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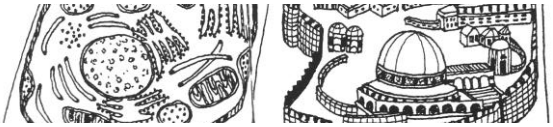
Science in the Soul, *Elective 1*

AUTHOR:	Daniel Utley
SUMMARY:	Participants will explore fun, innovative methods of bringing science games and concepts into camp. The session will include group activities, science- based mixers and culminate in Einstein's Beit Midrash, where ultimate Jewish knowledge and scientific theory meet. - *Submitted by Daniel Utley*
TOPICS:	Nature, Shabbat
LEARNING OBJECTIVE:	Participants will try out several science-based activities and connect them to concepts or rituals involving Jewish prayer, theology, or blessings. Participants will build community by working cooperatively with fellows from a diverse set of camps. Participants will leave with program activity ideas and a new mindset for incorporating science and Judaism.
AUDIENCE:	Full session geared towards counselors. Individual science activities easily usable by bunk-sized groups - (10-15 participants) ranging from 4th-8th grade.
LENGTH:	75-90 Minutes
APPENDIXES:	ScienceInTheSoul Writeup.doc; ScienceInTheSoul - Images and Texts.doc
MATERIALS:	1 printout of the program write-up 1 printout of the images & texts enlarged on 11x17 paper
SETTING:	4, 4-foot folding tables; access to water or several water pitchers

Session Description:

Timeframe: 90 minutes

(<5 min) Set induction with large group (~25 participants):
Display the Pollack Jerusalem/Cell artwork on a large printout or give out handouts to pairs of participants:



Think-pair-share: with a partner, take a few minutes to study this art.

- What do you notice?
- What are the details in the image?
- What's the message this art sends to you?

Discuss as a large group, briefly:

- What similarities exist between Judaism and the scientific principles of the foundations of life?

(30 minutes) Group Science Experiments/Activities:

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Instructions: In a moment you will be counted off in order to experience different science activity stations - each station is an example of a science activity/experiment you could use at camp and easily connect to Judaism or Jewish values. At the station you will find supplies, a direction sheet, and notes for a self-guided discussion to have as a small group after you finish the activity. I have extra paper and pens should you wish to record observations from your activity. Elect one or two members of your group to share your activity with everyone when we come back together. Please plan to explain your experiment, what made it work, and what Jewish connection you discovered.

Count off participants by fives, send them to different stations around the room for the following activities. **In about 20-25 minutes** bring the group back together in order to share observations from the experiments.

Group activities/experiments - (Each begins on a new page)

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1 - Naval Orange Havdalah sets:
Supplies:
10 Naval oranges
3 Sharp kitchen knives
1 Jug of cheap olive oil
10 small boxes of wood Matches
10 Grape juice boxes

Instructions:
Havdalah is a ritual that helps us make a mental and spiritual separation (*l'havdil* - to separate) between Shabbat or other holy days (*kodesh*) and the rest of our week (*chol*). The ritual involves many of our senses - taste, smell, sight, and even hearing, in order to create a full experience symbolic of this separation.

What do you need for havdalah?
Grape juice or wine
A candle with multiple wicks or strands
Spices

Usually we use a havdalah set for these items, but today we will make our own havdalah set out of a Naval Orange! Follow the directions carefully!!

1) Take the naval orange and hold it like Earth, with the stem on the bottom and the naval facing up. **Carefully cut through just the peel layer only**, all the way around the equator of the orange.
2) Take your finger or thumb and careful separate the peel from the orange flesh of the the bottom half with the stem. Keeping the peel intact, work your way down to the bottom, but don't break through the stem. Work your way all the way around the bottom half of the orange
3) Gently twist out the orange so that the stem stays through, it should pull out and you will have an empty half of the orange, with a stem sticking up in the middle - this will be your candle.
4) Separate the flesh from the other side, working again carefully to keep the peel intact, working toward the naval and then pull out the inside of the orange, leaving the other half of the orange peel - this becomes your cup! (but probably with a small hole at the bottom, only a minor problem!)
5) Observe the stem, you may be able to see or even gently peel apart two strands of stem material - this is your havdalah candle wick.
6) Fill the candle about halfway full with olive oil, pouring the oil over the stem material
7) Light the stem with a match - this might take a few tries.
8) Grab some juice, use your orange as "spices" and make havdalah!

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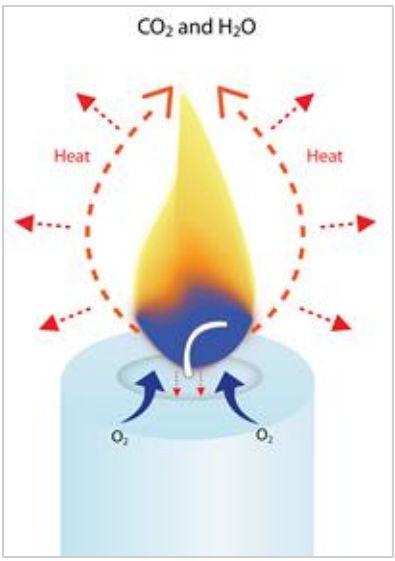
Check out the science behind candles: from candles.org
HOW CANDLES BURN



All waxes are essentially hydrocarbons, which means they are largely composed of hydrogen (H) and carbon (C) atoms.When you light a candle, the heat of the flame melts the wax near the wick. This liquid wax is then drawn up the wick by capillary action.

The heat of the flame vaporizes the liquid wax (turns it into a hot gas), and starts to break down the hydrocarbons into molecules of hydrogen and carbon. These vaporized molecules are drawn up into the flame, where they react with oxygen from the air to create heat, light, water vapor (H_2O) and carbon dioxide (CO_2). Approximately one-fourth of the energy created by a candle's combustion is given off as heat radiates from the flame in all directions. Enough heat is created to radiate back and melt more wax to keep the combustion process going until the fuel is used up or the heat is eliminated.

It takes a few minutes when you first light a candle for this combustion process to stabilize. The flame may flicker or smoke a bit at first, but once the process is stabilized, the flame will burn cleanly and steadily in a quiet teardrop shape, giving off carbon dioxide and water vapor. A quietly burning candle flame is a very efficient combustion machine. But if the flame gets too little or too much air or fuel, it can flicker or flare and unburned carbon particles (soot) will escape from the flame before they can fully combust.

The wisp of smoke you sometimes see when a candle flickers is actually caused by unburned soot particles that have escaped from the flame due to incomplete combustion.

Questions for Discussion:

- What connections can you draw between the science of candles and the meaning of havdalah?
- How can you draw in other Jewish content to the activity of making a fully nature havdalah set out of an orange?
- In what types of age groups and group sizes would this activity work best?
- What might you add or change about this activity at your camp?

2 - "Singing" wine glass niggunim:

10 glass wine glasses (typical stemmed glasses - please borrow from Capital Camps?)
Water pitcher
1 roll of paper towels
1 jug of Vinegar
1 8' table
1 bold dry-erase marker
Roll of duct tape
Information on the pentatonic scale and nusach

Instructions:

This activity involves friction, resonance, sound, and Jewish music!

Have you ever played with a wine glass in order to make it "sing" by moving your finger on the rim of the glass? It is pretty fun! Now you get to use that skill to compose some new Jewish music.

These wine glasses have been pre-set and tuned by filling them with water so that they will "sing" the different pitches of a **pentatonic (5 tone) scale** (the same notes you would hear if you played each of the black keys on a piano keyboard). Because of the certain frequency intervals between each pitch, any played together or in succession sound good - you can't play a wrong note! Interestingly, these same five pitches form the foundation for *nusach* of the weekday Amidah. In Jewish prayer each major holiday, including shabbat, has it own "sound" or *nusach* - a collection of pitches that when chanted, give us the feel/sound of that particular day. The pentatonic scale is the set of pitches used for chanting this part of weekday prayer.

Playing Directions:

1. Dip your pointer finger into the water (or vinegar) to clean it. Use a napkin to wipe off any dirt or oil on your finger. Clean is good.
2. You'll need a little moisture to help, so dip your finger into the water again.
3. Set your clean, moist finger on the rim of the glass, press down slightly, and rub it all the way around the rim without stopping. Keep going in a circular motion along the lip of the glass while maintaining the pressure, and, in almost no time, you'll have displayed a newfound musical talent.
4. Several things have to be just right for a tone to be produced: pressure, moisture, glass type, etc. Keep trying because it's worth it. Once you get there, it's hard to stop.

Activity:

As a group, compose a melody (a certain order in which you will play the different pitches). This melody will become a *niggun*- a wordless song. Think of a niggun you already know for an example - like the ones often sung to start kabbalat shabbat. Then the melody is repeated over and over again to create a song. Be prepared to teach it to the group when you are done!

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On Wine Glass Resonance: from Scientific American

Background:

Glasses have been used for making music since the Middle Ages. The first musical instrument made of upright wine glasses was called the glass harp and was invented around 1750. About 10 years later, Benjamin Franklin—one of the founding fathers of the United States—invented a mechanical version of the glass harp, called the glass harmonica. Both of these instruments are based on the principle of generating musical tones by means of friction. What does that mean?

When you rub your moistened finger along the rim of the glass, your finger will stick to the glass as it encounters resistance, or friction, when it moves over the glass surface. The water on your finger, however, will allow your finger to slip, as it forms a cushion that reduces friction. When the pressure and amount of moisture are just right, this so-called stick-slip motion (the slight friction between your finger and the rim of the glass) will cause vibrations in the sides of the glass. The sides of the glass transmit the vibration to the surrounding air, creating a sound wave with a specific frequency. The frequency specifies the rate at which a vibration occurs and is usually measured per second or Hertz (Hz). There is a particular frequency, called the resonant frequency, at which the sides of the glass will vibrate most easily. The resonant frequency of wine glasses is typically within the range of human hearing (20-20,000 Hz), and this is why you hear the resulting resonant vibration as a tone. Now let's make some music and you can play your very own wine glass instrument.

A word on Nusach: from *Emotions in Jewish Music: Personal and Scholarly Reflections*, J. Friedman, ed.

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WEEKDAY *NUSACH*

The *nusach* for the weekday morning *Amidah* is based on the pentatonic scale. It is a simple, unadorned, melodic scale which lends itself to the speed at which the weekday morning service is *davened* by religious Jews intent on praying but also in a hurry to get to work. The *nusach* pattern is based primarily on five notes with some variations possible beyond the octave. A typical pattern would be Eb-Gb-Bb-Ab-Gb/Eb-Gb-Ab-Eb-Gb with the *chatimah*, Eb-Gb-Ab-B-Db-Ab-Gb.

In keeping with the time restrictions that most work situations place on the morning *davener*, the weekday morning service is generally prayed quickly, leaving little time for great expressions of emotion or spirit. Indeed, in most instances, the morning service moves along as quickly as the service leader can chant the prayers in order for those in attendance to arrive at work on time. This is not to say that those praying move through the service devoid of any emotional connection to the prayers; rather, since the morning service is seen as an *halachic* obligation among all Orthodox and many Conservative Jews, those in attendance generally come to pray every weekday morning and know the liturgy almost by memory. As such, it is easy for them to pray quickly, concentrating on the *kavannah* of their supplications rather than stumbling through the Hebrew with no time to consider the nature of their prayers as would someone who attends infrequently.

3 - Milky Rainbows:

10 paper or styrofoam plates (that will hold up with liquid on them)
½ gallon whole milk
Food coloring
Dawn dish soap
20 Q-tips

Instructions

1. Pour whole milk onto the plate, filling it to the depth of about 1/4 -inch.
2. Let the milk settle and become perfectly still. (around 30 second)
3. Carefully and gently place a few droplets (4-5) of different food coloring on the surface of the milk, spaced out. Be careful not to stir or move the milk in the process.
4. Take a q-tip and carefully touch the milk in the center of the plate with the dry end of the q-tip. What happens?
5. Turn the q-tip over and cover the tip of it with dish soap. Touch the soap covered end of the q-tip to the surface of the milk. What happens?
6. See if you can create a beautiful rainbow with the patterns that emerge.

Background on Milk Rainbows: from Steve Spangler Science

Milk is mostly water but it also contains vitamins, minerals, proteins, and tiny droplets of fat suspended in solution. Fats and proteins are sensitive to changes in the surrounding solution (the milk).

The secret of the bursting colors is the chemistry of that tiny drop of soap. Dish soap, because of its bipolar characteristics (nonpolar on one end and polar on the other), weakens the chemical bonds that hold the proteins and fats in solution. The soap's polar, or *hydrophilic* (water-loving), end dissolves in water, and its *hydrophobic* (water-fearing) end attaches to a fat globule in the milk. This is when the fun begins.

The molecules of fat bend, roll, twist, and contort in all directions as the soap molecules race around to join up with the fat molecules. During all of this fat molecule gymnastics, the food coloring molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity. As the soap becomes evenly mixed with the milk, the action slows down and eventually stops.

Try adding another drop of soap to see if there's any more movement. If so, you discovered there are still more fat molecules that haven't found a partner at the big color dance. Add another drop of soap to start the process again.

Noah, God and the Rainbow - a sign of the covenant

Genesis 9:8-17

[8] And God said to Noah and to his sons with him, [9] "I now establish My covenant with you and your offspring to come, [10] and with every living thing that is with you — birds, cattle, and every wild beast as well — all that have come out of the ark, every living thing on earth. [11] I will maintain My covenant with

you: never again shall all flesh be cut off by the waters of a flood, and never again shall there be a flood to destroy the earth."
12 God further said, "This is the sign that I set for the covenant between Me and you, and every living creature with you, for all ages to come. 13 I have set My bow in the clouds, and it shall serve as a sign of the covenant between Me and the earth. 14 When I bring clouds over the earth, and the bow appears in the clouds, 15 I will remember My covenant between Me and you and every living creature among all flesh, so that the waters shall never again become a flood to destroy all flesh. 16 When the bow is in the clouds, I will see it and remember the everlasting covenant between God and all living creatures, all flesh that is on earth. 17 That," God said to Noah, "shall be the sign of the covenant that I have established between Me and all flesh that is on earth."

Whenever we see a rainbow we have the opportunity recite the following *b'racha*:

ברוך אתה ה' אלוקינו מלך העולם זוכר הברית, (ו)נאמן בבריתו, וקיים במאמרו

Baruch Ata Hashem Elokenu Melech HaOlam Zocher HaBrit, (Ve)Neeman BeVrito, VeKayam BeMaamaro

Blessed are You, Adonai our God, Ruler of the universe, who remembers the covenant, and is faithful to God's covenant, and keeps God's promise.

For Discussion:

- Why do you think the rainbow is a sign of God's covenant with Noah?
- What are the elements of this beautiful natural phenomenon that cause us to take notice?
- What are the elements of awe we experience through the rainbow?

4 - Pop the Balloon Challenge

15-20 Black balloons 10": http://www.amazon.com/Fun-Express-Black-Latex-Balloons/dp/B004N0KS8W/ref=sr_1_1?ie=UTF8&qid=1458486749&sr=8-1&keywords=black+balloons
15-20 Clear balloons 12": http://www.amazon.com/Balloon-Crystal-Premium-Helium-Quality/dp/B00KEW2RZ0/ref=sr_1_12?ie=UTF8&qid=1458487107&sr=8-12&keywords=clear+balloons
1 set Magnifying Lenses: http://www.amazon.com/Fresnel-Magnifier-Starter-Reading-Magnifying/dp/B01AKIP2A4/ref=sr_1_9?ie=UTF8&qid=1458168557&sr=8-9&keywords=magnifying+lens+glass

Instructions:

Your challenge, should you choose to accept it, is to figure out how to pop the black balloon that resides inside the clear balloon, without popping the clear balloon. You are given a magnifying lens to use in solving this challenge… good luck!

Background:

When you use a magnifying glass to focus the sun's rays into a dot, you create a spot that is incredibly hot. It's the perfect way to start a fire (literally). That's how hot that dot of light can get! It's no surprise, then, that this immensely hot light pops a balloon, but why is only the black balloon popped?

Luckily, for the clear balloon, most of the light and its heat, pass right through the balloon's surface. You've seen this in action before. When you look through glass windows, a clear drinking cup, or even a pair of glasses, you're witnessing light passing through a surface. Since the clear balloon is nearly transparent, the same thing happens when it is exposed to light, even in a high concentration.

The black balloon isn't so lucky. When we're talking about light, black is created by a surface that doesn't reflect any light… it absorbs almost all of its energy. In this case, that energy is heat, and a lot of it. The heat absorbed by the black balloon from the focused sunlight quickly causes the bonds and molecules of the balloon to weaken and spread apart until it can no longer contain the air on the inside. The pressure from the air is just too much as it explodes, releasing the air into the clear balloon.

Read and Discuss the following -

Jewish Topic: Tzimtzum: The idea of *tzimtzum* (contraction) -is attributed to R. Isaac Luria ("the Ari") in Chapter 1 of R. Hayyim Vital's book Etz Hayyim (Koretz, 1784):

"Know, that before the emanations were emitted and the creatures were created, a supernal light was extended, filling the entire universe. There was no unoccupied place, that is, empty air or space; rather, all was filled by that extended light…. But then, the Infinite contracted Itself into a central point which is truly in the center of the light, and that light was contracted and withdrew to sides around the central point. Then an empty place remained with air and empty space. The Infinite then extended one straight line from the light, and in the empty space It emanated, created, formed, and made all of the worlds in their entireties."

(Etz Hayyim, Part 1, Chapter 1).

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Rachel Elior: "Tzimtzum: A Kabbalistic Approach to Creation." (Sh'ma Journal, Jan. 2010)

"This doctrine holds that the divinity withdrew from the world at the beginning of the creative process and therefore is transcendent to the world and situated beyond it. According to this view, held by those who take the doctrine of *tzimtzum* literally, the sole divine presence in this world — otherwise bereft of divinity — is to be found in the Torah. Accordingly, study of the Torah and immersion in *halakhah* are the only ways to achieve bonding with God."

- What are the implications of this understanding of God's role in creation?
- Inside the balloon is basically empty space, filled with air. When heated the molecules spread apart from each other, releasing the air pressure. How can this be seen as as an analogy for tzimtzum?
- Another interpretation of tzimtzum suggests that God's essence filled clay vessels until they became too full and then shattered (*shvirat haKelim*), scattering God's essence throughout the world. Tikkun olam (repairing the world) is the act of reassembling the broken pieces… How does repairing the world compare to mending a broken balloon?

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5 - Sun Paper Creation Story

Sun paper - http://www.amazon.com/Tedco-Sun-Art-Paper-Kit/dp/B002KSKTG0/ref=sr_1_4?ie=UTF8&qid=1458168985&sr=8-4&keywords=sun+print+fabric
Large bowl
Access to Water
1 lemon or lemon juice
Creation story - Genesis 1

Instructions -

This is an experiment in basic photography using the sun & shadows.

1. Take several minutes as a group to study & discuss the story of the creation according to Genesis 1, each day from 1-Shabbat and review what was created on each day.
2. Using the sun sensitive paper, you are to illustrate the 7 days of creation, one sheet per day, using the sun and any objects you find in nature.
3. Read the instructions on the paper pack carefully for exposure, once finished rinse the paper in the water/lemon juice bath. Be careful not to expose the paper to direct sunlight until you are ready to make your exposure.

Genesis/Bereshit 1 (JPS TaNaKh)

Chapter 1

1 When God began to create heaven and earth — 2 the earth being unformed and void, with darkness
over the surface of the deep and a wind from God sweeping over the water — 3 God said, "Let there be
light"; and there was light. 4 God saw that the light was good, and God separated the light from the
darkness. 5 God called the light Day, and the darkness He called Night. And there was evening and there
was morning, a first day.

6 God said, "Let there be an expanse in the midst of the water, that it may separate water from water." 7
God made the expanse, and it separated the water which was below the expanse from the water which
was above the expanse. And it was so. 8 God called the expanse Sky. And there was evening and there
was morning, a second day.

9 God said, "Let the water below the sky be gathered into one area, that the dry land may appear." And it
was so. 10 God called the dry land Earth, and the gathering of waters He called Seas. And God saw that
this was good. 11 And God said, "Let the earth sprout vegetation: seed-bearing plants, fruit trees of every
kind on earth that bear fruit with the seed in it." And it was so. 12 The earth brought forth vegetation:
seed-bearing plants of every kind, and trees of every kind bearing fruit with the seed in it. And God saw
that this was good. 13 And there was evening and there was morning, a third day.

14 God said, "Let there be lights in the expanse of the sky to separate day from night; they shall serve as
signs for the set times — the days and the years; 15 and they shall serve as lights in the expanse of the
sky to shine upon the earth." And it was so. 16 God made the two great lights, the greater light to
dominate the day and the lesser light to dominate the night, and the stars. 17 And God set them in the
expanse of the sky to shine upon the earth, 18 to dominate the day and the night, and to separate light
from darkness. And God saw that this was good. 19 And there was evening and there was morning, a
fourth day.

20 God said, "Let the waters bring forth swarms of living creatures, and birds that fly above the earth
across the expanse of the sky." 21 God created the great sea monsters, and all the living creatures of
every kind that creep, which the waters brought forth in swarms, and all the winged birds of every kind.
And God saw that this was good. 22 God blessed them, saying, "Be fertile and increase, fill the waters in
the seas, and let the birds increase on the earth." 23 And there was evening and there was morning, a
fifth day.

24 God said, "Let the earth bring forth every kind of living creature: cattle, creeping things, and wild
beasts of every kind." And it was so. 25 God made wild beasts of every kind and cattle of every kind, and
all kinds of creeping things of the earth. And God saw that this was good. 26 And God said, "Let us make
man in our image, after our likeness. They shall rule the fish of the sea, the birds of the sky, the cattle,
the whole earth, and all the creeping things that creep on earth." 27 And God created man in His image,
in the image of God He created him; male and female He created them. 28 God blessed them and God
said to them, "Be fertile and increase, fill the earth and master it; and rule the fish of the sea, the birds of
the sky, and all the living things that creep on earth."
29 God said, "See, I give you every seed-bearing plant that is upon all the earth, and every tree that has
seed-bearing fruit; they shall be yours for food. 30 And to all the animals on land, to all the birds of the
sky, and to everything that creeps on earth, in which there is the breath of life, [I give] all the green plants
for food." And it was so. 31 And God saw all that He had made, and found it very good. And there was
evening and there was morning, the sixth day.

Chapter 2
1 The heaven and the earth were finished, and all their array. 2 On the seventh day God finished the work
that He had been doing, and He ceased on the seventh day from all the work that He had done. 3 And
God blessed the seventh day and declared it holy, because on it God ceased from all the work of
creation that He had done. 4 Such is the story of heaven and earth when they were created.

(15 min) Return to Full Group: Sharing Observations:
Gather the group in the central area of the program space. A representative from each group activity/experiment presents their "observations" from the activity. For example, the creation photo-paper group will share their images depicting creation, the wine class niggun group will share their melody and teach it, etc. Each group should also share the Jewish connection in the project.

Einstein's Beit Midrash (25 min)
11x17 Text printouts
Glue Sticks
Post-it wall chart paper pad
Masking tape
25 bold markers of any colors (one for each participant)

Instructions:
Verbally draw attention to the quotations from Einstein, Maimonides, and Heschel posted on the walls. (Texts on the source sheet below) Explain that participants will have the opportunity to move around our program space, now called Einstein's Beit Midrash, to contemplate and then add commentary onto the text sheets in reaction to the texts:

After commenting, the instructor will ask participants to stand by the text or texts to which they relate the most. In these groups that form, participants will sit down and discuss the commentary on the page.

Each group should draft a quote of thier own - a theological statement that captures their concern about science/creation/theology/etc in similar way to the statements posted around the room. Write this statement on a 8.5 x11 sheet of paper in bold marker. Each group shares their statement aloud.

Closure (2 min)-
Each participant identifies for themselves 2-3 takeaways from this session, and shares these ideas with a fellow participant.

Additional Notes for Bringing it Back to Camp:
You may wish to select 1-2 of these experiments to use for your group given a particular topic you wish to explore. You need not run all 5 experiments at once - we are only doing that here to provide ideas.

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Science in the Soul, *Elective 1 [full session]*

APPENDIXES:

Source Sheet:

"I want to know how God created this world. I am not interested in this or that phenomenon, in the spectrum of this or that element. I want to know his thoughts. The rest are details."
Einstein - In Salaman, "A Talk with Einstein," *Listener* 54 (1955), 370-371

"I believe in Spinoza's God, Who reveals himself in the lawful harmony of the world, not in a God who concerns himself with the fate and the doings of mankind."
Einstein - In Rowe and Schulmann, *Einstein on Politics,* 17. Einstein Archives 33-272.

"Everything is determined…by forces over which we have no control. It is determined for the insect as well as the star. Human beings, vegetables, or cosmic dust – we all dance to a mysterious tune intoned in the distance by an invisible piper."
Einstein - In G.S. Viereck, "What life means to Einstein," *Saturday Evening Post*, October 26, 1929.
Reprinted in Viereck, *Glimpses of the Great*, 452.

"Science without religion is lame, religion without science is blind."
Einstein - Written in "Science, Philosophy, and Religion," remarks for a symposium in New York, 1940.
Reprinted in *Ideas and Opinions* as "Science and Religion," 46. Einstein Archives 28-523

"The Jewish religion is…a way of sublimating everyday existence…. It demands no act of faith – in the popular sense of the term – on the part of its members. And for that reason there has never been a conflict between our religious outlook and the world outlook of science."
Einstein, From "Science and God: A Dialogue," *Forum and Century* 83 (June 1930), 373.

"Consequently he who wishes to attain to human perfection, must therefore first study Logic, next the various branches of Mathematics in their proper order, then Physics, and lastly Metaphysics."
Maimonides, *Guide for the Perplexed,* Chapter 34.

"In the realm of Nature there is nothing purposeless, trivial, or unnecessary"
Maimonides - *Guide for the Perplexed*, Chapter 1, p. 15

"Reality is not exhausted by knowledge. Inaccessible to research are the ultimate facts. All scientific conclusions are based on axioms, all reasoning depends ultimately upon faith. Faith is virgin thinking, preceding all transcendent knowledge. To believe is to abide at the extremities of spirit."
Heschel - *Moral Grandeur and Spiritual Audacity*, p. 338

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