Percentages

① Decimal or Fraction into percentage (×100)

$0.32 \times 100 = 32\%$

$1.25 \times 100 = 125\%$

$\frac{17}{20} \times 100 = 85\%$

$\frac{3}{25} \times 100 = 12\%$

② Percentage to Decimal or Fraction (÷100)

$35\% \rightarrow \frac{35}{100} = 0.3$

$35\% \rightarrow \frac{35}{100} = \frac{7}{20}$

$80\% \rightarrow \frac{80}{100} = 0.8$

$80\% \rightarrow \frac{80}{100} = \frac{4}{5}$

16% of $50 = 50\%$ of 16

$\frac{50}{100} \times 16 = \frac{16}{100} \times 50$

$a\%$ of $b = b\%$ of a

③ Calculation

(a) 10% of $30 = \frac{10}{100} \times 30 = \boxed{3}$

(b) 20% of $70 = \frac{20}{100} \times 70 = \boxed{14}$

$10\% \rightarrow$ Divide by 10

$5\% \rightarrow$ (Divide by 10) $\div 2$

$20\% \rightarrow$ (Divide by 10) $\times 2$

$30\% \rightarrow$ (Divide by 10) $\times 3$

$50\% \rightarrow$ Divide by 2

⑨ Increase and Decrease by a percentage

(a) Increase $30 by 20%.

① $\frac{20}{100} \times 30 = \$6$

Increase: $30 + 6 = \boxed{\$36}$

② → I prefer this so will stick to this for the next time

	%	$
original	100	30
	120	x

$100x = 120 \times 30$

$x = \frac{120 \times 30}{100}$

$\boxed{\$36}$

(b) Increase $60 by 40%.

%	$
100	60
140	x

$\boxed{x = \$84}$

(c) Decrease $70 by 25%.

%	$
100	70
75	x

$\boxed{x = 52.5}$

1. In a sale a shop reduces all its prices by 20%.
   Find the sale price of a sari which previously cost $44.
2. The price of a car was $5400 but it is increased by 6%.
   What is the new price?

1→

%	$
100	44
80	x

$x = \$35.2$

2⇒

%	$
100	5400
106	x

$x = \$5,724$

3. The price of a small Persian rug was $245 but it has been reduced by 30%. What is the new price?
4. A music shop offers a 7% discount for cash. How much does a cash-paying customer pay for a CD advertised at $9.50?

3→

%	$
100	245
70	x

$\frac{70 \times 245}{100} \rightarrow x$

$x = 171.5$

(4)

%	$
100	9.5
93	x

$\frac{93 \times 9.5}{100} = x$

$x = \$8.84$

⑤ Reverse Percentages

① After $\$x$ is increased by 20% it becomes $\$96$. Find x

%	$
120	96
100	x

$\boxed{x = \$80}$

② After a 25% tax the total bill for lunch is $\$1800$. Find
a. The total bill before tax
b. Tax

(a)

%	$
100	: x
125	: 1800

$$x = \frac{100 \times 1800}{125} = \frac{4}{\cancel{100}} \times \frac{\cancel{1800}^{360}}{\cancel{125}_{5}}$$

$= \boxed{\$1440}$

(b)
$$\begin{array}{r} {}^{7}\cancel{1}^{1}800 \\ -\ 1440 \\ \hline 0360 \end{array}$$

$\boxed{\$360}$

⑥ Expressing one value as a percentage of another

① Eg is what % of a kg $1\text{kg} = 1000\text{g}$

$$\frac{\text{is/as}}{\text{off}} \times 100 \rightarrow \frac{5}{1000_{2}} \times 100 = \boxed{0.5\%}$$

whatever value is written with these words will take their place. For eg

5 and is are together and of is of 1kg or 1000g

(b) 25 cm is what percent of 4m? $1m = 100cm$

$\frac{25}{400} \times 100 \Rightarrow$ **6.25%**

7 → Percentage change

$\%\text{ change} \rightarrow \frac{\text{New} - \text{Old}}{\text{Old}} \times 100$

13. In 2004 Colin had a salary of $7200.

(a) This was an increase of 20% on his salary in 2002.
Calculate his salary in 2002.

(b) In 2006 his salary increased to $8100.
Calculate the percentage increase from 2004 to 2006.

t3

(a)

%	$
120	7200
100	x

x = $6000

(b) $\%\text{ increase} = \frac{8100 - 7200}{7200} \times 100$

12.5%

18. a) A house is bought for $20 000 and sold for $24 400. What is the percentage profit?

b) A piece of fish, initially of mass 2.4 kg, is cooked and subsequently has mass 1.9 kg. What is the percentage loss in mass?

c) An article is sold at a 6% loss for $225.60. What was the cost price?

(a) $\frac{4400}{20000} \times 100 \Rightarrow$ **22%**

(b) $\frac{0.5}{2.4} \times 100 \Rightarrow$ **20.8%**

(c)

%	$
94	225.6
100	x

$x = 240$

$240