Rising 8th Grade Summer Math Packet

Concept 1 - Proportional Reasoning (7.RP.1, 7.NS.2 (d), 7.NS.3, 7.EE.4 (a), 7.G.1, 7.RP.2 (a,b,c,d), 7.RP.3, 7.EE.3)

Unit Rate - _____

To determine the unit rate for given values, ______ the values

Ratio - Comparison of two ______, represents ______

Proportional Relationship - A relationship in which every pair of values has the same

Representations of ratios: Consider this situation: At a store, every book costs \$3.

Fraction:	Table	(If ratios are e	qual, the relation	ionship is):
3		Number of Books	Price (in dollars)			
1	_	1	3			
	_	3	9			
		4	12			
	-	7	21			
Colony	Graph	•	21			
Cololl.	Orapii	•	10			
:			8-	Р	oints:	
vv			6			
			4		X	Y
			2		0	0
			-2-		1	
			-6-			6
					3	
Equation: $x = $,	y =					
y =x						
Common Ratios						
Speed =	Cost H	Per Item =				
Pay Rate =	Scale	Models =				
Percents						
- A percent is a ratio out of	used to comp	bare numbers.				
- To find the percent error or perce	nt change betwe	en two values:				
% Change = $\frac{New Value}{Old V}$	-Old Value Value • 100	% Error	$r = \frac{Actual Value}{Expect}$	–Expected Va ted Value	^{lue} • 100	

- When solving word problems involving percent change, carefully read the problem to determine if the change

is an _____ (like a tax, raise, tip, or commission) or _____ (like a discount, depreciation, or sale).

- Then, a visual model and/or equation can help solve it. For example:

A shirt costs \$25.74 after a 7% tax. What is the price of the shirt before tax?

Visual Model

0.07 •	Original Price (p)
Original	
Price (p)	
То	tal Price (\$25.74)

Equation

0.07p + p = 25.74

Higher-Level Questions for Discourse

1. What is one visual and one mathematical way you can tell if a relationship is proportional?

2. Why do you "move the decimal" two places to write a percent as a decimal?

Concept 1 Released EOG Questions (7.RP.1, 7.NS.2 (d), 7.NS.3, 7.EE.4 (a), 7.G.1, 7.RP.2 (a,b,c,d), 7.RP.3, 7.EE.3)

1 The table shows how much a store charges for certain numbers of pencils.

Number of pencils (p)	Cost (c)
4	\$0.72
7	\$1.26
12	\$2.16

Based on the table, which equation could be used to calculate the cost, c, of any number of pencils, p?

A) c = .09p B) c = .18p C) c = .54p D) c = .72p

- 2 Suppose that a butterfly can fly 82 feet in 4 seconds. A dragonfly can fly 50 feet in 2 seconds. Which can fly faster and by how much?
 - A The dragonfly is 4.5 feet per second faster.
 - B The dragonfly is 20.5 feet per second faster.
 - C The butterfly is 4.5 feet per second faster.
 - D The butterfly is 24 feet per second faster.
- 3 Chad built a scale model of a statue. He built the model 7 inches tall to represent the actual height of 15 feet. Which equation below represents the relationship between the actual height (*a*), in feet, and the height of the model (*m*), in inches?
 - A $a = \frac{7}{15}m$
 - B $m = \frac{7}{15}a$
 - C a = 0.75m
 - D m = 0.75a
 - 4 Michelle bought the same fabric on 3 different occasions and recorded the data below.

Yards of Fabric	Total Cost
2.2	\$2.53
3.6	\$4.14
4.2	\$4.83

What was the	price per yard of	f fabric?	
A) \$1.05	B) \$1.10	C) \$1.15	D) \$1.50

5 Mike earned the amounts listed in the table below.

Hours Worked (h)	Amount Earned (E)
15	\$183.75
22	\$269.50
26	\$318.50

Which equation could be used to find the amount of money Mike earns, E, for any number of hours worked, h?

B
$$E = 12.25 + h$$
 D $E = 12.25h$

- 3 John mixed $\frac{3}{4}$ liter of yellow paint with $1\frac{1}{4}$ liters of red paint to make 2 liters of orange paint.
 - He needed more orange paint.
 - To make a new batch of orange paint, he used exactly 1 liter of red paint.

Using the same ratio, how many liters of yellow paint should John use to make the new batch of orange paint?

- 9 One lap around a track is equal to one-eighth of a mile. A horse ran <u>a distance of 9</u> laps in 2 minutes and 30 seconds. What was the horse's average speed in miles per minute?
- 10 A store sells ladders.
 - The retail price was a 40 percent markup over the manufacturer price.
 - A month later, the store reduced the retail price of the ladder by 25 percent.

What percent markup is the new retail price over the manufacturer price?

16 A notebook costs \$4.50 plus sales tax. After sales tax, the notebook is \$4.86. What is the sales tax rate?

A) 6% B) 7% C) 8% D) 9%

- 17 The Smith family went out to dinner.
 - The price of the meal was \$29.85.
 - The sales tax was 6% of the price of the meal.
 - The tip was 15% of the meal and the sales tax.

How much money did the Smith family pay for the meal, including tax and tip?

A) \$50.85 B) \$36.39 C) \$36.12 D) \$31.95

18 Mr. Sanchez bought 2 magazines for \$9.95 each and 1 book for \$14.95. If the sales tax is 6%, what is the total cost of Mr. Sanchez's purchases?

A) \$25.50 B) \$26.39 C) \$35.45 D) \$36.94

- 35 Two sporting goods stores are having discount sales on basketballs.
 - At one store, a basketball is on sale for 20% off the regular price of \$24.95.
 - At the other store, the same kind of basketball is on sale for 25% off the regular price of \$25.80.

What is the difference between the sale prices of the two stores?

43 80 61	D	0.05	C	\$1 46	D)	62 60
A) 30.01	D	1 30.35	- U)	31.40	– U)	32.39

Concept 2 - Rational Number Operations (7.NS.1 (a,b,c,d), 7.NS.3, 7.EE.3, 7.NS.2 (a,b,c))

Adding and Subtracting with Negatives

You have \$2.75 in your pocket, but you owe your friend \$4.50. How much more do you need to pay him?

Draw a Picture

Number Line Representation

Addition Rules

You have 2 ½ cups of flour. A recipe for your friend's birthday cake needs 2 ½ cups of flour. How much flour do you have left after baking the cake?

Draw a Picture

Number Line Representation

Addition Rules

Operations with Negatives Rules





Exponents and Order of Operations:

 $4^3 = ___ \bullet ___ = __$ When evaluating expressions, exponents after $___$.

To raise a fraction to an exponent, apply the exponent to the ______ and _____.

Higher-Level Questions for Discourse

1. Explain, using a real-world situation, why adding two negatives equals a negative.

2. Why do we need a common denominator to add fractions but not to multiply fractions?

Concept 2 Released EOG Questions (7.NS.1 (a,b,c,d), 7.NS.3, 7.EE.3, 7.NS.2 (a,b,c))

- 6 A baker made two cakes of the same size.
 - At the end of the day, there was $\frac{2}{3}$ of a chocolate cake left.
 - There was $\frac{5}{6}$ of a strawberry cake left.
 - The baker divided the remaining chocolate cake into 2 equal pieces and the remaining strawberry cake into 3 equal pieces.

Which cake flavor had larger pieces and by how much?

- A chocolate by $\frac{1}{6}$ of a cake
- B strawberry by $\frac{1}{6}$ of a cake
- C chocolate by $\frac{1}{18}$ of a cake
- D strawberry by $\frac{1}{18}$ of a cake
- 7 Betty makes pies. To make 6 pies, she uses $7\frac{1}{2}$ cups of flour. How many cups of flour are needed to make 1 pie?
- 11 Mr. Adams had 24 guests at his house for a party. Each guest brought one item.
 - One-third of the guests brought drinks.
 - One-fourth of the guests brought a dessert.
 - The rest of the guests brought chips.

How many guests brought chips?

- 13 What is the value of $-2\left(4^2 + \left(\frac{1}{2}\right)^2\right)$?
- 20 Anna saved \$20 in a jar each month for $2\frac{1}{2}$ years. She spent 75% of her savings

on a computer. How much money did Anna have left in the jar?

A) \$150 B) \$240 C) \$450 D) \$600

Concept 3 - Expressions, Equations, and Inequalities (7.EE.1, 7.EE.2, 7.EE.4(a, b))

Simplifying Expressions



Expressions with Percents

The percentage that represents a whole is ______. So to add or subtract a percent of a value, we add or subtract the percent from ______.

As a decimal to perform operations, 100% = _____. After we convert our percent to a decimal, we can add or subtract it from _____.

Example: A CD costs \$15.95 + 7% sales tax. What expression represents the total cost? What is the cost?

What would be the cost if the CD's price was *x*?

Setting Up and Solving Equations

Let's say you go to the store with \$20. Sodas cost \$2 each. How many sodas can you buy? (Set up AND solve the equation.)

The next time you go to the store with \$20, you decide to buy a box of cookies for \$4 and then buy sodas with the rest of the money. How many sodas can you buy? (Set up AND solve the equation.)

Finally, you go to the store a third time with \$20, but you also bring 2 friends. All three of you are getting a box of cookies and sodas with the leftover money. How many total sodas will you be able to buy? (Set up AND solve the equation.)

What is the same and different about solving each of these equations?

Practice: (1) 7x + 38 = 157 (2) $3 + \frac{x}{5} = 7$ (3) 39 + 10x = 189

Solving Inequalities

The steps for solving inequalities are similar to solving equations, but you have to _____

when you multiply or divide by a negative.

Practice: 1) $11q + 5 \le 49$ 3.5x - 10 > 17.5 $\frac{5}{7}c + \frac{2}{3} \ge 4$



We can graph these solutions on a ______, because the answer is a range of values.

Look at the number lines above. What do you notice about the inequality signs and graphs?

Complete the following table with the characteristics of these graphs.

	Includes Equal To	Not Equal To
Greater Than		
Less Than		

Now, graph the solutions to the three inequalities you solved above.

-10 -8 -6 -4 -2 0 2 4 6 8 10 -10 -8 -6 -4 -2 0 2 4 6 8 10 -10 -8 -6 -4 -2 0 2 4 6 8 10 -10 -8 -6 -4 -2 0 2 4 6 8 10

Higher-Level Questions for Discourse

1. What does it mean to solve an equation or inequality?

2. Why do we add 100% when something increases by a percentage?

Concept 3 Released EOG Questions (7.EE.1, 7.EE.2, 7.EE.4(a, b))

15 \overline{SU} intersects \overline{TV} at point R. What is the value of x, in degrees? 19 Which expression is equivalent to $-4(x+2) - \frac{1}{2}(2x-6)$?



21	Mr. Jones spent \$156 to attend a college football game.		23	What	Vhat is the solution to the inequality $-3x - 42 > 3$	
		•	Twenty percent of this cost was for a parking pass.			
		•	He spent the remainder of the money on two tickets for the game.		А	<i>x</i> > ⁻ 13
	What	t was	the price per ticket?		р	w . =10
	А	\$15	.60		Б	x < 13
	В	\$31	.20		С	<i>x</i> > ⁻ 15
	С	\$62	.40			
	D	\$12	4.80		D	<i>x</i> < ⁻ 15

- 24 Evan has a summer job to pick berries on a farm.
 - He earns \$2.00 every 15 minutes that he picks strawberries.
 - He earns \$2.40 for every 15 minutes that he picks blueberries.
 - He picked strawberries for an hour and blueberries for 45 minutes.

How much money did Evan earn?

A) \$4.40 B) \$8.80 C) \$15.20 D) \$26.40

34 Mr. Tucker earns \$250 per week working in an appliance store. In addition, he earns 2% commission on all of his sales. Last week, he sold \$2,800 worth of appliances. What was Mr. Tucker's total income for the week?

A) \$56 B) \$287 C) \$306 D) \$467

36 Which choice is equivalent to the expression shown below?

 $^{-3}(3y - 2x) + 2(5x - 4y)$

- A -3y + 2x
- B -11y + 6x
- C -13y + 8x
- D -17y + 16x

22 When Derek planted a <u>tree</u> it was 36 inches tall. The tree grew $1\frac{1}{4}$ inches per

year. The tree is now $44\frac{3}{4}$ inches tall. How many years ago did Derek plant the tree?

- A) 7 B) 8 C) 9 D) 10
- 37 Karen spends \$450 on monthly bills. Of this total amount, 12% is for phone service, $\frac{1}{10}$ is for Internet service, and $\frac{2}{9}$ is for utilities. If the rest of the total

amount is for food, how much does Karen have for food?

A) \$144.00 B) \$199.00 C) \$251.00 D) \$277.00

38 Jacob is 12 years younger than twice Elizabeth's age. Jacob is 28 years old. How old is Elizabeth?

A) 8 B) 14 C) 16 D) 20

39 Which choice is a graph of the solution set for 12 - x < 8?



40 Which expression is equivalent to 2(x - 3) + 4x + 3?

B 6x - 3

6x

C 3*x*

A

В

С

D

А

D $^{-}2x + 3$

1

1 5

-1

-3Ę

41 What is the value of x in the equation -2 = 5x + 3?

- 42 Which set of numbers is included in the solution set of 4 3x < -2?
 - A {2.5, 8, 15}
 - B {⁻8,0,1.5}
 - C {-15, -8, 0}
 - D {0, 2.5, 8}

Concept 4 - Probability (7.SP.5, 7.SP.6, 7.SP.7 (a,b), 7.SP.8 (a,b,c), 7.RP.3)

Probability - The likelihood of an event occurring, calculated by dividing

Probability is always between _____ and _____. A probability of _____ means an event NEVER occurs, and a probability of _____ means the event ALWAYS occurs. A probability of _____ means the event has the exact same chance of occurring and not occurring.

Challenge: If you roll one 6-sided die, can you come up with a situation with a...

Probability of 0?

Probability of 1?

Probability of $\frac{1}{2}$ or 0.5?

Sample Space - All of the ______ that can occur from an event. For example, in rolling two dice, the sample space is:

Adding all of the probabilities for a given sample space will equal _____, because some event must occur.

Probability can also be calculated using area, by dividing _____

Example: You win a carnival game if you can throw a dart in the square below outside the circle. If one side of the square has a length of 3 feet, what is the probability of winning the game?



Higher Level Questions for Discourse

1. Why can probability not be less than 0 or higher than 1?

2. A coin is flipped 10 times with 8 heads. Can this occur? What would you expect if you flipped the coin 100 times?

32 Jeremy will roll a number cube, numbered 1–6, twice. What is the probability of rolling an even number, then the number 3?



49 Terry placed 6 number tiles labeled 4, 7, 10, 11, 14, and 21 in a box. He will pick one of the number tiles from the box without looking. What is the probability Terry will pick a tile labeled with an even number?



50 The table below shows the different choices for making a shake at a restaurant. Joey will randomly select one dairy, one fruit, and one topping choice.

Dairy Choices	Fruit Choices	Topping Choices			
ice cream	pineapple	peanuts			
yogurt	strawberry	granola			
	banana				

What is the probability that Joey's shake will be made with ice cream, pineapple, and granola?

- A $\frac{1}{12}$
- B $\frac{1}{6}$
- C $\frac{3}{12}$
- D $\frac{3}{7}$

Concept 5 - Inferences and Statistics (7.SP.1, 7.SP.2, 7.SP.3, 7.SP.4)

Mean
Median
Quartile
Mean Absolute Deviation (MAD)
Random Sample
When comparing data sets, a random sample will give the best comparison as it will produce the most fair data.
From these samples, you can make, or guesses, about the entire population.
Higher-Level Questions for Discourse

1. When comparing data sets, how is the information provided by the mean, median, and MAD different?

2. In your own words, what makes a sample "random"?

Concept 5 Released EOG Questions (7.SP.1, 7.SP.2, 7.SP.3, 7.SP.4)

- 30 Hillary and Devin will collect data to find out where the seventh-grade students should take their field trip. Which group should Hillary and Devin survey to collect the **best** data?
 - A the first 25 students through the lunch line
 - B ten random people from each seventh-grade class
 - C all the students in a dance class
 - D twenty of their friends
- 31 The chart below shows the number of miles Sam drove each day for two weeks.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1	30	26	48	34	42	25	48
Week 2	32	23	50	32	44	23	218

What is the *approximate* difference in average daily miles between the two weeks?

A) 96	B) 48	C) 34	D) 24
11,70	\mathbf{D}	0,01	D)

33 Veronica and James are both on a bowling team. Below are their bowling scores.

Game	Veronica	James	
1	141	118	
2	159	152	
3	128	129	
4	148	127	
5	136	133	

How much higher is Veronica's median score than James's median score?

A) 12 B) 10 C) 7 D) 3

48 The table below shows the grades for three students on five assignments.

Student	Grades	
1	77, 80, 100, 75, 82	
2	84, 92, 80, 82, 85	
3	88, 80, 79, 85, 90	

Which statement below is true about the mean absolute deviation (MAD) of the students?

- A MAD of Student 3 = MAD of Student 1
- B MAD of Student 2 = MAD of Student 1
- C MAD of Student 1 < MAD of Student 3
- D MAD of Student 1 > MAD of Student 2

Concept 6 - Shapes and Geometry, 2D and 3D (7.G.3, 7.G.4, 7.G.6)

Cross Sections

If you cut the prisms below with a plane PARALLEL to the base, what shape do you make? How do you know?



If you cut the prisms below with a plane PERPENDICULAR to the base, what shape do you make? How do you know?

\bigwedge	

Circles

Radius	Diameter
Area	Formula for Area
Circumference	Formula for Circumference
П	
All of these measurements can be used to solve	e problems.
Key Words for Area	
Key Words for Circumference	
Volume and Surface Area	
Area	
Area of Rectangle	Area of Triangle
Perimeter	
Volume	
Volume of Right Prism (like a box)	Volume of Pyramid
Surface Area	
Higher-Level Questions for Discourse	

1. How do the Area and Perimeter of Polygons, Area and Circumference of Circles, and Volume and Surface Area of 3-Dimensional Shapes relate?

2. Why does the area of the base times the height tell us the volume of a prism?

Concept 6 Released EOG Questions (7.G.3, 7.G.4, 7.G.6)

12 A kitchen is shaped like a rectangle with dimensions of $11\frac{1}{2}$ ft by $9\frac{1}{2}$ ft. The floor

of the room is made of square tiles with a side length of $\frac{1}{2}$ ft. What is the number

of tiles that will cover the kitchen floor?

44 A triangular right prism is cut perpendicular to the base. What is the shape of the cross section?

A) Hexagon	B) Rectangle	C) Trapezoid	D) Triangle
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26 The circumference of a circle is 188 meters. What is the *approximate* radius of the circle?

A) 30 m B) 60 m C) 94 m D) 128 m

29 Laura's yard is in the shape of a square and a half-circle.



What is the *approximate* area of Laura's yard?

45 What is the *approximate* circumference of the circle that has a center at (2, 1) and passes through the point (2, 5)?

A) 8 units B) 13 units C) 25 units D) 50 units

46 What is the surface area of the figure below?



47 What is the volume of this triangular right prism?



Concept 7 - Scale Drawings and Construction (7.G.1, 7.G.2, 7.G.5)

Scale Drawings

Scale drawings have	sides to the actual figures, s	o they have equal	
To find missing lengths of sides, w	e can set up a	or corresponding sides.	
Example: If the rectangle below is the new rectangle?	enlarged using a scale factor of 1 7 in. 2 in.	.5, what will be the perimeter and ar	ea of
Angle Relationships			
Supplementary Angles	Complementar	y Angles	
Vertical Angles			
Adjacent Angles			
If two adjacent angles form a straig	$\frac{1}{4}$ $\frac{2}{3}$ $\frac{1}{3}$ $\frac{2}{3}$ $\frac{1}{3}$ $\frac{1}$.dd to	
Triangle Relationships			
The angles of a triangle add to	In an isosceles triang	ele, and are	equal.
In an equilateral triangle, all	and are	e equal.	

Any two sides of a triangle must add to be ______ than the third. What happens if you try to draw a triangle with sides 1 inch, 2 inches, and 3 inches?

Higher-Level Questions for Discourse

1. What other major concept do scale drawings relate to? How do they relate?

2. Can a triangle have two right angles or two obtuse angles? Why or why not?

Concept 7 Released EOG Questions (7.G.1, 7.G.2, 7.G.5)

Brett made a scale drawing of a rectangular room in his house. The actual length of the room is $12\frac{4}{5}$ ft. The scale used to make the drawing was $\frac{1}{4}$ in. = 1 ft. What

is the length, in inches, of the room on the drawing?

28 Joe's bathroom floor is 5 feet wide and 8 feet long. He will cover the floor with 3-inch square tiles. How many tiles does Joe need?

A) 120	B) 160	C) 360	D) 640
/		,	

43 Laurie will draw a scale model of the garden she wants to plant. Her scale will be 1 cm = 2.5 ft.

		А	1.6 ft by 3.4 ft
	4 cm	В	4 ft by 34 ft
8.5 cm		С	8 ft by 34 ft
limonsions of Laurio's d	ardon?	D	10 ft by 21.25 ft

What will be the actual dimensions of Laurie's garden?

- 25 Which choice shows three lengths that *cannot* be the lengths of the three sides of a triangle?
 - A 2 cm, 8 cm, 8 cm
 - B 2 cm, 3 cm, 6 cm
 - C 4 cm, 5 cm, 7 cm
 - D 5 cm, 6 cm, 9 cm
- 27 Angles T and V are complementary. Angle T has a measure of $(2x + 10)^\circ$. Angle V has a measure of 48°. What is the value of x?

A) 16⁰ B) 19⁰ C) 26⁰ D) 42⁰