THE TOE PILOT EXAMINATION

3rd EACTAECHO

Bergamo, 2004, September 20th-24th

At the end of the EACTAECHO3 the Simulated Pilot TOE examination has been proposed to the 95 participants. 44 attendants registered for the examination on a voluntary basis.
The examination was anonymous, and the candidates have been assigned a code allowing them to recognise their examination form and the results.
The format of the examination (50 MCQs + 20 video-clips) has been reduced with respect to the first official EAE-EACTA Perioperative TOE examination that will be firstly introduced at the next EACTA Annual Meeting in Montpellier, in the year 2005.
The candidates had 90 minutes for the 50 MCQs and 40 minutes for the video-clips.
The aim of this pilot examination is NOT to certify any kind of expertise: it has been introduced to make the candidates familiar to the official examination format; moreover, it will be useful for us to assess the "complexity degree" for the official examination.
The questions have been prepared by 5 members of the EACTAECHO3 faculty. The format is 4-5 options for each question, and the "BEST POSSIBLE ANSWER" was requested.
The correct answers have been indicated by the faculty members according to recognised international standards and/or on the basis of what was presented during the EACTAECHO3 course.
Of course, it is possible that some questions and the relative answers may not be universally accepted. Some "correct answers" could be argued: please accept them as the result of the efforts of the Faculty.

In the following items you will find:

Marco Ranucci
Vice-president and organiser EACTAecho3

EACTA ECHO 3 - PILOT TOE EXAMINATION

ID CODE .....

Multiple choice questions - Select the best answer

1. In B-Mode imaging (2D), which statement is false?

- ❑ resolution increases as ultrasound frequency increases.
- ❑ lateral resolution decreases with penetration depth.
- ❑ the alignment of the ultrasound beam should be as parallel to the object surface as possible.
- ❑ the focus should be set at the depth of interest to increase imaging resolution.
- ❑ measurements should be made using the axial resolution.

2. Which statement is true?

Increasing ultrasound frequency causes:

- ❑ Propagation velocity to increase
- ❑ Resolution to decrease
- ❑ Penetration depth to increase
- ❑ Nyquist limit to increase
- ❑ Wave length to decrease

3. Which statement is true?

- ❑ Side lobe artifacts are horizontally aligned.
- ❑ A mirror image vessel can be differentiated by lack of signals in colour flow Doppler.
- ❑ Aliasing can be reduced by inversion of the colour coding or change in colour map.
- ❑ Refraction artifacts can be corrected using the angle correction.
- ❑ Mirror image artifacts in spectral Doppler are reduced using less gain or US power.

4. Which one of the following properties of continuous wave (CW) doppler is not correct?

- ❑ Depth discrimination
- ❑ Ability to measure high velocities
- ❑ Quantitative evaluation of abnormal blood flow
- ❑ Study of gradients across normal valves

5. The properties of pulsed wave (PW) doppler include all of the following except:

- ❑ Depth discrimination
- ❑ Pulmonary vein flow study
- ❑ Study of propagation velocity into the ventricle
- ❑ Study of mitral annulus displacement

6. The Bernoulli equation calculates

- ❑ The maximum velocity of the blood flow
- ❑ The cardiac output
- ❑ The pressure drop across an obstructive valve
- ❑ The diastolic function of the left ventricle

7. A blood flow velocity of 270 cm/sec corresponds to a pressure gradient of

- ❑ 27 mmHg
- ❑ 34 mmHg
- ❑ 61 mmHg
- ❑ 29 mmHg

8. Which one of the following conditions is needed to assess the systolic pulmonary arterial pressure?

- ❑ A tricuspid regurgitation and no pulmonary stenosis
- ❑ A pulmonary regurgitation and no tricuspid regurgitation
- ❑ A mitral regurgitation and a tricuspid regurgitation
- ❑ None of the above

9. The velocity time integral (VTI) of a blood flow can be measured using

- ❑ A PW Doppler
- ❑ A CW Doppler
- ❑ Both a CW and a PW Doppler
- ❑ None of the above

10. Which one of the following is correct?

- ❑ Stroke volume = VTI / Cross section area
- ❑ Stroke volume = Cross Section area / VTI
- ❑ Stroke volume = VTI x Cross section area
- ❑ Stroke volume = VTI^2 x 0.785

11. Which pressure should be directly measured to assess the LVEDP?

- ❑ Left atrial pressure
- ❑ Systemic diastolic pressure
- ❑ Systolic pulmonary pressure
- ❑ Right atrial pressure

12. Which of the following is NOT a fluid responsiveness indicator?

- ❑ E / A VTI ratio
- ❑ Aortic blood velocity changes
- ❑ Pulmonary blood velocity changes
- ❑ End diastolic area
- ❑ Pulmonary vein flow pattern

13. In a four chamber mid-esophageal view, which coronary arteries supply areas are seen?

- ❑ Right coronary and circumflex
- ❑ Left anterior descending and circumflex
- ❑ Right coronary and left anterior descending
- ❑ All the three vessels

14. In a two chamber mid-esophageal view, which coronary arteries supply areas are seen?

- ❑ Right coronary and circumflex
- ❑ Left anterior descending and circumflex
- ❑ Right coronary and left anterior descending
- ❑ All the three vessels

15. In a long axis mid-esophageal view, which coronary arteries supply areas are seen?

- ❑ Right coronary and circumflex
- ❑ Left anterior descending and circumflex
- ❑ Right coronary and left anterior descending
- ❑ All the three vessels

16. In a transgastric short axisl view, which coronary arteries supply areas are seen?

- ❑ Right coronary and circumflex
- ❑ Left anterior descending and circumflex
- ❑ Right coronary and left anterior descending
- ❑ All the three vessels

17. In a mid-esophageal commissural (60°) view, which mitral valve segments are seen?

- ❑ P1 and A3
- ❑ A1 and P3
- ❑ P1 , P3 and A2
- ❑ A1, A3 and P2

18. Which of the following views allow to see the three aortic valve leaflets?

- ❑ Mid-esophageal short axis view (45°)
- ❑ Mid-esophageal long axis view (120-140°)
- ❑ Deep transgastric view at 0°
- ❑ Transgastric long axis view (90°)

19. A bicuspid pulmonary valve can be diagnosed using

- ❑ An inflow-outflow view of the right ventricle
- ❑ A deep transgastric view at 0°
- ❑ An upper esophageal view at 90°
- ❑ None of the above

20. Which is the best view to get the maximal gradient through the aortic valve

- ❑ Mid-oesophageal short-axis 45°
- ❑ Mid-oesophageal long-axis 120°
- ❑ Transgastric long-axis 120°
- ❑ Transgastric short-axis 0°
- ❑ None of the above

21. Echocardiographic transvalvular peak gradient is?

- ❑ The same as peak gradient by catheterization
- ❑ Lower than peak gradient by catheterization
- ❑ Higher than peak gradient by catheterization
- ❑ Variable in comparison to peak gradient by catheterization
- ❑ Unreliable

22. The effective orifice area of a prosthetic valve

- ❑ Is smaller than the diameter of the annulus of the valve
- ❑ Might be obtained using the continuity equation
- ❑ Is larger in non stented bioprosthesis
- ❑ Might be decreased in case of thrombosis
- ❑ All of the above

23. Physiologic regurgitant jets in prosthetic valves are:

- ❑ Of high velocity, narrow, central or peripheric, short in duration
- ❑ Of high velocity, large, asymmetrical, central or peripheric
- ❑ Of low velocity, narrow, short in duration
- ❑ Of low velocity, large, long in duration, multiple

- Of low velocity, narrow, long in duration, single to multiple

24. The following would raise the suspicion of endocarditis in a prosthetic mitral valve

- A paraprosthetic leak
- Small flickering objects on the atrial side of the valve
- A transmitral velocity of 1.3m/s
- Left atrial appendage thrombus
- Multiple regurgitant jets early in systole

25. Infection of a bicuspid aortic valve will not directly or indirectly lead to the following

- A dilated left ventricle
- Mitral regurgitation
- Thickening of the posterior wall of the aortic root
- Turbulent flow in the LV outflow tract
- An atrial septal defect

26. Transoesophageal is more sensitive than transthoracic echocardiography for the detection of

- LV dysfunction in the presence of a mechanical mitral valve prosthesis
- Pulmonary valve endocarditis
- LV apical thrombus
- Aortic dissection
- Native mitral valve stenosis

27. Mitral regurgitation secondary to left ventricular dilatation is suggested by:

- An eccentric regurgitant jet
- Co-existent mitral stenosis
- Isolated P2 prolapse
- Thickening of the anterior leaflet of the mitral valve
- Normal mitral valve leaflet morphology

28. The normal value of the shortening fraction of the left ventricle is:

- 60%
- 25%
- 40%
- 15%
- 50%

29. The normal value of the ejection fraction of the right ventricle is:

- 60%
- 40%
- 50%
- 30%
- 70%

30. In a 70 years patient, the normal value of the E/A ratio is:

- > 1
- < 1
- 1
- > 1.5
- < 1.5

31. What is the best view to measure the mitral annulus diameter?

- Transgastric long-axis view
- Mid-esophageal commissural view
- Mid-esophageal four chamber view
- Mid-esophageal two chamber view

32. Which value of vena contracta indicates a severe mitral regurgitation?

- > 0.3 cm
- > 0.4 cm
- > 0.6 cm
- > 0.8 cm

33. Which value of PHT indicates a severe mitral stenosis?

- > 300 msec
- > 220 msec
- > 200 msec
- > 350 msec

34. Which value of coaptation depth indicates a severe mitral regurgitation

- 1 cm
- 0.5 cm
- 2 cm
- 2.5 cm

35. What is the normal value of myocardial velocity at tissue Doppler

- 5 cm /sec
- 10 cm/sec
- 15 cm/sec
- 20 cm/sec

36. The rupture of the supporting apparatus of the mitral valve allowing the tip of the leaflet to project into the left atrium in systole, is called?

- Mitral valve prolapse
- Billowing
- Tethering
- Mitral valve flail

37.What's the risk of a mitral repair in a patient with hypertrophic septum?

- Residual mitral insufficiency
- Systolic anterior motion of anterior leaflet (SAM)
- Mitral stenosis
- Aortic insufficiency

38. What are the differences between true and false lumen in the aortic dissection?

- The true lumen expands with systole
- The false lumen expands with systole
- The blood flow in the true lumen is generally slower than that in the false lumen
- The true lumen may be thrombosed

39. How can be identified entry tear in aortic dissection?

- There is a focal discontinuity of intimal flap
- The color doppler flow is directed from false to true lumen
- In diastole the intimal flap is seen being pushed against the wall
- None

40. Which mechanism cause aortic insufficiency in aortic dissection?

- The dissection may dilate the aortic root
- In an asymmetrical dissection pressure from the dissecting hematoma depresses one leaflet below the line of closure of the others
- Both the previous
- Aortic insufficiency is not associated with dissection

41.Which between these is a sign of diastolic dysfunction?

- Eiection Fraction(EF) <25%
- E/A<1
- Cardiac Index>2,5 L/min
- FAC >30%

42.Which between these answers is an index of elevated wedge pressure?

- S/D<1
- Ejection Fraction(EF) <25%
- FAC =30%
- Central venuos pressure (PVC) >15 mmHg

43.Which is not an advantage of intraoperative TEE in a high risk patient?

- Detection of an ischemic area
- High sensitivity and specificity for detection of Atheroma in a cannulation site
- Intraoperative TEE is useful in formulating the surgical plan
- Guide various hemodynamic interventions assessing the immediate results of surgery

44. Aortic valvular stenotic area may be assessed

- Using the continuity equation
- With a short axis view at 45°
- Both the previous
- With the Bernoulli equation
- With the Laplace's law

45. The gradient across a severely stenotic aortic valve may be assessed

- According to the Bernoulli equation, with a PW Doppler
- According to the continuity equation
- According to the Laplace's law
- According to the Bernoulli equation, with a CW Doppler
- It cannot be assessed with a TEE examination

46. Which one of the following is NOT useful for grading an aortic regurgitation?

- ❑ PISA
- ❑ Flow reversal in the descending aorta
- ❑ Vena contracta
- ❑ Left ventricular dilatation
- ❑ ERO

47. In a partial A-V canal, which of the following patterns is visible in a four chamber view ?

- ❑ An ostium primum ASD
- ❑ A mitral regurgitation within the body of the anterior leaflet
- ❑ Both the previous
- ❑ A VSD
- ❑ An ostium secundum ASD

48. Which view is the best for visualizing the RV outflow tract?

- ❑ A four chamber view
- ❑ An inflow-outflow 45° view
- ❑ A deep transgastric view
- ❑ A mid-esophageal long axis view

49. How can a left atrial thrombus be differentiated from a mixoma?

- ❑ We cannot, we are echocardiographists, not anatomo-pathologist
- ❑ The atrial thrombus is more echogenic
- ❑ The atrial thrombus is less echogenic
- ❑ The atrial thrombus is more mobile
- ❑ The atrial thrombus is less mobile

50. The more common location of an atrial mixoma is

- ❑ The right atrium
- ❑ The left atrium, close to left atrial appendage
- ❑ The left atrium, attached to the septum
- ❑ The right atrium, attached to the tricuspid valve
- ❑ The superior vena cava at its entrance into the right atrium

PART 2 – VIDEO CLIPS - Select the best answer

VIDEO CLIP 1 . The structure labeled with the letter "A" is more consistent with:

- ❑ Non-coronary aortic valve leaflet
- ❑ Left aortic valve leaflet
- ❑ Right aortic valve leaflet
- ❑ Left main coronary artery
- ❑ None of the above

VIDEO CLIP 2. The structure labeled with the letter "X" is:

- ❑ The P1 scallop of the posterior mitral valve leaflet
- ❑ The P3 scallop of the posterior mitral valve leaflet
- ❑ The A1 portion of the anterior mitral valve leaflet
- ❑ The A2 portion of the anterior mitral valve leaflet
- ❑ The A3 portion of the anterior mitral valve leaflet

VIDEO CLIP 3. The anterior wall of the left ventricle shown is indicated by which of the following letters?

- ❑ A
- ❑ B
- ❑ C
- ❑ D
- ❑ None of the above

VIDEO CLIP 4. The structure indicated by the arrow is?

- ❑ A cannula
- ❑ Artifact
- ❑ Posteromedial papillary muscle
- ❑ Anterolateral papillary muscle
- ❑ A moderator band

VIDEO CLIP 5. The structure labeled "X" is seen because:

- ❑ It is the inferior vena cava
- ❑ There is an aortic dissection
- ❑ It is an aliasing artifact
- ❑ It is a reverberation artifact
- ❑ The gain has been set too high

VIDEO CLIP 6. The image shown is most consistent with:

- ❑ Normal physiologic aortic blood flow
- ❑ Acute pericardial tamponade
- ❑ Acute aortic dissection
- ❑ Tricuspid valve regurgitation
- ❑ Aortic valve insufficiency

VIDEO CLIP 7. The image shown is consistent with:

- ❑ Aortic valve leaflet prolapse
- ❑ Bicuspid aortic valve
- ❑ Aortic valve endocarditis
- ❑ DeBakey type I aortic dissection
- ❑ Sinus of Valsalva aneurysm

VIDEO CLIP 8. The image shown is consistent with:

- ❑ Aortic valve leaflet prolapse
- ❑ Bicuspid aortic valve
- ❑ Aortic valve endocarditis
- ❑ DeBakey type I aortic dissection
- ❑ Sinus of Valsalva aneurysm

VIDEO CLIP 9. Theimage shown and the Doppler study are more consistent with:

- ❑ Mild mitral stenosis
- ❑ Moderate mitral stenosis
- ❑ Severe mitral stenosis
- ❑ Normal mitral inflow
- ❑ None of the above

VIDEO CLIP 10. The abnormality shown is most consistent with:

- ❑ Flail posterior mitral leaflet
- ❑ Prolapsed posterior mitral leaflet
- ❑ Annular dilatation
- ❑ Endocarditis
- ❑ None of the above

VIDEO CLIP 11. The abnormality shown is most consistent with:

- ❑ Prolapsed posterior mitral leaflet
- ❑ Tethered anterior mitral leaflet
- ❑ Cleft anterior mitral leaflet
- ❑ Systolic anterior motion (SAM) of the mitral valve
- ❑ None of the above

VIDEO CLIP 12. The abnormality shown is most consistent with:

- ❑ Prolapsed posterior mitral leaflet
- ❑ Tethered anterior mitral leaflet
- ❑ Cleft anterior mitral leaflet
- ❑ Systolic anterior motion (SAM) of the mitral valve
- ❑ None of the above

VIDEO CLIP 13. The image demonstrates:

- ❑ Anterior hypokinesis
- ❑ Anterolateral hypokinesis
- ❑ Anteroseptal hypokinesis
- ❑ Inferoseptal hypokinesis
- ❑ None of the above

VIDEO CLIP 14. The image demnstrates

- ❑ Severe anterior hypokinesis of the left ventricle
- ❑ Severe lateral hypokinesis of the left ventricle
- ❑ Severe right ventricle hypokinesis
- ❑ Dyskinesia of the interventricular septum
- ❑ Global left ventricular hypokinesis

VIDEO CLIP 15. The image is more consistent with:

- ❑ An aortic dissection
- ❑ An aneurysm of the Sinus of Valsalva
- ❑ An aortic valve endocarditis
- ❑ A bioprosthetic aortic valve dysfunction
- ❑ None of the above

VIDEO CLIP 16. The image is more consistent with:

- ❑ An aortic dissection
- ❑ An aneurysm of the Sinus of Valsalva
- ❑ An aortic valve endocarditis
- ❑ A bioprosthetic aortic valve dysfunction
- ❑ None of the above

VIDEO CLIP 17. The image demonstrates:

- ❑ A left atrium mixoma
- ❑ A right atrium mixoma
- ❑ A left atrium thrombus
- ❑ An inferior vena cava to right atrium thrombus
- ❑ A left atrium mixoma migrated into the right atrium through the fossa ovalis

VIDEO CLIP 18. The image is more consistent with:

- ❑ A flail of the posterior leaflet of the mitral valve
- ❑ A left atrium thrombus
- ❑ A left atrium mixoma
- ❑ An unidentified mass on the mitral valve and a flail of the posterior leaflet
- ❑ None of the above

VIDEO CLIP 19. The image is more consistent with:

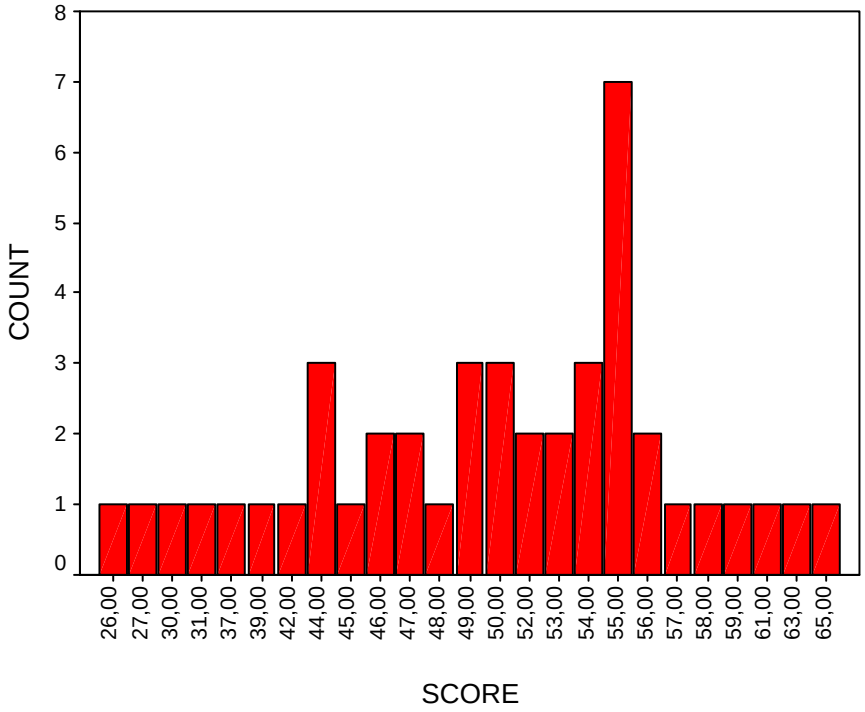
- ❑ Secundum atrial septal defect
- ❑ Persistent left-sided superior vena cava
- ❑ Membranous ventricular septal defect
- ❑ Anomalous pulmonary venous return
- ❑ Atrial septal aneurysm

VIDEO CLIP 20. The image is more consistent with:

- ❑ Hypovolemia
- ❑ Left ventricular ischemia
- ❑ Pericardial restriction
- ❑ Impaired ventricular relaxation
- ❑ Pericardial effusion

Results from pilot-examination.

CANDIDATE CODE	MCQS CORRECT ANSWERS	VIDEO-CLIPS CORRECT ANSWERS	TOTAL CORRECT ANSWERS	TOTAL CORRECT ANSWERS %
003	46	19	65	92,86
049	44	19	63	90,00
013	44	17	61	87,14
024	43	16	59	84,29
038	40	18	58	82,86
021	40	17	57	81,43
026	36	20	56	80,00
036	38	18	56	80,00
029	39	16	55	78,57
017	38	17	55	78,57
047	40	15	55	78,57
018	37	18	55	78,57
020	37	18	55	78,57
043	39	16	55	78,57
031	37	18	55	78,57
015	38	16	54	77,14
010	40	14	54	77,14
008	36	18	54	77,14
006	36	17	53	75,71
050	37	16	53	75,71
011	34	18	52	74,29
025	36	16	52	74,29
001	31	19	50	71,43
037	35	15	50	71,43
030	33	17	50	71,43
005	31	18	49	70,00
014	33	16	49	70,00
035	34	15	49	70,00
034	33	15	48	68,57
004	32	15	47	67,14
012	30	17	47	67,14
041	29	17	46	65,71
042	31	15	46	65,71
022	27	18	45	64,29
002	34	10	44	62,86
007	32	12	44	62,86
019	30	14	44	62,86
016	30	12	42	60,00
045	26	13	39	55,71
048	27	10	37	52,86
039	24	7	31	44,29
046	22	8	30	42,86
027	20	7	27	38,57
023	20	6	26	37,14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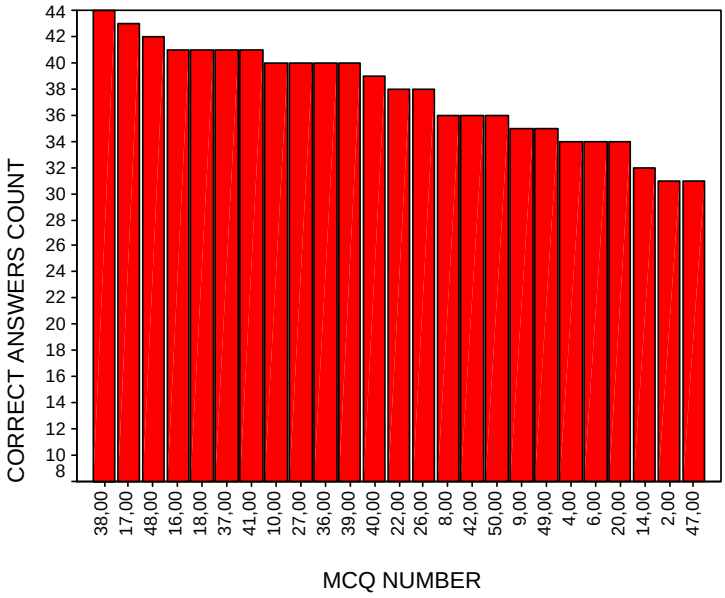
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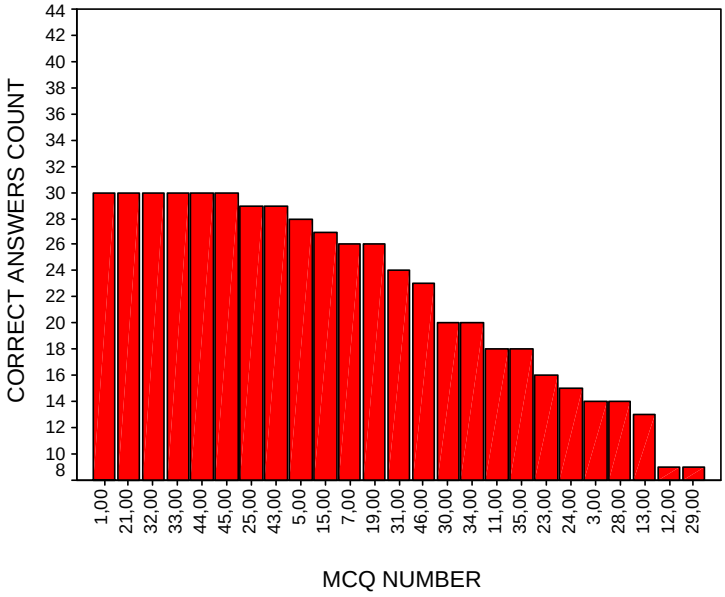
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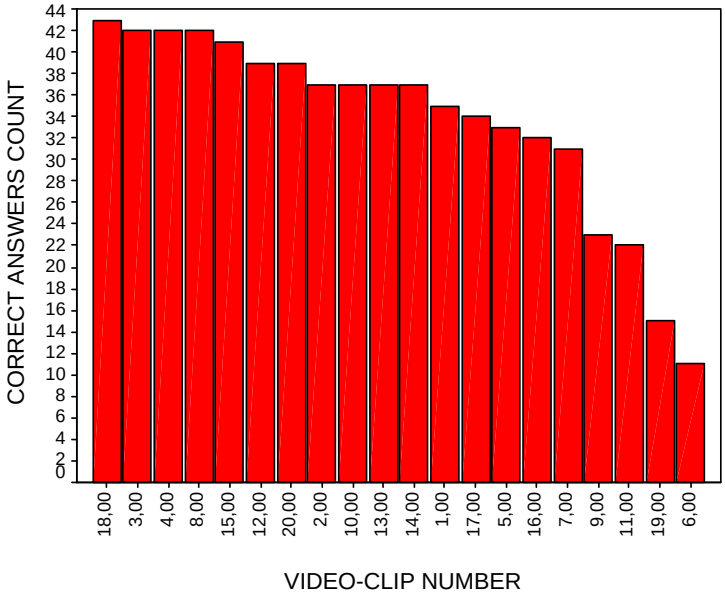
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VIDEO-CLIP NUMBER

Correct Answers to MCQ's

MCQ #	CORRECT ANSWER
1	C
2	E
3	E
4	A
5	D
6	C
7	D
8	A
9	C
10	C
11	B
12	E
13	B
14	C
15	B
16	D
17	C
18	A
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20	C
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22	D
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25	E
26	D
27	E
28	B
29	C
30	B
31	C
32	C
33	B
34	A
35	B
36	D
37	B
38	A
39	A
40	C
41	B
42	A
43	B
44	C
45	D
46	D
47	C
48	B
49	A
50	C

VIDEO-CLIP #	CORRECT ANSWER
1	C
2	D
3	A
4	C
5	D
6	E
7	A
8	D
9	B
10	B
11	B
12	D
13	D
14	C
15	C
16	B
17	E
18	D
19	B
20	E