A SIGNIFICANT REVIEW — KEY

Let's start off with scientific notation…

1a) 54,670,000,000 → 5.467×10^{10} (original value was greater than |1|, so positive exponent)
1b) –5526.7 → -5.5267×10^{3} (original value was greater than |1|, so positive exponent)
1c) 0.03289 → 3.289×10^{-2} (original value was less than |1|, so negative exponent)
1d) 100.00 → 1.0000×10^{2} (original value was greater than |1|, so positive exponent)
1e) –0.000093740 → -9.3740×10^{-5} (original value was less than |1|, so negative exponent)
1f) 9999.606 → 9.999606×10^{3} (original value was greater than |1|, so positive exponent)
1g) 2800 → 2.8×10^{3} (original value was greater than |1|, so positive exponent)
1h) –0.00000005883 → -5.883×10^{-8} (original value was less than |1|, so negative exponent)
1i) 0.00008 → 8×10^{-5} (original value was less than |1|, so negative exponent)
1j) 0.11250 → 1.1250×10^{-1} (original value was less than |1|, so negative exponent)

How many significant figures in a number:

2a) 6200 →**2**
2b) 1.032 →**4**
2c) 420. →**3**
2d) 3.750×10^{-6} →**4**
2e) 0.0006000 →**4**
2f) 1×10^{4} →**1**
2g) 35000000 →**2**
2h) 23.4400 →**6**
2i) 100.0003 →**7**
2J) 100. →**3**

Precision

3a) 280100 → **precise to the hundreds place**
3b) 6.341×10^{-4} → 0.0006341 → **precise to the 7th decimal place**
3c) 90 → **precise to the tens place** (the zero is not significant because the is not a decimal point)
3d) 0.00301 → **precise to the 5th decimal place**
3e) 3.20×10^{5} → 320000 → **precise to the thousands place** (this one is a bit tricky)
3f) 9900. → **precise to the ones place** (the zero *is* significant here due to the decimal point)
3g) 43.0 → **precise to the 1st decimal place**
3h) 7800000 → **precise to the hundred–thousands place**
3i) 15.130 → **precise to the 3rd decimal place**
3j) 2.6500×10^{3} → 2650.0 → **precise to the 1st decimal place**
3k) 7.3801×10^{10} → 73801000000 → **precise to the millions place**

Significant figures in calculations

4a) $160 \times 0.3490 \times 23.1 = 1289.904$ 160 = **2** s f., 0.3490 = **4** s f., 23.1 = **3** s f., so answer can only have 2 s f.→ **1300 or 1.3×10^{3}**

4b)
$$\begin{array}{r} 2.3806 \\ +1.01 \\ \hline 2.3906 \end{array}$$
→ **2.39**

4c) $\dfrac{0.2689}{0.000159} = 1691.19497$ 0.2689 = 4 s f., 0.000159 = 3 s.f., answer has 3 s f. → **1690 or 1.69×10^{3}**

4b)
$$\begin{array}{r} 11.3 \\ -2 \\ \hline 9.3 \end{array}$$
→ **9**

4e) $1500.\div 25 = 60$ 1500. = 4 s f., 25 = 2 s f., answer has 2 s.f. → **60. or $6.0\text{x}10^1$**

4f) $3.65\times10^{-3}\times9.822\times10^{4} = 358.503$ $3.65\text{x}10^{-3}$ = 3 s.f., $9.822\text{x}10^4$ = 4 s.f., answer has 3 s.f. → **359**

4g) $\dfrac{2.21100\times10^{2}}{32.1\times0.002000} = 3443.92523$ $2.21100\text{x}10^2$ = 6 s f., 32.1 = 3 s f., 0.002000 = 4 s f., answer = 3 s.f. → **3440**

OR **$3.44\text{x}10^3$**

4h) 0.34864
+1
1.34864
→ **1** (this is the answer)

4i) 26.1
− 0.00030000
26.09970000
→ **26.1** (you are subtracting a very small number from a large number; it doesn't make a difference here)

4j) 1200
+ 49.49
+ 1.004
1250.494
12|50.494 = 1.2|50494x10^3 → **$1.3\text{x}10^3$** (again, put into scientific notation THEN round off)

4k) $33.3\times3.0 = 99.9$ 33.3 = 3 s f., 3.0 = 2 s.f., answer = 2 s.f. 99.9 rounds to 100, but MUST have 2 s.f. → **$1.0\text{x}10^2$**

Significant figures in mixed operation calculations

5a) $0.0521\times\left(112.40+\left(3.02391+24.0224+31.9988\right)\times3.0000000\right)\Rightarrow0.0521\times\left(112.40+59.045\bar{1}1\times3.0000000\right)$ (step 1)

$0.0521\times\left(112.40+59.045\bar{1}1\times3.0000000\right)\Rightarrow0.0521\times\left(112.40+177.13\bar{5}33\right)$ (step 2)

$0.0521\times\left(112.40+177.13\bar{5}33\right)\Rightarrow0.0521\times289.5\bar{3}533$ (step 3)

$0.0521\times289.5\bar{3}533 = 15.\bar{0}8479069$ → **15.1** (answer)

5b) $5.6629\times\left(47.90+2.0000000\times\left(1.00797+15.9994\right)\right)\Rightarrow5.6629\times\left(47.90+2.0000000\times17.007\bar{3}7\right)$ (step 1)

$5.6629\times\left(47.90+2.0000000\times17.007\bar{3}7\right)\Rightarrow5.6629\times\left(47.90+34.014\bar{7}4\right)$ (step 2)

$5.6629\times\left(47.90+34.014\bar{7}4\right)\Rightarrow5.6629\times81.9\bar{1}474$ (step 3)

$5.6629\times81.9\bar{1}474 = 463.\bar{8}74981$ → **463.9** (answer)

5c) $\dfrac{28.641}{(-2.3154+2.1)} \Rightarrow \dfrac{28.641}{-0.\bar{2}154}$

$\dfrac{28.641}{-0.\bar{2}154} = -\bar{1}32.96657$ → **-100 or $-1\text{x}10^{2}$**

5d) $\dfrac{(-0.4680+135.79)\times 16.0}{(128.42-129.226)} \Rightarrow \dfrac{135.3\bar{2}2\times 16.0}{-0.8\bar{0}6}$

$\dfrac{135.3\bar{2}2\times 16.0}{-0.8\bar{0}6} = -2\bar{6}86.292804 = -2.\bar{6}86292804\times 10^{3}$ → **$-2.7\text{x}10^{3}$**

5e) $\dfrac{(0.8000-0.7943)}{0.8000} \Rightarrow \dfrac{0.005\bar{7}}{0.8000}$ $\dfrac{0.00\bar{5}7}{0.8000} = 7.\bar{1}25\times 10^{-3}$ → **$7.1\text{x}10^{-3}$**

5f) $\left(0.00748214\times 5.6237\times 10^{2}\right)+\left(1161\div 20\right) \Rightarrow 4.207\bar{7}31072+\bar{5}8.05$

$4.207\bar{7}31072+\bar{5}8.05 \Rightarrow \bar{6}2.25773107$ → **60 or $6\text{x}10^{1}$**

5g) $(28.621+81.993)\times 100.000 \Rightarrow 110.61\bar{4}\times 100.000$

$110.61\bar{4}\times 100.000 = 11061.\bar{4}$ → **11061.4**

5h) $8640.\times 85.4861+17.0\times 317.65 \Rightarrow 738\bar{5}99.904+54\bar{0}0.05$

$738\bar{5}99.904+54\bar{0}0.05 = 743\bar{9}99.954 \Rightarrow 7.43\bar{9}99954\times 10^{5}$ → **$7.440\text{x}10^{5}$**

5i) $106.905\ \text{X} + 108.9048 \bullet (1-\text{X}) = 107.870$ (step 1)

$106.905\ \text{X} + 108.9048 - 108.9048\ \text{X} = 107.870$ (step 2)

$106.905\ \text{X} + 108.9048 - 108.9048\ \text{X} = 107.870$

$-108.9048 \qquad -108.9048$ (step 3)

$106.905\ \text{X} \qquad -108.9048\ \text{X} = -1.03\bar{4}8$

$106.905\ \text{X} - 108.9048\ \text{X} = -1.03\bar{4}8$

$-1.99\bar{9}8\ \text{X} \qquad = -1.03\bar{4}8$ (step 4)

$\dfrac{-1.99\bar{9}8\ \text{X}}{-1.99\bar{9}8} = \dfrac{-1.03\bar{4}8}{-1.99\bar{9}8}$ → $\text{X} = 0.517451745$ → **0.5175** (answer)

5j) $184.95297\,X + 186.956 \cdot (1 - X) = 186.2$ (step 1)

$184.95297\,X + 186.956 - 186.956\,X = 186.2$ (step 2)

$$\begin{array}{l} 184.95297\,X + 186.956 - 186.956\,X = 186.2 \\ \quad -186.956 \qquad\qquad -186.956 \\ \hline 184.95297\,X \qquad -186.956\,X = -0.\overline{7}56 \end{array}$$ (step 3)

$$\begin{array}{l} 184.95297\,X - 186.956\,X = -0.\overline{7}56 \\ \quad -2.00\overline{3}03\,X \qquad = -0.\overline{7}56 \end{array}$$ (step 4)

$$\frac{-2.00\overline{3}03\,X}{-2.00\overline{3}03} = \frac{-0.\overline{7}56}{-2.00\overline{3}03} \rightarrow X = 0.377428196 \rightarrow \mathbf{0.4}$$ (answer)

5k) $120.903824\,X + 122.904222 \cdot (1 - X) = 121.75$ (step 1)

$120.903824\,X + 122.904222 - 122.904222\,X = 121.75$ (step 2)

$$\begin{array}{l} 120.903824\,X + 122.904222 - 122.904222\,X = 121.75 \\ \quad -122.904222 \qquad\qquad -122.904222 \\ \hline 120.903824\,X \qquad -122.904222\,X = -1.1\overline{5}4222 \end{array}$$ (step 3)

$$\begin{array}{l} 120.903824\,X - 122.904222\,X = -1.1\overline{5}4222 \\ \quad -2.000398\overline{8}\,X \qquad = -1.1\overline{5}4222 \end{array}$$ (step 4)

$$\frac{-2.000398\overline{8}\,X}{-2.000398\overline{8}} = \frac{-1.1\overline{5}4222}{-2.000398\overline{8}} \rightarrow X = 0.576996177 \rightarrow \mathbf{0.577}$$ (answer)