1) $\begin{array}{r} 2.2 \times 10^3 \\ + \ 0.47 \times 10^3 \\ \hline 2.6_7 \times 10^3 \end{array}$ or $\begin{array}{r} 22 \times 10^2 \\ 4.7 \times 10^2 \\ \hline 26._7 \times 10^2 \end{array}$ or $\begin{array}{r} 2200 \\ + \ 470 \\ \hline 2670 \end{array}$

$\frac{2.6_7 \times 10^3}{5.8 \times 10^{-3}} = 46_{0.344}$

$= 4.6 \times 10^5$ (2sf)

$\frac{26.7 \times 10^2}{5.8 \times 10^{-3}}$

$= 4.6 \times 10^5$

$\frac{26_{70}}{0.0058} = 4.6 \times 10^5$

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2) $\frac{5.07 \times (1.8)^2 \times 10^4 \times 10^{-6}}{0.065 + 0.033} = \frac{16._{43} \times 10^{-2}}{0.098} = \frac{1.6_{43} \times 10^{-2}}{9.8 \times 10^{-2}} = 1.7 \times 10^0$ (2sf)

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3) $(38.4 \times 6.56) \times 10^{-3} \times 10^5 = 244._{22} \times 10^2 = 2.44 \times 10^4$ (3sf)

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4) $\frac{1.45 \times 8.76}{(9.2)^2} \cdot \frac{10^2 \times 10^{-4}}{(10^{-3})^2} = 0.15_{01} \times 10^4 = 1.5 \times 10^3$ (2sf)

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5) $\begin{array}{r} 24.6 \\ + \ 18.35 \\ \hline 42.95 \end{array} \rightarrow \begin{array}{r} 42.95 \\ - \ 2.98 \\ \hline 39.97 \end{array} \rightarrow 39.9_7 = 40.0 \times 10^0 = 4.00 \times 10^1$ (3sf)

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6) $1.646 \times 10^3 - (2.18 \times 10^2) + (1.36 \times 5.17 \cdot (10^4 \times 10^{-2}))$

$1.646 \times 10^3 - (2.18 \times 10^2) + (7.03_{12} \times 10^2)$

$\begin{array}{r} 1.646 \times 10^3 \\ - \ 0.218 \times 10^3 \\ \hline 1.428 \times 10^3 \end{array} \rightarrow \begin{array}{r} 1.428 \times 10^3 \\ + \ 0.703_{12} \times 10^3 \\ \hline 2.131_{12} \times 10^3 \end{array} \rightarrow 2.131 \times 10^3$ (4sf)

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7) $\frac{-7.29 \times 10^{-4} + \sqrt{5.31_{44} \times 10^{-7} + 1._{08} \times 10^{-4}}}{2} = \frac{-7.29 \times 10^{-4} + \sqrt{0.00531_{44} \times 10^{-4} + 1._{08} \times 10^{-4}}}{2}$

$= 4._8 \times 10^{-3} = 5 \times 10^{-3}$ (1sf)

8) $\frac{2172\ \mu g}{1} \left| \frac{1\ g}{10^6\ \mu g} \right. = 2.172 \times 10^{-6}\ g = \underbrace{2.172 \times 10^{-3}\ g}_{\text{larger}}$

$\frac{0.00515\ mg}{1} \left| \frac{1\ g}{10^3\ mg} \right. = 0.00515 \times 10^{-3}\ g = 5.15 \times 10^{-6}\ g$

9) $\frac{3257\ mg}{1} \left| \frac{1\ g}{1000\ mg} \right. = 3257 \times 10^{-3}\ g = 3.257 \times 10^{0}\ g$

$\frac{0.00475\ kg}{1} \left| \frac{1000\ g}{1\ kg} \right. = 0.00475 \times 10^{3}\ g = \underbrace{4.75 \times 10^{0}\ g}_{\text{larger}}$

9a) This was not enumerated

$\frac{15\ hands}{1} \left| \frac{4\ in}{1\ hand} \right| \frac{2.54\ cm}{1\ in} \left| \frac{1\ m}{100\ cm} \right. = 1.5_{24}\ m$

2 sf exact exact exact

$= 1.5 \times 10^{0}\ m$ (2sf)

10) 8 furlong = 1 mile
10 chains = 1 furlong
100 links = 1 chain

$\frac{1\ link}{1} \left| \frac{1\ chain}{100\ links} \right| \frac{1\ furlong}{10\ chains} \left| \frac{1\ mile}{8\ furlong} \right| \frac{5280\ ft}{1\ mile} \left| \frac{12\ in}{1\ ft} \right. = \underbrace{7.92 \times 10^{0}\ in}_{\text{3sf}}$

11) $\text{Rate} = \frac{100\ yd}{9.3\ s} = \frac{10._{75}\ yd}{1\ s}$

a) $\text{time} = \frac{\text{distance}}{\text{Rate}}$ (d, rt, t)

4sf 2sf exact exact exact exact

$t = \frac{100.0\ yd}{1} \left| \frac{1\ s}{10._{75}\ yd} \right| \frac{1\ yd}{3\ ft} \left| \frac{1\ ft}{12\ in} \right| \frac{1\ in}{2.54\ cm} \left| \frac{100\ cm}{1\ m} \right.$

$t = 10._{17}\ s \approx 10.\ s \approx \underbrace{1.0 \times 10^{1}\ s}_{\text{2sf}}$

makes sense since $1\ yd \approx 1\ m$

12 b) (2 sf; exact; ex; ex)

$$\frac{10.75\ \text{yd}}{1\text{ s}} \left| \frac{3\text{ ft}}{1\text{ yd}} \right| \frac{12\text{ in}}{1\text{ ft}} \left| \frac{2.54\text{ cm}}{1\text{ in}} \right| \frac{1\text{ m}}{100\text{ cm}}$$

$$= \frac{9.8_{30}\text{ m}}{1\text{ s}} = 9.8 \times 10^{0}\ \frac{\text{m}}{\text{s}}$$

2 sf

12 c) ~~9.8 m/s~~

$$t = \frac{d}{r} = \frac{1.45\text{ km}}{1} \left| \frac{1000\text{ m}}{1\text{ km}} \right| \frac{1\text{ s}}{9.8_{30}\text{ m}}$$

(3 sf; ex; 2 sf)

$$= 14_{8}\text{ s} = 1.5 \times 10^{2}\text{ s}$$

2 sf

13) $1 \times 10^{4}\ \text{m}^2 = 1$ hectares exact

(1 hectometer = 100 m)

$1\text{ mi}^2 = 640.$ acres exact

1 mi = 5280 ft exact

1 ft = 12 in exact

$$\frac{1\text{ hectare}}{1} \left| \frac{1 \times 10^{4}\text{ m}^2}{1\text{ hectare}} \right| \frac{(100)^2\text{ cm}^2}{1^2\text{ m}^2} \left| \frac{1^2\text{ in}^2}{(2.54)^2\text{ cm}^2} \right| \frac{1^2\text{ ft}^2}{(12)^2\text{ in}^2}$$

$$= \left(\frac{1 \cdot 10^{4} \cdot 10^{4} \cdot 1 \cdot 1}{1 \cdot 1 \cdot 1 \cdot (2.54)^2 \cdot (12)^2}\right) \frac{\text{ft}^2}{1} \left| \frac{1^2\text{ mi}^2}{(5280)^2\text{ ft}^2} \right| \frac{640\text{ acres}}{1\text{ mi}^2}$$

$$= \frac{107639.1042 \cdot 640}{(5280)^2}\ \text{acres}$$

$$= 2.471 \times 10^{0}\ \text{acres}$$

no specified SF since this is an exact calculation.

12)

$32\ \cancel{lb}$	$1\ kg$	$(1)^2\ \cancel{in^2}$	$(100)^2\ \cancel{cm^2}$
$1\ \cancel{in^2}$	$2.205\ \cancel{lb}$	$(2.54)^2\ cm^2$	$1^2\ m^2$
2 sf	4 sf	ex	ex

$= 22494\ \frac{kg}{m^2}$

$= 2.2 \times 10^4\ \frac{kg}{m^2}$

2 sf

14) $1.4\ g\ Mg = 1\ kg\ SW$

$1\ ton = 2000\ lb$

$d_{sw} = 1.025\ \frac{g}{mL}$

tons Mg ⟶ m^3 SW

$1 \times 10^5\ \cancel{tons}$	$2000\ \cancel{lb}$	$1\ \cancel{kg}$	$1000\ g$	* $1\ \cancel{kg}$ SW	$1000\ \cancel{g}$	$1\ \cancel{mL}$	$1\ cm^3$	$1\ m^3$
1	$1\ \cancel{ton}$	$2.205\ \cancel{lb}$	$1\ kg$	$1.4\ g$ *	$1\ kg$	$1.025\ g$	$1\ mL$	$(100)^3\ cm^3$
1 sf	exact	4 sf	ex	2 sf	ex	4 sf	ex	ex

This gives g of Mg

* ↓ This converts Mg mass into SW mass

density calculation

$= 6320762.9\ m^3$

$= 6.3 \times 10^7\ m^3$

$\approx 6 \times 10^7\ m^3$

1 sf