Advanced Fetal Monitoring Review Course
(David A. Miller, MD, FACOG, and Lisa A. Miller, CNM, JD.)
Post-test

1. At 32 weeks and beyond, a FHR acceleration is defined as an increase in FHR that must be at least

   a. 5 bpm above the baseline and the acceleration must last at least 10 seconds
   b. 10 bpm above the baseline and the acceleration must last at least 10 seconds
   c. 15 bpm above the baseline and the acceleration must last at least 10 seconds
   d. 15 bpm above the baseline and the acceleration must last at least 15 seconds
   e. 20 bpm above the baseline and the acceleration must last at least 15 seconds

2. Fetal heart rate variability cannot be interpreted with an external monitor.

   a. True
   b. False

3. Use of the terms "beat-to-beat" variability and "long-term" variability is not recommended by the NICHD because in actual practice, they are visually determined as a unit.

   a. True
   b. False

4. Variable deceleration of the fetal heart rate is defined as a visually apparent abrupt decrease in FHR. The time from the onset of the deceleration to the nadir (lowest point) is less than:

   a. 15 seconds
   b. 20 seconds
   c. 30 seconds
   d. 60 seconds
   e. 2 minutes

5. According to NICHD definitions of FHR variability, which of the following is accurate?

   a. Range 1-5 bpm = absent variability
   b. Range visually detectable but ≤ 5 bpm = reduced variability
   c. Range 6-25 bpm = average variability
   d. Range > 25 bpm = excessive variability
   e. Range visually detectable but ≤ 5 bpm = minimal variability

6. Before 32 weeks of gestation, accelerations are defined as having a peak at least 15 bpm above baseline and a duration of at least 15 seconds.

   a. True
   b. False

7. According to standardized NICHD terminology, the normal FHR baseline range is:

    a. 120-160 beats per minute regardless of gestational age
    b. 110-170 beats per minute before 32 weeks of gestation
    c. 120-160 beats per minute after 32 weeks of gestation
    d. 110-160 beats per minute regardless of gestational age

8. According to the 2008 NICHD consensus report, at the time it observed, moderate FHR variability is highly predictive of the absence of fetal

    a. Metabolic acidemia
    b. Respiratory acidemia
    c. Hypoxemia
    d. Hemolytic anemia

9. Late deceleration of the fetal heart rate is associated most specifically with

    a. Transient fetal tissue hypoxia during a uterine contraction
    b. Transient fetal tissue metabolic acidosis during a uterine contraction
    c. Transient fetal hypoxemia during a uterine contraction
    d. Transient fetal asphyxia during a uterine contraction
    e. Transient fetal cerebral ischemia during a uterine contraction

10. According to the 2008 NICHD consensus report, at the time they are observed, FHR accelerations are highly predictive of the absence of:

    a. Transient fetal hypoxemia
    b. Fetal metabolic acidemia
    c. Fetal tissue metabolic acidosis
    d. Fetal tissue hypoxia

11. A FHR rise of at least 10 beats per minute lasting at least 10 seconds and less than 2 minutes is defined as an acceleration at a gestational age of

    a. < 32 weeks
    b. < 33 weeks
    c. < 35 weeks
    d. < 37 weeks

12. Clinically significant fetal heart rate decelerations (late, variable, prolonged) are associated with interruption of the normal delivery of oxygen from the environment to the fetus along a pathway including:

    a. Lungs, Heart, Vasculature, Kidneys, Uterus, Placenta, Umbilical cord
    b. Lungs, Heart, Vasculature, Uterus, Placenta, Umbilical cord
    c. Heart, Vasculature, Kidneys, Uterus, Umbilical cord
    d. Lungs, Vasculature, Placenta, Adrenal glands, Uterus, Umbilical cord

13. Assessment of FHR variability

    a. Requires a fetal scalp electrode
    b. Includes quantitiation of beat-to-beat changes
    c. Includes a thorough description of long-term variability
    d. Can be performed using an external monitor with autocorrelation technique

14. According to standardized NICHD nomenclature, decelerations that occur with at least 50% of uterine contractions in a 20 minute window are defined as:

    a. Repetitive
    b. Ominous
    c. Non-reassuring
    d. Recurrent
    e. Persistent

15. Which setting is most appropriate for fetal vibroacoustic stimulation:

    a. 38 weeks, active labor, FHR baseline 140 beats per minute, minimal variability, no accelerations, no decelerations

    b. 40 weeks, active labor, FHR baseline 150 beats per minute, moderate variability, prolonged deceleration to 60 beats per minute for 8 minutes

    c. 39 weeks, active labor, FHR baseline 115 beats per minute, minimal variability, frequent accelerations, occasional late decelerations

    d. 35 weeks, frequent contractions without cervical change, FHR baseline 180 beats per minute, moderate variability, frequent accelerations, frequent late decelerations

16. Progression from normal fetal oxygenation to eventual development of metabolic acidemia occurs in what order:

    a. Hypoxemia, tissue metabolic acidosis, tissue hypoxia, metabolic acidemia
    b. Hypoxemia, tissue hypoxia, tissue metabolic acidosis, metabolic acidemia
    c. Metabolic acidosis, tissue hypoxia, hypoxemia, metabolic acidemia
    d. Tissue hypoxia, metabolic acidosis, hypoxemia, metabolic acidemia
    e. Hypoxemia, cerebral ischemia, tissue acidosis, hypoxia, asphyxia

17. An intrapartum FHR tracing demonstrates a baseline rate of 125 beats per minute, moderate variability, accelerations and intermittent late and variable decelerations. Which of the following statements is most accurate?

    a. Moderate variability and accelerations are highly predictive of the absence of metabolic acidemia at the time they are observed
    b. Late decelerations reflect transient fetal asphyxia during uterine contractions
    c. Variable decelerations are caused by respiratory acidosis during cord compression
    d. Variable decelerations are caused by fetal hypoxia during cord compression

18. According to the ACOG – AAP monograph entitled Neonatal Encephalopathy and Cerebral Palsy: Defining the Pathogenesis and Pathophysiology, which of the following constitutes an essential criterion defining an acute intrapartum hypoxic event sufficient to cause cerebral palsy:

    a. Umbilical artery pH < 7.2 and base deficit of at least 6 mmol/L
    b. Profound respiratory acidemia
    c. Early onset of moderate-severe neonatal encephalopathy in infants born at ≥ 34 weeks of gestation
    d. Apgar score < 3 at 1 minute

19. A complete description of a fetal heart rate tracing requires a qualitative and quantitative description of all of the following except:

    a. Baseline rate
    b. Beat-to-beat variability
    c. Accelerations
    d. Decelerations
    e. Changes or trends in the fetal heart rate patterns over time

20. Minimal or absent FHR variability alone reliably predicts the presence of fetal metabolic acidemia at the time it is observed.

    a. True
    b. False

21. The absence of FHR accelerations is highly predictive of fetal metabolic acidemia at the time it is observed.

    a. True
    b. False

22. According to the 2008 NICHD consensus report, a Category I FHR tracing requires which of the following?

    a. Baseline rate 110-160 bpm
    b. Moderate variability
    c. Accelerations
    d. No late, variable or early decelerations
    e. a and b

23. According to the 2008 NICHD consensus report, variable decelerations are classified as "mild", "moderate" or "severe"

    a. True
    b. False

24. According to standardized the 2008 NICHD consensus report, which of the following would be classified as a Category III FHR tracing:

   a. Baseline 180 bpm, absent variability, no accelerations, no decelerations
   b. Baseline 180 bpm, minimal variability, no accelerations, recurrent late decelerations
   c. Baseline rate 140 bpm, absent variability, recurrent late decelerations
   d. b and c
   e. c only

25. A prolonged FHR deceleration lasts ≥ 2 and < 10 minutes.

   a. True
   b. False

26. According to the 2008 NICHD consensus report, decelerations that occur with < 50% of uterine contractions in a 20 minute window are defined as:

   a. Occasional
   b. Sporadic
   c. Intermittent
   d. Transient
   e. Insignificant

27. According to the 2008 NICHD consensus report, the normal frequency of uterine contractions is

   a. ≤ 5 contractions in 10 minutes averaged over twenty minutes
   b. < 5 contractions in 10 minutes averaged over twenty minutes
   c. < 6 contractions in 10 minutes averaged over thirty minutes
   d. < 5 contractions in 10 minutes averaged over thirty minutes
   e. ≤ 5 contractions in 10 minutes averaged over thirty minutes

28. According to the 2008 NICHD consensus report, uterine contraction frequency in excess of normal is defined as:

   a. Hyperstimulation
   b. Hypercontractility
   c. Hypertonus
   d. Tachysystole
   e. Hyperstimulation when uterine stimulants are used

29. Excessive uterine activity should always be qualified as to the presence or absence of associated FHR decelerations.

   a. True
   b. False

30. The term tachysystole applies to either spontaneous or stimulated labor.

   a. True
   b. False

31. According to the 2008 NICHD consensus report, the terms hyperstimulation and hypercontractility are not defined and should be abandoned.

   a. True
   b. False

32. A persistent sinusoidal pattern would be classified as:

   a. Category I
   b. Category II
   c. Category III

33. According to the 2008 NICHD consensus report, Category II FHR tracings reliably predict abnormal fetal acid-base status at the time they are observed

   a. True
   b. False

34. Which of the following most closely approximates normal umbilical artery pH at term?

   a. 6.9-7.0
   b. 7.0-7.1
   c. 7.1-7.2
   d. 7.2-7.3
   e. 7.3-7.4

35. Which of the following most closely approximates normal umbilical artery PO2 at term?

   a. 15-25 mmHg
   b. 35-45 mmHg
   c. 55-65 mmHg
   d. 75-85 mmHg
   e. > 90 mmHg

36. Which of the following most closely approximates normal umbilical artery PCO2 at term?

   a. < 25 mmHg
   b. 25-35 mmHg
   c. 45-55 mmHg
   d. 65-75 mmHg
   e. > 75 mmHg

37. A normal fetal base deficit at term is < 12 mmol/L

   a. True
   b. False

38. Which of the following most closely approximates the normal range of fetal hemoglobin saturation?
    a. 15-20%
    b. 30-70%
    c. 80-90%

39. FHR variability is defined as fluctuations in the baseline that are regular in amplitude and frequency

    a. True
    b. False

40. According to the 2008 NICHD consensus report, the "overshoot" FHR pattern is highly predictive of

    a. Fetal asphyxia
    b. Fetal hypoxia
    c. Fetal cerebral ischemia
    d. Preexisting fetal neurologic injury
    e. None of the above

41. According to the 2008 NICHD consensus report, a "shoulder" preceding a variable deceleration reliably predicts the absence of metabolic acidemia

    a. True
    b. False

42. According to the 2008 NICHD consensus report, a FHR deceleration demonstrating slow return to baseline requires further investigation to determine clinical significance.

    a. True
    b. False

43. A sinusoidal fetal heart rate pattern is a visually apparent, smooth, sine wave-like undulating pattern in FHR baseline with a cycle frequency of 3-5/min that persists for at least

    a. 10 minutes
    b. 20 minutes
    c. 30 minutes
    d. 40 minutes

44. The clinical significance of marked variability is not known

    a. True
    b. False

45. According to the International Cerebral Palsy Task Force and the ACOG-AAP Cerebral Palsy Task Force, acute intrapartum interruption of fetal oxygenation does not result in cerebral palsy unless the fetal response progresses to the stage of significant metabolic acidemia (pH < 7.0 and base deficit ≥ 12 mmol/L)

   a. True
   b. False

46. Which of the following statements regarding FHR interpretation is/are accurate?

   a. FHR decelerations (late, variable, prolonged) reflect interruption of the pathway of oxygen transfer from the environment to the fetus at one or more points
   b. Interruption of oxygen transfer from the environment to the fetus does not result in neurologic injury in the form of cerebral palsy in the absence of fetal metabolic acidemia
   c. Moderate variability and/or accelerations reliably predict the absence of fetal metabolic acidemia at the time they are observed
   d. Minimal-absent variability reliably predicts the presence of metabolic acidemia at the time it is observed
   e. Late decelerations reliably predict the presence of metabolic acidemia at the time they are observed
   f. a, b, c and e
   g. a, b and c only

47. Place a check mark beside each of the following conservative corrective measures that have been demonstrated to improve fetal heart rate abnormalities and/or increase fetal oxygen saturation?

   _____ Supplemental oxygen
   _____ Maternal position changes
   _____ Correction of maternal hypotension
   _____ Intravenous fluid bolus
   _____ Stopping or reducing uterine stimulants
   _____ Administering uterine relaxants
   _____ Performing amnioinfusion

48. A fetal heart rate acceleration following fetal vibroacoustic stimulation has the same clinical significance as a spontaneous acceleration

   a. True
   b. False

49. Periodic FHR patterns occur in association with uterine contractions.

   a. True
   b. False

50. Late decelerations and early decelerations are

    a. Periodic decelerations
    b. Episodic decelerations
    c. Gradual decelerations
    d. a and c

51. According to the 2008 NICHD consensus report, fetal heart rate tracing patterns provide information on the current acid-base status of the fetus and can reliably predict the development of cerebral palsy.

    a. True
    b. False

52. Which of the following statements is accurate regarding the FHR tracing below?

    a. The absence of decelerations indicates the absence of interruption of fetal oxygenation
    b. Accelerations and moderate variability reliably predict the absence of fetal metabolic acidemia
    c. The absence of metabolic acidemia reliably excludes on-going hypoxic injury
   d. This is a Category I tracing
    e. All of the above
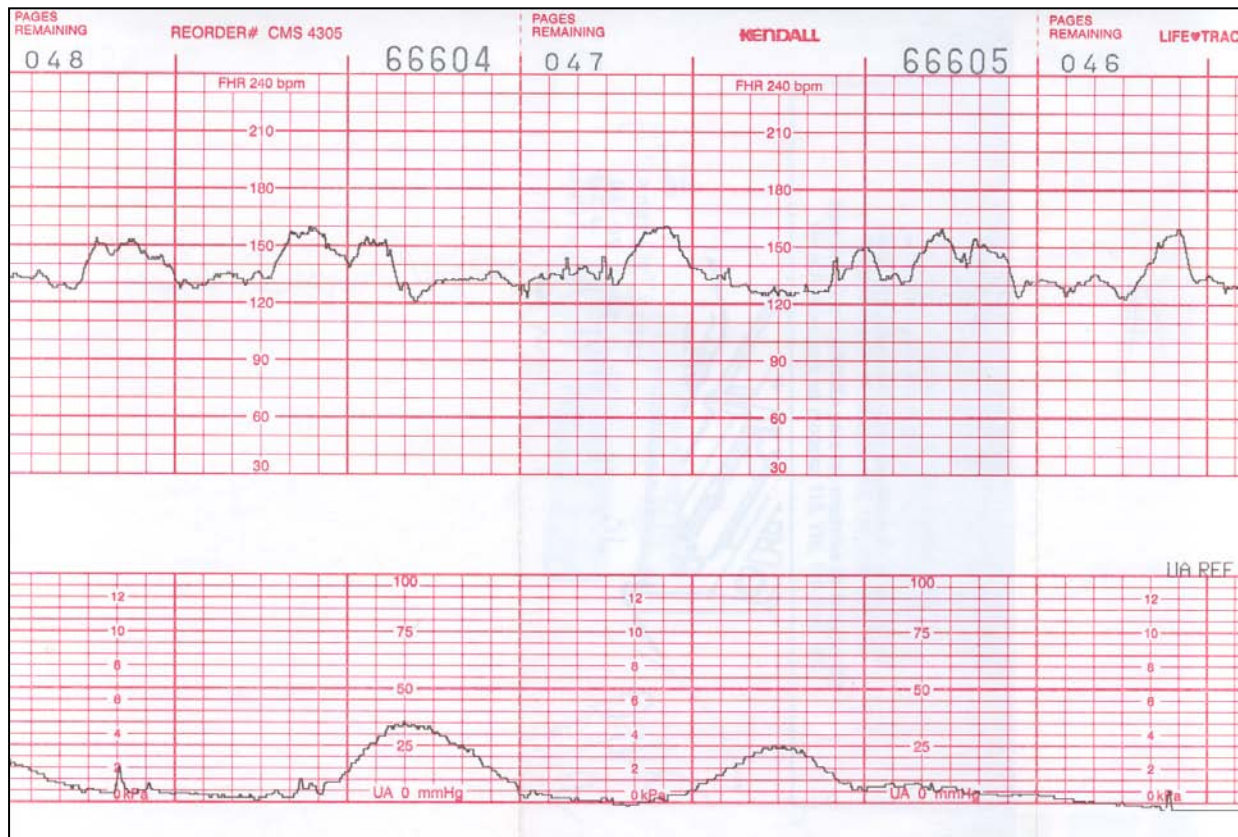
53. According to ACOG-AAP Guidelines for Perinatal Care, 6th Edition, in a low-risk patient, appropriate management of this intrapartum FHR tracing includes

   a. No specific action
   b. Review of the FHR tracing at least every hour in the active phase of the first stage of labor and every 30 minutes in the second stage
   c. Review of the FHR tracing at least every 30 minutes in the active phase of the first stage of labor and every 15 minutes in the second stage
   d. Periodic documentation that the tracing has been reviewed by a member of the healthcare team
   e. a and d
   f. b and d
   g. c and d
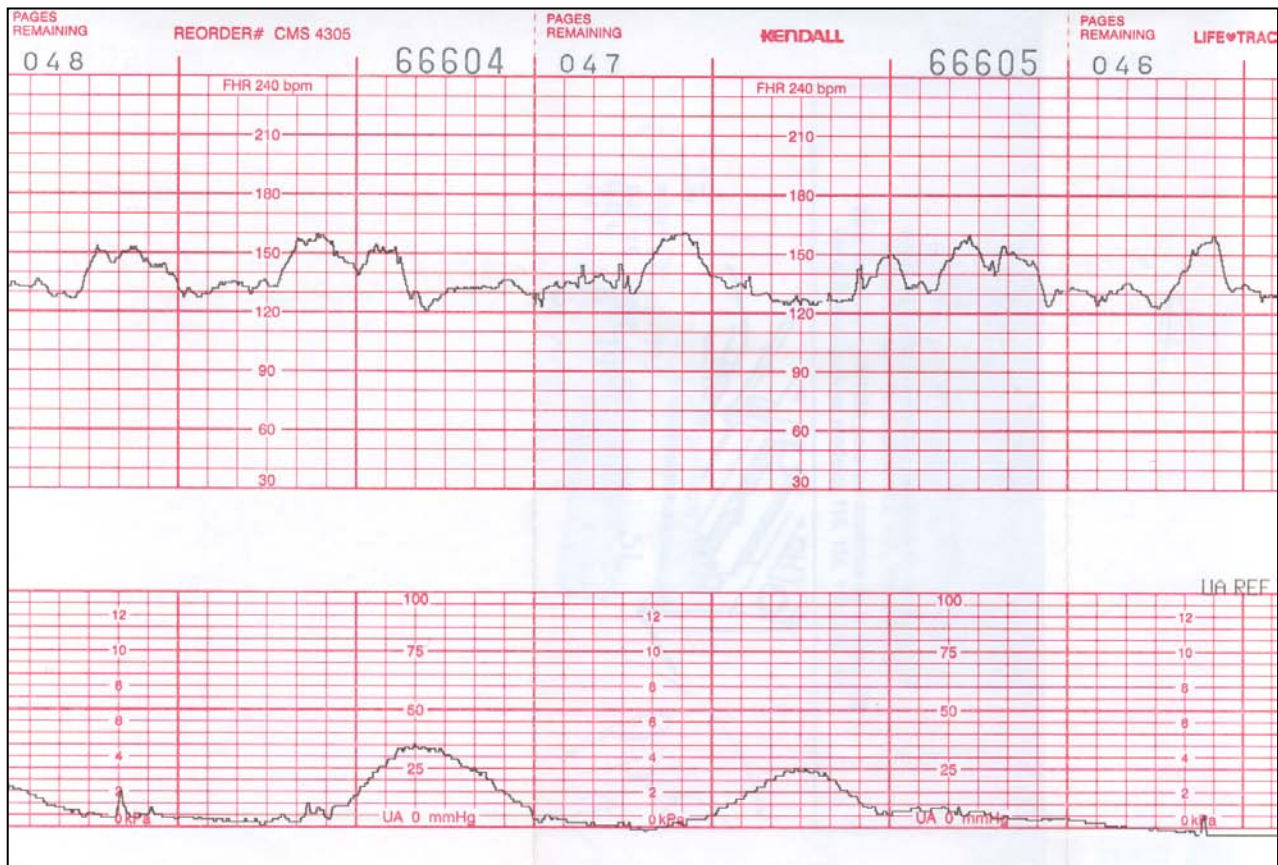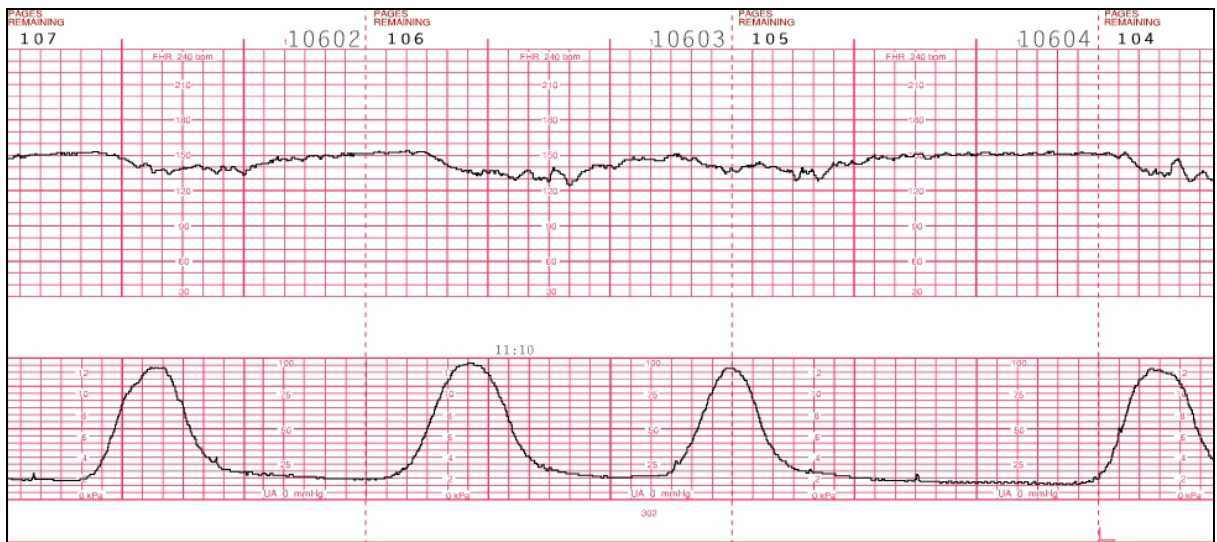
54. Which of the following is accurate regarding the FHR tracing below?

    a. Early decelerations with each contraction
    b. Late decelerations with each contraction
    c. Transient tissue hypoxia during uterine contractions
    d. Category III FHR tracing
    e. Highly predictive of abnormal fetal acid-base status
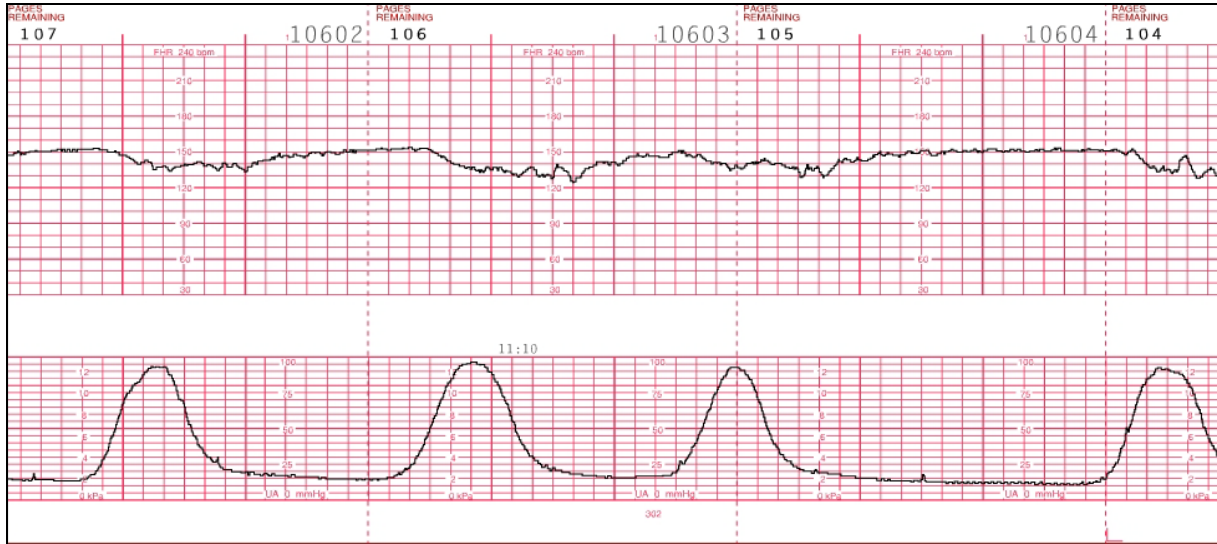
55. Which of the following is accurate regarding the FHR tracing below?

    a. Decelerations reflect interruption of oxygen transfer from the environment to the fetus
    b. Moderate variability reliably predicts the absence of fetal hypoxemia
    c. The absence of accelerations predicts fetal hypoxemia and metabolic acidemia
   d. Normal baseline FHR excludes chorioamnionitis

56. Which of the following is most accurate regarding the FHR tracing below?

    a. Variable decelerations can be caused by umbilical cord compression
    b. Variable decelerations reflect interruption of oxygen transfer from the environment to the fetus at one or more points
    c. Variability is moderate
    d. Accelerations are present
    e. a, b and c
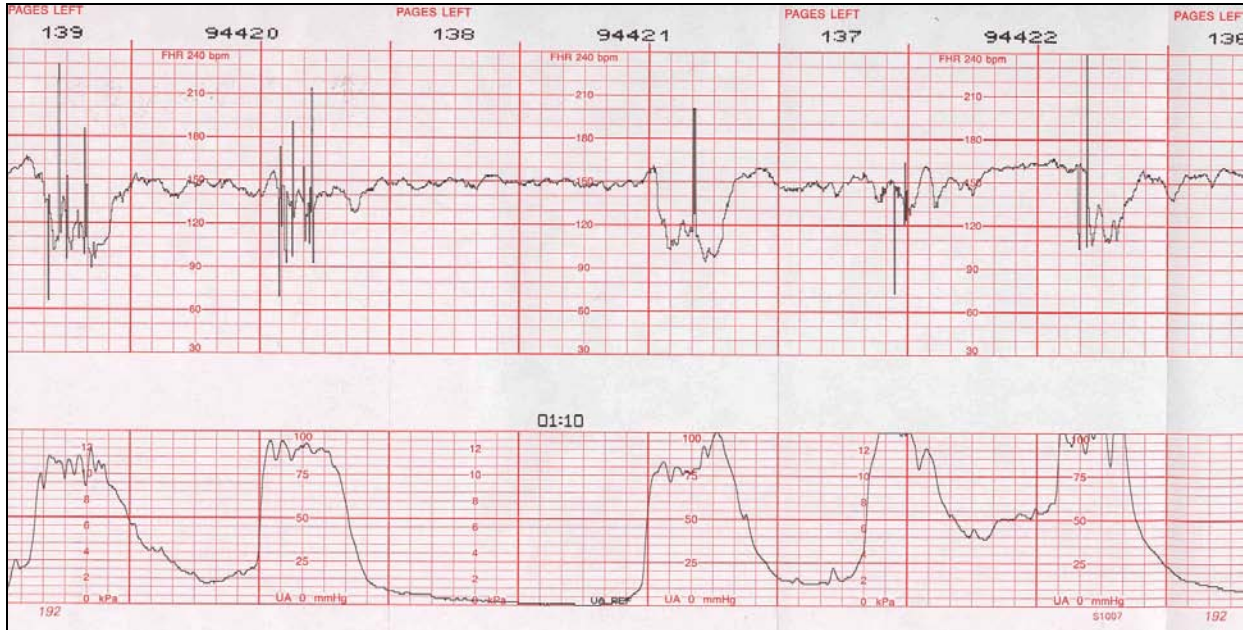
57. This FHR tracing reliably predicts the absence of on-going hypoxic injury
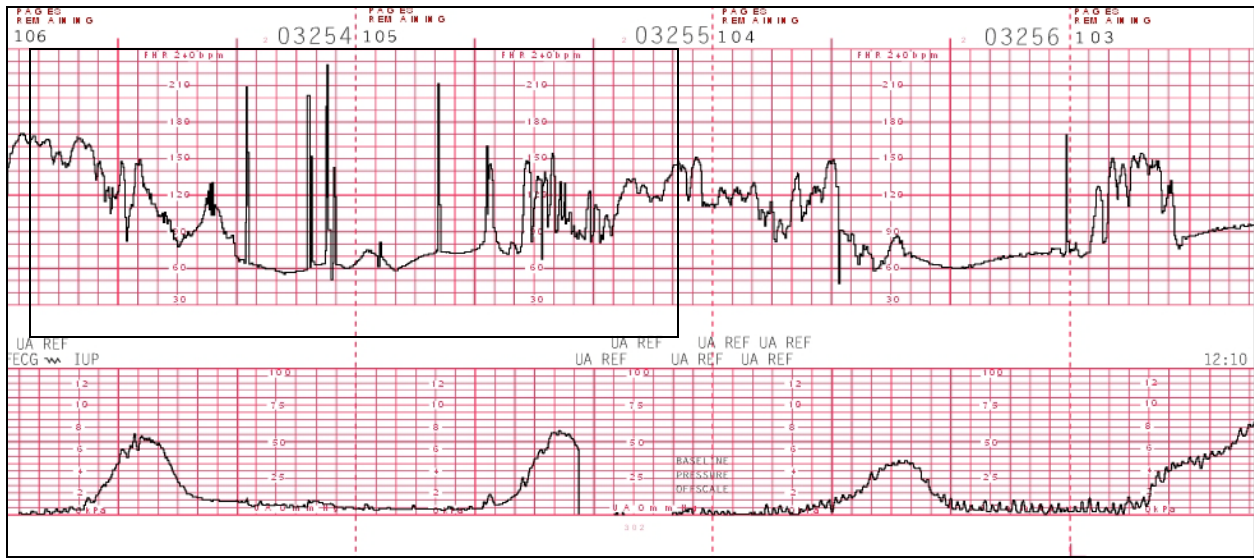
    a. True
    b. False
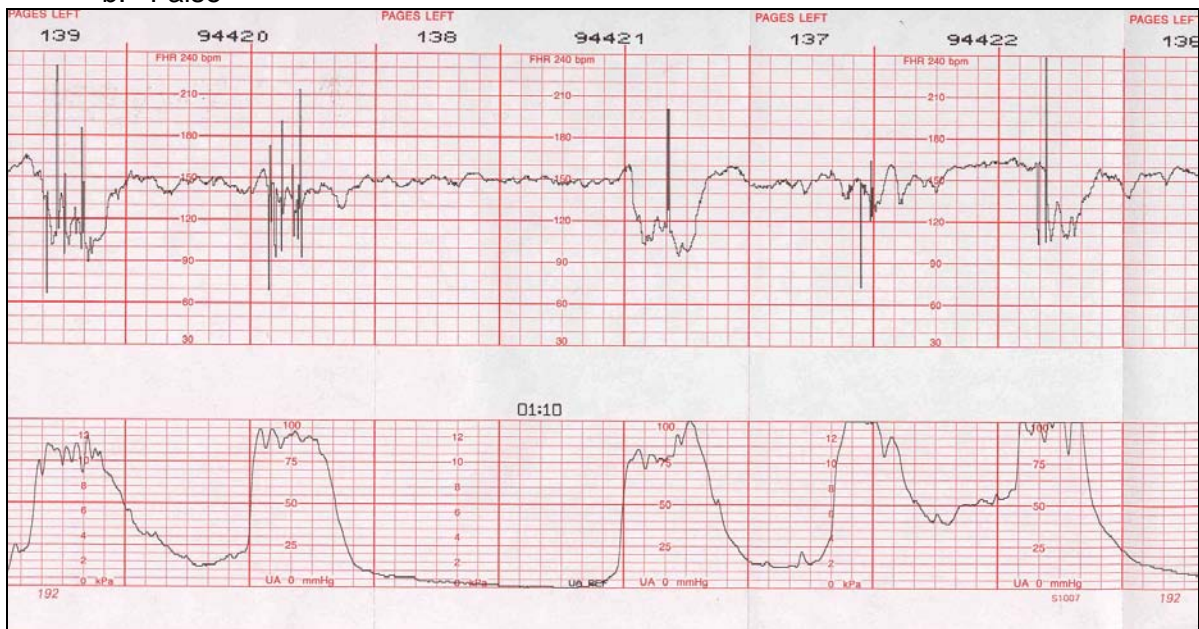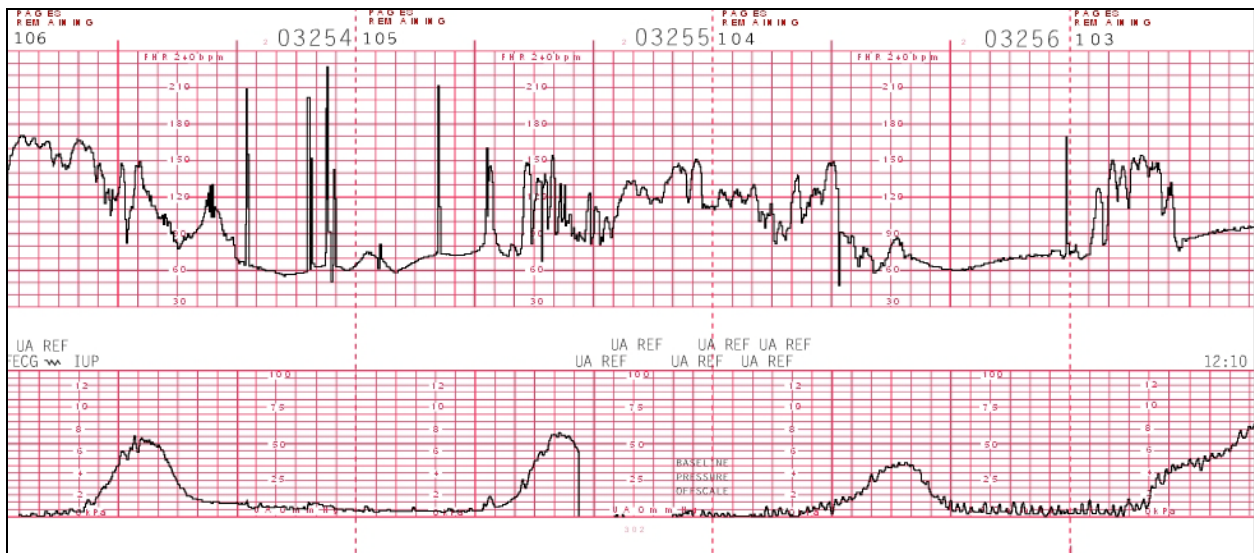
58. What type of deceleration is depicted in the box below

    a. Variable
    b. Early
    c. Late
    d. Prolonged

59. The deceleration identified in the box below can result from which of the following

    a. Maternal apnea
    b. Maternal cardiac arrhythmia
    c. Acute maternal hypotension
    d. Uterine rupture
    e. Umbilical cord prolapse
    f. Any of the above

60. Appropriate management of the FHR pattern identified below includes all of the following except

    a. Supplemental oxygenation
    b. Confirm maternal heart rate and blood pressure
    c. Maternal position changes
    d. Correct maternal hypotension if present
    e. Scalp stimulation
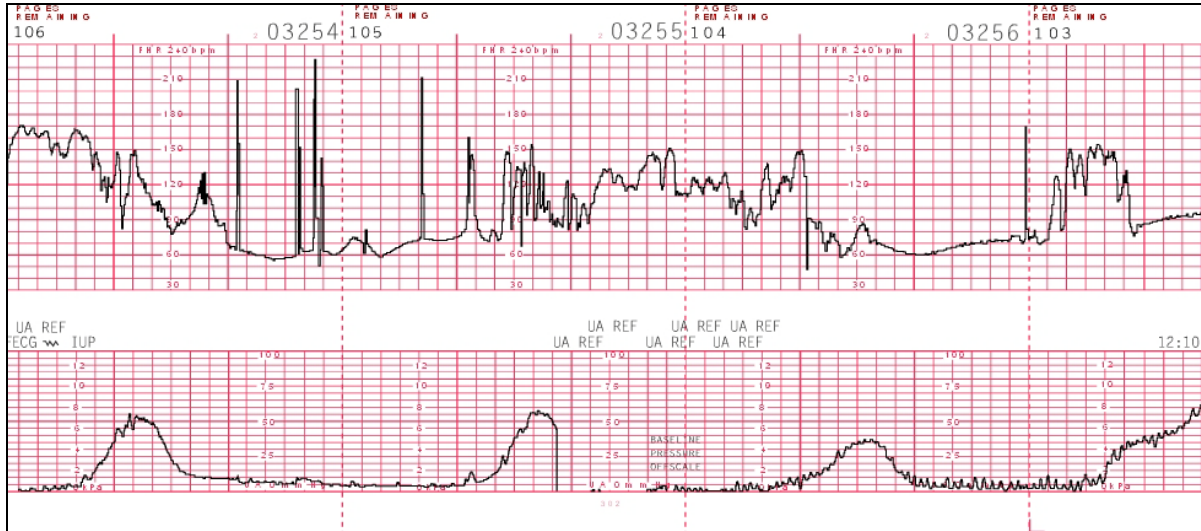
61. Which of the following statements most accurately interprets this FHR tracing?

    a. Baseline FHR 150 bpm
    b. Highly predictive of fetal metabolic acidemia
    c. Highly predictive of abnormal neurologic outcome
    d. Cannot exclude fetal metabolic acidemia at this time
    e. Subtle early decelerations present
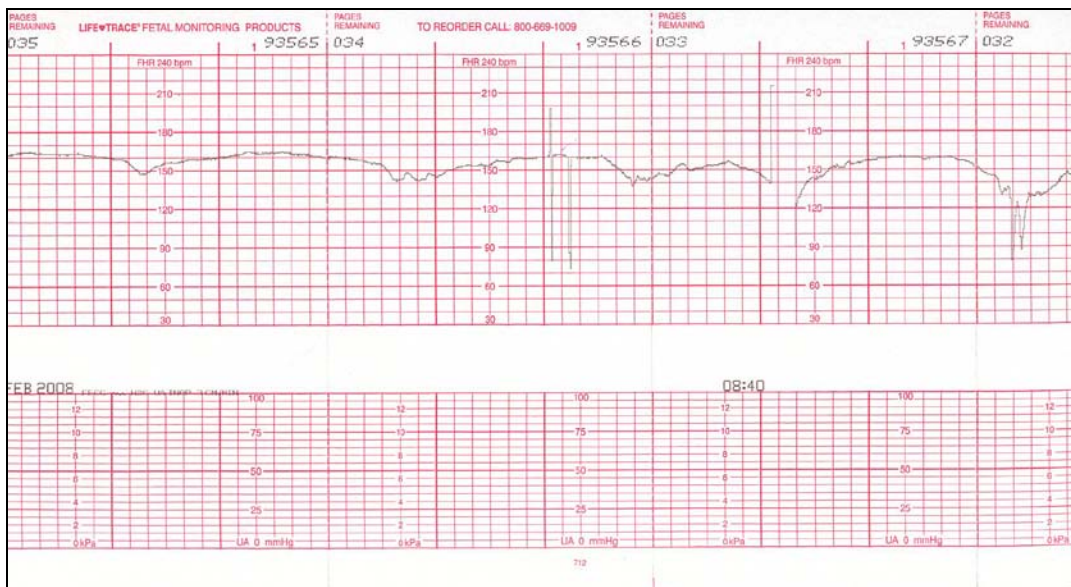
62. Minimal or absent FHR variability alone reliably predict the presence of fetal hypoxemia at the time of observation.

    a. True
    b. False

63. The absence of FHR accelerations is highly predictive of fetal hypoxia at the time it is observed.

    a. True
    b. False

64. According to the 2008 NICHD consensus report, a FHR tracing with a baseline rate of 140 beats per minute, variability of 6-25 beats per minute, no accelerations and no decelerations would be included in which Category:

    a. Category I
    b. Category II
    c. Category III

65. Category III includes which of the following:

    a. Absent variability with recurrent late decelerations
    b. Absent variability with recurrent variable decelerations
    c. Absent variability with bradycardia
    d. Sinusoidal pattern
    e. All of the above

66. A FHR tracing revealing a baseline of 170 beats per minute, minimal variability, no accelerations and no decelerations would be included in:

    a. Category I
    b. Category II
    c. Category III

67. A Category I FHR tracing must demonstrate FHR accelerations

    a. True
    b. False

68. If early decelerations are present, the FHR tracing cannot be included in Category I

    a. True
    b. False

69. A FHR tracing in Category I predicts the absence of fetal metabolic acidemia

    a. True
    b. False

70. Beat to beat changes in the FHR can be quantitated with the unaided eye

    a. True
    b. False

71. A Category II tracing

    a. Predicts abnormal fetal acid-base status
    b. Excludes abnormal fetal acid-base status
    c. Is not predictive of abnormal fetal acid-base status
    d. Is always predictive of normal feta acid-base status
    e. None of the above

Questions 72-81

For each of the following descriptions of FHR tracings, determine the appropriate NICHD category:

    a. Category I
    b. Category II
    c. Category III

72. Baseline rate - 145 beats/min
    Variability – Moderate
    Accelerations – Absent
    Decelerations – Present: Intermittent late decelerations

73. Baseline rate - 125 beats/min
    Variability – Minimal
    Accelerations – Absent
    Decelerations – Absent

74. Baseline rate - 165 beats/min
    Variability – Minimal
    Accelerations – Absent
    Decelerations – Present: Recurrent late decelerations

75. Baseline rate - 115 beats/min)
    Variability – Absent
    Accelerations – Absent
    Decelerations – Present: Recurrent variable decelerations

76. Baseline rate - 150 beats/min
    Variability – Moderate
    Accelerations – Present
    Decelerations – Present: Recurrent early decelerations

77. Baseline rate - 180 beats/min
     Variability – Absent
     Accelerations – Absent
     Decelerations – Absent

78. Baseline rate - 140 beats/min
     Variability – Moderate
     Accelerations – Present
     Decelerations – Present: Recurrent late decelerations

79. Baseline rate - 110 beats/min
     Variability – Marked
     Accelerations – Absent
     Decelerations – Absent

80. Baseline rate - 140 beats/min
     Variability – Absent
     Accelerations – Absent
     Decelerations – Present: Recurrent late decelerations

81. Baseline rate - 110 beats/min
     Variability – Moderate
     Accelerations – Present
     Decelerations – Present: Recurrent variable decelerations

82. Which of the following represents a normal umbilical artery pH at term?

   a. 7.05
   b. 7.10
   c. 7.18
   d. 7.24
   e. 7.35

83. Which of the following represents a normal umbilical vein pH at term?

   a. 7.07
   b. 7.11
   c. 7.19
   d. 7.21
   e. 7.30

84. Which of the following represents a normal umbilical vein PO2 at term?

   a. 75 mmHg
   b. 65 mmHg
   c. 55 mmHg
   d. 45 mmHg
   e. 35 mmHg

85. Which of the following represents a normal umbilical artery PO2 at term?

    a. 60 mmHg
    b. 50 mmHg
    c. 40 mmHg
    d. 30 mmHg
    e. 20 mmHg

86. Which of the following represents a normal umbilical artery PCO2 at term?

    a. 80 mmHg
    b. 50 mmHg
    c. 30 mmHg
    d. 20 mmHg
    e. 10 mmHg

87. An umbilical artery base deficit of 6 mmol/L is within the normal range

    a. True
    b. False

88. According to the ACOG-AAP Cerebral Palsy Task Force, which of the following is and essential criteria that defines an acute intrapartum event sufficient to cause cerebral palsy?

    a. Umbilical artery pH < 7.2
    b. Umbilical artery pH < 7.1
    c. Umbilical artery pH < 7.0

89. According to the ACOG-AAP Cerebral Palsy Task Force, which of the following is and essential criteria that defines an acute intrapartum event sufficient to cause cerebral palsy?

    a. Umbilical artery base deficit ≥ 8 mmol/L
    b. Umbilical artery base deficit ≥ 10 mmol/L
    c. Umbilical artery base deficit ≥ 12 mmol/L

90. Umbilical vein pH is normally lower than umbilical artery pH

    a. True
    b. False

91. Umbilical artery pH is normally lower than uterine artery pH

    a. True
    b. False

92. Umbilical vein PCO2 is normally lower than umbilical artery PCO2

    a. True
    b. False

93. Umbilical artery base deficit is normally greater than umbilical vein base deficit

    a. True
    b. False

94. One of the following blood gases was drawn from the umbilical artery and the other was drawn from the umbilical vein. Which was most likely drawn from the umbilical artery?

    a. pH 7.15, PCO2 49 mmHg, PO2 12 mmHg, Base deficit 6.5 mmol/L
    b. pH 7.31, PCO2 34 mmHg, PO2 35 mmHg, Base deficit 3.2 mmol/L

95. According to the ACOG-AAP Cerebral Palsy Task Force, which of the following is not one of the criteria that collectively suggest an event within 48 hours of birth

    a. A sentinel hypoxic event immediately before or during labor
    b. A sudden and sustained fetal bradycardia or the absence of FHR variability in the presence of persistent late or variable decelerations, usually after a hypoxic sentinel event when the pattern was previously normal
    c. An Apgar score of 5 at 10 minutes
    d. Onset of multisystem involvement within 72 hours of birth

96. "Beat-to-beat" changes in the fetal heart rate are detectable with the unaided eye

    a. True
    b. False

97. The 2008 NICHD consensus statement provides a detailed algorithm for the management of intrapartum FHR patterns.

    a. True
    b. False

98. Categories I, II and III proposed in the 2008 NICHD consensus statement are intended to replace a qualitative and quantitative description of baseline rate, variability, accelerations, decelerations and changes or trends in the FHR tracing over time.

    a. True
    b. False

99. Intrapartum FHR monitoring reliably predicts which of the following conditions.

    a. Cerebral palsy
    b. Autism
    c. Mental retardation
    d. Epilepsy
    e. None of the above

100. Intrapartum FHR monitoring is a:

   a. Screening test
   b. Diagnostic test
   c. Failed technology
   d. None of the above
   e. All of the above

101. Fetal scalp stimulation is used to

   a. Provoke FHR accelerations
   b. Correct prolonged decelerations
   c. Stimulate FHR variability during a prolonged deceleration
   d. All of the above

102. Standard of care requires:

   a. Reasonableness and prudence
   b. Perfection
   c. Clairvoyance
   d. All of the above

Answer Key

1.	D		51.	B
2.	B		52.	E
3.	A		53.	G
4.	C		54.	B
5.	E		55.	A
6.	B		56.	E
7.	D		57.	A
8.	A		58.	D
9.	C		59.	F
10.	B		60.	E
11.	A		61.	D
12.	B		62.	B
13.	D		63.	B
14.	D		64.	A
15.	A		65.	E
16.	B		66.	B
17.	A		67.	B
18.	C		68.	B
19.	B		69.	A
20.	B		70.	B
21.	B		71.	C
22.	E		72.	B
23.	B		73.	B
24.	E		74.	B
25.	A		75.	C
26.	C		76.	A
27.	E		77.	B
28.	D		78.	B
29.	A		79.	B
30.	A		80.	C
31.	A		81.	B
32.	C		82.	D
33.	B		83.	E
34.	D		84.	E
35.	A		85.	E
36.	C		86.	B
37.	A		87.	A
38.	B		88.	C
39.	B		89.	C
40.	E		90.	B
41.	B		91.	A
42.	A		92.	A
43.	B		93.	A
44.	A		94.	A
45.	A		95.	C
46.	G		96.	B
47.	Check all		97.	B
48.	A		98.	B
49.	A		99.	E
50.	A		100.	A
			101.	A
			102.	A