TNReady High School End-of-Course Science

This document provides information about the design of the TNReady assessment. It is not intended to be used solely as an instructional resource or as pacing guide. Districts should consult the Tennessee academic standards when making all instructional decisions including scope and sequence. The Tennessee academic standards can be found here.

High School EOC Testing Structure in Biology I and Chemistry I

As in the past, each year the state assessment includes both operational and field test items. The below testing structure for science reflects both the number of operational assessment items and the number of field test assessment items.

Test Design	
Biology I	• 75 minutes • 60 items
Chemistry I	• 75 minutes • 60 items

High School EOC Blueprints in Biology I and Chemistry I

The blueprints below reflect *only* operational assessment items. You can find both the Biology I and Chemistry I standards here.

Biology			
	# of Items	**# of Score Points**	**% of Test**
Content			
• Inquiry and Technology & Engineering	5–10	5–10	9–18
• Cells	11–13	11–13	20–24
• Interdependence	6–7	6–7	11–13
• Flow of Matter and Energy	9–10	9–10	16–18
• Heredity	11–14	11–14	20–25
• Biodiversity & Change	6–7	6–7	11–13
TOTAL	50	50	100
Chemistr			
	# of Items	**# of Score Points**	**% of Test**
Content			
• Inquiry and Technology & Engineering	8–10	8–10	14–18
• Atomic Structure	9–11	9–11	16–20
• Matter and Energy	14–16	14–16	25–29
• Interactions of Matter	20–22	20–22	36–40
TOTAL	50	50	100

Calculator Guidance for Science End-of-Course Assessments

Biology

The TNReady End-of-Course biology assessment does not require the use of a calculator. Tennessee science standards for this course do not have a mathematical component, and therefore students are not be permitted to use a calculator. It is unnecessary for IEP teams to recommend the use of calculators for students in this course.

Chemistry

The TNReady End-of-Course chemistry assessment requires the use of a calculator for all students. Tennessee science standards for this course have a very strong mathematical component, and therefore all students will need to have a calculator in order to complete the assessment. Please refer to the TNReady High School Mathematics Calculator Policy for a list of permissible calculators.

Item Types

Multiple choice: These are items with four answer options, only one of which is correct.

Multiple select: These are items with more than four answer choices with multiple correct answers. Sometimes the number of correct responses will be indicated (e.g., "choose the three correct answers"), but sometimes the number of correct responses will not be indicated (e.g., "select all of the correct answers"). These items are dependent and based on the standard. For 2017-18, these items will be field tested only in science.

Chemistry Reference Sheet

Periodic Table of the Elements

	1												13	14	15	16	17	18
1	1 **H** Hydrogen 1.008	2																2 **He** Helium 4.003
2	3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012											5 **B** Boron 10.811	6 **C** Carbon 12.011	7 **N** Nitrogen 14.007	8 **O** Oxygen 15.999	9 **F** Fluorine 18.998	10 **Ne** Neon 20.180
3	11 **Na** Sodium 22.990	12 **Mg** Magnesium 24.305	3	4	5	6	7	8	9	10	11	12	13 **Al** Aluminum 26.982	14 **Si** Silicon 28.086	15 **P** Phosphorus 30.974	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.453	18 **Ar** Argon 39.948
4	19 **K** Potassium 39.098	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.956	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.942	24 **Cr** Chromium 51.996	25 **Mn** Manganese 54.938	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933	28 **Ni** Nickel 58.693	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.409	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.610	33 **As** Arsenic 74.922	34 **Se** Selenium 78.960	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.800
5	37 **Rb** Rubidium 85.468	38 **Sr** Strontium 87.620	39 **Y** Yttrium 88.906	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.906	42 **Mo** Molybdenum 95.940	43 **Tc** Technetium (98)	44 **Ru** Ruthenium 101.070	45 **Rh** Rhodium 102.906	46 **Pd** Palladium 106.420	47 **Ag** Silver 107.868	48 **Cd** Cadmium 112.411	49 **In** Indium 114.818	50 **Sn** Tin 118.710	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.600	53 **I** Iodine 126.904	54 **Xe** Xenon 131.290
6	55 **Cs** Cesium 132.905	56 **Ba** Barium 137.327	57 **La** Lanthanum 138.905	72 **Hf** Hafnium 178.490	73 **Ta** Tantalum 180.948	74 **W** Tungsten 183.840	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.230	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.084	79 **Au** Gold 196.967	80 **Hg** Mercury 200.590	81 **Tl** Thallium 204.383	82 **Pb** Lead 207.200	83 **Bi** Bismuth 208.980	84 **Po** Polonium (209)	85 **At** Astatine (210)	86 **Rn** Radon (222)
7	87 **Fr** Francium (223)	88 **Ra** Radium (226)	89 **Ac** Actinium (227)	104 **Rf** Rutherfordium (261)	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (266)	107 **Bh** Bohrium (264)	108 **Hs** Hassium (269)	109 **Mt** Meitnerium (268)	110 **Ds** Darmstadtium (271)	111 **Rg** Roentgenium (272)	112 **Cn** Copernicium (285)	113 **Uut** ?	114 **Fl** Flerovium (289)	115 **Uup** ?	116 **Lv** Livermorium (292)	117 **Uus** ?	118 **Uuo** ?

Key

- Atomic Number
- Element Symbol
- Element Name
- Average Atomic Mass *

11 **Na** Sodium 22.990

* If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.

Turn over for Formulas, Constants, and Unit Conversions

Chemistry Reference Page
Formulas, Constants, and Unit Conversions

Formulas

Change in Enthalpy (Heat): $Q = m(\triangle T)c_p$

Heat of Fusion: $Q = m\triangle H_{fus}$

Ideal Gas Law: $PV = nRT$

Heat of Vaporization: $Q = m\triangle H_{vap}$

Density: $d = \frac{m}{V}$

Molarity (M) = $\frac{\text{mol of solute}}{\text{L of solution}}$

Combined Gas Law: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

Molality (m) = $\frac{\text{mol of solute}}{\text{kg of solvent}}$

Boiling Point Elevation: $\triangle T_b = k_b \times m$

Freezing Point Depression: $\triangle T_f = k_f \times m$

Constants

Universal Gas Constant (R): $0.0821 \frac{\text{atm} \times \text{L}}{\text{mol} \times \text{K}}$, or equal to $8.31 \frac{\text{kPa} \times \text{L}}{\text{mol} \times \text{K}}$

Molar Volume at STP: $22.4 \frac{\text{L}}{\text{mol}}$

Avogadro's Number (1 mole): 6.02×10^{23}

Specific Heat Capacity of Liquid Water: c_p (H_2O) = $1.00 \frac{\text{cal}}{\text{g} \times °\text{C}} = 4.18 \frac{\text{J}}{\text{g} \times °\text{C}}$

Unit Conversions

1 atm = 760 mm Hg = 760 Torr = 101.3 kPa = $14.7 \frac{\text{lb}}{\text{in.}^2}$ = 29.92 in. Hg

K = °C + 273

1.000 calorie = 4.184 Joules

1 mL = 1 cm^3

1 L = 1,000 mL = 1,000 cm^3

giga (G) = 10^9, mega (M) = 10^6, kilo (k) = 10^3, hecto (h) = 10^2, deka (da) = 10^1

deci (d) = 10^{-1}, centi (c) = 10^{-2}, milli (m) = 10^{-3}, micro (μ) = 10^{-6}, nano (n) = 10^{-9}

Common Ions

Element Name	Charges	Ions	Charges	Ions	Charges
Silver (Ag^{1+})	1+	Ammonium (NH_4^+)	1+	Oxide (O^{2-})	2–
Zinc (Zn^{2+})	2+	Nitrate (NO_3^-)	1–	Sulfide (S^{2-})	2–
Scandium (Sc^{3+})	3+	Nitrite (NO_2^-)	1–	Sulfate (SO_4^{2-})	2–
Copper (Cu^{1+}, Cu^{2+})	1+, 2+	Hydrogen Carbonate (HCO_3^-)	1–	Sulfite (SO_3^{2-})	2–
Gold (Au^{1+}, Au^{3+})	1+, 3+	Perchlorate (ClO_4^-)	1–	Carbonate (CO_3^{2-})	2–
Cobalt (Co^{2+}, Co^{3+})	2+, 3+	Chlorate (ClO_3^-)	1–	Peroxide (O_2^{2-})	2–
Nickel (Ni^{2+}, Ni^{3+})	2+, 3+	Chlorite (ClO_2^-)	1–	Chromate (CrO_4^{2-})	2–
Lead (Pb^{2+}, Pb^{4+})	2+, 4+	Hypochlorite (ClO^-)	1–	Dichromate ($Cr_2O_7^{2-}$)	2–
Tin (Sn^{2+}, Sn^{4+})	2+, 4+			Phosphate (PO_4^{3-})	3–
Mercury (Hg^{1+}, Hg^{2+})	1+, 2+				
Iron (Fe^{2+}, Fe^{3+})	2+, 3+				
Titanium (Ti^{2+}, Ti^{3+}, Ti^{4+})	2+, 3+, 4+				
Chromium (Cr^{2+}, Cr^{3+})	2+, 3+				
Vanadium (V^{2+}, V^{3+}, V^{4+})	2+, 3+, 4+				
Manganese (Mn^{2+}, Mn^{3+}, Mn^{4+})	2+, 3+, 4+				

Turn over for Periodic Table of the Elements