

ASVAB Math Self-Directed Guide

SECTION 1: PERCENTS

A foundation-first study guide with very basic instructions, worked examples, and the original practice worksheets.

What this section is designed to do

Teach percent skills in small steps. You will begin with the easiest percent shortcuts, practice them until they feel familiar, and then use them in word problems.

Important

Do not rush. If a lesson feels hard, go back one page and repeat the example. The goal is to understand the steps, not to finish quickly.

Name: _____

Date Started: _____

How to Use This Guide

Work through the pages in order. Each lesson teaches one small skill before you complete the worksheet that practices that skill.

1	Read the short lesson.
2	Copy the example on scratch paper if you need to.
3	Complete the worksheet that follows.
4	If you miss several problems, repeat the lesson before moving on.
5	Use the answer key only after you have tried the work yourself when an answer key is provided.

A simple reminder

Percent means “out of 100.” The symbol % means percent. For example, 50% means 50 out of 100, which is the same as one-half.

You do not need to memorize a complicated formula first. This section starts with shortcuts that are easier to see and use.

Lesson 1 - Finding 10%

The easiest percent to start with

10% means one-tenth of a number. A quick way to find 10% is to move the decimal point one place to the left.

Example 1: Find 10% of 50

- | | |
|---|--------------------------------------|
| 1 | Write the number: 50 |
| 2 | Think of it as 50.0 |
| 3 | Move the decimal one place left: 5.0 |
| 4 | So, 10% of 50 = 5. |

Example 2: Find 10% of 350

- | | |
|---|----------------------------------|
| 1 | Write 350. |
| 2 | Move the decimal one place left. |
| 3 | 350 becomes 35. |
| 4 | So, 10% of 350 = 35. |

Before the worksheet

Say this to yourself: **“For 10%, move the decimal one place left.”**

Worksheet 1 - Finding 10% of a Number

Directions: Find 10% of each number without using a calculator.

1. 10% of 30
2. 10% of 50
3. 10% of 80
4. 10% of 120
5. 10% of 200
6. 10% of 350
7. 10% of 470
8. 10% of 640
9. 10% of 900
10. 10% of 1,250

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9. 10% of 900
10. 10% of 1,250

Lesson 2 - A 10% Deduction

A **deduction** means something is taken away. If a problem says a salary is reduced by 10%, you must do two things: find 10%, then subtract it from the starting amount.

- | | |
|---|--|
| 1 | Find 10% of the starting number. |
| 2 | Subtract that 10% amount from the starting number. |
| 3 | The amount left is the new amount. |

Example: A worker earns \$40,000. The salary is reduced by 10%.

Step 1: 10% of \$40,000 = \$4,000

Step 2: \$40,000 - \$4,000 = \$36,000

Answer: The new salary is **\$36,000**.

Watch for this

If the question asks for the **new amount after a reduction**, do not stop after finding the percent. You still have to subtract.

10% Deduction Word Problems

A warehouse supervisor earns \$56,000 per year. If his salary is reduced by 10%, what is his new annual salary?

A mechanic earns \$72,000 per year. If his salary is reduced by 10%, what is his new annual salary?

A delivery driver earns \$85,000 per year. If his salary is reduced by 10%, what is his new annual salary?

A construction manager earns \$93,000 per year. If his salary is reduced by 10%, what is his new annual salary?

10% Deduction Worksheet Answers

Answer Key

1. $\$48,000 - \$4,800 = \$43,200$
2. $\$56,000 - \$5,600 = \$50,400$
3. $\$72,000 - \$7,200 = \$64,800$
4. $\$85,000 - \$8,500 = \$76,500$
5. $\$93,000 - \$9,300 = \$83,700$

Lesson 3 - Finding 15%

You already know how to find 10%. To find 15%, build it from 10% and 5%.

Shortcut

$$15\% = 10\% + 5\%$$

And 5% is half of 10%.

Example: Find 15% of 80

- | | |
|---|--------------------------------|
| 1 | Find 10% of 80: 8 |
| 2 | Find 5% by taking half of 8: 4 |
| 3 | Add 10% and 5%: $8 + 4 = 12$ |
| 4 | So, 15% of 80 = 12. |

Say it out loud

“Find 10%. Take half of that to get 5%. Add them together.”

Worksheet 2 - Finding 15% of a Number

Directions: First find 10%, then 5%, and add them together.

1. 15% of 40
2. 15% of 80
3. 15% of 120
4. 15% of 160
5. 15% of 200
6. 15% of 240
7. 15% of 300
8. 15% of 360
9. 15% of 420
10. 15% of 600

Lesson 4 - Finding 20%

20% is two groups of 10%. If you can find 10%, you can find 20%.

Shortcut

$$20\% = 10\% + 10\%$$

You can also find 10% and multiply that answer by 2.

Example: Find 20% of 70

- | | |
|---|----------------------------|
| 1 | Find 10% of 70: 7 |
| 2 | Double 7: $7 + 7 = 14$ |
| 3 | So, 20% of 70 = 14. |

Do not make this harder than it is

For the worksheets in this section, use the shortcut first. The goal is to recognize common percent patterns quickly.

Worksheet 3 - Finding 20% of a Number

Directions: Complete the first three review problems on 15%, then use $10\% + 10\%$ to find 20%.

1. Review: 15% of 60
2. Review: 15% of 140
3. Review: 15% of 220
4. 20% of 40
5. 20% of 70
6. 20% of 120
7. 20% of 180
8. 20% of 250
9. 20% of 360
10. 20% of 500
11. 20% of 640
12. 20% of 850

WORKSHEET 1: Finding 10% and 20% of Whole Numbers

Directions: Find each value. Show your work.

Example Start: 10% of 40 $\rightarrow 0.10 \times 40 = \underline{\hspace{1cm}}$ **Focus:** Calculating basic percents using simple multiplication. **Steps to Follow:**

- Convert percent to decimal (10% = 0.10, 20% = 0.20)
- Multiply

1. Find 10% of 40
2. Find 10% of 90
3. Find 20% of 50
4. Find 20% of 80
5. Find 10% of 100

1.

Lesson 5 - 50% and 25%

These are two of the easiest percent shortcuts because they match simple fractions.

50% means HALF

To find 50%, divide the number by 2.

Example: 50% of 46 = 23 because half of 46 is 23.

25% means ONE-FOURTH

One easy way to find 25% is to take half, then take half again.

Example: 25% of 40: half of 40 is 20; half of 20 is 10. So 25% of 40 = 10.

Remember

50% -> half once

25% -> half, then half again

For these exercises, don't use the percent formula. Practice recognizing the shortcuts. When you see **50%**, think **HALF**. When you see **25%**, think **HALF, THEN HALF AGAIN**.

Please read the examples below and then complete the 3 practice sets.

Shortcuts for 50% and 25%.

50% means HALF.

You do not need to use the regular percent formula when you see 50%.

- 50% of 20 → half of 20 = **10**
- 50% of 46 → half of 46 = **23**
- 50% of 100 → half of 100 = **50**

25% means HALF OF HALF.

First find 50%. Then take half again.

Example: **25% of 40**

1. Half of 40 = 20
2. Half of 20 = 10
3. So, **25% of 40 = 10**

Practice Set 1 — Make 50% Automatic

Find 50% of each number.

1. 50% of 10 = _____
2. 50% of 16 = _____
3. 50% of 24 = _____
4. 50% of 30 = _____
5. 50% of 42 = _____
6. 50% of 60 = _____
7. 50% of 80 = _____
8. 50% of 100 = _____

Instruction: Try these mentally first. If you get stuck, divide the number by 2.

Practice Set 2 — Learn the 25% Shortcut

Find 25% by taking **half and then half again**.

1. 25% of 20 = _____
2. 25% of 40 = _____
3. 25% of 60 = _____
4. 25% of 80 = _____
5. 25% of 100 = _____
6. 25% of 120 = _____

Fill in the blanks:

25% of 60

50% = _____

25% = _____

Practice Set 3 — Which Shortcut?

1. 50% of 36 = _____
2. 25% of 40 = _____
3. 50% of 70 = _____
4. 25% of 100 = _____
5. 50% of 54 = _____
6. 25% of 48 = _____
7. 50% of 120 = _____
8. 25% of 200 = _____

For these exercises, don't use the percent formula. Practice recognizing the shortcuts. When you see **50%**, think **HALF**. When you see **25%**, think **HALF, THEN HALF AGAIN**.

Please read the examples below and then complete the 3 practice sets.

Shortcuts for 50% and 25%.

50% means HALF.

You do not need to use the regular percent formula when you see 50%.

- 50% of 20 → half of 20 = **10**
- 50% of 46 → half of 46 = **23**
- 50% of 100 → half of 100 = **50**

25% means HALF OF HALF.

First find 50%. Then take half again.

Example: **25% of 40**

1. Half of 40 = 20
2. Half of 20 = 10
3. So, **25% of 40 = 10**

Practice Set 1 — Make 50% Automatic

Find 50% of each number.

1. 50% of 10 = _____
2. 50% of 16 = _____
3. 50% of 24 = _____
4. 50% of 30 = _____
5. 50% of 42 = _____
6. 50% of 60 = _____
7. 50% of 80 = _____
8. 50% of 100 = _____

Instruction: Try these mentally first. If you get stuck, divide the number by 2.

Practice Set 2 — Learn the 25% Shortcut

Find 25% by taking **half and then half again**.

1. 25% of 20 = _____
2. 25% of 40 = _____
3. 25% of 60 = _____
4. 25% of 80 = _____
5. 25% of 100 = _____
6. 25% of 120 = _____

Fill in the blanks:

25% of 60

50% = _____

25% = _____

Practice Set 3 — Which Shortcut?

1. 50% of 36 = _____
2. 25% of 40 = _____
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For these exercises, don't use the percent formula. Practice recognizing the shortcuts. When you see **50%**, think **HALF**. When you see **25%**, think **HALF, THEN HALF AGAIN**.

Please read the examples below and then complete the 3 practice sets.

Shortcuts for 50% and 25%.

50% means HALF.

You do not need to use the regular percent formula when you see 50%.

- 50% of 20 → half of 20 = **10**
- 50% of 46 → half of 46 = **23**
- 50% of 100 → half of 100 = **50**

25% means HALF OF HALF.

First find 50%. Then take half again.

Example: **25% of 40**

1. Half of 40 = 20
2. Half of 20 = 10
3. So, **25% of 40 = 10**

Practice Set 1 — Make 50% Automatic

Find 50% of each number.

1. 50% of 10 = _____
2. 50% of 16 = _____
3. 50% of 24 = _____
4. 50% of 30 = _____
5. 50% of 42 = _____
6. 50% of 60 = _____
7. 50% of 80 = _____
8. 50% of 100 = _____

Instruction: Try these mentally first. If you get stuck, divide the number by 2.

Practice Set 2 — Learn the 25% Shortcut

Find 25% by taking **half and then half again**.

1. 25% of 20 = _____
2. 25% of 40 = _____
3. 25% of 60 = _____
4. 25% of 80 = _____
5. 25% of 100 = _____
6. 25% of 120 = _____

Fill in the blanks:

25% of 60

50% = _____

25% = _____

Practice Set 3 — Which Shortcut?

1. 50% of 36 = _____
2. 25% of 40 = _____
3. 50% of 70 = _____
4. 25% of 100 = _____
5. 50% of 54 = _____
6. 25% of 48 = _____
7. 50% of 120 = _____
8. 25% of 200 = _____

WORKSHEET 2: Finding 25% and 50% Using Fraction Thinking

Directions: Use fraction reasoning where helpful.

Example Start: 50% of 60 $\rightarrow$ half of 60 = ____ **Focus:** Using fractions ($\frac{1}{2}$ and $\frac{1}{4}$) to simplify percent problems. **Strategy Tip:**

- 50% = half
- 25% = divide by 4

1. Find 50% of 60
2. Find 25% of 80
3. Find 50% of 40
4. Find 25% of 100
5. Find 50% of 90

Lesson 6 - 30%, 40%, 60%, 70%, and 80%

For these percents, use the 10% skill you already learned. Find 10% first, then multiply.

Example: Find 30% of 50

1	Find 10% of 50: 5
2	30% means three groups of 10%.
3	Multiply: $5 \times 3 = 15$
4	So, 30% of 50 = 15.

Example: Find 70% of 30

1	Find 10% of 30: 3
2	70% means seven groups of 10%.
3	Multiply: $3 \times 7 = 21$
4	So, 70% of 30 = 21.

Pattern to remember

$30\% = 3 \times 10\%$ | $40\% = 4 \times 10\%$ | $60\% = 6 \times 10\%$ | $70\% = 7 \times 10\%$ | $80\% = 8 \times 10\%$

WORKSHEET 3: Multiples of 10 Percents (30%–80%)

Directions: Break each percent into parts if needed.

Example Start: 30% of 50 $\rightarrow$ 10% = 5 $\rightarrow$ $3 \times 5 = \underline{\quad}$ (30%–80%) **Focus:** Breaking percents into parts (ex: 30% = $3 \times 10\%$). **Steps to Follow:**

1. Find 10%
2. Multiply to get final percent

1. Find 30% of 50
2. Find 40% of 60
3. Find 60% of 40
4. Find 70% of 30
5. Find 80% of 25

Lesson 7 - A 50% Deduction

A 50% reduction means half is taken away. Because 50% is half, the amount left after a 50% reduction is also half of the original amount.

Example: A salary of \$48,000 is reduced by 50%.

- | | |
|---|--|
| 1 | Find half of \$48,000. |
| 2 | $\$48,000 \div 2 = \$24,000$. |
| 3 | The reduction is \$24,000, and \$24,000 remains. |
| 4 | So the new salary is \$24,000 . |

Quick thought

When you see a **50% deduction**, think: "The new amount is half of the original."

50% Deduction Problems

1. A construction worker earns \$48,000 per year. If his salary is reduced by 50%, what is his new annual salary?
- 2.
3. A sales manager earns \$62,000 per year. If her salary is reduced by 50%, what is her new annual salary?
- 4.
5. A truck driver earns \$74,000 per year. If his salary is reduced by 50%, what is his new annual salary?
- 6.
7. An electrician earns \$86,000 per year. If her salary is reduced by 50%, what is her new annual salary?
- 8.
9. A project supervisor earns \$98,000 per year. If his salary is reduced by 50%, what is his new annual salary?

Percent Skill Check Before Moving On

Before moving to the next ASVAB math section, make sure you can explain these ideas in your own words.

- I can find 10% by moving the decimal one place left.
- I can find 5% by taking half of 10%.
- I can find 15% by adding 10% and 5%.
- I can find 20% by doubling 10%.
- I know 50% means half.
- I know 25% means half of half (or divide by 4).
- I can build 30%-80% from 10% groups.
- I know a deduction means I may need to subtract the percent amount from the original amount.

If you are not ready yet

That is okay. Return to the lesson connected to the skill you missed and redo its worksheet. You are building speed only after the steps make sense.