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(Excerpt)

90 – Navigation

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1 The rotational axis of the Earth runs through the... (1,00 P.)

- ☑ geographic North Pole and on the geographic South Pole.
- ☐ geographic North Pole and on the magnetic south pole.
- ☐ magnetic north pole and on the magnetic south pole.
- ☐ magnetic north pole and on the geographic South Pole.

2 Which statement is correct with regard to the polar axis of the Earth? (1,00 P.)

- ☑ The polar axis of the Earth crosses the geographic South Pole and the geographic North Pole and is perpendicular to the plane of the equator
- ☐ The polar axis of the Earth crosses the geographic South Pole and the geographic North Pole and is at an angle of 23.5° to the plane of the equator
- ☐ The polar axis of the Earth crosses the magnetic south pole and the magnetic north pole and is perpendicular to the plane of the equator
- ☐ The polar axis of the Earth crosses the magnetic south pole and the magnetic north pole and is at an angle of 66.5° to the plane of the equator

3 Which approximate, geometrical form describes the shape of the Earth best for navigation systems? (1,00 P.)

- ☐ Sphere of ecliptical shape
- ☑ Ellipsoid
- ☐ Perfect sphere
- ☐ Flat plate

4 Which statement about a rhumb line is correct? (1,00 P.)

- ☑ A rhumb line cuts each meridian at the same angle.
- ☐ The center of a complete cycle of a rhumb line is always the Earth's center.
- ☐ The shortest track between two points along the Earth's surface follows a rhumb line.
- ☐ A rhumb line is a great circle intersecting the the equator with 45° angle.

5 The shortest distance between two points on Earth is represented by a part of... (1,00 P.)

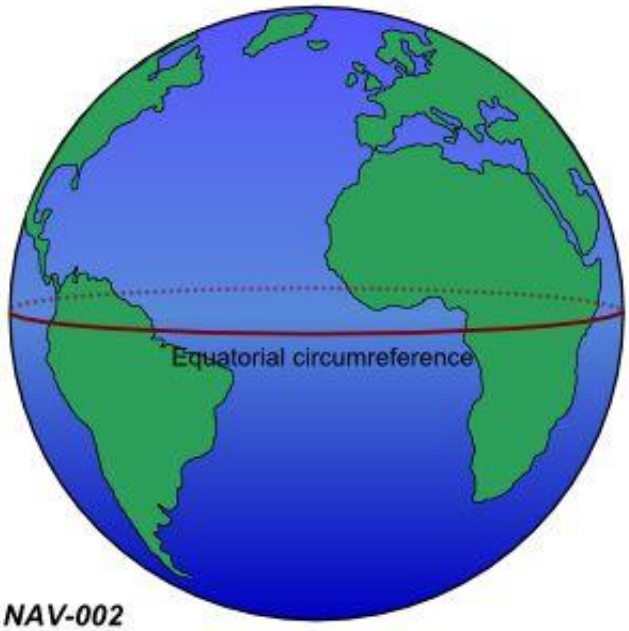
- ☑ a great circle.
- ☐ a small circle.
- ☐ a rhumb line.
- ☐ a parallel of latitude.

6 The circumference of the Earth at the equator is approximately...

See figure (NAV-002) (1,00 P.)

Siehe Anlage 1

- ☐ 10800 km.
- ☐ 40000 NM.
- ☐ 12800 km.
- ☑ 21600 NM.



NAV-002

7 What is the difference in latitude between A (12°53'30''N) and B (07°34'30''S)? (1,00 P.)

- ☑ 20°28'00''
- ☐ 05,19°
- ☐ 20,28°
- ☐ 05°19'00''

8 Where are the two polar circles? (1,00 P.)

- ☐ At a latitude of 20.5°S and 20.5°N
- ☑ 23.5° north and south of the poles
- ☐ 23.5° north and south of the equator
- ☐ 20.5° south of the poles

9 What is the distance between the parallels of latitude 48°N and 49°N along a meridian line? (1,00 P.)

- ☐ 1 NM
- ☑ 60 NM
- ☐ 111 NM
- ☐ 10 NM

10 What distance corresponds to one degree difference in latitude along any degree of longitude? (1,00 P.)

- ☐ 1 NM
- ☑ 60 NM
- ☐ 30 NM
- ☐ 60 km

11 Point A on the Earth's surface lies exactly on the parallel of latitude of 47°50'27''N.

Which point is exactly 240 NM north of A? (1,00 P.)

- ☐ 43°50'27''N
- ☐ 53°50'27''N
- ☐ 49°50'27''N
- ☑ 51°50'27'N'

12 What is the distance between the two parallels of longitude 150°E and 151°E along the equator? (1,00 P.)

- ☐ 60 km
- ☐ 111 NM
- ☑ 60 NM
- ☐ 1 NM

13 What is the great circle distance between two points A and B on the equator when the difference between the two associated meridians is exactly one degree of longitude? (1,00 P.)

- ☑ 60 NM
- ☐ 400 NM
- ☐ 120 NM
- ☐ 216 NM

14 Assume two arbitrary points A and B on the same parallel of latitude, but not on the equator. Point A is located on 010°E and point B on 020°E.

The rumb line distance between A and B is always... (1,00 P.)

- ☐ more than 600 NM.
- ☑ less than 600 NM.
- ☐ more than 300 NM.
- ☐ less than 300 NM.

15 What is the difference in time when the sun moves 20° of longitude? (1,00 P.)

- ☑ 1:20 h
- ☐ 0:20 h
- ☐ 0:40 h
- ☐ 1:00 h

16 What is the difference in time when the sun moves 10° of longitude? (1,00 P.)

- ☐ 0:30 h
- ☐ 0:04 h
- ☑ 0:40 h
- ☐ 1:00 h

17 The sun moves 10° of longitude. What is the difference in time? (1,00 P.)

- ☐ 0.4 h
- ☐ 1 h
- ☐ 0.33 h
- ☑ 0.66 h

18 With Central European Summer Time (CEST) given as UTC+2, what UTC time corresponds to 1600 CEST? (1,00 P.)

- ☐ 1600 UTC.
- ☐ 1500 UTC.
- ☐ 1700 UTC.
- ☑ 1400 UTC.

19 UTC is... (1,00 P.)

- ☐ a zonal time.
- ☐ a local time in Central Europe.
- ☐ local mean time at a specific point on Earth.
- ☑ an obligatory time used in aviation.

20 With Central European Time (CET) given as UTC+1, what UTC time corresponds to 1700 CET?
(1,00 P.)

- ☑ 1600 UTC.
- ☐ 1500 UTC.
- ☐ 1700 UTC.
- ☐ 1800 UTC.

21 Vienna (LOWW) is located at 016° 34'E, Salzburg (LOWS) at 013° 00'E.
The latitude of both positions can be considered as equal.

What is the difference of sunrise and sunset times, expressed in UTC, between Wien and Salzburg? (2,00 P.)

- ☑ In Vienna the sunrise and sunset are about 14 minutes earlier than in Salzburg
- ☐ In Vienna the sunrise is 14 minutes earlier and sunset is 14 minutes later than in Salzburg
- ☐ In Vienna the sunrise and sunset are about 4 minutes later than in Salzburg
- ☐ In Vienna the sunrise is 4 minutes later and sunset is 4 minutes earlier than in Salzburg

22 The term 'civil twilight' is defined as... (1,00 P.)

- ☑ the period of time before sunrise or after sunset where the midpoint of the sun disk is 6 degrees or less below the true horizon.
- ☐ the period of time before sunrise or after sunset where the midpoint of the sun disk is 6 degrees or less below the apparent horizon.
- ☐ the period of time before sunrise or after sunset where the midpoint of the sun disk is 12 degrees or less below the true horizon.
- ☐ the period of time before sunrise or after sunset where the midpoint of the sun disk is 12 degrees or less below the apparent horizon.

23 Given:
WCA: -012°; TH: 125°; MC: 139°; DEV: 002°E

What are: TC, MH und CH?
(2,00 P.)

- ☐ TC: 113°.
  MH: 127°.
  CH: 129°.

- ☑ TC: 137°.
  MH: 127°.
  CH: 125°.

- ☐ TC: 137°.
  MH: 139°.
  CH: 125°.

- ☐ TC: 113°.
  MH: 139°.
  CH: 129°.

24 Given:
TC: 179°; WCA: -12°; VAR: 004° E; DEV: +002°

What are MH and MC?
(1,00 P.)

- ☐ MH: 167°.
  MC: 175°.
- ☐ MH: 167°.
  MC: 161°.
- ☑ MH: 163°.
  MC: 175°.
- ☐ MH: 163°.
  MC: 161°.

25 The angle between the true course and the true heading is called... (1,00 P.)

- ☑ WCA.
- ☐ deviation.
- ☐ variation.
- ☐ inclination.

26 The angle between the magnetic course and the true course is called... (1,00 P.)

- ☐ deviation.
- ☐ WCA.
- ☑ variation.
- ☐ inclination.

27 The term ‚magnetic course' (MC) is defined as... (1,00 P.)

- ☑ the angle between magnetic north and the course line.
- ☐ the angle between true north and the course line.
- ☐ the direction from an arbitrary point on Earth to the geographic North Pole.
- ☐ the direction from an arbitrary point on Earth to the magnetic north pole.

28 The term 'True Course' (TC) is defined as... (1,00 P.)

- ☐ tthe angle between magnetic north and the course line.
- ☐ the direction from an arbitrary point on Earth to the geographic North Pole.
- ☑ the angle between true north and the course line.
- ☐ the direction from an arbitrary point on Earth to the magnetic north pole.

29 Given:
TC: 183°; WCA: +011°; MH: 198°; CH: 200°

What are TH and VAR?
(2,00 P.)

☑ TH: 194°.
VAR: 004° W

☐ TH: 194°.
VAR: 004° E

☐ TH: 172°.
VAR: 004° W

☐ TH: 172°.
VAR: 004° E

30 Given:
TC: 183°; WCA: +011°; MH: 198°; CH: 200°

What are the TH and the DEV?
(2,00 P.)

☐ TH: 172°.
DEV: +002°.

☐ TH: 172°.
DEV: -002°.

☑ TH: 194°.
DEV: -002°.

☐ TH: 194°.
DEV: +002°.

31 Given:
TC: 183°; WCA: +011°; MH: 198°; CH: 200°

What are the VAR and the DEV?
(2,00 P.)

☐ VAR: 004° W.
DEV: +002°.

☑ VAR: 004° W.
DEV: -002°.

☐ VAR: 004° E.
DEV: +002°.

☐ VAR: 004° E.
DEV: -002°.

32 Where does the inclination reach its lowest value? (1,00 P.)

- ☑ At the magnetic equator
- ☐ At the magnetic poles
- ☐ At the geographic equator
- ☐ At the geographic poles

33 The angle between compass north and magnetic north is called... (1,00 P.)

- ☐ WCA.
- ☐ variation.
- ☐ inclination.
- ☑ deviation.

34 Which direction corresponds to 'compass north' (CN)? (1,00 P.)

- ☐ The most northerly part of the magnetic compass in the aircraft, where the reading takes place
- ☐ The direction from an arbitrary point on Earth to the geographical North Pole
- ☐ The angle between the aircraft heading and magnetic north
- ☑ The direction to which the direct reading compass aligns due to earth's and aircraft's magnetic fields

35 The term 'isogonal' or 'isogonic line' is defined as a line on an aeronautical chart, connecting all points with the same value of... (1,00 P.)

- ☐ inclination.
- ☐ deviation.
- ☐ heading.
- ☑ variation.

36 The term 'agonic line' is defined as a line on Earth or an aeronautical chart, connecting all points with the... (1,00 P.)

- ☐ deviation of 0°.
- ☐ inclination of 0°.
- ☐ heading of 0°.
- ☑ variation of 0°.

37 Which are the official basic units for horizontal distances used in aeronautical navigation and their abbreviations? (1,00 P.)

- ☐ feet (ft), inches (in)
- ☑ Nautical miles (NM), kilometers (km)
- ☐ Yards (yd), meters (m)
- ☐ Land miles (SM), sea miles (NM)

38 1000 ft equal... (1,00 P.)

- ☐ 30 km.
- ☐ 3000 m.
- ☑ 300 m.
- ☐ 30 m.

39 5500 m equal... (1,00 P.)

- ☐ 7500 ft.
- ☑ 18000 ft.
- ☐ 10000 ft.
- ☐ 30000 ft.

40 Which of the items on the attached checklist are related to the direct reading compass?

See annex (NAV-004) (1,00 P.)

Siehe Anlage 2

- ☐ "Turning Instruments" only
- ☐ "Gyro" and "Circuit Breaker"
- ☑ "Gyro" and "Turning Instruments"
- ☐ "Turning Instruments" and "Circuit Breaker"

41 What could be a reason for changing the runway indicators at aerodromes (e.g. from runway 06 to runway 07)? (1,00 P.)

- ☐ The magnetic deviation of the runway location has changed
- ☑ The magnetic variation of the runway location has changed
- ☐ The direction of the approach path has changed
- ☐ The true direction of the runway alignment has changed

42 Electronic devices on board of an aeroplane have influence on the... (1,00 P.)

- ☐ turn coordinator.
- ☐ airspeed indicator.
- ☐ artificial horizon.
- ☑ direct reading compass.

43 Which are the properties of a Mercator chart? (1,00 P.)

- ☐ The scale is constant, great circles are depicted as curved lines, rhumb lines are depicted as straight lines
- ☑ The scales increases with latitude, great circles are depicted as curved lines, rhumb lines are depicted as straight lines
- ☐ The scales increases with latitude, great circles are depicted as straight lines, rhumb lines are depicted as curved lines
- ☐ The scale is constant, great circles are depicted as straight lines, rhumb lines are depicted as curved lines

44 How are rhumb lines and great circles depicted on a direct Mercator chart? (1,00 P.)

- ☐ Rhumb lines: curved lines
  Great circles: straight lines
- ☐ Rhumb lines: curved lines
  Great circles: curved lines
- ☑ Rhumb lines: straight lines
  Great circles: curved lines
- ☐ Rhumb lines: straight lines
  Great circles: straight lines

45 Which are the properties of a Lambert conformal chart? (1,00 P.)

- ☐ Great circles are depicted as straight lines and the chart is an equal-area projection
- ☐ The chart is conformal and an equal-area projection
- ☑ The chart is conformal and nearly true to scale
- ☐ Rhumb lines are depicted as straight lines and the chart is conformal

46 Which lines have to be used by the pilot to determine the aircraft's position? (1,00 P.)

- ☑ True bearings (QTE)
- ☐ Magnetic bearings (QDR)
- ☐ Relative bearings (RB)
- ☐ Magnetic headings (MH)

47 What is the radial from VOR Brünkendorf (BKD) (53°02?N, 011°33?E) to Pritzwalk (EDBU) (53°11'N, 12°11'E)?

See annex (NAV-031) (1,00 P.)

Siehe Anlage 3

- ☐ 024°
- ☐ 204°
- ☐ 248°
- ☑ 068°

48 The distance between two airports is 220 NM.
On an aeronautical navigation chart the pilot measures 40.7 cm for this distance.

The chart scale is... (1,00 P.)

- ☐ 1 : 250000.
- ☐ 1 : 2000000.
- ☐ 1 : 500000.
- ☑ 1 : 1000000.

49 Given the following information, what is the aircraft position at the cross bearing?

VOR Hamburg (HAM) (53°41?N, 010°12?E): Radial 119°
VOR Brünkendorf (BKD) (53°02?N, 011°33?E): Radial 320°

See annex (NAV-031) (1,00 P.)

Siehe Anlage 3

- ☐ 52°20'N, 10°10'E
- ☐ 54°40'N, 12°50'E
- ☐ 52°10'N, 10°20'E
- ☑ 53°20'N, 11°10'E

50 What is the distance from VOR Brünkendorf (BKD) (53°02?N, 011°33?E) to Pritzwalk (EDBU) (53°11'N, 12°11'E)?

See annex (NAV-031) (1,00 P.)

Siehe Anlage 3

- ☐ 24 km
- ☐ 42 NM
- ☑ 24 NM
- ☐ 42 km

51 A distance of 7.5 cm on an aeronautical chart represents a distance of 60.745 NM in reality.

What is the chart scale? (1,00 P.)

- ☐ 1 : 500000
- ☐ 1 : 1 000000
- ☐ 1 : 150000
- ☑ 1 : 1500000

52 For a short flight from A to B the pilot extracts the following information from an aeronautical chart:
True course: 245°.
Magnetic variation: 7° W

The magnetic course (MC) equals... (1,00 P.)

- ☑ 252°.
- ☐ 245°.
- ☐ 007°.
- ☐ 238°.

53 An aircraft is flying with an indicated airspeed (IAS) of 150 kt at 8000 ft MSL.

According to the rule of thumb, the true airspeed (TAS) equals... (1,00 P.)

- ☑ 174 kt.
- ☐ 150 kt.
- ☐ 142 kt.
- ☐ 208 kt.

54 Given:
True course from A to B: 250°.
Ground distance: 210 NM.
TAS: 130 kt.
Headwind component: 15 kt.
Estimated time of departure (ETD): 0915 UTC.

The estimated time of arrival (ETA) is... (2,00 P.)

- ☐ 1115 UTC.
- ☑ 1105 UTC.
- ☐ 1005 UTC.
- ☐ 1052 UTC.

55 Given:
True course from A to B: 283°.
Ground distance: 75 NM.
TAS: 105 kt.
Headwind component: 12 kt.
Estimated time of departure (ETD): 1242 UTC.

The estimated time of arrival (ETA) is... (1,00 P.)

- ☐ 1430 UTC
- ☐ 1356 UTC
- ☑ 1330 UTC
- ☐ 1320 UTC

56 Given:
True course from A to B: 352°.
Ground distance: 100 NM.
GS: 107 kt.
Estimated time of departure (ETD): 0933 UTC.

The estimated time of arrival (ETA) is...

(1,00 P.)

- ☐ 1129 UTC.
- ☑ 1029 UTC.
- ☐ 1146 UTC.
- ☐ 1045 UTC.

57 An aircraft travels 100 km in 56 minutes.

The ground speed (GS) equals...

(1,00 P.)

- ☐ 58 km/h.
- ☐ 198 kt.
- ☐ 93 kt.
- ☑ 107 km/h.

58 An aircraft travels 110 NM within 01:25.

The ground speed (GS) equals...

(1,00 P.)

- ☐ 120 km/h.
- ☐ 160 km/h.
- ☐ 86 kt.
- ☑ 78 kt.

59 What is the required flight time for a distance of 236 NM with a ground speed of 134 kt? (1,00 P.)

- ☐ 1:34 h
- ☐ 0:46 h
- ☑ 1:46 h
- ☐ 0:34 h

60 An aircraft is flying with a true airspeed (TAS) of 120 kt and experiences 35 kt tailwind.

How much time is needed for a distance of 185 NM?

(1,00 P.)

- ☐ 1 h 32 min
- ☐ 0 h 50 min
- ☑ 1 h 12 min
- ☐ 2 h 11 min

61 An aircraft is flying with a true airspeed (TAS) of 180 kt and a headwind component of 25 kt for 2 hours and 25 minutes.

The distance flown equals... (1,00 P.)

- ☐ 693 NM.
- ☐ 435 NM.
- ☑ 375 NM.
- ☐ 202 NM.

62 Given:

Calibrated airspeed (CAS): 155 kt.
Flight level (FL) 80.
Outside air temperature (OAT): +15° C.

The true airspeed (TAS) equals... (1,00 P.)

- ☐ 155 kts.
- ☐ 170 kts.
- ☑ 180 kts.
- ☐ 134 kts.

63 What is the true course (TC) from Uelzen (EDVU) (52°59?N, 10°28?E) to Neustadt (EDAN) (53°22'N, 011°37'E)?

See annex (NAV-031) (1,00 P.)

Siehe Anlage 3

- ☐ 241°
- ☐ 235°
- ☑ 061°
- ☐ 055°

64 An aircraft is flying at aFL 75
with an outside air temperature (OAT) of -9°C.
The QNH altitude is 6500 ft.

The true altitude equals... (1,00 P.)

- ☐ 6500 ft.
- ☐ 6750 ft.
- ☐ 7000 ft.
- ☑ 6250 ft.

65 What is the distance from Neustadt (EDAN) (53°22'N, 011°37'E) to Uelzen (EDVU) (52°59?N, 10°28?E)?

See annex (NAV-031) (1,00 P.)

Siehe Anlage 3

- ☑ 46 NM
- ☐ 78 km
- ☐ 46 km
- ☐ 78 NM

66 An aircraft is flying at a pressure altitude of 7000 feet with an outside air temperature (OAT) of +11°C. The QNH altitude is 6500 ft.

The true altitude equals... (1,00 P.)

- ☐ 6500 ft.
- ☐ 7000 ft.
- ☑ 6750 ft.
- ☐ 6250 ft.

67 An aircraft is flying at a pressure altitude of 7000 feet with an outside air temperature (OAT) of +21°C. The QNH altitude is 6500 ft.

The true altitude equals...
(1,00 P.)

- ☐ 6750 ft.
- ☐ 6250 ft.
- ☑ 7000 ft.
- ☐ 6500 ft.

68 Given:
True course: 255°.
TAS: 100 kt.
Wind: 200°/10 kt.

The true heading equals... (1,00 P.)

- ☐ 245°.
- ☐ 275°.
- ☐ 265°.
- ☑ 250°.

69 Given:
True course: 165°.
TAS: 90 kt.
Wind: 130°/20 kt.
Distance: 153 NM.

The true heading equals... (1,00 P.)

- ☐ 126°.
- ☑ 158°.
- ☐ 152°.
- ☐ 165°.

70 Given:
Ground speed (GS): 160 kt.
True course (TC): 177°.
Wind vector (W/WS): 140°/20 kt.

The true heading (TH) equals...

(1,00 P.)

- ☐ 169°.
- ☑ 173°.
- ☐ 184°.
- ☐ 180°.

71 An aircraft is following a true course (TC) of 220° at a constant TAS of 220 kt. The wind vector is 270°/50 kt.

The ground speed (GS) equals...

(1,00 P.)

- ☐ 170 kt.
- ☑ 185 kt.
- ☐ 255 kt.
- ☐ 135 kt.

72 An aircraft is following a true course (TC) of 040° at a constant true airspeed (TAS) of 180 kt. The wind vector is 350°/30 kt.

The groundspeed (GS) equals...
(1,00 P.)

- ☐ 172 kt.
- ☑ 159 kt.
- ☐ 155 kt.
- ☐ 168 kt.

73 An aircraft is following a true course (TC) of 040° at a constant true airspeed (TAS) of 180 kt. The wind vector is 350°/30 kt.

The wind correction angle (WCA) equals...

(1,00 P.)

- ☐ + 5°
- ☐ + 11°
- ☑ - 7°
- ☐ - 9°

74 Given:
True course: 270°.
TAS: 100 kt.
Wind: 090°/25 kt.
Distance: 100 NM.
The ground speed (GS) equals... (1,00 P.)

- ☑ 125 kt.
- ☐ 117 kt.
- ☐ 120 kt.
- ☐ 131 kt.

75 Given:
True course: 270°.
TAS: 100 kt.
Wind: 090°/25 kt.
Distance: 100 NM.

The flight time equals... (1,00 P.)

- ☐ 62 Min.
- ☐ 37 Min.
- ☑ 48 Min.
- ☐ 84 Min.

76 An aircraft is following a true course (TC) of 040° at a constant true airspeed (TAS) of 180 kt. The wind vector is 350°/30 kt.

The wind correction angle (WCA) equals...

(1,00 P.)

- ☑ 7° left.
- ☐ 3° right.
- ☐ 3° left.
- ☐ 7° right.

77 Given:
True course: 120°.
TAS: 120 kt.
Wind: 150°/12 kt.

The WCA equals... (1,00 P.)

- ☐ 6° to the right.
- ☐ 3° to the left.
- ☑ 3° to the right.
- ☐ 6° to the left.

78 The distance from 'A' to 'B' measures 120 NM. At a distance of 55 NM from 'A' the pilot realizes a deviation of 7 NM to the right.

What approximate course change must be made to reach 'B' directly?

(1,00 P.)

- ☐ 8° left
- ☐ 6° left
- ☐ 15° left
- ☑ 14° left

79 An aeroplane has a heading of 090°. The distance which has to be flown is 90 NM. After 45 NM the aeroplane is 4.5 NM north of the planned flight path.

What is the corrected heading to reach the arrival aerodrome directly? (1,00 P.)

- ☐ 18° to the right
- ☑ 12° to the right
- ☐ 6° to the right
- ☐ 9° to the right

80 What is the meaning of the 1:60 rule?

(1,00 P.)

- ☐ 6 NM lateral offset at 1° drift after 10 NM
- ☐ 60 NM lateral offset at 1° drift after 1 NM
- ☑ 1 NM lateral offset at 1° drift after 60 NM
- ☐ 10 NM lateral offset at 1° drift after 60 NM

81 An aircraft is flying from 'A' to 'B' (distance 220 NM) at an average ground speed (GS) of 120 kt. It departs 'A' at 1200 UTC. After 70 NM along the course from 'A', the aircraft is 5 min ahead of the planned schedule.

Using the actual GS, what is the revised estimated time of arrival (ETA) at B?

(1,00 P.)

- ☑ 1335 UTC
- ☐ 1340 UTC
- ☐ 1345 UTC
- ☐ 1330 UTC

82 Assume calm wind and an aircraft descending from 9000 ft to 1500 ft.
The rate of descent (ROD) equals 1200 ft/min.

The elapsed time will be... (1,00 P.)

- ☑ 6 min.
- ☐ 15 min.
- ☐ 12 min.
- ☐ 8 min.

83 Assume zero wind and an aircraft descending from 7500 ft to 1200 ft with an average true airspeed (TAS) during the descent of 105 kt. The rate of descent (ROD) equals 800 ft/min.

The elapsed time will be... (1,00 P.)

- ☑ 8 Min.
- ☐ 6 Min.
- ☐ 15 Min.
- ☐ 12 Min.

84 Which answer completes the flight plan (marked cells)?

See annex (NAV-014) (3,00 P.)

Siehe Anlage 4

☐ TH: 185°.
MH: 185°.
MC: 180°.

☑ TH: 185°.
MH: 184°.
MC: 178°.

☐ TH: 173°.
MH: 174°.
MC: 178°.

☐ TH: 173°.
MH: 184°.
MC: 178°.

85 What radio navigation aid can be received with the attached aerial?

See figure (NAV-017) (1,00 P.)

Siehe Anlage 5

☐ VOR
☐ DME
☑ NDB
☐ VDF

86 The approximate propagation speed of electromagnetic waves is... (1,00 P.)

- ☑ 300000 km/s.
- ☐ 300000 m/s.
- ☐ 300000 NM/s.
- ☐ 300000 ft/s.

87 Radio waves within the LF and MF range (e.g. NDB) travel as... (1,00 P.)

- ☐ sky wave.
- ☑ sky wave and as ground / surface wave.
- ☐ ground / surface wave.
- ☐ space wave (quasi-optical).

88 Radio waves within the VHF range (e.g. VOR) travel as... (1,00 P.)

- ☐ sky wave and ground / surface wave.
- ☐ ground / surface wave.
- ☐ sky wave.
- ☑ space wave (quasi-optical).

89 Quasi-optical waves travel... (1,00 P.)

- ☐ along the surface of the earth.
- ☑ through the air directly from the transmitter to the receiver.
- ☐ through the air and are influenced (e.g. reflected) by the ionosphere.
- ☐ along the surface of the earth, but are absorbed by the sea.

90 A VHF direction finder (VDF) can determine... (1,00 P.)

- ☐ slant ranges.
- ☑ magnetic bearings.
- ☐ approach speeds.
- ☐ true courses.

91 Which equipment is needed on board of an aircraft to use a VHF direction finder (VDF)? (1,00 P.)

- ☐ At least two VHF aerials
- ☑ A VHF radio
- ☐ A relative bearing indicator (RBI)
- ☐ A VDF receiver

92 Given:
QDM: 138°
VAR: 10° E

The QUJ equals... (1,00 P.)

- ☐ 168°.
- ☐ 318°.
- ☐ 328°.
- ☑ 148°.

93 Given:
QTE: 229°
VAR: 10° W

The QDM equals...
(1,00 P.)

- ☐ 039°.
- ☑ 059°.
- ☐ 239°.
- ☐ 049°.

94 Given:
QDR: 022°
VAR: 10° E

The QTE equals...
(1,00 P.)

- ☐ 212°.
- ☐ 202°.
- ☐ 052°.
- ☑ 032°.

95 Given:
QDM: 248°
VAR: 10° W

The QTE is...
(1,00 P.)

- ☐ 238°.
- ☐ 078°.
- ☑ 058°.
- ☐ 258°.

96 Given:
QDR: 067°
VAR: 5° E

The QDM equals...
(1,00 P.)

- ☑ 247°.
- ☐ 072°.
- ☐ 252°.
- ☐ 257°.

97 Given:
QDR: 152°
VAR: 5° W
DEV: 5° E

The QUJ equals... (1,00 P.)

- ☐ 332°.
- ☐ 147°.
- ☑ 327°.
- ☐ 317°.

98 Given:
QTE: 203°
VAR: 10° E

The QDR equals...
(1,00 P.)

- ☐ 023°.
- ☐ 213°.
- ☑ 193°.
- ☐ 013°.

99 Given:
QTE: 248°
VAR: 10° W

The QDR equals...

(1,00 P.)

- ☐ 068°.
- ☐ 238°.
- ☑ 258°.
- ☐ 078°.

100 Given:
QDM: 134°
VAR: 5° W

The QTE equals...

(1,00 P.)

- ☐ 314°.
- ☐ 299°.
- ☐ 129°.
- ☑ 309°.

101 The pilot receives a QDR of 225° from the VDF ground station.

Where is the aircraft located in relation to the ground station?

(1,00 P.)

- ☐ Southeast
- ☐ Northeast
- ☑ Southwest
- ☐ Northwest

102 The term QDR means... (1,00 P.)

- ☑ magnetic bearing from the station to the aircraft.
- ☐ true bearing from the aircraft to the station.
- ☐ magnetic bearing from the aircraft to the station.
- ☐ true bearing from the station to the aircraft.

103 The term QTE means... (1,00 P.)

- ☐ magnetic bearing from the station to the aircraft.
- ☐ magnetic bearing from the aircraft to the station.
- ☑ true bearing from the station to the aircraft.
- ☐ true bearing from the aircraft to the station.

104 A pilot receives a QDR of 135° from the VDF ground station.

Where is the aircraft located in relation to the ground station?
(1,00 P.)

- ☐ Northwest
- ☑ Southeast
- ☐ Southwest.
- ☐ Northeast

105 A pilot receives a QDR of 315° from the VDF ground station.

Where is the aircraft located in relation to the ground station? (1,00 P.)

- ☑ Northwest
- ☐ Northeast
- ☐ Southeast
- ☐ Southwest

106 The VDF range depends on... (1,00 P.)

- ☐ the aircraft's speed.
- ☐ the condition of the ionosphere.
- ☐ the range of the ground / surface wave.
- ☑ the aircraft's altitude.

107 Which equipment is needed on board of an aircraft to receive signals from a non-directional beacon (NDB)? (1,00 P.)

- ☐ Course deviation indicator (CDI)
- ☐ Horizontal situation indicator (HSI)
- ☑ Automatic direction finder (ADF)
- ☐ Secondary surveillance radar (SSR)

108 Non-directional beacons (NDBs) transmit within which frequency band? (1,00 P.)

- ☐ Very low frequency (VLF) and low frequency (LF)
- ☑ Low frequency (LF) and medium frequency (MF)
- ☐ High frequency (HF)
- ☐ Very high frequency (VHF)

109 A pilot wants to approach an NDB on QDM 090°. The aircraft flies for about 5 minutes with a magnetic heading (MH) of 095° and the RBI indication of 355°. After 6 minutes the RBI indicates 358°.

Which statement is correct? (1,00 P.)

- ☑ The crosswind component increased; the pilot has to increase the MH
- ☐ The crosswind component increased; the pilot has to decrease the MH
- ☐ The crosswind component decreased; the pilot has to increase the MH
- ☐ The crosswind component decreased; the pilot has to decrease the MH

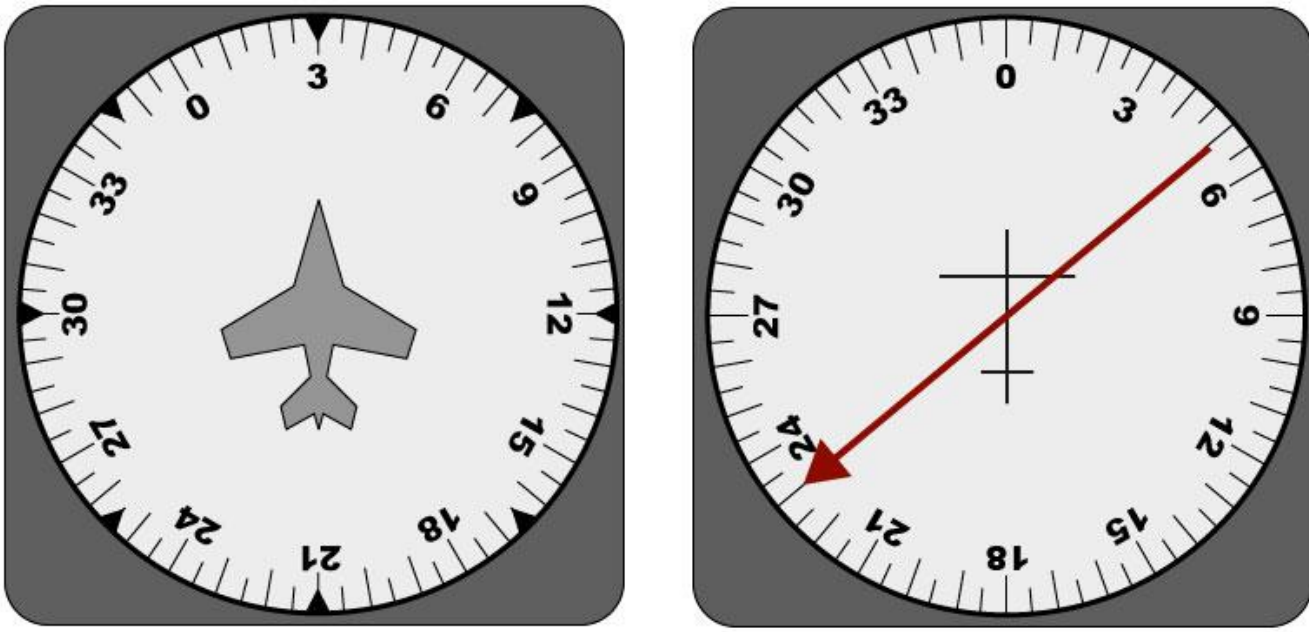
110 The pilot wants to proceed directly to the beacon. The wind is calm.

The pilot should follow a QDM of...

See figure (NAV-019) (1,00 P.)

Siehe Anlage 6

☐ 080°.
☐ 200°.
☑ 260°.
☐ 230°.



NAV-019

111 What is the difference between a locator beacon and a non-directional beacon (NDB)? (1,00 P.)

☐ Locator beacons transmit more precisely
☐ Locator beacons have a higher range than NDBs
☐ Locator beacons transmit on request only
☑ Locator beacons have a lower range than NDBs

112 The range of NDBs transmitting in the medium frequency range is greatest... (1,00 P.)

☐ before midday.
☑ at night.
☐ on midday.
☐ in the daytime.

113 The shoreline effect is greatest with radio wave propagation... (1,00 P.)

- ☐ at a right angle to the coast; aircraft below 6000 ft.
- ☐ at an acute angle to the coast; aircraft above 6000 ft.
- ☑ at an acute angle to the coast; aircraft below 6000 ft.
- ☐ at a right angle to the coast; aircraft above 6000 ft.

114 Fading in LF/MF frequency range occurs mainly... (1,00 P.)

- ☐ in the late afternoon.
- ☐ at midday.
- ☑ during the night.
- ☐ in the daytime.

115 The progress of an electromagnetic oscillation can be described by the... (1,00 P.)

- ☑ phase angle.
- ☐ amplitude angle.
- ☐ wave angle.
- ☐ frequency angle.

116 When transmitter and receiver are moving towards each other... (1,00 P.)

- ☐ the frequency varies, but the wavelength remains constant.
- ☐ the perceived frequency equals the transmitted frequency.
- ☑ the perceived frequency increases.
- ☐ the perceived frequency decreases.

117 When transmitter and receiver are moving away from each other... (1,00 P.)

- ☐ the perceived frequency increases.
- ☑ the perceived frequency decreases.
- ☐ the frequency varies, but the wavelength remains constant.
- ☐ the perceived frequency equals the transmitted frequency.

118 VOR radials are defined based on the principle of... (1,00 P.)

- ☑ phase comparison of two signals.
- ☐ frequency comparison of two signals.
- ☐ pulse comparison of two signals.
- ☐ amplitude comparison of two signals.

119 A VOR radial corresponds to the... (1,00 P.)

- ☐ QTE.
- ☐ QUJ.
- ☑ QDR.
- ☐ QDM.

120 Full deflection of the course deviation indicator (CDI) means that the aircraft is located at least... (1,00 P.)

- ☐ 2 NM beside the selected course.
- ☐ 10 NM beside the selected course.
- ☐ 2° beside the selected course.
- ☑ 10° beside the selected course.

121 Where is the aircraft located in relation to the VOR?

See annex (NAV-022) (1,00 P.)

Siehe Anlage 7

- ☑ Northeast
- ☐ Southeast
- ☐ Southwest
- ☐ Northwest

122 The aircraft is on radial...

See annex (NAV-024) (1,00 P.)

Siehe Anlage 8

- ☐ 066°.
- ☑ 234°.
- ☐ 060°.
- ☐ 246°.

123 The range of a VOR is affected by... (1,00 P.)

- ☐ daylight interference.
- ☐ reflected sky waves.
- ☐ multipath propagation of the ground wave.
- ☑ transmitter and receiver altitude.

124 The distance measuring equipment (DME) determines the distance based on the principle of... (1,00 P.)

- ☑ time measurement.
- ☐ Doppler.
- ☐ laser measurement.
- ☐ phase comparison.

125 The DME reading is a... (1,00 P.)

- ☐ ground distance.
- ☐ air range.
- ☐ radial distance.
- ☑ slant range.

126 The differenz between indicated DME slant range and horizontal distance from the DME station increases... (1,00 P.)

- ☐ when circling around the DME station.
- ☐ when descending.
- ☐ when departing the DME station.
- ☑ when approaching the DME station.

127 Using primary ground radar, the direction of the aeroplane in relation to the antenna is determined by... (1,00 P.)

- ☐ the pulse pair interval.
- ☑ the orientation of the antenna.
- ☐ the frequency shift of the received pulse.
- ☐ time measurement.

128 Which instantaneous information can be obtained from ground radar equipment? (1,00 P.)

- ☑ Distance and direction
- ☐ Airspeed (TAS) and distance
- ☐ Airspeed (TAS) and heading
- ☐ Direction and airspeed (TAS)

129 The on-board equipment of the secondary surveillance radar (SSR) is called... (1,00 P.)

- ☐ course indicator.
- ☑ transponder.
- ☐ interrogator.
- ☐ decoder.

130 What is the difference between primary and secondary radar? (1,00 P.)

- ☐ The pulses of a primary radar are variably pulse-modulated, the pulses of a secondary radar are statically amplitude-modulated
- ☐ The pulses of a primary radar are variably amplitude-modulated, the pulses of a secondary radar are statically pulse-modulated
- ☐ The primary radar is displayed on a computer screen, the secondary radar on a radar strip
- ☑ The pulses of a primary radar are reflected by the aircraft's surface, the pulses of a secondary radar system are answered by a transponder

131 The transponder code in case of hi-jacking is... (1,00 P.)

- ☐ 7000.
- ☐ 7600.
- ☑ 7500.
- ☐ 7700.

132 The transponder code in case of a radio communication failure is... (1,00 P.)

- ☐ 7700.
- ☐ 7500.
- ☐ 7000.
- ☑ 7600.

133 Which altitude is transmitted by the transponder in mode C? (1,00 P.)

- ☐ QFE altitude
- ☑ Pressure altitude
- ☐ QNH altitude
- ☐ Radio altitude

134 How many satellites are necessary for a precise and verified three-dimensional determination of the position? (1,00 P.)

- ☐ Two
- ☐ Three
- ☐ Five
- ☑ Four

135 When using a GPS for tracking to the next waypoint, a deviation indication is shown by a vertical bar and dots to the left and to the right of the bar.

What statement describes the correct interpretation of the display? (1,00 P.)

- ☐ The deviation of the bar from the center indicates the track error as angular distance in degrees; the scale for full deflection depends on the operating mode of the GPS.
- ☐ The deviation of the bar from the center indicates the track error as angular distance in degrees; the scale for full deflection is +-10°.
- ☐ The deviation of the bar from the center indicates the track error as absolute distance in NM; the scale for full deflection is +-10 NM.
- ☑ The deviation of the bar from the center indicates the track error as absolute distance in NM; the scale for full deflection depends on the operating mode of the GPS.

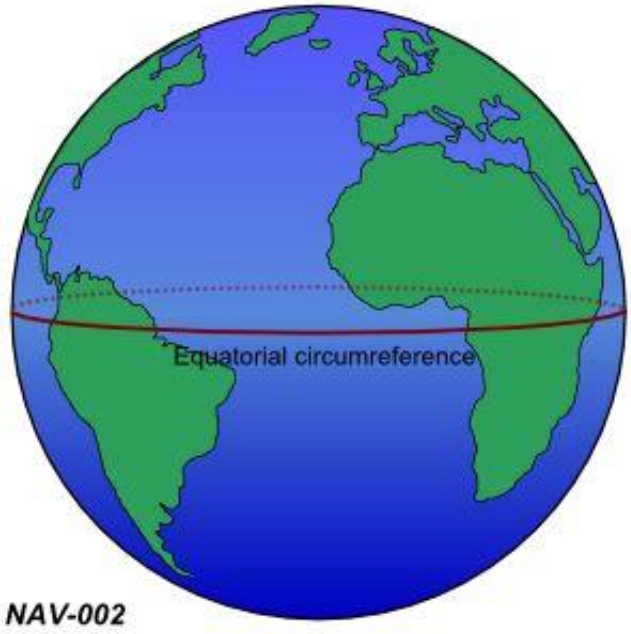
136 What is meant by the term "terrestrial navigation"? (1,00 P.)

- ☐ Orientation by ground celestial object during visual flight
- ☑ Orientation by ground features during visual flight
- ☐ Orientation by GPS during visual flight
- ☐ Orientation by instrument readings during visual flight

137 What ground features should preferrably be used for orientation during visual flight? (1,00 P.)

- ☐ Border lines
- ☐ Farm tracks and creeks
- ☐ Power lines
- ☑ Rivers, railroads, highways

Anlage 1



Anlage 2

NAV-004

BEFORE START CHECKLIST	
Preflight Check	COMPLETED
Passengers	ADVISED
Seats / Seat Belts	SECURE
Door / Window	CLOSED
Brakes	SET
Flight Controls	FREE
Fuel Selector	BOTH
Circuit Breaker	CHECKED
Radio Master Switch	OFF
ACL	ON
Master Switch	ON
Flaps	RETRACTED
Before Start Checklist completed	
AFTER START CHECKLIST	
Engine Instruments	NORMAL
Avionic Master	ON
Altimeter	SET
Gyro	SET
After Start Checklist completed	
TAXI CHECKLIST	
Lights	____
Brakes	CHECKED
Turning Instruments	CORRECT
Taxi Checklist completed	

Anlage 3

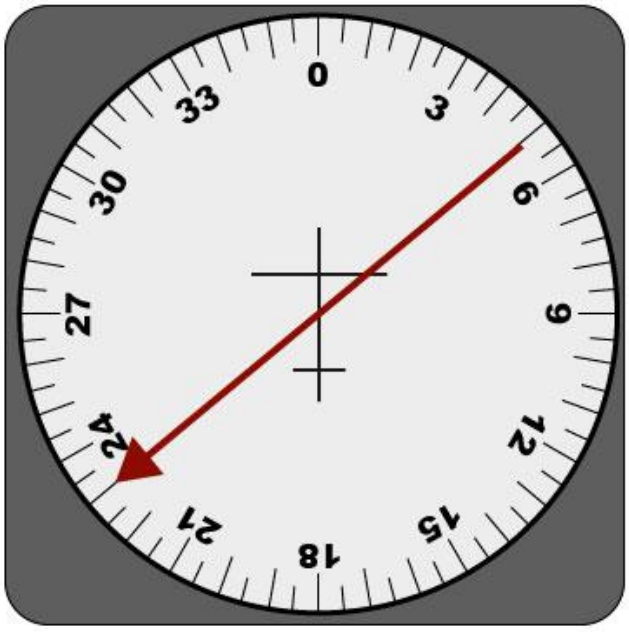

Bremen 125.1
KIEL HK
119.97
Michaelsdorf
112.2 MIC
Grube HB
122.6
Barth BH
118.07
Purkshof CX
122.4
Rerik CR
126.5
Neumünster HN
123.0
Sierksdorf XT
122.0
Lübeck
110.6 LUB
Wismar CW
123.05
Laage NL
118.42
Wahlstedt HW
121.02
Hartenholm HM
118.12
LUBECK HL
119.92
128.7
394 LYE
Güstrow CU
122.0
Hamburg
113.1 HAM
339 HOS
HAMBURG DH
123.12 118.2 126.85
350 EU
F60 45
BREMEN
125.1
Pinnow BP
122.5
333 PI
PARCHIM OP
128.9
315 PAH
Neustadt AN
123.37
Lüneburg HG
122.17
Uelzen VU
130.9
FASSBERG
118.52
Lüchow HC
122.5
Brunkendorf
117.7 BKD
Pritzwalk BU
122.6
Kyritz BK
122.72
Ruppiner Land
122.5
Klietz CL
122.37
Rhinow OR
122.0
Stendal OV
122.4
Stechow UA
122.2
Arloh VC
123.65
Celle
118.25
Wilsche VQ
Gardelegen OC
122.85
Hehlingen
117.3 HLZ
427 BRU
BRAUNSCHWEIG VE
120.05
Burg BG
122.05
HANNOVER
119.82
BREMEN
132.65
NAV-031

Anlage 4

P6	P7		P8	P9		P9	P10	P11
NAV-014								
VE	Wind W/V **Wind W/WS**		rwk	L	rwSK	MW	mwSK	mwK
TAS	Richtung	Geschw.	**TC**	**WCA**	**TH**	**VAR**	**MH**	**MC**
75	320	15	247	+11	258	1	257	246
95	320	15	152	+2	154	1	153	151
95	320	15	139	0	139	1	138	138
95	320	15	161	+3	164	1	163	160
95	320	15	179	+6		1		

Anlage 5

Anlage 6



NAV-019

Anlage 7

NAV-022

Anlage 8

NAV-024