RLP-AIDB · RLP AI Design B — Case Studies, Prototypes, Patents and Capstone

Unit 4: Capstone: A Biomedical AI Innovation from Concept to Exhibition

Practice Workbook. The same problems, in the same order, as the Practice sections of the online lessons.

Name _____ Period _____

Lesson 4.1 — Showing the Future: Exhibitions, Pitches and the Capstone Launch

FLUENCY

1. Name the designers, sponsor and year of (a) Mathematica and (b) Futurama, and the place each was shown.

2. What do the letters of SCAMPER stand for?

3. List the four lessons for your exhibit that the lesson draws from Mathematica and Futurama.

APPLICATION

4. Describe two Mathematica devices and the idea each makes visible, and state the design principle behind them.

5. Turn this problem into two 'How might we' questions: 'People using a home blood pressure monitor are not sure when a reading is worth reporting to their clinic.'

6. Apply two SCAMPER moves to an existing paper pill-reminder chart to make two concepts. For each, write one sentence on what the AI does and one on how a human stays in control.

7. A capstone concept is a mood-tracking app for teenagers. According to the lesson, what two requirements must it meet, and what must it never do?

REVIEW

8. Review 1.1: Futurama was a corporate vision that promoted cars. Which Unit 1 question about persuasive media should a visitor ask of it?

Lesson 4.2 — Paper Prototypes and Think-Aloud Testing

FLUENCY

1. Define *paper prototype*, *think-aloud test*, *Wizard of Oz test* and *usability*.

2. What should you say if a user asks for help during a think-aloud test, and what two questions do you ask after the task?

3. List three things the consent script tells a tester before every test.

APPLICATION

4. Write a Wizard of Oz script for a classifier that checks whether a photo of a pill compartment shows it empty or full. Give the outputs for three inputs, including one uncertain output.

5. An invented think-aloud log for three users shows: Problem P1 (did not notice the retake message) met by 3 users; P2 (misread a button label) met by 1 user; P3 (expected a confirmation screen) met by 2 users. Rank the problems and say which two to fix first. What share of users met each?

6. Rewrite this task so it is realistic and does not give away the answer: 'Press the green Report button to report your reading.'

7. Why does the lesson recommend two rounds of three users rather than one round of six? Explain in 2 sentences.

REVIEW

8. Review 2.4: Your capstone shows a heart-rate flag. In the Wizard of Oz test, which kind of output from Unit 2 should you deliberately include to see how users react, and why?

Lesson 4.3 — Money, Rules and Ethics: A Review Panel on the Record

FLUENCY

1. Match each FDA pathway to its use: 510(k); De Novo; PMA. Uses: novel low- to moderate-risk device with no predicate; high-risk device, most demanding; device substantially equivalent to a legally marketed predicate.

2. Define *contingency*, *IRB* and *informed consent*.

3. Name the four roles on the review panel and the question each asks.

APPLICATION

4. Check the lesson's illustrative budget: developer time 120 h x $35; cloud $150 x 6 months; 12 gift cards x $25; materials $180; 10% contingency. Compute each line, the subtotal and the total.

5. An invented project's budget lists: developer time 80 h x $40 = $3,000; cloud $100 x 6 = $600; materials $200; contingency 10% = $380; total $4,180. As the finance reviewer, find the error and give the corrected total.

6. An invented capstone is an app that flags possibly worrying skin-spot photos for a clinician to review. If it were real and intended to help diagnose, which FDA pathway might fit and why? Say what you are not certain of.

7. Write a defensible ethics review of an invented project, 'ClinicCheck', which trained its photo classifier on images from one city hospital and did not ask the people in the photos for consent. Give a rating, evidence and one recommendation.

8. Compare two funding routes from the lesson, investors and research grants such as SBIR: what each expects, and how it might shape what gets built.

REVIEW

9. Review 3.3: A patent and an FDA authorization are different things. In one sentence each, say what each one gives an inventor.

Lesson 4.4 — Resume, Portfolio and Recorded Mock Interview

FLUENCY

1. What does STAR stand for, and what goes in each part?

2. How many pieces should the portfolio contain, how long is each caption, and what four things does a caption say?

3. Using the lesson's May 2025 data, how many bioengineers and biomedical engineers and how many data scientists worked in Missouri, and what were their median annual wages?

APPLICATION

4. Using the lesson's Missouri figures, find (a) the difference between the two median wages, (b) each median as a monthly amount to the nearest dollar, and (c) about how many times more data scientists than bioengineers there are.

5. Rewrite these weak resume lines with an action verb and a result: (a) 'Responsible for drawings'; (b) 'Did user testing.'

6. Write a STAR answer to 'Tell me about a time a project didn't work,' using the Unit 2 heart-rate false alarm.

7. You have 11 pieces from the year. Choose and order a portfolio of 6-8 for a biomedical-design audience, and justify the first and last pieces in one sentence each.

REVIEW

8. Review 4.2: A portfolio caption must name your role and one decision you are proud of. Write a 40-60 word caption for your think-aloud tested prototype.

Unit 4 checkpoint

1. Which exhibition taught through hands-on devices such as funhouse mirrors and a cone in which balls speed up near the center?
   A. Futurama
   B. Mathematica
   C. The 1900 Paris Exposition
   D. The WPA poster project
2. True or false: Exhibitions about the future are persuasive media that may carry a sponsor's interests.
3. A question form that turns a problem into an opening for ideas begins 'How _____ we...'.
4. In a Wizard of Oz test, who produces the AI's output?
   A. A trained model
   B. A hidden person, by hand from a script
   C. The user
   D. Nobody
5. True or false: A self-test after a day away may count as one user if no tester is available, as long as it is labeled in the log.
6. An illustrative budget has costs of $3,000, $500 and $500. With a 10% contingency, what is the total?
   A. $4,000
   B. $4,400
   C. $4,100
   D. $3,600
7. Which FDA pathway shows that a device is substantially equivalent to a legally marketed device?
   A. De Novo
   B. PMA
   C. 510(k)
   D. IRB
8. A committee that reviews research with human participants is an institutional review _____.
9. In a STAR answer, which part describes what you actually did?
   A. Situation
   B. Task
   C. Action
   D. Result
10. True or false: A portfolio should put the strongest piece first and be ordered to show growth.
11. Career information such as typical education and outlook comes from the Bureau of Labor Statistics Occupational Outlook _____.

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