

EA EOPA Review Packet

Complete the following as a review for the upcoming End of Pathway Assessment (EOPA).

Vocabulary – define/describe, include formulas when necessary

1. Mass
2. Volume (cube and cylinder)
3. Velocity
4. Acceleration
5. Power
6. Torque
7. Efficiency
8. Horsepower
9. BTU
10. Calorie
11. Force
12. Gravity
13. English Engineering Units
14. International System of Units
15. Pressure
16. Significant digit
17. Rounding
18. Weight
19. Work
20. Energy
21. Ohm's Law
22. Innovation
23. Specialization
24. Discipline (engineering one, please)
25. Brainstorming
26. Group dynamics
27. Benchmarking
28. Milestones
29. Ethics
30. Model
31. Prototype

Measurements and Calculations – find the answers

1. Homer needs to push his old TV to the junk pile. The TV weighs 30 kilograms, and the junk pile is 150 meters down the street. How much work will he need to do? Your answer should be in Newtons.
2. Marge has a flat tire and needs to change it. To loosen the lug nuts, she has two wrenches: one is 12 inches long and the other is 18 inches long. Which wrench will generate more torque and make her job easier? Explain why using calculations to back you up.
3. Bart just shot Officer Wiggum with his slingshot. To avoid getting caught, he needs to get to his hiding place in 5.5 seconds. The hiding place is 38.6m away. If Bart weighs 35.2kg, what rate of power will Bart have to expend to avoid getting caught? Your answer should be in Watts.
4. Lisa needs to cut an onion. She finds two knives – one is very dull, the other is very sharp. Using what you've learned about the relationship between pressure, force, and surface area, explain using calculations why the sharp knife is best. Keep in mind that even the sharpest knife edges are flat at the microscopic level. Also, you don't have all the information you need to make specific calculations, so you'll have to make some assumptions.
5. Springfield Elementary had an elevator installed. The elevator has a mass of 1200kg, and the distance from the first and second floors is 10m. The elevator takes 8 seconds to go from the first to the second floor. Four students get on, weighing 21kg, 32kg, 28kg, and 41kg respectively. The elevator motor has an efficiency rating of 89%.
 - How much power does the elevator motor use to lift everything to the second floor (Watts)?
 - How much power does the elevator motor need to accomplish this (Watts)?
6. A 10-tooth gear turns a 20-tooth gear, which in turn drives a 40-tooth gear. What is the gear ratio of this gear train?
7. If a measured voltage is 100 volts and the resistance is 11 ohms, how much current is there?
8. Put these in order: ____ Cut board; ____ Measure; ____ Measure; ____ Draw line. (yes, I know there are 2 'measures')
9. Solve for x on the diagrams on the board.

Engineering and Design Process – answer these

1. What is the main focus of engineering?
2. What is the main characteristic of engineering?
3. What are the steps in the Engineering Design Process? Briefly describe what happens in each.
4. How does the EDP compare to the Design Cycle? (we didn't discuss Design Cycle, but it's similar to EDP)
5. What are criteria and constraints? List at least 3 sources of them.
6. Briefly describe at least 3 types or categories of prototyping.
7. When testing a prototype, to what do you compare the results? What are your options if the prototype fails?

Soft Skills, Presentations, Etc. – answer these

1. List at least 5 guidelines for effective brainstorming.
2. List at least 5 guidelines for effective project planning.
3. List at least 5 guidelines for BOTH good presentations and the media (PowerPoint, etc.) used.
4. Does ethics apply the same in all situations? Why/why not?
5. What are the 6 'Fundamental Canons' of the Engineers' Code of Ethics?

Blueprint – go review the pdf on my webpage

Competency Areas – review these

Competency Area 1: Integrate knowledge of basic engineering principles into technical writing and presentations following the guidelines the contest technical committee has established

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Apply engineering knowledge in the areas of force, work, rate, resistance, energy, power, force transformers, momentum, waves and vibrations, energy converters, transducers, radiation, optical systems?	☐	☐	☐

Competency Area 2: Transform existing systems into conceptual models

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Transform conceptual models into determinable models?	☐	☐	☐
2. Use determinable models to obtain system specifications?	☐	☐	☐
3. Select optimum specifications and create physical models?	☐	☐	☐
4. Apply the results from physical models to create real target systems?	☐	☐	☐
5. Critically review real target systems and personal performance?	☐	☐	☐
6. Design effective and usable IT-based solutions and integrate them into the user environment?	☐	☐	☐
7. Assist in the creation of an effective project plan?	☐	☐	☐
8. Identify and evaluate current and emerging technologies and assess their applicability to address the users' needs?	☐	☐	☐

Competency Area 3: Showcase knowledge of project planning

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Apply brainstorming techniques?	☐	☐	☐
2. Implement benchmarking?	☐	☐	☐
3. Discuss continuous improvement?	☐	☐	☐
4. Explain cause and effect relationships?	☐	☐	☐
5. Apply knowledge of customer satisfaction?	☐	☐	☐
6. Demonstrate how to collect data?	☐	☐	☐
7. Apply decision making skills?	☐	☐	☐
8. Define and describe a process?	☐	☐	☐
9. Empower team members?	☐	☐	☐
10. Recognize methods of idea generation?	☐	☐	☐
11. Prioritize tasks?	☐	☐	☐
12. Reach consensus amongst the team?	☐	☐	☐
13. Display teamwork during the contest?	☐	☐	☐
14. Have equal team participation?	☐	☐	☐
15. Show positive group dynamics?	☐	☐	☐
16. Define team roles?	☐	☐	☐

Competency Area 4: Developing/Identifying opportunities

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Identify and define the opportunity?	☐	☐	☐
2. Identify the customer?	☐	☐	☐
3. Identify the customer's needs?	☐	☐	☐
4. State the problem or areas of improvement within the identified opportunity clearly and concisely?	☐	☐	☐
5. Quantify the opportunity with data?	☐	☐	☐
6. Show data gathered from research?	☐	☐	☐
7. Identify opportunity for improvement?	☐	☐	☐
8. Make decisions based on facts, not opinions?	☐	☐	☐
9. Show how the team determined the cause(s) of the problem and gained an understanding of the variation that occurs in the process?	☐	☐	☐
10. Diagram and perform a thorough assessment of the possible causes?	☐	☐	☐
11. Develop various solutions?	☐	☐	☐
12. Show alternative approaches or changes that would improve the situation?	☐	☐	☐
13. Define milestones?	☐	☐	☐
14. Recommend a plan to implement the solution(s)?	☐	☐	☐
15. Use analytical decision making by making full use of flow charts, bar graphs, cause and effect diagrams, Pareto diagrams, etc.?	☐	☐	☐
16. Describe a method to standardize or institutionalize the process?	☐	☐	☐

Competency Area 5: Write a problem statement

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Define the problem?	☐	☐	☐
2. Define the customer?	☐	☐	☐
3. Explain the customer expectations?	☐	☐	☐
4. Describe the product or service?	☐	☐	☐
5. Discuss how the product or service fulfills the customer's expectations?	☐	☐	☐
6. List the needed data?	☐	☐	☐
7. Reflect on how the process can be improved?	☐	☐	☐
8. Describe how the improved process will meet or exceed the customer's expectations?	☐	☐	☐

Competency Area 6: Design and deliver a presentation that discusses the problems and processes of the local institution

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Make the presentation clear and concise?	☐	☐	☐
2. Use graphics effectively to clarify presentation topics?	☐	☐	☐
3. Use time wisely while presenting?	☐	☐	☐

Competency Area 7: Design and develop a presentation that is the result of findings from the on-site problem and process

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Make the presentation clear and concise?	☐	☐	☐
2. Use graphics effectively to clarify presentation topics?	☐	☐	☐
3. Use time wisely while presenting?	☐	☐	☐

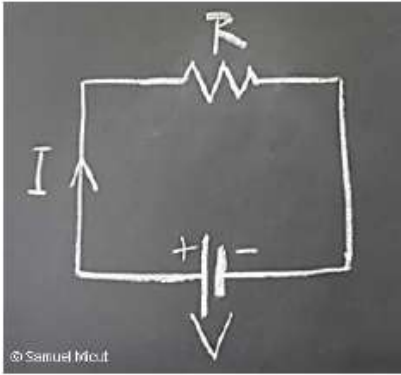
Competency Area 8: Deliver the presentation in a professional manner, meeting the standards outlined by the technical committee

Knowledge Check

How well do you know how to:	Very Well	Somewhat Well	Not Well
1. Explain the topic through the use of displays or practical operations?	☐	☐	☐
2. Demonstrate an effective and pleasing delivery style?	☐	☐	☐
3. Use verbal illustrations and examples effectively?	☐	☐	☐
4. Make a formal and effective introduction to the presentation that clearly identifies the scope of the presentation?	☐	☐	☐
5. Pronounce words in a clear and understandable manner?	☐	☐	☐
6. Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm?	☐	☐	☐
7. Demonstrate poise and self-control while presenting?	☐	☐	☐
8. Demonstrate good platform development and personal confidence?	☐	☐	☐
9. Communicate the primary points of the speech in a compact and complete manner?	☐	☐	☐
10. Tie organizational elements together with an effective ending?	☐	☐	☐
11. Complete the speech within the time limits set by the contest requirements?	☐	☐	☐
12. Develop storyboards for the presentation outlining the process?	☐	☐	☐

Sample Questions - answer all of these, then drag the answer box to see the correct one

1) The resistance of an electrical circuit is measured in:



- A. Current.
- B. Ohms.
- C. Voltage.
- D. Watts.

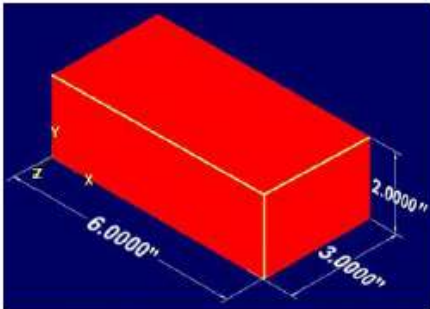
Your answer:

2) What is an improvement on an existing technological product, system or method?

- A. Experimentation
- B. Innovation
- C. Integration
- D. Specialization

Your answer:

3) What is the cubic volume of the shape shown?



- A. 30 cu. in.
- B. 32 cu. in.
- C. 36 cu. in.
- D. 40 cu. in.

Your answer:

4) The core process that is as fundamental to technology as inquiry is to science and reading is to language arts is called:

- A. Control.
- B. Design.
- C. Maintenance.
- D. Optimization.

Your answer:

5) Your supervisor has given you a project that needs to have 1600 parts manufactured in 36 hours. Each of the machines can produce 50 parts an hour. How many hours will you need to plan for?



- A. 18 hours
- B. 32 hours
- C. 44 hours
- D. 1800 hours

Your answer:

6) Which of the following statements about teamwork is FALSE?

- A. Teamwork can bring more talent, experience, knowledge and skills to a project.
- B. Teamwork requires less organization and coordination than working individually.
- C. Teamwork can be more satisfying and morale-boosting for people than working alone.
- D. Teamwork requires a different set of skills than working individually.

Your answer:

7) What do the letters OSHA stand for?

- A. Office of Secure Housing Authority
- B. Organized Safety and Healing Association
- C. Occupational Safety and Health Administration
- D. Original Steel and Health Act

Your answer: