

# Calculator & Formula Practice

Name: \_\_\_\_\_ Date: \_\_\_\_\_

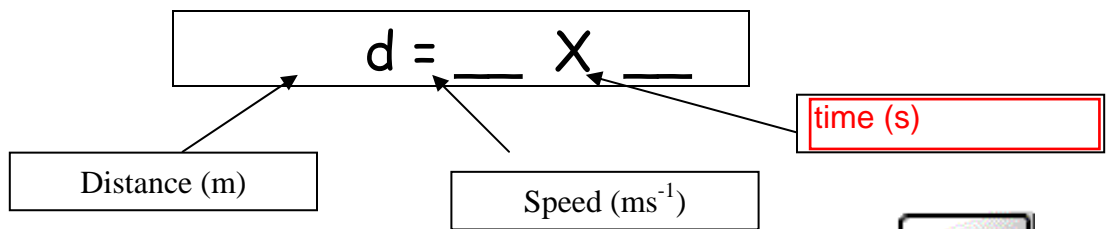


## Things to learn:

- ❖ Rearranging formula
- ❖ Correct use of units
- ❖ Using prefix's correctly
- ❖ Using the 'exponent' function on calculators

1). Define speed: Speed is distance (in metres) travelled in one second

2). Write down the equation in the space below which connects speed distance and time



Label this formula.

3). A car is moving at  $10\text{ms}^{-1}$ , How long will it take it to travel 50m?



Table of Values	Formula	Working
$v = \text{10} \text{ms}^{-1}$ $d = \text{50} \text{m}$ $t = ? \text{s}$	<div style="border: 1px solid red; padding: 5px; width: fit-content; margin: auto;"><math>d = vt</math></div>	<div style="border: 1px solid red; padding: 5px; width: fit-content; margin: auto;"><math>d = 50 / 10</math></div>
	Rearrange Formula <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: auto;"><math>t = d/v</math></div>	Answer: <u>Time to travel 50m = 5s.</u>

4). What is the speed of a plane which travels 3000m in 20s

Table of Values $v = ?$ $d = 3000\text{m}$ $t = 20\text{s}$	Formula $d = vt$	Working $t = 3000/20$
	Rearrange Formula $t = d/v$	Answer $t = 150\text{s}$

Often you will be given a question in which you are expected to change the units into those that we must use in Physics.

The units that you must use are:

metres kilograms seconds Watts and Joules  
Amperes Volts and Ohms

Make yourself a way of remember these:



**mkswj**  
My King Still Wants Jelly



In the next calculation we see that the distance is in Km we know this is not 'allowed'.

We must change the Km to metres. You will show this change when you fill in the table of values for your calculation.

(K = 1000 =  $10^3$ )

4). What is the speed of a plane which travels 3Km in 20s

Table of Values $v = ?$ $t = 20s$	Formula $d = vt$	Working $t = 3000/20$
$d = 3000m$	Rearrange Formula $t = d/v$	Answer $t = 150s$

A clever trick is to replace the K by 1000 (or better still  $10^3$ ) and to know that you can do this for any of the letters (prefix's) we use in front of our units. (E.g prefix's include K for kilo, M for Mega etc.)

We can use the table below to let us know what to replace the prefix with. This table appears in the front of the exam paper. I don't have to try and remember it

Prefix	Symbol	Factor	
giga	G	1 000 000 000	$10^9$
mega	M	1 000 000	$10^6$
kilo	K	1000	$10^3$
milli	m	.001	$10^{-3}$
micro	$\mu$	.000 0001	$10^{-6}$
nano	n	.000 000 0001	$10^{-9}$

e.g  $40GW = 40 \times 10^9 W$

I simply

replace the **G** by  $10^9$

5). Fill in the remaining spaces:

67MJ	$67 \times 10^6 W$
43nm	
5mm	
10GW	

6). The equation which connects Energy, Power and time is  $E = Pt$   
 How much energy is produced by a 60MW power station in 10 minutes  
 (note both the energy and the time need 'attention'.)

Table of Values	Formula	Working
	Rearrange Formula	Answer

We can use a calculator for dealing with powers of 10.

For example:

$$300 = 3 \times 100 = 3 \times 10^2$$

To put this into a calculator:

Put  $3 \times 10^2$  into your calculator

Press **3** & **EXP** & **2**

Check that you can do this! Is your calculator showing 300?

Put  $3 \times 10^2$  into your calculator

Press **3** & **EXP** & **2**

*If you can we're ready to work with some really big numbers (and really small ones too!).*

7). Multiply  $3 \times 10^8$  By  $2 \times 10^3$

Answer

Answer =  $6.0 \times 10^{11}$  your calculator may show this as  $6^{+11}$

Press **3** & **EXP** & **8** & **X** & **2** & **EXP** & **3**

8). Divide  $3 \times 10^8$  By  $2 \times 10^3$

In a calculation you might see this as:

$$\frac{3 \times 10^8}{2 \times 10^3}$$

Answer

Press **3** & **EXP** & **8** & **÷** & **2** & **EXP** & **3**

Answer =  $1.5 \times 10^5$

9). Multiply 300MJ By 2000s

Convert the above to powers of 10:

Answer

Answer =  $6.0 \times 10^{11}$

*We can include negative powers of 10 too:*

10). Divide 100mm By 2ms (ms means milliseconds)

Convert the above to powers of 10:

Answer

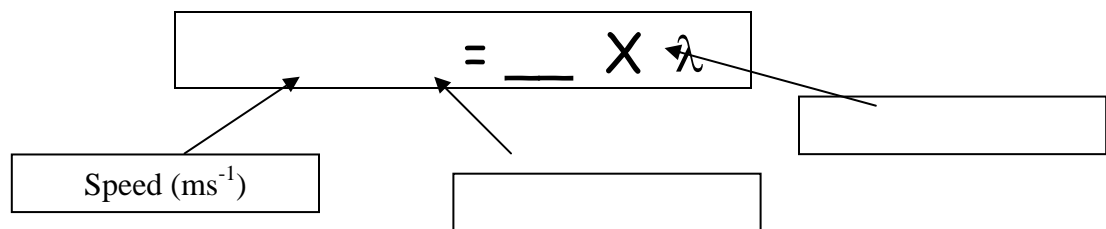
Press

**100** & **EXP** & **-** & **3** & **÷** & **2** & **EXP** & **-** & **3**

Answer = 50

*We can now combine these ideas:*

11). Write down the equation in the space below which connects speed, frequency and wavelength.



12). Yellow light has wavelength 500nm. What is it's frequency?  
Speed of light =  $3 \times 10^8 \text{ms}^{-1}$

Table of Values	Formula	Working
$v = \underline{\hspace{1cm}} \text{ms}^{-1}$ $f = \underline{\hspace{1cm}} \text{m}$ $\lambda = \underline{\hspace{1cm}} \text{Hz}$		
	Rearrange Formula	Answer:

Answer =  $6 \times 10^{14} \text{ Hz}$

13). What is the wavelength of radio waves of wavelength 3Km  
Speed of light =  $3 \times 10^8 \text{ms}^{-1}$

Table of Values	Formula	Working
	Rearrange Formula	Answer

Answer =  $10^5 \text{ m}$

14). What is the frequency of light which has wavelength 500nm macmin glass, if the speed in glass is  $2 \times 10^8 \text{ms}^{-1}$

Table of Values	Formula	Working
	Rearrange Formula	Answer

Answer =  $4 \times 10^{14} \text{ Hz}$