LHF STUDY GUIDE
PASS THE HiSET® MATH TEST!

PERCENT WORD PROBLEMS

Percent of a Number Word Problems
1. What is Percent?

Percent is used to show a portion of a total. You are probably familiar with 50%, which means you have half of the total.

If you say 50% of the people, you mean half of the people.

100% means the whole thing, so 100% of the people means all of the people.

0% means none, so 0% of the people, means none of the people.

You can think of percent as parts out of 100. For example, 35% means that if you divide one whole thing into 100 equal pieces, you have 35 of those pieces. It can be helpful to think about a specific percent in terms of where it fits between 0% and 100%.

You know that 50% means half, so 60% means a little more than half, because 60 is a little more than 50. 60% of my paycheck means a little more than half of my paycheck.

> 60 out of 100 squares are shaded.
> 60% of the squares are shaded.
> A little more than half of the whole thing is shaded.
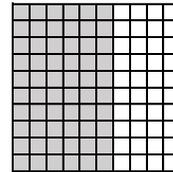
You know that 100% means all of something, so 92% means almost all of something, because 92 is almost as big as 100. If an employee is on time 92% of the days, the employee is on time almost all of the days, but not quite all of the days.

> 92 out of 100 squares are shaded.
> 92% of the squares are shaded.
> Almost all of the whole thing is shaded.
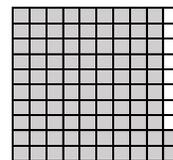
You know that 0% means none of something, so 4% means a very small amount of something, because 4 is just a little bigger than 0. If 4% of parts being manufactured are defective, it means a very small amount of parts are defective.

> 4 out of 100 squares are shaded.
> 4% of the squares are shaded.
> A very small amount of the whole thing is shaded.
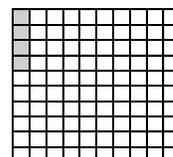
2. Converting Percents to Decimals

Before you can do mathematical operations with a percent like 42%, you must convert it to a fraction or a decimal. We will focus on converting to a decimal, as that is easier for most people.

The rule is: Locate the decimal point in the number, move it 2 places to the left, then drop the percent sign.

Tip – The number 42 is the same as 42.0, but we don't write the .0 part.
The decimal point is located to the right of the 2, even though it is not written.

<u>**Examples**</u>

4 2 % → 4 2.% → 4 2.% → .4 2   42% = **.42**

2 % → 2.% → 2.% → .02   2% = **.02**

Notice that if the percentage is a number less than 10, you will have an empty slot after moving the decimal point 2 places. Fill the slot with a 0.

Study the difference between the following two conversions: 2% = .02
                                                         20% = .2

A common mistake is to convert a percent like 2% to .2 instead of to .02.

Note – 0.02 is the same as .02
        0.42 is the same as .42

The only difference is that 0.02 and 0.42 have a 0 filling the ones column. In formal writing this is the way you will usually see it, and it is also the way it will display on the calculator.

To enter a decimal on the calculator, it is faster to enter .02 instead of 0.02, but either is correct and will work fine.

Note – When a decimal comes at the end of a sentence it is followed by a period, like you see in this sentence: Next, calculate 8% of $42.50. This looks a little odd. Don't think it is another decimal point. It is just the period that ends the sentence.

Percents can have a decimal point within the number. For example, 62.6% means an amount greater than 62% but less than 63%. Convert to a decimal the same way as above. Move the decimal point 2 places to the left, and drop the percent sign.

<u>**Examples**</u>

6 2 . 6 % → 6 2. 6 % → .6 2 6   62.6% = **.626**

3 . 4 % → 3. 4 % → .034   3.4% = **.034**

You can also use the calculator to convert percents to decimals.
The rule is: Enter the number and divide by 100.
To convert 29% to a decimal, enter $2\ 9 \div 1\ 0\ 0 =$ the calculator displays 0.29
To convert 7.8% to a decimal, enter $7\ .\ 8 \div 1\ 0\ 0 =$ the calculator displays 0.078

It is a good idea to know how to convert percents to decimals both ways in case you forget one way, or don't have a calculator handy.

Practice One – Convert the following percents to decimals. Do by hand first, and then check with the calculator. *Answers – p. 23*

1.	52%	**6.**	14%
2.	4%	**7.**	3.9%
3.	33%	**8.**	77.8%
4.	6%	**9.**	66.6%
5.	60%	**10.**	5%

3. Calculating The Percent of a Number

Most percent word problems involve calculating the percent of a number. For example, a question may ask: How much tip will you leave if your restaurant bill is $23 and you want to leave a 15% tip?

You need to get: the percent of a number.
The tip will be: 15%   of $23.

Think of the word "of" as multiplication and follow these steps to find the percent of a number.
1. Convert the percent to a decimal.
2. Replace the word "of" with the multiplication sign.
3. Calculate.

Example 1
15%   of $23 → .15 x $23 = **$3.45**

Example 2
45%   of   950 → .45 x 950 = **427.5**   If needed, round to **428**.

Example 3
7%   of $57.50 → .07 x $57.50 = **$4.025**   Round to **$4.03**, or **$4**.

Example 4
2.8%   of   6,950 → .028 x 6,950 = **194.6**   If needed, round to **195**.

Note – On the HiSET math test, look at the way the multiple choice answers are rounded to see how you should round your answer.

Percents can be greater than 100%.
If you know that 100% is the whole thing, then:

200% is the whole thing twice, so multiply x 2.
200% of 8 = 2 x 8 = 16

300% is the whole thing three times, so multiply x 3.
300% of 8 = 3 x 8 = 24

150% is the whole thing plus another half of the thing, so multiply x 1.5.
150% of 8 = 1.5 x 8 = 12

Example 5
200%   of   350
Move the decimal 2 places to the left and drop the % sign.
200% → 200.% → 2.00 → 2
2 x 350 = **700**

Example 6
125%   of $60
Move the decimal 2 places to the left and drop the % sign.
125% → 125.% → 1.25
1.25 x $60 = **$75**

Example 7
300%   of $150
Move the decimal 2 places to the left and drop the % sign.
300% → 300.% → 3.00 → 3
3 x $150 = **$450**

Practice Two – Find the following percents.   *Answers – p. 23*

1. 16% of 77

2. 2% of 60

3. 20% of 60

4. 6.5% of $18

5. 15% of 499

6. 150% of 40

7. 500% of 229

8. 67% of $800

9. 47.7% of 90

10. 4% of 12,500

11. 9% of 400

12. 100% of 57

13. 120% of $39

14. 106% of 90

4. Basic Percent Word Problems – The Percent of a Number

Example 1
Maya's hairdresser charged her $40 for a haircut, and Maya wants to leave a 15% tip. How much tip will she leave?

A. $600   B. $6   C. $60   D. $46   E. $25

The amount of tip will be 15% of $40. Convert 15% to a decimal and multiply.
15% of $40 → .15 x $40 = $6   **Answer: B. $6**

Note – The question asked is: How much tip will she leave? Answer: $6

The question could also have been: What is the total Maya will pay her hairdresser? To answer that question, you would have to add the $6 tip to the $40 haircut charge for a total of $46.

Be careful when reading and doing percent problems. Make sure you are answering the question that is being asked. Often, additional steps will be needed after you do the percent calculation.

Example 2
A customer ordered some books that cost $42.50 from an on-line store. A shipping & handling charge of 8% of the cost is added to the order. What is the total cost of the order?

A. $3.40   B. $50.50   C. $39.10   D. $34.00   E. $45.90

Shipping & handling charge is 8% of $42.50. Convert 8% to a decimal and multiply.
8% of $42.50 → .08 x $42.50 = $3.40
Add to cost of books to get the total cost of the order. $42.50 + $3.40 = $45.90
Answer: E. $45.90

Example 3
An artist has to pay a 35% commission to the art gallery on any of her paintings sold at the gallery. If she sold paintings totaling $2,295, what is the approximate amount she will have to pay in commission?

A. $800   B. $850   C. $65   D. $70   E. $750

The amount of commission will be 35% of $2,295.
Convert 35% to a decimal and multiply.
35% of $2,295 → .35 x $2,295 = $803.25
The problem asks for the approximate amount, so round $803.25 down to $800.
Answer: A. $800

Example 4

For his office meeting, Joe ordered 2 dozen donuts, 8 muffins, and 1 fruit tray as priced in the chart below. If Joe's state has a 6% sales tax on food items, what is the total cost of all the food ordered?

A. $3.16   B. $52.69   C. $55.85   D. $42.70   E. $84.30

Item	Price Each	Price per Dozen
Donut	$1.05	$9.99
Muffin	$1.59	$16.99
Bagel	$1.25	$12.99
Fruit Cup	$1.50	$16.99
Fruit Tray	$19.99	n/a

Step One – Add up the cost of the food.

Donuts: 2 x $9.99 = $19.98

Muffins: 8 x $1.59 = $12.72

Fruit Tray: 1 x 19.99 = $19.99

Total = $19.98 + $12.72 + $19.99 = $52.69

Step Two – Calculate the sales tax.

6% of $52.69 → .06 x $52.69 = $3.1614 → $3.16

Step Three – Add the food cost and sales tax together.

$52.69 + $3.16 = $55.85   **Answer: C. $55.85**

Example 5

If a clothing store is having a 20% off sale, what is the sale price of a hat that is regularly priced at $35?

A. $7   B. $15   C. $42   D. $28   E. $25

The discount is 20% of $35 → .2 x $35 = $7
Sale price = Regular price – Discount → $35 – $7 = $28
Answer: D. $28

Think about it – The regular price is 100% of the cost of the hat, and 20% is being deducted as a discount. What percent of the regular price is left over for the sale price of the hat?   100% – 20% = 80%

So, a way to do this problem in one step is to calculate 80% of the regular price.
    80% of $35 → .8 x $35 = **$28**

Regular Price= 100%

Discount=20%

Sale Price= 80%

Do this kind of problem in whichever way makes the most sense to you. Most people prefer the first way shown with two steps.
If you like the one-step method, use it for problems where you have to calculate a percent and then deduct it from the original number.

Example 6

Mrs. Kayem's restaurant bill was $25 and she left a 15% tip. What was the total amount that she paid?

A. $3.75   B. $3.00   C. $40.00   D. $28.75   E. $35.00

The amount of tip will be 15% of $25. Convert 15% to a decimal and multiply.
15% of $25 → .15 x $25 = $3.75
The question asks for the total amount paid, so add the tip to the restaurant bill.
$25 + $3.75 = $28.75   **Answer: D. $28.75**

Think about it – $25 is 100% of the restaurant bill, and another 15% of the restaurant bill is being added as a tip. A total of 100% + 15% = 115% of the restaurant bill will be paid. So, a way to do this problem in one step is to calculate 115% of $25.
    115% of $25 → 1.15 x $25 = **$28.75**

Do this kind of problem in whichever way makes the most sense to you. Most people prefer the first way shown with two steps.
If you like the one-step method, use it for problems where you have to calculate a percent and then add it to the original number.

1. The Marquez family had to make a 20% down payment to purchase their new house which cost $189,000. What was the amount of the down payment?

A. $37,800   B. $9,450   C. $151,200   D. $39,600   E. $3,780

2. How much will a shopper save on a winter coat if the store is having a 15% off sale, and the coat's regular price is $45?

A. $38.25   B. $3.00   C. $30.00   D. $6.75   E. $6.00

3. A family purchased 8 notebooks, 3 packs of pencils, and 4 packs of pens for their back to school supplies. If sales tax in their state is 7%, and prices for the supplies are as shown in the chart below, what was the total cost of the school supplies?

A. $24.13   B. $22.55   C. $23.85   D. $25.25   E. $25.52

Item	Price Each
Notebooks	$1.29
Pack of Pens	$2.49
Pack of Pencils	$1.19

4. The goal of a manufacturing company is to have no more than 2% of all parts that are made labeled as defective by the quality control department. If the company makes 2,500 parts per day, what is the maximum number of defective parts the company can have per day and still meet its goal?

A. 500   B. 50   C. 13   D. 40   E. 400

5. A store is having a 25% off sale. What is the sale price of a TV that is regularly priced at $349.99?

A. $87.50   B. $14.00   C. $226.49   D. $262.49   E. $324.99

6. If a customer had to pay an energy surcharge of 2.5% on a shipment of merchandise that cost $1,500, what was the customer's total bill?

A. $1,875.00   B. $600.00   C. $1,537.50   D. $37.50   E. $375.00

7. If a company donates 3% of its profits to charity, and profits were $20,250 what is the approximate amount of the donation?

A. $6,000   B. $60   C. $600   D. $7,000   E. $700

8. If a taxi cab fare is $18.50, and the rider wants to leave a 15% tip, how much will he pay the cab driver?

A. $2.78　　　B. $21.28　　　C. $33.50　　　D. $28.21　　　E. $2.87

5. More Percent Word Problems – The Percent of a Number

Example 1

4 years ago, Julian bought some land for $175,000. There has been a property boom and the value of the land has increased by 45%. What is his land worth now?

A. $78,750　　B. $253,750　C. $96,250　　　D. $75,780　　E. $235,750

The increase in value is 45% of $175,000 → .45 x $175,000 = $78,750
The value of the land now is the original value plus the increase.
$175,000 + $78,750 = $253,750
Answer: B. $253,750

OR – 100% of the land cost plus another 45% for the increase is 145% of the cost.
　　145% of $175,000 → 1.45 x $175,000 = **$253,750**

Careful – A very common mistake with this kind of problem is to calculate the amount of the increase, which is $78,750, and use that for the answer.

Example 2

Sue rents a booth at the Apex Craft Fair each year to sell her handcrafted jewelry. She will have to pay a booth rental charge of $250 as well as a sales fee of 9% on all sales after her first $1,200 of sales. If her total sales are $4,000, how much in total will she have to pay to the Apex Craft Fair?

A. $610　　　B. $252　　　C. $360　　　D. $502　　　E. $520

This is a multi-step problem that must be read carefully.

Step 1 – Calculate the sales that are subject to the sales fee.
　　It says she will pay 9% on all sales after the first $1,200. This means that she
　　does not have to pay the sales fee on the first $1,200 in sales. She will
　　pay the fee on the rest of the sales, which are $4,000 – $1,200 = $2,800.

Step 2 – Calculate the sales fee.
　　9% of $2,800 → .09 x $2,800 = $252

Step 3 – Calculate the total owed, which is the booth rental charge plus the sales fee.
　　$250 + $252 = $502
Answer: D. $502

Example 3

After Halloween, one store puts all bags of Halloween candy on sale for 35% off the regular price. The regular price of the candy ranges from $4.99 per bag to $8.99 per bag. What is the range of the sale prices for the bags of candy?

A. $1.75 to $3.15   B. $4.99 to $8.99   C. $4.64 to $8.64

D. $3.00 to $5.00   E. $3.24 to $5.84

The range of something means the distance between the lowest and highest value.

Lowest sale price: Discount is 35% of $4.99 → .35 x $4.99 = $1.7465 → $1.75
        Sale price = Regular price – Discount → $4.99 – $1.75 = $3.24

Highest sale price: Discount is 35% of $8.99 → .35 x $8.99 = $3.1465 → $3.15
        Sale price = Regular price – Discount → $8.99 – $3.15 = $5.84

Answer: E. $3.24 to $5.84

OR – If the discount off the regular price is 35%, the amount remaining to be paid is
  100% – 35% = 65% of the regular price.

Lowest sale price: .65 x $4.99 = $3.2435 → $3.24
Highest sale price: .65 x $8.99 = $5.8435 → $5.84
Answer: E. $3.24 to $5.84

Careful – A very common mistake with this type of problem is to calculate the range of discounts, which is $1.75 to $3.15, and use that as the answer. But, the question does not ask for the range of discounts, it asks for the range of sale prices, so the discounts must be subtracted from the regular prices to get the answer.

The question could have been: What is the range of savings for the bags of candy? If that was the question, then the answer would be $1.75 to $3.15.

Example 4

Ebony budgets to spend 40% of her income on rent and utilities, 25% on food, 5% on transportation, and 20% on other expenses. The rest she sets aside to save for a house down payment. If she makes $3,000 per month and sticks to her budget, how much can she save each month?

A. $150   B. $1,200   C. $300   D. $600   E. $750

The key to this problem is realizing that all of her expenses and savings have to add up to 100% of her $3,000 income.

Total the percents for all the listed expenses: 40% + 25% + 5% + 20% = 90%
This means she spends 90% of her $3,000 income on the listed expenses.
The amount she has left for savings is her whole income minus 90% of her income.
      100% − 90% = 10%.
Amount of savings = 10% of $3,000 → .1 x $3,000 = $300
Answer: C. $300

OR – You could calculate 90% of $3,000 to cover all the listed expenses and then subtract from $3,000 to see how much is left for savings.
     .9 x $3,000 = $2,700 $3,000 − $2,700 = **$300**

OR – You could calculate all the expenses separately by multiplying each percent times $3,000, add them up, and subtract the total from $3,000. The amount left would be the savings.
     .4 x $3,000 = $1,200
     .25 x $3,000 = $750
     .05 x $3,000 = $150
     .2 x $3,000 = $600
    Total listed expenses = $2,700 $3,000 − $2,700 = **$300**

All three methods work, but the first method is the fastest.

Example 5

The retail price of boots at a shoe store is determined by adding a 95% markup to the wholesale price that the shoe store has to pay its supplier for the boots. If the shoe store pays their supplier a wholesale price of $65 for a pair of boots, what will the price of the boots be in the store?

A. $61.75   B. $126.75   C. $160.00   D. $30.00   E. $162.75

Wholesale price is the amount the store pays a supplier to get its merchandise.
Markup is the amount the store adds to the wholesale price, to cover the store's expenses and profit.
Retail price is the price customers pay for a product.
Retail price = Wholesale price + Markup

Markup: 95% of $65 → .95 x $65 = $61.75
Retail price: Wholesale price + Markup → $65 + $61.75 = $126.75
Answer: B. $126.75

OR – 100% of wholesale plus another 95% for the markup is 195% of the cost.
     195% of $65 → 1.95 x $65 = **$126.75**

Practice Four   *Answers – p. 26*

1. The population in a city has decreased by 15% since the last census. If the population was 187,654 at the last census, what is the population now?

A. 28,148   B. 159,506   C. 12,510   D. 187,639   E. 28,841

2. The Now or Never Fitness Center has a goal of increasing its number of clients by 7% over their current enrollment of 425 clients. If they reach their goal, how many new clients will they have?

A. 30   B. 455   C. 298   D. 61   E. 300

3. The amount of surface area covered by an experimental substance is predicted to decrease by 4% over 10 days. If the surface area covered is now 18 ft^2, how much surface area will the substance cover 10 days from now, assuming the prediction is correct?

A. .72 ft^2 B. 18.72 ft^2 C. 17.28 ft^2 D. 7.2 ft^2 E. 10.8 ft^2

4. A salesperson earns a base salary of $400 per week plus a commission of 20% on any sales made after the first $800 of merchandise sold. If she sold $2,500 of merchandise last week, what was her total pay?

A. $340   B. $500   C. $740   D. $900   E. $580

5. Ella's car insurance policy says that for repairs resulting from an accident, it will pay 90% of repair costs after she has met her deductible of $1,000. If her repair bill is $2,800, how much of the bill will the insurance company pay?
A. $2,520   B. $900   C. $2,800   D. $1,620   E. $2,250

6. A company contributes 3% of an employee's salary to a retirement plan, and the employee can also contribute to the retirement plan by payroll deduction. If Raisa makes $36,000 per year, and she contributes $200 per month via payroll deduction, what is the total amount that is contributed to her retirement plan in 1 year?
A. $1,080   B. $3,480   C. $2,400   D. $10,800   E. $11,000

7. The number of students at Braden College is expected to increase between 10% and 15% next year. If there are 1,800 students now, the number of students expected for next year falls in which range?
A. between 180 and 270   B. between 150 and 300
C. between 1,800 and 2,070   D. between 1,800 and 1,980
E. between 1,980 and 2,070

8. At a used car lot, customers are required to make a down payment of between 10% and 25% of the car's price, depending on their credit rating. For a car that is priced at $9,500, the required down payment will fall in which of the following ranges?
A. $950 to $2,375   B. $7,125 to $8,550   C. $10,450 to $11,875
D. $380 to $950   E. $950 to $2,950

9. A college recruiter wants to make sure not to run out of information packets when she makes a presentation at a high school, and uses the following formula to determine how many information packets to bring with her.

Students expected + 15% of students expected = Number of information packets

If Central High School has told her to expect 200 students, how many information packets will she bring?
A. 215   B. 30   C. 15   D. 230   E. 320

10. A grocery store has a 45% markup on Roma spaghetti sauce. If the wholesale cost from the supplier is $1.75 for a jar of sauce, what will the retail price of the sauce be in the store?
A. $0.79   B. $0.96   C. $1.30   D. $3.54   E. $2.54

Use this chart to answer questions 11 and 12.

Flavor	% of Ice Cream Sales
Chocolate	30%
Vanilla	30%
Strawberry	18%

11. What percent of ice cream sales are made from flavors other than chocolate, vanilla, and strawberry?
A. 22%   B. 78%   C. 18%   D. 13%   E. 30%

12. If total ice cream sales were $5,000, what were the sales of strawberry ice cream?
A. $1,500   B. $1,667   C. $1,800   D. $800   E. $900

13. There are 450 students enrolled in an adult ed program. If 20% of students are 30 years old or younger, and 48% are between 31 and 45 years old, how many students are over 45 years old?
A. 32   B. 144   C. 90   D. 216   E. 23

The Percent One Number is of Another Number Word Problems

1. Converting Decimals to Percents

Before learning how to do this type of percent problem, you will need to know how to convert a decimal to a percent.

You just learned that to convert a percent to a decimal, you move the decimal point 2 places to the left and drop the % sign.

To convert a decimal to a percent, do the opposite:

The rule is: 1. move the decimal 2 places to the right
                 2. add a % sign

Examples

Convert .25 to a percent.

.25 → 2 5. → 25%   .25 = **25%**

Convert .03 to a percent.

.03 → 0 3. → 3%   .03 = **3%**

Convert .629 to a percent.

.629 → 6 2.9 → 62.9%   .629 = **62.9%**

Convert .3 to a percent.

.3 → 3 . → 30%   .3 = **30%**

In this last example, fill in the empty ones column with a zero.

You can also use the calculator to convert a decimal to a percent.
The rule is: Multiply the decimal x 100, then add a percent sign.
To convert .29 to a percent, enter .2 9 x 1 0 0 =   the calculator displays 29 → 29%
To convert .078 to a percent, enter .078 x 1 0 0 =   the calculator displays 7.8 → 7.8%

Practice One – Convert the following decimals to percents. Do by hand first, and then check with the calculator. *Answers – p. 31*

1. .27   **2.** .35   **3.** .82

4. .07   **5.** .7   **6.** .348

2. Review – Concept of a Fraction

A fraction represents the part you have of a whole thing. For example, $\frac{2}{3}$ of a pizza means if you divided the whole pizza into 3 equal parts, you would have 2 of the parts. The top of the fraction is the part you have and the bottom is the whole thing.

You have 2 out of 3 parts → $\frac{2}{3}$ $\frac{\text{the part you have}}{\text{the whole thing}}$

6 out of 10 students → $\frac{6}{10} = \frac{\text{part}}{\text{whole}}$

The whole thing, 10, is on the bottom, and the part you have, 6, is on the top.

\$3 out of \$22 → $\frac{3}{22} = \frac{\text{part}}{\text{whole}}$

3. Mechanics – Calculating the Percent One Number is of Another Number

Some percent problems will require you to find what percent one number is of another number. For example, if a restaurant meal cost \$25 and a \$5 tip was left, what percent tip was left? You need to find what percent \$5 is of \$25.

To do this, think: I have \$5 out of \$25, and follow these 3 steps.
1. Make a fraction with the part you have, \$5, on the top,
    and the whole, \$25, on the bottom: $\frac{5}{25}$
2. Divide to get a decimal: $5 \div 25 = .2$
3. Convert .2 to a percent: $.2 = 20\%$

The tip left was 20%.

Note – Remember, think of the fraction bar as a division sign.
$\frac{5}{25}$ is the same as $5 \div 25$.

Examples

1. What percent of 800 is 200?
   Think, I have 200 out of 800.

   Make a fraction with the part on the top and the whole on the bottom: $\frac{200}{800}$

   Divide to get a decimal: $200 \div 800 = .25$
   Move the decimal 2 places to the right and add the % sign: **25%**
   So, **200 is 25% of 800**.

2. What percent of 35 is 5? $\frac{5}{35}$ → 5 ÷ 35 → .1428 → **14.28%**

3. 6 is what percent of 75? $\frac{6}{75}$ → 6 ÷ 75 → .08 → **8%**

4. 9 is what percent of 250? $\frac{9}{250}$ → 9 ÷ 250 → .036 → **3.6%**

Practice Two   *Answers – p. 31*

1. What percent of 65 is 5?

2. 16 is what percent of 90?

3. 4 is what percent of 50?

4. What percent is 240 of 800?

4. Word Problems – Calculating the Percent One Number is of Another Number

Example 1
22 students showed up for the Tuesday night yoga class. If there are 28 students enrolled, what percentage of students attended class.
A. 6%   B. 22%   C. 28%   D. 79%   E. 27%

You are looking for what percent 22 is of 28.
22 is the top of the fraction (the part) and 28 is the bottom of the fraction (the whole).

$\frac{22}{28}$ → 22 ÷ 28 → .7857 → 78.57%   round to 79%   **Answer: D. 79%**

Example 2
A company awards a rebate to its customers as a percentage of their total purchases each month. If a customer purchased $4,150 and received a rebate of $62.25, what percentage is the rebate?
A. 1.5%   B. 15%   C. 66.7%   D. 2.5%   E. .15%

You are looking for what percent $62.25 is of $4,150.
$62.25 is the top of the fraction (the part) and $4,150 is the bottom of the fraction (the whole).

$\frac{62.25}{4,150}$ → 62.25 ÷ 4,150 → .015 → 1.5%   **Answer: A. 1.5%**

Example 3
I have saved $250 for a new cell phone that costs $350. What percent of the price do I still have left to save?

A. 71%   B. 29%   C. 100%   D. 92%   E. 75%

The amount left to save: $350 – $250 = $100
You are looking for what percent $100 is of $350.
$100 is the top of the fraction (the part) and $350 is the bottom of the fraction (the whole).

$\frac{100}{350}$ → 100 ÷ 350 → .2857 → 28.57%   round to 29%   **Answer: B. 29%**

Careful - you are given the amount already saved ($250), but the question asks for the % that still has to be saved, so subtract before calculating the percent.

OR – Calculate the percent already saved and subtract from 100% to get the percent that still has to be saved.

$\frac{250}{350}$ → 250 ÷ 350 → .7143 → 71.43% → 71% = amount already saved

100% – 71% = **29%** = amount still to be saved

Practice Three   *Answers – p. 31*

1. Luis earns $2,900 per month and spends $375 each month on his car payment. What percentage of his earnings does he spend on his car payment?

A. 1.3%   B. 7.7%   C. 13%   D. 12%   E. 10%

2. On a test with 40 questions, a student got 3 questions wrong. What percent of the questions did the student get right?

A. 7.5%   B. 92.5 %   C. 37%   D. 3%   E. 29.5%

3. If a customer was charged $2.70 sales tax on a $45 purchase, what is the sales tax percentage?

A. 16.6%   B. 60%   C. 2.7%   D. 1.6%   E. 6%

4. Lisa bought a bag of assorted candies, and just for fun wanted to know what percentage of them were cherry flavor. She counted 75 total candies and 18 cherry flavor candies. What percentage of the candies were cherry flavor?

A. 24%   B. 4%   C. 2.4%   D. 57%   E. 18%

5. For groups of 8 or larger, a restaurant adds a tip as a percentage of the bill. If the bill for a group of 10 people was $250 and the tip added was $45, what percentage tip does the restaurant add?

A. 6%   B. 25%   C. 15%   D. 18%   E. 20%

Refer to the chart below for questions 6 – 7.

ITEM	SALES
Coffee	$255
Tea	$75
Soda	$475
Juice	$75
Water	$300
Milk	$95

6. A business is analyzing its beverage sales for the week. What percentage of beverage sales were soda?
A. 3.7%   B. 73%   C. 59%   D. 37%   E. 6%

7. What percentage of beverage sales were coffee and tea?
A. 26%   B. 2.6%   C. 6%   D. 4%   E. 62%

8. If a mother allows her children to watch TV 2 hours per day, what percentage of each day are the children allowed to watch TV?
A. 2%   B. 8.33%   C. 9.33%   D. 12%   E. 83.3%

9. If Anita is responsible for cooking dinner for the family 2 times each week, what percentage of the days does she have to cook dinner?
A. 2.9%   B. 2%   C. 29%   D. 9%   E. 4%

Comparison of Percent Word Problems Types

This Study Guide has taught two types of percent word problems. (There are other types, but we have focused on the two most common types.)

Type One: Percent of a Number Problems

The Marquez family had to make a 20% down payment to purchase their new house which cost $189,000. What was the amount of the down payment?

A. $37,800   B. $9,450   C. $151,200   D. $39,600   E. $3,780

The problem gives you a number ($189,000) and a percent (20%), and you have to calculate a number. Use multiplication to solve.

The amount of down payment was 20% of $189,000.

20% of $189,000 → .2 x $189,000 = $37,800   **Answer: A. $37,800**

Type Two: Percent One Number is of Another Number Problems

22 students showed up for the Tuesday night yoga class. If there are 28 students enrolled, what percentage of students attended class.

A. 6%   B. 22%   C. 28%   D. 79%   E. 27%

The problem gives you two numbers (22 and 28) and you have to calculate a percent. Form a fraction to solve.

You are looking for what percent 22 is of 28.
Make a fraction with the part, 22, on the top and the whole, 28, on the bottom.

$\frac{22}{28}$ → 22 ÷ 28 → .7857 → 78.57%   round to 79%   **Answer: D. 79%**

What is the difference between these two types of percent problems?

Type One – you are given a number and a percent and have to calculate a number.

Type Two – you are given two numbers and have to calculate a percent.

Think about this difference as you do the mixed problems in the following Test.
If the answer needed is a number, it is a Type One problem. Use multiplication to solve.
If the answer needed is a percent, it is a Type Two problem. Form a fraction to solve.

Percent Word Problems Test   *Answers – p. 34*

1. How much will a shopper save on a TV that is on sale for 25% off the regular price of $399.99?
A. $300   B. $10   C. $16   D. $100   E. $9

2. A restaurant bill is $28.00, and the customer wants to leave a 20% tip. How much in total will the customer pay?
A. $5.60   B. $33.60   C. $8.00   D. $48.00   E. $36.30

3. In a class of 15 students, 3 students arrived late. What percent of the students were on time?
A. 20%   B. 80 %   C. 8%   D. 2%   E. 12%

4. A store is having a 60% off clearance sale. What is the sale price of a sweater that is regularly priced at $49.99?
A. $29.99   B. $25.00   C. $20.00   D. $29.00   E. $20.99

5. Every Saturday Lana volunteers from 8 AM until 11 AM delivering meals to the elderly. What percentage of her Saturday does she spend delivering meals?
A. 12.5%   B. 8%   C. 16.7%   D. 1.25%   E. 3%

6. The average price of a house in Dover has increased by 32% over the past 10 years. If the average house price was $165,500 10 years ago, what is the average house price now?
A. $52,960   B. $217,800   C. $52,800   D. $197,500   E. $218,460

Refer to the chart below for questions 7 – 8.

ITEM	SALES
Cake	$400
Pie	$375
Brownies	$255
Cookies	$450
Bread	$650
Rolls	$150

7. A bakery's weekend sales are shown in the chart. What percentage of the bakery's sales were bread?
A. 2.9%   B. 26%   C. 2.6%   D. 29%   E. 19%

8. The bakery is open from 8:00 AM until 6:00 PM. If 35% of sales were made in the afternoon from 2:00 PM until closing, what was the dollar amount of sales made before 2:00 PM?
A. $798   B. $1,008   C. $1,872   D. $1,482   E. $1,842

9. A salesperson earns a base salary of $500 per week plus a commission of 10% on her first $800 of merchandise sold, and a commission of 22% on all her additional sales beyond the first $800. If she sold $2,500 of merchandise last week, what was her total pay?
A. $2,154   B. $750   C. $954   D. $1,050   E. $1,300

10. At a used car lot, customers are charged a service fee of between 1% and 2.5% of the car's price, depending on their credit score. For a car that is priced at $11,999, the service fee will fall in which of the following ranges?
A. $119.99 to $299.98   B. $1,199.90 to $2,999.75   C. $119.99 to $239.98
D. $13,198.90 to $14,998.75   E. $12,118.99 to $12,298.98

11. If a salesperson earned a $1,440 commission on sales of $18,000, what is the sales commission percentage?
A. 80%   B. 12.5%   C. 18%   D. 10%   E. 8%

Answer Key – Percent of a Number Word Problems

Practice One *(page 3)* Convert the following percents to decimals. Do by hand first, and then check with the calculator.

1. 52% = **.52** or **0.52**

2. 4% = **.04** or **0.04**

3. 33% = **.33** or **0.33**

4. 6% = **.06** or **0.06**

5. 60% = **.6** or **0.6**

6. 14% = **.14** or **0.14**

7. 3.9% = **.039** or **0.039**

8. 77.8% = **.778** or **0.778**

9. 66.6% = **.666** or **0.666**

10. 5% = **.05** or **0.05**

Practice Two *(page 4)* Find the following percents.

1. 16% of 77 → .16 x 77 = **12.32**

2. 2% of 60 → .02 x 60 = **1.2**

3. 20% of 60 → .2 x 60 = **12**

4. 6.5% of $18 → .065 x $18 = **$1.17**

5. 15% of 499 → .15 x 499 = **74.85**

6. 150% of 40 → 1.5 x 40 = **60**

7. 500% of 229 → 5 x 229 = **1,145**

8. 67% of $800 → .67 x $800 = **$536**

9. 47.7% of 90 → .477 x 90 = **42.93**

10. 4% of 12,500 → .04 x 12,500 = **500**

11. 9% of 400 → .09 x 400 = **36**

12. 100% of 57 → 1 x 57 = **57**

13. 120% of $39 → 1.2 x $39 = **$46.80**

14. 106% of 90 → 1.06 x 90 = **95.4**

Practice Three *(page 8)*

1. The Marquez family had to make a 20% down payment to purchase their new house which cost $189,000. What was the amount of the down payment?
A. $37,800   B. $9,450   C. $151,200   D. $39,600   E. $3,780

The amount of down payment was 20% of $189,000.
20% of $189,000 → .2 x $189,000 = $37,800   **Answer: A. $37,800**

Note – When buying an expensive item like a car or a house, most people pay a portion of the price at the time of purchase, and take out a loan for the rest of the purchase price. The amount paid at the time of purchase is called a down payment.

2. How much will a shopper save on a winter coat if the store is having a 15% off sale, and the coat's regular price is $45?

A. $38.25   B. $3.00   C. $30.00   **D. $6.75**   E. $6.00

The amount of savings is 15% of $45 → .15 x $45 = $6.75
Answer: D. $6.75

3. A family purchased 8 notebooks, 3 packs of pencils, and 4 packs of pens for their back to school supplies. If sales tax in their state is 7%, and prices for the supplies are as shown in the chart below, what was the total cost of the school supplies?

A. $24.13   B. $22.55   C. $23.85   D. $25.25   **E. $25.52**

Item	Price Each
Notebooks	$1.29
Pack of Pens	$2.49
Pack of Pencils	$1.19

Step One – Add up the cost of the supplies.
Notebooks: 8 x $1.29 = $10.32
Pencils: 3 x $1.19 = $3.57
Pens: 4 x $2.49 = $9.96
Total = $10.32 + $3.57 + $9.96 = $23.85

Step Two – Calculate the sales tax.
7% of $23.85 → .07 x $23.85 = $1.6695 → $1.67

Step Three – Add the supplies cost and sales tax together.
$23.85 + $1.67 = $25.52   **Answer: E. $25.52**

OR – 100% of the cost plus another 7% for the tax is 107% of the cost.
107% of $23.85 → 1.07 x $23.85 = $25.5195 → **$25.52**

4. The goal of a manufacturing company is to have no more than 2% of all parts that are made labeled as defective by the quality control department. If the company makes 2,500 parts per day, what is the maximum number of defective parts the company can have per day and still meet its goal?

A. 500   **B. 50**   C. 13   D. 40   E. 400

2% of 2,500 parts is the maximum number of defective parts within the stated goal.
2% of 2,500 → .02 x 2,500 = 50 **Answer: B. 50**

5. A store is having a 25% off sale. What is the sale price of a TV that is regularly priced at $349.99?

A. $87.50   B. $14.00   C. $226.49   **D. $262.49**   E. $324.99

The discount is 25% of $349.99 → .25 x $349.99 = $87.4975 → $87.50
Sale price = Regular price – Discount → $349.99 – $87.50 = $262.49
Answer: D. $262.49

OR – If the regular price is 100% of the cost, and 25% is being deducted as a discount, 100% – 25% = 75% is the amount left to pay.
75% of $349.99 → .75 x $349.99 = $262.4925 → **$262.49**

6. If a customer had to pay an energy surcharge of 2.5% on a shipment of merchandise that cost $1,500, what was the customer's total bill?

A. $1,875   B. $600.00   **C. $1,537.50**   D. $37.50   E. $375.00

Surcharge is 2.5% of $1,500 → .025 x $1,500 = $37.50
Add merchandise cost plus surcharge to get total bill.
$1,500 + $37.50 = $1,537.50   **Answer: C. $1,537.50**

OR – 100% of the cost plus another 2.5% for the surcharge is 102.5% of the cost.
102.5% of $1,500 → 1.025 x $1,500 = **$1,537.50**

7. If a company donates 3% of its profits to charity, and profits were $20,250 what is the approximate amount of the donation?

A. $6,000   B. $60   **C. $600**   D. $7,000   E. $700

The donation is 3% of $20,250 → .03 x $20,250 = $607.50
The question asks for the approximate amount, so round to $600.
Answer: C. $600

8. If a taxi cab fare is $18.50, and the rider wants to leave a 15% tip, how much will he pay the cab driver?

A. $2.78   **B. $21.28**   C. $33.50   D. $28.21   E. $2.87

The tip is 15% of $18.50 → .15 x $18.50 = $2.775 → $2.78
Total paid to cab driver: $18.50 + $2.78 = $21.28
Answer: B. $21.28

OR – 100% of the cost plus another 15% for the tip is 115% of the cost.
115% of $18.50 → 1.15 x $18.50 = $21.275 → **$21.28**

<u>Practice Four</u> *(page 12)*

1. The population in a city has decreased by 15% since the last census. If the population was 187,654 at the last census, what is the population now?

A. 28,148   **B. 159,506**   C. 12,510   D. 187,639   E. 28,841

Amount of decrease is 15% of 187,654 → .15 x 187,654 = 28,148.1 → 28,148
Current population is original population minus the amount of decrease.
187,654 – 28,148 = 159,506   **Answer: B. 159,506**

OR – You start with 100% of the population, and decrease it by 15%. The percent
      of the population that is left is 100% – 15% = 85%.
      85% of 187,654 → .85 x 187,654 = 159,505.9 → **159,506**

2. The Now or Never Fitness Center has a goal of increasing its number of clients by 7% over their current enrollment of 425 clients. If they reach their goal, how many new clients will they have?

A. 30   B. 455   C. 298   D. 61   E. 300

The goal number of new clients is 7% of 425 → .07 x 425 = 29.75 → 30
The question asks for the number of new clients, so 30 is the answer.
Answer: A. 30

Careful – Read the question carefully so you answer exactly what is being asked for.
A common mistake would be to calculate the total number of clients (425 + 30 = 455)
instead of answering with just the number of new clients (30) that the question asks
for.

3. The amount of surface area covered by an experimental substance is predicted to decrease by 4% over 10 days. If the surface area covered is now 18 ft^2, how much surface area will the substance cover 10 days from now, assuming the prediction is correct?

A. .72 ft^2 B. 18.72 ft^2 **C. 17.28 ft^2**   D. 7.2 ft^2 E. 10.8 ft^2

Amount of decrease is 4% of 18 ft^2 → .04 x 18 ft^2 = .72 ft^2
Surface area covered in 10 days is current surface area minus amount of decrease.
18 – .72 = 17.28 ft^2
Answer: C. 17.28 ft^2

OR – Current surface area covered is 100%, area covered after 10 days is 4% less,
      so calculate 100% – 4% = 96% of current area.
      96% of 18ft^2 → .96 x 18ft^2 = **17.28 ft^2**

4. A salesperson earns a base salary of $400 per week plus a commission of 20% on any sales made after the first $800 of merchandise sold. If she sold $2,500 of merchandise last week, what was her total pay?

A. $340   B. $500   **C. $740**   D. $900   E. $580

Total pay = Base salary + Commission

Step 1 – Calculate the sales that earn commission.
$$\$2,500 - \$800 = \$1,700$$

Step 2 – Calculate the commission
20% of $1,700 → .2 x $1,700 = $340

Step 3 – Calculate total pay, which is base salary plus commission.
$$\$400 + \$340 = \$740$$

Answer: C. $740

5. Ella's car insurance policy says that for repairs resulting from an accident, it will pay 90% of repair costs after she has met her deductible of $1,000. If her repair bill is $2,800, how much of the bill will the insurance company pay?

A. $2,520   B. $900   C. $2,800   **D. $1,620**   E. $2,250

Step 1 – Calculate how much of the repair bill the insurance company will make payment on. Deductible of $1,000 means insurance will not pay any part of the first $1,000 of repair expense, so Ella will have to pay the first $1,000. So, the insurance company will make payment on the total repair cost minus the deductible → $2,800 – $1,000 = $1,800.

Step 2 – Calculate the amount the insurance company is responsible for. The policy says the company will pay 90%.
90% of $1,800 → .9 x $1,800 = $1,620

Answer: D. $1,620

Note – Instead of asking how much the insurance company will pay, the question might have been: How much of the repair bill will Ella have to pay?

She has to pay the deductible of $1,000.
She has to pay 10% of the rest of the bill, or .1 x $1,800 = $180.
Her total cost is $1,000 + $180 = $1,180.

When answering insurance questions, be sure to read carefully, so you know whether to calculate how much the person pays or how much the insurance company pays.

6. A company contributes 3% of an employee's salary to a retirement plan, and the employee can also contribute to the retirement plan by payroll deduction. If Raisa makes $36,000 per year, and she contributes $200 per month via payroll deduction, what is the total amount that is contributed to her retirement plan in 1 year?

A. $1,080   **B. $3,480**   C. $2,400   D. $10,800   E. $11,000

Total contribution is the amount from the company + the amount from Raisa.

Amount contributed by the company: 3% of $36,000 → .03 x $36,000 = $1,080
Amount contributed by Raisa: $200 x 12 months = $2,400
Total contribution: $1,080 + $2,400 = $3,480
Answer: B. $3,480

7. The number of students at Braden College is expected to increase between 10% and 15% next year. If there are 1,800 students now, the number of students expected for next year falls in which range?

A. between 180 and 270   B. between 150 and 300
C. between 1,800 and 2,070   D. between 1,800 and 1,980
E. between 1,980 and 2,070

Lowest number of expected students:
    Increase is 10% of 1,800 → .1 x 1,800 = 180
    Number of students expected next year is current number plus increase.
    1,800 + 180 = 1,980

Highest number of expected students:
    Increase is 15% of 1,800 → .15 x 1,800 = 270
    Number of students expected next year is current number plus increase.
    1,800 + 270 = 2,070
Answer: E. between 1,980 and 2,070

OR
For lowest number, 100% plus 10% more is 110% of 1,800. 1.1 x 1,800 = **1,980**
For highest number, 100% plus 15% more is 115% of 1,800. 1.15 x 1,800 = **2,070**

8. At a used car lot, customers are required to make a down payment of between 10% and 25% of the car's price, depending on their credit rating. For a car that is priced at $9,500, the required down payment will fall in which of the following ranges?

A. $950 to $2,375   B. $7,125 to $8,550   C. $10,450 to $11,875

D. $380 to $950   E. $950 to $2,950

Lowest down payment: 10% of $9,500 → .1 x $9,500 = $950
Highest down payment: 25% of $9,500 → .25 x $9,500 = $2,375
Answer: A. $950 to $2,375

9. A college recruiter wants to make sure not to run out of information packets when she makes a presentation at a high school, and uses the following formula to determine how many information packets to bring with her.

Students expected + 15% of students expected = Number of information packets

If Central High School has told her to expect 200 students, how many information packets will she bring?

A. 215   B. 30   C. 15   **D. 230**   E. 320

Extra packets: 15% of students expected → .15 x 200 = 30
Total packets needed: 200 + 30 = 230
Answer: D. 230

OR – 100% of students plus another 15% is 115% of the number of students.
    115% of 200 → 1.15 x 200 = **230**

10. A grocery store has a 45% markup on Roma spaghetti sauce. If the wholesale cost from the supplier is $1.75 for a jar of sauce, what will the retail price of the sauce be in the store?

A. $0.79   B. $0.96   C. $1.30   D. $3.54   **E. $2.54**

Markup: 45% of $1.75 → .45 x $1.75 = $0.7875 → $0.79
Retail price = Wholesale price + Markup → $1.75 + $0.79 = $2.54
Answer: E. $2.54

OR – 100% of wholesale plus another 45% for the markup is 145% of the cost.
    145% of $1.75 → 1.45 x $1.75 = $2.5375 → **$2.54**

Use this chart to answer questions 11 and 12.

Flavor	% of Ice Cream Sales
Chocolate	30%
Vanilla	30%
Strawberry	18%

11. What percent of ice cream sales are made from flavors other than chocolate, vanilla, and strawberry?

A. 22%   B. 78%   C. 18%   D. 13%   E. 30%

Sales of chocolate, vanilla, and strawberry: 30% + 30% + 18% = 78%
Total ice cream sales: 100%
Sales from all other flavors: 100% − 78% = 22%
Answer: A. 22%

12. If total ice cream sales were $5,000, what were the sales of strawberry ice cream?

A. $1,500   B. $1,667   C. $1,800   D. $800   **E. $900**

Strawberry is 18% of the total, or 18% of $5,000 → .18 x $5,000 = $900
Answer: E. $900

13. There are 450 students enrolled in an adult ed program. If 20% of students are 30 years old or younger, and 48% are between 31 and 45 years old, how many students are over 45 years old?

A. 32   **B. 144**   C. 90   D. 216   E. 23

It may be helpful to make a simple chart to organize all the percents and numbers.

Age	Percent of Total
30 and under	20%
31 – 45	48%
Over 45	?

Percent of students over age 45: 100% − 20% − 48% = 32%
Number of students over age 45: 32% of 450 → .32 x 450 = 144
Answer: B. 144

Answer Key – The Percent One Number is of Another Number

Practice One *(page 15)* Convert the following decimals to percents.

1. $.27 = \mathbf{27\%}$

2. $.35 = \mathbf{35\%}$

3. $.82 = \mathbf{82\%}$

4. $.07 = \mathbf{7\%}$

5. $.7 = \mathbf{70\%}$

6. $.348 = \mathbf{34.8\%}$

Practice Two *(page 17)*

1. What percent of 65 is 5? $\quad \frac{5}{65} \rightarrow 5 \div 65 \rightarrow .0769 \rightarrow \mathbf{7.69\%}$

Think: 5 out of 65. Make a fraction with the part, 5, on top and the whole, 65, on the bottom.

2. 16 is what percent of 90? $\quad \frac{16}{90} \rightarrow 16 \div 90 \rightarrow .178 \rightarrow \mathbf{17.8\%}$

Think: 16 out of 90. Make a fraction with the part, 16, on top and the whole, 90, on the bottom.

3. 4 is what percent of 50? $\quad \frac{4}{50} \rightarrow 4 \div 50 \rightarrow .08 \rightarrow \mathbf{8\%}$

Think: 4 out of 50. Make a fraction with the part, 4, on top and the whole, 50, on the bottom.

4. What percent is 240 of 800? $\quad \frac{240}{800} \rightarrow 240 \div 800 \rightarrow .3 \rightarrow \mathbf{30\%}$

Think: 240 out of 800. Make a fraction with the part, 240, on top and the whole, 800, on the bottom.

Practice Three *(page 18)*

1. Luis earns $2,900 per month and spends $375 each month on his car payment. What percentage of his earnings does he spend on his car payment?
A. 1.3%   B. 7.7%   **C. 13%**   D. 12%   E. 10%

You are looking for what percent $375 is of $2,900.

$\frac{375}{2,900} \rightarrow 375 \div 2,900 \rightarrow .1293 \rightarrow 12.93\%$ round to 13%
Answer: C. 13%

2. On a test with 40 questions, a student got 3 questions wrong. What percent of the questions did the student get right?

A. 7.5%   **B. 92.5 %**   C. 37%   D. 3%   E. 29.5%

You are given 3 questions wrong, and asked for the percent of questions right, so subtract to get the number of questions right, then calculate percent.

40 – 3 = 37 questions right.
You are looking for what percent 37 is of 40.

$\frac{37}{40}$ → 37 ÷ 40 → .925 → 92.5%   **Answer: B. 92.5%**

OR – Calculate the percent of questions wrong and subtract from 100% to get the

percent of questions right. $\frac{3}{40}$ → 3 ÷ 40 → .075 → 7.5% = questions wrong

100% – 7.5% = **92.5%** = questions right

3. If a customer was charged $2.70 sales tax on a $45 purchase, what is the sales tax percentage?

A. 16.6%   B. 60%   C. 2.7%   D. 1.6%   **E. 6%**

You are looking for what percent $2.70 is of $45.

$\frac{2.70}{45}$ → 2.7 ÷ 45 → .06 → 6%
Answer: E. 6%

4. Lisa bought a bag of assorted candies, and just for fun wanted to know what percentage of them were cherry flavor. She counted 75 total candies and 18 cherry flavor candies. What percentage of the candies were cherry flavor?

A. 24%   B. 4%   C. 2.4%   D. 57%   E. 18%

You are looking for what percent 18 is of 75.

$\frac{18}{75}$ → 18 ÷ 75 → .24 → 24%
Answer: A. 24%

5. For groups of 8 or larger, a restaurant adds a tip as a percentage of the bill. If the bill for a group of 10 people was $250 and the tip added was $45, what percentage tip does the restaurant add?

A. 6%   B. 25%   C. 15%   **D. 18%**   E. 20%

You are looking for what percent $45 is of $250.

$\frac{45}{250}$ → 45 ÷ 250 → .18 → 18%   **Answer: D. 18%**

Refer to the chart below for questions 6 – 7.

ITEM	SALES
Coffee	$255
Tea	$75
Soda	$475
Juice	$75
Water	$300
Milk	$95

6. A business is analyzing its beverage sales for the week. What percentage of beverage sales were soda?

A. 3.7%   B. 73%   C. 59%   **D. 37%**   E. 6%

You are looking for what percent $475 is of the total. Add up all the sales in the chart to get total sales of $1,275.

$\frac{475}{1,275}$ → 475 ÷ 1,275 → .3725 → 37.25%   rounds to 37%   **Answer: D. 37%**

7. What percentage of beverage sales were coffee and tea?

A. 26%   B. 2.6%   C. 6%   D. 4%   E. 62%

Add coffee and tea sales together to get $330.
Then find what percent $330 is of $1,275.

$\frac{330}{1,275}$ → 330 ÷ 1,275 → .2588 → 25.88%   rounds to 26%   **Answer A. 26%**

8. If a mother allows her children to watch TV 2 hours per day, what percentage of each day are the children allowed to watch TV?

A. 2%   **B. 8.33%**   C. 9.33%   D. 12%   E. 83.3%

You are looking for what percent 2 hours is out of a day. You have to supply the total of 24 hours in a day, so you want to find: 2 is what percent of 24.

$\frac{2}{24}$ → 2 ÷ 24 → .0833 → 8.33%
Answer: B. 8.33%

9. If Anita is responsible for cooking dinner for the family 2 times each week, what percentage of the days does she have to cook dinner?

A. 2.9%   B. 2%   **C. 29%**   D. 9%   E. 4%

You are looking for what percent 2 days is out of a week. You have to supply the total of 7 days in a week, so you want to find: 2 is what percent of 7.

$\frac{2}{7}$ → 2 ÷ 7 → .2857 → 28.57% rounds to 29%
Answer: C. 29%

Answer Key – Percent Word Problems Test *(page 21)*

1. How much will a shopper save on a TV that is on sale for 25% off the regular price of $399.99?

A. $300 B. $10 C. $16 **D. $100** E. $9

***Type One – You are given a number and a percent and have to calculate a number.
Use multiplication to solve.***

The amount of savings is 25% of $399.99 → .25 x $399.99 = $99.9975 → $100
Answer: D. $100

2. A restaurant bill is $28.00, and the customer wants to leave a 20% tip. How much in total will the customer pay?

A. $5.60 **B. $33.60** C. $8.00 D. $48.00 E. $36.30

***Type One – You are given a number and a percent and have to calculate a number.
Use multiplication to solve.***

The tip is 20% of $28.00 → .2 x $28.00 = $5.60
Total paid to restaurant: $28.00 + $5.60 = $33.60
Answer: B. $33.60

OR – 100% of the bill plus another 20% for the tip is 120% of the bill.
120% of $28.00 → 1.2 x $28.00 = **$33.60**

3. In a class of 15 students, 3 students arrived late. What percent of the students were on time?

A. 20% **B. 80 %** C. 8% D. 2% E. 12%

***Type Two – You are given two numbers and have to calculate a percent.
Form a fraction to solve.***

You are given 3 late students, and asked for the percent of on time students, so subtract to get the number of on time students before calculating the percent.
15 – 3 = 12 on time students.
You are looking for what percent 12 is of 15.

$\frac{12}{15}$ → 12 ÷ 15 → .8 → 80%
Answer: B. 80%

OR – Calculate the percent of late students and subtract from 100% to get the percent of on time students.

$\frac{3}{15}$ → 3 ÷ 15 → .2 → 20% = late students

100% – 20% = **80%** = on time students

4. A store is having a 60% off clearance sale. What is the sale price of a sweater that is regularly priced at $49.99?

A. $29.99   B. $25.00   **C. $20.00**   D. $29.00   E. $20.99

Type One – You are given a number and a percent and have to calculate a number.
        Use multiplication to solve.

The discount is 60% of $49.99 → .6 x $49.99 = $29.994 → $29.99
Sale price = Regular price – Discount → $49.99 – $29.99 = $20
Answer: C. $20

OR – If the regular price is 100% of the cost, and 60% is being deducted as a
        discount, 100% – 60% = 40% is the amount left to pay.
        40% of $49.99 → .4 x $49.99 = $19.996 → **$20**

5. Every Saturday Lana volunteers from 8 AM until 11 AM delivering meals to the elderly. What percentage of her Saturday does she spend delivering meals?

A. 12.5%   B. 8%   C. 16.7%   D. 1.25%   E. 3%

Type Two – You are given numbers and have to calculate a percent.
        Form a fraction to solve.

It is 3 hours from 8 AM until 11 AM. You are looking for what percent 3 hours is out of a day. You have to supply the total of 24 hours in a day, so you want to find:
3 is what percent of 24.

$\frac{3}{24}$ → 3 ÷ 24 → .125 → 12.5%
Answer: A. 12.5%

6. The average price of a house in Dover has increased by 32% over the past 10 years. If the average house price was $165,500 10 years ago, what is the average house price now?

A. $52,960   B. $217,800   C. $52,800   D. $197,500   **E. $218,460**

Type One – You are given a number and a percent and have to calculate a number.
        Use multiplication to solve.

Amount of increase is 32% of $165,500 → .32 x $165,500 = $52,960
Average price 10 years ago plus increase is the average price now.
$165,500 + $52,960 = $218,460   **Answer: E. 218,460**

OR – 100% of the old price plus another 32% for the increase is 132% of the old
        price.
        132% of $165,500 → 1.32 x $165,500 = **$218,460**

Refer to the chart below for questions 7 – 8.

ITEM	SALES
Cake	$400
Pie	$375
Brownies	$255
Cookies	$450
Bread	$650
Rolls	$150

7. A bakery's weekend sales are shown in the chart. What percentage of the bakery's sales were bread?

A. 2.9% B. 26% C. 2.6% **D. 29%** E. 19%

Type Two – You are given numbers and have to calculate a percent.
      Form a fraction to solve.

You are looking for what percent $650 is of the total. Add up all the sales in the chart to get total sales of $2,280.

$\frac{650}{2,280}$ → 650 ÷ 2,280 → .285 → 28.5% rounds to 29% **Answer: D. 29%**

8. The bakery is open from 8:00 AM until 6:00 PM. If 35% of sales were made in the afternoon from 2:00 PM until closing, what was the dollar amount of sales made before 2:00 PM?

A. $798 B. $1,008 C. $1,872 **D. $1,482** E. $1,842

Type One – You are given numbers and a percent and have to calculate a number.
      Use multiplication to solve.

Sales from 2:00 PM until closing are 35% of $2,280 → .35 x $2,280 = $798
The question asks for sales made before 2:00 PM, so subtract from total sales.

Total Sales – Sales from 2:00 PM until closing = Sales before 2:00 PM
$2,280 – $798 = $1,482
Answer: D. $1,482

OR – If 35% of sales are made from 2:00 PM until closing, then 100% – 35% = 65% of sales remain for the time period before 2:00 PM.
      65% of $2,280 → .65 x $2,280 = **$1,482**

9. A salesperson earns a base salary of $500 per week plus a commission of 10% on her first $800 of merchandise sold, and a commission of 22% on all her additional sales beyond the first $800. If she sold $2,500 of merchandise last week, what was her total pay?

A. $2,154   B. $750   **C. $954**   D. $1,050   E. $1,300

Type One – You are given numbers and percents and have to calculate a number.
         Use multiplication to solve.

Total pay = Base salary + Comm. on first $800 of sales + Comm. on the rest of sales

Step 1 – Calculate the 10% commission on the first $800 of sales.
       10% of $800 → .1 x $800 = $80

Step 2 – Calculate the amount of sales that get the 22% commission.
       $2,500 – $800 = $1,700

Step 3 – Calculate the 22% commission on the additional $1,700 of sales.
       .22 of $1,700 → .22 x $1,700 = $374

Step 4 – Calculate total pay: base salary plus both commissions.
       $500 + $80 + $374 = $954

Answer: C. $954

10. At a used car lot, customers are charged a service fee of between 1% and 2.5% of the car's price, depending on their credit score. For a car that is priced at $11,999, the service fee will fall in which of the following ranges?

A. $119.99 to $299.98   B. $1,199.90 to $2,999.75   C. $119.99 to $239.98
D. $13,198.90 to $14,998.75   E. $12,118.99 to $12,298.98

Type One – You are given a number and percents and have to calculate a number.
         Use multiplication to solve.

Lowest service fee: 1% of $11,999 → .01 x $11,999 = $119.99
Highest service fee: 2.5% of $11,999 → .025 x $11,999 = $299.975 → $299.98
Answer: A. $119.99 to $299.98

11. If a salesperson earned a $1,440 commission on sales of $18,000, what is the sales commission percentage?

A. 80%   B. 12.5%   C. 18%   D. 10%   **E. 8%**

Type Two – You are given two numbers and have to calculate a percent.
         Form a fraction to solve.

You are looking for what percent $1,440 is of $18,000.

$\frac{1,440}{18,000}$ → 1,440 ÷ 18,000 → .08 → 8%
Answer: E. 8%