8th Grade Math Distance Learning Packet

Name_____ Per_____

In order to continue your development as an independent and mathematical learner please complete <u>one</u> "iM task" and <u>half</u> of a "fluency support" page each day.

This is important because your education matters and YOU MATTER!

Return this completed packet to your math teacher upon your return.

8.NS Approximating pi

Alignments to Content Standards: 8.NS.A

Task

a. Different cultures through history have used many different rational numbers to approximate π. For each of the historical approximations below, use a calculator to determine approximately how far the fraction is from π:

i. $\frac{22}{7}$

ii. $\frac{25}{8}$

iii. $\left(\frac{9785}{5568}\right)^2$

iv. $\frac{355}{113}$

b. The fraction with denominator 1 which is closest to π is $\frac{3}{1} = 3$. For each of the following whole numbers, find the fraction with this denominator which is closest to π:

i. 3

ii. 10

iii. 20

iv. 100

v. 113

vi. 10000

c. Look for patterns in the data you've collected thus far. What effect does increasing the denominator have on the accuracy of the best approximation?

Illustrative Mathematics

N-RN, 8-NS Calculating the square root of 2

Alignments to Content Standards: 8.NS.A N-RN.B

Task

Jessica evaluates $\sqrt{2}$ on her calculator which shows a value of

$$1.4142136.$$

She then writes

$$\sqrt{2} = 1.4142136.$$

a. Is Jessica correct? Explain.

b. Explain, in terms of the structure of the expression $(1.4142136)^2$, why it can not be equal to 2.

c. Use the reasoning of part (b) to explain why $\sqrt{2}$ can not be equal to any terminating decimal.

8.EE Ants versus humans

Alignments to Content Standards: 8.EE.A.4 8.EE.A.1

Task

The average mass of an adult human is about 65 kilograms while the average mass of an ant is approximately 4×10^{-3} grams. The total human population in the world is approximately 6.84 billion, and it is estimated there are currently about 10,000 trillion ants alive.**1**

Based on these values, how does the total the total mass of all living ants compare to the total mass of all living humans?

1: Holldobler, B., E. Wilson, *Journey to the Ants: A Story of Scientific Exploration* (London, England: The Belknap Press of Harvard University, 1994).

8.EE Ant and Elephant

Alignments to Content Standards: 8.EE.A.3

Task

An ant has a mass of approximately 4×10^{-3} grams and an elephant has a mass of approximately 8 metric tons.

a. How many ants does it take to have the same mass as an elephant?

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

Note: 1 kg = 1000 grams, 1 metric ton = 1000 kg, 1m = 100 cm, 1km = 1000 m

Illustrative Mathematics

8.EE Coupon versus discount

Alignments to Content Standards: 8.EE.C.7

Task

You have a coupon worth $18 off the purchase of a scientific calculator. At the same time the calculator is offered with a discount of 15%, but no further discounts may be applied. For what tag price on the calculator do you pay the same amount for each discount?

Illustrative Mathematics

8.EE Summer Swimming

Alignments to Content Standards: 8.EE.C.8.c

Task

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.

a. 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.

b. Write a second equation that represents the amount of money you would spend if you decided to take the special offer.

c. Graph your two equations from part (a) and (b).

d. After how many days of visiting the pool will the special offer be a better deal? How can you tell algebraically? How can you see this graphically?

e. You only have $60 to spend for the summer on visiting this pool. Which offer would you take? Explain.

8.F Introducing Functions

Alignments to Content Standards: 8.F.A 8.F.A.1

Task

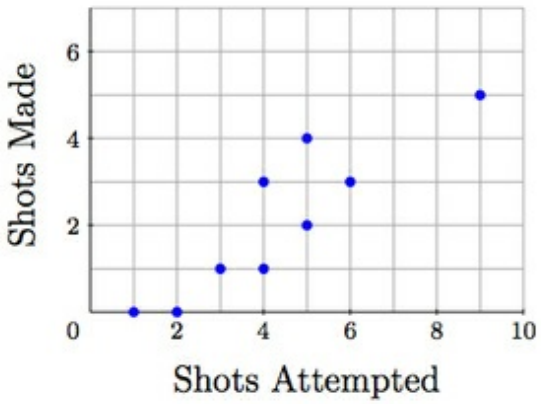
a. For each situation below, fill in the missing information in the tables.

i. A parking meter takes only dimes and each dime is worth 6 minutes on the meter.

Number of Dimes	Minutes of Parking
2	
3	
7	

Minutes of Parking	Number of Dimes
0	
12	
54	

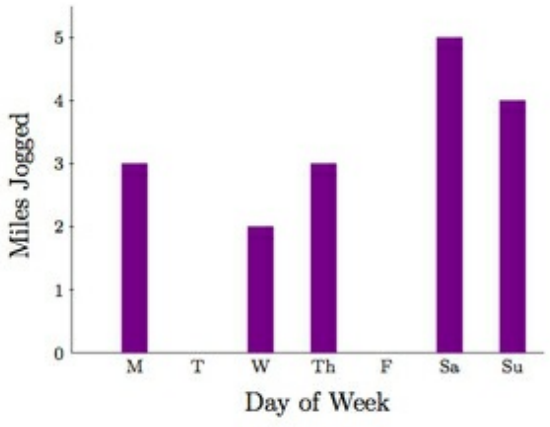
ii. Each point on the graph below shows how many shots a player on a basketball team took and made in the first half of a game.



Shots Attempted	Shots Made
2	
4	
7	

Shots Made	Shots Attempted
1	
4	
6	

iii. Below is a graph showing how far Marika jogged each day in a week:



Day of Week	Miles Jogged
Monday	
Friday	
Sunday	

Miles Jogged	Day of Week
1	
3	
5	

b. What, if any, difficulties did you encounter filling out these tables? Explain.

6.EE,NS,RP; 8.EE,F Pennies to heaven

Alignments to Content Standards: 6.EE.B.6 6.NS.B.3 6.RP.A.3 8.EE.A.3 8.EE.A.4 8.F.A.1

Task

A penny is about $\frac{1}{16}$ of an inch thick.

a. In 2011 there were approximately 5 billion pennies minted. If all of these pennies were placed in a single stack, how many miles high would that stack be?

b. In the past 100 years, nearly 500 billion pennies have been minted. If all of these pennies were placed in a single stack, how many miles high would that stack be?

c. The distance from the moon to the earth is about 239,000 miles. How many pennies would need to be in a stack in order to reach the moon?

Illustrative Mathematics

8.F US Garbage, Version 1

Alignments to Content Standards: 8.F.A.1

Task

The following table shows the amount of garbage that was produced in the US each year between 2002 and 2010 (as reported by the EPA).

t **(years)**	2002	2003	2004	2005	2006	2007	2008	2009	2010
G **(million tons)**	239	242	249	254	251	255	251	244	250

Let's define a function which assigns to an input t (a year between 2002 and 2010) the total amount of garbage, G, produced in that year (in million tons). To find these values, you can look them up in the table.

a. How much garbage was produced in 2004?

b. In which year did the US produce 251 million tons of garbage?

c. Does the table describe a linear function?

d. Draw a graph that shows this data.

Illustrative Mathematics

8.F Introduction to Linear Functions

Alignments to Content Standards: 8.F.A.3

Task

a. Decide which of the following points are on the graph of the function $y = 2x + 1$:

- $(0, 1), (2, 5), (\frac{1}{2}, 2), (2, -1), (-1, -1), (0.5, 1).$
- Find 3 more points on the graph of the function.

b. Find several points that are on the graph of the function $y = 2x^2 + 1$.

- Plot the points in the coordinate plane. Is this a linear function?
- Support your conclusion.

c. Graph both functions and list as many differences between the two functions as you can.

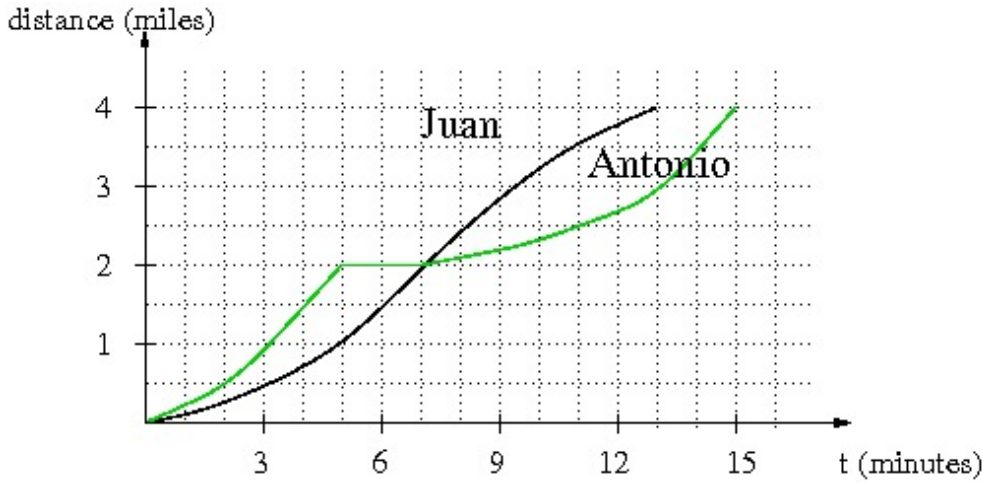
Illustrative Mathematics

8.F Bike Race

Alignments to Content Standards: 8.F.B.5

Task

Antonio and Juan are in a 4-mile bike race. The graph below shows the distance of each racer (in miles) as a function of time (in minutes).



a. Who wins the race? How do you know?

b. Imagine you were watching the race and had to announce it over the radio, write a little story describing the race.

Illustrative Mathematics

8.G Partitioning a hexagon

Alignments to Content Standards: 8.G.A

Task

a. Find a way to partition a regular hexagon into 2 congruent figures. Explain how you know the 2 figures are congruent.

b. Find many ways to partition a regular hexagon into 2 congruent figures.

c. Find a way to partition a regular hexagon into 4 congruent figures. Explain how you know the 4 figures are congruent.

d. Find a way to partition a regular hexagon into 8 congruent figures. Explain how you know the 8 figures are congruent.

Bonus 1: Find a different way to partition a regular hexagon into 8 congruent figures.

Bonus 2: Find a different way to partition a regular hexagon into 4 congruent figures.

Bonus 3: Find yet another way to partition a regular hexagon into 8 congruent figures.

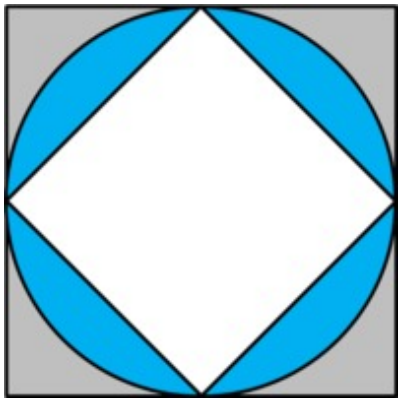
Illustrative Mathematics

8.G Circle Sandwich

Alignments to Content Standards: 8.G.B.7 8.G.A.2

Task

A square is inscribed in a circle which is inscribed in a square as shown below. Note that the vertices of the inner square meet the midpoints of the outer square's sides.



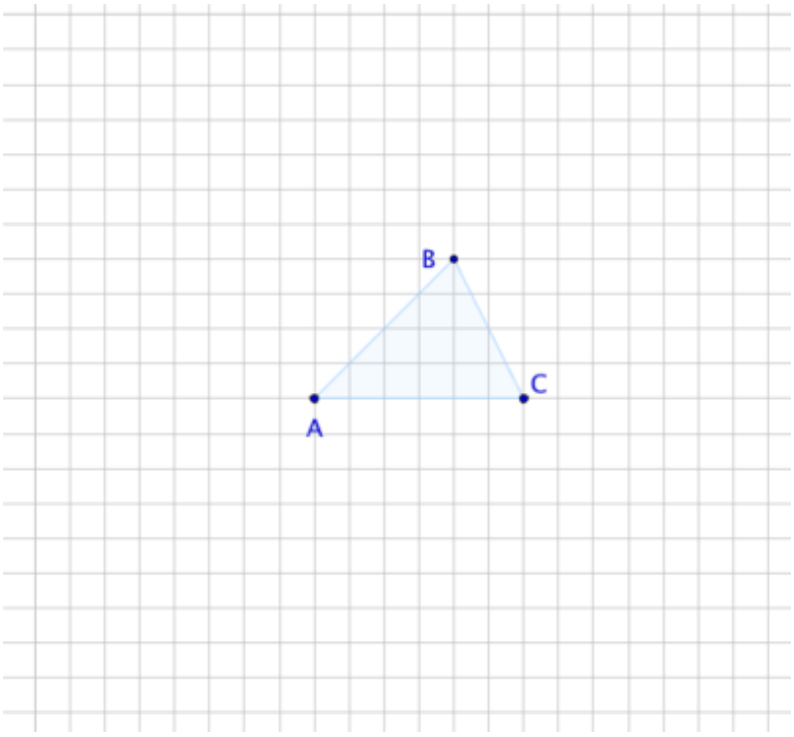
Consider the area of the region left by removing the interior of the small square from the interior of the big square. Is the area of the blue region more or less than $\frac{1}{2}$ of that?

8.G.A.3 Effects of Dilations on Length, Area, and Angles

Alignments to Content Standards: 8.G.A.3

Task

Consider triangle ABC.



a. Draw a dilation of ABC with:

i. Center A and scale factor 2.

ii. Center B and scale factor 3.

iii. Center C and scale factor $\frac{1}{2}$.

b. For each dilation, answer the following questions:

i. By what factor do the base and height of the triangle change? Explain.

ii. By what factor does the area of the triangle change? Explain.

iii. How do the angles of the scaled triangle compare to the original? Explain.

Number Correct: _____

Improvement: _____

Sprint Title – Round 2

Directions: Evaluate each expression. Place the final answer in the last column in each section

1.	12 ones ÷ 2 ones	
2.	12 ÷ 2	
3.	12 tens ÷ 2 tens	
4.	120 ÷ 20	
5.	12 hundreds ÷ 2 hundreds	
6.	1,200 ÷ 200	
7.	12 halves ÷ 2 halves	
8.	$\frac{12}{2} \div \frac{2}{2}$	
9.	12 fourths ÷ 3 fourths	
10.	$\frac{12}{4} \div \frac{3}{4}$	
11.	$\frac{12}{8} \div \frac{3}{8}$	
12.	$\frac{2}{4} \div \frac{1}{4}$	
13.	$\frac{1}{4} \div \frac{2}{4}$	
14.	$\frac{4}{5} \div \frac{2}{5}$	
15.	$\frac{2}{5} \div \frac{4}{5}$	
16.	$\frac{3}{5} \div \frac{4}{5}$	
17.	$\frac{6}{8} \div \frac{2}{8}$	
18.	$\frac{6}{8} \div \frac{4}{8}$	
19.	$\frac{6}{8} \div \frac{5}{8}$	
20.	$\frac{6}{10} \div \frac{2}{10}$	
21.	$\frac{7}{10} \div \frac{8}{10}$	
22.	$\frac{4}{10} \div \frac{7}{10}$	

23.	$\frac{6}{12} \div \frac{4}{12}$	
24.	$\frac{6}{12} \div \frac{2}{6} = \frac{6}{12} \div \frac{\quad}{12}$	
25.	$\frac{8}{14} \div \frac{7}{14}$	
26.	$\frac{8}{14} \div \frac{1}{2} = \frac{8}{14} \div \frac{\quad}{14}$	
27.	$\frac{11}{14} \div \frac{2}{14}$	
28.	$\frac{11}{14} \div \frac{1}{7} = \frac{11}{14} \div \frac{\quad}{14}$	
29.	$\frac{1}{7} \div \frac{6}{14} = \frac{\quad}{14} \div \frac{6}{14}$	
30.	$\frac{7}{18} \div \frac{3}{18}$	
31.	$\frac{7}{18} \div \frac{1}{6} = \frac{7}{18} \div \frac{\quad}{18}$	
32.	$\frac{1}{3} \div \frac{12}{18} = \frac{\quad}{18} \div \frac{12}{18}$	
33.	$\frac{1}{6} \div \frac{4}{18}$	
34.	$\frac{4}{12} \div \frac{8}{6}$	
35.	$\frac{1}{3} \div \frac{3}{15}$	
36.	$\frac{2}{6} \div \frac{1}{9} = \frac{\quad}{18} \div \frac{\quad}{18}$	
37.	$\frac{1}{6} \div \frac{4}{9}$	
38.	$\frac{2}{3} \div \frac{3}{4}$	
39.	$\frac{1}{3} \div \frac{3}{5}$	
40.	$\frac{1}{7} \div \frac{1}{2}$	
41.	$\frac{5}{6} \div \frac{2}{9}$	
42.	$\frac{5}{9} \div \frac{2}{6}$	
43.	$\frac{5}{6} \div \frac{4}{9}$	
44.	$\frac{1}{2} \div \frac{4}{5}$	

Number Correct: _____
Improvement: _____

Subtraction of Decimals – Round 2

Directions: Evaluate each expression.

1.	$66 - 60$	
2.	$66 - 6$	
3.	$6.6 - 6$	
4.	$6.6 - 0.6$	
5.	$99 - 90$	
6.	$99 - 9$	
7.	$9.9 - 9$	
8.	$9.9 - 0.9$	
9.	$22 - 20$	
10.	$22 - 2$	
11.	$2.2 - 2$	
12.	$3 - 0.4$	
13.	$3 - 0.04$	
14.	$3 - 0.004$	
15.	$0.3 - 0.04$	
16.	$8 - 0.2$	
17.	$8 - 0.02$	
18.	$8 - 0.002$	
19.	$0.8 - 0.02$	
20.	$5 - 0.1$	
21.	$5 - 0.01$	
22.	$5 - 0.001$	

23.	$6.8 - 4$	
24.	$6.8 - 0.4$	
25.	$0.68 - 0.4$	
26.	$0.68 - 0.04$	
27.	$7.3 - 1$	
28.	$7.3 - 0.1$	
29.	$0.73 - 0.1$	
30.	$0.73 - 0.01$	
31.	$9.5 - 2$	
32.	$9.5 - 0.2$	
33.	$0.95 - 0.2$	
34.	$8.3 - 5$	
35.	$8.3 - 0.5$	
36.	$0.83 - 0.5$	
37.	$0.83 - 0.05$	
38.	$7.2 - 4$	
39.	$7.2 - 0.4$	
40.	$0.72 - 0.4$	
41.	$0.72 - 0.04$	
42.	$9.3 - 7$	
43.	$9.3 - 0.7$	
44.	$0.93 - 0.7$	

Number Correct: _____
Improvement: _____

Multiplication of Decimals – Round 2

Directions: Evaluate each expression.

1.	9×1	
2.	0.9×1	
3.	0.09×1	
4.	0.009×1	
5.	2×2	
6.	2×0.2	
7.	2×0.02	
8.	2×0.002	
9.	3×2	
10.	0.3×2	
11.	0.03×2	
12.	0.7×0.1	
13.	0.07×0.1	
14.	0.7×0.01	
15.	0.07×0.01	
16.	0.2×0.4	
17.	0.02×0.4	
18.	0.2×0.04	
19.	0.02×0.04	
20.	0.1×0.1	
21.	0.01×0.1	
22.	0.1×0.01	

23.	3×4	
24.	3×0.4	
25.	0.3×4	
26.	0.3×0.4	
27.	7×7	
28.	7×0.7	
29.	0.7×7	
30.	0.7×0.7	
31.	2×8	
32.	2×0.8	
33.	0.2×0.8	
34.	0.6×0.5	
35.	0.6×0.05	
36.	0.6×0.005	
37.	0.06×0.005	
38.	0.9×0.9	
39.	0.09×0.9	
40.	0.009×0.9	
41.	0.009×0.09	
42.	1.1×0.5	
43.	1.1×0.05	
44.	1.1×0.005	

Number Correct: _____

Integer Subtraction—Round 1

Directions: Determine the difference of the integers, and write it in the column to the right.

1.	$4 - 2$	
2.	$4 - 3$	
3.	$4 - 4$	
4.	$4 - 5$	
5.	$4 - 6$	
6.	$4 - 9$	
7.	$4 - 10$	
8.	$4 - 20$	
9.	$4 - 80$	
10.	$4 - 100$	
11.	$4 - (-1)$	
12.	$4 - (-2)$	
13.	$4 - (-3)$	
14.	$4 - (-7)$	
15.	$4 - (-17)$	
16.	$4 - (-27)$	
17.	$4 - (-127)$	
18.	$14 - (-6)$	
19.	$23 - (-8)$	
20.	$8 - (-23)$	
21.	$51 - (-3)$	
22.	$48 - (-5)$	

23.	$(-6) - 5$	
24.	$(-6) - 7$	
25.	$(-6) - 9$	
26.	$(-14) - 9$	
27.	$(-25) - 9$	
28.	$(-12) - 12$	
29.	$(-26) - 26$	
30.	$(-13) - 21$	
31.	$(-25) - 75$	
32.	$(-411) - 811$	
33.	$(-234) - 543$	
34.	$(-3) - (-1)$	
35.	$(-3) - (-2)$	
36.	$(-3) - (-3)$	
37.	$(-3) - (-4)$	
38.	$(-3) - (-8)$	
39.	$(-30) - (-45)$	
40.	$(-27) - (-13)$	
41.	$(-13) - (-27)$	
42.	$(-4) - (-3)$	
43.	$(-3) - (-4)$	
44.	$(-1{,}066) - (-34)$	

Number Correct: _____
Improvement: _____

Integer Subtraction—Round 2

Directions: Determine the difference of the integers, and write it in the column to the right.

1.	$3 - 2$	
2.	$3 - 3$	
3.	$3 - 4$	
4.	$3 - 5$	
5.	$3 - 6$	
6.	$3 - 9$	
7.	$3 - 10$	
8.	$3 - 20$	
9.	$3 - 80$	
10.	$3 - 100$	
11.	$3 - (-1)$	
12.	$3 - (-2)$	
13.	$3 - (-3)$	
14.	$3 - (-7)$	
15.	$3 - (-17)$	
16.	$3 - (-27)$	
17.	$3 - (-127)$	
18.	$13 - (-6)$	
19.	$24 - (-8)$	
20.	$5 - (-23)$	
21.	$61 - (-3)$	
22.	$58 - (-5)$	

23.	$(-8) - 5$	
24.	$(-8) - 7$	
25.	$(-8) - 9$	
26.	$(-15) - 9$	
27.	$(-35) - 9$	
28.	$(-22) - 22$	
29.	$(-27) - 27$	
30.	$(-14) - 21$	
31.	$(-22) - 72$	
32.	$(-311) - 611$	
33.	$(-345) - 654$	
34.	$(-2) - (-1)$	
35.	$(-2) - (-2)$	
36.	$(-2) - (-3)$	
37.	$(-2) - (-4)$	
38.	$(-2) - (-8)$	
39.	$(-20) - (-45)$	
40.	$(-24) - (-13)$	
41.	$(-13) - (-24)$	
42.	$(-5) - (-3)$	
43.	$(-3) - (-5)$	
44.	$(-1{,}034) - (-31)$	

Number Correct: _____

Generating Equivalent Expressions—Round 1

Directions: Write each as an equivalent expression in standard form as quickly and accurately as possible within the allotted time.

1.	$1+1$	
2.	$1+1+1$	
3.	$(1+1)+1$	
4.	$(1+1)+(1+1)$	
5.	$(1+1)+(1+1+1)$	
6.	$x+x$	
7.	$x+x+x$	
8.	$(x+x)+x$	
9.	$(x+x)+(x+x)$	
10.	$(x+x)+(x+x+x)$	
11.	$(x+x+x)+(x+x+x)$	
12.	$2x+x$	
13.	$3x+x$	
14.	$4x+x$	
15.	$7x+x$	
16.	$7x+2x$	
17.	$7x+3x$	
18.	$10x-x$	
19.	$10x-5x$	
20.	$10x-10x$	
21.	$10x-11x$	
22.	$10x-12x$	

23.	$4x+6x-12x$	
24.	$4x-6x+4x$	
25.	$7x-2x+3$	
26.	$(4x+3)+x$	
27.	$(4x+3)+2x$	
28.	$(4x+3)+3x$	
29.	$(4x+3)+5x$	
30.	$(4x+3)+6x$	
31.	$(11x+2)-2$	
32.	$(11x+2)-3$	
33.	$(11x+2)-4$	
34.	$(11x+2)-7$	
35.	$(3x-9)+(3x+5)$	
36.	$(11-5x)+(4x+2)$	
37.	$(2x+3y)+(4x+y)$	
38.	$(5x+1.3y)+(2.9x-0.6y)$	
39.	$(2.6x-4.8y)+(6.5x-1.1y)$	
40.	$\left(\frac{3}{4}x-\frac{1}{2}y\right)+\left(-\frac{7}{4}x-\frac{5}{2}y\right)$	
41.	$\left(-\frac{2}{5}x-\frac{7}{9}y\right)+\left(-\frac{7}{10}x-\frac{2}{3}y\right)$	
42.	$\left(\frac{1}{2}x-\frac{1}{4}y\right)+\left(-\frac{3}{5}x+\frac{5}{6}x\right)$	
43.	$\left(1.2x-\frac{3}{4}y\right)-\left(-\frac{3}{5}x+2.25x\right)$	
44.	$(3.375x-8.9y)-\left(-7\frac{5}{8}x-5\frac{2}{5}y\right)$	