

API AUTHORIZED PIPING INSPECTOR
PREPARATION COURSE FOR CERTIFICATION EXAMINATION
FINAL EXAMINATION #1

NAME _____
DATE _____
COMPANY _____

AUTHORED BY:
T. SCHINDLER

API 570
FINAL EXAMINATION #1

OPEN BOOK QUESTIONS (1 - 50)

1. A weld will be radiographed using a source-side wire penetrameter. The weld is 3/8" thick with 1/16" reinforcement on both sides. What ASTM penetrameter set will be required?
 - A. Set A
 - B. Set B
 - C. Set C
 - D. Set D

2. A pipe is NPS 16, and is made from A 335 Grade P1 material. The design pressure is 1200 psig, and the temperature is 750°F. What is the minimum thickness of this pipe, if a 1/16" corrosion allowance will be maintained?
 - A. .760"
 - B. .675"
 - C. .480"
 - D. .970"

3. From the information in #2 above, what will the required PWHT be (if any), if this piping will be girth welded in place, and the actual thickness used will be 1/16" over the required thickness (including the corrosion allowance)?
 - A. 1100 - 1325°F
 - B. 1100 - 1200°F
 - C. 200° preheat in lieu of PWHT is allowable per API 570
 - D. No PWHT is required on this thickness

4. If a WPS is qualified using a base material that is 9" thick, the correct base metal thickness range shown in the WPS should be:
 - A. 3/16" - 12" thick
 - B. 1/16" - 14" thick
 - C. 3/16" - 18" thick
 - D. 3/16" - 9.9" thick

5. A valve will be replaced in a line that has seen significant external corrosion. The new valve is heavier than the old valve, and will be placed in a location 10' away from the nearest supports. What would a primary concern be to you, the Inspector, regarding this situation?
 - A. Incorrect material on the valve flanges
 - B. Moving the supports in to properly support the valve
 - C. Reordering a valve with lesser body thickness and less weight
 - D. Recommending an evaluation of the structural bending moment at the corroded area for the amount of weight installed

6. An NPS 1/2 Category M pipe will be replaced. Baseline UT thickness readings to API 570 were waived by the owner/user. The most likely reason for this is:
 - A. Category M does not require baseline readings
 - B. It was probably secondary Class B piping - no UT's required
 - C. NPS 1/2 pipe is beyond the scope of API 570
 - D. There is no such thing as NPS 1/2 Category M piping

7. The total linear thermal expansion of a 30' long, A426 Grade CP5 pipe operating between 70° and 350°F is:
- A. .63"
 - B. 2.10"
 - C. 3.4'
 - D. 47"
8. An A-135 Gr. B Category D service pipe is to be replaced. The pipe is NPS 8, and will be .875" thick. The pressure on the system is 120 psi @ 300°F, and the minimum temperature is -20°F. This piping:
- A. Must be impact tested
 - B. Is exempt from impact testing
 - C. Must be RT'd to NFS
 - D. Must be received with MTR's
9. Re-ratings must be acceptable to the:
- A. owner/user
 - B. Engineer or Inspector
 - C. Only the Engineer
 - D. Both A & B above
10. The primary difference between pipe and tube is the:
- A. Sizes
 - B. Materials
 - C. Welding
 - D. Hydro requirements
11. During impact testing of an A430 FP 321 base metal, a 3/4 size bar was used instead of a full size bar. The design temperature is 30° below the allowable minimum temperature listed in B31.3. At what temperature must the impact test be performed?
- A. -325°F
 - B. -355°F
 - C. -360°F
 - D. -430°F
12. A Class 600 flange, NPS 14, has a bolt hole diameter of _____.
- A. 1.50"
 - B. 20.75"
 - C. 1.375"
 - D. Not given in any available literature
13. When conducting ultrasonic shear wave examination of metal pipe and tubing, it is recommended that, when specified by the requesting party:
- A. The examination be conducted under water
 - B. A permanent record of the exam results (such as a strip chart recording) accompany each pipe or tube
 - C. Only longitudinal waves be used
 - D. Couplant should only be "Vaseline" or equivalent

14. Two types of impact testing are permitted in ASME IX. One of these is:
- A. Charpy V-notch
 - B. Etch-notch
 - C. Drop weight
 - D. Either A or C, above
15. A NPS 16 pipe has externally corroded 1/8" uniformly around the circumference. The pipe was originally 1.031" thick, and the material is SA-106 B, seamless with a temperature of 650°F. The current operating pressure is 875 psi. Per API 570 rules, can this piping continue to run at this pressure for 10 years, assuming a continued external corrosion rate of .031" per year?
- A. Yes, can continue to operate for 10 years at this pressure
 - B. No, cannot continue to operate at this pressure
 - C. Not enough information given to calculate the problem
 - D. Only if Tim personally sprinkles "holy" water on it.
16. The gasket contact surface from a 600# flange (NPS 8) has a "ding" in the 125 RMS face surface that is not deeper than the bottom of the serrations. The length of the "ding" is 3/8". This imperfection should be judged _____.
- A. Acceptable
 - B. Rejectable
 - C. Not enough information given
 - D. Flange "dings" are not a concern to a piping inspector
17. The individual diameter tolerance for a .010" wire on an ASTM Set B wire penetrameter is:
- A. .0098" - .0102"
 - B. .008" - .012"
 - C. A .010" diam. wire is not on Set B
 - D. No tolerance is allowed by Code
18. A locally thin area is 1/2" away from a girth weld on an NPS 18 pipe. The thin area is found to be .725" thick, and the original base metal is 1.23" thick. The pipe is A 369 Gr. FP9, and the temperature is 600°F. If the girth weld has not been radiographed, what is the current design pressure (or MAWP) of this piping using the formula provided in API 570. (Not considering future corrosion or inspections.)
- A. 812 psi
 - B. 947 psi
 - C. 1150 psi
 - D. 1350 psi
19. A 12 NPS pipe is repaired by butt welding a replacement piece into the line using machine GMAW. The welding operator is qualified by radiography on the first butt weld. What criteria should be used to determine the acceptability of this radiograph?
- A. ASME IX
 - B. ASME V
 - C. ASME B31.3
 - D. API 570

20. A hole-type penetrameter is observed on a RT film. The penetrameter has two notches in the end closest to the 2T hole. The base material is B-167 Class CD. This penetrameter is:
- A. Acceptable as shown
 - B. Unacceptable - wrong material
 - C. Unacceptable - hole penetrameters cannot be used on this material
 - D. Unacceptable - notches should not be placed in end nearest the 2T hole.
21. A globe valve will normally:
- A. Allow flow in only one direction
 - B. Allow flow in three directions
 - C. Be installed with the flow coming from above the disc
 - D. Be installed with the flow coming from below the disc
22. A B564 GR NO 6600 Class 2500 flange is installed in a piping system that will be hydrotested at 9500 psi. This condition will be:
- A. Acceptable
 - B. Unacceptable - exceeds flange hydro-rating
 - C. Acceptable, provided the test medium is water, and not air
 - D. Unacceptable if the system will operate above 10,000 psi
23. A piping system will be hydrotested after a re-rating. The new design is for 600 psi @ 800°F, and material is A376 TP 304H. The test will be run with condensate at 400°F. What is the required test pressure on this system?
- A. 900 psi
 - B. 1184 psi
 - C. 1107 psi
 - D. 1200 psi
24. If a carbon steel piping system is A-106B and is .125" thick with a minimum design temperature of -55°F, the piping must be:
- A. Normalized
 - B. Annealed
 - C. Impact tested
 - D. Radiographed
25. One of the items that must be marked on every B16.5 flange is:
- A. Material heat number
 - B. Mill marking
 - C. Size
 - D. Temperature marking
26. Piping stress analysis can be employed to:
- A. Take the place of inspections
 - B. Solve any questionable conditions discovered by inspection
 - C. Allow the owner/user to waive thickness inspections
 - D. Help solve piping vibration and flexibility problems

27. The difference between a "cross" and a "tee" is:
- A. 3 inlets/outlets instead of 4
 - B. 2 inlets and 2 outlets instead of 6
 - C. Flow is allowed to go only one way in a cross
 - D. A "cross" can be used as a reducer - a "tee" cannot
28. During a pneumatic leak test of a 160 psi design pressure system, the pressure shall be gradually increased until _____ psi is reached, and then a preliminary check of the system shall be made:
- A. 25
 - B. 88
 - C. 176
 - D. 80
29. ASME V recommends that when using a manual RT development system, the stop bath, fixer, and water wash should be maintained within _____ of the developer temperature.
- A. $\pm 10^{\circ}\text{F}$
 - B. $\pm 5^{\circ}\text{F}$
 - C. $\pm 5\%$ of each temperature
 - D. $70^{\circ} - 120^{\circ}\text{F}$
30. A 600# flanged fitting is NPS 6 (6.625" O.D.) and is made from A-48 Grade 55 gray cast iron. The fitting is installed in a system operating at 200 psig @ 300°F. The fitting is seamless, and will be used in an underground piping system. What is the minimum thickness of this fitting?
- A. .250
 - B. .120
 - C. .350
 - D. .180
31. Clamped joints cannot be used:
- A. On Category D piping systems
 - B. Without adequate axial restraints on the piping
 - C. To stop leaks
 - D. On underground piping
32. SCC of Austenitic stainless steels is classified as _____ per API 570, when it does not occur under insulation.
- A. Environmental cracking
 - B. Creep
 - C. CUI
 - D. Erosion
33. A welding procedure is qualified on P5A to P5A steel. This WPS is then qualified to weld on:
- A. P5A - P4 steels
 - B. P5A - P5B steels
 - C. P4 - P4 steels
 - D. All of the above

34. A hot spot on a run of piping can best be detected by:
- A. Contact pyrometers
 - B. Infrared thermography
 - C. Temper sticks
 - D. Feeling with your hand
35. A pipe is thickness checked in 1997 and found to be .380" thick. The pipe was previously checked in 1991 and was found to be .466" thick. The pipe is 16 NPS and is made from API 5L Grade X-42 ERW pipe. Assuming the same corrosion rate continues, can the piping MAWP rating of 150 psi @ 400°F be continued if the next inspection is set for 10 years?
- A. Yes. MAWP is acceptable
 - B. No. MAWP must be reduced
 - C. Not enough information given
 - D. MAWP should be increased to 250 psig
36. When inaccessibility prevents placing of RT location markers on the source or film side, a _____ shall accompany the radiographs to show full coverage has been obtained.
- A. Narrative report
 - B. Inspector's certification
 - C. Dimensioned map
 - D. Photograph
37. A girth weld is UT inspected to Normal Fluid Service and is found to have an indication that is characterized as a slag inclusion. The inclusion is 3/8" long and the piping is 1/2" thick. The width is 3/8". This indication is characterized as a _____ per B31.3.
- A. Imperfection - acceptable
 - B. Discontinuity - acceptable
 - C. Defect - unacceptable
 - D. Indication - acceptable
38. When is the next UT thickness inspection required on a Class 2 piping system with the following information:
- NPS 3.5, standard wall pipe
 - Design pressure 775 psi @ 500°F
 - A53 Grade A, ERW with supplemental 100% RT performed on the longitudinal weld
 - Initial UT inspection - not done - installed new in 1974
 - Last UT inspections done - 1990 - .175" thick
- A. 1995
 - B. 1998
 - C. 2000
 - D. 2013
39. An NPS 4 branch connection is made from A-106 Gr B, and is installed in an NPS 16 header that is A671-CC70. The installation is similar to Fig. 328.5.4D, Sketch 4. The branch is .281" thick. The header is .535" thick, and the repad is .200" thick. The fillet weld leg is .500". This connection _____ per B31.3.
- A. Will require post weld heat treatment.
 - B. Will not require post weld heat treatment.
 - C. Will require full RT.
 - D. Is not allowed in "lethal" service.

40. When conducting a bubble leak test, the temperature at the surface of the part should be within _____ °F to _____ °F.
- A. 60 - 125
 - B. 40 - 125
 - C. 30 - 100
 - D. Above 70°F

Questions 41 - 50 are based on WPS/PQR GMAW-2; attached.

41. The upper base metal thickness allowed on the WPS:
- A. Is acceptable as shown
 - B. Should be .495"
 - C. Should be .900"
 - D. Should be .450"
42. The preheat temperature range shown on the WPS is:
- A. Acceptable to B31.3
 - B. Should be 100°F min
 - C. Should be 160°F min
 - D. Not to B31.3 requirements - must be at least 175°F
43. The gas backing range shown on the WPS, as qualified on the PQR is:
- A. Acceptable as shown
 - B. Unacceptable - should not be shown on the WPS
 - C. Unacceptable - should not be shown on the PQR
 - D. Unacceptable - material shown does not require a backing gas
44. The bend tests shown on the PQR should be:
- A. Rejected due to the 1/4" corner crack
 - B. Rejected due to the 1/8" crack
 - C. Changed to side bends
 - D. Accepted
45. The tension tests results shown on the PQR:
- A. Are acceptable
 - B. Are rejectable - T-1 fails
 - C. Are rejectable - T-2 fails
 - D. Are rejectable - not enough specimens were taken
46. The impact test results shown on the PQR for the weld:
- A. Are acceptable as shown
 - B. Are unacceptable per ASME IX
 - C. Are unacceptable per ASME B31.3
 - D. Should be changed to drop-weight tests
47. If this procedure will be used for pipe inservice at -30°F design temperature, the impact tests shown on the PQR for the HAZ are:
- A. Unacceptable due to insufficient absorbed energy
 - B. Unacceptable due to insufficient temperature for size of specimen
 - C. Unacceptable due to wrong type of test
 - D. Both A & B above

48. The shielding gas shown on the WPS:
- A. Is proper for the gas qualified
 - B. Is unacceptable due to flow rate
 - C. Is unacceptable due to change in gas composition
 - D. Both B & C above
49. The PQR is unacceptable because:
- A. It was done after the WPS was written
 - B. It is not certified
 - C. It was done without PWHT
 - D. It cannot be traced to the WPS
50. The DWM range shown on the WPS is:
- A. Acceptable as shown
 - B. Should be restricted to .495"
 - C. Should be restricted to .550"
 - D. Should be 1/8" only, as shown on the PQR for filler metal size

QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATION (WPS)
 (See QW-200.1, Section IX, ASME Boiler & Pressure Vessel Code)

Company Name: XYZ COMPANY By: JOE BLOW
 Welding Procedure Spec. No.: GMAW-2 Date: 2-29-92 Supporting PQR No. (s): GMAW-2
 Revision No.: 0 Date: 2-29-92
 Welding Process(es): GMAW (SHORT ARC) Type(s): SEMI-AUTO
 (Automatic, Manual, Machine, or Semi-Auto)

JOINTS (QW-402)

Details

Joint Design: SINGLE VEE GROOVE
 Backing: (Yes) _____ (No) X
 Backing Material: (Type): NONE
 (Refer to both backing & retainers)

- Metal
- Nonfusing Metal
- Nonmetallic
- Other

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

(At the option of the Mfr., Sketches may be attached to illustrate joint design, weld layers, and the bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

***BASE METALS (QW-403)**

P-No. 1 Group No. 1 to P-No. 1 Group No. 1
 OR
 Specification type and grade SA-36
 to Specification type and grade SA-36
 OR
 Chem. Analysis and Mech. Prop. _____
 to Chem. Analysis and Mech. Prop. _____

Thickness range:
 Base Metal: Groove: 3/16" - .900" Fillet: ALL
 Pipe Dia. Range: Groove: ALL Fillet: ALL

*** FILLER METALS (QW-404)**

Spec. No. (SFA): SFA 5.18
 AWS No. (Class): ER 70S-7
 Filler Metal F-No.: 6
 Chem. Comp. - A No.: 1
 Size of Filler Metals: 1/8" - 3/32"

Weld Metal
 Thickness range:
 Groove: .900" MAX.
 Fillet: UNLIMITED
 Electrode-Flux (Class): N/A
 Flux Trade Name: N/A
 Consumable Insert: N/A
 Other: _____

* Each base metal-filler metal combination should be recorded individually.

QW-482 (Back)

WPS No.: GMAW-2 Rev. No.: _____

POSITIONS (QW-405) Position(s) of Groove: <u>ALL</u> Welding Progression: Up <u>X</u> Down <u>X</u> Positions(s) of Fillet <u>ALL</u>	POSTWELD HEAT TREATMENT (QW-407) Temperature Range <u>NONE</u> Time Range _____																
PREHEAT (QW-406) Preheat Temp. Min.: <u>60 DEG MIN</u> Interpass Temp. Max.: <u>NONE</u> Preheat Maint.: _____ _____ (Continuous or special heating where applicable should be recorded.)	GAS ((QW-408) Percent Composition <table style="width:100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">Gas(es)</td> <td style="text-align: center;">(Mixture)</td> <td style="text-align: center;">Flow Rate</td> </tr> <tr> <td>Shielding:</td> <td style="text-align: center;"><u>YES</u></td> <td style="text-align: center;"><u>75%CO2/25%A</u></td> <td style="text-align: center;"><u>25-30 CFH</u></td> </tr> <tr> <td>Trailing:</td> <td style="text-align: center;"><u>NONE</u></td> <td></td> <td></td> </tr> <tr> <td>Backing:</td> <td style="text-align: center;"><u>YES</u></td> <td style="text-align: center;"><u>ARGON</u></td> <td style="text-align: center;"><u>2 - 3 CFH</u></td> </tr> </table>		Gas(es)	(Mixture)	Flow Rate	Shielding:	<u>YES</u>	<u>75%CO2/25%A</u>	<u>25-30 CFH</u>	Trailing:	<u>NONE</u>			Backing:	<u>YES</u>	<u>ARGON</u>	<u>2 - 3 CFH</u>
	Gas(es)	(Mixture)	Flow Rate														
Shielding:	<u>YES</u>	<u>75%CO2/25%A</u>	<u>25-30 CFH</u>														
Trailing:	<u>NONE</u>																
Backing:	<u>YES</u>	<u>ARGON</u>	<u>2 - 3 CFH</u>														

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC DC Polarity REVERSE
 Amps Range 120-200 Volts (Range) 14-18

(Amps and volts range should be recorded for each electrode size, position, and thickness, etc. This information may be listed in a tabular form similar to that shown below.)

Tungsten Electrode Size and Type _____
 (Pure Tungsten, 2% Thoriated, etc.)
 Mode of metal Transfer for GMAW SHORT CIRCUITING
 (Spray arc, short circuiting arc, etc.)
 Electrode Wire feed speed range _____

TECHNIQUE (QW-410)

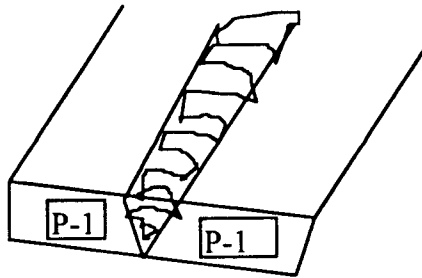
String or Weave Bead STRING
 Orifice or Gas Cup Size 1/2"
 Initial and Interpass Cleaning (Brushing, Grinding, etc.) GRINDING, BRUSHING
 Method of Back Gouging NONE
 Oscillation REVERSE
 Contact Tube to Work Distance 1/8" - 1/4"
 Multiple or Single Pass (per side) MULTIPLE
 Multiple or Single Electrodes SINGLE
 Travel Speed (Range) 10-15 IPM
 Peening NONE
 Other NO PASS GREATER THAN 1/2"

Weld Layer(s)	Process	Class	Filler Metal		Current		Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Etc)
			Dia.	Type Polar.	Amp Range	Volt Range		
ALL	GMAW S/C ARC	ER-70S-7	1/8" OR 3/32"	DCRP	12-200	14-19	10-15 IPM	NONE

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORDS (PQR)
 (See QW-200.2, Section IX, ASME Boiler and Pressure vessel Code)
 Record Actual Conditions Used to Weld Test Coupon

Company Name: XYZ COMPANY
 Procedure Qualification Record No.: GMAW-2 Date: 3-29-92
 WPS No.: GMAW-2
 Welding Process(s): GMAW SHORT CIRCUITING ARC
 Types (Manual, Automatic, Semi-Auto.): SEMI-AUTO

JOINTS (QW-402)



Groove Design of Test Coupon
 (For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

BASE METALS (QW-403)
 Material Spec.: SA 516
 Type or Grade: GR 70
 P-No.: 1 to P-No.: 1
 Thickness of Test Coupon: .450"
 Diameter of Test Coupon: N/A
 Other: _____

POSTWELD HEAT TREATMENT (QW-407)
 Temperature: NONE
 Time: _____
 Other: _____

FILLER METALS (QW-404)
 SFA Specification: 5.18
 AWS Classification: ER 70 S-2
 Filler Metal F No.: 6
 Weld metal Analysis No.: 1
 Size of Filler metal: 1/8"
 Other: _____
 Weld Metal Thickness: .450"

GAS (QW-408)

	Percent Composition		Flow Rate
	Gas(es)	(Mixture)	
Shielding:	<u>YES</u>	<u>100%AR</u>	<u>20</u>
Trailing:	<u>NONE</u>		
Backing:	<u>NONE</u>		

POSITION (QW-405)
 Position of Groove: 3G
 Weld Progression (Uphill, Downhill) DOWNHILL
 Other: _____

ELECTRICAL CHARACTERISTICS (QW-409)
 Current: DC
 Polarity: RP
 Amps.: 130 Volts: 17
 Tungsten Electrode Size: NA
 Other: _____

PREHEAT (QW-406)
 Preheat Temp.: 160 DEG F
 Interpass temp 650 DEG
 Other: _____

TECHNIQUE (QW-410)
 Travel Speed: 12 IPM
 String or WeaveBead WEAVE
 Oscillation: NONE
 Multipass or Single Pass (per side): MULTIPASS
 Single or Multiple Electrodes: SINGLE
 Other: _____

QW-483 (Back)

PQR No.: GMAW-2

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load Lb.	Ultimate Unit Stress psi	Type of Failure & Location
T-1	.750	.450	.337	23,000	68,249	DF-BM
T-2	.749	.449	.336	23,500	69,940	DF-WELD

Guided Bend Tests (QW-160)

Type and Figure No.	Result
FACE #1	PASS
FACE #2	PASS 1/4" CORNER CRACK - NO DEFECT
ROOT #1	PASS
ROOT #2	PASS - 1/8" CRACK

Toughness Tests (QW-170)

Specimen No.	Notch Location	Specimen Size	Test Temp.	Impact Values			Drop Weight Break (Y/N)
				Ft. Lbs.	% Shear	Mils	
1	WELD	10 MM X 10 MM	-30°F	10 FT LBS			
2	WELD	10 MM X 10 MM	-30°F	26 FT LBS			
3	WELD	10 MM X 10 MM	-30°F	15 FT LBS	N/A	N/A	N/A
4	HAZ	7 MM X 7 MM	-30°F	8 FT LBS			
5	HAZ	7 MM X 7 MM	-30°F	16 FT LBS			
6	HAZ	7 MM X 7 MM	-30°F	15 FT LBS			

Comments: TEST COUPON WAS FULLY DEOXIDIZED STEEL

Fillet Weld Test (QW-180)

Result — Satisfactory: Yes: _____ No: _____ Penetration Into Parent Metal: Yes: _____ No: _____

Macro — Results: _____

Other Tests

Type of Test: _____

Deposit Analysis: _____

Other: _____

Welder's Name: JOE BLOW JR Clock No.: 2 Stamp No.: 3

Tests conducted by: JIMS TEST LAB Laboratory Test No.: 1234

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: BILLS WELDING SHOP

Date: 2-29-92

By: BILL BLOW

CLOSED BOOK QUESTIONS (#51 - 150)

51. The radiographic density through a penetrameter is measured at 2.6 with a densitometer using gamma RT. The allowable density through the weld will be _____, if no shim is used.
- A. 2.0 - 4.0
 - B. 1.8 - 4.0
 - C. 2.21 - 3.38
 - D. 2.0 - 2.99
52. A pipe support that is adjustable and is spring loaded is a _____.
- A. Hydraulic snubber
 - B. Shoe
 - C. "Can" hanger
 - D. Sway brace
53. RBI utilizes two assessments of failures. These are:
- A. Consequence and probability
 - B. Likelihood and outcome
 - C. Consequence and likelihood
 - D. Truth or consequences
54. A Class 3 pipe is UT thickness checked in 1990 and found to be .385" thick. The pipe is then checked in 1994 and found to be .300" thick. Original (nominal) thickness was .432" in 1981. If the minimum thickness is .182", how many years can pass before the next thickness inspection?
- A. 5.6
 - B. 5
 - C. 10
 - D. 2.8
55. The term "FFSOF" refers to:
- A. Flat Face Slip On Flange
 - B. Free Fat Schindlers Or Fight
 - C. Flange Finish Standard Operating Figure
 - D. Flat Face Socket Flange
56. A hole type penetrameter may be placed:
- A. Only on the weld
 - B. Only beside the weld
 - C. Either on or beside the weld
 - D. Wire type penetrameters must always be used
57. Austenitic stainless steel piping (for example A312 Type 304) is NPS 6 (.432" nominal wall thickness). This piping will have a minimum wall thickness (new and cold) of:
- A. .432"
 - B. .378"
 - C. .300"
 - D. SS piping is not supplied in "NPS", it only comes in "min. wall"

58. Which of the following is an essential variable for the GMAW process?
- A. Wire diameter
 - B. Travel speed
 - C. Interpass temperature
 - D. Electrical characteristics (short arc to spray or vice-versa)
59. A P-1 (carbon steel) piping system has originally been PWHT'd because of H2S Service. A flush patch repair weld is required to one section of the pipe due to corrosion. This repair weld:
- A. Must be PWHT'd
 - B. May be preheated to 300°F per API 570, and no PWHT applied
 - C. May be "Temper-bead" repaired per API 570
 - D. Can be stress relieved by peening and interpass heat control
60. A 4T hole on a 40 penetrometer has an area of:
- A. .0400
 - B. .160
 - C. .020
 - D. .40
61. The scope of API 570 does not include:
- A. Pressure vessels
 - B. HF Alky piping
 - C. Bulk transfer lines at a dock
 - D. Both A & C above
62. Per ASME V, personnel performing PT examinations must be qualified to:
- A. SNT-TC-1A
 - B. CP-189
 - C. An in-house manufacturer's program
 - D. No specific personnel qualifications are mandated by ASME V
63. Inspection of Category D piping is:
- A. Not required per B31.3
 - B. Optional per B31.3
 - C. Mandatory per B31.3
 - D. Left up to the discretion of the Erector
64. A "TML" is utilized to provide thickness information on piping systems. This information must then be used to establish:
- A. Corrosion rates
 - B. Inspection Intervals
 - C. Metal loss
 - D. All of the above
65. An API 570 Inspector with a high school education must have _____ years experience to qualify as an API 570 Inspector.
- A. 3
 - B. 5
 - C. 8
 - D. 10

66. An API 570 Inspector with a high school education must have _____ years experience to qualify as an ASME 31.3 Inspector
- A. 3
 - B. 5
 - C. 8
 - D. 10
67. The scope of API 570 does not include:
- A. Hydrogen service
 - B. Catalyst lines
 - C. Sour water piping NPS 3/8"
 - D. Raw chemicals
68. Per API 570, CUI inspections on Class 2 systems _____ include _____ % of suspect areas and _____% of damaged insulation areas for plants with no CUI experience or history.
- A. Should, 50%, 10%
 - B. Shall, 33%, 50%
 - C. Should, 50%, 33%
 - D. Should, 25%, 10%
69. A welder cannot be qualified by radiography when using:
- A. P4X metals
 - B. P5A metals
 - C. P3X metals with GMAW-Spray Arc
 - D. P-1 metals with GMAW short-circuiting arc
70. Dry MT shall not be performed above what temperature?
- A. 60 - 125°F
 - B. 135°F
 - C. 600°F
 - D. 800°F
71. Class 3 secondary SBP shall be UT inspected at which maximum intervals?
- A. 10 years
 - B. 5 years
 - C. 3 years
 - D. None of the above
72. An example of a place to check for erosion includes:
- A. Downstream of control valves
 - B. Downstream of orifices
 - C. Downstream of pump discharges
 - D. All of the above
73. Fatigue cracking will normally be prevalent at:
- A. Areas of high stress reversals
 - B. Insulated stainless steel areas
 - C. Pipe supports on "sleeper" racks
 - D. Junctions of flow restrictions

74. Underground piping may alternatively be pressure tested instead of inspected. If used, this pressure test must be conducted at _____ intervals on piping not cathodically protected in soil that has a resistivity of 2,000 - 10,000 OHM/CM.
- A. 5 year
 - B. 10 year
 - C. 15 year
 - D. 20 year
75. One of the procedural requirements for MT examination that must be addressed is:
- A. Cleaning materials
 - B. Developer application
 - C. Type of particles, wet or dry
 - D. A and B above
76. The primary difference between a repair and an alteration is:
- A. Material considerations
 - B. Welding considerations
 - C. Design considerations
 - D. Inspector opinion
77. An internal inspection of piping is:
- A. Required for large bore piping
 - B. Not required for underground large bore piping
 - C. Is normally not done unless the piping is opened
 - D. Must always be done for H₂S service
78. Cathodic protection systems shall be monitored at intervals in accordance with:
- A. NACE RP 0169
 - B. API RP 651
 - C. Both A & B above
 - D. None of the above
79. Essential variables must be documented on:
- A. WPS only
 - B. PQR only
 - C. WPS and PQR only
 - D. WPS, PQR, and WPQ
80. Per B31.3, personnel performing VT examinations shall be qualified to _____.
- A. SNT-TC-1A
 - B. AWS CWI
 - C. Manufacturer's/contractor's program
 - D. ACCP
81. Class 3 piping should be visually inspected at a maximum interval of _____ years.
- A. 5
 - B. 10
 - C. 15
 - D. 1/2 RCL or 10 years

82. Supplementary Essential Variables (if applicable) must be addressed on the:
- A. WPS only
 - B. PQR only
 - C. WPQ only
 - D. WPS and PQR only
83. After major repairs are completed on a piping system a pressure test shall be performed if:
- A. The repair is an alteration
 - B. The API 570 Inspector deems a test practical and necessary
 - C. The Engineer deems one necessary
 - D. The repair firm conducts a pressure test in lieu of NDE
84. If RBI is used to plan the frequency of detailed inspections on a Class 1 system, the RBI assessment must be done at least every _____.
- A. 3 years
 - B. 10 years
 - C. 5 years
 - D. year
85. A piping system is Class 3 and is 1/2" thick carbon steel. The decision is made to replace a corroded section of the piping by welding in an insert (flush) butt-welded patch. This patch will:
- A. Require full RT on the weld
 - B. Require full UT on the weld
 - C. Not require RT or UT on the weld
 - D. Either A or B above
86. The required mill undertolerance on welded pipe is normally -12.5%, but some piping is made from plate which has an undertolerance of _____.
- A. 12.5%
 - B. +16", -0"
 - C. - .01"
 - D. ± 9%
87. If environmental cracking is suspected on attached piping during internal inspection of pressure vessels, the Inspector should:
- A. Designate pipe spools upstream and down for inspection
 - B. Not assume automatically that the piping is also cracked
 - C. Require all piping in the unit to be inspected
 - D. Replace all cracked piping nozzles in the vessel
88. For corrosion calculations, the surface at the weld is considered to be:
- A. 1" on either side of the weld or twice the minimum measured thickness on either side of the weld, whichever is greater
 - B. 1" on either side of the weld or twice the minimum measured thickness on either side of the weld, whichever is less
 - C. 2" on either side of the weld or twice the minimum measured thickness on either side of the weld, whichever is less
 - D. 4" on either side of the weld or twice the minimum measured thickness on either side of the weld, whichever is greater

89. Which of the following is not a tool for measuring corrosion of piping:
- A. Acoustic emission transducers
 - B. Ultrasonic instruments
 - C. Radiography profile
 - D. Corrosion coupons
90. If the WPS shows a single "Vee" groove is to be used and the PQR was qualified with a double "Vee" groove:
- A. The WPS can be used without re-qualification
 - B. The WPS must be requalified
 - C. The PQR must be retested
 - D. The WPS must be modified to show the correct joint
91. Welded repair of cracks occurring in-service should not be attempted without consulting the:
- A. API Inspector
 - B. Contractor
 - C. Piping Engineer
 - D. Maintenance Foreman
92. If carbon steel piping is to be welded and the temperature is less than 32°F, the piping must be preheated to a minimum temperature of _____ °F per B31.3
- A. 100°F
 - B. 75°F
 - C. 150°F
 - D. 50°F
93. Many problems found during in-service inspection of piping systems can be directly attributable to:
- A. Hydrostatic testing
 - B. Lack of proper new-construction inspection
 - C. Cold winters
 - D. Lack of internal inspections
94. Of the types of stresses that are placed on a thin walled cylinder, the most severe is:
- A. Longitudinal
 - B. Circumferential
 - C. Compressive
 - D. Radial
95. The ultimate load on a .510" diameter tensile specimen is 15,000 lbs. The ultimate strength of this specimen is approximately:
- A. 73,529 psi
 - B. 90,200 psi
 - C. 85,100 psi
 - D. 18,359 psi
96. The piezoelectric element is used in:
- A. RT
 - B. PT
 - C. UT
 - D. ET

97. A common root pass welding defect is:
- A. Porosity
 - B. Lack of penetration
 - C. Tungsten inclusion
 - D. Overlap
98. If a probable corrosion rate cannot be determined from the same or similar service, estimated data, or other methods, an initial thickness measurement shall be conducted after no more than _____ of service using NDE thickness measurements.
- A. 1000 hours
 - B. 3 months
 - C. 2 years
 - D. 5 years
99. A pressure test of a final closure weld is not required when a slip-on flange construction is used, provided the new piping is pressure tested, a miter joint is not used, and _____.
- A. PT/RT is performed on the welds
 - B. UT/VT is performed on the welds
 - C. ET/UT is performed on the welds
 - D. MT/PT is performed on the welds
100. A welding electrode is marked E8018. The first two digits mean that the electrode has:
- A. 80 KSI weld strength
 - B. 80 PSI stress
 - C. 80,000 KSI tensile strength
 - D. 80,000 psi tensile strength
101. A standard hydrostatic test is to be run after an alteration on a piping system. The piping has a stress value of 20 ksi at the test temperature and 17 ksi at design temperature. The design pressure is 720 psi. What is the calculated test pressure?
- A. 1080 psi
 - B. 918 psi
 - C. 1270 psi
 - D. 792 psi
102. Before breaking a flanged connection to conduct an inspection, necessary precautions should include:
- A. Purging of the system before disconnection
 - B. Proper PPE or blinding
 - C. Gas freeing of all connections to the system
 - D. All of the above
103. After radiography of a piping girth weld, a dark image of a "B" is noticed on the radiograph. This is probably caused by:
- A. Backscatter
 - B. A welders I.D. stamp indented in the metal
 - C. A lead reference mark
 - D. An artifact of the film

104. A piping "scab" patch will be applied to correct a leak in an NPS 14 pipe. The pipe material is rated for 41 KSI SMYS. This "scab" patch is _____.
- A. Allowed per API 570
 - B. Disallowed per API 570
 - C. Radiographed per API 570
 - D. Approved by the Piping Engineer, only
105. Per ASME IX, a longitudinal bend test is only allowed when:
- A. The base and filler metal is the same
 - B. The base and filler metal is non-ferrous
 - C. The base and filler metals are of different compositions
 - D. The weld is a fillet weld
106. The scope of API 570 begins where a vessel terminates, specifically:
- A. At the face of first flange
 - B. At the vessel-to-nozzle connection
 - C. At the pipe hanger
 - D. At the weld attaching a LWN nozzle to the vessel
107. Creep is affected by:
- A. Time, temperature, stress
 - B. Time, stress, materials
 - C. Time, upsets, coatings
 - D. Temperature, stress, service
108. The two primary NDE methods referenced by API 570 for thickness examinations are:
- A. RT, AET
 - B. ET, UT
 - C. MT, UT
 - D. UT, RT
109. The primary difference between GMAW and FCAW is:
- A. The wire feeder used
 - B. The gas used
 - C. The wire used
 - D. The power source used
110. A leak test of a buried piping system should be maintained for a minimum of _____ hours. After _____ hours the system pressure should be noted, and the system should be re-pressurized if required.
- A. 4, 4
 - B. 8, 8
 - C. 8, 4
 - D. 4, 8
111. An API Piping Inspector's duties may include:
- A. Authorize repairs and alterations
 - B. Performing design calculations
 - C. Perform RT
 - D. Install nameplates

112. A pipe is UT inspected in 1978 and found to be .370" thick. The pipe is next inspected in 1982 and found to be .300" thick. The pipe is next inspected in 1990 and found to be .200" thick. The pipe is then inspected in 1997 and found to be .180" thick. If the piping minimum thickness is .135", when should the next UT thickness inspection be conducted?
- A. 4.5
 - B. 2.25
 - C. 5
 - D. 10
113. A ferritic stainless steel piping system will be hydrotested. The water used for this test must be:
- A. Low in chlorine
 - B. Low in fluorine
 - C. Low in sulphur
 - D. None of the above
114. Per ASME IX a welding operator may be qualified by:
- A. Test plates (bend tests)
 - B. Production weld radiograph
 - C. Radiography of a test pipe
 - D. Any of the above
115. An ASME magnetic particle field indicator is made up of how many "PIE" sections furnace brazed together?
- A. 2
 - B. 8
 - C. 6
 - D. 4
116. Per ASME V Article 9, personnel performing VT shall:
- A. Be qualified to SNT-TC-1A
 - B. Have 10 years experience
 - C. Have an annual vision test to J-1 standards
 - D. Have an annual vision test to J-2 standards
117. A UT indication that is in excess of 20% of DAC is called a(n) _____.
- A. Non-relevant indication
 - B. Relevant indication
 - C. Discontinuity
 - D. Defect
118. CUI must be investigated for piping systems operating between _____ which may have had moisture ingress.
- A. 20 - 250°F
 - B. 250 - 600°F
 - C. -4 to 120°C
 - D. 65 to 204°C

119. Remaining Life is calculated using the formula:
- A. $RL = CA / \text{pressure}$
 - B. $RL = t \text{ actual} - t_{\text{min}} / \text{corrosion rate}$
 - C. $RL = t \text{ minimum} / \text{corrosion allowance}$
 - D. $RL = t \text{ actual} - t_{\text{min}} / \text{temperature}$
120. Which of the following should not be considered an alteration per API 570.
- A. Replacement of a 6" nozzle with a 6" nozzle (both reinforced)
 - B. Replacement of an un-reinforced 6" nozzle with a 12" reinforced nozzle
 - C. Replacement of a 12" reinforced nozzle with an 18" reinforced nozzle
 - D. All of the above should be considered alterations
121. The allowable internal misalignment on a circumferential butt weld is _____ per ASME B31.3 requirements.
- A. 1/16"
 - B. 1/8"
 - C. Per the Inspector's judgment
 - D. Per the WPS allowances
122. A quench cracked aluminum block is used in:
- A. PT examinations
 - B. RT examinations
 - C. MT examinations
 - D. AE examinations
123. A 1/4" leg fillet weld will have a throat dimension of:
- A. .250"
 - B. .176"
 - C. .190"
 - D. .35"
124. Per API 570, the absolute minimum number of TML's that any given piping circuit must be assigned is _____.
- A. One
 - B. Two
 - C. 12
 - D. As required by the API 570 Inspector
125. The pressure classes given in ASME B16.5 include which of the following:
- A. 100
 - B. 700
 - C. 900
 - D. 1200
126. If seal welds are employed on a threaded joint, the Code requires that:
- A. Seal welds be at least .250" leg
 - B. The seal welds must cover all threads
 - C. The seal welds can only be used in Cat. D and NFS
 - D. Both B & C, above

127. The difference between a concentric and eccentric reducer is:
- A. Size
 - B. Diameter at the reduced end
 - C. Diameter at the large end
 - D. The geometry of the reduction
128. If welding procedures are to be "shared" between companies as allowed by ASME B31.3, a number of conditions must be met. One of these conditions is:
- A. P # limited to 1, 3, 4, 5, 6, 7, or 8
 - B. Material to be welded is not more than 3/4" thick
 - C. Lethal service is not permitted
 - D. The employer has at least two welders qualified with the new procedure.
129. A Class 1 piping system has been thickness checked in 1972, and was found to be .760" thick. The minimum thickness is .428" (by calculation), and the piping was re-checked visually and for thickness in 1984 and 1995. The 1984 inspection showed .688" and the 1995 inspection shows .540". Per API 570, when should the next UT and visual inspection be conducted?
- A. 2.3 years UT, 5 years visual
 - B. 4.16 UT, 5 years visual
 - C. 2.3 years UT, 10 years visual
 - D. 5 years UT, 5 years visual
130. When weld hardness tests are required by ASME B31.3, at least _____% must be tested when local PWHT is employed.
- A. 5%
 - B. 10%
 - C. 25%
 - D. 100%
131. _____ or _____ must be used with UT instruments when checking pipe with operating temperatures above 200°F.
- A. Delay line transducers, pulse echo equipment
 - B. Water cooled transducers, delay line transducers
 - C. Special air cooled equipment, water "bubble" transducers
 - D. Lucite shoes, delay line "sweep" a scan machines
132. The penetrometer image must be visible on _____ sides when using a shim, per ASME V.
- A. 1
 - B. 2
 - C. 3
 - D. 4
133. A flared tubing joint has (essentially) 4 critical components, one of these components, by name is the:
- A. Body
 - B. Nut
 - C. Sleeve
 - D. Both A & B above

134. Socket weld and threaded flanges are not recommended for service above _____°F or below _____°F, per B16.5.
- A. 500, -50
 - B. 300, -20
 - C. 200, -10
 - D. 100, -5
135. Which of the following welding documents must be certified by the test laboratory, per ASME IX?
- A. WPS
 - B. PQR
 - C. PQR and WPQ
 - D. None of the above
136. The most common internal corrodents found in a refinery are:
- A. Sulfur and chlorine compounds
 - B. Caustics and organic salts
 - C. Water deposits and marine growth
 - D. Atmospheric contaminants and rain
137. The difference between an "examination" and an "inspection" per B31.3 is:
- A. One is QC, the other is NDE
 - B. One is QA, the other is hydrotesting
 - C. One is QC- done by the examiner, one is QA-done by the Inspector
 - D. One is required, the other is optional
138. Shims may be placed under a hole penetrameter to simulate weld reinforcement to assure the density in the area of interest is not more than _____ lighter than the density through the penetrameter.
- A. -30%
 - B. +30%
 - C. -15%
 - D. +15%
139. The intensity of the black light at the surface shall not be less than _____ when conducting a fluorescent PT examination.
- A. 100 $\mu\text{W}/\text{cm}^2$
 - B. 1000 $\mu\text{W}/\text{cm}^2$
 - C. 800 $\mu\text{W}/\text{cm}^2$
 - D. 400 $\mu\text{W}/\text{cm}^2$
140. By definition, a piping circuit is a section of piping that has all points exposed to an environment of similar corrosivity and of similar _____ and _____.
- A. Design conditions and operations
 - B. Design conditions and construction materials
 - C. Materials and flow characteristics
 - D. Operating parameters and piping specifications

141. When selecting TML's for threaded connections, only those that can be _____ should be selected.
- A. UT'd
 - B. VT'd
 - C. RT'd
 - D. PT'd
142. A welder qualifies on a 3 NPS pipe in a 6G position. The piping is titanium, and the weld is made with SMAW. How many bend tests are required for this test weld?
- A. 2
 - B. 4
 - C. At least 3
 - D. RT is required for this weld in lieu of bend tests
143. How many individual examinations must be conducted on each area of interest when conducting MT examination, per ASME V?
- A. 1
 - B. 2
 - C. 3
 - D. 4
144. The recommended upstream limit of an injection point on an NPS 10 pipe in a Class 1 system is?
- A. 12"
 - B. 20"
 - C. 18"
 - D. 30"
145. Rerating by changing temperature or pressure of a system can be done only if which of the following is met?
- A. Accepted by the Engineer
 - B. Leak test is performed
 - C. All piping components are checked for the new service conditions
 - D. All of the above
146. An example of an essential variable using the SMAW process is:
- A. Change in PWHT
 - B. Change in backing
 - C. Change in pipe diameter
 - D. Change in amps/volts
147. If pipe leaks are clamped and re-buried, the location of the clamp _____ be logged in the inspection record and _____ be surface marked.
- A. Shall, shall
 - B. Shall, must
 - C. Shall, may
 - D. May, shall

148. TML's can be reduced or eliminated on piping systems that _____.
- A. Are guaranteed not to leak by the Engineer
 - B. Are non-corrosive, as demonstrated by history or similar service
 - C. Are classified as Category K piping systems
 - D. Have a higher complexity in terms of fittings, branches, etc.
149. Per ASME V, an examiner must be in a darkened room for at least _____ minutes prior to performing a fluorescent examination.
- A. 2
 - B. 5
 - C. 10
 - D. 15
150. Per ASME B16.5, bolt holes in flanges are all required to be placed in multiples of _____.
- A. 2
 - B. 3
 - C. 6
 - D. 4

CODEWEST API-570 ANSWER SHEET FOR FINAL EXAMINATION #1

FILL IN THE BLOCK TO THE RIGHT OF THE CORRECT ANSWER

OPEN BOOK ANSWERS

- | | | | | | |
|-----|---|------|---|------|---|
| 1. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 51. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 103. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 2. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 52. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 104. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 3. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 53. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 105. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 4. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 54. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 106. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 5. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 55. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 107. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 6. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 56. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 108. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 7. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 57. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 109. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 8. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 58. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 110. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 9. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 59. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 111. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 10. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 60. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 112. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 11. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 61. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 113. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 12. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 62. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 114. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 13. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 63. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 115. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 14. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 64. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 116. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 15. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 65. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 117. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 16. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 66. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 118. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 17. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 67. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 119. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 18. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 68. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 120. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 19. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 69. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 121. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 20. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 70. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 122. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 21. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 71. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 123. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 22. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 72. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 124. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 23. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 73. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 125. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 24. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 74. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 126. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 25. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 75. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 127. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 26. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 76. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 128. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 27. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 77. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 129. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 28. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 78. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 130. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 29. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 79. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 131. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 31. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 81. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 133. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 32. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 82. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 134. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 33. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 83. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 135. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 36. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 86. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 138. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 37. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 87. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 139. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 38. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 88. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 140. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 40. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 90. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 142. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 43. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 93. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 145. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 44. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 94. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 146. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 45. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 95. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 147. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 48. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 98. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 150. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 49. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 99. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | | |
| 50. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 100. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | | |
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| | | 102. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | | |