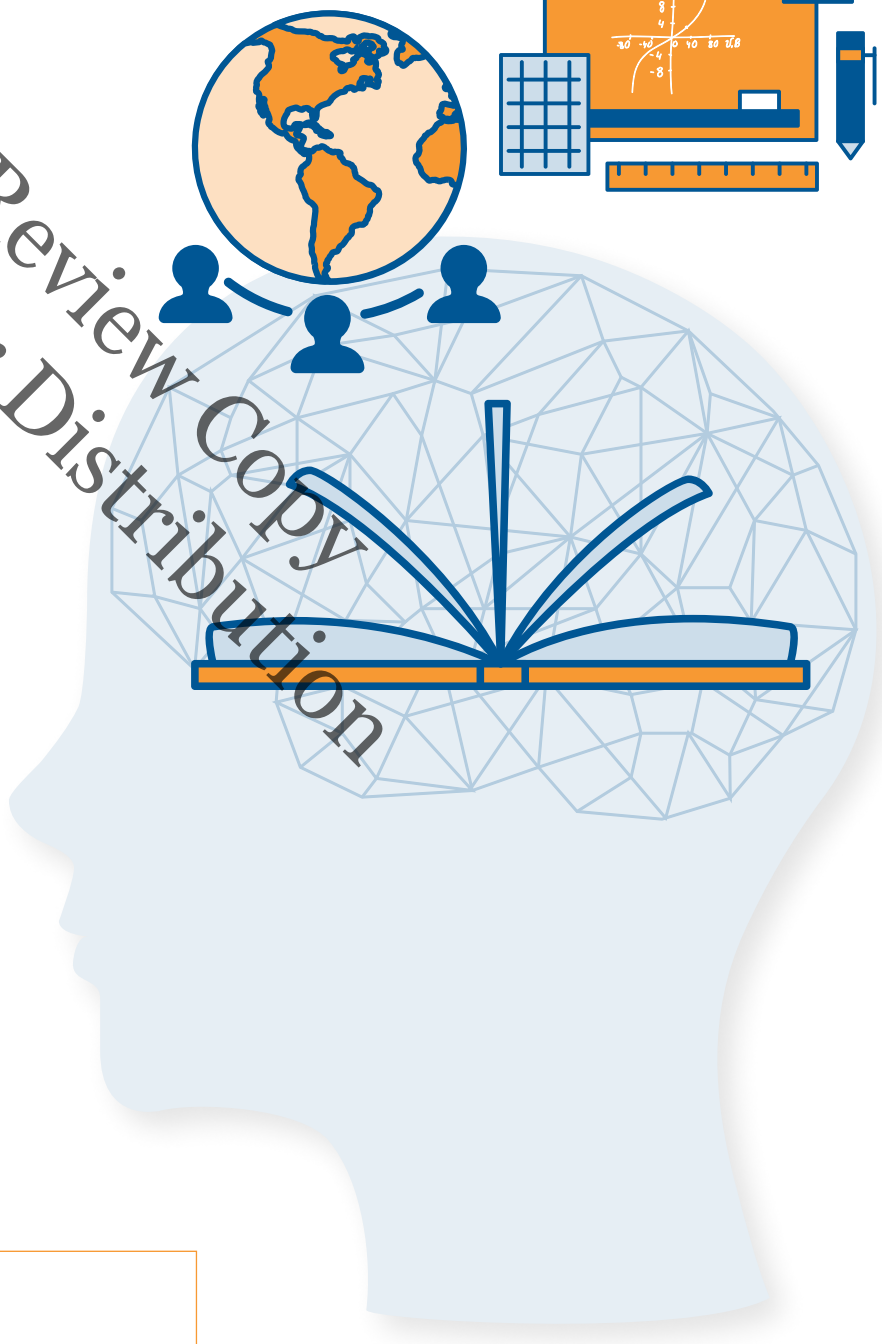


Student Manual

Math Unit 7

Systems of Equations



Name

Unit 7 . Systems of Equations

Contents

Task #1: Playing Catch Up

Act One

What did/do you notice?

What questions come to your mind?

Main Question: Who will win the race — Julio Jones or Rich Eisen?

Estimate the result of the main question. Explain your estimate.

Act Two

What information would you like to know or do you need to solve the MAIN question?

Record the given information (measurements, materials, etc…)

Use this area for your work, tables, calculations, sketches, and final solution.

Task #1: Playing Catch Up Act Three

What was the result? Is this different from your original guess?

The Sequel

What kind of head start would have allowed Julio Jones to beat Rich Eisen?

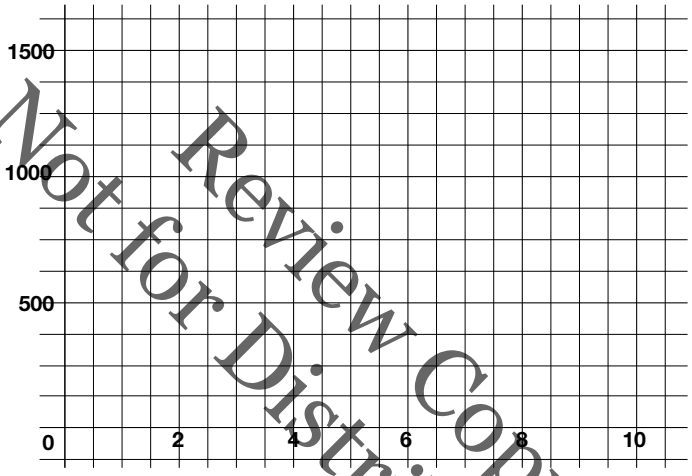
Task #2: Practice Together

1) Tim buys a new computer for his office for $1200. For tax purposes, he declares a linear depreciation (loss of value) of $200 per year. Let *y* be the declared value of the computer after *x* years.

- What is the slope of the line that models this depreciation?

- Find the y-intercept of the line.

- Write a linear equation in slope-intercept form to model the value of the computer over time.

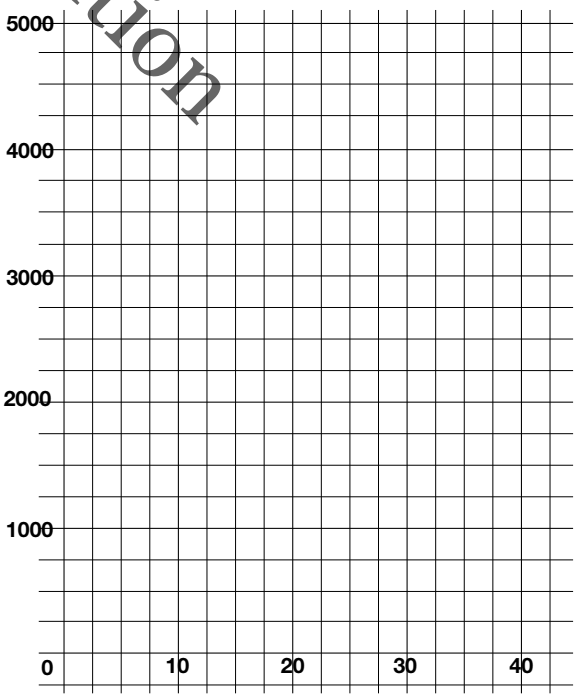


- Find the value of the computer after 4.5 years.

2) An attorney charges a fixed fee on $250 for an initial meeting and $150 per hour for all hours worked after that.

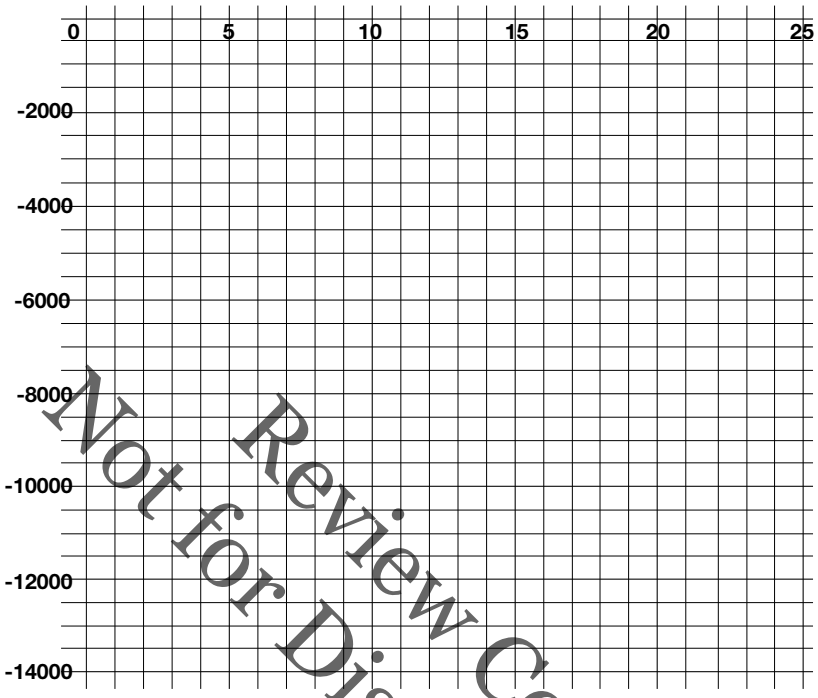
Write an equation in slope-intercept form.

- Find the charge for 26 hours of work.



3) A submarine designed to explore the ocean floor is at an elevation of 13,000 feet (below sea level). The submarine ascends to the surface at an average rate of 650 feet per minute.

- Write an equation in slope-intercept form.



4) Wendy is starting a catering business and is attempting to figure out who she should be using to transport the food to different locations. She has found two trucking companies that are willing to make sure her food arrives intact. Peter's Pick Up charges $0.40 per mile and charges a flat fee of $68. Helen's Haulers charges $0.65 per mile and charges a flat fee of $23.

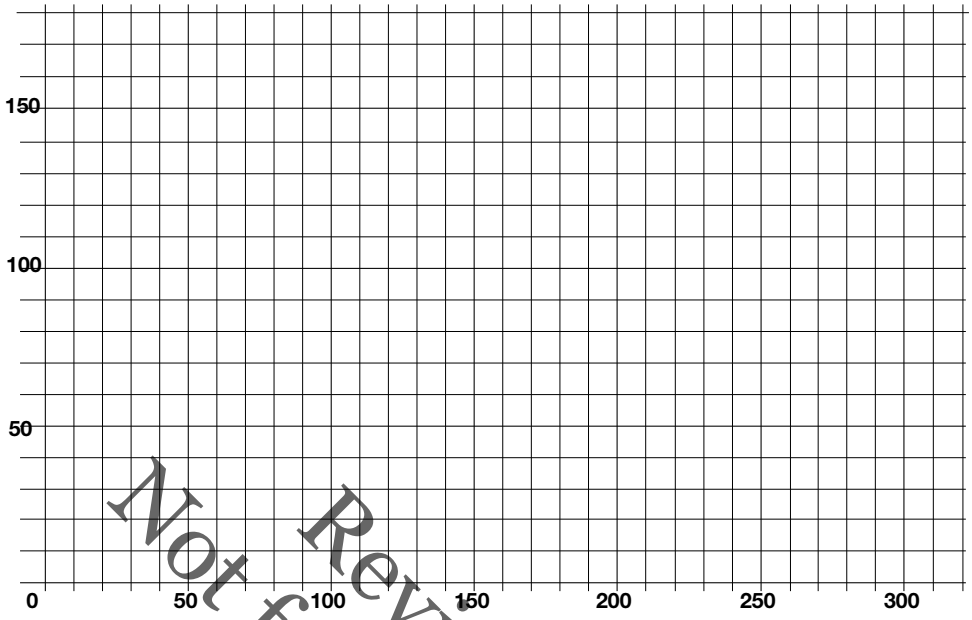
- Define your variables.

- Write an equation for each company to model the situation above.

- For what distance would the cost of transporting to the produce be the same for both companies? What is that equal cost? Use mathematics to explain how you determined your answer. Use words, symbols or both in your explanation.

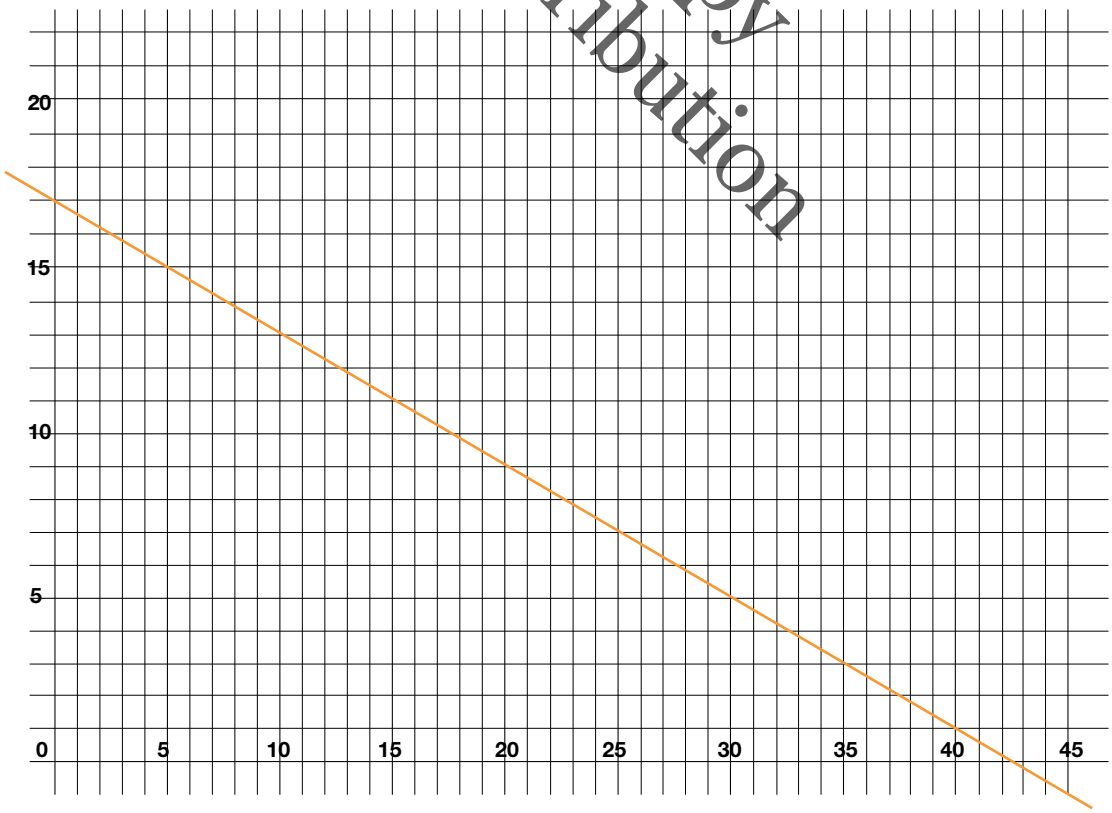
- Which company charges a lower fee for a 160 mile trip? Use mathematics to justify your answer.

- Which company will move a greater distance for $200? Use mathematics to justify your answer.



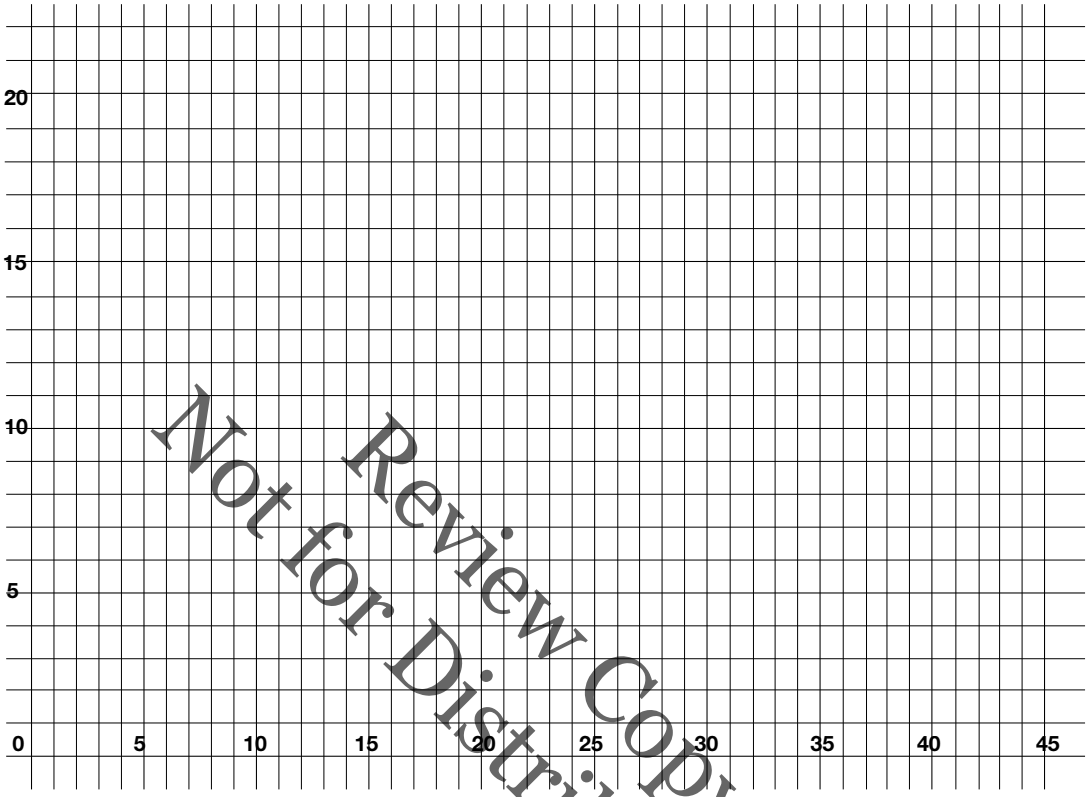
5) Max sells lemonade for $2 per cup and candy for $1.50 per bar. He earns $425 selling lemonade and candy.

- Write a linear model that relates the number of cups of lemonade he sold to the number of bars of candy he sold.
- If Max sold 90 bars of candy, how many cups of lemonade did he sell?



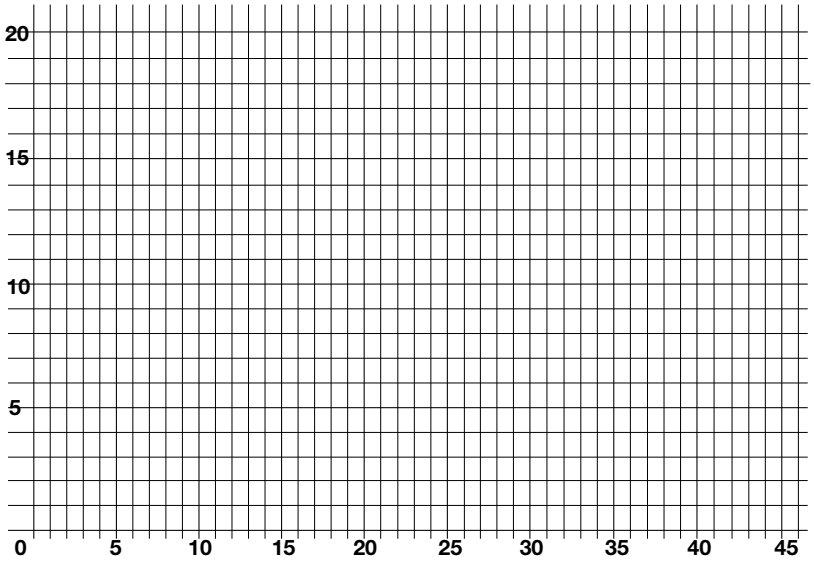
6) The model $2x + 5y = 85$ can be used to model how much money Tim spent on x sodas and y sandwiches.

- If he bought 15 sodas, how many sandwiches did he purchase?



7) At a school play, children's tickets cost $3 each and adult tickets cost $7 each. The total amount of money earned from ticket sales equals $210.

- Write and graph a linear model that relates the number of children's tickets sold to the number of adult tickets sold. Let x represent the number of children's tickets sold and let y represent the number of adult tickets sold.



Task #4: Balloons

Part I:

Demonstration: Have one student hold the helium balloon near the floor and another hold the other balloon as high as they can safely. Let the balloons go at the same time.

How can we model what just happened mathematically?

Time in seconds	Helium Balloon Height	Regular Balloon Height

Create equations that can be used to model the demonstration.

What question are you answering for this problem?

How would you represent it mathematically?

What is the solution?

Part 2:

A hot air balloon is 70 meters above the ground and is descending at a constant rate of 6 meters per second. While another balloon that is 10 meters from the ground is rising at a constant rate of 15 meters per second.

How far from the ground will the two balloons be after 10 seconds?

When will the two balloons be at the same height above the ground?

How far above the ground will the two balloons be when they meet?

Time (seconds)	Balloon #1 Height in Meters	Balloon #2 Height in Meters

Create equations that can be used to represent the data.

What question are you answering for this problem?

How would you represent it mathematically?

What is the solution?

Task #5: Jerseys

Kristin spent $157 on jerseys for her team and one shirt for her coach. Home jerseys cost $28 each and away jerseys cost $15 each.

If she bought a total of 7 jerseys, how many of each kind did she buy?

Home jersey	$28 each	Away jersey	$15 each	Cost

Create equations that can be used to represent the data.

What question are you answering for this problem?

How would you represent it mathematically?

What is the solution?

Task #6: Basketball Tickets

At a state basketball tournament game15 tickets were sold to one group. Adult tickets are $17 each and student tickets are $6 each.

If the group leader paid $167 for the group, how many student tickets did he purchase?

Adult Tickets	Student Tickets	Total cost

Create equations that can be used to represent the data.

What question are you answering for this problem?

How would you represent it mathematically?

What is the solution?

Task #7: Test Questions

Part I:

This equation represents the total number of questions on your next test. x represents the number of multiple choice; y represents the number of free response questions.

$y + x = 17$

How many of each question type are on your next test?

Part 2:

Multiple choice questions are 2 points each and essay questions are 4 points each. This equation represents the total number of points on the assessment:

$2x + 4y = 40$

How many of each type of question are on your test?

What if you knew the total number of questions and the total number of points on the test? Could you determine the total number of each type of questions on the test?

Multiple Choice ?'s	Essay ?'s	Total number of ?'s	Total number of points

Is there another way we could determine the number of test questions?

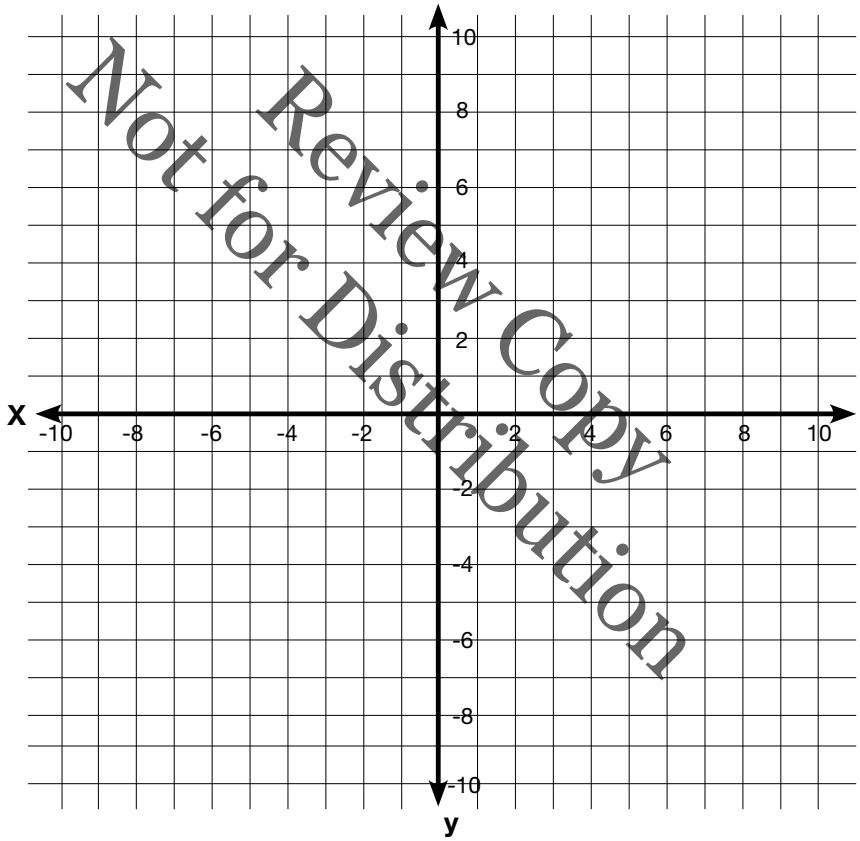
Part 3:

Graphs of Systems

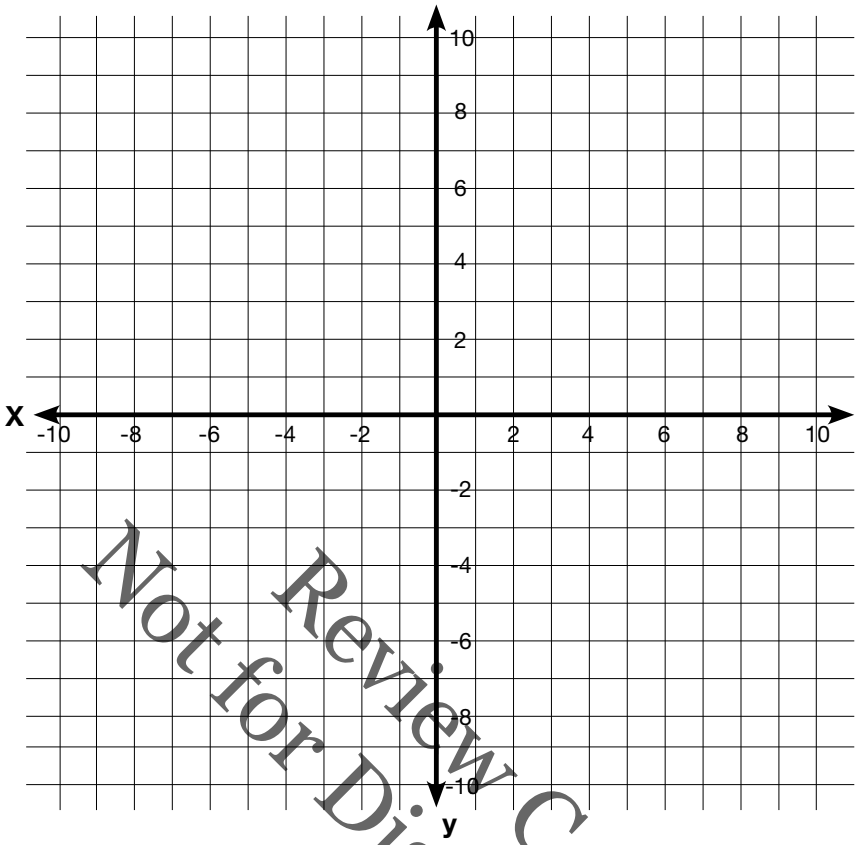
A) $\begin{cases} y = -\frac{1}{2}x - 1 \\ y = \frac{1}{4}x - 4 \end{cases}$ B) $\begin{cases} y = \frac{2}{3}x - 2 \\ 2x - 3y = 6 \end{cases}$ C) $\begin{cases} 2x + y = 5 \\ 2x + y = 2 \end{cases}$

Graph the above equations on the same set of axis.

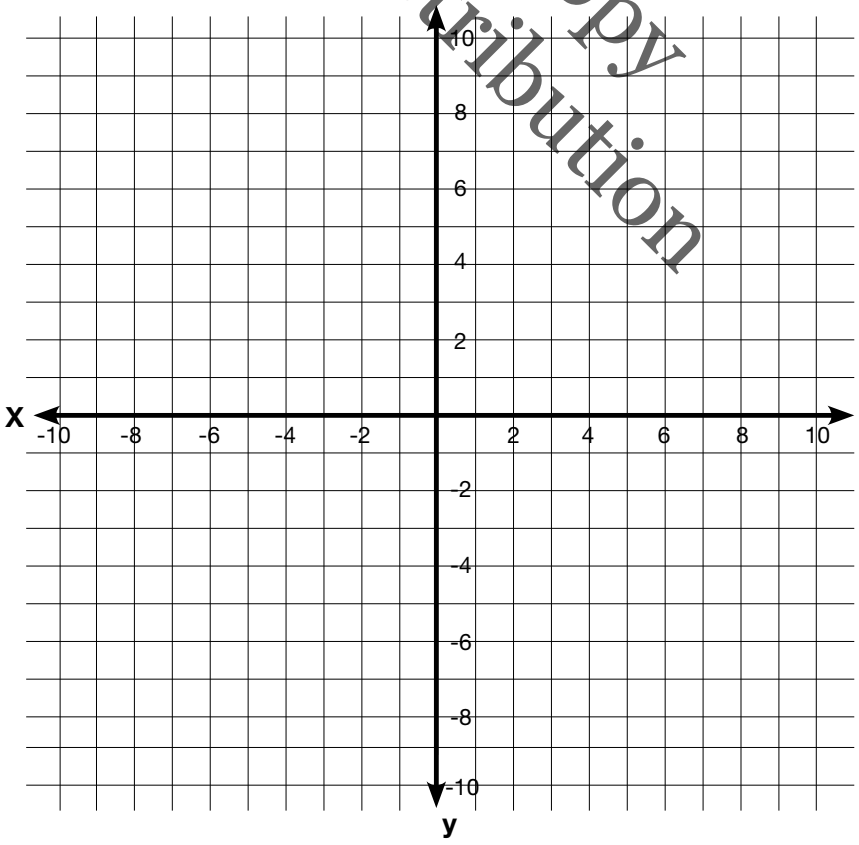
A)



B)



C)



Each of these are a system of equations. The solution to a system of equations is the set of all points that satisfy both equations. With that definition of solution answer the following questions?

How many solutions does set A have? _____

How many solutions does set B have? _____

How many solutions does set C have? _____

How can you tell by the equations how many solutions each will have?

_____

_____

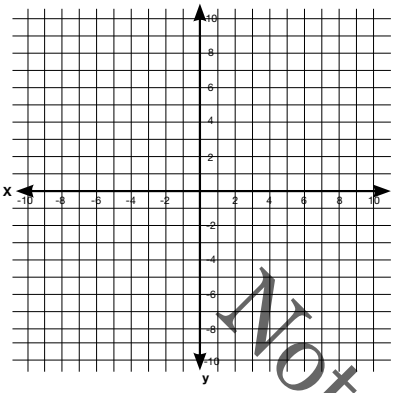
_____

Task #8: Systems of Equations Practice

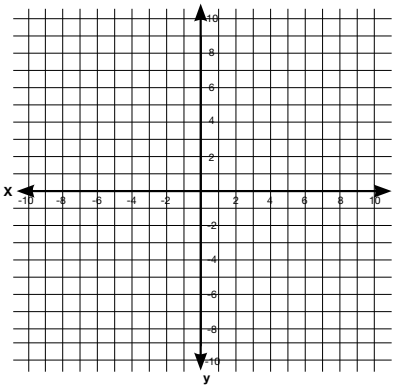
Part 3:

Graph the following systems of equations to find the solution to each system.

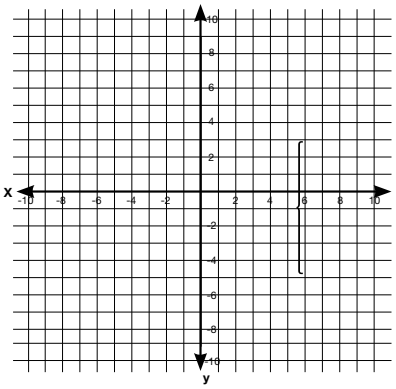
1. $\begin{cases} y = -4x + 5 \\ y = 3x - 9 \end{cases}$



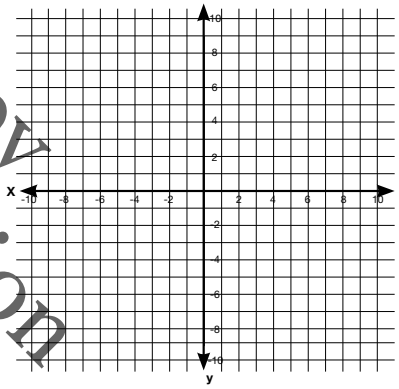
2. $\begin{cases} y = -3x + 7 \\ y = 2x - 3 \end{cases}$



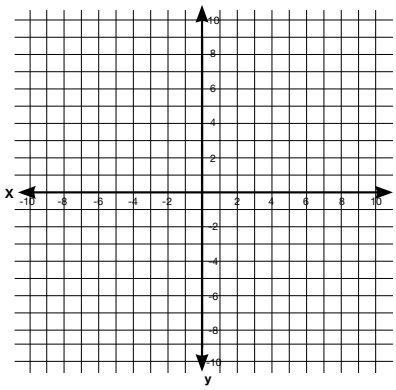
3. $\begin{cases} x + 3y = 6 \\ x - 3y = 6 \end{cases}$



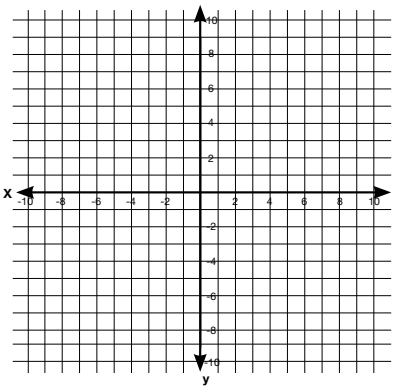
4. $\begin{cases} y = x + 6 \\ y = -2x \end{cases}$



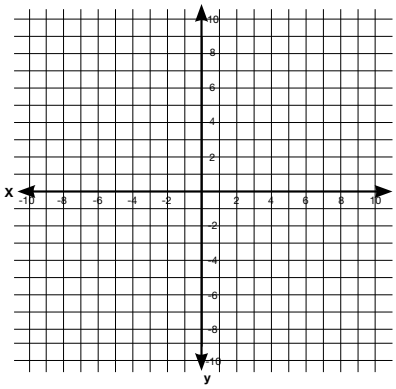
5. $\begin{cases} y = 4x - 3 \\ y = -2x + 9 \end{cases}$



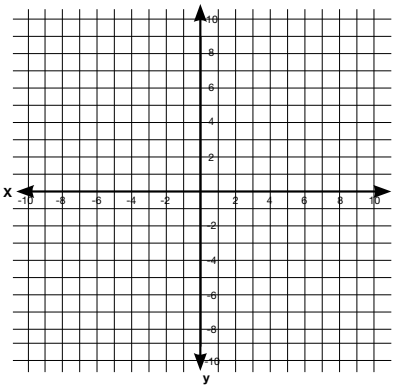
6. $\begin{cases} 3x - 2y = 4 \\ y = -2x + 5 \end{cases}$



7. $\begin{cases} 3x - 2y = 6 \\ x - y = 2 \end{cases}$



8. $\begin{cases} x + y = 4 \\ 2x + 2y = 10 \end{cases}$



Task #9: Brian and Luis

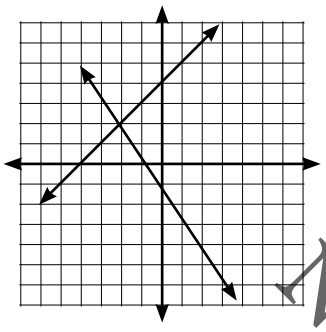
Brian stated that the following system of linear equations has two solutions. Luis stated that is has an infinite number of solutions. How would you determine the number of solutions? Who made the mistake and what is incorrect about their thinking? Who is correct and how can you tell?

$$\begin{cases} y = -2x + 5 \\ 6x + 3y = 15 \end{cases}$$

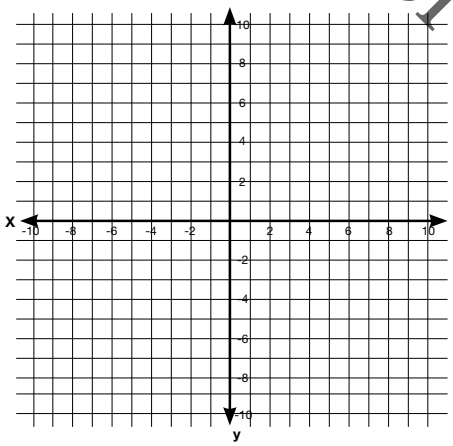
Task #10: Exit Slip

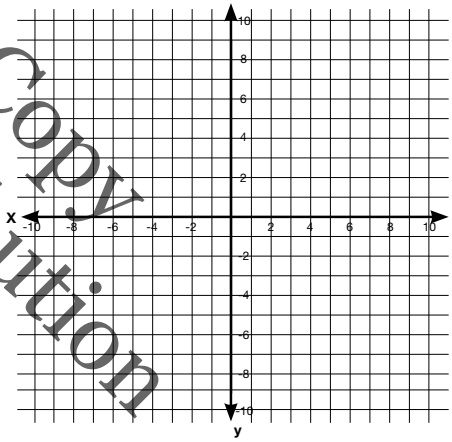
1. How can you recognize when a system of equations has no solution?

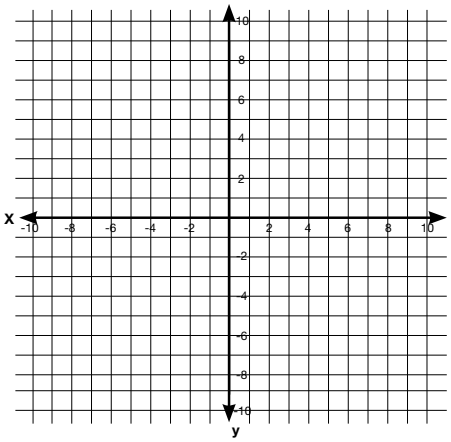
2. Provide a solution for the following system and a non-solution. Explain your reasoning.



3. Sketch and label the three outcomes when graphing a system of linear equations.







Task #11: System of Equations Scenarios

Scenario A

The local swim center is making a special offer. They usually charge $7 per day to swim at the pool. This month swimmers can pay an enrollment fee of $30 and then the daily pass will only be $4 per day.

1. Suppose you do not take the special offer. Write an equation that represents the amount of money you would spend based on how many days you go to the pool if the passes were bought at full price.

2. Write a second equation that represents the amount of money you would spend if you decided to take the special offer.

3. After how many days of visiting the pool will the special offer be a better deal?

4. You only have $60 to spend for the summer on visiting this pool. Which offer would you take? Explain.

Scenario B

Kimi and Jordan are each working during the summer to earn money in addition to their weekly allowance, and they are saving all their money. Kimi earns $9 an hour at her job, and her allowance is $8 per week. Jordan earns $7.50 an hour, and his allowance is $16 per week.

5. Write an equation that can be used to calculate the total of Kimi's allowance and job earnings at the end of one week given the number of hours she works.

6. Write an equation that can be used to calculate the total of Jordan's allowance and job earnings at the end of one week given the number of hours worked.

7. Jordan wonders who will save more money in a week if they both work the same number of hours.

8. When will both girls save the same amount of money?

Scenario C

Your boss asks you to visually display three plans and compare them so you can point out the advantages of each plan to your customers.

- Plan A costs a basic fee of $29.95 per month and 10 cents per text message
- Plan B costs a basic fee of $90.20 per month and has unlimited text messages
- Plan C costs a basic fee of $49.95 per month and 5 cents per text message

All plans offer unlimited calling, calls on nights and weekends are free and long distance calls are included.

A customer wants to know how to decide which plan will save her the most money. Determine which plan has the lowest cost, given the number of text messages a customer is likely to send.

S**cenar**io D

Ivan's furnace has quit working during the coldest part of the year, and he is eager to get it fixed. He decides to call some mechanics and furnace specialists to see what it might cost him to have the furnace fixed. Since he is unsure of the parts he needs, he decides to compare the costs based only on service fees and labor costs. Shown below are the price estimates for labor that were given to him by three different companies. Each company has given the same time estimate for fixing the furnace.

- Company A charges $35 per hour to its customers.
- Company B charges a $20 service fee for coming out to the house and then $25 per hour for each additional hour.
- Company C charges a $45 service fee for coming out to the house and then $20 per hour for each additional hour.

For which time intervals should Ivan choose Company A, Company B, Company C? Support your decision with sound reasoning and representations. Consider including equations, tables, and graphs.

Task #12: Solving a System Using Substitution

Solve the following systems of equations without graphing:

a. $\begin{cases} x = 6y + 7 \\ x = 10y + 2 \end{cases}$

b. $\begin{cases} 2x - 5 = y \\ -3x - 1 = 2y \end{cases}$

c. $\begin{cases} x = -9 + y \\ x = 4y - 6 \end{cases}$

Explain how you used substitution to determine your answers.

Task #13: Return to Hot Air Balloon Problem

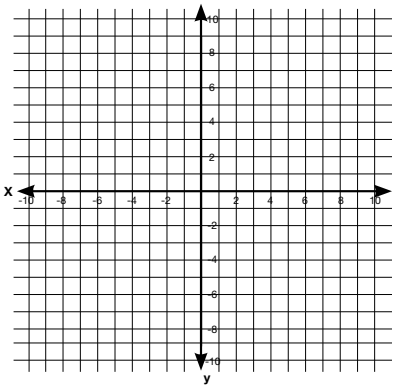
In lesson 4, we modeled the paths of two hot air balloons using the equations $y = 70 - 6x$ and $y = 10 + 15x$, where x represented time in seconds, and y represented height in meters. Use substitution to determine the exact time that the hot air balloons are the same height above the ground.

Task #14: Independent Practice

Solve the following systems of equations using substitution. Support your answers by graphing.

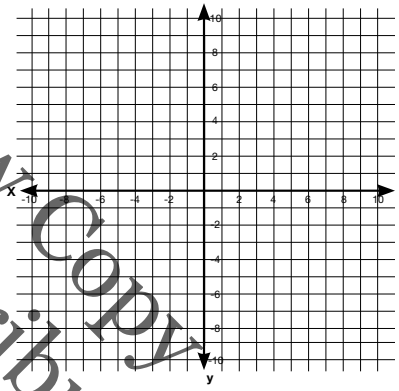
1.

$$\begin{cases} 4x - 5y = 19 \\ y = 7x - 10 \end{cases}$$



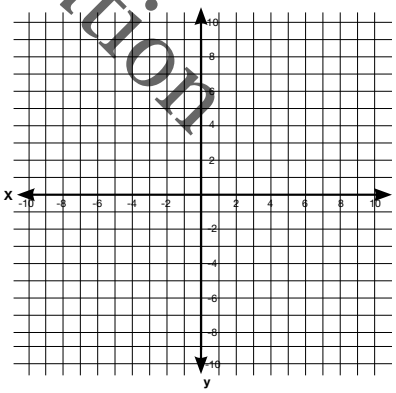
2.

$$\begin{cases} 2y = 3x - 6 \\ 2y = 11x - 1 \end{cases}$$



3.

$$\begin{cases} y = \frac{4}{5}x - 9 \\ -4x + 5y = 7 \end{cases}$$



Task #15: Smarties and Lifesavers

Suppose Ms. Lopez bought bags of Smarties and Lifesavers as a special treat for her math students. Each bag of Smarties cost $6.40 (including tax), and each bag of Lifesavers cost $4.25 (including tax). She spent a total of $57.50 on eleven bags of candy. Using this information, set up and solve a system of equations without graphing.

What do we need to do first?

What equations should we use in our system of equations?

Solve the system of equations using the elimination method.

Task #16: Solving Systems of Equations Using Elimination

Solve the following systems of equations using the elimination method.

1. $\begin{cases} 2x + 3y = 20 \\ -2x + y = 4 \end{cases}$

2. $\begin{cases} 3x + 4y = 10 \\ 2x + 3y = 7 \end{cases}$

3. $\begin{cases} 2x - y = 1 \\ 6x - 3y = 3 \end{cases}$

Task #17: How Much Did They Cost?

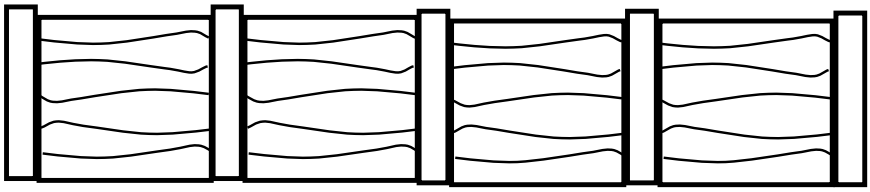
Mr. Nelson went to Taco Town to get lunch for the eighth-grade teachers. He bought eight tacos and five burritos, and the total cost before tax was $13.27. The next time he went back to Taco Town, he got six tacos and seven burritos for a cost of $14.47 before tax. The teachers now want to pay Mr. Nelson, but Mr. Nelson doesn't remember how much one taco costs or how much one burrito costs.

Find the cost of one taco and the cost of one burrito, using the elimination method. Provide a written explanation and a graph that supports your work to present to the teachers so that they will understand how you solved the problem.

Task #18: Fencing

Jon buys fencing for his yard.

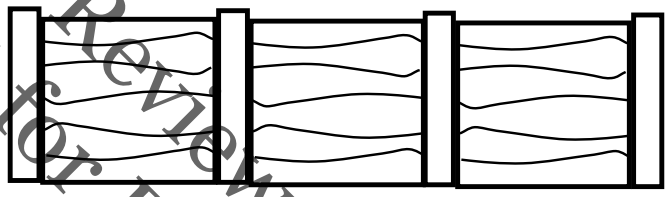
He pays $122 for 5 fence posts and 4 fence panels.



He pays $570 for 21 fence posts and 20 fence panels.

How much does he pay for 4 fence posts and 3 fence panels? _____

Show how you figured **it out**.



Task #19: Stacking Cups

ACT 1

What did/do you notice?

What questions come to your mind?

Main Question: How many cups does it take for the stacks to be equal in height?

Estimate the result of the main question. Explain your estimate.

ACT 2

What information would you like to know or do you need to solve the MAIN question?

Record the given information (measurements, materials, etc…)

Use this area for your work, tables, calculations, sketches, and final solution.

ACT 3

What was the result? Is this different from your original guess?

The Sequel

1. What is the height of the cups when the stacks are equal?

2. Suppose there are 50 blue plastic cups and 1 white Styrofoam cup. At what height will the white cups reach the blue cups if you continue to add one cup to each stack?