Percent of Change

Percent of Change:

When an increase or decrease is expressed as a percent, the percent is called the percent of change.

If the new number is greater than the original number, the percent of change is a percent of increase.

If the new number is less than the original, the percent of change is a percent of decrease.

We calculate percent of change using the formula $\frac{\text{change in amount}}{\text{original amount}}$. The change in the amount is simply the absolute value of the difference between the new value and the original value.

Example 1:

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change.

Original: \$25

New: \$28

Since the new price is more than the original price, we know this is a percent of increase.

We need to start by calculating the change in price:

$|28 - 25| = |3| = 3$

$$\frac{\text{change in amount}}{\text{original amount}} = \frac{3}{25} = 0.12$$

$0.12 = 12\%$

This is a 12% increase.

Example 2:

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change.

Original: 30

New: 12

Since the new price is less than the original price, we know this is a percent of decrease.

We need to start by calculating the change in amount:

$|12 - 30| = |-18| = 18$

$$\frac{\text{change in amount}}{\text{original amount}} = \frac{18}{30} = 0.6$$

$0.6 = 0.60 = 60\%$

This is a 60% decrease.

Example 3:

A concert ticket costs $45. If the sales tax is 6.25%, what is the total price of the ticket?

There are two methods to solving this. They both give you the same answer, but I will present both for you to decide which is easier.

Option #1:

$6.25\% = .0625$

Multiply the price by the tax and that will tell you the amount to be added back to the price.

$45 \cdot .0625 = 2.8125$

Remember, we are talking cost so we should round to the nearest hundredth.

$2.81 in tax will be added to the cost.

Total cost: $45 + 2.81 = 47.81$

Option #2:

We want to pay 100% of the ticket price plus an additional 6.25% in sales tax.

So, we want to pay $100\% + 6.25\% = 106.25\%$ of the cost of the ticket.

$106.25\% = 1.0625$

Multiply the price by the total percent we will be charged.

$45 \cdot 1.0625 = 47.8125$

Since we are talking cost we should round to the nearest hundredth.

$47.81

Either way we choose to solve the problem, **the total cost of the ticket is $\$\mathbf{47.81}$.**

Example 4:

A sweater is on sale for 35% off the original price. If the original price of the sweater is $38, what is the discounted price?

There are two methods to solving this. They both give you the same answer, but I will present both for you to decide which is easier.

Option #1:

$35\% = .35$

Multiply the price by the discount and that will tell you the amount to be subtracted from the price.

$38 \cdot .35 = 13.3$

Remember, we are talking cost so we should round to the nearest hundredth.

$13.30 will be subtracted from the cost.

Total cost: $\$38 - \$13.30 = \$24.70$

Option #2:

We want to pay 100% of the ticket price minus the discount of 35%.

So, we want to pay $100\% - 35\% = 65\%$ of the cost of the ticket.

$65\% = 0.65$

Multiply the price by the total percent we will be charged.

$38 \cdot 0.65 = 24.7$

Since we are talking cost we should round to the nearest hundredth.

$24.70

Either way we choose to solve the problem, **the discounted price of the sweater is $\$\mathbf{24.70}$**.

Example 5:

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change. Round to the nearest whole percent.

Original: 72

New: 36

Since the new price is less than the original price, we know this is a percent of decrease.

We need to start by calculating the change in amount:

$|36 - 72| = |-36| = 36$

$$\frac{\text{change in amount}}{\text{original amount}} = \frac{36}{72} = 0.5$$

$0.5 = 0.50 = 50\%$

This is a 50% decrease.

Example 6:

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change. Round to the nearest whole percent.

Original: 45

New: 50

Since the new is more than the original, we know this is a percent of increase.

We need to start by calculating the change:

$|50 - 45| = |5| = 5$

$$\frac{\text{change in amount}}{\text{original amount}} = \frac{5}{45} = 0.11\overline{1}$$

$0.11\overline{1} = 11.\overline{1}\% \approx 11\%$

This is an 11% increase.

Example 7:

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change. Round to the nearest whole percent.

Original: 14 books

New: 16 books

Since the new is more than the original, we know this is a percent of increase.

We need to start by calculating the change:

$|16 - 14| = |2| = 2$

$$\frac{\text{change in amount}}{\text{original amount}} = \frac{2}{14} = 0.142857\ldots$$

$0.142857\ldots = 14.2857\ldots\% \approx 14\%$

This is a 14% increase.

Example 8:

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change. Round to the nearest whole percent.

Original: 150 T-shirts

New: 120 T-shirts

Since the new price is less than the original price, we know this is a percent of decrease.

We need to start by calculating the change in amount:

$|120 - 150| = |-30| = 30$

$$\frac{\text{change in amount}}{\text{original amount}} = \frac{30}{150} = 0.2$$

$0.2 = 0.20 = 20\%$

This is a 20% decrease.

Example 9:

Find the total price of each item.

Software: \$39.50 Sales Tax: 6.5%

There are two methods to solving this.

Option #1:

$6.5\% = .065$

Multiply the price by the tax and that will tell you the amount to be added back to the price.

$39.50 \cdot .065 = 2.5675$

Remember, we are talking cost so we should round to the nearest hundredth.

\$2.57 in tax will be added to the cost.

Total cost: $39.50 + 2.57 = 42.07$

Option #2:

We want to pay 100% of the price plus an additional 6.5% in sales tax.

So, we want to pay $100\% + 6.5\% = 106.5\%$ of the cost.

$106.5\% = 1.065$

Multiply the price by the total percent we will be charged.

$39.50 \cdot 1.065 = 42.0675$

Since we are talking cost we should round to the nearest hundredth.

$42.07

Either way we choose to solve the problem, **the total cost of the software is $\$\mathbf{47.81}$**.

Example 10:

Find the total price of each item.

Music Subscription: $15.99 Sales Tax: 5.75%

There are two methods to solving this.

Option #1:

$5.75\% = .0575$

Multiply the price by the tax and that will tell you the amount to be added back to the price.

$15.99 \cdot .0575 = 0.919425$

Remember, we are talking cost so we should round to the nearest hundredth.

$0.92 in tax will be added to the cost.

Total cost: $15.99 + 0.92 = 16.91$

Option #2:

We want to pay 100% of the price plus an additional 5.75% in sales tax.

So, we want to pay $100\% + 5.75\% = 105.75\%$ of the cost.

$105.75\% = 1.0575$

Multiply the price by the total percent we will be charged.

$15.99 \cdot 1.0575 = 16.909425$

Since we are talking cost we should round to the nearest hundredth.

$16.91

Either way we choose to solve the problem, **the total cost of the subscription is $\$\mathbf{16.91}$**.

Example 11:

Find the discounted price of each item.

Jeans: $45.00 Discount: 25%

There are two methods to solving this.

Option #1:

$25\% = .25$

Option #2:

We want to pay 100% of the ticket price minus the discount of 25%.

Multiply the price by the discount and that will tell you the amount to be subtracted from the price.

$45 \cdot .25 = 11.25$

$11.25 will be subtracted from the cost.

Total cost: $\$45.00 - \$11.25 = \$33.75$

So, we want to pay $100\% - 25\% = 75\%$ of the cost of the ticket.

$75\% = 0.75$

Multiply the price by the total percent we will be charged.

$45 \cdot 0.75 = 33.75$

$33.75

Either way we choose to solve the problem, **the discounted price of the jeans is $\$\mathbf{33.75}$**.

Example 12:

Find the discounted price of each item.

Book: $19.95 Discount: 33%

There are two methods to solving this.

Option #1:

$33\% = .33$

Multiply the price by the discount and that will tell you the amount to be subtracted from the price.

$19.95 \cdot .33 = 6.5835$

Remember, we are talking cost so we should round to the nearest hundredth.

$6.58 will be subtracted from the cost.

Total cost: $\$19.95 - \$6.58 = \$13.37$

Option #2:

We want to pay 100% of the ticket price minus the discount of 33%.

So, we want to pay $100\% - 33\% = 67\%$ of the cost of the ticket.

$67\% = 0.67$

Multiply the price by the total percent we will be charged.

$19.95 \cdot 0.67 = 13.3665$

Since we are talking cost we should round to the nearest hundredth.

$13.37

Either way we choose to solve the problem, **the discounted price of the book is $\$\mathbf{13.37}$**.

Example 13:

A sweater is on sale for 35%$ off the original price. If the original price of the sweater is $38, and the tax paid will be 6%, what is the cost of the sweater?

We first must find the discounted price of the sweater using one of two options.

Option #1:

$35\% = .35$

Multiply the price by the discount and that will tell you the amount to be subtracted from the price.

$38 \cdot .35 = 13.3$

Remember, we are talking cost so we should round to the nearest hundredth.

$13.30 will be subtracted from the cost.

Total cost: $\$38 - \$13.30 = \$24.70$

Option #2:

We want to pay 100% of the ticket price minus the discount of 35%.

So, we want to pay $100\% - 35\% = 65\%$ of the cost of the ticket.

$65\% = 0.65$

Multiply the price by the total percent we will be charged.

$38 \cdot 0.65 = 24.7$

Since we are talking cost we should round to the nearest hundredth.

$24.70

Either way we choose to solve the problem, the discounted price of the sweater is $\$24.70$.

We then must add the tax onto the discounted price using one of two options. Again, I am calculating tax on the discounted price, not the original price.

Option #1:

$6\% = .06$

Multiply the price by the tax and that will tell you the amount to be added back to the price.

$24.70 \cdot .06 = 1.482$

Remember, we are talking cost so we should round to the nearest hundredth.

$1.48 in tax will be added to the cost.

Total cost: $24.70 + 1.48 = 26.18$

Option #2:

We want to pay 100% of the price plus an additional 6% in sales tax.

So, we want to pay $100\% + 6\% = 106\%$ of the cost.

$106\% = 1.06$

Multiply the price by the total percent we will be charged.

$24.70 \cdot 1.06 = 26.182$

Since we are talking cost we should round to the nearest hundredth.

$26.18

Either way we choose to solve the problem, **the total cost of the sweater is $\$\mathbf{26.18}$**.