



ORDERING RATIONAL NUMBERS ANSWER KEY

EXTENDED LEARNING

1. The Houston Texans 2022 Draft Class demonstrated their abilities at the NFL Combine. The players' times for the 40-yard dash are listed in the table.

PLAYER	TIME (SECONDS)
Derek Stingley	4.37
Kenyon Green	5.24
Jalen Pitre	4.43
Dameon Pierce	4.59
Christian Harris	4.44

Place the players in order from fastest to slowest.

Derek Stingley
Jalen Pitre
Christian Harris
Dameon Pierce
Kenyon Green

2. The *Ball Possession and Drive Chart* includes the number of yards gained for each ball possession. In the 2021 Week 16 Houston Texans vs Detroit Lions game at Ford Field, the yards gained for each play are listed below. If yards were lost during a play, the number is recorded as a negative number.

POSSESSION	1	2	3	4	5	6	7	8	9	10	11	12
YARDS GAINED	66	-8	52	94	52	70	40	72	-1	34	9	-3

Order the number of yards gained from greatest to least.

94, 72, 70, 66, 52, 52, 40, 34, 9, -1, -3, -8



The Stats Challenge curriculum was developed by educators at Region 4 in conjunction with the Houston Texans



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3. Each game the average number of yards gained for pass receiving is reported for all players. If yards are lost during a play, the number is recorded as a negative number. The table lists the average number of yards gained for the Houston Texans in the 2021 Week 12 Houston Texans vs New York Jets at NRG Stadium.

PLAYER	AVERAGE YARDS GAINED
Brandin Cooks	15.0
Rex Burkhead	9.0
Pharaoh Brown	0.0
Brevin Jordan	7.7
Chris Moore	-4.0
Nico Collins	14.0
Danny Amendola	7.6

Order the average number of yards gained from least to greatest.

-4.0, 0.0, 7.6, 7.7, 9.0, 14.0, 15.0

ENRICHMENT

The Ball Possession and Drive Chart also includes the net yards that the team has gained or lost at the end of each possession. Study the chart on one of the stats sheets. How is the net yards value different than the yards gain value? Which possession had the greatest net gain of yards? Which possession had the least net gain of yards?

TERMINOLOGY

Each February, hundreds of the very best college football players are invited to the NFL Scouting Combine, where executives, coaches, scouts, and doctors from all 32 NFL teams conduct an intense, four-day job interview with physical and mental tests in advance of the NFL draft.



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INTEGER OPERATIONS

ANSWER KEY

1. The table shows the number of yards gained due to plays or penalties in each play of the Houston Texans' third possession of the ball in the 2021 Week 5 Houston Texans vs New England Patriots game. If yards are lost during a play, the number is recorded as a negative number.

PLAY	1	2	3	4	5	6	7	8	9	10	11
YARDS GAINED	3	1	9	10	16	0	40	-2	0	3	-9

The net yards gained is calculated by determining the sum of the yards gained for each play of the possession. Calculate the net yards for the fifth possession.

71 Net Yards

2. The Houston Texans this past year, there was a winter storm that dropped temperatures in Houston to below freezing for an average temperature of 20 degrees. The average temperature in Houston during the Houston Texan's season is 77.5 degrees. What is the difference between the historically low temperature during the Winter Storm in Houston vs the average Houston temperature during the football season?

77.5 - 20
57.5 degrees difference



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INTEGER OPERATIONS

ANSWER KEY

3. If the opposing team's quarterback is tackled by a defensive player on the Houston Texans while the quarterback still has possession of the football, it is called a sack. In the 2021 season the average yards gained by the opposing team to the nearest integer when The Houston Texans sacked the opposing team's quarterback in the Week 13 game Vs The Indianapolis Colts is -7 yards. This means that the team loses 7 yards on average each time their quarterback is sacked. If this average continues, what will be the average yards gained/lost by the opposing team due to sacks if the team sacks their quarterback 3 times in a game?

$$3(-7 \text{ yards}) \\ -21 \text{ yards}$$

4. On a typical gameday, the kitchen at NRG stadium prepares 8,000 hot dogs. Two hundred hot dogs are discarded for quality reasons each game. The kitchen records a loss of -\$600 for each game due to discarding these hot dogs. What is the loss for each hot dog?

$$\frac{-\$600}{200} = -\$3$$

There is a loss of \$3 for every hot dog discarded

ENRICHMENT

The *Ball Possession and Drive Chart* from each Stats Report includes the net yards that the team has gained or lost at the end of each possession. Choose a Stats Report and study the chart. What was the total number of net yards for the Houston Texans? For the opposing team?



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RATIONAL NUMBER OPERATIONS

ANSWER KEY

EXTENDED LEARNING

1. The Houston Texans allow fans to purchase ticket packages for groups of ten that include game tickets and sideline passes. Your family decides to purchase a package for \$1,400. Your family will use $\frac{2}{5}$ of the tickets, and family friends will use the rest. How much money is owed to you by family friends?

$$\frac{3}{5} \cdot \$1400 = \$840$$

$\frac{2}{5}$ family $\frac{3}{5}$ friends

\$840 is owed.

2. Fans can purchase all of their favorite gear at the Houston Texans Team Shop at NRG Stadium. If each member of a family of four purchases a t-shirt for \$27.99, a key chain for \$5.99, and pays \$2.31 in sales tax, how much will the family pay?

$$4(\$27.99 + \$5.99 + \$2.31) = \$137.16$$



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RATIONAL NUMBER OPERATIONS

ANSWER KEY

3. Houston Texans Cheerleaders Gabrielle, Phoebe, Savannah, Shakiia, and Taylor are proud University of Houston Cougars. In 2021 the average yearly tuition and fees for the University of Houston is \$9,457 for in-state students. Consider if your parents have told you they plan to pay $\frac{5}{8}$ of your tuition and fees for four years of college plus the cost of your books.

- How much money would you need to save in order to pay the rest of your tuition and fees?
- If you save every month for 6 years, how much do you need to save per month?

cost of four years = \$37,828

$\frac{3}{8}$ of \$37,828 = \$14,185.50

$\frac{\$14,185.50}{72} = \197.02 per month



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RATIONAL NUMBER OPERATIONS

ANSWER KEY

ENRICHMENT

Many fans purchase Texans gear and other products to wear on gameday from shop.houstontexans.com. If you won a \$100 online gift certificate to the Houston Texans Official Online Store, how would you spend the certificate? Remember, you will need to pay sales tax on your purchase. Multiply your pre-tax total by 0.0825 to calculate 8.25% sales tax.

Problem-Solving Board

SEE: What is the question asking me to do? What do I know? What do I need to know?	PLAN: Estimate: _____
DO: (Solve) Solve the problem. Answer: _____	REFLECT: My solution is reasonable because

Questions to Ask Myself

SEE: What do I know? What do I need to know? Have I seen a similar or related problem?	PLAN: Would making the numbers simpler or working backwards help? What would a diagram of the problem look like? How will I use each relevant value?
DO: (Solve) Am I following the order of operations that match the problem's context? Am I using correct computation? Do the labels of the values make sense with each step?	REFLECT: Have I checked my computations? Is my answer reasonable? Is there another way to solve the problem and does this other way give the same solution?



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RATIOS & RATES

ANSWER KEY

EXTENDED LEARNING

1. In the 2021 Week 14 Houston Texans vs Seattle Seahawks game, the Texans successfully converted 3 of their 13 third downs to a first down or a scoring play. Use this information to complete the following sentence.

The ratio of successful conversions to unsuccessful conversions is 3:10, so the number of successful conversions is less than the number of unsuccessful conversions.

2. The Houston Texans players study their playbooks each week to prepare for gameday. Roy Lopez can learn 3 new plays in 10 minutes. If he continues at this rate, how long would it take him to learn 120 plays?

$$\frac{3 \text{ plays}}{10 \text{ minutes}} = \frac{120 \text{ plays}}{x \text{ minutes}}$$

x 40

x 40

$$x = 400 \text{ minutes}$$

or

$$6 \text{ hours } 40 \text{ minutes}$$



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RATIOS & RATES

ANSWER KEY

3. Houston Texans mascot TORO takes the field before each home game and throws red t-shirts and blue t-shirts to fans in the crowd. He starts with 24 t-shirts in his back pack. The ratio of red t-shirts to blue t-shirts is 2:1. Before going out TORO decides to add 12 more blue t-shirts to his backpack. What is the new ratio of red t-shirts to blue t-shirts?

$$\begin{array}{l}
 \text{Original: } \frac{2 \text{ red}}{1 \text{ blue}} \qquad \begin{array}{c} \overbrace{\hspace{2cm}}^{24} \\ \boxed{\begin{array}{|c|c|c|} \hline 8 & 8 & 8 \\ \hline \end{array}} \\ \text{red} \quad \text{red} \quad \text{blue} \end{array} \qquad \frac{16 \text{ red}}{8 \text{ blue}} \\
 \\
 \text{New: } \frac{16 \text{ red}}{8 + 12 \text{ blue}} = \frac{16 \text{ red}}{20 \text{ blue}} = \frac{4 \text{ red}}{5 \text{ blue}} = 4:5
 \end{array}$$

ENRICHMENT

Look at the Final Individual Statistics on one of the Stats Reports. It includes statistics on how the quarterbacks from both teams performed in the game. Write ratios comparing the number of passes attempted, the number of completions, the number of interceptions, and the number of yards gained for each player. Use these ratios to determine who you think had the better game.

TERMINOLOGY

A **completion** is when a receiver successfully catches a pass thrown by the quarterback. An **interception** happens when a member of the defensive team catches a ball thrown by the quarterback instead of the intended receiver. This results in a turnover and the defense gets the ball.



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PERCENTAGES

ANSWER KEY

EXTENDED LEARNING

1. In 2021, Houston Texans kicker Ka'imi Fairbairn attempted 19 field goals. He made 15 of the field goals. What proportion can be used to calculate the percent of the successful field goals by Fairbairn?

$$\frac{\text{successful field goals}}{\text{total field goals}} = \frac{15}{19} = \frac{x}{100}$$

2. On an average gameday, the concession stands sell hot dogs, popcorn, hamburgers, and chicken finger baskets. Hot dogs are the best-selling concession stand food and are 40% of the total number of food items sold each game. On average, the concession stands sell 7,000 hot dogs each game. How many total food items are sold each game?

$$\frac{40}{100} = \frac{7000 \text{ hotdogs}}{x \text{ food items}}$$

$$\frac{40}{100} \div \frac{20}{20} = \frac{2}{5}$$

$$\frac{2}{5} = \frac{7000 \text{ hotdogs}}{x \text{ food items}}$$

$$x = 17,500 \text{ food items}$$



PERCENTAGES

ANSWER KEY

3. During a typical Texans home game, there are 72,000 fans in attendance. Half of the fans wear mostly blue, 25% wear mostly red, 0.2 wear mostly white, and the rest wear other colors. On average, how many fans are wearing other colors?

$$50\% + 25\% + 20\% + x = 100\% \quad x = 5\% \quad \text{or} \quad 0.05 \times 72,000 = 3,600 \text{ fans}$$

$$\frac{5}{100} = \frac{x \text{ fans}}{72,000 \text{ fans}}$$

x 720 (above the fraction) and x 720 (below the fraction)

There are 3,600 fans on average wearing other colors.

4. The Houston Texans Home record in 2021 was 2 wins and 7 losses. What percentage of their home games did they win?

$$2 \text{ wins} + 7 \text{ losses} = 9 \text{ home games} \quad \frac{2 \text{ wins}}{9 \text{ games}} = 22.2\%$$

ENRICHMENT

The Final Individual Statistics from each Stats Report includes the total number of yards each player gained by rushing or pass receiving. Choose a Stats Report. What percent of the total yards gained by the Houston Texans were earned through receiving a pass?



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SOLVING ONE-STEP EQUATIONS & ONE-STEP INEQUALITIES

ANSWER KEY

EXTENDED LEARNING

1. Texans wide receiver Brandin Cooks is 70 inches tall. His teammate Brevin Jordan's height in inches, h , can be determined by solving the equation $h-5=70$. What does the equation tell us about these two players' heights in relationship to each other? What is Brevin Jordan's height?

Brandin is 5 inches shorter than Brevin Jordan
or Brevin Jordan is 5 inches taller than Brandin.

$$\begin{array}{r} h - 5 = 70 \\ + 5 \quad + 5 \\ \hline h = 75 \end{array}$$

Brevin is 75 inches tall.
(6 feet, 3 inches)

2. In 2021, Texans running back Rex Burkhead rushed the ball for 122 plays and gained an average of 3.5 yards on each play. The equation below represents the relationship between t , the total number of yards rushed by Mr. Burkhead, and his average gain for each play. How many yards rounded to the next whole number did Mr. Burkhead rush over the 122 plays?

$$\frac{t}{122} = 3.5$$

$$122 \cdot \frac{t}{122} = 3.5 \cdot 122$$

$$t = 427 \text{ yards}$$





SOLVING ONE-STEP EQUATIONS & ONE-STEP INEQUALITIES

ANSWER KEY

3. The Houston Texans Cheerleaders rehearse their routines each week. The number of hours they practice each week can be determined by solving the inequality $60r \geq 540$. What is the minimum number of hours the Cheerleaders rehearse each week?

$$\frac{60r}{60} \geq \frac{540}{60}$$

$$r \geq 9 \text{ hours}$$

4. A sack in football occurs when a defensive player tackles the quarterback for a loss of yards on a play. Hall of Fame defensive end Bruce Smith holds the current record for the most career sacks with 200. The inequality below represents the minimum number of sacks, s , Whitney Mercilus must make to break Bruce Smith's record. How many sacks must Whitney Mercilus make to break the current record for most career sacks?

$$9 + s > 200$$

$$\begin{array}{r} 9 + s > 200 \\ - 9 \quad \quad - 9 \\ \hline \end{array}$$

$$s > 191$$

ENRICHMENT

Use a Stats Report to write a problem and a one-step equation or one-step inequality comparing the performance of the Texans to the performance of the opposing team. Trade problems with another student in the class and solve the problem.

FINAL ACTIVITY

ANSWER KEY

Congratulations on completing the Houston Texans Stats Challenge presented by Schlumberger! There's just one activity left and this one is for a chance to win prizes!

Teachers, please see contest rules for specific information on how your students could win prizes.

Create a video to share with your favorite member of the Houston Texans organization about your experience with the Houston Texans Stats Challenge. In your video include an explanation of the mathematics you learned and a description of how the Stats Challenge impacted your learning. In your explanation remember to show your understanding of the mathematical concepts and use correct mathematical vocabulary.

Your video will be graded by your teacher using the following rubric. Use the rubric to guide your video creation and make any revisions necessary before submitting your video.

CATEGORY	EXPERT	PROFICIENT	DEVELOPING	NOVICE
Mathematical Concepts	The explanation shows complete understanding of the mathematics in the challenge. 50 POINTS	The explanation shows understanding of most of the mathematics in the challenge. 40 POINTS	The explanation shows some understanding of the mathematics in the challenge. 30 POINTS	The explanation shows limited understanding of the mathematics in the challenge. 20 POINTS
Mathematical Vocabulary	Accurate vocabulary is used throughout the explanation. 16 POINTS	Accurate vocabulary is used in most of the explanation. 12 POINTS	Accurate vocabulary is sometimes used in the explanation. 8 POINTS	Accurate vocabulary is rarely used in the explanation. 4 POINTS
Mathematical Exploration	The explanation is detailed and clear. 16 POINTS	The explanation is clear and has some details. 12 POINTS	The explanation includes some details and is not clear. 8 POINTS	The explanation includes few or no details and is not clear. 4 POINTS
Ideas	The ideas expressed are clear and organized. The video is easy to follow and makes a clear point. 10 POINTS	The ideas expressed are clear. The video has some organization to the ideas. 8 POINTS	The ideas expressed are not fully developed. The video was difficult to follow and would benefit from more organization. 6 POINTS	The ideas are not clear and are unorganized. The video was difficult to follow. 4 POINTS
Video Format	The video includes a greeting, a closing, and the speaking is clear and easy to follow. 8 POINTS	The video includes a greeting, a closing, and the speaking is mostly easy to follow. 6 POINTS	The video is missing a greeting or a closing. The speaking is hard to follow in some places. 4 POINTS	The video is missing a greeting and a closing. The speaking is difficult to follow. 2 POINTS