

Mechanical Engineering Undergraduate Admissions Test - Readiness Test Questions

NOTE: Enter your answers correct to at least 3 significant figures. For example if you find the answer to a question is 41.26, then you can enter 41.26 or you can round to 41.3 before you enter it.

1. Solve the equation $2^{x+3} = 5^{6x}$.

[Ans: $x = 0.232$]

[Solution: $(x + 3) \log 2 = 6x \log 5$, so $x = -3 \log 2 / (\log 2 - 6 \log 5)$]

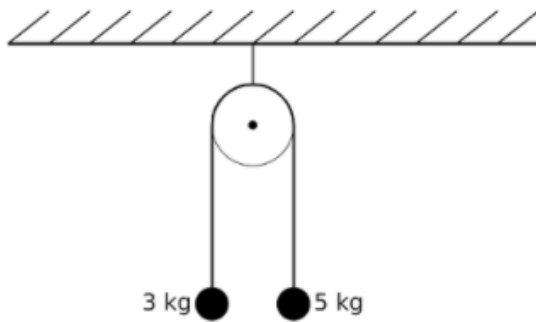
2. A multiple choice test has 5 questions and each question has 3 choices, only one of which is correct. A student passes the test if they score 40% or more. If a student guesses all the answers randomly, then what is the probability that they fail the test? (Give your answer as a decimal number between 0 and 1)

[Ans: The probability is 0.461]

[Solution: to score 40% or more, the student must answer 2 or more questions correctly. The probability of 0 or 1 correct questions is $\frac{5!}{0!5!} \left(\frac{1}{3}\right)^0 \left(\frac{2}{3}\right)^5 + \frac{5!}{1!4!} \left(\frac{1}{3}\right)^1 \left(\frac{2}{3}\right)^4$]

3. Two particles, of mass 3 kg and 5 kg respectively, are connected by a light inextensible string. The string passes over a fixed smooth pulley and the system is initially held at rest with the strings taut and vertical as shown in the diagram below. If the system is released from rest, what is the magnitude of the acceleration of the

particles, assuming that acceleration due to gravity is 9.8 ms^{-2} .



[Ans: 2.45 ms^{-2}]

[Solution: $3 \times a = T - 3 \times 9.8$ and $5 \times a = 5 \times 9.8 - T$, so $8 \times a = 2 \times 9.8$]

4. The photo below was taken by a camera moving in a straight line at fixed velocity. The exposure time was $\frac{1}{250}$ seconds. Estimate the speed of the car, in kilometers per hour, assuming that the car is perfectly in focus, and the blurred region in the photo between the red and white strips is 5 cm wide.



[Ans: 45 kph]

[Solution: the car and the camera both travelled 0.05 m in $\frac{1}{250}$ seconds, so they are travelling at 12.5 ms^{-1}]

If you have questions please email me.admissions@imperial.ac.uk