M1.

(a) 0.0048

B1

(b) 0.000 012

B1

(c) 2.5×10^6

B1

[3]

M2.

49 (%) seen or implied

B1

their 3.22 ($\times 10^7$) ÷ 51 (= 1%)
or *their* 3.22 ($\times 10^7$) ÷ 51 × 2 (= 2%)

or *their* $3.22\ (\times 10^7) \times \frac{66}{360}$

oe
[631 372, 631 373]
1 262 745
5 903 333

M1

their 3.22 ($\times 10^7$) ÷ 51 × 49

or *their* $3.22\ (\times 10^7) - \frac{3.22 \times 2}{51}$

or *their* $3.22\ (\times 10^7) \times \frac{66}{360} \div 51$

oe
[30 937 254, 30 937 255]
[115 751, 115 752]

M1dep

their $3.22\ (\times 10^7) \div 51 \times 49 \times \frac{66}{360}$

or $(\textit{their}\ 3.22 - \frac{3.22 \times 2}{51}) \times \frac{66}{360}$

oe

M1dep

5 671 830 or [5 500 000, 5 700 000]

oe

A1

5.67×10^6 or 6×10^6
or $[5.5 \times 10^6, 5.7 \times 10^6]$

*ft **their** answer which may be rounded and given in standard form*

B1ft

Additional Guidance
$\times 10^7$ not required for method marks
Accept decimals to 2 dp or better

[6]

M3.(a) 7.2×10^{-4}

B1

(b) 80 000 000

B1

Their 80 000 000 ÷ 20 000 correctly evaluated

M1

Their answer correctly converted to standard form (4×10^3 if correct)

ft if B0 awarded

A1 ft

Alternative method

8×10^7 or 2×10^4

oe eg 80×10^6

M1

$\frac{8 \times 10^7}{2 \times 10^4}$

oe using index form

A1

4×10^3

ft if M1A0 awarded

A1ft

[4]

M4.(a) 17 000 000 × 1.8 (= 30 600 000)

30.6 million

M1

3.06×10^7 or 3.1×10^7

Strand (i) Correct notation

Accept 3×10^7 with method seen

Condone 3.06 (or 3.1) × 10^1 million

SC1 any value changed correctly to standard form

SC1 9.4(…) × 10^6

Q1

(b) $(5.6 \times 10^{11}) \div 17\,000\,000$ *oe*

560 000 000 000 ÷ 17 000 000

or $(5.6 \times 10^{11}) \div (1.7 \times 10^7)$

M1

32941.(…)

May be implied by 30 000, 33 000, 32900 or 32940

A1

30 000 or 33 000

oe

ft any value > 2sf rounded to 1 or 2 sf
SC1 3.(0) × 10^{-5} or 0.00003(0)

B1 ft

[5]

M5.(a) 1612.5 *oe*

1.6 × 10^3 or 1.61 × 10^3
or 1.612 × 10^3 or 1.613 × 10^3

M1

1.6125 × 10^3

A1

(b) 5.05 × 10^3 × 20 + 1000 *oe*oe
or 101 000 seen

M1

102 000 *oe*
SC1 for 100 000 or 1252.5

A1

1.02 × 10^5
SC2 for 1 × 10^5 or 1.2525 × 10^3

B1 ft

[5]

M6. Selects 1 000 000 or 1 × 10^6

or 5 × 10^3 or 5000

B1

Subtracts two values from list *oe*

1 000 000 − 5 × 10^3

Condone incorrect conversion to or from standard form for this mark

M1

995 000

May be implied

A1

9.95×10^5

Strand (i)

ft any answer correctly converted to standard form

Q1ft

[4]

M7. 4 540 000 000 or 4540×10^6

M1

$4.54(0) \times 10^9$

SC1 their 4 540 000 000, with digits 454, correctly converted to standard form

SC1 $4.54(0) \times 10^3$ (million)

SC1 4.5×10^6

A1

[2]

M8. (a) (0).00246

B1

(b) 0.2×10^3

180 000 (÷) 900 or 200 or $18 \times 10^4 \div 9 \times 10^2$ or $\frac{1.8 \times 10^3}{9}$ *or other correct equivalent expression*

M1

$2(.0) \times 10^2$

A1

[3]

M9.(a) 1.8×10^{15}

B1 for an equivalent expression such as 18×10^{14}
B1 for 9×10^{14}
B1 for 1 800 000 000 000 000
B1 for 1.8^{15}

B2

(b) 5×10^{-5}

B1 for an equivalent expression such as 0.5×10^{-4}
B1 for -3×10^{-4}
B1 for $\frac{1}{2} \times 10^{-4}$

B1 for 0.00005
B1 for 5^{-5}

B2

[4]

M10. $\left(\frac{1}{2}\right)^5 \div (7.15 \times 10^{-8})$ *oe*

Condone bracket error in (7.15×10^{-8})

or

$\frac{1}{32}$ *oe* seen

Condone use of $\frac{2}{5}$ *for* $\frac{1}{2}$ *or* $\frac{32}{3125}$ *oe seen*

M1

= 437062.(…)

May be implied

A1

4.4×10^5

Strand (i) Correct notation required

ft any decimal (at least 3 sf) rounded to 2 sf and written in correct standard form

4.37 … × 10^5 scores M1A1Q0

440 000 scores M1A1Q0

Q1ft

[3]

M11. (a) (0).00528

B1

(b) 49×10^6 or 49 000 000

B1

4.9×10^7

ft their 49 × 10^6 or 49 000 000

B1 ft

[3]

M12. (a) 7.5×10^{18}

Strand (i)

Q1

(b) Sight of 110 or 1.1(0)

M1

$6.81(8…) \times 10^{18}$ or 6.82×10^{18}

or correct answer in another form

A1

6.8×10^{18}

ft any number correctly rounded to
2 significant figures and in standard form

B1 ft

[4]