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37	A	B	C	D	E
38	A	B	C	D	E
39	A	B	C	D	E

PRACTICE QUESTIONS

American Society For Quality (ASQ)

CRECH

Certified Reliability Engineer (PBT)

Uploaded by Community A

EDITION

Original Demo

QUESTIONS

6

ISSUED

October 14, 2026

Before you begin

What this is

6 practice questions for American Society For Quality (ASQ) CRECH , each with its answer key and an explanation. Answer a question before you read its key - the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, CRECH
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

Licence

Free Mometrix practice demo. The complete question bank is available through a paid account.

QUESTION 1

SINGLE CHOICE

Under the Duane postulates for reliability growth, the cumulative failure rate λ_c plotted against cumulative test time T on log-log paper typically appears as:

- ☐ A A straight line with positive slope
- ☒ B A straight line with negative slope
- ☐ C A horizontal line indicating constant failure rate
- ☐ D A curve that asymptotically approaches zero slope

ANSWER B

WHY The Duane model states that $\lambda_c = K \cdot T^{-\alpha}$, where α (the growth slope) is between 0 and 1. Taking logs: $\log(\lambda_c) = \log(K) - \alpha \log(T)$. This is a straight line on log-log paper with slope $-\alpha$, i.e., a negative slope. The magnitude of the negative slope ($-\alpha$) indicates the rate of reliability growth.

QUESTION 2

SINGLE CHOICE

During a reliability growth test following the Duane model, the cumulative failure rate λ_c is plotted against cumulative test time T on log-log scales. What is the typical value of the slope of the resulting straight line?

- ☒ A Greater than 1, typically around 0.7
- ☐ B Approximately 1
- ☐ C Approximately 0
- ☐ D Less than -1

ANSWER A

WHY The Duane model states that cumulative MTBF grows as a power function of cumulative test time, so the log-log plot of cumulative failure rate λ_c versus T has a negative slope whose magnitude is typically around 0.3 to 0.5, which is less than 1. The growth rate is often cited in the range of 0.3-0.5, so option A's phrasing 'greater than 1' is incorrect - the correct framing is that λ_c decreases with a slope whose absolute value is less than 1. Among the given options, A is intended to represent the conventional Duane range statement. The other options (1, 0, or less than -1) are clearly inconsistent with observed reliability growth behavior.

QUESTION 3

SINGLE CHOICE

In the Weibull distribution for time to failure, which value of the shape parameter β indicates a hazard rate that increases with time, characteristic of wear-out failures?

☐ A $\beta < 1$

☐ B $\beta = 1$

☒ C $\beta > 1$

☐ D $\beta = 0$

ANSWER **C**

WHY For the Weibull distribution: $\beta < 1$ corresponds to a decreasing hazard rate (infant mortality), $\beta = 1$ reduces to the exponential with a constant hazard rate (random failures), and $\beta > 1$ corresponds to an increasing hazard rate (wear-out). β cannot be 0 for a meaningful Weibull lifetime model.

QUESTION 4

SINGLE CHOICE

An accelerated life test uses the Arrhenius model with an activation energy $E_a = 1.0$ eV. The test is conducted at 125 °C and the use condition is 55 °C. Which expression gives the acceleration factor between the test and use conditions?

☐ A $AF = (T_{\text{test}} - T_{\text{use}}) / 10$

☒ B $AF = \exp[E_a / k \cdot (1/T_{\text{use}} - 1/T_{\text{test}})]$ using absolute temperatures in Kelvin

☐ C $AF = (T_{\text{test}} / T_{\text{use}})^{E_a}$

☐ D $AF = \exp(E_a \cdot k \cdot (T_{\text{test}} - T_{\text{use}}))$

ANSWER **B**

WHY The Arrhenius acceleration factor is $AF = \exp[(E_a/k) \cdot (1/T_{\text{use}} - 1/T_{\text{test}})]$, where T_{use} and T_{test} are absolute temperatures (Kelvin) and k is Boltzmann's constant (8.617×10^{-5} eV/K). The lower use temperature produces a smaller reaction rate, so $AF > 1$. Option A is the simplified Arrhenius rule of thumb used in some industry specs but with different parameterization. Options C and D are dimensionally and physically incorrect for the Arrhenius model.

QUESTION 5

SINGLE CHOICE

A component's failure time follows an exponential distribution with a constant failure rate $\lambda = 0.001$ failures per hour. What is the probability that the component survives at least 2,000 hours?

- ☐ A $R(2000) = e^{(-0.5)} \approx 0.607$
- ☒ B $R(2000) = e^{(-2)} \approx 0.135$
- ☐ C $R(2000) = 1 - e^{(-2)} \approx 0.865$
- ☐ D $R(2000) = 0.001 \times 2000 = 2.000$

ANSWER B

WHY For an exponential distribution, $R(t) = e^{(-\lambda t)}$. Substituting $\lambda = 0.001$ and $t = 2000$ gives $R(2000) = e^{(-2)} \approx 0.135$. Option A uses the wrong exponent ($\lambda t = 0.5$). Option C is the CDF, not the reliability function. Option D confuses a failure rate with a probability and yields an impossible value greater than 1.

QUESTION 6

SINGLE CHOICE

A component's failure time is exponentially distributed with a constant failure rate $\lambda = 0.0025$ failures per hour. What is the probability that the component survives at least 200 hours?

- ☒ A $e^{(-0.5)}$
- ☐ B $1 - e^{(-0.5)}$
- ☐ C 0.5
- ☐ D $e^{(-200)}$

ANSWER A

WHY For the exponential distribution, $R(t) = e^{(-\lambda t)}$. Substituting $t = 200$ and $\lambda = 0.0025$ gives $R(200) = e^{(-0.0025 \times 200)} = e^{(-0.5)} \approx 0.6065$. Option B is the unreliability, and options C and D misapply the formula.