

ARITHMETIC

- WE NEED TO BE VERY COMFORTABLE WORKING WITH PERCENTAGES.

IN PARTICULAR

TO WRITE SOMETHING AS A PERCENTAGE OF SOMETHING ELSE :

- ① WRITE IT AS A FRACTION
- ② MULTIPLY BY 100 TO MAKE IT A PERCENTAGE.
(USE FRACTION BUTTON ON YOUR CALCULATOR)

eg WRITE 350g AS A PERCENTAGE OF 1kg
• UNITS NEED TO BE THE SAME.

ANS $\frac{350}{1000} \times 100 = 35\%$

WE SAY: 350g OUT OF 1000g

THIS IS USED FOR

- eg
- PERCENTAGE PROFIT
 - PERCENTAGE LOSS
 - PERCENTAGE ERROR
- + LOADS MORE

TO GET A PERCENTAGE OF SOMETHING

- ① WRITE PERCENTAGE AS A DECIMAL

TECHNICALLY THIS BIT IS OPTIONAL

- ② MULTIPLY THE DECIMAL BY THE NUMBER YOU'RE GETTING THE PERCENTAGE OF.

eg (i) 25% of £360

ANS $0.25 \times 360 = \boxed{£90}$

(ii) 12.7% of 4,550

$0.127 \times 4550 = \boxed{577.85}$

WE NEED BOTH OF THESE TECHNIQUES FOR

LOADS OF QUESTIONS.

TAX / DEDUCTIONS FROM INCOME

- STATUTORY
 - NON-STATUTORY
- DEDUCTIONS FROM INCOME
- ↑
MONEY YOU EARN FOR DOING A JOB.
- STATUTORY DEDUCTIONS MUST BE PAID TO THE GOVERNMENT.
(eg INCOME TAX, PRSI, USC)
 - NON-STATUTORY DEDUCTIONS ARE VOLUNTARY
(eg PENSION PLAN, SAVINGS, UNION FEES)

TAX

BEFORE WE REVISE HOW INCOME TAX WORKS, WE REMEMBER :

- THE HIGHER RATE OF TAX IS ONLY APPLIED TO EARNINGS ABOVE A CERTAIN AMOUNT
NOT THE ENTIRE INCOME
 - TAX CREDITS - ARE LIKE A "DISCOUNT". THIS FIGURE IS TAKEN AWAY FROM THE TAX BILL AT THE END OF THE CALCULATIONS
- ie. TAX CREDITS ARE DEDUCTED FROM THE GROSS TAX TO CALCULATE THE TAX PAYABLE

eg

JOHN EARNS €45,000 PER ANNUM. IN A YEAR
 HE PAYS TAX AT THE STANDARD RATE OF 20% UP TO THE STANDARD RATE CUT-OFF POINT OF €32,000; AND HE PAYS THE HIGHER RATE OF 42% ON ANY EARNINGS ABOVE THIS AMOUNT. HE HAS A TAX CREDIT OF €2,400.

CALCULATE HIS TAKE-HOME PAY

STANDARD

HIGHER

② 20% of 32,000
 $0.20 \times 32,000$
 $= \boxed{€ 6,400}$

③ $45,000 - 32,000$
 $= 13,000$
 ④ 42% of 13,000
 $0.42 \times 13,000$
 $= \boxed{€ 5,460}$

⑤ GROSS TAX = $6,400 + 5,460$
 $= \boxed{€ 11,860}$

⑥ GROSS TAX - TAX CREDITS = TAX PAYABLE
 $11,860 - 2,400 = € 9,460$

⑦ $45,000 - 9,460 = \boxed{€ 35,540}$
ANSWER

METHOD / NOTES

- ① SPLIT PAGE IN TWO
STANDARD | HIGHER
- ② CALCULATE STANDARD RATE TAX.
- ③ FIND OUT REMAINDER OF SALARY WHICH IS ABOVE 32,000
- ④ CALCULATE HIGHER RATE TAX
- ⑤ ADD TWO AMOUNTS TO MAKE GROSS TAX
- ⑥ TAKE AWAY TAX CREDITS
• THIS IS THE AMOUNT OF TAX ACTUALLY PAYABLE
- ⑦ TAKE-HOME PAY = GROSS PAY - TAX PAYABLE

THERE ARE OTHER DEDUCTIONS YOU MIGHT HAVE TO WORK OUT,
BUT THESE FIGURES ARE USUALLY GIVEN TO YOU IN QUESTIONS:

USC (UNIVERSAL SOCIAL CHARGE)

eg

RATE	CHARGED ON
2%	€0 → € 10,036
4%	€ 10,036 → € 16,016
6%	€ 16,016 → ABOVE

LIKE HIGHER RATE
OF TAX, ONLY
AMOUNTS ABOVE
THESE AMOUNTS ARE
CHARGED AT THE
HIGHER RATES OF
USC.

PRSI - WORKS IN A VERY SIMILAR WAY.

V.A.T. (VALUE ADDED TAX)

LIKE THE EXTRA TAX YOU HAVE TO PAY WHEN YOU GO SHOPPING IN AMERICA

eg. A COMPUTER COSTS €650 PLUS 21% VAT. CALCULATE THE PRICE INCLUDING VAT.

MINUS
DOIT
DOIT

①	$0.21 \times 650 = 136.50$	① FIND 21% OF 650
②	$650 + 136.50 = \boxed{€786.50}$	② ADD THIS TO THE €650

PLUS
DOIT
DOIT

①	$1.21 \times 650 = \boxed{€786.50}$	① FIND 121% OF €650
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↑
THIS IS 121%

• DIFFICULT QUESTIONS : YOU MIGHT HAVE TO WORK BACKWARDS. THEY TELL YOU THE PRICE INCLUDING VAT. THE IMPORTANT

QUESTION YOU NEED TO ASK YOURSELF IS

"WHAT PERCENTAGE OF THE "ORIGINAL PRICE" IS THAT?"

eg. MR O'BRIEN BOUGHT A COMPUTER FOR HIS COMPANY WHICH COST €984 INCLUDING VAT AT 23%. HIS COMPANY SHOULDN'T PAY VAT, SO HE CAN CLAIM THIS AMOUNT BACK! WHAT WAS THE ORIGINAL PRICE OF THE COMPUTER BEFORE VAT WAS ADDED?

ANS:

$$\text{ORIGINAL PRICE} + \text{VAT} = \text{€ } 984$$

THIS IS WHAT WE'RE TRYING TO FIND

$$100\% + 23\% = 984$$

$$\text{SO } 123\% = 984$$

$$\text{e.g. } (\text{ORIGINAL AMOUNT}) \times 1.23 = 984$$

$$\text{ORIGINAL AMOUNT} = 984 \div 1.23$$

$$= \boxed{\text{€ } 800}$$

BOTH SIDES BY 1.23

PERCENTAGE PROFIT / LOSS

ALWAYS WRITE

$$\frac{\text{PROFIT / LOSS}}{\text{ORIGINAL AMOUNT}} \times 100$$

ALWAYS ORIGINAL UNLESS THE QUESTION SAYS OTHERWISE.

BE VERY CAREFUL ABOUT THE WORDING OF THE QUESTIONS

INTEREST / COMPOUND INTEREST

$$F = P(1+i)^t$$

↑
IN TABLES BOOK

eg MIKE INVESTS €5,000 FOR
6 YEARS AT 3% INTEREST.

HOW MUCH WILL HE HAVE AT
THE END OF THE 6 YEARS?

① WRITE THE FORMULA

$$F = P(1+i)^t$$

② WRITE DOWN WHAT EACH
LETTER IS.

F = FINAL AMOUNT = ?

P = PRINCIPAL (START AMOUNT) = 5000

i = INTEREST RATE (IN DECIMALS) = 0.03

t = TIME = 6

③ SUBSTITUTE THESE VALUES INTO THE FORMULA

$$F = P(1+i)^t$$

$$F = 5000(1.03)^6$$

④ USE YOUR CALCULATOR :

$$F = \boxed{€5,970.26}$$

HARD QUESTIONS

IF THEY TELL YOU THE
FINAL AMOUNT AND
YOU HAVE TO CALCULATE
SOMETHING ELSE

(SEE EXAMPLES ON NEXT PAGE)

METHOD :

SAME AS ABOVE,
BUT YOU WILL
NEED TO SOLVE
THE EQUATION

eg How MUCH WOULD MARY HAVE TO INVEST NOW, IF SHE NEEDS A FINAL AMOUNT OF €15,000 IN 2 YEARS, WITH AN INTEREST RATE OF 3.5%

① $F = P(1+i)^t$

① WRITE FORMULA

② WHAT IS EACH LETTER

②

$F = 15000$
$P = ?$
$i = 0.035$
$t = 2$

$15000 = P(1.035)^2$

③ SUBSTITUTE INTO FORMULA

$15000 = P(1.071225)$

④ SOLVE



$P \times 1.071225 = 15000$
 $\div 1.071225$

$P = \boxed{€14,002.66}$

AER

→ ANNUAL EQUIVALENT RATE

→ THIS IS OFTEN USED IN QUESTIONS WHERE YOU NEED TO CALCULATE i - THE INTEREST RATE

→ USE SAME METHOD AS ABOVE (YOU MIGHT NEED TO DO SOME OTHER CALCULATIONS TO WORK OUT F FIRST)

eg YOU MIGHT HAVE AN EQUATION LIKE THIS

$12000 = 10000(1+i)^6$

HOW DO WE SOLVE THIS!? → SEE INDICES NOTES

↓

$1.2 = (1+i)^6$ $\div 10000$

$(1.2)^{\frac{1}{6}} = 1+i$ $\Rightarrow i = 0.03$ OR 3%

DEPRECIATION

(WORKS THE SAME AS

COMPOUND INTEREST, BUT

INSTEAD OF $F = P(1+i)^t$

IT IS $F = P(1-i)^t$

↑
DEPRECIATION
MEANS REDUCING
IN VALUE

eg. MR HILLIARD BUYS A NEW CAR
FOR €15,000. IT DEPRECIATES
AT 10% PER ANNUM. HOW
MUCH IS IT WORTH AFTER 6 YEARS?

$$F = P(1-i)^t$$

$$P = 15000$$

$$i = 0.10$$

$$t = 6$$

$$\rightarrow F = 15000(0.9)^6$$

$$= \boxed{\text{€ } 7,971.62}$$

$$(1 - 0.1 = 0.9)$$

ARITHMETIC II

RATIO / PROPORTION

- KNOW HOW TO DIVIDE AN AMOUNT IN A RATIO.

eg DIVIDE €900 IN THE RATIO 7:8:3

- ① ADD THE NUMBERS OF "PARTS" IN THE RATIO

$$7 + 8 + 3 = 18 \text{ PARTS}$$

- ② DIVIDE THE €900 INTO 18 EQUAL PARTS.

$$900 \div 18 = €50 \leftarrow 1 \text{ PART}$$

- ③ MULTIPLY THIS BY EACH NUMBER OF PARTS IN THE RATIO

$$7 \times 50 = 350$$

$$8 \times 50 = 400$$

$$3 \times 50 = 150$$

CHECK	900
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$$7 : 8 : 3$$

350	:	400	:	150
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PERCENTAGE ERROR :

=

$\frac{\text{ERROR}}{\text{ACTUAL VALUE}} \times 100$

ALWAYS
THE "CORRECT" VALUE
ON THE BOTTOM.

TOLERANCE — THE AMOUNT OF ERROR THAT IS
"ACCEPTABLE"

RATES OF CHANGE

eg SPEED

(SLOPES / HOW FAST SOMETHING IS CHANGING)

$$\text{RATE OF CHANGE} = \frac{\text{AMOUNT OF CHANGE}}{\text{CHANGE IN TIME}}$$

REMEMBER !



"DAD'S SILLY TRIANGLE"

eg TO CALCULATE DISTANCE, COVER "D"

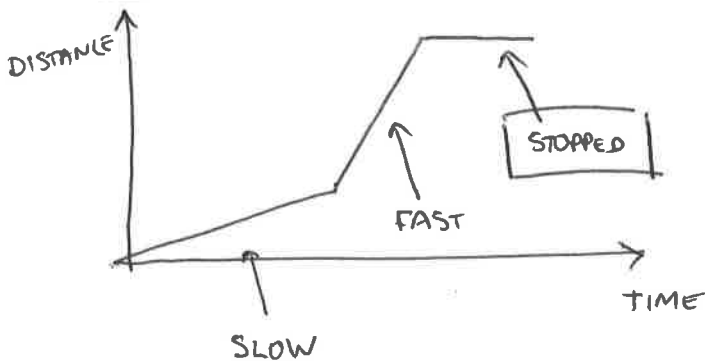
SO $D = S \times T$

$$S = \frac{D}{T}$$

$$T = \frac{D}{S}$$

DISTANCE - TIME GRAPHS

$$\text{SLOPE} = \text{SPEED}$$



REMEMBER
RATE OF CHANGE CAN BE NEGATIVE

BE ABLE TO DESCRIBE WHAT IS HAPPENING AT PARTICULAR PARTS OF A GRAPH

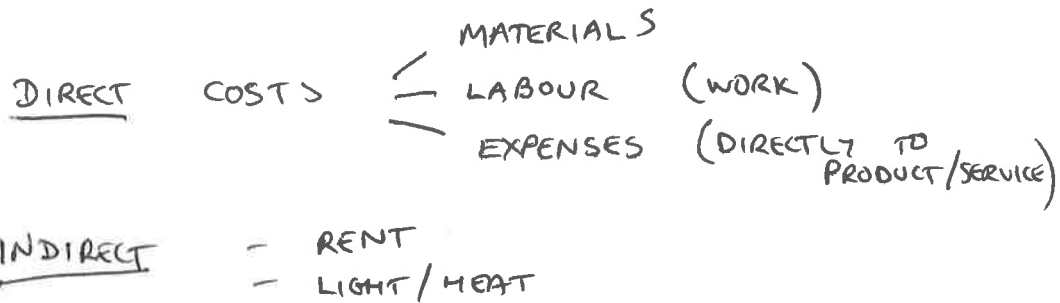
BILLS

THERE ARE LOTS OF DIFFERENT QUESTIONS WHICH CAN BE ASKED ABOUT HOUSEHOLD BILLS.

READ THE QUESTION CAREFULLY, IN PARTICULAR:

- CALCULATE THE NUMBER OF UNITS USED.
- INCLUDE STANDING / FIXED CHARGES.
- CALCULATE V.A.T.
- ROUND CORRECTLY.

BUSINESS TERMS.



VARIABLE COSTS : eg COMMISSION [CAN CHANGE DEPENDING ON SALES ETC]

FIXED COSTS : eg RENT [DOESN'T CHANGE]

WASTAGE : eg HUMAN ERROR / MACHINE FAULTS.

CONVERSION

(UNITS / CURRENCY)

CURRENCY EXCHANGE :

eg. $€1 = \$1.32$

CALCULATE THE VALUE OF

(i) $€370$ IN DOLLARS (ii) $\$750$ IN EURO

(i) $€1 = \$1.32$

$$€370 = 370 \times 1.32$$

$$= \$488.40$$

(ii) $\$1.32 = €1$ ← € ON RIGHT

$$\begin{aligned} \$750 &= 750 \div 1.32 \\ &= €568.18 \end{aligned}$$

- YOU WILL BE GIVEN AN EXCHANGE RATE
- WRITE DOWN THIS EXCHANGE RATE WITH THE CURRENCY YOU ARE TRYING TO CALCULATE ON THE RIGHT.
- YOU WILL EITHER MULTIPLY OR DIVIDE BY THIS RATE DEPENDING ON ~~IT~~ WHAT YOU'RE TRYING TO CALCULATE.
- IF YOU'RE NOT SURE, DO BOTH + CHECK WHICH ANSWER MAKES SENSE
- BE CAREFUL WITH COMMISSION ADD / SUBTRACT A PERCENTAGE...

UNITS (eg METRIC / IMPERIAL)

- AS WITH CURRENCY EXCHANGE, DECIDE WHETHER YOU NEED TO MULTIPLY OR DIVIDE BY THE CONVERSION RATE.