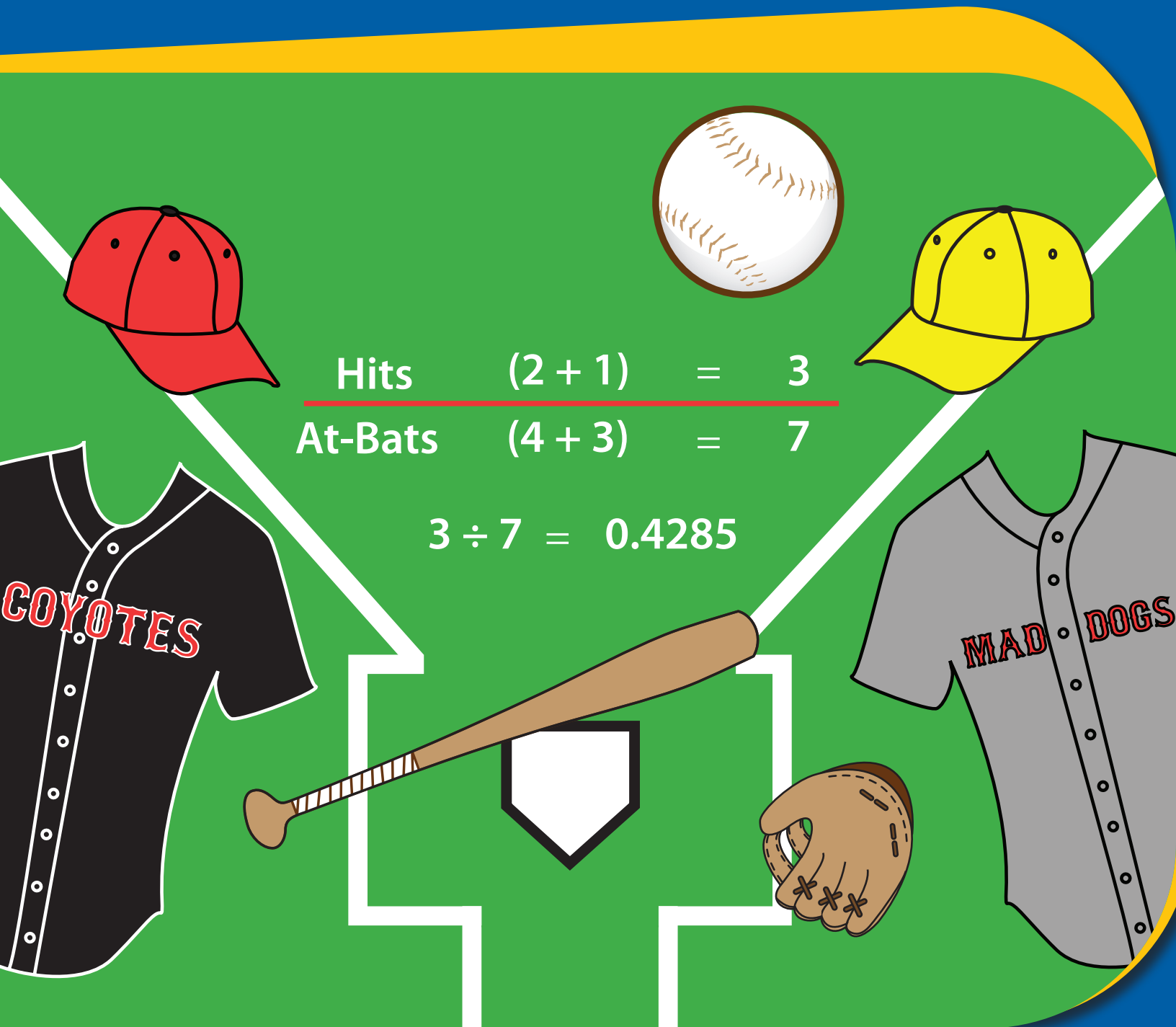


Baseball Math

5th
Grade



$$\begin{array}{rcl} \text{Hits} & (2 + 1) & = 3 \\ \hline \text{At-Bats} & (4 + 3) & = 7 \end{array}$$

$$3 \div 7 = 0.4285$$

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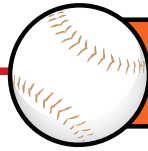
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INTRODUCTION

Baseball is a sport with fans who speak in numbers—scores, stats, and averages. How do the fans come up with these numbers, and can you make sense of them?

If you know the rules of baseball, you'll have a head start. If you don't know much about baseball, don't worry! Read this page to learn some of the words and phrases that will come up in this book.

"Pitcher" and "Batter"	In the middle of the baseball diamond stands the pitcher, and every play begins with the ball in his hand. Baseball is one of the only sports where the defense has the ball. The pitcher hurls the ball with great speed (sometimes faster than 100 miles per hour!), to home plate, where the batter (or "hitter") tries to hit the ball with a bat.
"Hits" and "Outs"	After the batter hits the ball, he runs to first base. If a defensive player (or "fielder") catches the ball in the air, the batter is out. If the defense gets the ball and tags first base before the batter gets there, the batter is out. If nobody catches the ball and nobody can throw to first base in time, the batter got a "hit." Once he's on the bases, he tries to run around the bases and back to home plate.



"Runs"	If the batter can make it around the bases to home plate, he scores a "run." In baseball: points aren't scored when a team gets a ball into a goal. Points are scored by a human running on a plate, no matter where the ball is. The team with the most runs at the end of the game wins.
"Home Runs"	The biggest hit of all is the "home run." When a batter hits a ball over the fence, it's a home run. He can take his time rounding the bases and scoring at home plate.
"Innings"	There is no clock in baseball. Instead, there are nine "innings." Each team gets to bat in an inning. Once a team makes three outs, the other team comes to bat. If the game is tied after nine innings, it keeps going into "extra innings" until one team has more runs than the other. There's no crying in baseball, and there's no tying either.

These are just the basics

These terms will help you in this workbook, but there's so much more to know about baseball. There are strikeouts, wild pitches, doubleheaders, double plays, ground rule doubles and Uncle Charlies. Batters love to hit bombs, blasts, taters, goners, jacks and dingers, but they can't stand hitting cans of corn or whiffing altogether. Pitchers throw cutters, sliders and curves, but they usually just throw stinky cheese. Runners might get into a pickle, but they're usually safe on a squeeze. Baseball sounds strange, but it's all kinds of fun!





SNACK BAR MATH

Do you know how much your favorite baseball game meal costs when sales tax is added? At the Kalamazoo Tigers game, sales tax on food is *10 percent*.

Examples:

1. James wants to buy a bag of peanuts, which costs \$2.00 plus tax. How much will the peanuts cost with tax?

Start by multiplying the cost by 10 percent to find out the tax added:

$$\$2.00 \times .10 = .20$$

Then, add the tax to the cost:

$$\$2.00 + .20 = \$2.20$$

2. Terrence wants a hot dog (\$3.00) and a small soda (\$3.00).

Because this problem has two food items, add the cost of them together first:

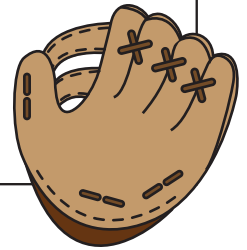
$$\$3.00 + \$3.00 = \$6.00$$

Then multiply your answer by .10:

$$\$6.00 \times .10 = .60$$

Then, find the sum:

$$\$6.00 + .60 = \$6.60$$



Now, find cost of food for the rest of people in line.

1. Megan wants to buy a small soda (\$3.00) and a small popcorn (\$2.00). How much will this cost with tax?
2. Stephen is buying food for himself and his brother. He wants a hot dog (\$4.00) and a small soda (\$3.00) and his brother wants a cheeseburger (\$5.00) and a large soda (\$4.00).
3. Amanda wants a churro (\$3.50) and peanuts (\$2.00).
4. Jamal wants a hot dog (\$4.00), a churro (\$3.50) and a small soda (\$3.00).
5. Ricky wants to buy a hot dog for himself and for all four friends who he brought with him to the game. That's five hot dogs at \$3.00 each.





ATTENDANCE & TV VIEWING

Directions: Use your addition, multiplication, and estimation skills to complete the following problems.

1. The El Paso Elephants are hoping to sell about 2 million tickets this season. After 20 games at home, they want to find out if they will meet this goal. They've sold about 25,000 tickets at each game. They have 65 more home games to go, and they expect about the same number of people will come to every game. At the end of the season, will they have sold 2 million tickets?
2. The Worldwide Baseball League wants to know how many people are watching their games on TV. There are 12 games tonight, and about 1.5 million fans tune in for each game aired. How many people in total are watching baseball?





ATTENDANCE & TV VIEWING

Later in the season, the league found more specific numbers for their viewership. Use the information below to find out how many people are watching each game.

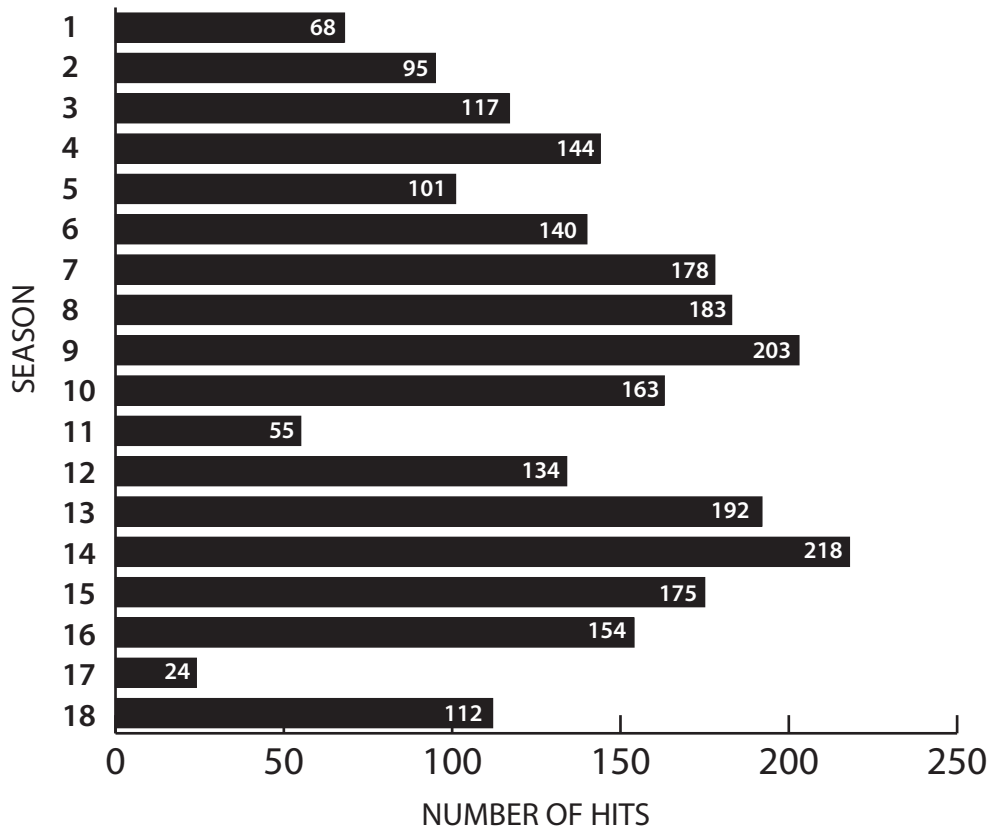
1. For 12 different games, about 1.3 million fans watched each one. How many watched in total?
2. For 5 of the games, about 1.2 million fans watched each one. How many watched in total?
3. For 2 of the games, about 1.9 million fans watched each one. How many watched in total?
4. About 2 million fans total have watched all of the El Paso Elephants' games so far this season. About 1.2 million fans have watched all of the Nacogdoches Warriors' games so far. All together, the Elephants and the Warriors have played a total of 20 games. On average, how many people have watched each game?





BENNY'S HITS

Directions: Benny has spent 18 years in pro baseball, and he's calling it a career and becoming the team's hitting coach. Look at this chart of his hit totals in each of his 18 seasons, and answer the questions.



1. How many times did Benny reach 150 hits?
2. What was the first year he reached 150 hits? Which was the last?
3. How many more hits did Benny have in year 14 than he had in year 13?
4. Find Benny's average number of hits per season.
5. Benny missed a lot of games in his first season because he joined the pro team near the end of the season. In seasons 2, 5, 11 and 17, he missed a lot of games because he was hurt. Ignoring these five seasons, find Benny's average number of hits in the 13 other seasons.
6. Look closely at the numbers for the seasons when Benny was hurt. What trends do you notice?





$3 \div 9 = 0.333$

In baseball, we often round numbers to the thousandths place, which means we'll have three digits on the right side of the decimal point. In that case, we'd round this number to 0.333.

1. Decide which digit to round to:

- 2.** Look at the digit to the right of the last digit.

- This makes sense because 562.75 is closer to 563 than it is to 562.





ROUNDING DECIMALS

Round these numbers to **whole numbers**:

287.32

901.8

12.0913442

6,843.36

37.9

Round these numbers to the **tenths place**:

12.80234

453.36

1.97

56.873

9,308.34

Round these numbers to the **hundredths place**:

45.1074

9.008

412.3903

0.352

706.429

Round these numbers to the **thousandths place**:

908.87321

4.50892

32.8543

0.2666666

812.3845





RANKING BATTING AVERAGES

In this workbook, you will need to know how to rank decimals. Here's how:

. 3 1 8
↑ ↑ ↑ ↑

- **First arrow: Decimal point**
- **Second arrow (pointing to 3): Tenths place**
- **Third arrow: Hundreds Place**
- **Fourth arrow: Thousands Place**

Which decimal is larger: .318 or .313? The first two digits are the same, so we can move on to the third. Since 8 is higher than 3, .318 is higher than .313.

Practice ranking the averages for the Ocean City Crabs using the table below. Rewrite the batting averages for the players in order from highest to lowest in the blank table on the right.

PLAYER	AVERAGE
Leo	.290
Israel	.234
Floyd	.301
Russell	.282
Jeremy	.217
Dennis	.345
Elijah	.254
Abel	.287
Santos	.293
Gregg	.314
Tom	.235
Alex	.256
Jay	.308

PLAYER	AVERAGE





CALCULATING BATTING AVERAGE

Batting average is a number that shows how many of a player's at-bats result in a base hit.

Calculating batting average is easy! Divide a player's **base hits** by his number of **at-bats**.

Example:

Jimmy had **20** at-bats and **6** base hits:

$$6 \div 20 = 0.3$$

That means Jimmy got a hit **30 percent** of the time, but batting average is expressed in decimals. To write Jimmy's batting average, convert the percentage to a decimal to the thousandth place.

Remember: don't write a 0 before the decimal point!

$$30\% = .300$$

Talking about averages is a different story! To say it out loud, say "three hundred". An average of .275 is "two seventy-five", and a .238 is "two thirty-eight", and so on.

Express the percentages below as written and spoken batting averages!

50 percent

Written: _____

Spoken: _____

29 percent

Written: _____

Spoken: _____

35 percent

Written: _____

Spoken: _____

45 percent

Written: _____

Spoken: _____

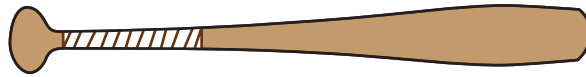




CALCULATING BATTING AVERAGE

Sometimes the decimal you calculate will go far beyond the thousandths place! Make sure to round it up or down.

0.256146 0.256 .256 or "Two fifty-six"



Calculate the batting averages of these players.

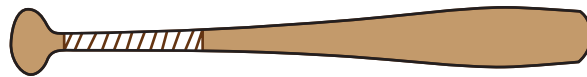
1. Carlos had 7 base hits in 19 at-bats.
2. Jeff had 8 base hits in 24 at-bats.
3. Michael had 5 base hits in 20 at-bats.
4. Andrew had 10 base hits in 23 at-bats.
5. Rafael had 9 base hits in 21 at-bats.
6. Paul had 13 base hits in 30 at-bats.





FIND THE MISSING NUMBERS

The Poughkeepsie Pilots played a three-game series against the Bowie Badgers, and this is a table of their hits, at-bats and batting averages. But the Badgers must have taken a bite of this scorecard, because some of the numbers are missing! Fill in the missing numbers.



PLAYER	HITS	AT-BATS	BATTING AVERAGE
Desmond		9	.333
Chris	6		.500
Omar	2	8	
Quan		15	.400
Matthew		12	.167
Leonard	3		.300
Oliver	3	12	
William		10	.200
Darrell	4		.308
TOTALS			





MEAN, MEDIAN, AND MODE

Now that you've calculated batting average, you know how to find the mean. "Mean" is another word for "average". Add up the numbers, then divide by how many numbers there are.

Median is the "middle" value in a group of numbers. To find the median, you need to write the list of numbers in order. Then locate the number in the middle. That is your median.

Example:

7, 3, 1, 4, 6, 2, 3, 1, 4

In order from least to greatest:

1, 2, 3, 3, 3, 4, 4, 6, 7

Find the median by locating the number (or, if it's an even amount, the two numbers) in the middle of the group.

The median is 3.

Mode is the number that appears the most times in the list. In the list of numbers above, **3** appears more than any other number. If no number occurs more than once, there is no mode.





MEAN, MEDIAN, AND MODE

The Danbury Dragons played the Springfield Serpents every day this week. Here is a list of the scores of their games.

DAY	DRAGONS	SERPENTS
Sunday	4	1
Monday	2	11
Tuesday	3	2
Wednesday	8	2
Thursday	4	5
Friday	5	0
Saturday	1	7

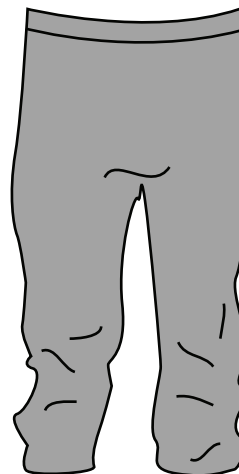
1. What is the mean of the Dragons' runs?
2. What is the mode?
3. What is the median?
4. What is the mean number of runs for both teams (what is the average number of runs either team scored in a game? (Hint: you will need to divide by 14.)
5. What is the mode of all the scores?
6. Which team scored more runs during the week?





DRESS FOR SUCCESS

Check out the Coyotes new uniforms!



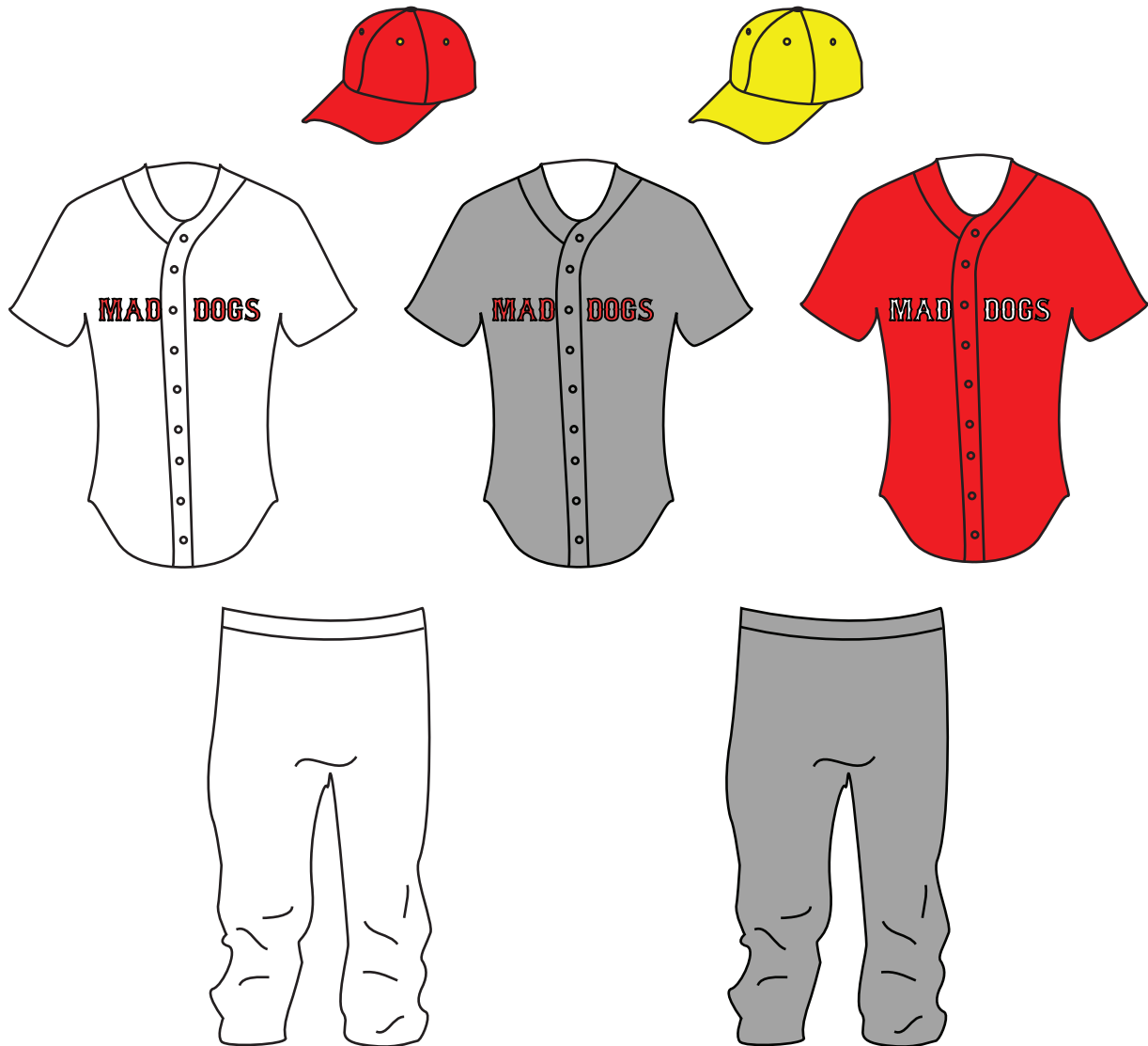
How many different combinations of hats, jerseys and pants can the Coyotes wear?





DRESS FOR SUCCESS

The Mad Dogs also got new uniforms, but they have rules about what to wear. First, they can only wear white jerseys with white pants, and they can only wear gray jerseys with gray pants. Second, they can't wear red jerseys with yellow hats.



How many different combinations of hats, jerseys and pants can the Mad Dogs wear?





ERA: EARNED RUN AVERAGE

ERA stands for “earned run average,” and it shows how many earned runs a pitcher gave up per nine innings pitched.

Here’s the formula:

$$(\text{Earned Runs} \div \text{Innings Pitched}) \times 9$$

Example:

Example: Roger pitched six innings today. He allowed 3 runs.

$$(3 \div 6) \times 9 = 4.50$$

Your turn! Find out the ERA for these pitchers:

1. Myles allowed 2 runs in six innings.
2. Reid allowed 5 runs in eight innings.
3. Byron allowed 1 runs in seven innings.
4. Johnnie allowed 18 runs in 51 innings.
5. Leo allowed 28 runs in 62 innings.
6. Dave allowed 25 runs in 72 innings.
7. Tyler allowed 26 runs in 59 innings.
8. Ramon allowed 66 runs in 189 innings.





HOW MANY GAMES BACK?

"Games back" is number that shows how far a team is from first place. To find games back, use this formula:

$$(\text{Difference in wins} + \text{difference in losses}) \div 2$$

Here's a basic example:

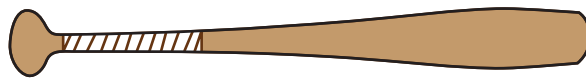
TEAM	WINS	LOSSES
Wildcats	37	24
Knights	34	29
Rebels	33	31

The Wildcats are in first place. They have 3 more wins and 5 fewer losses than the Knights. How many games back are the Knights?

$$(3 + 5) \div 2 = 4 \text{ games back}$$

The Wildcats have 4 more wins and 7 fewer losses than the Rebels. How many games back are the Rebels?

$$(4 + 7) \div 2 = 5.5 \text{ games back}$$



Complete this table to find the games back for all teams who aren't in first place.

TEAM	WINS	LOSSES	GAMES BACK
Racers	38	23	--
Alligators	36	25	
Owls	30	29	
Wolves	24	38	
Nomads	22	39	





SLUGGING PERCENTAGE

Slugging percentage is almost like batting average, but it also considers what types of hit a player gets.

To calculate slugging percentage, use the chart below to find a player's total bases.

Single: the player makes it to 1st base.	Multiply the number of times he hit a single by 1 .
Double: the player makes it to 2nd base.	Multiply the number of times he hit a double by 2 .
Triple: the player makes it to 3rd base.	Multiply the number of times he hit a triple by 3 .
Home Run: the player makes it to home.	Multiply the number of times he hit a home run by 4 .

Example:

Ben and Andre both have a batting average of .300, but Ben hits almost all singles and Andre hits more doubles and home runs. This means Andre's slugging percentage is higher than Ben's, since he has more total bases.

Calculate Andre's slugging percentage by adding together his total bases from his three most recent games. Out of **16** at-bats, he had **2** singles, **1** double and **2** home runs. Multiply these by the number of bases in the type of hit. (See the chart above if you need help!)

$$2 \text{ singles} \times 1 \text{ base} = 2 \text{ bases}$$

$$1 \text{ double} \times 2 \text{ bases} = 2 \text{ bases}$$

$$0 \text{ triples} \times 3 \text{ bases} = 0 \text{ bases}$$

$$2 \text{ home runs} \times 4 \text{ bases} = 8 \text{ bases}$$

$$2+2+0+8 = 12 \text{ total bases}$$

Divide Andre's total bases by the number of times he batted.

$$12 \div 16 = .750 \text{ slugging percentage}$$





SLUGGING PERCENTAGE

Use the information in the table below to find the slugging percentages for these players from the Medford Miners. See the previous page if you need help!

PLAYER	SINGLES	DOUBLES	TRIPLES	HOME RUNS	AT-BATS	BATTING AVERAGE	SLUGGING %
Casey	2	2	0	0	15	.267	
Duane	3	1	1	0	15	.333	
Everett	1	0	0	1	12	.250	
Brad	3	0	0	1	14	.286	
Nolan	3	0	0	0	15	.200	
Mark	1	2	0	1	15	.333	

Once you've found them, answer the questions below.

1. Duane and Mark both have .333 batting averages. Who has the higher slugging percentage?
2. Who has the highest slugging percentage *without* hitting a home run?
3. There's one player who has a higher batting average but lower slugging percentage than another player. Who is it?





"THE SPEEDSTER"

Meet Damon, also known as "The Speedster." He has plenty of other nicknames: "Flash," "Lightning," "Sweet Feet" and "Wheels." He's the fastest runner in professional baseball!

However, even Damon gets thrown out sometimes when he's trying to steal a base. In baseball, **stolen base percentage** shows how often a player is successful when trying to steal a base.

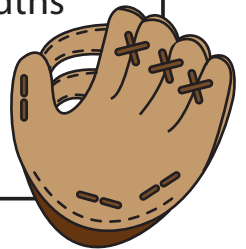
Here's how you find it:

Divide the number of steals by the number of stealing attempts.
Here's Damon's first season as an example:

$$23 \text{ stolen bases} \div 39 \text{ stealing attempts} = .589744$$

It's expressed the same as batting average, with three digits to the right of the decimal point. Round the number to the thousandths place.

$$.589744 \rightarrow .590$$



Find Damon's stolen base percentage and fill out this chart, then answer the questions on the next page.

Season	Steals	Stealing Attempts	SB%
1	23	39	.590
2	34	58	
3	31	52	
4	25	38	
5	22	30	
6	24	31	
7	21	28	





"THE SPEEDSTER"

1. In which season did Damon steal the most bases?
2. In which season did Damon attempt the most steals?
3. In which season did Damon record his best stolen base percentage?
4. If you were Damon's coach, would you tell him to attempt more or fewer steals each season? Why?
5. What do you notice about these statistics?





WHAT SHOULD THE MANAGER DO?

Baseball is a game of strategy, and managers use numbers to decide their strategy. One group of numbers that they look to is the “splits” or “lefty-righty.” For batters, splits show how well the batter does against right-handed pitchers and left-handed pitchers. Pitchers also have split statistics, showing how well they do against right-handed batters and left-handed batters. Most batters do better against opposite-handed pitchers (for example, a right-handed batter would have a better average against a lefty).

Here’s a table showing a group of batters and their batting averages against right-handed pitchers (RHP) and left-handed pitchers (LHP). The letters next to the players’ names are for right-handed or left-handed.

PLAYER	vs. RHP	vs. LHP
Trent (R)	.223	.314
Pete (L)	.279	.246
Wade (R)	.250	.306

If you were the manager, and you could choose one of these batters to face a right-handed pitcher, who should you choose?





WHAT SHOULD THE MANAGER DO?

Let's make this tougher! This is the lineup for the Nighthawks, listed in its batting order. You are the manager for the Eagles.

ORDER	PLAYER	vs. RHP	vs. LHP
1	Trent (R)	.223	.314
2	Pete (L)	.279	.246
3	Wade (R)	.250	.306
4	Percy (R)	.276	.299
5	Toby (L)	.300	.283
6	Micah (L)	.257	.262
7	Vicente (R)	.212	.253
8	Eldon (R)	.240	.249

1. Would you choose a righty or a lefty to start the game against the Nighthawks?
2. There is one out in the 7th inning, and you can bring in a new pitcher to face two batters: Toby and Micah. Would you call in the lefty or the righty?
3. It's crunch time! You are starting the 9th inning with a new pitcher to face three batters: Wade, Percy and Toby. Are you choosing the lefty or the righty?
4. Which Nighthawks player has the biggest difference between his splits? Who has the smallest difference?





YOU MAKE THE CALL!

For once, there are no wrong answers! It's time for you to decide how to answer these questions.

Baseball is unpredictable. That's one great thing about it. You never know what you're going to see! Look at these standings for the first half of season (81 games). In the second half, each team will be playing 81 more games. Answer the questions below, but make sure you have a reason for your answer. Ask your family or friends what they think.

Team	Wins	Losses
Cobras	51	30
Mustangs	49	32
Hornets	43	38
Pilots	40	41
Cougars	40	41
Bobcats	37	44
Firebirds	35	46
Panthers	33	48



1. The Cobras will play the Cougars three more times. How many games will the Cobras win?
2. The Hornets will play the Panthers five more times. How many games will the Hornets win?





YOU MAKE THE CALL!

3. You have to predict which team will end the season with the most wins. Here are your options:

- Option 1: Cobras
- Option 2: Mustangs **or** Hornets
- Option 3: Any of the other five teams

Which option do you choose?

4. During the first half of the season, the Cougars played the Mustangs six times. The Cougars won five of those games. In the second half, they'll play against each other six more times. How many of those games do you think the Cougars will win?

5. Which of these two scenarios is more likely to happen?

- The Firebirds end the season with more wins than the Cobras.
- The Pilots ends the season with the most wins.

6. Which of these two scenarios is more likely to happen?

- The Bobcats end the season with fewest wins **and** the Mustangs end the season with the most wins
- The Panthers end the season with the fewest wins **and** the Pilots end the season with the most wins





JUST FOR FUN!

Directions: Put the numbers in order from least to greatest, then enter them in order in the table below. Use the code to solve the riddle!

.8 .75 .13 9/10 .25 1/3 3/10 .1 5/9 1/2

B	P	U	D	Y	L	E	L	O	A



Man's best friend is a dog. Pitcher's best friend is a...

3/10	.8	.25	.1	1/2	5/9	---	.13	.75	9/10	1/3





Great job!

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Answer Sheets

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Answer Sheet



SNACK BAR MATH

Do you know how much your favorite baseball game meal costs when sales tax is added? At the Kalamazoo Tigers game, sales tax on food is *10 percent*.

Examples:

1. James wants to buy a bag of peanuts, which costs \$2.00 plus tax. How much will the peanuts cost with tax?

Start by multiplying the cost by 10 percent to find out the tax added:

$$\$2.00 \times .10 = .20$$

Then, add the tax to the cost:

$$\$2.00 + .20 = \$2.20$$

2. Terrence wants a hot dog (\$3.00) and a small soda (\$3.00).

Because this problem has two food items, add the cost of them together first:

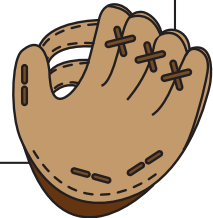
$$\$3.00 + \$3.00 = \$6.00$$

Then multiply your answer by .10:

$$\$6.00 \times .10 = .60$$

Then, find the sum:

$$\$6.00 + .60 = \$6.60$$



Now, find cost of food for the rest of people in line.

1. Megan wants to buy a small soda (\$3.00) and a small popcorn (\$2.00). How much will this cost with tax?

$$\$3.00 + \$2.00 = \$5.00; \$5.00 \times .10 = .50; \$5.00 + .50 = \$5.50$$

2. Stephen is buying food for himself and his brother. He wants a hot dog (\$4.00) and a small soda (\$3.00) and his brother wants a cheeseburger (\$5.00) and a large soda (\$4.00).

$$\$4.00 + \$3.00 + \$5.00 + \$4.00 = \$16.00; \$16.00 \times .10 = \$1.60; \$16.00 + \$1.60 = \$17.60$$

3. Amanda wants a churro (\$3.50) and peanuts (\$2.00).

$$\$3.50 + \$2.00 = \$5.50; \$5.50 \times .10 = .55; \$5.50 + .55 = \$6.05$$

4. Jamal wants a hot dog (\$4.00), a churro (\$3.50) and a small soda (\$3.00).

$$\$4.00 + \$3.50 + \$3.00 = \$10.50; \$10.50 \times .10 = \$1.05; \$10.50 + \$1.05 = \$11.55$$

5. Ricky wants to buy a hot dog for himself and for all four friends who he brought with him to the game. That's five hot dogs at \$3.00 each.

$$5 \times \$3.00 = \$15.00; \$15.00 \times .10 = \$1.50; \$15.00 + \$1.50 = \$16.50$$



Answer Sheet



ATTENDANCE & TV VIEWING

Directions: Use your addition, multiplication, and estimation skills to complete the following problems.

1. The El Paso Elephants are hoping to sell about 2 million tickets this season. After 20 games at home, they want to find out if they will meet this goal. They've sold about 25,000 tickets at each game. They have 65 more home games to go, and they expect about the same number of people will come to every game. At the end of the season, will they have sold 2 million tickets?

Answer: Yes!

How many games? $20 + 65 = 85$

$25,000 \times 85 = 2,125,000$

Even if their estimate of 25,000 tickets per game is a bit high, there is still a good chance they'd sell 2 million tickets.

2. The Worldwide Baseball League wants to know how many people are watching their games on TV. There are 12 games tonight, and about 1.5 million fans tune in for each game aired. How many people in total are watching baseball?

$12 \times 1,500,000 = 18,000,000$ or 18 million



Answer Sheet



ATTENDANCE & TV VIEWING

Later in the season, the league found more specific numbers for their viewership. Use the information below to find out how many people are watching each game.

1. For 12 different games, about 1.3 million fans watched each one. How many watched in total?

$$12 \times 1,300,000 = 15,600,000$$

2. For 5 of the games, about 1.2 million fans watched each one. How many watched in total?

$$5 \times 1,200,000 = 6,000,000$$

3. For 2 of the games, about 1.9 million fans watched each one. How many watched in total?

$$2 \times 1,900,000 = 3,800,000$$

4. About 2 million fans total have watched all of the El Paso Elephants' games so far this season. About 1.2 million fans have watched all of the Nacogdoches Warriors' games so far. All together, the Elephants and the Warriors have played a total of 20 games. On average, how many people have watched each game?

$$2,000,000 + 1,200,000 = 3,200,000$$

$$3,200,000 \div 20 = 160,000$$

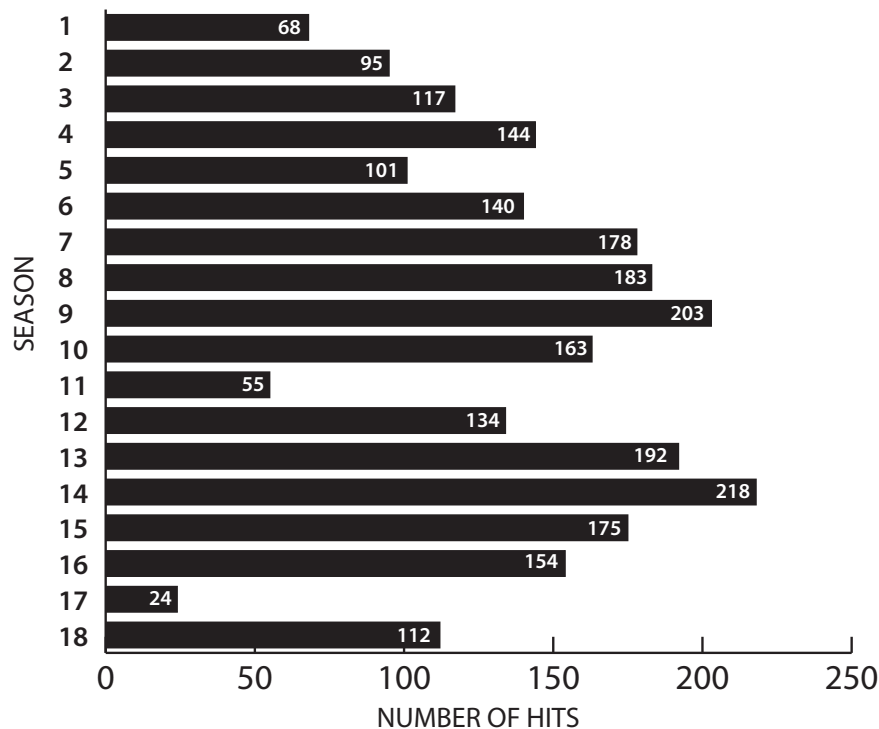


Answer Sheet



BENNY'S HITS

Directions: Benny has spent 18 years in pro baseball, and he's calling it a career and becoming the team's hitting coach. Look at this chart of his hit totals in each of his 18 seasons, and answer the questions.



1. How many times did Benny reach 150 hits? **8**
2. What was the first year he reached 150 hits? Which was the last? **Year 7; Year 16**
3. How many more hits did Benny have in year 14 than he had in year 13? **26**
4. Find Benny's average number of hits per season. **$2456/18=136$**
5. Benny missed a lot of games in his first season because he joined the pro team near the end of the season. In seasons 2, 5, 11 and 17, he missed a lot of games because he was hurt. Ignoring these five seasons, find Benny's average number of hits in the 13 other seasons. **$2113/13=163$**
6. Look closely at the numbers for the seasons when Benny was hurt. What trends do you notice? **He always had low hit numbers the year after the years he was injured. Then, his numbers steadily rose to a peak number, and then steadily dropped back down before another injury. These are just two trends to notice. You may notice something different!**



Answer Sheet



ROUNDING DECIMALS

Round these numbers to **whole numbers**:

$$287.32 = 287$$

$$901.8 = 902$$

$$12.0913442 = 12$$

$$6,843.36 = 6,843$$

$$37.9 = 38$$

Round these numbers to the **tenths place**:

$$12.80234 = 12.8$$

$$453.36 = 453.4$$

$$1.97 = 2.0$$

$$56.873 = 56.9$$

$$9,308.34 = 9,308.3$$

Round these numbers to the **hundredths place**:

$$45.1074 = 45.11$$

$$9.008 = 9.01$$

$$412.3903 = 412.39$$

$$0.352 = 0.35$$

$$706.429 = 706.43$$

Round these numbers to the **thousandths place**:

$$908.87321 = 908.873$$

$$4.50892 = 4.509$$

$$32.8543 = 32.854$$

$$0.2666666 = 0.267$$

$$812.3845 = 812.385$$



Answer Sheet



RANKING BATTING AVERAGES

In this workbook, you will need to know how to rank decimals. Here's how:

. 3 1 8
↑ ↑ ↑ ↑

- First arrow: Decimal point
- Second arrow (pointing to 3): Tenths place
- Third arrow: Hundreds Place
- Fourth arrow: Thousands Place

Which decimal is larger: .318 or .313? The first two digits are the same, so we can move on to the third. Since 8 is higher than 3, .318 is higher than .313.

Practice ranking the averages for the Ocean City Crabs using the table below. Rewrite the batting averages for the players in order from highest to lowest in the blank table on the right.

PLAYER	AVERAGE
Leo	.290
Israel	.234
Floyd	.301
Russell	.282
Jeremy	.217
Dennis	.345
Elijah	.254
Abel	.287
Santos	.293
Gregg	.314
Tom	.235
Alex	.256
Jay	.308

PLAYER	AVERAGE
Dennis	.345
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Russell	.282
Alex	.256
Elijah	.254
Tom	.235
Israel	.234
Jeremy	.217



Answer Sheet



CALCULATING BATTING AVERAGE

Batting average is a number that shows how many of a player's at-bats result in a base hit.

Calculating batting average is easy! Divide a player's **base hits** by his number of **at-bats**.

Example:

Jimmy had **20** at-bats and **6** base hits:

$$6 \div 20 = 0.3$$

That means Jimmy got a hit **30 percent** of the time, but batting average is expressed in decimals. To write Jimmy's batting average, convert the percentage to a decimal to the thousandth place. Remember: don't write a 0 before the decimal point!

$$30\% = .300$$

Talking about averages is a different story! To say it out loud, say "three hundred". An average of .275 is "two seventy-five", and a .238 is "two thirty-eight", and so on.

Express the percentages below as written and spoken batting averages!

50 percent

Written: .500

Spoken: Five hundred

29 percent

Written: .290

Spoken: Two ninety

35 percent

Written: .350

Spoken: Three fifty

45 percent

Written: .450

Spoken: Four fifty



Answer Sheet



CALCULATING BATTING AVERAGE

Sometimes the decimal you calculate will go far beyond the thousandths place! Make sure to round it up or down.

0.256146 0.256 .256 or "Two fifty-six"



Calculate the batting averages of these players.

1. Carlos had 7 base hits in 19 at-bats.
 $7 / 19 = 0.3684210 = .368$ "three sixty-eight"
2. Jeff had 8 base hits in 24 at-bats.
 $8 / 24 = 0.3333333 = .333$ "three thirty-three"
3. Michael had 5 base hits in 20 at-bats.
 $5 / 20 = 0.25 = .250$ "two fifty"
4. Andrew had 10 base hits in 23 at-bats.
 $10 / 23 = 0.4347826 = .435$ "four thirty-five"
5. Rafael had 9 base hits in 21 at-bats.
 $9 / 21 = 0.4285714 = .429$ "four twenty-nine"
6. Paul had 13 base hits in 30 at-bats.
 $13 / 30 = 0.4333333 = .433$ "four thirty-three"



Answer Sheet



FIND THE MISSING NUMBERS

The Poughkeepsie Pilots played a three-game series against the Bowie Badgers, and this is a table of their hits, at-bats and batting averages. But the Badgers must have taken a bite of this scorecard, because some of the numbers are missing! Fill in the missing numbers.



PLAYER	HITS	AT-BATS	BATTING AVERAGE
Desmond	3	9	.333
Chris	6	12	.500
Omar	2	8	.250
Quan	6	15	.400
Matthew	2	12	.167
Leonard	3	10	.300
Oliver	3	12	.250
William	2	10	.200
Darrell	4	13	.308
TOTALS	31	101	.307



Answer Sheet



MEAN, MEDIAN, AND MODE

The **Danbury Dragons** played the Springfield Serpents every day this week. Here is a list of the scores of their games.

DAY	DRAGONS	SERPENTS
Sunday	4	1
Monday	2	11
Tuesday	3	2
Wednesday	8	2
Thursday	4	5
Friday	5	0
Saturday	1	7

1. What is the mean of the Dragons' runs?

$$27 / 7 = 3.857$$

2. What is the mode?

4

3. What is the median?

4

4. What is the mean number of runs for both teams (what is the average number of runs either team scored in a game? (Hint: you will need to divide by 14.)

$$55 / 14 = 3.929$$

5. What is the mode of all the scores?

2

6. Which team scored more runs during the week?

Serpents

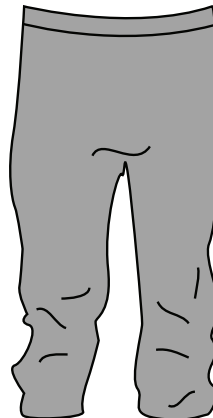


Answer Sheet



DRESS FOR SUCCESS

Check out the Coyotes new uniforms!



How many different combinations of hats, jerseys and pants can the Coyotes wear?

12

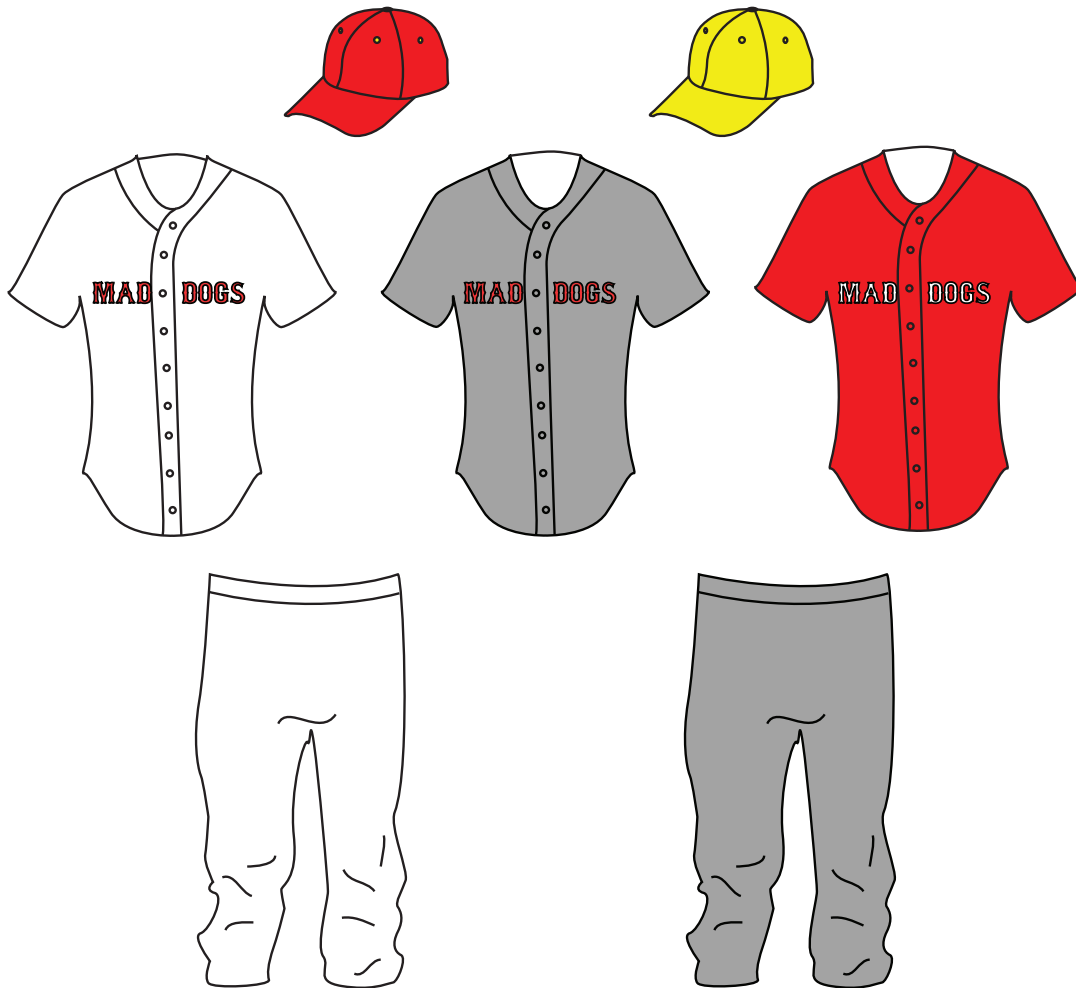


Answer Sheet



DRESS FOR SUCCESS

The **Mad Dogs** also got new uniforms, but they have rules about what to wear. First, they can only wear white jerseys with white pants, and they can only wear gray jerseys with gray pants. Second, they can't wear red jerseys with yellow hats.



How many different combinations of hats, jerseys and pants can the Mad Dogs wear?

6



Answer Sheet



ERA: EARNED RUN AVERAGE

ERA stands for “earned run average,” and it shows how many earned runs a pitcher gave up per nine innings pitched.

Here's the formula:

$$(\text{Earned Runs} \div \text{Innings Pitched}) \times 9$$

Example:

Example: Roger pitched six innings today. He allowed 3 runs.

$$(3 \div 6) \times 9 = 4.50$$

Your turn! Find out the ERA for these pitchers:

1. Myles allowed 2 runs in six innings. **3.00**
2. Reid allowed 5 runs in eight innings. **5.63**
3. Byron allowed 1 runs in seven innings. **1.29**
4. Johnnie allowed 18 runs in 51 innings. **3.18**
5. Leo allowed 28 runs in 62 innings. **4.06**
6. Dave allowed 25 runs in 72 innings. **3.13**
7. Tyler allowed 26 runs in 59 innings. **3.97**
8. Ramon allowed 66 runs in 189 innings. **3.14**



Answer Sheet



HOW MANY GAMES BACK?

"Games back" is number that shows how far a team is from first place. To find games back, use this formula:

$$(\text{Difference in wins} + \text{difference in losses}) \div 2$$

Here's a basic example:

TEAM	WINS	LOSSES
Wildcats	37	24
Knights	34	29
Rebels	33	31

The Wildcats are in first place. They have 3 more wins and 5 fewer losses than the Knights. How many games back are the Knights?

$$(3 + 5) \div 2 = 4 \text{ games back}$$

The Wildcats have 4 more wins and 7 fewer losses than the Rebels. How many games back are the Rebels?

$$(4 + 7) \div 2 = 5.5 \text{ games back}$$



Complete this table to find the games back for all teams who aren't in first place.

TEAM	WINS	LOSSES	GAMES BACK
Racers	38	23	--
Alligators	36	25	2
Owls	30	29	7
Wolves	24	38	14.5
Nomads	22	39	16



Answer Sheet



SLUGGING PERCENTAGE

Use the information in the table below to find the slugging percentages for these players from the Medford Miners. See the previous page if you need help!

PLAYER	SINGLES	DOUBLES	TRIPLES	HOME RUNS	AT-BATS	BATTING AVERAGE	SLUGGING %
Casey	2	2	0	0	15	.267	.400
Duane	3	1	1	0	15	.333	.533
Everett	1	0	0	1	12	.250	.417
Brad	3	0	0	1	14	.286	.500
Nolan	3	0	0	0	15	.200	.200
Mark	1	2	0	1	15	.333	.600

Once you've found them, answer the questions below.

1. Duane and Mark both have .333 batting averages. Who has the higher slugging percentage?
Mark
2. Who has the highest slugging percentage *without* hitting a home run?
Duane, .533
3. There's one player who has a higher batting average but lower slugging percentage than another player. Who is it?
Casey. His batting average (.267) is higher than Everett's (.250), but his slugging percentage (.400) is lower than Everett's (.417).



Answer Sheet



"THE SPEEDSTER"

Meet **Damon**, also known as "The Speedster." He has plenty of other nicknames: "Flash," "Lightning," "Sweet Feet" and "Wheels." He's the fastest runner in professional baseball!

However, even Damon gets thrown out sometimes when he's trying to steal a base. In baseball, **stolen base percentage** shows how often a player is successful when trying to steal a base.

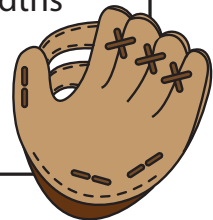
Here's how you find it:

Divide the number of steals by the number of stealing attempts.
Here's Damon's first season as an example:

$$23 \text{ stolen bases} \div 39 \text{ stealing attempts} = .589744$$

It's expressed the same as batting average, with three digits to the right of the decimal point. Round the number to the thousandths place.

$$.589744 \rightarrow .590$$



Find **Damon's stolen base percentage** and fill out this chart, then answer the questions on the next page.

Season	Steals	Stealing Attempts	SB%
1	23	39	.590
2	34	58	.586
3	31	52	.596
4	25	38	.658
5	22	30	.733
6	24	31	.774
7	21	28	.750



Answer Sheet



"THE SPEEDSTER"

1. In which season did Damon steal the most bases?

2

2. In which season did Damon attempt the most steals?

2

3. In which season did Damon record his best stolen base percentage?

6

4. If you were Damon's coach, would you tell him to attempt more or fewer steals each season? Why?

Fewer. When he attempts fewer stolen bases, he has a higher stolen base percentage.

5. What trends do you notice about these statistics?

When he attempts fewer steals, he has a higher stolen base percentage. Also, he generally attempted fewer steals each season (with the exception of season 7).



Answer Sheet



WHAT SHOULD THE MANAGER DO?

Baseball is a game of strategy, and managers use numbers to decide their strategy. One group of numbers that they look to is the “splits” or “lefty-righty.” For batters, splits show how well the batter does against right-handed pitchers and left-handed pitchers. Pitchers also have split statistics, showing how well they do against right-handed batters and left-handed batters. Most batters do better against opposite-handed pitchers (for example, a right-handed batter would have a better average against a lefty).

Here’s a table showing a group of batters and their batting averages against right-handed pitchers (RHP) and left-handed pitchers (LHP). The letters next to the players’ names are for right-handed or left-handed.

PLAYER	vs. RHP	vs. LHP
Trent (R)	.223	.314
Pete (L)	.279	.246
Wade (R)	.250	.306

If you were the manager, and you could choose one of these batters to face a right-handed pitcher, who should you choose?

Pete



Answer Sheet



WHAT SHOULD THE MANAGER DO?

Let's make this tougher! This is the lineup for the Nighthawks, listed in its batting order. You are the manager for the Eagles.

ORDER	PLAYER	vs. RHP	vs. LHP
1	Trent (R)	.223	.314
2	Pete (L)	.279	.246
3	Wade (R)	.250	.306
4	Percy (R)	.276	.299
5	Toby (L)	.300	.283
6	Micah (L)	.257	.262
7	Vicente (R)	.212	.253
8	Eldon (R)	.240	.249

1. Would you choose a righty or a lefty to start the game against the Nighthawks?

Righty

2. There is one out in the 7th inning, and you can bring in a new pitcher to face two batters: Toby and Micah. Would you call in the lefty or the righty?

Lefty

3. It's crunch time! You are starting the 9th inning with a new pitcher to face three batters: Wade, Percy and Toby. Are you choosing the lefty or the righty?

Righty

4. Which Nighthawks player has the biggest difference between his splits? Who has the smallest difference?

Trent; Micah



Answer Sheet



JUST FOR FUN!

Directions: Put the numbers in order from least to greatest, then enter them in order in the table below. Use the code to solve the riddle!

.8 .75 .13 9/10 .25 1/3 3/10 .1 5/9 1/2

B	P	U	D	Y	L	E	L	O	A



Man's best friend is a dog. Pitcher's best friend is a...

D	O	U	B	L	E		P	L	A	Y
3/10	.8	.25	.1	1/2	5/9	---	.13	.75	9/10	1/3

