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3. Viewing your status page, scroll down and click on "[Click here to start this course.](#)"
4. Begin viewing the web pages. Refer to your printed test to find the correct answers. The questions track the web pages.
5. As you find the answers, circle them on your printed copy.
6. At the end of each section, you'll enter the quiz which is the same as your printed test. Refer to your circled answers when actually answering the quiz on the web.
7. Upon passing, you will proceed to the next section. If you failed to pass, you will be moved back to the beginning of that section for more review.



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### **Quiz 1**

1. UPC Chapter 11 Storm Drainage governs the materials, design and \_\_\_\_\_ of stormwater drainage systems.
  - inspection
  - manufacturing
  - installation
  - overview
  - utilization
2. A \_\_\_\_\_ is an exterior vertical drainage pipe for conveying stormwater from the roof or gutter drains.
  - soil stack
  - catch basin
  - sanitary drain
  - leader
  - storm drain
3. \_\_\_\_\_ system is designed to collect rainwater runoff, domestic sewage and industrial wastewater.
  - A combined sewer
  - A free-for-all
  - An unrestricted water
  - A stormwater drainage
  - An archaic piping
4. It is permissible for the rainwater drainage from a rooftop to drain into a location other than a separate or combined storm sewer system.
  - No, this is not permitted.
  - Yes, this is permitted, but only if neither type of storm sewer system is available.
  - No, this is not permitted unless the drainage system was installed prior to 1990.
  - Yes, it is possible to drain to some other place of disposal satisfactory to the AHJ.
  - Yes, this is permitted, but only for upgrades to existing drainage systems.

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5. In the case of a single-family dwelling, it is permissible to drain stormwater onto a lawn.
  - Yes, provided the water flows away from the building and does not create a nuisance.
  - No, this is not permitted.
  - Yes, this is recommended, provided that the adjacent properties have the same owner.
  - No, this is not permitted without pre-approval from the AHJ.
  - Yes, this is permitted if there is nowhere on the property for the water to drain.

## Quiz 2

1. Subsoil drains must be installed around the perimeter of buildings having basements, cellars, crawl spaces or floors \_\_\_\_\_.
  - below grade
  - that are likely to flood
  - under construction in wet locations
  - located within 50 feet of a body of water
  - where the soil is not sufficiently porous to drain well on its own
2. Perforated subsoil drain piping laid in crushed rock must have no less than \_\_\_\_\_ of the crushed rock surrounding the pipe.
  - 2 inches
  - 4 inches
  - 12 inches
  - 6 inches
  - 14 inches
3. Subsoil drainage shall be piped to \_\_\_\_\_.
  - a storm drain
  - an approved water course
  - a street curb
  - an alley
  - any of the above
4. It is permissible to use a concrete gutter to route the discharge from a subsoil drain to an alley.
  - No, it is not acceptable to discharge stormwater into an alley.
  - Yes, this is permitted, provided the concrete gutter is no less than 4 inches in diameter.
  - Yes, this is permitted, provided the discharge runs to open-jointed rain tiles in the alley.
  - Yes, this is acceptable.
  - Yes, this is allowed for alleys with existing storm drains.

5. What is required if one encounters continuously flowing groundwater during the installation of subsoil drain pipe?
  - Continue with the installation, adding extra perforations to the pipe in this area.
  - Direct the subsoil drain pipe to a storm drain or approved water course.
  - Terminate the piping at this location.
  - Run a concrete gutter through this location, then proceed with the installation.
  - Increase the 4 inches of porous rock surrounding the pipe to 12 inches or more.

## Quiz 3

1. The paved areas at a public filling station \_\_\_\_\_.
  - are required to drain to an approved water course
  - must be sloped toward sumps or gratings within the property lines
  - larger than 400 square feet must have a drain installed
  - smaller than 1000 square feet may drain to an unpaved area filled with crushed rocks
  - do not require a drain provided they slope toward a curb or gutter storm drain
2. Where the drainage at a motor vehicle washing establishment needs to be directed to a sump, the UPC may require the establishment to \_\_\_\_\_.
  - reduce the amount of waste water they produce
  - first discharge the water to a properly graded open area
  - install curb and gutter drains
  - install 6-inch or taller curbs to direct the water
  - replace some paved areas with crushed rocks
3. If a newly constructed building and parking area create surface water drainage, the sumps and drains must be piped \_\_\_\_\_.
  - to a storm drain or approved water course
  - around the edges of the parking area
  - onto a properly graded open area
  - to a subsoil drain
  - to the nearest sanitary sewer
4. Vertical rainwater piping must be \_\_\_\_\_.
  - round
  - rectangular
  - square
  - any of the answers provided
  - none of the answers provided

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5. The location and sizing of roof drains and gutters \_\_\_\_\_.
- must be coordinated with the aesthetic style of the roof
  - are determined by Table D 101.1
  - are dependent solely on the size and pitch of the roof
  - must be coordinated with the pitch and design of the roof
  - depend on the porosity of the roof covering

## Quiz 4

1. Leaders and storm drains must be trapped.
  - Yes, this is always required.
  - No, this is not a requirement.
  - Yes, this is required at the location where they connect to a combined sewer.
  - No, this is not required unless the location is one that has a lot of debris.
  - Yes, this is required within two feet of a junction or connection.
2. Traps shall not be required where roof drains, rain leaders, and other inlets are at locations allowed under \_\_\_\_\_.
  - Section 719.0, Cleanouts
  - Section 908.0, Wet Venting
  - Section 1101.7, Building Subdrains
  - Section 720.0, Sewer and Water Pipes
  - Section 906.0, Vent Termination
3. Traps are not required for leaders or conductors that are connected to a sewer \_\_\_\_\_.
  - with a sufficiently large diameter to handle the debris
  - that connects to a combined sewer
  - that discharges to a building sub-drain
  - carrying stormwater exclusively
  - within 10 feet of the property line
4. Traps for individual conductors must be \_\_\_\_\_ the horizontal drain to which they are connected.
  - the same size as or larger than
  - the same size as
  - smaller than
  - the same size as or smaller than
  - larger than

5. In lieu of individual traps for the drain branch serving each stormwater inlet, it is permissible to install a single trap in the main storm drain just before its connection with the \_\_\_\_\_.
- combined building sewer
  - next horizontal branch
  - underground public sewer
  - building sump pit
  - public sewer main

## Quiz 5

1. The sizing of vertical rainwater piping is based on \_\_\_\_\_ and Table 1101.12.
  - the minimum projected roof area
  - the size of the drain serving the pipe
  - the maximum projected roof area
  - the pitch and design of the roof
  - whether or not it is part of a combined sewer system
2. What is the maximum roof area that can be served by a 3-inch vertical rainwater pipe in a location that receives rain at a rate of up to 3 inches per hour?
  - 960 square feet
  - 2930 square feet
  - 9200 square feet
  - 6130 square feet
  - 2200 square feet
3. What is the minimum size vertical rain pipe permitted for a rooftop of 3000 square feet in an area that receives rain at a rate of 1 inch per hour?
  - 1 inch diameter
  - 2 inches diameter
  - 3 inches diameter
  - 4 inches diameter
  - 5 inches diameter
4. The sizing of a horizontal branch of a building storm drain is based upon \_\_\_\_\_ and Table 1101.8.
  - the area of the rooftop plus the area of the parking lot
  - the size of the vertical pipes serving the branch
  - the slope of the rooftop
  - the porosity of the rooftop or parking lot materials
  - the maximum projected roof or paved area being served

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5. What is the maximum size 1/4-inch-per-foot slope parking area that can be served by a 6-inch diameter horizontal storm sewer in a location that receives rain at a rate of 5 inches per hour?
- 6040 square feet
  - 4280 square feet
  - 7670 square feet
  - 46,000 square feet
  - 13,040 square feet

## Quiz 6

1. An engineered storm drainage system must be designed \_\_\_\_\_.
- to the manufacturers listed materials
  - to adhere to safety standards
  - and installed to the manufacture's installation instructions
  - by a registered design professional
  - all of the answers provided
2. Siphonic roof drainage systems are \_\_\_\_\_.
- exactly the same as conventional roof drainage systems
  - not approved by the 2018 Uniform Plumbing Code
  - required to comply with ASPE 144.6.6.2.5.1
  - not required to be tested
  - none of the answers provided

3. Existing storm drainage systems that have been extended are required to be tested for leaks and defects.
- Yes, this is correct.
  - No, this is only required for new storm drainage systems.
  - No, this is not required if the existing system does not have any known leaks.
  - Yes, this is required, but only for existing systems that have needed repair.
  - No, this is not required unless specifically requested by the AHJ.
4. New installations of storm drain systems must have the rough piping installation tested \_\_\_\_\_.
- and proved tight
  - within 30 days
  - except for plastic pipes
  - with the cleanout plugs removed
  - by the AHJ
5. Storm drainage piping that is to be checked for leaks by the water test may be tested in sections or as a whole system.
- True
  - False

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**ABBREVIATED TABLE 1101.8 SIZING OF HORIZONTAL RAINWATER PIPING <sup>1,2</sup>**

SIZE OF PIPE	FLOW 1/8 inch per foot slope	MAXIMUM ALLOWABLE HORIZONTAL PROJECTED ROOF AREAS AT VARIOUS RAINFALL RATES (square feet)					
		1 (in/h)	2(in/h)	3(in/h)	4(in/h)	5(in/h)	6(in/h)
inches	gpm						
3	34	3288	1644	1096	822	657	548
4	78	7520	3760	2506	1880	1504	1253
5	139	13360	6680	4453	3340	2672	2227
6	222	21400	10700	7133	5350	4280	3566

SIZE OF PIPE	FLOW 1/4 inch per foot slope	MAXIMUM ALLOWABLE HORIZONTAL PROJECTED ROOF AREAS AT VARIOUS RAINFALL RATES (square feet)					
		1 (in/h)	2(in/h)	3(in/h)	4(in/h)	5(in/h)	6(in/h)
inches	gpm						
3	48	4640	2320	1546	1160	928	773
4	110	10600	5300	3533	2650	2120	1776
5	196	18880	9440	6293	4720	3776	3146
6	314	30200	15100	10066	7550	6040	5033

SIZE OF PIPE	FLOW 1/2 inch per foot slope	MAXIMUM ALLOWABLE HORIZONTAL PROJECTED ROOF AREAS AT VARIOUS RAINFALL RATES (square feet)					
		1 (in/h)	2(in/h)	3(in/h)	4(in/h)	5(in/h)	6(in/h)
inches	gpm						
3	68	6576	3288	2192	1644	1310	1096
4	156	15040	7520	5010	3760	3010	2500
5	278	26720	13360	8900	6680	5320	4450
6	445	42800	21400	14267	10700	8580	7140

Notes: <sup>1</sup> The sizing data for horizontal piping are based on the pipes flowing full.

<sup>2</sup> For rainfall rates other than those listed, determine the allowable roof area by dividing the area given in the 1 inch per hour column by the desired rainfall rate.

**ABBREVIATED TABLE 1103.3 SIZE OF GUTTERS**

DIAMETER OF GUTTER (1/16 inch per foot slope)	MAXIMUM RAINFALL RATES BASED ON ROOF AREA (square feet)					
	2 (in/h)	3 (in/h)	4 (in/h)	5 (in/h)	6 (in/h)	
inches						
3	340	226	170	136	113	
4	720	480	360	288	240	
5	1250	834	625	500	416	
6	1920	1280	960	768	640	

DIAMETER OF GUTTER (1/8 inch per foot slope)	MAXIMUM RAINFALL RATES BASED ON ROOF AREA (square feet)					
	2 (in/h)	3 (in/h)	4 (in/h)	5 (in/h)	6 (in/h)	
inches						
3	480	320	240	192	160	
4	1020	681	510	408	340	
5	1760	1172	880	704	587	
6	2720	1815	1360	1085	905	

DIAMETER OF GUTTER (1/4 inch per foot slope)	MAXIMUM RAINFALL RATES BASED ON ROOF AREA (square feet)					
	2 (in/h)	3 (in/h)	4 (in/h)	5 (in/h)	6 (in/h)	
inches						
3	680	454	340	272	226	
4	1440	960	720	576	480	
5	2500	1668	1250	1000	834	
6	3840	2560	1920	1536	1280	

**TABLE 1105.1 (1)**

**CONTROLLED-FLOW MAXIMUM ROOF WATER DEPTH**

ROOF RISE* (inches)	MAXIMUM WATER DEPTH AT DRAIN (inches)
Flat	3
2	4
4	5
6	6

\*Vertical measurement from the roof surface at the drain to the highest point of the roof surface served by the drain, ignoring a local depression immediately adjacent to the drain.

**ABBREVIATED TABLE D 101.1**

MAXIMUM RATES OF RAINFALL FOR VARIOUS CITIES		
STATES AND CITIES	STORM DRAINAGE 60-MINUTE DURATION, 100-YEAR RETURN	
	inches per hour	gallons per minute per square foot
<b>MONTANA</b>		
Billings	1.8	0.019
Glendive	2.5	0.026
Great Falls	1.8	0.019
Missoula	1.3	0.014
<b>WASHINGTON</b>		
Seattle	1.0	0.010
Spokane	1.0	0.010
Walla Walla	1.0	0.010

**TABLE 1105.1 (2)**

**DISTANCE OF SCUPPER BOTTOMS ABOVE ROOF**

ROOF RISE* (inches)	ABOVE ROOF LEVEL AT DRAIN (inches)
Flat	3
2	4
4	5
6	6

\*Vertical measurement from the roof surface at the drain to the highest point of the roof surface served by the drain, ignoring a local depression immediately adjacent to the drain.

**ABBREVIATED TABLE 1101.12 SIZING ROOF DRAINS, LEADERS AND VERTICAL RAINWATER PIPING <sup>2,3</sup>**

SIZE OF DRAIN, LEADER OR PIPE	FLOW	MAXIMUM ALLOWABLE HORIZONTAL PROJECTED ROOF AREAS AT VARIOUS RAINFALL RATES (square feet)							
		1 (in/h)	2(in/h)	3(in/h)	4(in/h)	5(in/h)	6(in/h)	7(in/h)	8(in/h)
inches	gpm <sup>1</sup>								
2	30	2880	1440	960	720	575	480	410	360
3	92	8800	4400	2930	2200	1760	1470	1260	1100
4	192	18400	9200	6130	4600	3680	3070	2630	2300
5	360	34600	17300	11530	8650	6920	5765	4945	4325
6	563	54000	27000	17995	13500	10800	9000	7715	6750
8	1208	116000	58000	38660	29000	23200	19315	16570	14500

Notes:

<sup>1</sup> Maximum discharge capacity, gpm, with approximately 1-3/4 inch head of water at the drain.

<sup>2</sup> For rainfall rates other than those listed, determine the allowable roof area by dividing the area given in the 1 inch per hour column by the desired rainfall rate.

<sup>3</sup> Vertical piping shall be round, square or rectangular. Square pipe shall be sized to enclose its equivalent round pipe. Rectangular pipe shall have not less than the same cross-sectional area as its equivalent round pipe, except that the ratio of its side dimensions shall not exceed 3 to 1.