PERCENTAGE

Converting from percentage to decimals

"Percentage means parts of 100."

57%	6.8%	49.2%	$22\frac{1}{2}\%$
$\frac{57}{100}$	$\frac{6.8}{100}$	$\frac{49.2}{100}$	22.5%
0.57	0.068	0.492	$\frac{22.5}{100}$
			0.225

Converting from percentage to fractions

57%

$\frac{57}{100}$

6.8%

$\frac{6.8}{100}$

$\frac{6.8}{100 \times 10}$

$\frac{68}{1000}$

49.2%

$\frac{49.2}{100 \times 10}$

$\frac{492}{1000}$

$22\frac{1}{2}\%$

22.5%

$\frac{22.5}{100}$

$\frac{22.5}{100 \times 10}$

$\frac{225}{1000}$

Converting from fractions to percentage

***To change a fraction or decimal to a percentage, multiply by* 100.**

$\frac{17}{20}$

$\frac{17}{20} \times \overset{5}{\cancel{100}}$

17×5

85 %

$\frac{18}{50}$

$\frac{18}{\cancel{50}} \times \overset{2}{\cancel{100}}$

18×2

36 %

$\frac{23}{25}$

$\frac{23}{\cancel{25}} \times \overset{4}{\cancel{100}}$

23×4

92 %

Converting from decimals to percentage

To change a fraction or decimal to a percentage, multiply by 100.

0.57	6.8	49.2	$22\frac{1}{2}$
0.57×100	6.8×100	49.2×100	22.5%
$57\ \%$	$680\ \%$	$4920\ \%$	22.5×100
			$2250\ \%$

Expressing one quantity as a percentage of a second quantity

Write 40 as a percentage of 50.

$$\frac{\overset{8}{\cancel{40}}}{\cancel{50}} \times 100$$

$$8 \times 10$$

$$80\ \%$$

Expressing one quantity as a percentage of a second quantity

There are 30 students in a class. Six of the students are left − handed. What percentage of the students are left − handed?

$$\frac{\overset{2}{\cancel{6}}}{\cancel{30}} \times 10\cancel{0}$$

$$6 \times 10$$

$$20\ \%$$

Expressing one quantity as a percentage of a second quantity

Rawish took 72 marks out of 80 in mathematics.
Find his percentage in mathematics?

$$\frac{\cancel{72}^{9}}{\cancel{80}} \times 100\cancel{0}$$

$$9 \times 10$$

$$90\ \%$$

Expressing one quantity as a percentage of a second quantity

There are 30 students in a class. Six of the students are left − handed. What percentage of the students are not left − handed?

$$\textbf{students who are not left - handed} = 30 - 6$$

$$\textbf{students who are not left - handed} = 24$$

$$\frac{\overset{8}{\cancel{24}}}{\cancel{30}} \times 10\cancel{0}$$

$$8 \times 10$$

$$80\ \%$$

Commission

Raju sells computers. Last year he sold computers worth $124 5800. How much commission did he earn?

COMMISSION FOR SALESMEN:

6 % of all sales

$$6\,\% \times 1245800$$

$$\frac{6}{\cancel{100}} \times 1245\cancel{800}$$

$$6 \times 12458$$

$$\$\,747480$$

Commission

Ibrahim sells a house worth Rs. 6250000. He gets 2 % commission to sell this house. How much commission did he earn?

COMMISSION FOR SALESMEN:

2 %

$$2\ \% \times 6250000$$

$$\frac{2}{\cancel{100}} \times 6250\cancel{000}$$

$$2 \times 62500$$

$$Rs\ 125000$$

Commission

John sold a car which was worth $ 2500. He gets 7 % commission to sell this car. How much commission did he earn?

COMMISSION FOR SALESMEN:

7 %

$$7\,\% \times 2500$$

$$\frac{7}{100} \times 2500$$

$$7 \times 25$$

$$\$\ 175$$

Increased or Decreased Percentage

$$\%\ increase = \frac{increase\ value}{original\ value} \times 100$$

$$\%\ decrease = \frac{decrease\ value}{original\ value} \times 100$$

John's income increases from \$20 000 *a year to* \$23 000 *a year. Calculate the percentage increase in his income.*

$$increase\ value = 23000 - 20000$$

$$increase\ value = 3000$$

$$original\ value = 20000$$

$$\%\ increase = \frac{increase\ value}{original\ value} \times 100$$

$$\%\ increase = \frac{\overset{15}{\cancel{3000}}}{\cancel{20000}} \times \cancel{100}$$

$$\%\ increase = 15\ \%$$

Increased or Decreased Percentage

$$\%\ increase = \frac{increase\ value}{original\ value} \times 100$$

$$\%\ decrease = \frac{decrease\ value}{original\ value} \times 100$$

The population of a village decreases from 700 to 637. Calculate the percentage decrease in the population.

$$decrease\ population = 700 - 637$$

$$decrease\ population = 63$$

$$original\ population = 700$$

$$\%\ deccrease = \frac{decrease\ value}{original\ value} \times 100$$

$$\%\ decrease = \frac{63}{700} \times 100$$

9

$$\%\ increase = 9\ \%$$

Increased or Decreased Percentage

$$\%\ increase = \frac{increase\ value}{original\ value} \times 100$$

$$\%\ decrease = \frac{decrease\ value}{original\ value} \times 100$$

The weight of a new born baby was 4 kg. After six month it was 8 kg. Calculate the percentage increase or decrease.

$$increase\ value = 8 - 4$$

$$increase\ population = 4$$

$$original\ value = 4$$

$$\%\ inccrease = \frac{increase\ value}{original\ value} \times 100$$

$$\%\ increase = \frac{4}{4} \times 100$$

$$\%\ increase = 100\ \%$$

Increased or Decreased Percentage

What would be the new wage of someone who presently earns $650 a week?

$$(100 + 10)\% \times 650$$

$$\frac{110}{100} \times 650$$

$$11 \times 65$$

$$\$\ 715$$

ALL WAGES TO BE INCREASED BY

10%

Increased or Decreased Percentage

The price of a car was Rs. 1050000. It was decreased by 30 %.
find the decreased price

$$(100 - 30)\% \times 1050000$$

$$\frac{70}{100} \times 1050000$$

$$70 \times 10500$$

$$Rs\ 735000$$

ALL WAGES TO BE DECREASED BY

30%

Increased or Decreased Percentage

Helen bought a television which priced at $700. It was increased at 4%. How much did she pay?

ALL WAGES TO BE DECREASED BY

$$(100 - 4)\% \times 700$$

$$\frac{96}{\cancel{100}} \times 7\cancel{00}$$

$$96 \times 7$$

$$\$\,672$$

Profit and Loss Percentage

$$\%\ Profit = \frac{profit}{cost\ price} \times 100$$

$$\%\ Loss = \frac{loss}{cost\ price} \times 100$$

A car salesman buys a car for $15 000 and sells it for $18 000. Calculate the percentage profit.

$$c.p = 15000$$

$$s.p = 18000$$

$$profit = sale\ price - cost\ price$$

$$profit = 18000 - 15000$$

$$profit = 3000$$

$$\%\ Profit = \frac{profit}{cost\ price} \times 100$$

$$\%\ Profit = \frac{\cancel{3000}^{20}}{\cancel{15000}} \times \cancel{100}$$

$$\%\ Profit = 20\ \%$$

Profit and Loss Percentage

$$\%\ Profit = \frac{profit}{cost\ price} \times 100$$

$$\%\ Loss = \frac{loss}{cost\ price} \times 100$$

Cara buys a bike for $250 and then sells it one year later for $180. Calculate the percentage loss.

$$c.p = \$\,250$$

$$s.p = \$\,180$$

$$loss = c.p - s.p$$

$$loss = 250 - 180$$

$$loss = 70$$

$$\%\ Loss = \frac{loss}{cost\ price} \times 100$$

$$\%\ Loss = \frac{\cancel{70}}{\cancel{250}} \times \cancel{100}^{4}$$

$$\%\ Loss = 7 \times 4$$

$$\%\ Loss = 28\ \%$$

Profit and Loss Percentage

$$\%\ Profit = \frac{profit}{cost\ price} \times 100$$

$$\%\ Loss = \frac{loss}{cost\ price} \times 100$$

The Robinsons bought their house for £180 000 and sold it 3 years later for £216000. Find the percentage profit that they made on the sale

$c.p = £180\ 000$

$s.p = £2160\ 00$

$$profit = c.p - s.p$$

$$profit = 216000 - 180000$$

$$profit = 36000$$

$$\%\ Profit = \frac{profit}{cost\ price} \times 100$$

$$\%\ Profit = \frac{\overset{20}{\cancel{36000}}}{\cancel{180000}} \times \cancel{100}$$

$$\%\ Profit = 20\ \%$$

Profit and Loss Percentage

Ali made a profit of 20 % to sell a house at Rs 1260000.
What was the cost of this house?

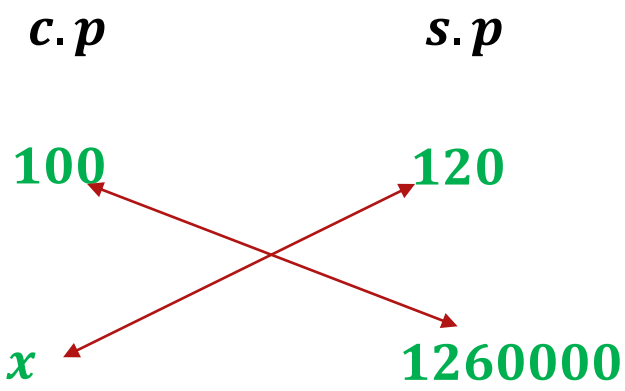
$s.p = Rs\ 1260000$

$profit = 20\ \%$

$let \quad c.p = 100\ \%$

$s.p = 100 + 20$

$s.p = 120\%$



$120\ x = 100 \times 1260000$

$x = \dfrac{100 \times 1260000}{120}$

$x = Rs\ 1050000$

Profit and Loss Percentage

Carlos buys a new bicycle. After one year he sells it at $ 231. *He makes a loss of* 40 % *on the sale price he paid. Find the price Carlos paid for the bicycle?*

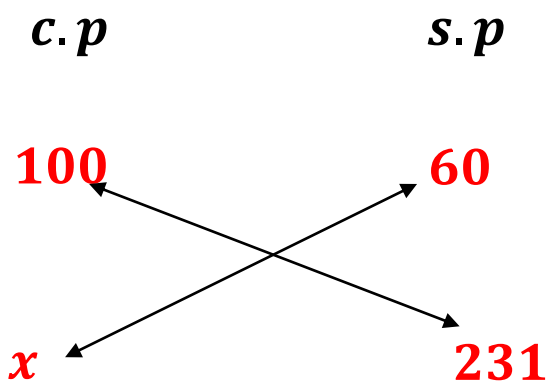
$s.p = \$\,231$

$loss = 40\ \%$

$let \quad c.p = 100\ \%$

$s.p = 100 - 40$

$s.p = 60\%$



$60\ x = 100 \times 231$

$x = \dfrac{100 \times 231}{60}$

$x = \$\,385$

Profit and Loss Percentage

The cost of a bike is $1620. *The shopkeeper sells it and makes a profit of* 45 %. *Calculate the selling price?*

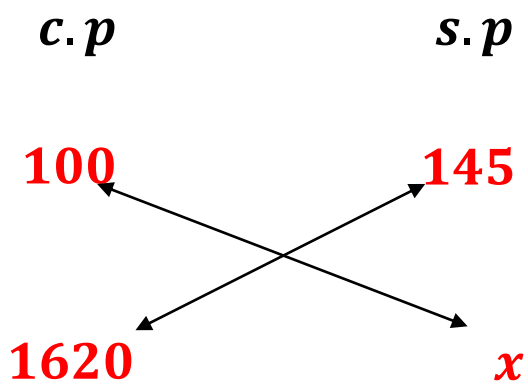
$c.p = \$\,1620$

$loss = 45\ \%$

$let \quad c.p = 100\ \%$

$s.p = 100 + 45$

$s.p = 145\ \%$



$100\ x = \ 145 \times 1620$

$x = \ \dfrac{145 \times 1620}{100}$

$x = \$\,2349$

Profit and Loss Percentage

The cost of a television was at 350. *It was sold by* 30 % *loss.*
Calculate the selling price?

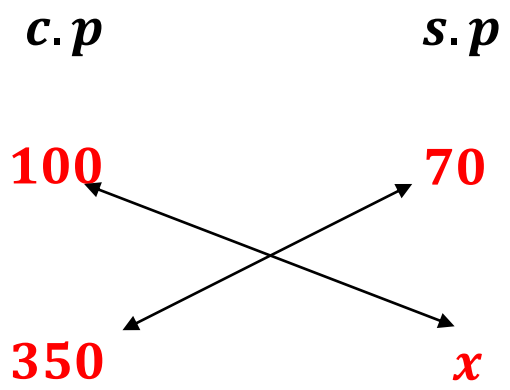
$c.p = \$\,350$

$loss = 30\ \%$

$let \quad c.p = 100\ \%$

$s.p = 100 - 30$

$s.p = 70\ \%$



$100\ x = 70 \times 350$

$$x = \frac{70 \times 350}{100}$$

$x = \$\,245$

Marked Price and Discount Percentage

$$\%\ discount = \frac{discount}{marked\ price} \times 100$$

The marked price on a calculator is $30. *Calculate the discount percentage when the sale price is* $24.

$$m.p = \$\,30$$

$$s.p = \$\,24$$

$$discount = m.p - s.p$$

$$discount = 30 - 24$$

$$discount = \$\,6$$

$$\%\ discount = \frac{discount}{marked\ price} \times 100$$

$$\%\ discount = \frac{\cancel{6}^{\,2}}{\cancel{30}} \times \cancel{100}$$

$$\%\ discount = 2 \times 10$$

$$\%\ discount = 20\ \%$$

Marked Price and Discount Percentage

$$\%\ discount = \frac{discount}{marked\ price} \times 100$$

The marked price on a City bike is $450. Calculate the discount percentage when the sale price is $400.

$$m.p = \$\,450$$

$$s.p = \$\,400$$

$$discount = m.p - s.p$$

$$discount = 450 - 400$$

$$discount = \$\,50$$

$$\%\ discount = \frac{disccount}{marked\ price} \times 100$$

$$\%\ discount = \frac{50}{400} \times 100$$

$$\%\ discount = \frac{50}{4}$$

$$\%\ discount = 12.5\%$$

Marked Price and Discount Percentage

The marked price on a calculator is $30. Calculate the sale price of the calculator when 20 % discount is given .

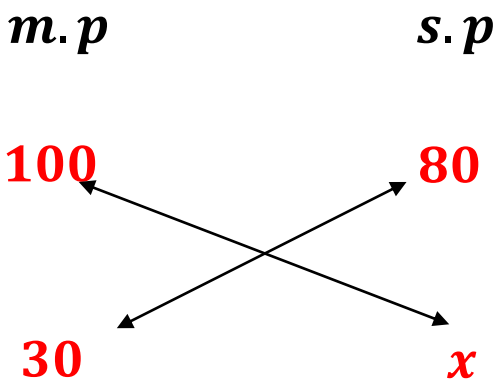
$m.p = \$\,30$

$dicount = 20\ \%$

$let \quad m.p = 100\ \%$

$s.p = 100 - 20$

$s.p = 80\ \%$



$100\ x = \ 80 \times 30$

$$x = \frac{80 \times 30}{100}$$

$x = \ \$\,24$

Marked Price and Discount Percentage

A car is priced at $5600. Helen pays cash for the car and receives a 10% cash discount. How much does she pay?

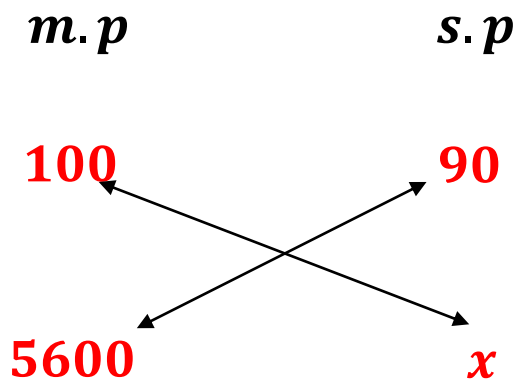
$m.p = \$\,5600$

$dicount = 10\ \%$

$let \quad m.p = 100\ \%$

$s.p = 100 - 10$

$s.p = 90\ \%$



$100\ x = 90 \times 5600$

$$x = \frac{90 \times 5600}{100}$$

$x = \$\,5040$

Marked Price and Discount Percentage

The sale price of a mobile phone is Rs 25000. Calculate the marked price of the mobile phone when 15% discount is given .

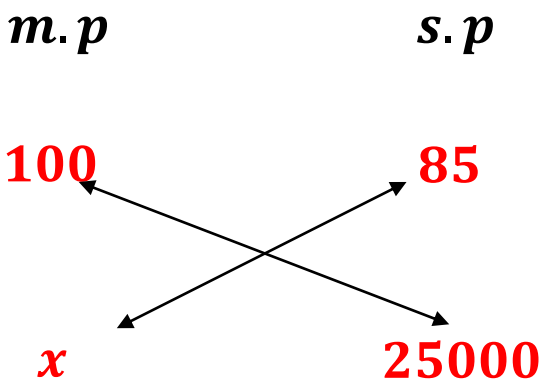
$s.p = \$\,25000$

$dicount = 15\ \%$

$let \quad m.p = 100\ \%$

$s.p = 100 - 15$

$s.p = 85\ \%$



$85x = 100 \times 25000$

$$x = \frac{100 \times 25000}{85}$$

$x = \$\,29412$

Marked Price and Discount Percentage

A shirt has sale price $\$120$. *Calculate the marked price of a shirt when* 18% *discount is given* .

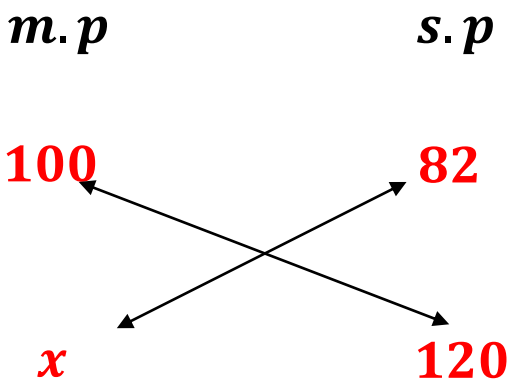
$s.p = \$120$

$dicount = 18\ \%$

let $m.p = 100\ \%$

$s.p = 100 - 18$

$s.p = 82\ \%$



$82\ x = 100 \times 120$

$$x = \frac{100 \times 120}{82}$$

$x = \$146.3$

Reverse Percentage

The price of a house was reduced by 12 % and now its price is $ 227040. Find the original price of the house.

$100\ \% - 12\ \%$

$88\ \%$

$$original\ price = \frac{new\ price}{\%\ after\ reduction}$$

$\frac{88}{100}$

$$original\ price = \frac{227040}{0.88}$$

0.88

$$original\ price = \$\ 258000$$

Reverse Percentage

The price of a car after first year was $\$ 16400$. ***It was depreciated by*** $18\ \%$ ***in the first year. Find the original value of the car.***

Value after first year
$= \$16 \quad 400$

Car depreciated by 18% ***in the first year.***

$100\ \% - 18\ \%$

$82\ \%$

$$original\ price = \frac{new\ price}{\%\ after\ reduction}$$

$$\frac{82}{100}$$

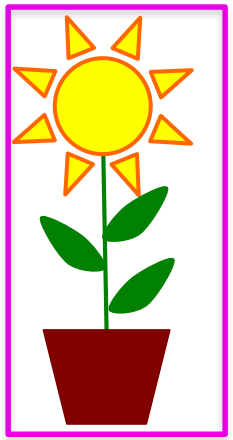
$$original\ price = \frac{16400}{0.82}$$

0.82

$$original\ price = \$\,20000$$

Reverse Percentage

The plant increases in height by 4 % in one day. It now has a height 41.6 cm. Find the height of the plant yesterday.



Plant increases in height by 4% in one day.

It now has a height of 41.6 cm.

$100\ \% + 4\ \%$

$104\ \%$

$$original\ height = \frac{new\ height}{\%\ after\ increased}$$

$$\frac{104}{100}$$

$$original\ height = \frac{41.6}{1.04}$$

1.04

$$original\ height = 40\ cm$$

Reverse Percentage

The population of an Island was 50000 in 2015. It was 25 % more than in 2010. Find the population in 2010.

$$100\ \% + 25\ \%$$

$$125\ \%$$

$$\frac{125}{100}$$

$$1.25$$

$$population\ in\ 2010 = \frac{population\ in\ 2015}{\%\ after\ increased}$$

$$population\ in\ 2010 = \frac{50000}{1.25}$$

$$population\ in\ 2010 = 40000$$

Reverse Percentage

The population of an Island was 50000 in 2015. It was 25 % more than in 2010. Find the population in 2010.

$$100\ \% + 25\ \%$$

$$125\ \%$$

$$\frac{125}{100}$$

$$1.25$$

$$population\ in\ 2010 = \frac{population\ in\ 2015}{\%\ after\ increased}$$

$$population\ in\ 2010 = \frac{50000}{1.25}$$

$$population\ in\ 2010 = 40000$$

Simple Interest

$$simple\ interest = \frac{Principal \times Rate \times Time}{100} \quad OR$$

$$total\ amount = principal + interest \quad OR \quad total\ amount = P + I$$

To buy a laptop computer, Alice borrowed $\$2,000$ *for* 3 *years at an annual simple interest rate of* 5%. *How much interest will she pay if she pays the entire loan off at the end of the third year? What is the total amount that she will repay?*

$P = \$2000$

$R = 5\ \%$

$T = 3\ years$

$$I = \frac{P\ R\ T}{100}$$

$$I = \frac{2000 \times 5 \times 3}{100}$$

$$I = \$\ 300$$

$$total\ amount = P + I$$

$$total\ amount = 2000 + 300$$

$$total\ amount = \$\ 2300$$

Simple Interest

$$simple\ interest = \frac{Principal \times Rate \times Time}{100} \quad OR$$

$$total\ amount = principal + interest \quad OR \quad total\ amount = P + I$$

Bertha deposited $1000 *into a retirement account when she was* 18. *How much will Bertha have in this account after* 50 *years at a yearly simple interest rate of* 7.5%?

$P = \$\,1000$

$R = 7.5\ \%$

$T = 50\ years$

$$I = \frac{P\ R\ T}{100}$$

$$I = \frac{1000 \times 7.5 \times 50}{100}$$

$$I = \$\,3750$$

$$total\ amount = P + I$$

$$total\ amount = 1000 + 3750$$

$$total\ amount = \$\,4750$$

Simple Interest

If you invested $200 in an account that paid simple interest, find how long you'd need to leave it in at 4% interest to make $10.00.

$P = \$\,200$

$R = 4\%$

$I = \$\,10$

$T = T\ years$

$$I = \frac{P\,R\,T}{100}$$

$$10 = \frac{200 \times 4 \times T}{100}$$

$$10 \times 100 = 800T$$

$$1000 = 800T$$

$$T = \frac{1000}{800}$$

$$T = 1.25\ years$$

Simple Interest

Mr. Johnson borrowed $P for 4 years to make home improvements. If he repaid interest of $2320, at 7.25% interest rate. Find the value of P ?

$P = \$\, P$

$R = 7.25\%$

$I = \$\, 2320$

$T = 4\ years$

$$I = \frac{P\ R\ T}{100}$$

$$2320 = \frac{P \times 7.25 \times 4}{100}$$

$$2320 \times 100 = 29\ P$$

$$232000 = 29P$$

$$P = \frac{232000}{29}$$

$$T = \$\, 8000$$

Simple Interest

TJ invested $4000 in a bond at a yearly rate of R%. He earned $200 in interest in 2.5 years. What will be his rate?

$P = \$\,4000$

$R = R\,\%$

$I = \$\,200$

$T = 2.5\ years$

$$I = \frac{P\,R\,T}{100}$$

$$200 = \frac{4000 \times R \times 2.5}{100}$$

$$200 \times 100 = 10000R$$

$$20000 = 10000R$$

$$P = \frac{20000}{10000}$$

$$T = 2\,\%$$

Compound Interest

$$compound\ interest = P\left(1 + \frac{r}{100}\right)^t \qquad OR \qquad A = P\left(1 + \frac{r}{100}\right)^t$$

$$I = A - P$$

David invested $1800 *in a savings account that pays* 4.5% *interest compounded annually. Find the value of the investment in* 12 *years.*

$$P = \$\,1800$$

$$R = 4.5\ \%$$

$$T = 12\ years$$

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$$A = 1800\left(1 + \frac{4.5}{100}\right)^{12}$$

$$A = \$\,3052.6$$

Compound Interest

$$compound\ interest = P\left(1 + \frac{r}{100}\right)^t \qquad OR \qquad A = P\left(1 + \frac{r}{100}\right)^t$$

$$I = A - P$$

Find the amount that results from \$500 *invested at* 8% *compounded after a period of* 2 *years.*

$$P = \$\,500$$

$$R = 8\%$$

$$T = 2\ years$$

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$$A = 500\left(1 + \frac{8}{100}\right)^2$$

$$A = \$\,583.2$$