

## 7.4 - Percents

Per Cent = "per 100"  
"Divide" "100"

eg. ①  $25\% = \frac{25}{100} = 0.25$   
 $= \frac{1}{4}$  as a fraction

②  $100\% = \frac{100}{100} = 1$ , i.e. the "whole thing"

③  $200\% = \frac{200}{100} = 2$

④ Convert  $37.5\%$  to a fraction in lowest form.

$$\Rightarrow 37.5\% = \frac{37.5}{100} \cdot \frac{2}{2} = \frac{75}{200}$$
$$= \frac{25 \cdot 3}{25 \cdot 8} = \boxed{\frac{3}{8}}$$

⑤ Convert  $\frac{7}{8}$  to a percentage.

$$\Rightarrow \begin{array}{r} 0.875 \\ 8 \overline{) 7.000} \\ \underline{-64} \phantom{0} \\ 60 \phantom{0} \\ \underline{-56} \phantom{0} \\ 40 \\ \underline{-40} \\ 0 \end{array} = \boxed{87.5\%}$$



# Percentage Problems

$\Rightarrow$   $p\%$  of  $X$  is  $Y$

$$\begin{array}{ccccccccc} & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ & p & & X & & = & & Y & & \\ & \hline & 100 & & & & & & & & \end{array}$$

eg. (1) What is 12% of 96?

$$Y = \frac{12}{100} \cdot 96$$

$$Y = \frac{3}{25} \cdot \frac{96}{1} = \frac{288}{25} = \boxed{11.52}$$

\* OR  
 $\frac{0.12}{1}$

$$\frac{12}{100} = \frac{6}{50} = \frac{3}{25}$$

OR

$$Y = 0.12 \cdot 96 = \boxed{11.52}$$

---

(2) 4 is what percent of 30?

$$\frac{4}{4} = \frac{p}{100} \cdot \frac{30}{30}$$

$$\Rightarrow 4 = \frac{p}{100} \cdot 30 \Rightarrow 4 = \frac{30}{100} \cdot p$$

$$\Rightarrow \frac{4}{\left(\frac{3}{10}\right)} = \frac{\left(\frac{3}{10}\right)p}{\left(\frac{3}{10}\right)} \Rightarrow p = \frac{4 \cdot 10}{3} = \frac{40}{3} = 13.\bar{3}$$

$$\Rightarrow \boxed{13.\bar{3}\%} \approx \boxed{13.3\%}$$



③

A is 18% of what?

$$\begin{array}{ccccccc} \downarrow & \downarrow & \downarrow & \downarrow & & & \\ A & = & 0.18 & \cdot & X & & \end{array}$$

$$\Rightarrow A = \frac{0.18 \cdot X}{0.18} \Rightarrow X = 22.\bar{2} \approx 22.2$$

OR  $A = \frac{18}{100} \cdot X$

$$\Rightarrow A = \left(\frac{9}{50}\right) X \Rightarrow X = \frac{A \cdot 50}{9} = \frac{200}{9} = 22.\bar{2}$$

④

Suppose a store increases all their prices by 10% one week, then reduces them by 10% the following week. Afterwards, are the prices back to "normal"?

Suppose an item originally costs \$100.

$$\begin{aligned} \Rightarrow \text{1st week: } & \$100 - \$10 = \$90 \quad \downarrow 10\% \text{ of } \$100 \\ \text{2nd week: } & \$90 + \$9 = \$99 \quad \uparrow 10\% \text{ of } \$9 \end{aligned}$$

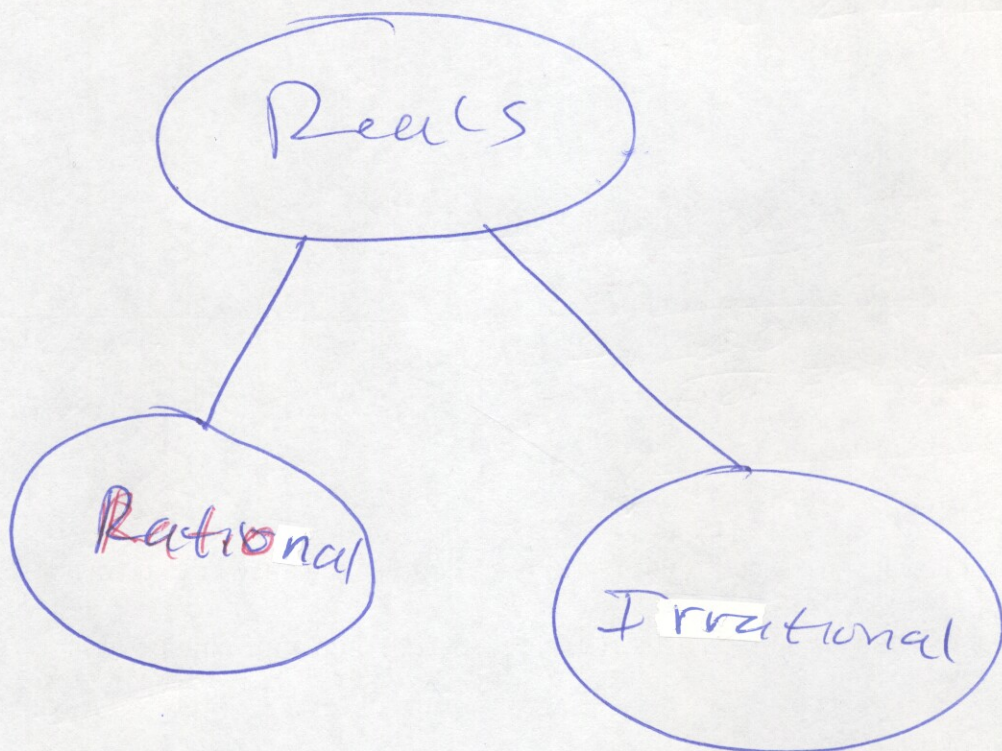
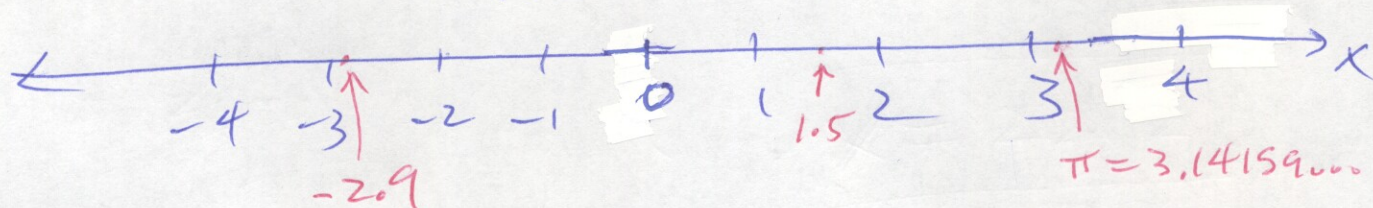
⇒ No!



# Ch. 9 - Rational & Real Numbers

## Real Numbers

the Real Number Line



## Rational Numbers

Any real number that can be written as the RATIO of two integers

$\Rightarrow \frac{m}{n}$ ,  $m$  is any integer,  
 $n$  is any non-zero integer.

Integers =  $\{\dots, -2, -1, 0, 1, 2, 3, \dots\}$



e.g. Which are Rational?

$\frac{2}{3}$ ,  $-7$ ,  $0.316$ ,  $\pi$ ,  $0$ ,  $-0.5$

Yes, Yes, Yes, No, Yes, Yes  
 $(\frac{-7}{1})$   $(\frac{316}{1000})$   $(\frac{0}{1})$   $(\frac{-1}{2})$

---

If a Real Number Cannot be written as the ratio of two integers (i.e. Not Rational), then it is Irrational.

e.g.  $\pi$ ,  $\sqrt{2}$ ,  $\sqrt{3}$ ,  $\sqrt{\text{Any Non-perfect Square}}$ , ...

---

Every Rational Number has a Decimal representation that either Terminates or Repeats.

e.g.  $\frac{1}{2} = 0.5$ ,  $\frac{1}{3} = 0.\overline{3}$ ,  $\frac{2}{3} = 0.\overline{6}$ ,  
 $\frac{5}{8} = 0.625$ ,  $\frac{8}{9} = 0.\overline{8}$ ,  $\frac{7}{11} = 0.\overline{63}$ ,  
 $\frac{11}{12} = 0.91\overline{6}$ ,  $\frac{17}{100} = 0.17$ ,  
 $\frac{7}{13} = 0.\overline{538461}$ , ...