For each question, please provide a good citation for where you found the answer. If you used library materials, provide the call number and library in which it is located. If you used a database, indicate which database was used.

1. You are investigating TOPIC and need to find some facts. (Hint: standards and handbooks are great for finding this kind of information)

   - TOPIC: a massaging vest for pregnant women and know there are standards in place for different clothing sizes.
     a. Find a table of measurements for maternity sizes. What is the girth measurement (in centimeters) for the upper arm of a size 12? What is the width & length measurement (in inches) from across the back 5” down for size 16?

   ANSWER: 33.62, 16 1/8


   - TOPIC: a portable jungle gym. You know you want to use screws as a fastener, and handbook is a quick way to get information about screws.
     a. When using a high-strength bolting screw, what is the maximum pitch diameter tolerance (inches) for screw size 9/16?
     b. Name the 6 most common types of machine screw heads.

   ANSWER:
   a. .0040
   b. Flat, round, fillister, oval, hexagon, socket

   How: Search Mark’s Standard Handbook for Mechanical Engineers. Search for (a) “high-strength bolting screw” and (b) “machine screw head”. Answer is in (a)Table 8.2.10 – Screw Threads for High-Strength Bolting. And (b) on page 8-20 or shown in Fig 8.2.11.

   Citation:

   - TOPIC: a grocery cart with built in step stool to reach high shelves. You want to make sure children in the cart are safe and you know there are standards in place for consumer safety specifications of shopping carts.
     a. How much force (lbf) should be applied to a single attachment point when testing?
     b. How many times should this test be repeated?
ANSWER:
  a. 45 lbf
  b. 5


Citation:
Found in ASTM digital Library: [http://libraries.mit.edu/get/astmstand](http://libraries.mit.edu/get/astmstand)

- **TOPIC:** a new home gym which can be used by anyone, regardless of whether or not they have a disability. You know there are standards for universal design of fitness equipment.
  a. What should be the maximum step-on height from the ground onto a transfer surface (inches)?
  b. For seated cardio equipment with back support, what is the maximum height for the walk through structure (mm)?

ANSWER:
  a. 6.7
  b. no higher than 125mm


Citation:
Found in ASTM digital Library: [http://libraries.mit.edu/get/astmstand](http://libraries.mit.edu/get/astmstand)

- **TOPIC:** a portable pop-up collapsible box for grocery shopping. Hand holes are key to this design, and you want to be sure to follow industry standards.
  a. How wide should a top hinged hand hole be?
  b. Why is it better to use curved type hand holes?

ANSWER:
  a. 3.5 in.
  b. they will not tear as easily, more evenly distributed lifting force along the surface.


Citation:
• **TOPIC: a pedal powered phone charger for bike commuters**
  
  a. What is the equation for useful power production by pedaling (legs only) for working durations of from 20-120s?
  
  b. What is the equation for useful power with pedaling efforts from 1 to about 100 minutes?

  **ANSWER:**
  
  a. \( \text{hp} = 2.8t^{-0.40} \) (\( t \) is in seconds)
  
  b. \( \text{hp} = 0.53 - 0.13 \log t \) (\( t \) is in minutes)

  **How:** Use Mark’s Handbook. Search for “useful power production” with quotation marks. Muscle generated power, pg 9-4


• **TOPIC: a portable solar powered insulin monitor.**
  
  a. What is the solar absorptance (shortwave) for red brick?
  
  b. What is the radiation ratio for polished Aluminum?

  **ANSWER:**
  
  a. .55
  
  b. 6.00

  **How:** Use Mark’s Handbook. Search for “solar absorption” with quotation marks. Table 9.1.5 – Solar absorption, longwave emittance and radiation ratio for typical surfaces

  **Citation:**
  

• **TOPIC: a lunch bag that senses the temperature and either heats or cools the contents accordingly. You know finding the thermal conductivities of several solid substances will be useful.**
  
  a. Thermal conductivity (Temp °F) of Kaolin wool? Of dry sawdust?

  **ANSWER:**
  
  a. 800, 68

  **How:** Use Mark’s Handbook. Search for “thermal conductivities” with quotation marks and kaolin (do NOT include the word “and”). Or just search for kaolin. Table 4.4.3 – Thermal conductivities of miscellaneous solid substances

  **Citation:**
  
2. You are trying to estimate the size of the market and understand the industry for your magical new product which...

Passport questions:

- **TOPIC: **...is a new in-car entertainment system.
  
  **Question:** It would be helpful to get some statistics on the number of in-car entertainment systems consumers purchased recently.
  
  a. Find the total number of retail sales of in-car entertainment systems in the USA and in China in 2015.
  
  b. Which brand of in-car entertainment system is most popular with Chinese consumers this year?

  **Answer:**
  
  a. China 9,128,800 units. USA 16,036,200 units.
  
  b. Top brand in China is Road Rover at 10.4%.

  **How:** There are two different ways to find this data from the Passport home page.

  1. Type in-car entertainment into the search box in the upper right corner. Select Popular Statistics, Market Sizes. Historic data, 2010-2015, will be retrieved.
  

The default statistics tables are different in each path: one is historic sales data covering 2010 to 2015, and the other is a projection of sales from 2015 to 2020. (The tables can be manipulated in either mode). However, either table gives the same unit sales figure for 2015 for USA and China. By clicking the blue brands icon next to a country, a table of brand share data is also retrieved. In path 1, there is also an option to click Brand Share, also listed under Popular Statistics. It has the same brand data as path 2, but takes more scrolling.

- **TOPIC: **is a wearable electronic product—a new smart watch with many innovative features.

  **Question:** In developing a market plan for your product, you will need to find statistics on the best retail channels for getting wearable electronic products to consumers (eg., stores, internet, etc.).

  a. What is the market size for all types of wearable electronics in the USA this year (answer in ’000 units sold)?
  
  b. What percent of wearable electronics sold in the USA in 2015 did consumers purchase via the Internet?

  **Answer:**

  a. USA retail volume is 29,655,500 units in 2015.
  
  b. 45.9% distributed via Internet retail in 2015.

  **How:**
1. Type wearable electronics into the search box in the upper right corner. Select Popular Statistics, Market Sizes. This will be historic data, 2010-2015. Either click on the small green Distribution icon next to the country to generate a distribution table, or click on distribution in the panel on the left to generate a table.

2. From top black bar menu, click on **industry/consumer electronics**
   - Under **Search Tree**, choose **Portable Consumer Electronics**
   - Click on blue > next to **Portable Consumer Electronics** and select **Wearable Electronics**
   - Click Next and type **USA** in the search box for **Geography**.
   - Select USA and click on Search
   - Click on **Market Sizes**.
   - Total retail volume in ’000 of units for wearable electronics in USA for 2015: 29,655.5

• **TOPIC: ... is a new energy-efficient chiller for use in craft beer production.**

  **Question:** Before you start work on the prototype of your product, you would like to review data on the total market for beer and the most popular beers in the USA.
  a. Find data on the amount of beer sold in the USA in 2014 (in ’000 litres).
  b. What were the top three brands and their respective market shares in 2014?

  **Answer:**
  a. 244,151,900 litres (or is this billions?).
  b. 1) Bud Light 19.9%, 2) Coors Light 9.3%, 3) Budweiser 8.1%.

  **How:**
  1. Type beer into the search box in the upper right corner. Select Popular Statistics, Market Sizes. Historic data, 2009-2014, will be retrieved. Clicking the blue Brand icon next to the country retrieves brand share. There is the option to click Brand Shares also listed under Popular Statistics, but this choice results in a confusing table that includes soft drinks. Will this be a problem for the TH?
  2. Hover over the Search Statistics box. Tag Industries. Select Alcoholic Drinks. Select Beer. This retrieves data projecting sales from 2014 to 2019. Clicking the blue Brand icon next to the country retrieves brand shares.

• **Topic: ... is a life-size simulation of the Quidditch game (practiced at Hogwarts School) designed for use in amusement parks.**

  **Question:** You speculate that people between the ages of 13 and 17 (teens) would be most interested in playing the game. Data on consumer demographics should be helpful.
  a. What is the current population (2015) of teens in the US and what is their projected number for 2019?
Answer:

a. 2015 population of US teens (aged 13-17) is 20,946,700. Projection for 2019 is 21,011,700.

How:

2. Data can also be found via a KW search teens USA, but again, the table is historic rather than a forecast. Will this be a problem? Would the students be likely to use the change time series option that Passport offers?
3. o Click on Consumers/Consumer Trends and Lifestyles from the top menu in black.
   o Under Rank Countries, select Teens (13-17). Make sure, you have forecast selected.
   o Click on Go.
   o 2015 population of US teens (aged 13-17) is 20,946,700. Projection for 2019 is 21,011,700.

IBISWorld Questions:

• Topic: .... is a new in-car entertainment system.

Question: Your product falls within the global consumer electronics manufacturing industry. Given current economic conditions, you would like to get a better idea of the competitive landscape in this industry. A current industry report should be able to help answer these questions:
   a. What is the level of competition in the consumer electronics manufacturing industry?
   b. How do industry analysts characterize the barriers to entry to the industry?

Answer:

a. “Competition is high and the trend is steady.”
   b. “Barriers to entry are high and the trend is steady.”

How:

KW search on Consumer Electronics Stores to retrieve report titled, “Consumer Electronics Stores in the US.” Tab on Industry Outlook. First sentence in report states, “The outlook for the Consumer Electronics Stores industry is somewhat positive, with revenue forecast to increase an annualized 2.3% to $86.4 billion in the five years to 2020.”
- **Topic**: *is a new energy-efficient chiller for use in craft beer production.*

  **Question:**
  An advisor has suggested you find out what the outlook is for the craft beer production industry in the U.S. An industry report should be able to give you some idea about prospects for growth.
  a. Currently, what prospects are industrial analysts projecting for craft beer production?

  **Answer:**
  a. The industry is growing. IBISWorld projects the industry to experience 5.5% annualized revenue growth, reaching $6.5 billion by the end of the period.


- **Topic**: *is a life-size simulation of the Quidditch game designed for use in amusement parks.*

  **Question:** Reports by industry analysts note that the US amusement park industry has been showing steady growth.
  a. What are considered the five key drivers of the performance of the amusement park industry in the US?

  **Answer:**
  a. Domestic trips by US residents, Consumer spending, Inbound trips by non-US residents, Number of adolescents aged 10-19, and Time spent on leisure and sports.

  **How:** KW search on amusement parks, then select report titled “Amusement Parks in the US.” Tab on Industry Performance – Key drivers in a subheading.

- **Topic**: *is a wearable electronic product—a new smart watch with many innovative features.*

  **Question:** You’ve been advised to include data on the U.S. consumer electronics stores industry in the market plan for your new smart watch.
  a. Is the outlook for this industry considered positive?
  b. What level of revenue do industry specialists forecast for consumer electronics stores over the next five years?

  **Answer:**
  a. Yes, the outlook is considered “somewhat positive
  b. Revenue forecast to increase an annualized 2.3% to $86.4 billion in the five years to 2020.

  **How:** KW search on Consumer Electronics Stores to retrieve report titled, “Consumer Electronics Stores in the US.” Tab on Industry Outlook. First sentence in report states, “The outlook for the Consumer Electronics Stores industry is somewhat positive, with revenue forecast to increase an annualized 2.3% to $86.4 billion in the five years to 2020.”
3. You need to find a partner to help develop and commercialize your new product idea. An industry expert has suggested that COMPANY X, one of the largest TOPIC in the world and a publicly-owned company, might be a potential partner. Before contacting them, learn more about COMPANY X. Please indicate the database you used to get the information you used to answer this question.

   a. Uncover the following facts about the company’s operations:
      1. The year when the company was founded or incorporated (or changed ownership)
      2. The address of their headquarters
      3. Total number of employees worldwide (ie, all sites, if possible)
      4. Latest revenue (sales) figures
      5. Was the company profitable last fiscal year? How much was their profit or loss? (Hint: look for “net income” or “total net income”)
      6. What is the North American Industry classification code for their primary industry?

   b. Find a news article about the company published in the past year. Provide a good citation for the article and include the name of the bibliographic database where you found the article.

How:
Go to course page. Look for "Researching Companies" tab.

   • Look for the box “Looking up a company” with databases on finding financials, addresses, etc. on a company. Can use any, but One Source is recommended. If you can't find info in One Source, use Mergent Intellect next.
   • Look for box of databases “Finding news about a company.” Select a database and search. May need to sort results by publication date instead of relevance.

Answer:

1. Pioneer Corp. (In-car entertainment systems)  OneSource
   1. Incorporated 1947
   2. 1-1, SHINOGURA, SAIWAI-KU, KAWASAKI, KANAGAWA - 212-0031, JAPAN
   3. 19,404
   4. $4,569 million sales
   5. Yes. Net income = 133.3 million
   6. 33431 Audio and video equipment manufacturing

   News articles included in OneSource entry.

2. Clarion Company  (In-car entertainment systems)  OneSource
   1. 1940 incorporated
   2. 2Fm 7-2, Shintoshin, Chuo-ku, Sitama-Shi, 330-0081, Japan
   3. 9,413
   4. 1813.1 sales
   5. Yes. Net income = 44.4
   6. 33431 Audio and video equipment manufacturing
3. FitBit Incorporated (wearable electronics)  
   *Mergent Intellect*
   1. 2007
   2. 405 Howard Street, SanFrancisco, US 94105
   3. 579
   4. $745.43 Million sales
   5. NA in table. Text for Company Overview (in Company Description, Financial performance section) says $131.7 million in 2014
   6. 334519 Other Measuring and Controlling Device Manufacturing

   News articles included in Intellect, “Web Intelligence”

4. GameStop Corporation (wearable electronics retail outlets)  
   *OneSource*
   1. 2005
   2. 625 Westport Parkway, Grapevine, TX 76051, US
   3. 18,000
   4. $9,296.0 million sales
   5. Yes. Net income = $393.1 millions
   6. 443142 Electronics stores

   News articles included in Intellect

5. Owens-Illinois Inc. (glass bottle manufactures, required in beer production)  
   *OneSource*
   1. 1987
   2. 1 Michael Owens Way. Perrysburg, Ohio 43551
   3. 21,100
   4. $6,784.0 million sales
   5. Yes. Net income = $75.0
   6. 327213 glass container manufacturing

   News articles included in OneSource

6. Young and Company’s Brewery (craft beer distributor, pubs)  
   *OneSource*
   1. 1890
   2. Riverside House, 26 Osiers Road, Wandsworth, London SW18 1NIH, United Kingdom
   3. 3,496
   4. $365.8 million sales
   5. Yes. Net income = $43.0 million
   6. 72241 Drinking places

   News articles are included in OneSource

7. Six Flags Entertainment Corporation (amusement park games)  
   *OneSource*
   1. 1997
   2. 924 Avenue J East, Grand Prairie, TX 75050
   3. 1,900
   4. $1,175.8 million sales
   5. Yes. Net income = $76.0 million
   6. 71311 Amusement and theme parks

   News articles are included in OneSource
8. SeaWorld Entertainment Corporation (amusement park games)  *OneSource*
   1. 2009
   2. Suite 400 9205 South Park Center Loop, Orlando FL 32810
   3. 5,000
   4. $1,377.8 million sales
   5. Yes. Net income = $49.9 million
   6. 71311 Amusement and theme parks

News articles are included in OneSource
4. You would like to learn more about TOPIC, and you know that the right book can provide a good summary on this topic.

   a. **Find a general book on TOPIC, available in the MIT Libraries.** Provide a good citation for the book, including the library call # at the end of the citation and which library has the item (Dewey, Rotch, Barker etc.). Also include if this book is available on the shelf (according to Barton) and the day/time this was checked. You do NOT need to physically get the book, use Barton to answer the questions. Electronic books are allowed. If you select an electronic book, provide the publisher or service provider (Springer, Wiley, Books24x7, ebrary, etc.) and the date/time this was checked.

**TOPICS:**
1. interior decoration
2. wildfires
3. food security
4. Human biomechanics
5. Self help devices for people with disabilities
6. Sleep disorders
7. hydrophobic surfaces
8. crime prevention

**ANSWERS: use Barton to find books**

b. **To find more specific information, you want to read a scholarly article on the narrower topic of TOPIC.**
   1. Search for an English language journal article on this topic published in 2005-2015. Provide a good citation for the article, and include the bibliographic database you used to find the citation.
   2. Does MIT have a print subscription to this journal for the year that the article was published? If yes, in which library is it held? Does MIT have access to an electronic version of this article? If yes, what are the years of access?

**1. Furniture Design**
2. erosion as a result of fighting wild fires
3. food security and refrigeration
4. biomechanics of bicycle riding
5. walking aids
6. pillow design for better sleep
7. hydrophobic coatings as a way to stop ice formation
8. cameras used in crime prevention

**ANSWERS: can be found in Compendex, then search Barton for journal holdings.**
5. You want to make sure your design or project idea is unique before you take it to a company or customer for production. Check the patent literature, and find one granted (not an application) United States technical patent for:

1. a showerhead that includes a light
2. wearable GPS
3. eyeglasses with lenses that transition from clear to sunglasses (dark) - photochromic
4. portable hammock/ collapsible hammock
5. roller shoes (not roller skates)
6. autonomous vacuum cleaner
7. lost object finder (keys, remotes, etc)
8. light up alarm clock

a. What is the patent title?
b. What is the patent number? (Tip: numbers starting with D, e.g. D593812, are design patents, not technical patents. Numbers starting with the year, e.g. US20060201950, are applications, not granted patents)
c. Who is the assignee? The inventor?
d. Provide at least one classification code assigned to this patent (number and name, example: 446/486: Amusement Devices: Toys/ Resilient toy or actuator, OR A63F9/00: Sports;Games;Amusements: Card, board or roulette games; indoor games using small moving playing bodies, miscellaneous games: games not otherwise provided for)
e. Where did you find this patent/what database did you use?

**ANSWER:** Go to the Patents tab on the course page, which directs you to the Patents research guide. Select any patent database and do a search. There is also a link on the course page to the US Patent classification system for easy look up of classification codes.

**TIP:** Google patents now puts classification codes in the results list. Also links to schedule in ESpaceNet to see full listing for classification codes.