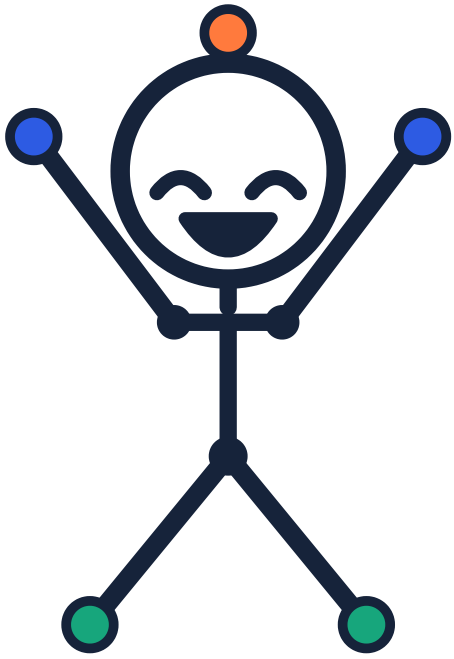
Young Innovators
FOR CHANGE
innovateyouth.org

A FULL-YEAR FINANCIAL LITERACY PROGRAM · GRADE 6

The Asking Year

36 weekly assignments on the numbers people put in front of you: what they mean, what they leave out, and what to ask.



This book belongs to

_____

A claim I took apart _____

A question I asked, on _____

Teacher _____

School year _____

Free to print, copy and use. No license, no account, no cost to any student or school.

START HERE HOW THIS BOOK WORKS

Somebody chose that number.

Two pages a week, front and back. About thirty-five minutes.

The shape of a week

Page 1 teaches one idea and gives you something to do with it. **Page 2** is practice, two questions to talk over, and a harder challenge. No computer needed.

Weeks 1 to 12 are percent, done properly, and then what a percent is doing when somebody puts it on a sign. Weeks 13 to 24 are numbers that go both ways: a balance below zero, and a price that is a range rather than a fact. Weeks 25 to 36 write a cost as a rule with a letter in it, and then turn the whole year into questions you can ask.

The boxes on the page

IN CLASS	The Grade 6 standard your class is most likely on that week. This book sits beside your math lesson, not against it.
MONEY WARM-UP	Two minutes of arithmetic with money in it. Percent above all, because a student who cannot find twenty percent of a price cannot check anything at all. That is 6.RP.3c.
WORDS TO KEEP	One or two words pinned down. Adults use these loosely; you will not have to.
QUESTION BOOK	The one thing you build all year. 15 pages by week 36, most of them a real number from a sign, an ad, a label or a price list, taken apart.
TALK ABOUT IT	Two questions for someone at home or at school.
STUCK? TRY THIS	A way in when the page stops making sense.
CHALLENGE ZONE	Harder, and usually open. For whoever finishes early.

Four things this book does not do

Nothing is sold. This book teaches percent from the side of the person being sold to. The Market Year, also Grade 6, teaches it from the seller's side.

Nobody is accused of anything. Every claim here is true; the skill is knowing what it leaves out.

Nobody is asked what anything costs at their house. Every price comes from the page, a sign, an ad or a flyer.

No decision is graded right or wrong. What can be graded is whether the arithmetic behind it is.

WEEK	TITLE	STRAND	WHAT IT SITS BESIDE IN CLASS
TRIMESTER 1 · WEEKS 1–12 · PERCENT, AND WHAT IT IS DOING			
1	**Out of a Hundred**	Percent	Find a percent of a quantity (6.RP.3c)
2	**Ten Percent of Anything**	Percent	Find a percent of a quantity (6.RP.3c)
3	**Taking It Off**	Percent	Find a percent of a quantity (6.RP.3c)
4	**Adding It On**	Percent	Find a percent of a quantity (6.RP.3c)
5	**Off What?**	Percent	Find a percent of a quantity (6.RP.3c)
6	**Up To**	Percent	Find a percent of a quantity (6.RP.3c)
7	**A Dollar a Day**	Framing	Ratio and rate reasoning (6.RP.3)
8	**The Number They Put First**	Framing	Ratio and rate reasoning (6.RP.3)
9	**Nine Ninety-Nine**	Framing	Ratio and rate reasoning (6.RP.3)
10	**Percent of Different Things**	Percent	Find a percent of a quantity (6.RP.3c)
11	**One After Another**	Percent	Find a percent of a quantity (6.RP.3c)
12	**The Asking Detective**	Review	Find a percent of a quantity (6.RP.3c)
TRIMESTER 2 · WEEKS 13–24 · NUMBERS THAT GO BOTH WAYS			
13	**Below Zero**	Below Zero	Positive and negative numbers (6.NS.5)
14	**Getting Back to Zero**	Below Zero	Positive and negative numbers (6.NS.5)
15	**What It Costs to Be Short**	Below Zero	Positive and negative numbers (6.NS.5)
16	**One Price, or a Range?**	Spread	Statistical questions and variability (6.SP.1, 6.SP.2)
17	**The Middle, Two Ways**	Spread	Measures of center (6.SP.5c)
18	**The Far One**	Spread	Measures of center and variability (6.SP.5c)

WEEK	TITLE	STRAND	WHAT IT SITS BESIDE IN CLASS
19	**Per Unit, Properly**	Comparing	Unit rate (6.RP.2, 6.RP.3b)
20	**The Bigger Pack Costs More**	Comparing	Unit rate (6.RP.2, 6.RP.3b)
21	**Free**	Framing	Ratio and rate reasoning (6.RP.3)
22	**The Claim With No Number**	Comparing	Statistical questions (6.SP.1)
23	**Somebody Is Paid to Ask You**	Framing	Ratio and rate reasoning (6.RP.3)
24	**What the Number Was Doing**	Review	Find a percent of a quantity (6.RP.3c)
TRIMESTER 3 · WEEKS 25–36 · RULES, AND ASKING			
25	**A Rule With a Letter In It**	Rules	Write and evaluate expressions (6.EE.2, 6.EE.6)
26	**Two Rules, One Question**	Rules	Dependent and independent variables (6.EE.9)
27	**At Most**	Rules	Write and solve inequalities (6.EE.5, 6.EE.8)
28	**What Would Have to Be True?**	Asking	Find a percent of a quantity (6.RP.3c)
29	**The Number They Did Not Give You**	Asking	Statistical questions (6.SP.1)
30	**Who Benefits From Yes?**	Asking	Find a percent of a quantity (6.RP.3c)
31	**The Claim You Cannot Check**	The Limits	Statistical questions (6.SP.1)
32	**Deciding Anyway**	The Limits	Find a percent of a quantity (6.RP.3c)
33	**Asking Well**	Asking	Unit rate (6.RP.2)
34	**What You Do With the Answer**	Asking	Find a percent of a quantity (6.RP.3c)
35	**Your Question Book, Finished**	Review	Find a percent of a quantity (6.RP.3c)
36	**Somebody Chose That Number**	Review	Find a percent of a quantity (6.RP.3c)

WEEK 1 PERCENT

Out of a Hundred

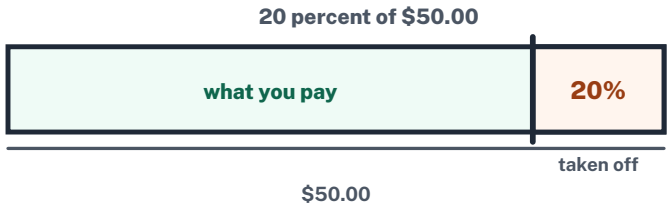
A percent is a rate, and it is always a rate of something. Both halves matter.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
What is 20 percent of $50? _____

WORDS TO KEEP

percent A rate out of a hundred. 20 percent means 20 for every 100.



Twenty for every hundred

20 percent means 20 for every 100. Of $50.00 that is **$10.00**, because $50 is half of $100 and half of 20 is 10.

Two routes and both are worth having. Divide by 100 to get one percent, then multiply: $0.50 times 20. Or find ten percent by moving the point, $5.00, and double it. The second is faster and the first always works.

Notice the shape of the sentence. A percent is never just a number, it is a percent OF something, and the something is doing half the work. Twenty percent is meaningless on its own and week 5 is about what happens when somebody leaves that half out.

Find the percent

	The amount	The percent	How much
a	$50.00	20%	$10.00
b	$80.00	25%	
c	$40.00	15%	
d	$120.00	5%	
e	$36.00	50%	

Two of these come to the same amount of money and their percents are nothing alike. Which two, and how is that possible?

▶ ADD TO YOUR QUESTION BOOK

Start your Question Book with this page: one percent you found in the real world, what it was a percent of, and what it came to.

💬 TALK ABOUT IT

Find a percent on a label, a sign or an advertisement. Write where it was.

Why do stores write 20 percent off rather than the number of dollars?



STUCK? TRY THIS

Find one percent first by dividing by 100. Everything else is multiplying that.

★ CHALLENGE ZONE

25 percent of one amount equals 50 percent of another. What do you know about the two amounts?

WEEK 2 PERCENT

Ten Percent of Anything

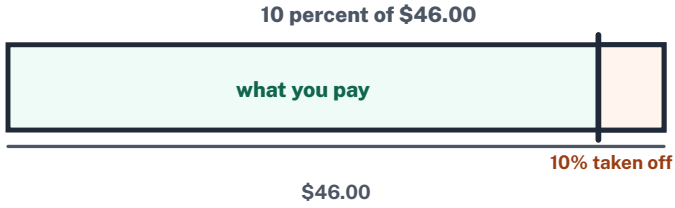
The one you should be able to do in your head, because everything else is built on it.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
10 percent of $46.00 is _____

WORDS TO KEEP

percent A rate out of a hundred. 20 percent means 20 for every 100.



Move the point one place

10 percent of $46.00 is $4.60. Move the decimal point one place left and you are done.

From there almost everything is reachable. 20 percent is double it. 5 percent is half of it. 15 percent is ten plus five. 30 percent is ten, three times. 1 percent is the point moved once more.

This matters more than it looks. A person who can do ten percent in their head can check a claim while they are standing in front of it, and a person who cannot has to take the number on trust. That is the whole difference between reading a price and being told one.

Build it from ten

	The amount	10%	20%	5%	15%
a	$46.00	$4.60	$9.20	$2.30	$6.90
b	$80.00				
c	$12.40				
d	$7.40				
e	$250.00				

In one row every column comes out as a whole number of dollars. Which row?

TALK ABOUT IT

Work out ten percent of three real prices without writing anything down.

Is a tip of 15 percent generous, ordinary or stingy? Who decides?



STUCK? TRY THIS

Ten percent first, always. Then halve it, double it, or add the two together.

★ CHALLENGE ZONE

Work out 17.5 percent of $80 using only ten percent, five percent and half of five percent. Then check it a different way.

WEEK 3 PERCENT

Taking It Off

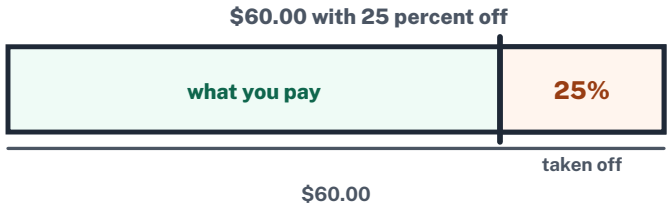
A discount, worked out rather than felt.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
$60.00 with 25 percent off is _____

WORDS TO KEEP

discount An amount taken off a price. Off WHICH price is the question.



Two ways, and one of them is faster

25 percent of $60.00 is $15.00, so you pay $45.00.

Or go straight there: if 25 percent comes off, 75 percent stays on, and 75 percent of $60.00 is $45.00. One step instead of two, and it is the way to do it when the numbers are awkward.

Do it before you look at the sale price they printed. Not because the printed one is wrong, it almost never is, but because working it out first means you know what you are looking at rather than being told.

What do you pay?

	Price	Off	The discount	You pay
a	$60.00	25%	$15.00	$45.00
b	$40.00	10%		
c	$25.00	20%		
d	$18.00	50%		
e	$90.00	30%		

Which row saves the most money? Which row has the biggest percent? They are not the same row, and that is week 10.

▶ ADD TO YOUR QUESTION BOOK

Add a page headed Worked It Out First, with a real advertised discount, your arithmetic, and the price they printed.

💬 TALK ABOUT IT

Find a discount advertised somewhere and work out the real price yourself.

Does a bigger percent off always save you more money?



STUCK? TRY THIS

Work out the part that comes off, or work out the part that stays on. Either way, decide which one you are doing before you start.

★ CHALLENGE ZONE

A store takes 40 percent off and you pay $27. What was the price before? Explain the step that is easy to get wrong.

WEEK 4 PERCENT

Adding It On

Tax, a fee, a tip. Worked out from the price and arriving after you decided.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
$20.00 with 8 percent added is _____

WORDS TO KEEP

added on Tax, a fee or a tip, worked out from the price and added after.



The price is not what you hand over

8 percent of $20.00 is $1.60, so you pay $21.60.

Or in one step, 108 percent of $20.00. The same trick as last week and it is worth practicing in both directions, because added-on amounts arrive at the register when you have already decided.

In some countries the price on the shelf is what you pay and the tax is already inside it. In others it is added at the counter. Neither is a trick; they are different conventions. But if you live in the second kind, every shelf price you see is smaller than the number that will actually leave your hand, and it is worth carrying that around.

What do you hand over?

	Price	Added	The addition	Altogether
a	$20.00	8%	$1.60	$21.60
b	$50.00	9%		
c	$16.00	5%		
d	$35.00	20%		
e	$8.00	12.5%		

In two rows the addition is a whole number of dollars, and in one of those it is exactly one dollar. Which are they?

TALK ABOUT IT

Look at a receipt or a price sign anywhere. Was anything added after the prices? Should the shelf price include the tax? Argue the side you disagree with.



STUCK? TRY THIS

Work out the percent of the price, then add it. Or multiply by a hundred plus the percent, all at once.

★ CHALLENGE ZONE

A bill is $54.00 including 8 percent tax. What was it before the tax? This is harder than it looks and the wrong answer is $49.68.

WEEK 5 PERCENT

Off What?

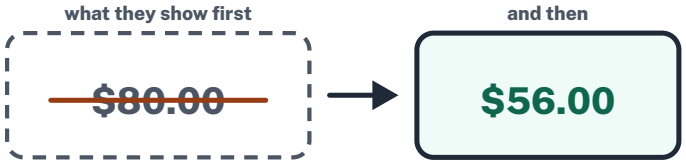
The move. A percent is always a percent of something, and that something is a choice too.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
30 percent off $80 is _____. Off $60? _____

WORDS TO KEEP

off what? The question a percent cannot answer on its own. A percent is always a percent OF something.



the first number is not a price anybody is charging

Somebody chose that number

30 percent off sounds like a fact about how much you save. It is a fact about a percent and a price, and only one of those is on the sign.

30 percent off $80.00 is $56.00. 30 percent off $60.00 is $42.00. Same percent, fourteen dollars apart, and the sign says the same thing in both stores.

Now the harder half. The price it comes off is also a number somebody chose. If a thing was $60.00 last month, is marked up to $80.00, and then sold at 30 percent off, you pay $56.00 for a thing that was $60.00, and every number in that sentence is true. Nobody lied. The question to carry is not **is this a discount**, it is **off what**.

Off which price?

	Percent off	Off this price	You pay	And if the price were $60
a	30%	$80.00	$56.00	$42.00
b	20%	$80.00		
c	50%	$80.00		
d	10%	$80.00		
e	40%	$80.00		

In one row you pay more at the $80 price than you would pay in another row at the $60 price, even though its percent off is bigger. Find a pair like that and write both amounts.

▶ ADD TO YOUR QUESTION BOOK

Add a page headed Off What, with a real sign, the percent, the price it comes off, and what you would have to know to judge it.

💬 TALK ABOUT IT

Find a sign with a percent on it and work out what it is a percent of.

If a price goes up and then goes on sale, was it a sale?



STUCK? TRY THIS

Work the whole column for the $80 price first, then the whole column for $60. Comparing across rows comes last.

★ CHALLENGE ZONE

A thing costs $50. It is marked up 20 percent and then sold at 20 percent off. What do you pay, and why is it not $50?

WEEK 6 PERCENT

Up To

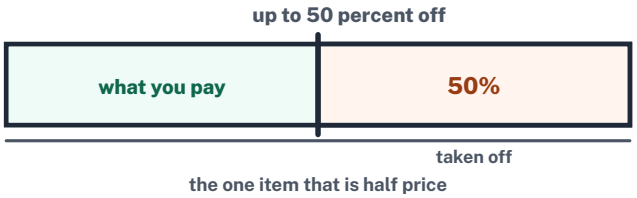
A ceiling with no floor under it. Two words that promise nothing at all.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
Six items, one at 50% off, five at 0%. Average discount? _____

WORDS TO KEEP

up to — A ceiling with no floor. “Up to 50 percent off” is satisfied by one item at 50 and everything else at nothing.



Satisfied by one item

UP TO 50 PERCENT OFF is a true sign in a store where one item is half price and everything else is full price.

That is not a loophole somebody is exploiting. It is what the words mean. Up to names a maximum, and a maximum tells you nothing about the typical, the median or the minimum. A sign that said **at least 10 percent off** would promise far less and guarantee far more.

So the question is not what does up to mean. You know what it means. The question is what would have to be true for this sign to be worth walking in for, and the answer is a number the sign does not contain.

What does the sign guarantee?

	The sign	Guarantees at least	Could be true if
a	up to 50% off	nothing	one item at 50%, rest at 0%
b	at least 10% off everything		
c	everything 20% off		
d	up to 70% off selected items		
e	50% off everything		

Put the five signs in order, from the one that promises most to the one that promises least. It is not the order of the percents.

TALK ABOUT IT

Find an “up to” claim outside a store. What would make it true?

Is an “up to” sign dishonest? Say exactly what would make it so.



STUCK? TRY THIS

For each sign, invent the stingiest store that could legally display it. That is what it guarantees.

★ CHALLENGE ZONE

Write a sign that is completely honest and still tells a customer almost nothing useful. Then write the shortest honest sign that would actually help.

WEEK 7 FRAMING

A Dollar a Day

The same money, presented two ways, felt as two different amounts.

IN CLASS THIS WEEK
Ratio and rate reasoning (6.RP.3)

MONEY WARM-UP · 2 MINUTES
$1.00 a day for a year is _____

WORDS TO KEEP

a frame — The way a number is presented. The same cost framed two ways feels like two different costs.

$1 a day
sounds like nothing

=

$365 a year
sounds like something

the same money, both times

Neither number is lying

A dollar a day is three hundred and sixty-five dollars a year. Both sentences are exactly true and they feel nothing alike.

Somebody selling you something will pick the frame that helps them, and so will somebody trying to talk you out of something. A charity says a dollar a day. A parent says three hundred and sixty-five dollars a year. Neither is cheating; each is choosing.

The defense is not suspicion, it is arithmetic. Convert it to the other frame yourself, look at both, and then decide. Anybody who resists you doing that has told you something.

Say it the other way

	As they said it	As a year	As a week
a	$1 a day	$365.00	$7.00
b	$15 a month		
c	$260 a year		
d	$0.50 a day		
e	$4 a week		

Two of these are within twenty dollars of each other over a year and are presented in units that make them feel very different. Which two?

TALK ABOUT IT

Find a cost advertised per day or per month. Convert it to a year.

Which frame would you use to persuade somebody? Does that make it dishonest?



STUCK? TRY THIS

Pick one unit and put everything into it before you compare anything. A year is usually the clearest.

★ CHALLENGE ZONE

Write the same real cost in the frame that makes it sound smallest and the frame that makes it sound largest. How far apart do they feel?

WEEK 8 FRAMING

The Number They Put First

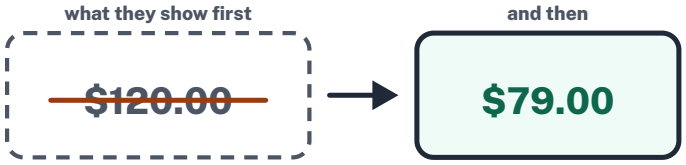
The first price you see becomes the ruler for every price after it.

IN CLASS THIS WEEK
Ratio and rate reasoning (6.RP.3)

MONEY WARM-UP · 2 MINUTES
Was $80, now $56. How much off? _____

WORDS TO KEEP

an anchor — The first number you are shown. Everything after it gets measured against it, including by you.



the first number is not a price anybody is charging

A ruler, not a price

Crossed out: $120.00. Underneath: $79.00. Maybe nobody has ever paid $120.00 for it.

The first number is not there to be paid. It is there so that $79.00 has something to be measured against. Next to a crossed-out $120.00, $79.00 is made to look like a saving of $41.00, whatever the thing is worth. Knowing that does not switch it off, which is the uncomfortable part.

The only reliable defense is to bring your own ruler. What would you have paid before you saw either number? What do other sellers charge? Those are anchors too, and at least they are yours.

Bring your own ruler

	They show	Then	Off, in dollars	Off, as a percent
a	$120.00	$79.00	$41.00	about 34%
b	$50.00	$40.00		
c	$28.00	$21.00		
d	$200.00	$150.00		
e	$16.00	$12.00		

Three of these are the same percent off and their dollar amounts are nothing alike. Which three, and what is the percent?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed My Own Ruler, with a crossed-out price you found, and the number you would have said before you saw it.

💬 TALK ABOUT IT

Find a crossed-out price. Ask somebody at home or at school if they think it is real.

Would you rather be shown the crossed-out price or not shown it?



STUCK? TRY THIS

Take the difference first, then put it over the first price to get the percent. Round the percent; the dollars are the exact part.

★ CHALLENGE ZONE

Design a price tag that would make $79 feel expensive. Now one that makes it feel cheap. You may not change the $79.

WEEK 9 FRAMING

Nine Ninety-Nine

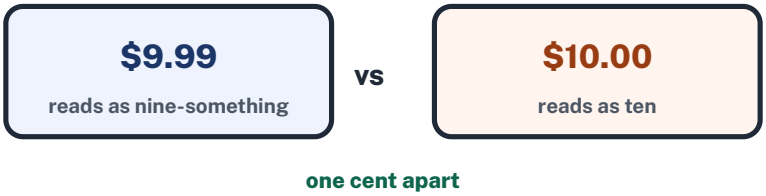
One cent, and what it is doing there.

IN CLASS THIS WEEK
Ratio and rate reasoning (6.RP.3)

MONEY WARM-UP · 2 MINUTES
$9.99 rounded to the nearest dollar is _____

WORDS TO KEEP

the left digit — The first digit of a price. People read it first and often stop there, so $9.99 reads as nine.



The left digit does the work

$9.99 and $10.00 are one cent apart and they do not read as one cent apart.

People read prices left to right and stop early. The nine at the front lands before the rest arrives, so $9.99 files itself under nine and $10.00 files itself under ten. That is not stupidity, it is how reading works, and it is why so many prices end in 99.

The fix is small and it works: round every price up to the next dollar before you think about it. You lose almost nothing in accuracy, you can add them in your head, and you know what a basket of six things comes to before the register tells you.

Round it up and add it

	The basket	Rounded up	Rounded total	Real total
a	$9.99, $4.99, $2.99	$10, $5, $3	$18.00	$17.97
b	$1.99, $1.99, $1.99			
c	$7.49, $2.49			
d	$19.99, $0.99			
e	$3.95, $3.95, $3.95, $3.95			

In which row is the rounded total furthest from the real one? What is it about that row?

💬 TALK ABOUT IT

Count how many prices you can find that end in 99. Just count them.

Does the 99 trick work on you? Be honest, and say how you know.



STUCK? TRY THIS

Round every price up to the next whole dollar, add those, then work out the real total afterwards and compare.

★ CHALLENGE ZONE

Rounding up always overestimates. By how much, at most, for a basket of ten things? What does that tell you about when the trick is safe?

WEEK 10 PERCENT

Percent of Different Things

Twenty percent beats ten percent, unless it does not.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
20% of $10 or 10% of $30? Which is more? _____

WORDS TO KEEP
of different things Two percents are not comparable until you know what each one is a percent of.

20% of $10
= $2.00

vs

10% of $30
= $3.00

the smaller percent is the bigger saving

A percent is half a fact

20 percent of $10.00 is $2.00. 10 percent of $30.00 is $3.00. The smaller percent saves you more.

Nothing surprising is happening here and people still get it wrong, because a percent looks like a size and it is a rate. Two rates cannot be compared until you know what each is a rate of, and a store window shows you the rate in large type and the price in small type.

So the habit is short: never compare two percents. Turn both into money and compare those. It takes four seconds and it is right every time.

Turn both into money

	This offer	In money	That offer	In money	Better
a	20% of $10	$2.00	10% of $30	$3.00	the second
b	50% of $8		25% of $20		
c	30% of $40		60% of $15		
d	5% of $200		40% of $20		
e	15% of $60		10% of $90		

One row is a tie. In how many of the other four does the bigger percent win? Is that more or fewer than you expected?

TALK ABOUT IT

Find two offers with different percents and work out both in money.

Why would a store advertise the percent rather than the dollars?



STUCK? TRY THIS

Work out every money column before you compare anything. Comparing as you go is where the mistake lives.

★ CHALLENGE ZONE

Write two offers where the bigger percent saves less than half what the smaller one saves. How far apart do the prices have to be?

WEEK 11 PERCENT

One After Another

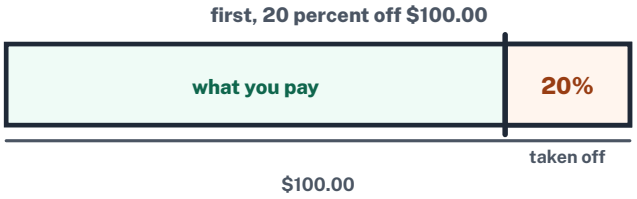
Twenty off and then ten off is not thirty off, and it never was.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
$100 with 20% off, then 10% off the rest, is _____

WORDS TO KEEP

one after another Two discounts in a row do not add. Each one works on what is left after the last.



The second one works on what is left

$100.00, 20 percent off, is $80.00. Then 10 percent off **that** is $8.00, not $10.00. You pay $72.00, and 28 percent came off.

The second discount never sees the original price. It only ever works on what survived the first one, which is smaller, so it takes off less than its percent would suggest. Two discounts in a row always come to less than their sum, and the bigger they are the further off it gets.

Half off and then half off is not free. It is a quarter of the price, and if the arithmetic ever tells you something is free you have made an error rather than found a bargain.

Two in a row

	Price	First off	After the first	Then off	You pay	Really, off
a	$100.00	20%	$80.00	10%	$72.00	28%
b	$60.00	50%		50%		
c	$80.00	25%		20%		
d	$40.00	10%		10%		
e	$200.00	30%		30%		

In every row the real percent off is less than the two added together. By how much, in the row where the gap is biggest?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed Two In A Row, with a real stacked offer, the price after each step, and the single percent it really came to.

💬 TALK ABOUT IT

Explain to somebody at home or at school why 50 and 50 is not 100. Use row b.

Does the order matter? Try 20 then 10, and 10 then 20.



STUCK? TRY THIS

Work out the price after the first discount and write it down. The second discount is a percent of THAT number and of nothing else.

★ CHALLENGE ZONE

A store offers 30 percent off, then another 30 percent off. What single percent would give the same price? Now do it for three 30s in a row.

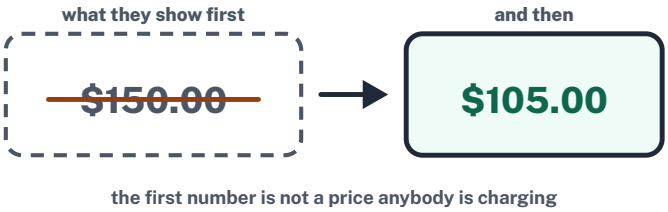
WEEK 12 REVIEW

The Asking Detective

Everything from weeks 1 to 11, on one advertisement that is entirely true.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
$120 marked up 25%, then 30% off, is _____



the first number is not a price anybody is charging

Nobody lied on this sign

A thing was $120.00 in June. In July the store marked it up 25 percent. In August the sign says WAS $150, NOW 30 PERCENT OFF, and underneath, UP TO 30 PERCENT OFF STOREWIDE.

Every number on that sign is true and the arithmetic is correct. Work out what you pay. Then work out what you would have paid in June. Then say what the storewide sign guarantees.

Write your findings in sentences. A detective says what happened and does not accuse anybody of anything the evidence does not show.

The evidence

	The question	Your answer
a	What is 25 percent added to $120.00?	
b	What is 30 percent off that?	
c	So what do you pay, against June's price?	
d	What does “up to 30 percent off storewide” guarantee?	
e	Is anything on this sign untrue?	

Now write the one question you would ask somebody working in the store. It has to be answerable with a fact.

TALK ABOUT IT

Take your question home and ask somebody whether they would ask it out loud.

Is this store doing something wrong? Say exactly what, or say no.



STUCK? TRY THIS

Do parts a and b in order and write both numbers down. Part c is comparing your answer with $120.00 and nothing more.

★ CHALLENGE ZONE

Design a sign where every number is true and the customer ends up paying more than the price a month ago. Then design one that is true and fair.

Below Zero

A balance can be less than nothing, and it is still a number.

IN CLASS THIS WEEK
Positive and negative numbers (6.NS.5)

MONEY WARM-UP · 2 MINUTES
You have $12 and spend $20. Your balance is _____

WORDS TO KEEP

below zero — A balance can be less than nothing. That is a number, not a disaster, and it obeys the same rules.



less than nothing is still a number

Minus eight is a position

$12.00, and $20.00 goes out. The balance is **-$8.00**, which is eight dollars below nothing.

It is not a mistake in the arithmetic and it does not mean the money vanished. It means eight dollars have to arrive before you are back at zero, and zero is not the same as having something.

Negative numbers are new this year in your math class, and this is the place they are least abstract. Minus eight degrees is a temperature you have to imagine. Minus eight dollars is a fact about what you can do next.

Where does it land?

	You have	Goes out	Balance	Above, below, or at zero
a	$12.00	$20.00	-$8.00	below
b	$30.00	$18.00		
c	$5.00	$5.00		
d	$0.00	$14.00		
e	$9.50	$22.00		

Put the five balances in order from smallest to largest. Is -$8.00 bigger or smaller than -$12.50, and how do you know?

▶ ADD TO YOUR QUESTION BOOK

Start a page headed Below Zero with a number line from -20 to 20 and the five balances marked on it.

💬 TALK ABOUT IT

What do you think a bank does when an account goes below zero? How could you check?

Is owing $8 the same as having $8 taken away? Say what is different.



STUCK? TRY THIS

Take what goes out from what you have, and keep the sign. Below zero is not an error message.

★ CHALLENGE ZONE

Two balances are -$5.00 and -$15.00. Which is worse? Now: which is the larger number? Those are different questions and both have answers.

WEEK 14 BELOW ZERO

Getting Back to Zero

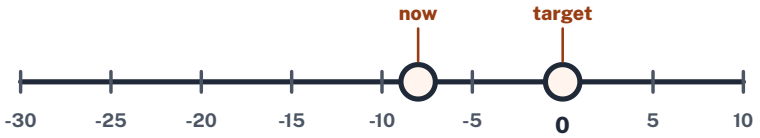
How much has to arrive, which is a different question from how much you owe.

IN CLASS THIS WEEK
Positive and negative numbers (6.NS.5)

MONEY WARM-UP · 2 MINUTES
Your balance is -$8.00. How much gets you to zero? _____

WORDS TO KEEP

below zero — A balance can be less than nothing. That is a number, not a disaster, and it obeys the same rules.



less than nothing is still a number

The distance, not the position

At -$8.00, eight dollars gets you to zero. At -$8.00 with $3.00 arriving, you are at -$5.00, which is closer to zero and still below it.

Two numbers are worth keeping apart. Where you are, which is negative, and how far you have to travel, which is not. The distance is always a positive number, and it is the one you can actually act on.

Getting back to zero is not the same as being all right. Zero is having nothing, which is better than owing and is not a comfortable place to stop. Money kept aside for surprises is a set-aside, and this is the week it starts to matter.

How far to zero?

	Balance now	Money arrives	New balance	Still to go
a	-$8.00	$3.00	-$5.00	$5.00
b	-$14.00	$14.00		
c	-$6.50	$2.00		
d	-$20.00	$25.00		
e	-$3.00	$0.00		

In one row the answer to the last column is nothing, and in one row it is nothing for a different reason. Which two, and what is the difference?

💬 TALK ABOUT IT

Work out how many weeks at $5 it would take to clear a $23 hole.

Should you get back to zero, or past it? What would past it be for?



STUCK? TRY THIS

Add what arrives to the balance, keeping the signs. The distance to zero is whatever is left, written without the sign.

★ CHALLENGE ZONE

A balance is -$40 and $12 arrives every week. Write the balance after each of the first four weeks. In which week does it stop being negative?

WEEK 15 BELOW ZERO

What It Costs to Be Short

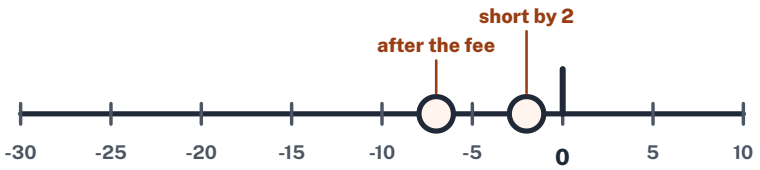
Being below zero is usually charged for, and the charge does not care how short you were.

IN CLASS THIS WEEK
Positive and negative numbers (6.NS.5)

MONEY WARM-UP · 2 MINUTES
A $5 fee on being $2 short. The fee is what percent of $2? _____

WORDS TO KEEP

below zero — A balance can be less than nothing. That is a number, not a disaster, and it obeys the same rules.



less than nothing is still a number

A flat fee on a small shortfall is enormous

Two dollars short, and a five dollar fee. The fee is two and a half times the amount you were short by.

Flat fees do not scale. The same $5.00 lands on somebody $2.00 short and somebody $200.00 short, and as a share of the problem it is 250 percent for one and 2.5 percent for the other. The person with least is charged most, in the only sense that matters.

This is not a hidden fact and there is no trick in it. It is arithmetic, and the reason it belongs in this book is that a person who has done this calculation once, and has money to move, can move a small amount to avoid a small shortfall. A person who has not may not see why it is worth the trouble.

The fee as a share of the shortfall

	Short by	The fee	Fee as a percent of the shortfall
a	$2.00	$5.00	250%
b	$10.00	$5.00	
c	$50.00	$5.00	
d	$1.00	$5.00	
e	$200.00	$5.00	

The fee is the same in every row. Put the percents in order and say, in one sentence, who a flat fee falls hardest on.

TALK ABOUT IT

Ask somebody at home or at school whether a flat fee is fair. Listen to the reason. Should a fee for being short be a percent instead? What would go wrong?



STUCK? TRY THIS

Put the fee over the shortfall and turn it into a percent. It will be more than a hundred in some rows, which is correct.

★ CHALLENGE ZONE

Design a fee that discourages being short without falling hardest on the person with least. Say what your design costs the people charging it.

WEEK 16 SPREAD

One Price, or a Range?

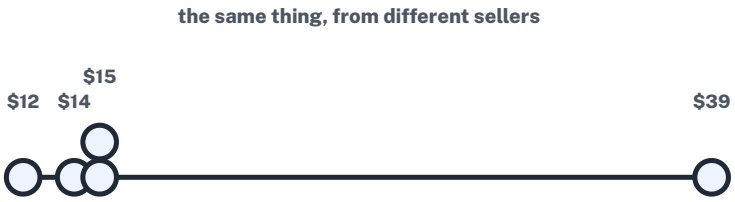
The same thing costs several different amounts, and the one you saw is a sample.

IN CLASS THIS WEEK
Statistical questions and variability (6.SP.1, 6.SP.2)

MONEY WARM-UP · 2 MINUTES
Prices $12, $14, $15, $15, $39. What is the range? _____

WORDS TO KEEP

a range The same thing at several prices. One price is a sample, not a fact about the thing.



A price is a sample, not a fact

Five sellers, the same thing: $12, $14, $15, $15 and $39. The range is $27, which is more than twice the cheapest price.

Anybody who looked at exactly one of these would walk away believing something true about that seller and nothing at all about the thing. What it costs is not a number, it is a spread, and where you land in it depends on how many sellers you looked at.

This is what a statistical question is, and it is why 6.SP starts with variability rather than with averages. “What does this cost?” has an answer only if you also say where, and “what does this usually cost?” is a different question needing more than one number to answer.

Read the spread

	The prices	Lowest	Highest	Range
a	$12, $14, $15, $15, $39	$12	$39	$27
b	$20, $21, $22, $23			
c	$5, $30, $55			
d	$9, $9, $9, $9			
e	$40, $44, $41, $95			

In one row every seller charges the same. What would you conclude about that thing, and how is it different from the others?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed A Range, Not a Price, with one thing priced at three or more sellers, from stores or flyers, and the range worked out.

💬 TALK ABOUT IT

Find the same item at two sellers. Write down both prices.

How many sellers would you check before you believed you knew the price?



STUCK? TRY THIS

The range is the highest minus the lowest, and it is one number describing a whole set. Find both ends before you subtract.

★ CHALLENGE ZONE

Two sets of prices have the same range and look completely different. Invent them, and say what the range fails to capture.

WEEK 17 SPREAD

The Middle, Two Ways

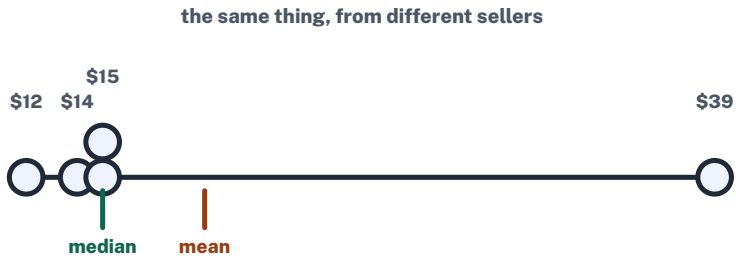
Mean and median both name a middle. They are different numbers and they answer different questions.

IN CLASS THIS WEEK
Measures of center (6.SP.5c)

MONEY WARM-UP · 2 MINUTES
Mean of 12, 14, 15, 15, 39? _____

WORDS TO KEEP

the middle Mean and median both name a middle and they are not the same number.



Nineteen, or fifteen

The mean of $12, $14, $15, $15 and $39 is **$19.00**. The median is **$15.00**. Four of the five sellers charge less than the mean.

Neither number is wrong. The mean is what you would pay each if the total were shared out evenly, which is the right question when you are buying all five. The median is what the middle seller charges, which is the right question when you are buying one.

So the honest report is both, and the useful skill is noticing when somebody has quoted you only one. An average price with no spread beside it is a number that has had its interesting part removed.

Both middles

	The prices	Mean	Median	Which is higher
a	$12, $14, $15, $15, $39	$19.00	$15.00	mean
b	$20, $21, $22, $23			
c	$5, $30, $55			
d	$9, $9, $9, $9			
e	$2, $3, $4, $95			

In three rows the mean and the median are the same number. What do those three rows have in common, and what does that tell you?

TALK ABOUT IT

Work out the mean and the median of five real prices for one thing, from flyers or ads.

If a store told you its average price, what would you want to see as well?



STUCK? TRY THIS

Add and divide for the mean. Put them in order and take the middle for the median. Do them separately and do not let one influence the other.

★ CHALLENGE ZONE

Invent five prices where the mean is more than double the median. What has to be true, and does the reverse ever happen?

WEEK 18 SPREAD

The Far One

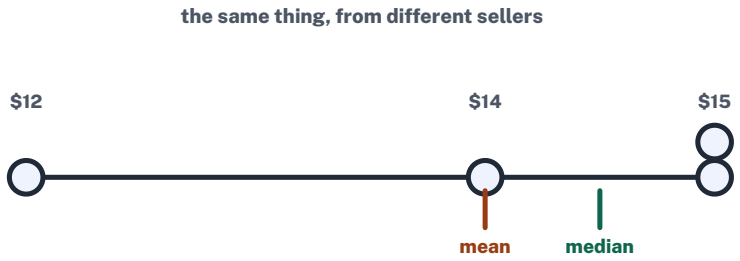
One price a long way from the others moves the mean and leaves the median alone.

IN CLASS THIS WEEK
Measures of center and variability (6.SP.5c)

MONEY WARM-UP · 2 MINUTES
Take the $39 out of 12, 14, 15, 15, 39. New mean? _____

WORDS TO KEEP

the far one A single very high or very low price. It moves the mean and leaves the median alone.



Take it out and watch what moves

With the $39 in, the mean is $19.00 and the median is $15.00. Take it out and the mean falls to $14.00. The median moves to $14.50, which is barely anywhere.

One value out of five moved the mean by five dollars and the median by fifty cents. That is what a mean is for and it is also its weakness: every value gets a vote and a very unusual one votes very loudly.

Which is the honest number depends on what the far one IS. If that seller is a genuine option, it belongs in the picture. If they are the airport store and nobody would ever go there on purpose, the median describes the market you actually face. You have to look at the far one and decide, and no formula can do it for you.

With it, and without it

	The prices	Mean with	Mean without the far one	Median moved by
a	$12, $14, $15, $15, $39	$19.00	$14.00	$0.50
b	$20, $21, $22, $80			
c	$5, $6, $7, $6			
d	$30, $31, $32, $150			
e	$8, $9, $40, $9			

In one row there is no far one at all. Which, and how did you decide? There is no rule and you have to say what you used.

▶ ADD TO YOUR QUESTION BOOK

Add a page headed The Far One, with a real set of prices, both means and both medians, and a sentence on whether the far one belongs.

💬 TALK ABOUT IT

Find a price that is a long way off the others. Why is that seller different?

Should an unusual price be thrown out of an average? Who gets to decide?



STUCK? TRY THIS

Work out the mean twice, once with every price and once with the far one removed. The gap between them is the far one's vote.

★ CHALLENGE ZONE

A survey reports an average price and does not say how many were surveyed or what the spread was. Write the two questions you would ask, and say what a refusal to answer either would tell you.

WEEK 19 COMPARING

Per Unit, Properly

Price divided by how much you get, so two sizes can be compared at all.

IN CLASS THIS WEEK
Unit rate (6.RP.2, 6.RP.3b)

MONEY WARM-UP · 2 MINUTES
$4.50 for 300 g is _____ per 100 g

WORDS TO KEEP

per unit Price divided by how much you get, so two sizes can be compared at all.

$4.50 / 300 g
$1.50 per 100 g

vs

$6.40 / 400 g
$1.60 per 100 g

now they can be compared

Pick one unit and use it for both

$4.50 for 300 g is $1.50 per 100 g. $6.40 for 400 g is $1.60 per 100 g. The smaller pack is better value, which is the opposite of the usual rule.

Any unit works as long as you use the same one for both. Per gram, per 100 g, per kilogram: all give the same answer about which is better, and per 100 g happens to keep the numbers a size you can hold.

Shelf labels often print this for you, and they are often printed in different units on labels next to each other, which makes them useless for exactly the comparison they exist for. Doing it yourself takes one division.

Put both in the same unit

	Pack	Price	Per 100 g	Rank, best value first
a	300 g	$4.50	$1.50	3rd
b	400 g	$6.40		
c	250 g	$3.00		
d	1 kg	$13.00		
e	150 g	$2.40		

Put all five in order of value. Is the biggest pack the best value? Is the smallest the worst?

TALK ABOUT IT

Compare two sizes of one thing, from a store or a flyer, using the same unit.

Why might a store print unit prices in different units on labels next to each other?



STUCK? TRY THIS

Choose your unit before you start and write it at the top of the column. Then every row is one division.

★ CHALLENGE ZONE

Two packs have the same unit price and one is still the better buy. Give a reason that is not about the arithmetic.

WEEK 20 COMPARING

The Bigger Pack Costs More

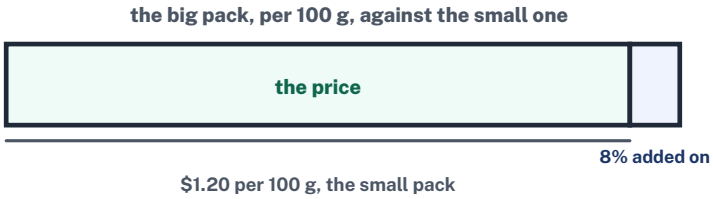
It happens often enough that checking is worth the four seconds.

IN CLASS THIS WEEK
Unit rate (6.RP.2, 6.RP.3b)

MONEY WARM-UP · 2 MINUTES
500 g for $6.00 or 1 kg for $13.00. Which is cheaper per 100 g? _____

WORDS TO KEEP

per unit Price divided by how much you get, so two sizes can be compared at all.



Nobody promised the big one was cheaper

500 g for $6.00 is $1.20 per 100 g. 1 kg for $13.00 is $1.30 per 100 g. The big pack costs about eight percent more per gram and looks like the sensible buy.

There is no rule anywhere that a larger pack must be cheaper per unit. It usually is, which is exactly what makes the exception work: people stop checking, and a pack that costs more per unit sits quietly among packs that are not.

One question is whether the cheap thing is cheap. This one asks whether the big thing is big value, and the answer is the same shape: sometimes, and you cannot tell without dividing.

Check the big one

	Small pack	Per 100 g	Big pack	Per 100 g	Which is cheaper per 100 g
a	500 g, $6.00	$1.20	1 kg, $13.00	$1.30	the small one
b	200 g, $3.00		500 g, $7.00		
c	100 g, $1.80		400 g, $6.40		
d	250 g, $5.00		750 g, $13.50		
e	300 g, $2.70		900 g, $8.55		

In how many rows is the big pack cheaper per 100 g? In one other row besides a, the big pack costs more by only a few cents, which is easy to miss. Which row?

TALK ABOUT IT

Check three big packs, in a store or on a flyer. How many were cheaper per unit?

If the big pack costs more per unit, is buying it ever still right?



STUCK? TRY THIS

Two divisions per row, both into the same unit, then one comparison. Do not guess from the pack sizes.

★ CHALLENGE ZONE

A store wants the big pack to look like the better buy without lowering its price. What could it do to the small pack, and is that dishonest?

WEEK 21 FRAMING

Free

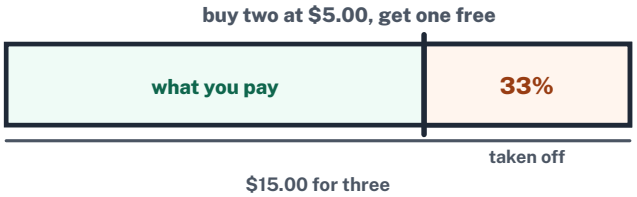
The most effective word in a store, and somebody is paying for it.

IN CLASS THIS WEEK
Ratio and rate reasoning (6.RP.3)

MONEY WARM-UP · 2 MINUTES
Buy 2 at $5, get 1 free. What is that each? _____

WORDS TO KEEP

free	Given at no price. Somebody is still paying for it, and knowing who tells you what it is for.



Three for the price of two

Two at $5.00 and one free is $10.00 for three, which is $3.33 each. That is a third off, and it is a real saving.

It is also not free. One item has no price attached and the money you hand over is the same as if each of the three cost a third of $10.00. Free is a description of how the offer is arranged, not of where the money went.

Which does not make it a bad offer. A third off is a third off. The thing to check is the two you are buying: if they were marked up first, or if you only wanted one, the arithmetic changes and the word FREE does not.

What is it each?

	The offer	You pay	You get	Each	Percent off
a	buy 2 at $5, get 1 free	$10.00	3	$3.33	33%
b	buy 1 at $8, get 1 free				
c	buy 3 at $4, get 1 free				
d	buy 2 at $6, get 2 free				
e	buy 5 at $2, get 1 free				

Put the five in order by percent off. Which offer sounds most generous, and is it the one that is?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed What Free Costs, with a real offer, the price each, and the percent it really comes to.

💬 TALK ABOUT IT

Find a free offer somewhere and work out what it is each.

If you only wanted one, is a free second one worth anything?



STUCK? TRY THIS

Work out what leaves your hand and how many you go home with. Divide one by the other. The word free does not enter the arithmetic.

★ CHALLENGE ZONE

Write a buy-some-get-some-free offer that is worth less than 20 percent off, and one that is worth more than 50 percent off. What makes the difference?

WEEK 22 COMPARING

The Claim With No Number

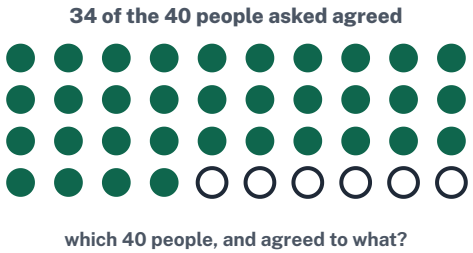
Some claims cannot be checked at all, and noticing that is the whole skill.

IN CLASS THIS WEEK
Statistical questions (6.SP.1)

MONEY WARM-UP · 2 MINUTES
Of 40 people asked, 34 agreed. What percent? _____

WORDS TO KEEP

checkable — A claim you could, in principle, go and test. Having a number in it is not the same thing.



Nine out of ten what?

NINE OUT OF TEN PEOPLE PREFER IT. Ten people? Ten thousand? Which people, asked what, prefer it to what?

Nine out of ten is a real ratio and it is doing no work at all without those four answers. Asked of ten people chosen by the seller, it is almost certainly true and means nothing. Asked of four hundred people chosen at random and compared against a named alternative, it is worth something.

The test is not whether a claim has a number in it. It is whether you could, in principle, go and check it. A claim nobody could check is an opinion wearing a number, and there is no arithmetic that will rescue it.

Could you check it?

	The claim	Could you check it?	What is missing
a	9 out of 10 people prefer it	no	how many, which people, than what
b	34 of the 40 people we asked chose it over our old one		
c	the best value in town		
d	lasts 20 percent longer than our old one		
e	$2.40 per 100 g		

Three of these could be checked, at least in principle, and two could not, even though one of those two has numbers in it. Which two, and what do they leave out that the other three do not?

TALK ABOUT IT

Find a claim on a package. Write down what you would need to check it.

Is an uncheckable claim dishonest? Say when it would be and when it would not.



STUCK? TRY THIS

For each one, ask what you would have to be given to test it. Whatever you have to ask for is what is missing.

★ CHALLENGE ZONE

Rewrite claim c so it is fully checkable. Is it still a good advertisement?

WEEK 23 FRAMING

Somebody Is Paid to Ask You

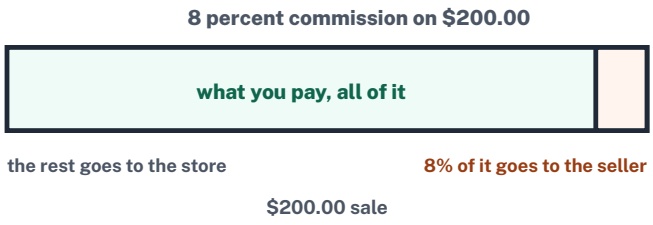
Which does not make them liars, and does tell you what to check.

IN CLASS THIS WEEK
Ratio and rate reasoning (6.RP.3)

MONEY WARM-UP · 2 MINUTES
A $200 sale at 8 percent commission pays _____

WORDS TO KEEP

who is asking Somebody is paid to put this number in front of you. That does not make it false and it does tell you what to check.



Whose question is this

Somebody paid 8 percent of a $200.00 sale earns $16.00 when you say yes and nothing when you say no.

That is not a scandal. It is how a great deal of honest work is paid for, and most people in it will tell you the truth, partly because they want you back. Treating everybody who is paid on commission as a liar is both unfair and unhelpful.

What it does tell you is which questions they are the wrong person to answer. Is this good is a question they cannot answer neutrally, however honest they are. What is the unit price, what is the return policy, what does it cost to run for a year: those are facts, and a person on commission can hand them over as easily as anybody else.

Who should you ask?

	The question	Ask the seller?	Why
a	What does it cost per 100 g?	yes	a fact they hold
b	Is this the best one for me?		
c	Can I return it, and by when?		
d	Will I be glad I bought this?		
e	What does it cost to run for a year?		

Three of these are facts and two are judgments. Which are which, and who could answer the two judgment questions?

💬 TALK ABOUT IT

Ask somebody at home or at school whether they have been sold something by a person on commission.

Should a seller have to tell you they are paid on commission?



STUCK? TRY THIS

For each question, ask whether the answer could be looked up: a price, a date, a written policy, a number on a label. If it could, it is a fact. If it depends on what you want, it is a judgment.

★ CHALLENGE ZONE

You are paid on commission and a customer asks question b honestly. What is the most useful true thing you could say?

WEEK 24 REVIEW

What the Number Was Doing

Everything from weeks 1 to 23, on one page of claims that are all true.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
20% off $50, then 10% off the rest, is _____

$1.30 a day	=	$949 total
for 24 months		the same thing

which one did they lead with?

Five claims, all true

UP TO 40 PERCENT OFF. WAS $200. ONLY $1.30 A DAY. NINE OUT OF TEN PREFER IT. BIGGEST PACK, BEST VALUE.

Take them one at a time. For each, write what it would have to mean to be true, and then the one question you would ask to find out whether it is worth anything to you.

None of these is a lie. Every one of them can be arranged so that a careful person would still want the thing. The skill this year is not catching people in a mistake, it is knowing which question turns a slogan back into a number.

One question each

	The claim	Your question
a	up to 40 percent off	
b	was $200	
c	only $1.30 a day	
d	nine out of ten prefer it	
e	biggest pack, best value	

Now pick the claim you think is least useful to a customer and say why. Then pick the one that is most useful, and say why that one.

TALK ABOUT IT

Try one of your questions on a real advertisement.

Which of these five would you use if you were selling something? Would you feel bad?



STUCK? TRY THIS

Every question should be answerable with a number or a fact. If yours can be answered with enthusiasm, sharpen it.

★ CHALLENGE ZONE

Write an advertisement for something real that contains only checkable claims. Is it worse at selling? Is it worse at being read?

WEEK 25 RULES

A Rule With a Letter In It

One line that covers every number of them, instead of a table you have to extend.

IN CLASS THIS WEEK
Write and evaluate expressions (6.EE.2, 6.EE.6)

MONEY WARM-UP · 2 MINUTES
c = 3n + 12. What is c when n is 5? _____

WORDS TO KEEP

a rule with a letter A cost written as an expression, so one line covers every number of them.

the rule

c = 3n + 12

$12 to join, then $3 each time

Twelve to join, three each time

c = 3n + 12. The n is how many times, the 3 is what each one costs, and the 12 is the part you pay whether you go once or fifty times.

At n = 5 the cost is $27.00. At n = 20 it is $72.00. One line answers every version of the question, which is what an expression is for, and it is why this is where Grade 6 algebra starts.

Reading them is as useful as writing them. When somebody quotes you a joining fee and a per-visit price, they have handed you 3n + 12 in words, and writing it down in symbols is what lets you answer the only question that matters: what does this come to for the number of times I would actually go?

Use the rule

	The rule	n = 1	n = 5	n = 20
a	c = 3n + 12	$15.00	$27.00	$72.00
b	c = 5n			
c	c = 2n + 30			
d	c = 8n + 4			
e	c = 40			

Rule e has no n in it at all. What kind of price is that, and when would it be the best one?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed A Rule With a Letter, with a real price written as an expression and worked out at three values of n.

💬 TALK ABOUT IT

Find a real price with a joining fee and a per-time cost. Write its rule.

Which part of 3n + 12 would you rather negotiate down, and does it depend on n?



STUCK? TRY THIS

Multiply first, then add. The number without a letter is the part that does not change however many times you go.

★ CHALLENGE ZONE

Two rules give the same cost at n = 6 and nothing alike at n = 1 and n = 20. Write them.

WEEK 26 RULES

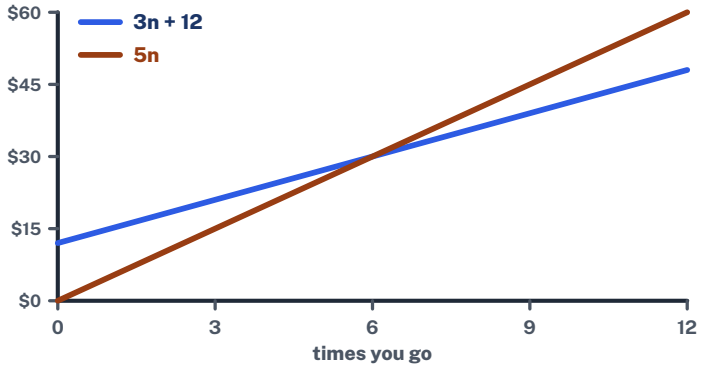
Two Rules, One Question

Where they meet, found with algebra instead of by building the table.

IN CLASS THIS WEEK
Dependent and independent variables (6.EE.9)

MONEY WARM-UP · 2 MINUTES
3n + 12 and 5n are equal when n is _____

WORDS TO KEEP
a rule with a letter A cost written as an expression, so one line covers every number of them.



Six times

3n + 12 against 5n. They are equal at n = 6, where both come to $30.00. Below six, the one with no joining fee is cheaper. Above six, the joining fee has paid for itself.

One way to find a crossing is to take the gap and divide it by how fast it closes, which works and is exactly this: the gap is 12, it closes at 2 a time, so 6. Writing it as two rules is the same arithmetic with the reasoning visible, which is what algebra is for.

And the crossing does not decide anything. It turns the decision into one honest question about you: how many times will I actually go?

Find where they meet

	Rule one	Rule two	Equal at n =	Both cost
a	3n + 12	5n	6	$30.00
b	2n + 20	6n		
c	n + 18	4n		
d	4n + 10	8n		
e	5n + 30	8n		

In one row the crossing is not a whole number of times. Which, and what would you tell somebody deciding?

TALK ABOUT IT

Write the two rules for a real choice you have seen advertised.

If you are not sure how often you will go, which side of the crossing is safer?



STUCK? TRY THIS

Set the two rules equal, take the smaller n term from both sides, and divide. Then put your answer back into both rules and check they agree.

★ CHALLENGE ZONE

Two rules never meet at all. Write them, and say what that means about the decision.

WEEK 27 RULES

At Most

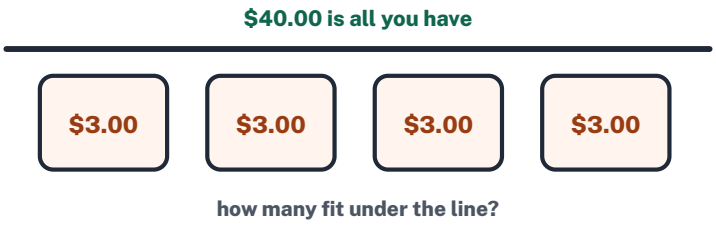
Not what it costs. How many you can have, which is the question a budget asks.

IN CLASS THIS WEEK
Write and solve inequalities (6.EE.5, 6.EE.8)

MONEY WARM-UP · 2 MINUTES
3n + 12 must be at most $40. The largest whole n is _____

WORDS TO KEEP

at most	An inequality. Not what it costs, but how many you can have.



Nine, not nine and a third

3n + 12 has to be at most 40. Take the 12 off both sides: 3n is at most 28. Divide: n is at most 9.33. So **nine**.

The arithmetic gives 9.33 and the answer is 9, because you cannot go a third of a time. That last step is not a rounding rule, it is a fact about the thing being counted, and the two go in opposite directions depending on what you are counting: nine visits, but ten boxes if you need to carry 9.33 boxes worth of something.

An equation answers what does it cost. An inequality answers what can I have, and that is the question you actually stand in a store asking.

How many can you have?

	The rule	You have	n is at most	So, whole ones
a	3n + 12	$40.00	9.33	9
b	5n	$32.00		
c	2n + 30	$50.00		
d	9n + 4	$60.00		
e	5n + 4	$40.00		

In one row the answer comes out exactly whole and you can spend every cent. Which, and how would you know without dividing?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed At Most, with a budget you choose, a real rule, and the largest number it would buy.

💬 TALK ABOUT IT

Pick a budget yourself and work out how many of something it would buy.

When would you round the answer up instead of down? Give a real case.



STUCK? TRY THIS

Take away the part that does not change, then divide. Round DOWN, because the last one you cannot afford is one you do not get.

★ CHALLENGE ZONE

A rule is 6n + 5 and you have $50. Now the price rises to 7n + 5. How many do you lose? Is that a bigger loss than a $5 rise in the joining fee?

WEEK 28 ASKING

What Would Have to Be True?

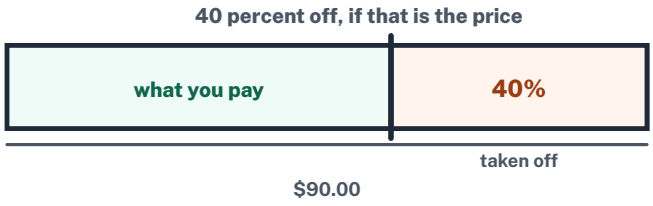
Instead of asking whether a claim is true, ask what the world would look like if it were.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
A claim of 40% off a $90 price means paying _____

WORDS TO KEEP

worth acting on — What would have to be true before a claim changes what you do. Each part can be checked or asked about.



The most useful question in the book

SAVE 40 PERCENT. What would have to be true for that to be worth walking in for?

The price would have to be one somebody was really charging last month. It would have to apply to the thing you came for, not one item at the back. And 40 percent off would have to leave it cheaper than the store across the street, which the sign says nothing about at all.

Notice what this question does. It does not accuse anybody. It converts a slogan into a short list of facts, and every item on that list is something you can check or ask about. Somebody arguing with the list rather than answering it has told you something.

What would have to be true?

	The claim	For it to be worth acting on
a	save 40 percent	the old price was real, and it applies to this item
b	cheapest in town	
c	lasts twice as long	
d	pays for itself in a year	
e	free delivery	

For one of these, everything that would have to be true is something you could check in five minutes. Which one, and how?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed What Would Have To Be True, with a real claim and your list beside it.

💬 TALK ABOUT IT

Take a claim from a real advertisement and write your list of what must be true.

Is asking this question the same as not believing somebody?



STUCK? TRY THIS

Write the list before you decide anything. A claim you cannot turn into a list is week 31.

★ CHALLENGE ZONE

Write a claim where the list of things that would have to be true is very short. Is a short list a sign of an honest claim or a small one?

WEEK 29 ASKING

The Number They Did Not Give You

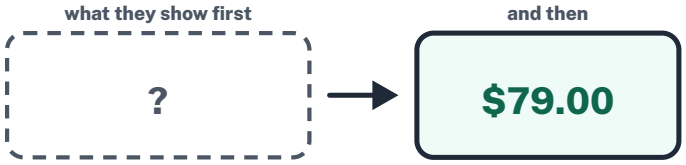
Every claim leaves one out, and it is usually the same one.

IN CLASS THIS WEEK
Statistical questions (6.SP.1)

MONEY WARM-UP · 2 MINUTES
20% off, but off what? The missing number is the _____

WORDS TO KEEP

the missing number The half of a fact a claim leaves out: the price under a percent, the size under a price, the people behind a result.



a price, and no word on what it was before

Which half is missing

A percent with no price. A price with no size. A saving with no comparison. A result with no sample size.

Each of those is half a fact, and the missing half is almost never missing by accident. Whichever number is absent is usually the one that would make the claim less impressive, which is a rule of thumb and not a law, and it is right often enough to lead with.

This is the whole year in one habit. When you meet a number, ask what it is a number OF, and if you cannot find that, you have found the question rather than the answer.

What is missing?

	The claim	The missing number	Why it matters
a	20 percent off	the price it comes off	the saving depends on it
b	$2.40 a pack		
c	nine out of ten agree		
d	lasts 30 percent longer		
e	was $200 for all of May, now $150		

One of these is missing nothing at all: everything you would need is on it. Which, and is that the most useful claim on the list?

TALK ABOUT IT

Find a claim missing its other half. Write down what you would ask for.

Is a claim with a number in it more trustworthy than one without? Should it be?



STUCK? TRY THIS

For each claim, finish the sentence “a percent of WHAT” or “longer than WHAT.” The word after WHAT is the missing number.

★ CHALLENGE ZONE

Write a claim that is missing nothing and still tells a customer very little. What does that show about completeness?

WEEK 30 ASKING

Who Benefits From Yes?

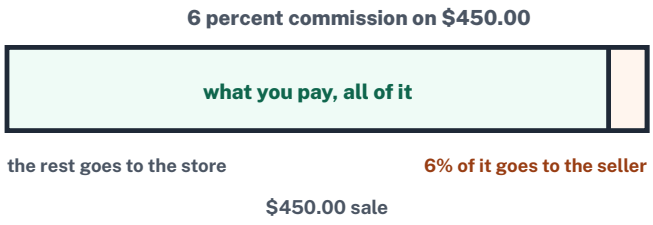
Not a reason to distrust anybody. A reason to know which questions to ask elsewhere.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
6 percent commission on a $450 sale is _____

WORDS TO KEEP

who is asking Somebody is paid to put this number in front of you. That does not make it false and it does tell you what to check.



Ask the question they can answer

$27.00 on a $450.00 sale. That is what a yes is worth to the person asking, and it is a fact rather than an accusation.

Most people selling things are honest and most of them believe what they are telling you. The problem is not lying, it is that nobody can be neutral about a question when one answer pays them, and they usually do not notice it happening any more than you would.

So sort the questions. Facts they hold: unit price, return policy, running costs, what is in the box. Judgments they cannot be neutral about: is this right for me, is this a good deal, should I get the bigger one. Ask the first kind of them and the second kind of somebody with nothing riding on it.

Fact, or judgment?

	The question	Fact or judgment	Who to ask
a	What is the price per 100 g?	fact	the seller
b	Is this the right one for me?		
c	What is your return policy?		
d	Is this a good price?		
e	What does it cost to run for a year?		

Question d looks like a fact and is not. What would you have to add to it to turn it into one?

💬 TALK ABOUT IT

Ask somebody at home or at school whether they have ever felt sold to. What gave it away? Is it rude to ask somebody how they are paid? When would it not be?



STUCK? TRY THIS

For each question, ask whether the answer could be looked up: a price, a date, a written policy, a number on a label. If it could, it is a fact. If it depends on what you want, it is a judgment.

★ CHALLENGE ZONE

A friend recommends something and gets nothing for it. Which of the five questions can you now ask them, and which still need somebody else?

WEEK 31 THE LIMITS

The Claim You Cannot Check

An opinion wearing a number. There is no arithmetic that will rescue it.

IN CLASS THIS WEEK
Statistical questions (6.SP.1)

MONEY WARM-UP · 2 MINUTES
Of 200 asked, 150 said yes. What percent? _____

WORDS TO KEEP

cannot check A claim with nothing behind it you could look at. Treat it as an opinion wearing a number.

150 of the 200 people asked said yes



one dot for every 10 people asked

Where the checking runs out

THE BEST VALUE ANYWHERE. There is no measurement that settles that, and no arithmetic that turns it into one.

Some claims are checkable in principle and expensive in practice, like whether it really lasts 30 percent longer than the old model. Some are not checkable at all, because the words do not name anything measurable. Best, premium, quality and value belong to the second group unless somebody defines them, and almost nobody does.

The move is not to reject those claims. It is to notice that they carry no information and to stop weighing them, so the decision rests on the parts you can actually check. A page of unfalsifiable praise plus one real number is a page with one number on it.

Where does it sit?

	The claim	Checkable, costly, or not at all	What you would do
a	the best value anywhere	not at all	set it aside
b	150 of the 200 we asked would buy it again		
c	lasts 30 percent longer than the old model		
d	premium quality		
e	$2.40 per 100 g		

Two of these are not checkable at all. If you set both aside, what is left of the advertisement, and would you still buy it?

TALK ABOUT IT

Count the uncheckable words on one package or advertisement. Just count them.

Should a store be allowed to say “the best”? What would the rule be?



STUCK? TRY THIS

Ask what measurement would settle it. If you cannot name one, nothing will settle it, and that is your answer.

★ CHALLENGE ZONE

Take an uncheckable claim and write the checkable version a seller could honestly make instead. Is the honest version worse at selling?

WEEK 32 THE LIMITS

Deciding Anyway

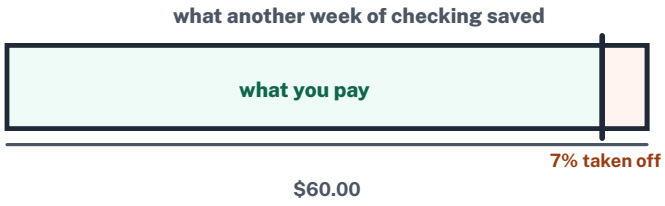
You will never have all of it. Refusing to decide is a decision and usually a costly one.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
Waiting a week to check saves $4 on $60. That is _____ percent

WORDS TO KEEP

cannot check A claim with nothing behind it you could look at. Treat it as an opinion wearing a number.



Checking has a cost too

A week of asking around saved $4.00 on a $60.00 thing. That is about seven percent, and it took a week.

Every question in this book costs something: time, or the thing being gone when you come back, or simply the tiredness of interrogating a purchase you were happy about. A person who checks everything is not making better decisions than a person who checks the big ones well.

So scale the checking to the decision. For something small, ten percent and a glance is plenty. For something large, or something with a running cost, or something you cannot return, the whole apparatus earns its keep. Knowing which is which is the last skill in this year, and it is judgment rather than arithmetic.

How much checking?

	The decision	How much checking	Why
a	a $2 snack	almost none	the checking costs more than the item
b	a $60 pair of shoes		
c	a $9 a month arrangement with no end date		
d	a $400 thing you cannot return		
e	a $15 gift you need today		

Row c has a smaller price than row b and deserves more checking. Say why, using what the monthly cost adds up to over a year.

▶ ADD TO YOUR QUESTION BOOK

Add a page headed How Much Checking, with three real decisions and how much each deserved.

💬 TALK ABOUT IT

Ask somebody at home or at school about a time checking more would not have helped.

Can you check too much? What does it cost?



STUCK? TRY THIS

Compare what the checking could save against what the checking costs. For small items the second is bigger, and that is a real answer.

★ CHALLENGE ZONE

Write a rule for how much checking a decision deserves. Test it on all five rows and say where it fails.

WEEK 33 ASKING

Asking Well

A question somebody can answer with a fact rather than with enthusiasm.

IN CLASS THIS WEEK
Unit rate (6.RP.2)

MONEY WARM-UP · 2 MINUTES
A question with a number in the answer is a _____ question

WORDS TO KEEP

ask well	A question a seller can answer with a fact rather than with enthusiasm.

Is it good?
answered with enthusiasm

vs

Price per 100 g?
answered with a number

one of these you can write down

Short, specific, and answerable

Is this good? gets you an opinion. What is the price per 100 grams? gets you a number, and you can write it down and compare it later.

Three things make a question answerable. It asks for one thing. The answer is a fact rather than a judgment. And the person you are asking actually holds it: a salesclerk knows the return policy and does not know how long it will last.

Asking well is not being difficult. Most people would rather answer a clear question than a vague one, and a seller who has been asked what the unit price is has been given an easy job. The awkwardness is almost entirely in the asking, and it goes away with practice.

Sharpen the question

	The vague version	The answerable version
a	Is it good value?	What is the price per 100 g?
b	Does it last?	
c	Is this the best one?	
d	Is that expensive?	
e	How many days do I have to bring it back?	

One of these is already answerable as written. Which, and what makes it different from the other four?

▶ ADD TO YOUR QUESTION BOOK

Add a page headed Asking Well, with five questions you sharpened and one you actually asked.

💬 TALK ABOUT IT

Ask one sharpened question out loud, to your teacher or a grown-up you know.

Which is harder, thinking of the question or saying it?



STUCK? TRY THIS

Rewrite each one so the answer is a number, a date or a written policy. If the answer could be yes, it is not sharp enough yet.

★ CHALLENGE ZONE

Write the question you would most like to ask about something you own and never asked. Why did you not ask it at the time?

WEEK 34 ASKING

What You Do With the Answer

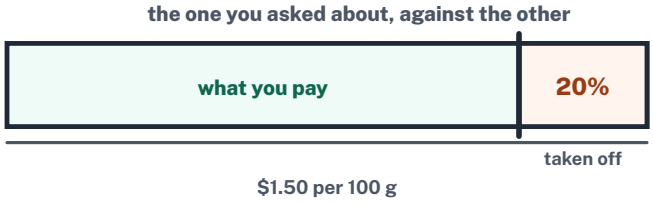
The point of asking is to change what you do, and sometimes the answer says buy it.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
You asked, and it is $1.20 per 100 g against $1.50. Better by _____ percent

WORDS TO KEEP

ask well A question a seller can answer with a fact rather than with enthusiasm.



Sometimes the answer is yes

You asked. It is $1.20 per 100 g and the other is $1.50, which is twenty percent better. Buy it.

A whole year of checking numbers can leave a person thinking the checking is the point and that the right answer is always no. It is not. The point of the questions is to make a yes worth something, and most of the things you check will turn out fine, because most sellers are ordinary people selling ordinary things at ordinary prices.

What changes is not how often you buy. It is that you know why, you would notice if the numbers were different, and you can say what would have changed your mind. That is what the year was for.

So what do you do?

	You asked, and	So	Why
a	it is 20 percent cheaper per unit	buy it	the number answers the question
b	they would not tell you the unit price		
c	the old price was never charged		
d	it costs $9 a month with no end date		
e	it is the same price as everywhere else		

In row e the answer is that there is nothing to choose between them. What do you decide on then, and is that a failure of the method?

TALK ABOUT IT

Tell somebody at home or at school about a time you checked and it was fine.

Has this year made you buy less, or buy differently? Say which honestly.



STUCK? TRY THIS

For each row, say what the answer rules in or out. An answer that rules nothing out was the wrong question.

★ CHALLENGE ZONE

A seller refuses to answer a fair question. Is that always a reason not to buy? Find the case where it is not.

WEEK 35 REVIEW

Your Question Book, Finished

Every page of it a number somebody put in front of you and you took apart.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
Ten of the pages at 2 claims each is _____ claims

one box per page of your Question Book

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	

What is in it

Go through the Question Book from the front. Most pages should have a real number in them, from a sign, an ad, a label or a price list.

A percent you found in the world and what it was a percent of. A discount you worked out before you read the sale price. A sign that said off what. A crossed-out price and the ruler you brought instead. A stacked offer and the single percent it really came to. A number line with a balance below zero. A range of prices for one thing. A set of prices with a far one in it. A free offer and what it was each. A rule with a letter in it. A budget as an at most. A claim and what would have to be true. Three decisions and how much checking each deserved. And the questions you sharpened, with the one you actually asked.

Nobody else could have written it.

Check the book

	Question	Your answer
a	How many pages are in your Question Book?	
b	Which number surprised you most?	
c	Which claim was hardest to take apart?	
d	Which page would you show somebody first?	
e	Did you ever change what you did because of a page?	

If a page is missing, fill it in now from the workbook page it came from. A book with a gap filled late is still a book.

▶ ADD TO YOUR QUESTION BOOK

This is the last page. Number every page in the book, front to back, and write the total on this one.

💬 TALK ABOUT IT

Show one page you choose to somebody at home or at school.

Which page would you keep if you could only keep one?



STUCK? TRY THIS

Work from the front. Every page has a heading that came from a week, so any gap has a workbook page waiting to fill it.

★ CHALLENGE ZONE

If you kept this book for another year, what kind of number would you add that is not in it now?

WEEK 36 REVIEW

Somebody Chose That Number

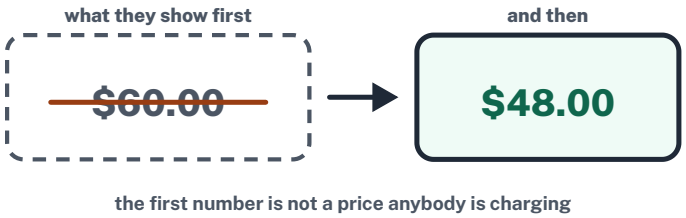
Four words, and what a year of this adds up to.

IN CLASS THIS WEEK
Find a percent of a quantity (6.RP.3c)

MONEY WARM-UP · 2 MINUTES
A $50 price marked up 20% then 20% off is _____

WORDS TO KEEP

somebody chose that number The whole year in four words.



the first number is not a price anybody is charging

Where this leaves you

Every number outside a classroom was chosen by somebody, for a reason, and usually to be read a particular way.

Every choice costs you the thing you did not pick. Decide it before you are standing in front of it. The tag is the beginning of the arithmetic rather than the end. This year added that the tag was written by a person.

None of that is a reason to trust nobody, and a person who suspects everybody is as easy to sell to as a person who suspects nobody, just more tiring to be near. It is a reason to know which questions turn a claim back into a number, and to be able to ask them without embarrassment. What you buy after that is yours.

The last questions

	Question	Your answer
a	What is the one thing you would tell a younger student?	
b	Which idea from this year have you actually used?	
c	What do you now check that you used to accept?	
d	Has any of this made you buy something you would not have?	
e	Will you keep doing this? Say honestly.	

Row d may surprise you. Checking sometimes says yes, and a yes you can defend is worth more than a no you cannot.

TALK ABOUT IT

Tell somebody at home or at school the four words and what they mean.

What is one number you will never look at the same way again?



STUCK? TRY THIS

There is no arithmetic on this page. Answer in sentences and take your time over row c.

★ CHALLENGE ZONE

Write the week this book is missing. What kind of number does it take apart, and where in the year would it go?

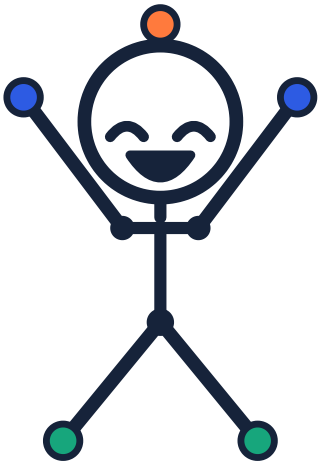
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Grade 6 · The Asking Year

Certificate of Completion

This is to certify that

practiced taking numbers apart for thirty-six weeks: working out a percent without being told the answer, asking what a discount is a discount of, checking that two discounts in a row do not add, reading a price as a range rather than a fact, writing a cost as a rule with a letter in it, and asking a question a seller can answer with a fact.



Teacher

Date

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