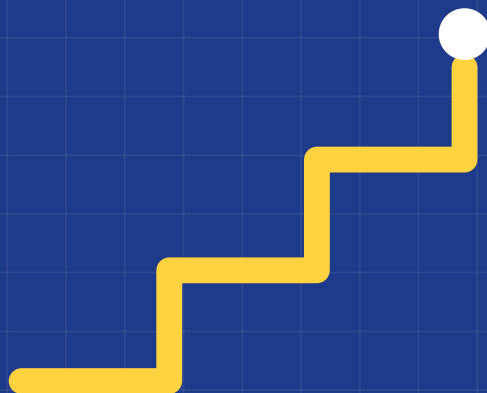




UpOnly Learning



GRADE 7

FREE SAMPLE WORKBOOK

Math Grade 7

One step at a time. · Ages 12–13 · Free sample: 1 of 8 topics

UO-MATH-7

One step at a time

I'm Dr. Evan J. Hasson. I've run a specific chiropractic practice for over twelve years, and I'm a dad of three. My work is about alignment: get the structure right, and everything else works better.

At home, nothing was aligned. I was spending thousands a month on tutors, extracurriculars and programs, and when I asked about enrolling a second or third child the answer was always the same: that'll be double, that'll be triple. The charter school had a waiting list. The good public school had a waiting list. The private schools had the kind of list where it helps to know someone, or to give generously first.

And underneath all of it, the same quiet threat: if you don't pay for this, your child will fall behind. Not sold with evidence. Sold with fear.

So I did my own research, and here is what I found: none of it is secret. The standards are published. The order a child should learn in is written down and freely available. It is just scattered. Nobody had done the work of pulling it together, putting it in order and handing it over. So I did.

When every step has its place, confusion has nowhere to hide.

I built this for my own kids. I'm giving it to yours.

Dr. Evan J. Hasson, DC

Founder and dad of three

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No guaranteed results, and mistakes happen. Every student learns differently. We write and review every question and answer key carefully, and we still get things wrong — an answer key can be wrong, and a question can be worded badly or have two defensible answers. Check the answer key before you hand it over, and trust your own judgement over ours. Found a problem? **Photograph the page and email it to support@uponlearning.com** — the picture tells us more than a description, and we fix it for every family.

Safety. Some activities use household items such as scissors, coins or food. An adult should supervise and skip anything unsafe for the student.

Not professional advice. This workbook does not replace an evaluation by a qualified educator or specialist. The founder is a Doctor of Chiropractic; UpOnly Learning does not provide medical or health advice.

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How to use this workbook

Each topic follows the same steps, so your student always knows what comes next.

1. ① **Quick Check.** 10 questions before you teach. Read them aloud for younger students. A high score means you can move faster.
2. ② **Learn It.** Key words, step-by-step teaching with lines you can read aloud, worked examples and the mistakes to watch for.
3. ③ **We Do It Together.** 10 questions you do side by side. The answer and the "why" are printed right after each question, so you can talk it through.
4. ④ **You Try.** 10 questions your student does alone.

Answers with short explanations for every question are in the **Answer Key** at the end of each topic, so students can work without peeking. Go over each wrong answer together using the explanation.

This workbook is printed in full color. To save ink, choose "Black and white" or "Grayscale" in your printer settings; every page still works in black and white.

Want online checks that score themselves and track each student's progress? Visit uponlylearning.com.



How to use this Math book in Grade 7

Pace

Plan on 1 to 2 weeks for each of the 8 topics, about 8 to 16 weeks for the book, in 2 to 4 sessions a week.

A typical session

A 40 to 45 minute session runs Quick Check, Learn It, We Do It Together, and a block of You Try questions, with Show What You Know saved for its own day at the end of the topic.

Tips for this book

- Proportional relationships comes first and returns in later topics; make sure your student can find a constant of proportionality before moving on.
- For Rational number operations, keep a number line handy and have your student say each negative sign aloud as they work.
- Sampling and probability works best with real objects: a coin, two dice, or a bag of colored buttons for running small experiments.
- Encourage your student to check their own work with the answer key and explain any changed answer in a sentence or two.

Your seventh grader is learning to reason with ratios, equations, and chance, and your patience gives them room to think it through.

GRADE 7

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Math: Grade 7

Free Sample Workbook · Ages 12–13 · 1 of 8 topics, with a Quick Check, a lesson, We Do It Together, You Try and an answer key

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Proportional relationships

The student will find the constant of proportionality in tables, equations and word problems, and use proportional reasoning to solve multi-step percent problems such as discounts, tax, tips and percent change.

① Quick Check

Do this before the lesson. It shows what your student already knows. Score: ____ / 10

1. A proportional relationship has a graph that is a straight line through which point?
A (0, 0) **B** (0, 1) **C** (1, 1)
2. An item is 30% off. What percent of the original price do you pay?
A 70% **B** 3% **C** 30% **D** 130%
3. In which table, with $x = 1, 2, 3$, is y proportional to x ?
A $y = 5, 7, 9$ **B** $y = 4, 8, 12$ **C** $y = 2, 3, 4$ **D** $y = 3, 6, 10$
4. In the equation $y = 6x$, what is the constant of proportionality?
A $1/6$ **B** x **C** y **D** 6
5. A recipe uses 3 cups of flour for every 2 cups of sugar. How much flour goes with 5 cups of sugar?
A 8 cups **B** 7.5 cups **C** 3.33 cups **D** 10 cups
6. A \$120 coat is 35% off. What is the sale price?
A \$155 **B** \$42 **C** \$85 **D** \$78
7. Pay for 2, 4 and 6 hours is \$27, \$54 and \$81. What is the constant of proportionality?
A 2 **B** 13.5 **C** 27
8. Sneakers cost \$60 and are 15% off. What is the sale price?
A \$51 **B** \$45 **C** \$75 **D** \$9
9. A receipt shows a total of \$26.50 with 6% sales tax included. What was the price before tax?
A \$25 **B** \$25.50 **C** \$26.44 **D** \$24.91
10. A \$80 item is 20% off, then an extra 10% off the new price. What is the final price?
A \$64.00 **B** \$57.60 **C** \$72.00 **D** \$56.00

② Learn It

Key words

- **proportional relationship:** Two quantities that always grow or shrink by the same multiplier, so $y \div x$ is always the same number.
- **constant of proportionality (k):** The fixed multiplier in $y = kx$. It is the unit rate: how much y you get for 1 of x .
- **unit rate:** A rate per one unit, like 3 dollars per pound or 2 miles per hour.
- **percent:** Per hundred. 18% means 18 out of every 100, or 0.18.
- **percent change:** How much something grew or shrank compared to where it started: $(\text{change} \div \text{original}) \times 100$.

Warm-up

1. Write this on paper: 3 pounds of apples cost \$6. 5 pounds cost \$10. 8 pounds cost \$16.
2. Ask: How much does 1 pound cost? (2 dollars.) How did you figure it out?
3. Ask: How much would 20 pounds cost? (40 dollars.)
4. Point out that every cost is the number of pounds times 2. Tell them that 2 is the secret multiplier we are hunting today.

Every price on this list follows one hidden rule. If you can find the rule, you can predict any price without even going to the store.

Teach

1. Make a two-column table: x = pounds (3, 5, 8) and y = cost (6, 10, 16). Add a third column for $y \div x$. Every row gives 2.
2. Explain: when $y \div x$ is the same in every row, the relationship is proportional. That constant number is called k , the constant of proportionality, and the equation is $y = kx$. Here, $y = 2x$.
3. Show a table that is NOT proportional: a taxi charges \$3 to start plus \$2 per mile. 1 mile costs \$5, 2 miles cost \$7. $5 \div 1 = 5$ but $7 \div 2 = 3.5$, so the ratios do not match. Also, 0 miles costs \$3, not \$0. A proportional graph is a straight line through (0, 0).
4. Show a fraction unit rate: Sam walks $\frac{1}{2}$ mile in $\frac{1}{4}$ hour. $k = (\frac{1}{2}) \div (\frac{1}{4}) = 2$ miles per hour. Dividing fractions works exactly like dividing whole numbers here.
5. Switch to percents. Explain that a percent is a constant of proportionality too: the tax is always 0.06 times the price, a tip is always 0.18 times the bill.
6. Teach the multiplier shortcut: 25% off means you pay $100\% - 25\% = 75\%$, so multiply by 0.75. Adding 6% tax means you pay 106%, so multiply by 1.06.
7. Teach percent change: $\text{percent change} = (\text{new} - \text{original}) \div \text{original} \times 100$. Always divide by the ORIGINAL amount.

A proportional relationship is like a recipe with one magic number. Once you know k , you just multiply. Percents are the same idea, with the magic number written out of 100.

Guided practice

1. Pull out a receipt or flyer. Pick one item and its price together.
2. Work through: the item is 30% off. Ask the student what percent they actually pay (70%), then multiply the price by 0.70.
3. Now add 7% sales tax to the sale price by multiplying by 1.07. Round to the nearest cent.
4. Give a table: hours worked 2, 4, 6 and pay \$27, \$54, \$81. Have the student find k (13.50) and write the equation $y = 13.5x$.
5. Ask them to explain in a sentence what 13.5 means in the story (dollars earned per hour).
6. Work through the two examples in this lesson together, with the student doing the writing and you asking the questions.

You be the cashier and I will be the customer. Tell me what I really owe after the discount and the tax.

Worked examples

A recipe uses 3 cups of flour for every 2 cups of sugar. Write an equation for cups of flour (y) in terms of cups of sugar (x), and find the flour needed for 5 cups of sugar.

$k = 3 \div 2 = 1.5$, so $y = 1.5x$. For $x = 5$, $y = 1.5 \times 5 = 7.5$ cups of flour.

A jacket costs \$40. It is 25% off, and then 6% sales tax is added. What is the final price?

Pay 75% of the price: $40 \times 0.75 = \$30$. Add tax by multiplying by 1.06: $30 \times 1.06 = \$31.80$.

Watch for these mistakes

Mistake: Any table where both columns go up is proportional.

Fix: Have the student divide y by x in every row. If the answers are not all the same, or if $x = 0$ does not give $y = 0$, it is not proportional. The taxi with a starting fee goes up but is not proportional.

Mistake: If a price goes up 20% and then down 20%, it ends up back where it started.

Fix: Try it with \$100: up 20% is $100 \times 1.2 = \$120$, down 20% is $120 \times 0.8 = \$96$. The second percent is taken of a bigger number, so the result is lower. Always ask: percent of WHAT?

③ We Do It Together: 10 questions

Do these side by side. Read each question together, let your student answer, then read the answer and the "why" right below it and talk it through.

1. Maya earns \$9 per hour. Which equation gives her pay y for x hours?

A $x = 9y$ B $y = x + 9$ C $y = 9x$ D $y = 9 + x$

Answer: C $y = 9x$

Why: Pay is a constant 9 dollars per hour times the hours, so $y = 9x$.

2. The equation $y = 2.5x$ relates miles y to hours x . How far is it in 4 hours?

A 8 miles B 10 miles C 6.5 miles D 1.6 miles

Answer: B 10 miles

Why: Substitute $x = 4$: $2.5 \times 4 = 10$.

3. A \$80 jacket is 10% off. What is the sale price?

A \$70 B \$72 C \$88 D \$8

Answer: B \$72

Why: Pay 90%: $0.9 \times 80 = 72$. The \$8 is the discount, not the price.

4. Five pounds of grapes cost \$15. What is the price per pound?

A \$10 B \$20 C \$3 D \$75

Answer: C \$3

Why: Unit price = $15 \div 5 = 3$ dollars per pound.

5. Mateo walks $\frac{1}{2}$ mile in $\frac{1}{4}$ hour. What is his speed?

A 4 miles per hour B $\frac{1}{8}$ miles per hour C 2 miles per hour

Answer: C 2 miles per hour

Why: Speed = $(\frac{1}{2}) \div (\frac{1}{4}) = \frac{1}{2} \times 4 = 2$ miles per hour.

6. A \$64 meal gets a 20% tip. What is the total paid?

A \$12.80 B \$76.80 C \$65.20 D \$84.00

Answer: B \$76.80

Why: Tip = $0.2 \times 64 = 12.80$, so the total is $64 + 12.80 = 76.80$.

7. A team's score drops from 80 to 60. What is the percent decrease?

- A 33% B 20% C 25%

Answer: C 25%

Why: The change is 20, divided by the original 80, gives 25%.

8. Priya used 3 gallons of paint to cover 1,050 square feet. At this rate, how many square feet will 8 gallons cover?

- A 1,058 square feet B 2,800 square feet C 350 square feet

Answer: B 2,800 square feet

Why: 1 gallon covers $1,050 \div 3 = 350$ square feet, so 8 gallons cover 2,800.

9. A price goes up 20% and then down 20%. What is the net percent change?

- A A 4% increase B A 40% decrease C No change D A 4% decrease

Answer: D A 4% decrease

Why: Start at 100: $100 \times 1.2 = 120$, then $120 \times 0.8 = 96$. That is 4 less than 100.

10. The number 12 is 5% of what number?

- A 0.6 B 17 C 60 D 240

Answer: D 240

Why: $12 \div 0.05 = 240$. Check: $0.05 \times 240 = 12$.

④ You Try: 10 questions

Now your student works alone. Check answers in the Answer Key at the end of this topic. Score: ____ / 10

- Twelve apples cost \$6. What is the cost of one apple?
A \$2.00 **B** \$0.50 **C** \$6.00
- What is 10% of 50?
A 5 **B** 10 **C** 40 **D** 500
- A price goes from \$20 to \$25. What is the percent change?
A 5% **B** 20% **C** 25%
- A phone loses 10% of its \$1,400 value in a year. What is it worth then?
A \$140 **B** \$1,540 **C** \$1,260 **D** \$1,390
- A worker earning \$2,000 a month gets a 5% raise. What is the new monthly pay?
A \$2,100 **B** \$2,500 **C** \$2,005
- A runner goes $\frac{3}{4}$ mile in $\frac{1}{2}$ hour. What is her speed?
A 1.5 miles per hour **B** 2 miles per hour **C** $\frac{3}{8}$ miles per hour
- A town grows from 800 to 1,000 people. What is the percent increase?
A 25% **B** 20% **C** 125% **D** 200%
- Car A goes 150 miles in 3 hours. Car B goes 220 miles in 4 hours. How many miles per hour faster is Car B?
A 10 miles per hour **B** 5 miles per hour **C** 1 mile per hour **D** 70 miles per hour
- The point (4, 10) is on the graph of a proportional relationship. What is y when x = 10?
A 16 **B** 20 **C** 25
- Yuki puts \$800 in an account that pays 3.5% simple interest each year. What is her balance after 4 years?
A \$828 **B** \$912 **C** \$1,200 **D** \$112

Proportional relationships: Answers and explanations

① Quick Check

1. A proportional relationship has a graph that is a straight line through which point?
A (0, 0)
If x is 0, then y must be 0 in $y = kx$, so the line passes through the origin.
2. An item is 30% off. What percent of the original price do you pay?
A 70%
You pay $100\% - 30\% = 70\%$ of the price.
3. In which table, with $x = 1, 2, 3$, is y proportional to x ?
B $y = 4, 8, 12$
Only 4, 8, 12 gives the same $y \div x$ each time: 4. The others go up but not by a constant multiplier.
4. In the equation $y = 6x$, what is the constant of proportionality?
D 6
In $y = kx$, k is the number multiplied by x . Here $k = 6$.
5. A recipe uses 3 cups of flour for every 2 cups of sugar. How much flour goes with 5 cups of sugar?
B 7.5 cups
 $k = 3 \div 2 = 1.5$, so $y = 1.5x$. With $x = 5$, $y = 7.5$ cups.
6. A \$120 coat is 35% off. What is the sale price?
D \$78
Pay 65%: $0.65 \times 120 = 78$. The \$42 is the discount.
7. Pay for 2, 4 and 6 hours is \$27, \$54 and \$81. What is the constant of proportionality?
B 13.5
 $27 \div 2 = 54 \div 4 = 81 \div 6 = 13.5$ dollars per hour.
8. Sneakers cost \$60 and are 15% off. What is the sale price?
A \$51
Pay 85%: $0.85 \times 60 = 51$. The \$9 is the discount.
9. A receipt shows a total of \$26.50 with 6% sales tax included. What was the price before tax?
A \$25
The total is 106% of the price: $26.50 \div 1.06 = 25$.
10. A \$80 item is 20% off, then an extra 10% off the new price. What is the final price?
B \$57.60
 $80 \times 0.8 = 64$, and $64 \times 0.9 = 57.60$. The two discounts are not added to 30%.

④ You Try

1. Twelve apples cost \$6. What is the cost of one apple?
B \$0.50
Unit rate = $6 \div 12 = 0.50$ dollars per apple.

2. What is 10% of 50?
A 5
 $10\% = 0.1$, and $0.1 \times 50 = 5$.
3. A price goes from \$20 to \$25. What is the percent change?
C 25%
Change = 5, and $5 \div \text{original } 20 = 0.25$, which is 25%. Divide by the original.
4. A phone loses 10% of its \$1,400 value in a year. What is it worth then?
C \$1,260
It keeps 90%: $0.9 \times 1,400 = 1,260$. The \$140 is the loss.
5. A worker earning \$2,000 a month gets a 5% raise. What is the new monthly pay?
A \$2,100
Multiply by 1.05: $2,000 \times 1.05 = 2,100$. A 5% raise is 5% of 2,000, which is \$100.
6. A runner goes $\frac{3}{4}$ mile in $\frac{1}{2}$ hour. What is her speed?
A 1.5 miles per hour
 $(\frac{3}{4}) \div (\frac{1}{2}) = \frac{3}{4} \times 2 = 1.5$ miles per hour.
7. A town grows from 800 to 1,000 people. What is the percent increase?
A 25%
The change is 200, and $200 \div 800 = 0.25$, so 25%. Dividing by the new amount would give 20%.
8. Car A goes 150 miles in 3 hours. Car B goes 220 miles in 4 hours. How many miles per hour faster is Car B?
B 5 miles per hour
A: $150 \div 3 = 50$ mph. B: $220 \div 4 = 55$ mph. The difference is 5.
9. The point (4, 10) is on the graph of a proportional relationship. What is y when x = 10?
C 25
 $k = 10 \div 4 = 2.5$, so $y = 2.5 \times 10 = 25$. Adding 6 to both gives 16.
10. Yuki puts \$800 in an account that pays 3.5% simple interest each year. What is her balance after 4 years?
B \$912
Interest each year is $0.035 \times 800 = 28$, so 4 years is 112. The balance is $800 + 112 = 912$.

Keep going with the full Math workbook

You just tried one topic. The full Grade 7 workbook has every topic below, each with a Quick Check, a lesson, We Do It Together, up to 90 You Try questions, Show What You Know and a full answer key.

- | | |
|--|----------|
| 1. Proportional relationships | 7.RP |
| 2. Rational number operations | 7.NS |
| 3. Multi-step equations and inequalities | 7.EE |
| 4. Multi-step problems with rational numbers | 7.EE.B.3 |
| 5. Scale drawings | 7.G.A |
| 6. Circles, angles, area and volume | 7.G.B |
| 7. Sampling and probability | 7.SP |
| 8. Comparing two groups | 7.SP.B |

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— Dr. Evan J. Hasson, founder

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