Percentages

Rounding

Round 907.45 to the nearest tens place

Hundreds	Tens	Ones	.	tenths	hundredths	thousandths
9	0	7	.	4	5	7

↑ ≥ 5

so round up

910

Round 907.457 to the nearest ones place.

↑ < 5 Round down

907

Round 907.457 to the nearest tenths place

↑ = 5 Round up

907.5

Round 907.457 to the nearest hundredths place

↑ > 5 round up

907.46

Percentages

To change a percent to a decimal:	25% -> 0.25 divide 25 by 100 and drop the percent sign	or move the decimal two places to the right and drop the percent sign.
To change a decimal to a percent:	0.25 -> 25% multiply 0.25 by 100 and add the percent sign	or move the decimal two places to the left and add the percent sign

25% of a number, means	.25 * x	where x is a real number.
25% of 75, means	.25 * 75 = 18.75.	
The percent of a number is an amount	25% of x is 45, what is x?	**0.25x = 45 is the equation needed to find x.** x = 45/0.25 x = 180
To add a percentage to a number, such as 5% sales tax added to your total purchase, multiply the total by 1.05.	**Ex:** A book cost $5.95 and the sales tax is 5%. If we multiply $5.95 * .05 we get the amount of the sales tax $0.2975 rounded to the nearest hundredth is $0.30 then we must add that to $5.95 which is $6.25. We get the same answer if we multiply $5.95 * 1.05 = $6.25 rounded without the extra steps.	
A customer pays $1,100 in state taxes on a newly purchased car. What is the value of the car if state taxes are 8.9% of the value? Fill in the equation with the information given.	8.9% of the value is $1,100.	0.089x = 1,100 Solve for x.

Percentages

Simple Interest		
I = Prt	gives the amount of interest ***I*** earned when a principal ***P*** is deposited for ***t*** years at an interest rate ***r***.	
Example: The principal, interest, and rate are given, find the time:	How long will it take $2,500 to earned $600 at a rate of 6%	I=Prt -> 600 = 2500(0.06)t, solve for t t = 600/(2500(0.06)) Divide t = 4 years
A = P(1+rt)	gives the amount ***A*** when a principal ***P*** is deposited for ***t*** years at an interest rate ***r***.	
Example:	$1000 at 5% interest for 2 years. The amount of interest 'I' is Prt, (1000)(0.05)(2) = $100.	The 'A' amount in the account after 2 years is A=P(1+rt), A = 1000(1+ 0.05*2) Add (1+0.05^2) A = 1000(1.10) Multiply A = $1100.

Percentages

Compound Interest:		
$I = P\left(1+\frac{r}{n}\right)^{nt} - P$	gives the amount of interest ***I*** earned when a principal ***P*** is deposited for ***t*** years at an interest rate ***r*** and compounded ***n*** times per year.	
Example: The principal, interest, and rate are given, find the time:	How long will it take $2,500 to earned $600 at a rate of 6% and compounded semiannually?	$600 = 2500\left(1+\frac{.06}{2}\right)^{2t} - 2500$ solve for t: t = 3.64 years Remember that you use LN, Natural Log, to get the variable out of the exponent.
$A = P\left(1+\frac{r}{n}\right)^{nt}$	gives the amount ***A*** when a principal ***P*** is deposited for ***t*** years at an interest rate ***r*** and compounded ***n*** times per year.	
Example:	When $2500 is deposited, find the amount in the account after 5 years, at 6% interest, compounded quarterly	$A = 2500\left(1+\frac{.06}{4}\right)^{4(5)}$ A = $3367.14

Compounded Continuously		
$A = Pe^{rt}$	Gives the amount ***A*** when a principal ***P*** is deposited for ***t*** years at an interest rate ***r*** and compounded continuously	
Example:	When $2500 is deposited, find the amount in the account after 2 years, at 6% interest, compounded continuously	$A = 2500 * e^{.06(2)}$ A = $2818.74

1. If a discount of 25% off the retail price of a desk saves Mark $45, how much did he pay for the desk?

$135
$160
$180
$210
$215

25% of what is 45
.25x = 45
.25 .25
x = 180 is the original cost

Then $180 - $45 = $135 is what he paid for the desk

1. A: The original price of the desk may be found by solving the equation, 0.25x = 45. Thus, x = 180. However, this is the original price of the desk. Since he saves $45, he pays $45 less, or $135.

2. A customer pays $1,100 in state taxes on a newly purchased car. What is the value of the car if state taxes are 8.9% of the value?

$9.765.45
$10,876.90
$12,359.55
$14,345.48
$15,745.45

2. C: The following equation may be used to find the value of the car: 1,100 = 0.089x. Solving for x gives x ≈ 12,359.55. Thus, the value of the car is $12,359.55.

3. How many years does Steven need to invest his $3,000 at 7% to earn $210 in simple interest?

1 year
2 years
3 years
4 years
5 years

3. A: The formula, I = Prt, represents the amount of interest earned, for a particular principal, interest rate, and amount of time. Substituting 210 for I, 3000 for P and 0.07 for r gives: 210 = 3000(0.07)t. Solving for t gives t = 1. Thus, he will earn $210 in interest, after 1 year.

4. Sabrina's boss states that she will increase Sabrina's salary from $12,000 to $14,000 per year if she enrolls in business courses at a local community college. What percent increase in salary will result from Sabrina taking the business courses?

15%
16.7%
17.2%
85%
117%

4. B: The percent increase may be modeled by the expression, (14,000-12,000)/12,000, which equals 16.7%.

5. 35% of what number is 70?

100
110
150
175
200

5. E: The equation, 0.35x = 70, may be used to solve the problem. Dividing both sides of the equation by 0.35 gives x = 200.

6. What number is 5% of 2000?

50
100
150
200
250

6. B: The problem may be modeled as x = 0.05(2000). Thus, 100 is 5% of 2000.

7. What percent of 90 is 27?

15%
20%
30%
33%
41%

7. C: The problem may be modeled as 90x = 27. Dividing both sides of the equation by 90 gives x = 0.3 or 30%.

8. Jim works for $15.50 per hour for a health care facility. He is supposed to get a 75 cent per hour raise at one year of service. What will his percent increase in hourly pay be?

2.7%
3.3%
133%
4.8%
105%

8. D: The percent increase may be modeled by the expression, 0.75/15.50, which is approximately 0.048, or 4.8%.

9. If 45 is 120% of a number, what is 80% of the same number?

30
32
36
38
41

9. A: The first part of the problem may be modeled with the equation, 45 = 1.2x. Solving for x gives x = 37.5. 80% of 37.5 may be written as 0.80(37.5), which equals 30.

10. How long will Lucy have to wait before her $2,500 invested at 6% earns $600 in simple interest?

2 years
3 years
4 years
5 years
6 years

10. C: The formula, I = Prt, represents the amount of interest earned, for a particular principal, interest rate, and amount of time. Substituting 600 for I, 2500 for P and 0.06 for r gives: 600 = 2500(0.06)t. Solving for t gives t = 4. Thus, she will have to wait 4 years to earn $600 in interest.

11. What is 35% of a number if 12 is 15% of a number?

5
12
28
33
62

11. C: The second part of the problem may be modeled with the equation, 12 = 0.15x. Solving for x gives x = 80. Thus, the number is 80. 35% of 80 may be written as 0.35(80), which equals 28.

12. A computer is on sale for $1600, which is a 20% discount off the regular price. What is the regular price?

$1800
$1900
$2000
$2100
$2200

12. C: The price of the computer is 80% of the regular price. Thus, the following equation may be used to solve the problem: 1600 = 0.80x. Solving for x gives x = 2000. Thus, the regular price of the computer is $2000.

13. A car dealer sells a SUV for $39,000, which represents a 25% markup over the dealer's cost. What was the cost of the SUV to the dealer?

$29,250
$31,200
$32,500
$33,800
$33,999

13. B: The following equation may be used to solve the problem: 0.25=(39,000-x)/x. Multiplying both sides of the equation by x gives 0.25x = 39,000 - x. Adding x to both sides of the equation gives 1.25x = 39,000, where x = 31,200. Thus, the cost of the SUV to the dealer was $31,200.

14. After having to pay increased income taxes this year, Edmond has to sell his BMW. Edmond bought the car for $49,000, but he sold it for a 20% loss. What did Edmond sell the car for?

$24,200
$28,900
$35,600
$37,300
$39,200

14. E: The problem may be modeled by the expression, 49,000 - (0.20(49,000)), which equals 39,200. Thus, he had to sell the car for $39,200.

15. At a company fish fry, ½ in attendance are employees. Employees' spouses are 1/3 of the attendance. What is the percentage of the people in attendance who are not employees or employee spouses?

10.5%
16.7%
25%
32.3%
38%

15. B: The attendance of employees and spouses may be modeled as 1/2+1/3, or 5/6. Thus, 1/6 of those, in attendance, who are not employees or spouses, is approximately 16.7%.

16. If 6 is 24% of a number, what is 40% of the same number

8
10
15
20
25

16. B: The first part of the problem may be modeled with the equation, 6 = 0.24x. Solving for x gives x = 25. Thus, the number is 25. 40% of this number may be written as 0.40(25), which equals 10.

17. 25% of 400 =

100
200
800
10,000
12,000

17. A: The problem may be modeled as 0.25(400), which equals 100.

18. 22% of $900 =

90
198
250
325
375

18. B: The problem may be modeled as 0.22(900), which equals 198.

19. Which of the following percentages is equal to 0.45?

0.045%
0.45%
4.5%
45%
0.0045%

19. D: The percentage may be obtained by multiplying 0.45 by 100. Doing so gives 45%.

20. Which of these percentages equals 1.25?

0.125%
12.5%
125%
1250%
1250.5%

20. C: The percentage may be obtained by multiplying 1.25 by 100. Doing so gives 125%.

Practice Questions

1. Express fourteen hundredths as a percent.
A. 0.14%
B. 14%
C. 0.014%
D. 1.4%

B: "Fourteen hundredths" can be written as 0.14. To convert to a percent, move the decimal point two places to the right and add the percent sign.

2. 3 is what percent of 50?
A. 3%
B. 4%
C. 5%
D. 6%

D: Divide 3 by 50 to get 0.06 or 6%.

3. The ratio of 2:10 is the same as what percentage?
A. 2%
B. 5%
C. 10%
D. 20%

D: Divide 2 by 10 (not 10 by 2) to get 0.2 or 20%.

4. Lauren had $80 in her savings account. When she received her paycheck, she made a deposit which brought the balance up to $120. By what percentage did the total amount in her account increase as a result of this deposit?
A. 50%
B. 40%
C. 35%
D. 80%

A: The rate of increase equals the change in the account balance divided by the original amount, $80. Multiply that decimal by 100 to yield the percentage of increase. To determine the change in the balance, subtract the original amount from the new balance:
Change in account balance = $120-$80 = $40.
Now, determine the percentage of increase as described above: Percent=$40/$80*100=50%

5. Round to the nearest whole number: What is 17/68, as a percent?
A. 17%
B. 25%
C. 40%
D. 68%

B: The answer is 25%. This problem requires you to understand how to convert fractions into percentages. One way to make this conversion is to divide 17 by 68 using long division, which will create a decimal quotient, and then convert this decimal into a percentage. 17/68 = 0.25 = 25%

6. Round to the nearest whole number: Gerald made 13 out of the 22 shots he took in the basketball game. What was his shooting percentage?
A. 13%
B. 22%
C. 59%
D. 67%

C: The answer is 59%. To solve this problem, you must know how to convert a fraction into a percentage. Gerald made 13 out of 22 shots, a performance that can also be expressed by the fraction 13/22. 13/22 = 0.5909 = 59%

7. Change the following fraction to the simplest possible ratio: 8/14
A. 4:3
B. 4:6
C. 4:7
D. 3:4

A: To solve this problem, you must know how to convert fractions into ratios. A ratio expresses the relationship between two numbers. For instance, the ratio 2:3 suggests that for every 2 of one thing, there will be 3 of another. This equates to a fraction of 2/5 because there are 5 things total. If we applied this ratio to the length and width of a rectangle, for instance, we could say that for every 2 units of width, the rectangle must have 3 units of length. We could also say that 2/5 of the perimeter is from the width and 3/5 is from the length. The fraction 8/14 is equivalent to the ratio 8:6. To simplify the ratio, divide both sides by the greatest common factor, 2. The simplest form of this ratio is 4:3.

8. If 5 people buy 3 pens each and 3 people buy 7 pencils each, what is the ratio of the total number of pens to the total number of pencils?
A. 15:21
B. 3:7
C. 5:3
D. 1:1

A: First, find the total number of pens: 5 3 = 15. Then, find the total number of pencils: 3 7 = 21. Finally, express it as a ratio: 15:21

9. In a town, the ratio of men to women is 2:1. If the number of women in the town is doubled, what will be the new ratio of men to women?
A. 1:2
B. 1:1
C. 2:1
D. 3:1

B: Currently, there are two men for every woman. If the number of women is doubled (1 2 = 2), then the new ratio is 2:2. This is equivalent to 1:1.

10. A man's lawn grass is 3 inches high. He mows the lawn and cuts off 30% of its height. How tall will the grass be after the lawn is mowed?
A. 0.9 inches
B. 2.1 inches
C. 2.7 inches
D. 2.9 inches

B: First, calculate 30% of 3 inches: 3 0.30 = 0.9 inches.
Then, subtract this value from the original length: 3 - 0.9 = 2.1