1. The Radar signal's frequency is:
   a. the number of waves sent out in one second.
   b. approximately 186,000 miles per second.
   c. about 3 centimeters, or 1.2 inches.
   d. infinite, unless it strikes a solid object.
   e. dependent upon the size/shape of the target vehicle

2. New Jersey law states that the speed limit for business or residential districts, unless otherwise posted, is:
   a. 15 MPH
   b. 25 MPH
   c. 30 MPH
   d. 40 MPH
   e. 50 MPH

3. In X-Band traffic Radar, for every one mile per hour that a target vehicle is traveling, the reflected signal will be changed in which one of the following ways:
   a. the speed of the reflected signal will be increased by one mile per hour.
   b. the speed of the reflected signal will be increased 31.4 miles per hour.
   c. the reflected signal will be shifted 5,280 waves per second.
   d. the frequency of the reflected signal will be shifted 31.4 waves per second.
   e. None of the above

4. To properly establish a tracking history, you should observe the target for at least:
   a. 3 to 5 minutes
   b. 30 seconds
   c. 1 to 2 minutes
   d. 3 to 5 seconds
   e. None of the above

5. A person who is cited for speeding in New Jersey violates which statute?
   a. 39:4-97
   b. 39:6B-2
   c. 39:4-98
   d. 39:4-50
   e. 39:8-1

6. The minimum number of hours of hands-on, non-enforcement Radar operation required to gain a Radar operator’s certification is guided by which court case?
   a. State v. Wojtkowiak
   b. State v. Boyington
   c. State v. Tomanelli
   d. State v. Hanson
   e. State v. Dantonio
7. To sustain a conviction for speeding, a police officer must identify:
   a. the driver and vehicle                           d. the time and place of violation
   b. posted or statutory speed limit                  e. all of the above
   c. the speed of the violator

8. The term RADAR is an acronym for:
   a. RA dio And Doppler Area                          d. Rapid Area Deployment And Repositioning
   b. Record And Discern A Range                      e. RA dio Detection And Ranging
   c. Audio Detection And Ranging

9. When the frequency of a signal is increased:
   a. the wavelength doubles in size
   b. the length of the wave is increased
   c. the number of waves per second is increased
   d. the speed of the signal is increased
   e. all of the above

10. The speed of a Radar signal is changed when:
    a. there is relative motion between the Radar unit and the target
    b. when there is a change in frequency
    c. when there is a change in wavelength
    d. all of the above
    e. none of the above

11. When a Radar signal is changed, the following is also changed:
    1. signal speed
    2. wavelength
    3. frequency
    a. 1 and 2 only                                     d. 1, 2, and 3
    b. 1 and 3 only                                    e. none of the above
    c. 2 and 3 only

12. The ABC's of Radar installation are:
    a. Angle, Battery, Cord                           d. Angle, Box, Counter
    b. Antenna, Battery, Current                      e. Antenna, Box, Current
    c. Always Be Careful

Radar Operator Test A
13. Cosine effect is:
   a. a function of the angular displacement of the antenna relative to the target path.
   b. an "under voltage" condition
   c. an "over voltage" condition
   d. a phenomena causing the target speed to read high in stationary operation
   e. none of the above

14. A characteristic that is often associated with the inside mounting of a Radar antenna is:
   a. possible interference
   b. slightly reduced range
   c. reduced possibility of damage to the equipment
   d. all of the above
   e. none of the above

15. The statement that says "If there is relative motion between a Radar unit and an object, the frequency changes when the radio signal is reflected back to the antenna" is an example of:
   a. the angular effect
   b. the reflective effect
   c. the bunching principle
   d. scanning effect
   e. the Doppler Principle

16. The inability of a traffic Radar unit to maintain a true patrol vehicle speed reading under severe acceleration or deceleration is referred to as the:
   a. panning effect
   b. velocity effect
   c. sudden surge effect
   d. scanning effect
   e. batching effect

17. Courts can and do take judicial notice of:
   a. the validity of certain scientific principles underlying Doppler Radar.
   b. the accuracy of patrol vehicle speedometers since they were first calibrated during production.
   c. the accuracy of every Radar device that uses the Doppler Principle so that external tests are no longer necessary.
   d. the competency of a particular Radar operator as an expert so that testimony is no longer required.
   e. all of the above

18. The cosine effect as it relates to traffic Radar is:
   a. a concern since it may result in a target speed reading that is higher than the actual target speed in some circumstances.
   b. always in favor of the motorist in the moving mode.
   c. to be disregarded in that it has no effect on target speeds.
   d. is a factor in causing higher than actual readings in the stationary mode.
   e. none of the above
19. To be a qualified Radar Operator, the court requires that you have enough knowledge and training to be able to _________________ the Radar device:

a. assemble, aim, and adjust
d. calibrate, tune, and connect
b. set up, test, and properly operate
e. set range, aim, and read
c. assemble, tune, and read

20. A vehicle's total stopping distance is:

a. approximately doubled for every 10 MPH increase in speed.
b. affected by the vehicle's speed and the driver's perception/reaction time.
c. the distance it will travel in 3/4 of a second.
d. about three times as great at 65 MPH as it is at 55 MPH.
e. impacted by the driver's visibility of the roadway.


a. Doppler
d. clarity
b. speed
e. strength
c. frequency

22. If several vehicles are all "in range," the Radar unit will always display the speed of the vehicle that is the:

a. largest (size)
d. closest (position)
b. heaviest (weight)
e. none of the above
c. fastest (speed)

23. The prevailing New Jersey case governing the use of moving Radar is:

a. State v. Tomanelli
d. State v. Massey
b. State v. Dantonio
e. State v. Wojtkowiak
c. State v. Hanson

24. When you test a Radar unit, it is good practice to:

a. hold the tuning fork approximately one foot from the antenna face.
b. strike the fork on a good, hard metal surface so that it will vibrate smoothly.
c. strike the fork against a non-metallic surface.
d. adjust the Radar's power control to the mid-range position before testing.
e. point the antenna toward traffic to insure good readings.
25. A Radar's signal wavelength is:
   a. approximately three billion waves per second.
   b. the distance between the beginning of a wave peak to the end of the wave valley.
   c. the distance the signal travels from the Radar antenna to the object that it strikes
   d. constant.
   e. approximately 186,000 miles.

26. The basic computation involved in using moving Radar is:
   a. Target Speed = Patrol Speed - Closing Speed
   b. Closing Speed = Patrol Speed - Target Speed
   c. Target Speed = Patrol Speed + Closing Speed
   d. Target Speed = Closing Speed - Patrol Speed
   e. Patrol Speed = Ground Speed - Closing Speed

27. The improper aiming of the antenna at the counting unit during operation is referred to as the:
   a. scanning effect
   b. panning effect
   c. cosine effect
   d. batching effect
   e. counting effect

28. When the K-Band Radar unit computes the speed of a target vehicle, it divides the Doppler Shift (change in frequency) by ____________.
   a. 45.5 cps
   b. 90.0 cps
   c. 72.0 cps
   d. 31.4 cps
   e. Varies by make/model of unit

29. Radar microwave energy can be:
   a. reflected
   b. absorbed
   c. refracted
   d. all of the above
   e. none of the above

30. X-Band traffic Radar operates at a frequency of
   a. 10.525 GHz
   b. 24.150 GHz
   c. 31.400 GHz
   d. 45.460 GHz
   e. 56.120 GHz
31. Ka-Band traffic Radar operates at frequencies ranging from __________________depending upon manufacturer:
   a. 29.0 GHz to 43.0 GHz
d. 33.0 GHz to 36.0 GHz
   b. 30.0 GHz to 38.0 GHz
e. none of the above
   c. 35.0 GHz to 44.5 GHz

32. Which of the following methods of speed enforcement are prohibited by Title 39 in New Jersey?
   a. Laser
d. Radar
   b. Photo
e. All of these methods are permissible
c. Pace

**True/False (“A” for True; “B” for False)**

33. Elements of a tracking history are the same for stationary and moving mode.

34. When the patrol vehicle is moving and the Radar is in the stationary mode, the reading that you obtain upon meeting an oncoming vehicle will most likely be the violator's speed only, displayed in the patrol window.

35. The recommended method of controlling the Radar's range is to tilt the antenna vertically.

36. Traffic Radar units will always pick up the closest moving vehicle.

37. In order to issue a traffic summons, the officer must lock in the motorist’s speed on the Radar unit.

38. Whenever a radio signal's frequency changes, its wavelength also changes.

39. A moving Radar unit uses the Doppler Principle to measure the patrol car's own speed.

40. A visual estimate of the violator's excessive speed is an optional element of the tracking history.

41. A Radar instrument is considered to have passed the internal circuitry test if the test results are ±1 MPH of the prescribed value.

42. While 39:4-98 is the primary statute governing speed in New Jersey, there are actually many other statutes that govern speed under varying conditions.
Matching

43. Shadowing effect
44. Harmonic effect
45. Power surge effect
46. Negative Shift

Part I

a. A signal returning to the Radar unit showing no movement of any objects in the Radar’s beam
b. Caused by a surge of electricity flowing through the unit, possibly from starting the car
c. A signal returning to the Radar unit that is lower than the transmitted signal.
d. “Ghost” readings that may be caused by airport Radar, neon lights, electrical substations, etc.
e. When the Radar beam obtains its patrol speed from a moving object rather than a stationary object,

Matching

47. Basic Speed Law
48. National Maximum Speed Limit
49. Absolute Speed Limit
50. Prima Facie Speed Limit

Part II

a. Speed limits enacted by state legislatures, but later overturned by Congress
b. A speed limit that is considered reasonable, but can be challenged by the motorist
c. Unlawful to drive a vehicle at a speed greater than what is reasonable and prudent under existing conditions
d. Prohibits driving in excess of a posted speed, regardless of conditions

e. Speed limits enacted by Congress, but later relaxed
1. A vehicle's total stopping distance is:
   a. approximately doubled for every 10 MPH increase in speed.
   b. affected by the vehicle's speed and the driver's perception/reaction time.
   c. the distance it will travel during a second.
   d. about three times as great at 65 MPH as it is at 55 MPH.
   e. about 10 feet for every 1 MPH the vehicle is traveling.

2. New Jersey law states that the speed limits for business or residential districts, unless otherwise posted, is:
   a. 15 MPH  d. 40 MPH
   b. 25 MPH  e. 50 MPH
   c. 30 MPH

3. The two speeds that the Radar unit measures are the:
   a. Patrol Speed and Target Speed
   b. Closing Speed and Target Speed
   c. Ground Speed and Patrol Speed
   d. Ground Speed and Closing Speed
   e. Closing Speed and Patrol Speed

4. The basic computation involved in using moving Radar is:
   a. Patrol Speed - Closing Speed = Target Speed
   b. Closing Speed - Target Speed = Patrol Speed
   c. Closing Speed - Patrol Speed = Target Speed
   d. Ground Speed - Target Speed = Patrol Speed
   e. Patrol Speed + Closing Speed = Target Speed

5. Increased vehicular speed:
   1. Increases stopping distance.
   2. Decreases stopping distance.
   3. Has no effect on stopping distance.
   4. Effects the distance traveled during perception/reaction time.

   a. 2 and 3 only  d. 2 and 4 only
   b. 3 and 4 only  e. None of the above
   c. 1 and 4 only
6. The minimum training requirements for Radar Operators are guided by which court case?
   a. State v. Wojtkowiak  
   b. State v. Boyington  
   c. State v. Tomanelli  
   d. State v. Hanson  
   e. State v. Dantonio

7. All traffic units operate on a scientific principle first postulated by
   a. Christian Doppler  
   b. Dominick Dantonio  
   c. James Hanson  
   d. Douglas Wojtkowiak  
   e. Ray Finkle

8. To be a qualified Radar operator, the court requires that you have enough knowledge and training to be able to______________ the Radar device.
   a. assemble, aim, and adjust  
   b. set up, test, and properly operate  
   c. assemble, tune, and read  
   d. calibrate, tune, and connect  
   e. set range, aim, and read

9. The speed of a Radar signal is changed when
   a. there is relative motion between the Radar unit and the target  
   b. when there is a change in frequency  
   c. when there is a change in wavelength  
   d. all of the above  
   e. none of the above

10. A traffic Radar beam is comprised of
    a. one main beam  
    b. one main beam and side lobes  
    c. several main beams and side lobes  
    d. several main beams but no side lobes  
    e. none of the above

11. The ABC's of Radar installation are:
    a. Angle, Battery, Cord  
    b. Antenna, Battery, Current  
    c. Always Be Careful  
    d. Angle, Box, Counter  
    e. Antenna, Box, Current

12. The Radar unit transmits a radio signal, in waves, which travels at a speed
    a. which changes when it strikes a moving object  
    b. of 186,000 miles per second  
    c. of 55 miles per hour  
    d. equal to the speed of sound  
    e. both a and b
13. A characteristic that is often associated with the inside mounting of a Radar antenna is
   a. possible interference  
   b. slightly reduced range  
   c. reduced possibility of damage to the equipment  
   d. all of the above  
   e. none of the above

14. Courts can and do take judicial notice of:
   a. validity of certain scientific principles underlying Doppler Radar.  
   b. the accuracy of patrol vehicle speedometers since they were first calibrated during production  
   c. the accuracy of every Radar device that uses the Doppler Principle so that external tests are no longer necessary.  
   d. the competency of a particular Radar operator as an expert so that testimony is no longer required.  
   e. all of the above

15. As Doppler frequency shift increases, the audio pitch of the signal
   a. decreases  
   b. increases  
   c. increases to equilibrium, then decreases  
   d. remains the same  
   e. b and c

16. What action must be taken if the internal circuitry test or the tuning fork tests fail to indicate specified readings?
   a. adjust the calibration mechanism on the back of the console  
   b. race the vehicle's engine to provide additional power  
   c. tap the tuning forks together to reset their frequencies  
   d. continue to use Radar unit, but only if it reads low.  
   e. secure the unit and return it for repair

17. A Radar signal's frequency is
   a. equal to the speed of sound.  
   b. approximately 186,000 miles per second.  
   c. about 3 centimeters, or 1.2 inches.  
   d. infinite, unless it strikes a solid object.  
   e. the number of waves sent out in one second.

18. A transmitted traffic Radar signal strikes a metal object that is moving away from the signal. The reflected signal will:
   a. increase in frequency  
   b. increase in speed  
   c. decrease in frequency  
   d. decrease in speed  
   e. none of the above
19. If several vehicles are all "in range," the Radar unit will always display the speed of the vehicle that is the:
   a. largest (size)  
   b. heaviest (weight)  
   c. fastest (speed)  
   d. closest (position)  
   e. none of the above

20. When you want to change a Radar's _______________, you adjust its sensitivity setting.
   a. power  
   b. operational range  
   c. beam length  
   d. lobes  
   e. wavelength

21. A person who violates the “Basic Speed Law” is one who travels at a speed
   a. in excess of the posted limit regardless of conditions.  
   b. in excess of an absolute limit set by statute.  
   c. over 55 miles per hour.  
   d. greater than is reasonable and prudent under existing conditions.  
   e. none of the above.

22. A valid criteria when choosing a place to operate Radar is:
   a. demonstrated need  
   b. traffic and road conditions  
   c. safety  
   d. location of speeding complaints  
   e. all of the above

23. The statement that says "If there is relative motion between a Radar unit and an object, the frequency changes when the radio signal is reflected back to the antenna” is an example of
   a. the angular effect  
   b. the reflective effect  
   c. the bunching principle  
   d. scanning effect  
   e. the Doppler Principle

24. When operating moving Radar, it must be remembered that:
   a. locking in the target speed is a crucial part of the officer’s courtroom testimony.  
   b. the patrol vehicle's speedometer must never be used to verify a Radar patrol speed.  
   c. the patrol vehicle and the target vehicle must be heading in the same direction.  
   d. the computed target speed could be higher than the true target speed under some circumstances.  
   e. all of the above.

25. Judicial Notice of the Doppler Principle was first taken in the case of:
   a. Honeycutt v. Commonwealth  
   b. State v. Tomanelli  
   c. State v. Dantonio  
   d. State v. Hanson  
   e. State v. Wojtkowiak
26. According to case law, in order to pass the external tuning fork test, the Radar must measure the tuning fork speed:
   a. exactly                      d. within 1 MPH
   b. within 1/4 of 1 MPH          e. within 2 MPH
   c. within 1/2 of 1 MPH

27. When testifying in court, a police Radar operator must be able to provide:
   a. only a brief, simple explanation of the Doppler Principle
   b. a clear explanation of how speed affects frequency shift, though without going into scientific detail
   c. only a description of the fundamental relationship among speed, frequency, and wavelength.
   d. no explanation of the Doppler Principle.
   e. operators never have to testify to Radar issues in court.

28. Radar microwave energy can be:
   a. reflected                     d. all of the above
   b. absorbed                     e. none of the above
   c. refracted

29. X-Band traffic Radar operates at a frequency of
   a. 10.525 Ghz                    d. 45.460 Ghz
   b. 24.150 Ghz                    e. 56.120 Ghz
   c. 31.400 Ghz

30. K-Band traffic Radar operates at a frequency of
   a. 10.525 Ghz                    d. 45.460 Ghz
   b. 24.150 Ghz                    e. 56.120 Ghz
   c. 31.400 Ghz

31. When the Ka-Band Radar unit computes the speed of a target vehicle, it divides the Doppler Shift (change in frequency) by ________________ .
   a. 45.5 cps                      d. 31.4 cps
   b. 90.0 cps                      e. varies by make/model of unit
   c. 72.0 cps

32. As part of tracking history, the officer’s speed estimate of the target vehicle must be within ______ MPH in order to be valid.
   a. ± 2 MPH                        d. ± 8 MPH
   b. ± 4 MPH                        e. there is no standard for speed estimates
   c. ± 6 MPH
True/False ("A" for True; "B" for False)

33. Tuning forks may be interchanged between all models of traffic Radar.
34. The verification procedure for moving Radar requires that the operator verify the accuracy of the Radar's own speed tracking system against a patrol vehicle's speedometer.
35. The recommended method of controlling the Radar's range is to tilt the antenna vertically.
36. An automobile with a fiberglass body cannot be detected by Doppler Radar.
37. The term Radar stands for RAdio Dopper And Ranging.
38. Elements of a tracking history are the same for stationary and moving mode.
39. A good place to strike a tuning fork is on a padded steering wheel.
40. A Radar unit can have two separate transmitters.
41. While 39:4-98 is the primary statute governing speed in New Jersey, there are actually many other statutes that govern speed under varying conditions.
42. Target identification problems can usually be avoided by always using the Radar's automatic locking feature.

Matching

Part I

<table>
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<tr>
<th>Number</th>
<th>Effect</th>
<th>a.</th>
<th>b.</th>
<th>c.</th>
<th>d.</th>
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<td>43.</td>
<td>Scanning effect</td>
<td>Effect caused by improper alignment of the Radar antenna</td>
<td>Effect caused by the Radar beam improperly aimed at the counter unit, resulting in improper readings</td>
<td>Effect caused by a rapid movement of a Radar antenna; common with one-piece units</td>
<td>Effect caused by a surge of electricity flowing through the unit, possibly from starting the car</td>
<td>Occurs in the moving mode when the Radar unit cannot compute a proper patrol speed due to rapid acceleration or deceleration.</td>
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<td>Batching effect</td>
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<td>b.</td>
<td>c.</td>
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<td>c.</td>
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### Part II

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<td>47.</td>
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<td>48.</td>
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<td>Power surge effect</td>
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<td>Negative Shift</td>
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#### Matching

a. A signal returning to the Radar unit showing no movement of any objects in the Radar’s beam

b. Caused by a surge of electricity flowing through the unit, possibly from starting the car

c. A signal returning to the Radar unit that is lower than the transmitted signal.

d. “Ghost” readings that may be caused by airport Radar, neon lights, electrical substations, etc.

e. When the Radar beam obtains its patrol speed from a moving object rather than a stationary object.
<table>
<thead>
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<th>Radar Operator’s Examination Answer Sheet</th>
<th>Name:</th>
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Radar Operator’s Examination Answer Key

Test A


Test B