Revision 2

Standard Form

In standard form a number is expressed as a number between 1 and 10 multiplied by a power of 10.

$263 = 2.63 \times 10^{2}$

$51,800 = 5.18 \times 10^{4}$

$0.00625 = 6.25 \times 10^{-3}$

$0.0000412 = 4.12 \times 10^{-5}$

$3.8 \times 10^{7} = 38,000,000$

$5.62 \times 10^{-7} = 0.000000562$

With calculator

$(5.6 \times 10^{23}) + (4.8 \times 10^{25}) = 4.856 \times 10^{25}$

5 . 6 [x10^x] 2 3 + 4 . 8 [x10^x] =

Exp Exp

Without a Calculator

Addition / Subtraction $(4.8 \times 10^{7}) + (5.6 \times 10^{6})$

$$\begin{array}{r} 48000000 \\ 5600000 + \\ \hline 53600000 \end{array}$$

$= 5.36 \times 10^7$

Multiplication

$$(3.6 \times 10^5) \times (4 \times 10^7)$$

$= 14.4 \times 10^{12}$

$= 1.44 \times 10^{13}$

Division $(3.6 \times 10^{18}) \div (3 \times 10^{29})$

$$= \frac{3.6 \times 10^{18}}{3 \times 10^{29}} = 1.2 \times 10^{-11}$$

Mass of Earth $= 5.972 \times 10^{24}$ kg

Mass of Sun $= 1.989 \times 10^{30}$ kg

How many times is the Sun more massive than the Earth?

$$\frac{1.989 \times 10^{30}}{5.972 \times 10^{24}}$$

$= 333054$

Changing the Subject

1) $C = 2\pi rh$ $[h]$

2) $S = \frac{1}{2}n(a+d)$ $[a]$

3) $c = \sqrt{a^2+b^2}$ $[a]$

4) $t = \sqrt{\frac{2s}{g}}$ $[s]$

5) $\frac{PV}{T} = k$ $[T]$

1) $C = 2\pi rh$

$\frac{C}{2\pi r} = h$

$h = \frac{C}{2\pi r}$

3) $c = \sqrt{a^2+b^2}$

$c^2 = a^2+b^2$

$c^2-b^2 = a^2$

$\pm\sqrt{c^2-b^2} = a$

5) $\frac{PV}{T} = k$

$PV = kT$

$\frac{PV}{k} = T$

2) $S = \frac{1}{2}n(a+d)$

$2s = n(a+d)$

$\frac{2s}{n} = a+d$

$\frac{2s}{n} - d = a$

$a = \frac{2s}{n} - d$

4) $t = \sqrt{\frac{2s}{g}}$

$t^2 = \frac{2s}{g}$

$\frac{gt^2}{2} = s$

6) $y = 3\sqrt{1-x^2}$ $[x]$

7) $x^2+y^2 = 1$ $[y]$

8) $v = w\sqrt{a^2-x^2}$ $[x]$

9) $y = \frac{2x}{x+1}$ $[x]$

10) $m = \frac{p+q}{p-q}$ $[p]$

11) $y = \frac{7x-2}{4x+3}$

$y(4x+3) = 7x-2$

$4xy + 3y = 7x - 2$

$3y + 2 = 7x - 4xy$

$3y + 2 = x(7 - 4y)$

$\frac{3y+2}{7-4y} = x$

12) $y = \frac{4x}{x+1}$

$y(x+1) = 4x$

$xy + y = 4x$

$y = 4x - xy$

$y = x(4 - y)$

$\frac{y}{4-y} = x$

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9) $y = \frac{2x}{x+1}$ $[x]$

$y(x+1) = 2x$

$xy + y = 2x$

$y = 2x - xy$

$y = x(2 - y)$

10) $m = \frac{p+q}{p-q}$ $[p]$

$m(p-q) = p+q$

$mp - mq = p+q$

$mp - p = q + mq$

$p(m-1) = q + mq$

$$\frac{y}{2-y} = x$$

$$p = \frac{q+mq}{m-1}$$

or $$p = \frac{q(1+m)}{m-1}$$

Factorising Quadratic Expressions

Ex1 $x^2 + 5x + 6$

$= (x+2)(x+3)$

$+1 \quad +6$
$-1 \quad -6$
$+2 \quad +3$ ✓
$-2 \quad -3$

Ex2 $x^2 - 3x + 2$

$= (x-1)(x-2)$

$+1 \quad +2$
$-1 \quad -2$ ✓

Ex3 $x^2 - x - 12$

$= (x+3)(x-4)$

$+1 \quad -12$
$-1 \quad +12$
$+2 \quad -6$
$-2 \quad +6$
$+3 \quad -4$ ✓
$-3 \quad +4$

Ex4 $x^2 + 2x - 15$

$= (x-3)(x+5)$

$+1 \quad -15$
$-1 \quad +15$
$+3 \quad -5$
$-3 \quad +5$ ✓

Difference of two squares

$$a^2 - b^2 = (a+b)(a-b)$$

$$x^2 - 9 = (x+3)(x-3)$$

$16x^2 - 25$

$= (4x)^2 - 5^2 = (4x+5)(4x-5)$

Exercice Factorice

1) $x^2 + 11x + 24$

$= (x+3)(x+8)$

2) $x^2 - 8x - 20$

$= (x+2)(x-10)$

3) $9x^2 - 64$

$= (3x)^2 - 8^2$

$= (3x+8)(3x-8)$