

IE-341
Section 1, CRN: 30512/513/514
Section 2, CRN: 30515/516/517
Section 3, CRN: 38299/300/301
First Semester 1436-37 H (Fall-2015) – 3(2,1,2)
“HUMAN FACTORS ENGINEERING”

Sunday, Nov. 22, 2015 (10/02/1437H)

Homework 2 (Midterm 2)

Name:	Student Number:	Section:
	4	8 / 9 / 10

Place the correct LETTER in the box at the right of each question [0.5 Points Each]

Questions 1-5. Consider the figure shown at the bottom of this page.

1. The figure shows an example of a ...display.

- A. fixed-scale, moving-pointer, mechanical, analog
- B. fixed-scale, moving-pointer, electronic, analog
- C. fixed-scale, moving-pointer, mechanical, digital
- D. moving-scale, fixed-pointer, mechanical, analog
- E. moving-scale, fixed-pointer, electronic, analog

2. The *DCV* scale numbered interval and range are ... and ..., respectively.

- A. 250, 50
- B. 25, 250
- C. 250, 25
- D. 5, 250
- E. 50, 250

3. The *mA* scale intermediate and graduation intervals are ... and ..., respectively.

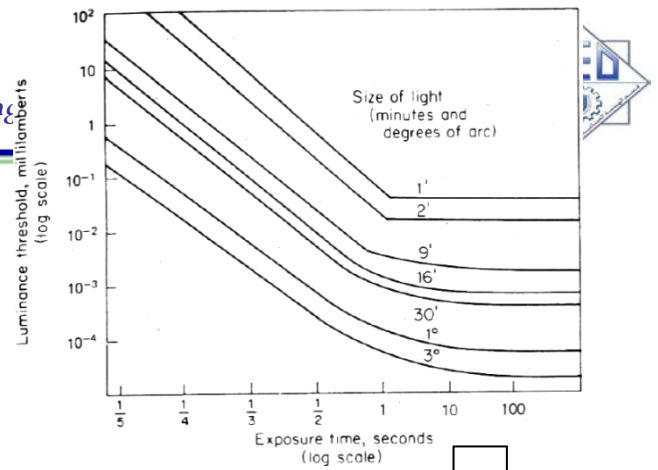
- A. 2, 1
- B. 0.5, 1
- C. 1, 0.2
- D. 1, 0.5
- E. 2, 0.2



4. **Such type of scale is usually preferred for which type of data?**
- A. when values are not continuously changing
 - B. generally preferred for different data types
 - C. when a numerical value is needed to be readily available
 - D. when relating to a null value
 - E. mostly used for quantitative data
5. **Name one change that should be made to match the recommended scale format.**
- A. parallax should be avoided
 - B. length of scale units should be enlarged (for *DCV*, *ACV*, and *mA*)
 - C. a longer pointer should be used
 - D. each graduation marker should be numbered
 - E. intermediate markers should be shorter than major scale markers
6. **Which of the following is acceptable regarding flashing lights?**
- A. displaying five different flashing lights at the same time
 - B. using a light that flashes at a rate of 2,000 times per minute
 - C. using a light that flashes with a duration of 0.03 s
 - D. using a flyway light at 90 flashes per minute
 - E. using a light that flashes at 5 times per second at a flashing duration of 0.01 s
7. **What is the biggest advantage of the “gestalt” phenomenon in the figure below?**
- A. it makes it easier to count the number of objects in the photo
 - B. it makes it easy to identify the dissimilar object
 - C. it adds to the contrast of the figure
 - D. it helps in identifying the shape and size of each component
 - E. it offers no advantage in this particular figure



Questions 8-9. Consider the figure shown on the right, where a light is displayed at an exposure time of 0.5 s.



8. As a result of reducing a 60' light by 50%, the luminance threshold should ...

- A. become approximately 10 times the original value
- B. become approximately 200 times the original value
- C. become approximately 20 times the original value
- D. become approximately 100 times the original value
- E. become approximately one-tenth of the original value

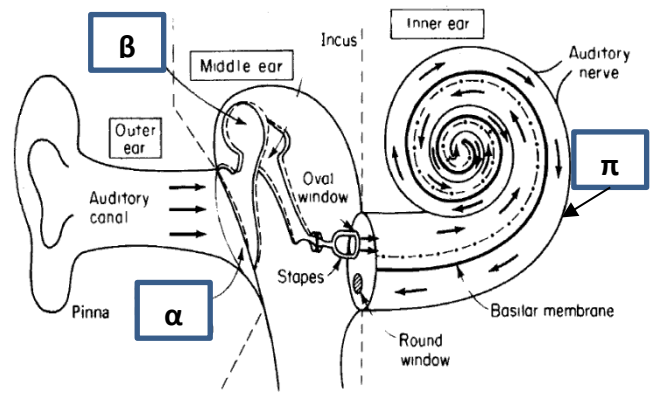
9. For operational use, the luminance value in Q8 above should ...

- A. become approximately 10 times the original value
- B. become approximately 200 times the original value
- C. become approximately 20 times the original value
- D. become approximately 100 times the original value
- E. become approximately one-tenth of the original value

Questions 10-11. Answer the following questions regarding the figure shown below.

10. Label the diagram shown below.

- A. α : eardrum; β : cochlea; π : malleus
- B. α : malleus; β : eardrum; π : cochlea
- C. α : cochlea; β : malleus; π : eardrum
- D. α : eardrum; β : malleus; π : cochlea
- E. α : cochlea; β : eardrum; π : malleus



11. Which part is responsible for protecting the ear against intense sounds?

- A. inner ear
- B. inner and outer ear
- C. middle ear
- D. ear cannot protect itself against such sounds
- E. outer ear

12. What is the *SPL* for a sound pressure 100 times that of the reference value?

- A. 40 *dB*
- B. 20 *dB*
- C. 10 *dB*
- D. 100 *dB*
- E. 400 *dB*

13. What is true regarding the spectral analysis within a single bandwidth?

- A. wider bandwidths produce higher *SPL*, and more frequency details
- B. wider bandwidths produce lower *SPL*, and more frequency details
- C. wider bandwidths produce lower *SPL*, and less frequency details
- D. wider bandwidths produce higher *SPL*, and less frequency details
- E. wider bandwidths produce lower *SPL*, no change in frequency details

14. What is true regarding octaves?

- A. measures frequency intervals; each octave has double frequency of octave above it
- B. measures frequency intervals; each octave has half frequency of octave above it
- C. measures intensity; each octave has double intensity of octave above it
- D. measures intensity; each octave has half intensity of octave above it
- E. measures frequency intervals; each octave has 10 times frequency of octave above it

15. As the loudness of a *masking* sound increases (for a constant *masked* sound), ...

- A. threshold of audibility stays the same, and *SNR* decreases
- B. threshold of audibility decreases, and *SNR* decreases
- C. threshold of audibility increases, and *SNR* increases
- D. threshold of audibility decreases, and *SNR* increases
- E. threshold of audibility increases, and *SNR* decreases

16. Which of the following noise exposures poses the highest risk?

- A. Exposing adults to occupational noise @ 100 *dB* and 22 *kHz* everyday
- B. Exposing adults to occupational noise @ 100 *dB* and 0.5 *kHz* everyday
- C. Exposing adults to occupational noise @ 50 *dB* and 3.5 *kHz* everyday
- D. Exposing adults to occupational noise @ 100 *dB* and 3.5 *kHz* everyday
- E. Exposing adults to occupational noise @ 50 *dB* and 0.5 *kHz* everyday

17. Examples of a speech manipulator and resonator are, respectively, ... and

- A. vocal cords, pharynx
- B. velum, pharynx
- C. vocal cords, velum
- D. epiglottis, pharynx
- E. epiglottis, tongue

18. Which of the following should have the highest *SPL*?

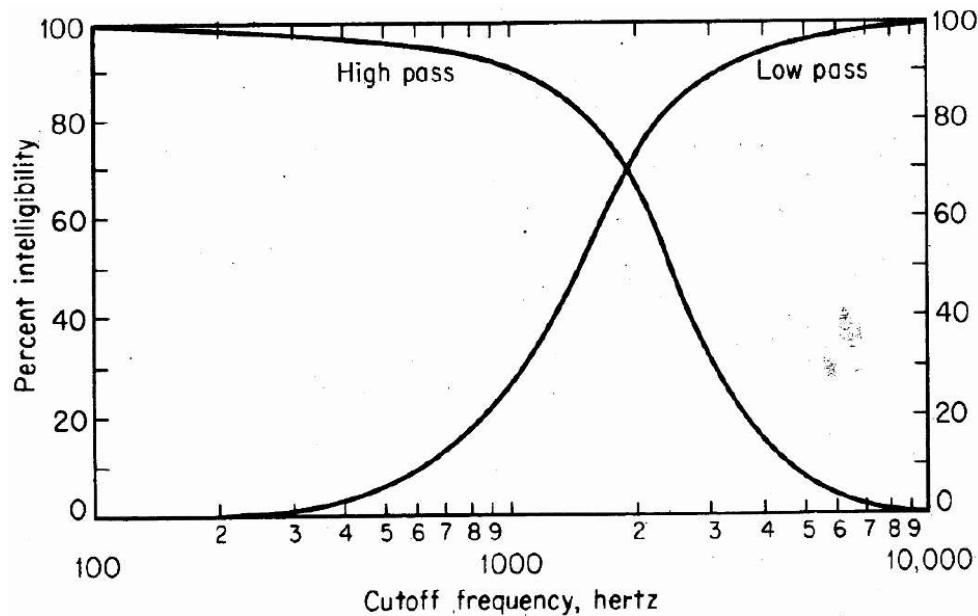
- A. a woman pronouncing a low-frequency vowel
- B. a man pronouncing a high-frequency vowel
- C. a man pronouncing a low-frequency vowel
- D. a man pronouncing a low-frequency consonant
- E. a woman pronouncing a high-frequency consonant

19. Which of the following has the highest intelligibility (in the absence of noise)?

- A. use of meaningful sentences, longer words
- B. use of monosyllables
- C. use of less vocabulary
- D. use of shorter syllables
- E. speaking with low frequency, low intensity

20. Which of the following produces the lowest speech intelligibility?

- A. filtering sounds below 1,500 Hz
- B. filtering sounds below 1,000 Hz
- C. filtering sounds above 5,000 Hz
- D. filtering sounds above 2,000 Hz
- E. filtering sounds above 900 Hz



$$SPL (dB) = 10 \log \frac{P_1^2}{P_0^2} = 20 \log \frac{P_1}{P_0} = 20 [\log P_1 - \log P_0]$$

Rules:

- You must prepare and submit the homework **individually**.
- All work must be neatly typed and printed.
- Use **proper English**.
- Show all work.
- **BOX** your answer(s) and include the **units** (if applicable).
- **Due date:** the first class of Week 14 (beginning of class). **NO** late homework will be accepted.