

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	<ul style="list-style-type: none"> • 75 minutes • 60 items
Chemistry I	<ul style="list-style-type: none"> • 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 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																	
Key																	
Atomic Number																	
Element Symbol																	
Element Name																	
Average Atomic Mass *																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H Hydrogen 1.008	2 He Helium 4.003	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	11 Na Sodium 22.990	12 Mg Magnesium 24.305	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
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
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
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)
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 Flerovium (289)	114 Fl Flerovium (289)	115 Uup Livermorium (292)	116 Lv Livermorium (292)	117 Uus Tennessine (294)	118 Uuo Oganesson (294)

* 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): $Q = m(\Delta T)c_p$	Heat of Fusion: $Q = m\Delta H_{fus}$
Ideal Gas Law: $PV = nRT$	Heat of Vaporization: $Q = m\Delta H_{vap}$
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: $\Delta T_b = k_b \times m$	Freezing Point Depression: $\Delta T_f = k_f \times m$

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: $c_p (\text{H}_2\text{O}) = 1.00 \frac{\text{cal}}{\text{g} \times ^\circ\text{C}} = 4.18 \frac{\text{J}}{\text{g} \times ^\circ\text{C}}$	

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