

Wee Engineer – One Unit, Four Challenges

Engineering Challenge	Science Concept Connections	Arizona Science Standards 2018
		Pre-K/Kindergarten
Noisemakers	<ul style="list-style-type: none"> • forces • sound • properties of materials 	K.P2U1.1
Fans	<ul style="list-style-type: none"> • forces • properties of materials 	
Wrecking Balls	<ul style="list-style-type: none"> • weight • force and motion • action and reaction 	1.P3U1.3
Rafts	<ul style="list-style-type: none"> • sinking and floating 	

EiE for Kindergarten – Two Units		
Unit	Science Concept Connections	Arizona Science Standards 2018
		Pre-K/Kindergarten
Raise the Roof: Designing Shelters	<ul style="list-style-type: none"> • light and shadow • the warming effect of the Sun • animals and animal needs 	K.L1U1.7 K.L2U1.8 1.P2U1.1
Here's the Scoop: Designing Trash Collectors	<ul style="list-style-type: none"> • the basic needs of living things • animal habitats and ecosystems • human impact on the environment • recycling and environmental stewardship 	

Units with Life Science Topics

Unit	Engineering and Science Fields	Arizona Science Standards					
		Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
The Best of Bugs: Designing Hand Pollinators	Agricultural Engineering Insects and Plants	K.L1U1.6 K.L1U1.7	1.L1U1.6 1.L2U2.7 1.L2U1.8 1.L3U1.9	2.L2U1.9	3.L1U1.5 3.L2U1.6 3.L2U1.8	4.L4U1.11	5.L4U3.11
Just Passing Through: Designing Model Membranes	Bioengineering Needs of Organisms	K.E1U1.3 K.E1U1.4 K.L1U1.6 K.L1U1.7	1.L2U2.7	2.L2U1.9	3.L1U1.5	4.L4U1.11 4.E1U3.9	5.L4U3.11
No Bones About It: Designing Knee Braces	Biomedical Engineering Skeletal and Muscular Systems				3.L1U1.5		5.P3U1.4 5.P3U2.5
A Slick Solution: Cleaning an Oil Spill <i>Also listed with Earth Science</i>	Environmental Engineering Ecosystems		1.L1U1.6 1.L2U2.7 1.L2U1.8	2.E1U3.7 2.L2U1.9 2.L2U1.10	3.L2U1.7 3.L2U1.8	4.E1U1.6 4.E1U3.9 4.L4U1.11	5.L4U3.11
Thinking Inside the Box: Designing Plant Packages	Package Engineering Plants	K.L1U1.6 K.L2U1.8	1.L2U2.7	2.L2U1.9 2.L2U1.10	3.L1U1.5 3.L2U1.6	4.E1U3.9	



Units with Earth Science Topics

Unit	Engineering and Science Fields	Arizona Science Standards					
		Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Catching the Wind: Designing Windmills <i>Also listed with Physical Science</i>	Mechanical Engineering Weather	K.E1U1.3 K.E1U1.4	1.P3U1.3 1.E1U1.5 1.L2U2.7	2.E1U2.6 2.E1U3.7 2.L2U1.9	3.L2U1.6	4.P4U3.4 4.E1U1.8 4.E1U3.9	5.P3U1.4 5.P3U2.5 5.P4U1.6 5.L4U3.11
Now You're Cooking: Designing Solar Ovens <i>Also listed with Physical Science</i>	Green Engineering Energy and Energy Resources	K.E2U1.5	1.P2U1.1 1.E1U1.5	2.P4U1.3 2.E2U1.8	3.E1U1.4	4.P4U1.1 4.P4U3.4	5.L4U3.11
A Slick Solution: Cleaning an Oil Spill <i>Also listed with Life Science</i>	Environmental Engineering Ecosystems		1.L1U1.6 1.L2U2.7 1.L2U1.8	2.E1U3.7 2.L2U1.9 2.L2U1.10	3.L2U1.7 3.L2U1.8	4.E1U1.6 4.E1U3.9 4.L4U1.11	5.L4U3.11
Solid as a Rock: Replicating an Artifact	Materials Engineering Rocks and Minerals					4.E1U1.6 4.E1U1.7	
A Stick in the Mud: Evaluating a Landscape	Geotechnical Engineering Landforms and Maps	K.E1U1.3	1.E1U1.5	2.E1U1.4 2.E1U2.6 2.E1U3.7		4.E1U1.6 4.E1U1.7 4.E1U3.9 4.E1U2.10	
Taking the Plunge: Designing Submersibles <i>Also listed with Physical Science</i>	Ocean Engineering Sinking and Floating			2.P1U1.1			5.P3U2.5
Water, Water Everywhere: Designing Water Filters	Environmental Engineering Water		1.E1U1.5 1.L2U1.8	2.P4U1.3 2.E1U1.5 2.E1U3.7 2.L2U1.9		4.E1U1.6 4.E1U3.9	5.L4U3.11

Units with Physical Science Topics

Unit	Engineering and Science Fields	Arizona Science Standards					
		Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
An Alarming Idea: Designing Alarm Circuits	Electrical Engineering Electricity					4.P4U1.2 4.P4U3.4	
The Attraction Is Obvious: Designing Maglev Systems	Transportation Engineering Magnets		1.P3U1.3			4.P4U1.1 4.P2U1.3	5.P2U1.3 5.P3U1.4 5.P3U2.5 5.P4U1.6
Catching the Wind: Designing Windmills <i>Also listed with Earth Science</i>	Mechanical Engineering Weather	K.E1U1.3 K.E1U1.4	1.P3U1.3 1.E1U1.5 1.L2U2.7	2.E1U2.6 2.E1U3.7 2.L2U1.9	3.L2U1.6	4.P4U3.4 4.E1U1.8 4.E1U3.9	5.P3U1.4 5.P3U2.5 5.P4U1.6 5.L4U3.11
To Get to the Other Side: Designing Bridges	Civil Engineering Forces		1.P3U1.3				5.P3U1.4 5.P3U2.5
Lighten Up: Designing Lighting Systems	Optical Engineering Light	K.P2U1.1 K.P2U2.2	1.P2U1.1		3.P2U1.1 3.P4U1.3		
A Long Way Down: Designing Parachutes	Aerospace Engineering Solar System	K.E2U1.5	1.P3U1.3	2.P1U1.1			5.P3U1.4 5.P3U2.5 5.E2U1.8
Marvelous Machines: Making Work Easier	Industrial Engineering Simple Machines		1.P3U1.3				5.P3U1.4 5.P4U1.6 5.P3U2.5

Physical Science continues on next page.

Units with Physical Science Topics, *continued*

Unit	Engineering and Science Fields	NGSS Performance Expectations					
		Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Now You're Cooking: Designing Solar Ovens <i>Also listed with Earth Science</i>	Green Engineering Energy	K.E2U1.5	1.P2U1.1 1.E1U1.5	2.P4U1.3 2.E2U1.8	3.E1U1.4	4.P4U1.1 4.P4U3.4	5.L4U3.11
Sounds Like Fun: Seeing Animal Sounds	Acoustical Engineering Sound	K.P2U1.1 K.P2U2.2	1.P2U1.2		3.P2U1.2 3.P4U1.3		
A Sticky Situation: Designing Walls	Materials Engineering Earth Materials		1.E1U1.5	2.P4U1.3		4.E1U2.10	5.P1U1.1 5.P1U1.2
Taking the Plunge: Designing Submersibles <i>Also listed with Earth Science</i>	Ocean Engineering Sinking and Floating			2.P1U1.1			5.P3U2.5
A Work in Process: Improving a Play Dough Process	Chemical Engineering Process Engineering Solids and Liquids			2.P1U1.1			5.P1U1.1 5.P1U1.2

Recommended Grade / Unit Title	Engineering and Science Fields	Arizona Science Standards					
		Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
1 / Designing Lighting Systems	Optical Engineering Light	K.P2U1.1	1.P2U1.1		3.P2U1.1 3.P4U1.3		
2 / Designing Hand Pollinators	Agricultural Engineering Insects and Plants	K.L1U1.6 K.L1U1.7	1.L1U1.6 1.L2U2.7 1.L2U1.8 1.L4U1.10	2.L2U1.9	3.L1U1.5 3.L2U1.6 3.L2U1.8		5.L4U3.11
3 / Designing Maglev Systems	Transportation Engineering Magnets		1.P3U1.3			4.P4U1.1 4.P2U1.3	5.P2U1.3 5.P3U1.4 5.P3U2.5 5.P4U1.6
4 / Designing Solar Ovens	Green Engineering Energy and Energy Resources	K.E2U1.5	1.P2U1.1 1.E1U1.5	2.P4U1.3 2.E2U1.8	3.E1U1.4	4.P4U1.1 4.P4U3.4	5.L4U3.11
5 / Cleaning an Oil Spill	Environmental Engineering Ecosystems		1.L1U1.6 1.L2U2.7 1.L2U1.8	2.E1U3.7 2.L2U1.9 2.L2U1.10	3.L2U1.7 3.L2U1.8	4.E1U1.6 4.E1U3.9 4.L4U1.11	5.L4U3.11

Suggested Grade / Unit Title	Concept Tool Type	Arizona Computer Science Standards, 2018					
		K	1	2	3	4	5
1 / Programming Robots	Computing Systems Robotics	K.AP.A.1 K.AP.V.1 K.AP.C.1 K.AP.M.1 K.AP.PD.1 K.AP.PD.3 K.AP.PD.4	1.AP.A.1 1.AP.V.1 1.AP.C.1 1.AP.M.1 1.AP.PD.1 1.AP.PD.3 1.AP.PD.4	2.AP.A.1 2.AP.V.1 2.AP.C.1 2.AP.M.1 2.AP.PD.1 2.AP.PD.3 2.AP.PD.4			
2 / Creating Animations	Algorithms & Programming Visual Programming		1.AP.A.1 1.AP.V.1 1.AP.C.1 1.AP.M.1 1.AP.PD.1 1.AP.PD.3 1.AP.PD.4	2.DA.S.1 2.AP.A.1 2.AP.V.1 2.AP.C.1 2.AP.M.1 2.AP.PD.1 2.AP.PD.3 2.AP.PD.4 2.AP.PD.4	3.AP.A.1 3.AP.C.1 3.AP.M.1 3.AP.PD.1 3.AP.PD.3 3.AP.PD.4 3.AP.PD.5		
3 / Building Automated Systems	Computing Systems Visual Computing			2.CS.HS.1 2.CS.T.2 2.AP.A.1 2.AP.C.1 2.AP.M.1 2.AP.PD.1 2.AP.PD.3 2.AP.PD.4	3.CS.D.1 3.CS.HS.2 3.CS.T.1 3.AP.A.1 3.AP.C.1 3.AP.M.1 3.AP.PD.1 3.AP.PD.1 3.AP.PD.3 3.AP.PD.4 3.AP.PD.5	4.CS.HS.2 4.CS.T.1 4.AP.A.1 4.AP.C.1 4.AP.M.1 4.AP.PD.1 4.AP.PD.3 4.AP.PD.4 4.AP.PD.5	

Suggested Grade / Unit Title	Concept Tool Type	Arizona Computer Science Standards, 2018					
		K	1	2	3	4	5
4 / Designing Computer Games	Impacts of Computing Visual Programming				3.DA.CVT.1 3.DA.IM.1 3.AP.A.1 3.AP.V.1 3.AP.C.1 3.AP.M.1 3.AP.PD.1 3.AP.PD.3 3.AP.PD.4 3.AP.PD.5	4.DA.CVT.1 4.DA.IM.1 4.AP.A.1 4.AP.V.1 4.AP.C.1 4.AP.M.1 4.AP.M.2 4.AP.PD.1 4.AP.PD.3 4.AP.PD.4 4.AP.PD.5	5.DA.CVT.1 5.DA.IM.1 5.AP.A.1 5.AP.C.1 5.AP.M.1 5.AP.M.2 5.AP.PD.1 5.AP.PD.3 5.AP.PD.4 5.AP.PD.5
5 / Analyzing Digital Images	Data & Analysis Visual Programming					4.CS.HS.1 4.DA.CVT.1 4.DA.IM.1 4.AP.A.1 4.AP.V.1 4.AP.C.1 4.AP.M.1 4.AP.M.2 4.AP.PD.1 4.AP.PD.3 4.AP.PD.4 4.AP.PD.5	5.CS.D.1 5.CS.HS.1 5.DA.CVT.1 5.DA.IM.1 5.AP.A.1 5.AP.V.1 5.AP.C.1 5.AP.M.1 5.AP.M.2 5.AP.PD.1 5.AP.PD.3 5.AP.PD.4 5.AP.PD.5

Unit	Engineering Fields and Science Connections	Arizona Science Standards		
		Grade 3	Grade 4	Grade 5
Bubble Bonanza: Engineering Bubble Wands	Materials Engineering Matter and Its Interactions			5.P1U1.2
Go Green: Engineering Recycled Racers	Green Engineering Energy, Forces			5.P3U1.4 5.P3U2.5 5.P4U1.6
In Good Hands: Engineering Space Gloves	Materials Engineering Properties of Materials, Energy Transfer			5.P4U1.6
Liftoff: Engineering Rockets and Rovers	Aerospace Engineering Forces and Interactions			5.P3U1.4 5.P3U2.5 5.P4U1.6 5.E2U1.8
Light Up the Night: An Electrical Engineering Challenge	Electrical Engineering Electric Circuits, Light		4.P4U1.2	
Music to My Ears: An Acoustical Engineering Challenge	Acoustical Engineering Sound	3.P2U1.2 3.P4U1.3	4.P4U1.1	
The Sky's the Limit: Engineering Flying Technologies	Aeronautical Engineering Forces and Interactions			5.P3U1.4 5.P3U2.5 5.P4U1.6 5.E2U1.8

Unit	Engineering Fields and Science Connections	Arizona Science Standards		
		Grade 3	Grade 4	Grade 5
Shake Things Up: Engineering Earthquake-Resistant Buildings	Earthquake Engineering Earthquakes		4.E1U1.5 4.E1U1.6 4.E1U2.10	5.P3U1.4 5.P3U2.5 5.P4U1.6
A Slippery Slope: Engineering an Avalanche Protection System	Avalanche Engineering Forces and Interactions		4.E1U1.6 4.E1U2.10	5.P3U1.4 5.P3U2.5 5.P4U1.6 5.E2U1.8
Hop to It: Safe Removal of Invasive Species	Mechanical Engineering Environmental Science		4.L4U1.11	5.P3U1.4 5.L4U3.11
To the Rescue: Engineering Aid Drop Packages	Package Engineering Energy, Forces			5.P3U1.4 5.P3U2.5 5.P4U1.6 5.E2U1.8

Unit	Engineering Field	Science Topics	Arizona Standards		
			Grade 6	Grade 7	Grade 8
Don't Runoff: Engineering an Urban Landscape	Environmental Engineering	Natural Resources Earth and Human Activity	6.L2U3.11 6.L2U1.13		8.E1U3.8
Food for Thought: Engineering Ice Cream	Process Engineering	Matter Energy Transfer	6.P1U1.2		8.P4U1.3
Go Fish: Engineering Prosthetic Tails	Biomechanical Engineering	Structures and Function in Animals			
Growing Up: Engineering Vertical Farms	Agricultural Engineering	Light Photosynthesis Natural Resources		7.L2U1.12	8.P4U1.3 8.P4U2.5
It's in the Bag: Engineering Bioinspired Gear	Materials Engineering Bioinspired Engineering	Structures and Function in Animals			
Outbreak Alert!: Engineering a Pandemic Response	Biomedical Engineering	Cells, Viruses Public Health		7.L1U1.8	8.L4U1.11
Testing the Waters: Engineering a Water Reuse Process	Process Engineering Water Resource Engineering	Natural Resources			8.E1U3.8
Worlds Apart: Engineering Remote Sensing Devices	Remote Sensing Engineering	Light Solar System	6.E2U1.7		8.P4U1.4

Unit	Engineering Field	Science Topics	Arizona Standards		
			Grade 6	Grade 7	Grade 8
Plants to Plastics: Engineering Bioplastics	Chemical Engineering	Properties of Matter Chemical Reactions			8.P1U1.1 8.P1U1.2 8.E1U3.8
It's About Time: Engineering Timers	Mechanical Engineering	Physical Science	6.P2U1.4	7.P2U1.2 7.P3U1.3	
Put a Lid on It: Engineering Safety Helmets	Biomechanical Engineering	Forces and Motion Nervous System		7.P3U1.3	
Here Comes the Sun: Engineering Insulated Homes	Green Engineering	Thermal Energy Transfer Properties of Matter Natural Resources Earth and Human Activity	6.E1U1.6		8.P4U1.3 8.P4U2.5 8.E1U3.8