

1. The beam-output monitor of an x-ray electron beam therapy unit shall be accurate to within \_\_\_\_\_ at all available settings. 15:74
  - A. .1%
  - B. 1%
  - C. .3%
  - D. 3%
2. Baseline calibrations of a linear accelerator must be performed by a qualified physicist: 22:2
  - A. Before the first treatment
  - B. After the first treatment
  - C. After each treatment
  - D. When changes in treatment are required
3. Weekly spot checks for high energy photon beams must be included in checks for the determination of:
  1. Field symmetry
  2. Light field coincidence
  3. Dose rate
  - A. 1 & 2 only
  - B. 1 & 3 only
  - C. 2 & 3 only
  - D. 1, 2, & 315:75
4. A test consisting of a film shielded by two lead blocks exposed at two gantry positions 180° apart best describes a:
  - A. Field congruence test
  - B. Dual field back scatter test
  - C. Split field test
  - D. Double overlap test22:109
5. The quality, quantity, and timing circuit of a collimated teletherapy source should be performed at least:
  - A. Twice a year
  - B. Once a month
  - C. Once weekly
  - D. Daily17:77
6. Before a new unit is used for medical purposes, it must be calibrated for 15:73
  1. Collimator scattering
  2. Beam quality
  3. Central axis kerma
  - A. 1 & 2 only
  - B. 1 & 3 only
  - C. 2 & 3 only
  - D. 1, 2, & 3
7. The common standard depth for gamma ray measurements for photon energies below 10 MeV which will avoid contamination by secondary electrons is 15:73
  - A. .5 cm
  - B. 1 cm
  - C. 2.5 cm
  - D. None of the above
8. Full or partial re-calibration of a gamma beam therapy unit is required if the kerma or dose rate shows greater than a \_\_\_\_\_ change from previous measurements 15:74
  - A. 1%
  - B. 2%
  - C. 3%
  - D. 5%
9. Constancy checks for all linear accelerators must be performed by a qualified individual 22:55
  - A. Preceding each treatment
  - B. Following each treatment
  - C. At least once a day
  - D. At least once a week
10. To check the accuracy of the gantry digital readouts, you should 22:90
  - A. Close the collimator shutters
  - B. Use a spirit level at 45° angulations
  - C. Use a breast bridge at 90° angulations
  - D. Use a split field test at 180° angulations

11. When calibrations are attempted for electron beams, the preferred phantom material is: 8:306  
 A. Distilled water C. Paraffin  
 B. Polystyrene D. Cerrobend
12. During a split field test for longitudinal displacement of the collimator for jaw symmetry, the collimator is rotated to angles of: 22:109  
 A. 360 C. 180  
 B. 270 D. 90
13. After a split field test is performed, the acceptable limit of shift between two parallel opposed fields is: 22:110  
 A. 1 mm or less C. 1 cm or less  
 B. 3 mm or less D. 3 cm or less
14. When light localization of treatment portals are employed, a means for their adjustment should be available in/on the: 14:33  
 A. Treatment room C. Both of the above  
 B. Control panel D. Neither of the above
15. Which of the following devices or equipment can be employed to perform constancy checks related to field symmetry and flatness? 22:56  
 1. Ready pack film 2. Ionization chambers 3. TLD's  
 A. 1 only C. 3 only  
 B. 2 only D. 1, 2, & 3
16. Constancy checks may be accomplished in many ways using an ion chamber for air, water, or phantom measurements and TLD's. Which method is not acceptable for machine calibration? 13:69  
 A. Air measurements C. TLD measurements  
 B. Phantom measurements D. Water measurements
17. Using a 10cm x 10cm field, coincidence of the light field to the therapy beam must agree to within: 13:51  
 A. 1 mm C. 3 mm  
 B. 2 mm D. 5 mm
18. Inaccurate field alignment of any type of treatment machine may result in  
 1. Normal tissue overdose 2. Decreased tumor dose 3. Increased backscatter factor  
 A. 1 only C. 3 only  
 B. 2 only D. 1, 2, & 3
19. While treating a patient using a rotational technique, the gantry rotates past the end point. This is most likely a malfunction of the:  
 A. Console C. Collision ring  
 B. Limit switch D. Override switch
20. A baseline calibration of the dose rate of a Co 60 unit would be required: 15:74  
 1. When sources are replaced 2. On all new machines 3. After a timer failure  
 A. 1 & 2 only C. 2 & 3 only  
 B. 1 & 3 only D. 1, 2, & 3
21. An overhead sagittal laser light is useful in aligning the sagittal axis of the patient with the axis of the:  
 A. Collimator rotation C. Table rotation 8:268  
 B. Gantry rotation D. Tumor rotation

22. Which of the following is not an appropriate use for radiographic filming for a 200 kV photon beam? 8:155
- A. Light field coincidence  
B. Absolute dosimetry  
C. Port simulation  
D. Field flatness
23. The alignment of the therapy beam, localizing light and collimators shall be conducted at least once a: 15:74
- A. Day  
B. Week  
C. Year  
D. No periodic testing is required
24. The standard field size that is selected for the calibration of an orthovoltage or supervoltage treatment unit is: 8:48
- A. 2cm x 2cm  
B. 4cm x 4cm  
C. 10cm x 10cm  
D. 20cm x 20cm
25. In order to check the centering of isocentric units, a film is placed to approximate the central ray with exposures being made at the nine gantry positions spaced \_\_\_\_\_ apart. 13:48
- A. 20  
B. 30  
C. 40  
D. 60
26. A door interlock system has been found to be inoperable. This unit can be operated only if: 15:58
- A. The patient has been set up  
B. The switch is not repairable  
C. The radiation safety officer is present  
D. None of the above
27. A short exposure is taken on a radiographic film aligned with metallic marks on the borders of the collimated light field. This arrangement best describes a test for: 15:45
- A. Light field coincidence  
B. Field flatness  
C. Collimator symmetry  
D. Field dosimetry
28. During a rotational therapy, the point of intersection of the collimator and gantry axis is called the: 8:164
- A. Convergence point  
B. Perspex  
C. Isocenter  
D. Fluence point
29. Which of the following are all possible sources of light field incongruence? 22:47
1. *Mirror misalignment*      2. *Gantry angulation*      3. *Electron beam contamination*
- A. 1 only  
B. 2 only  
C. 3 only  
D. 1, 2, & 3
30. The common acceptable value for field flatness is about \_\_\_\_\_ over the central 80% of the largest field size at isocenter. 22:69
- A. +/- 30%  
B. +/- 12%  
C. +/- 5%  
D. +/- 3%
31. The monitoring chambers of a linear accelerator can be used for the evaluation of a: 8:56
1. *Monitor dose rate*      2. *Field symmetry*      3. *Beam energy*
- A. 1 & 2 only  
B. 1 & 3 only  
C. 2 & 3 only  
D. 1, 2, & 3
32. A spot check for dose rate and light field congruence on a high energy photon beam unit must be performed at least once each: 15:75
- A. Week  
B. Month  
C. Year  
D. Decade

33. A split field test is performed to check the alignment of: 22:108  
 A. Opposed fields C. Spirit levels  
 B. Laser lights D. Back pointers
34. Daily or weekly safety checks should be performed for all: 22:31  
 1. Door interlocks 2. Monitor systems 3. Protective barriers  
 A. 1 only C. 3 only  
 B. 2 only D. 1, 2, & 3
35. Full recalibration on a gamma beam therapy should be performed upon installation and at intervals not to exceed: 15:74  
 A. 3 months C. 1 year  
 B. 6 months D. 3 years
36. The principal objective in performing field symmetry and flatness checks is the determination of: 22:68  
 A. Dose rate consistency across the field C. Film density across the field  
 B. Dose rate consistency at the central axis D. Attenuation at the central axis
37. A common cause of a longitudinal shift between radiation fields during a split field test is a (an): 22:108  
 A. Incorrect wedge placement C. Sagging gantry arm  
 B. Misaligned laser light D. Defective shadow trav
38. All of the following are functions of the light field except:  
 A. Guide to portal size C. Guide to tumor size  
 B. Guide to radiation beam position D. Guide to portal shape
39. The maximum difference from the dose on the central axis over 80% of the field dimension best defines: 22:69  
 A. Isocenter axis C. Penumbra  
 B. Field size limit D. Field flatness
40. All of the following might account for a beam's flatness drifting outside specifications, except: 22:67  
 A. Flattening filter shift C. Incorrect mirror angulation  
 B. Target position shift D. Fluxuation of current to the bending magnet
41. Following repairs to a linear accelerator field/distance light assembly, which of the following checks must be performed before treatment can occur? 15:74  
 1. Dose rate 2. Light field/radiation field coincidence 3. Collimator readout  
 A. 1 & 2 only C. 2 & 3 only  
 B. 1 & 3 only D. 1, 2, & 3
42. The calibration test for a high energy therapy unit must include determinations for: 15:74  
 1. Field uniformity 2. Light field congruence 3. Beam quality  
 A. 1 & 2 only C. 2 & 3 only  
 B. 1 & 3 only D. 1, 2, & 3
43. Mechanical distance indicators can be employed to verify: 14:76  
 A. Gantry rotation C. Accuracy of optical distance  
 B. Side laser alignment indicator D. Field size congruence

44. During the calibration of a high energy x-ray beam, an increase in field size will increase the exposure rate. The principal reason for this is: 8:183
- A. Block transmission  
B. Collimator scattering  
C. Beam attenuation  
D. Auger contamination
45. Which of the following is not a common cause of beam misalignment? 22:106
- A. Focal spot displacement  
B. Collimator asymmetry  
C. Source penumbra  
D. Misalignment of the gantry rotational axis
46. The dose distribution across a given field (beam uniformity) can be determined by the use of a:
- A. Water phantom  
B. Solid phantom  
C. Both of the above  
D. Neither of the above
47. All of the following are true regarding a constancy check, except: 22:54
- A. Frequency depends on the unit employed  
B. It is employed for baseline testing  
C. It is employed for calibrations  
D. It can be performed by various instruments
48. The verification of an isocentric unit requires that the final location of the images of the cross wires shall pass through a sphere not exceeding: 13:48
- A. 4 mm in diameter  
B. 8 mm in diameter  
C. 1.5 cm in diameter  
D. 5 cm in diameter
49. A split field test can be employed to detect: 22:109
- A. Stability of the isocenter  
B. Position of the Co60 source  
C. Collimator asymmetry  
D. All of the above
50. Which of the following is needed for checking collimator rotation accuracy? 14:94
- A. Spirit level  
B. Metric ruler  
C. Film  
D. Shielding blocks
51. If the radiation source on a Cobalt 60 unit has failed to terminate exposure at the end of the preset time, what action should the technologist take? 15:110
- A. Enter room and physically reset the source  
B. Consult physicist prior to any action  
C. Remove patient from room  
D. Enter room and close collimators to zero

*Match the following safety devices with their appropriate testing frequency (Answers can be used more than once):*

- A. Weekly    B. Monthly    C. Quarterly    D. Yearly    E. Daily    22:31-35

52. \_\_\_\_ Collision ring
53. \_\_\_\_ Emergency "off" switch
54. \_\_\_\_ Override switch
55. \_\_\_\_ Limit switches
56. \_\_\_\_ Back-up timer switch
57. \_\_\_\_ Door interlocks
58. \_\_\_\_ Radiation "off" switch on console

59. The timer of an electron or gamma beam therapy unit shall be accurate to within: 15:74
- A. 1 %
  - B. 3%
  - C. 5%
  - D. None of the above
60. The Kerma rate measurements to evaluate the adequacy of the primary barriers should be made using: 15:77
- A. A phantom which intercepts the beam
  - B. Collimators open to 10 cm x 10 cm field
  - C. Both of the above
  - D. Neither of the above