

2021 Bulletin of Information

AN INTERNATIONAL PROGRAM
FOR THE CERTIFICATION OF
PLUMBING ENGINEERING
PROFESSIONALS





The Certified in Plumbing Design (CPD) program is an international certification program for engineers and designers of plumbing systems. Completion of the CPD program and examination confers upon the successful candidate the designation *Certified in Plumbing Design* or CPD. The certification program provides the profession, the plumbing industry, and the general public with a single, comprehensive qualification of professional competence for engineers and designers of plumbing systems. The CPD is the only international credential program in the plumbing engineering field. It sets the standards for leadership within the industry and provides formal recognition of outstanding professionals with advanced skills in the design and specification of plumbing systems.

The statement and designation **Certified in Plumbing Design** and the acronym **CPD**, are registered Marks of the American Society of Plumbing Engineers.

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American Society of Plumbing Engineers Certified in Plumbing Design Examination Bulletin of Information

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Certified in Plumbing Design

The Certified in Plumbing Design Examination has been developed by the American Society of Plumbing Engineers to provide professional recognition of qualified individuals who design plumbing systems. The Certified in Plumbing Design program has five primary objectives:

1. Provide a standard of professional competence in the practice of plumbing engineering.
2. Identify and recognize those individuals who successfully complete the certification examination, thereby demonstrating their acquired knowledge and abilities in the field of plumbing engineering.
3. Encourage plumbing engineers to participate in a continuing program of professional development.
4. Provide a standard for educational programs in plumbing engineering and encourage implementation of such programs.
5. Enhance the status of plumbing engineering as a unique discipline and profession by demonstrating that a realistic standard of professional competence can be clearly defined.

Examination results should not be used for employment ranking.

CPD Committee

The Certified in Plumbing Design program and the Certified in Plumbing Designer designation are under the control of an independent committee appointed by the Society's Board of Directors.

CPD and P.E. Registration

The Certified in Plumbing Design designation or CPD is not the same as Professional Engineer registration (P.E.). Having the CPD designation does not confer upon an individual the right to sign drawings or specifications, or to use the designation, *Engineer*, in states where this is restricted by law.

Who is Eligible?

To be eligible to take the CPD examination, a candidate must possess a minimum of four (4) years of practical experience in a position of responsibility for the design of plumbing systems and possess a baccalaureate degree in a field related to engineering. In lieu of an accredited degree, a candidate may substitute up to an additional four (4) years of practical experience in the design of plumbing systems [for a total of eight (8) years] or be granted a credit of one-half year of practical experience for each one (1) full-year of education in an accredited curriculum related to plumbing engineering.

CPD Recertification

Individuals that have passed the CPD examination and achieved the CPD designation, are required to maintain the designation through a biennial recertification program. (See the CPD Recertification web page at [https://www.aspe.org/education-credentialing/cpd/recertification/.](https://www.aspe.org/education-credentialing/cpd/recertification/))

About the Examination

The Certified in Plumbing Design Examination consists of 100 multiple-choice questions. The test specifications for the examination were developed by ASPE's CPD Committee with the help of an independent testing and certification service organization, using information derived from a job analysis. The test specifications and content reflect the knowledge, skills and problem solving experience essential to performing the job of a plumbing engineer.

Inside the Examination

The single most important criterion used in the development of the CPD examination was *job relatedness* — the knowledge and skills required of a competent plumbing engineer. Each examination question deals with a critical and important task performed by a plumbing engineer; uses the language and symbols familiar to the profession; and the wording of written passages and the calculations needed to solve mathematical problems are those commonly used by plumbing engineers on the job.

To ensure the job relatedness of the CPD exam, a job analysis was conducted by the CPD Committee and an independent testing and certification organization (the Educational Testing Service). The job analysis determined what a plumbing engineer actually does on the job and was performed by visiting with experienced plumbing engineers and their supervisors and conducting interviews and on-site job observations.

As a result of observations and interviews, *task statements* were developed — descriptions of specific activities a plumbing engineer may perform during the work day. Examples of task statements are:

- Review the water distribution riser diagram(s) to see that the systems are designed and sized correctly and are adequately protected against backflow and cross-connections.
- Determine water pressure requirements to establish the need for auxiliary pressure systems.
- Select piping insulation for thermal and condensation requirements.
- Determine the type and location of underground systems and sub-structures.

To establish that the developed task statements were truly representative of the job content of a plumbing engineer, they were evaluated, utilizing a specially constructed questionnaire, by a sample group of professional plumbing engineers. The engineers rated each task based on four factors: Frequency; Difficulty; Importance; and Experience Required for Proficiency. Factor analysis (a statistical procedure used to identify and to group related tasks) was performed on the questionnaire responses to identify the major content areas and job dimensions of a plumbing engineer. This evaluation and analysis procedure established five broad job dimensions or job categories: Gathering Information; Design; Specifications; Construction Services; and Administration. Every question in the CPD examination is linked to a task statement and demonstrably related to the job of a plumbing engineer.

The development of the CPD examination included a series of reviews by the editors and test development staff of the independent testing and certification service organization to insure conformance to test specification classification, statistical criteria, question format, and clarity of language. In addition, in accordance with the Educational Testing Service *Standards for Quality and Fairness*, each examination question is subjected to a Test Sensitivity Review designed to detect and eliminate any language, symbols, or content that might be considered potentially offensive or inappropriate by any examination candidate.

Independent Testing and Certification

To ensure the independence of the CPD examination, ASPE contracts with third-party exam administrators to create the test forms and to conduct, oversee and grade the examination. The test administrator is engaged in test development, test administration, and educational and occupational measurement and research.

CPD Examination Date

The Certified in Plumbing Design Examination is offered annually in electronic digital form only. This years exam will be remote proctored.

The next CPD Examination dates are: **April 5-16, 2021.**

CPD Examination Registration

The best way to register for the Certified in Plumbing Design examination is online. Go to <https://www.aspe.org/education-credentialing/cpd/exam/> to complete the eligibility form. After completion you will be sent an email to the link for registering and pay fee's for the exam.

The registration form is used as the basis to prepare and e-mail candidate's test center location and address and proctor number, to complete test arrangements, to mail test results and to issue certification documentation. Registration form errors may cause a processing delay or the form may be returned — please follow the instructions.

The registration form is used as the basis to prepare the candidate testing time and date arrangements. Registration forms are not transferable — only the individual registered for the exam will be allowed to test.

Registration closes April 8, 2021

CPD Examination Fees

The fees in USD for the CPD Examination are:

ASPE Members (USA & Canada)	\$ 450.00	(International) \$ 575
Nonmembers (USA & Canada)	\$ 675.00	(International) \$ 800

Examination fees are not transferable to another exam date.

Refunds and Cancellations

All examination cancellations and requests for refunds must be made in writing to the CPD Certification Program (the address can be found on the inside of the back bulletin cover).

A registration, processing and administration fee, as specified on the registration form will be deducted from the examination fee prior to the issuing of the refund. Refunds will be issued two to three weeks after the examination date.

Remote Proctoring Information

Remote Proctoring Candidates are permitted to take the exam from April 5 - 16, 2021 via remote proctoring. Registered candidates will receive confirmation emails from ProctorExam (via Straszczyk) with more information about technical specifications and requirements to take their exam. Candidates in conjunction with Straszczyk will select a time and date to take their examination. Candidates launch the remote proctoring software through Google Chrome web browser and begin their exam session.

About the Technical Requirements

Your computer is required to have a webcam (internal or external) which will be used to monitor you during the exam process.

You're required to download an app to your Android or Apple phone or tablet. This will be placed behind you in the room which you'll be taking the exam to monitor your surroundings.

You're required to use Google Chrome and download a browser extension which records your monitor. Nothing is downloaded or stored to your computer. Upon the conclusion of your exam session you may remove Google Chrome from your computer if you wish.

Your Internet speed should be consistent enough as to not time out during your exam session. It's recommended that your Internet speeds be at least 5 MB down and up. If you need to determine this please visit speedtest.net and run a test on the computer and Internet connection you will use for the exam.

Examination Schedule

Each CPD examination candidate is permitted three hours and thirty minutes (210 minutes) to complete the exam. No one will be permitted to work on the exam beyond the allotted time. A sample of a typical CPD examination schedule is:

2:00 PM	Registered examination candidates sign on to test site.
2:15 AM	CPD Examination begins.
5:45 PM	Examination over.

Actual timing for each examination depends on the remote proctor.

Special Accommodation Requests

Any individual who has a physical or cognitive impairment or limitation that prevents him/her from taking the test under standard conditions may request special testing arrangements.

For the electronic examination, ASPE and its examination service provider requires written documentation of the special condition. Documentation should be in the form of a letter on the official letterhead of a licensed or certified professional qualified to diagnose and treat special conditions. The written documentation must accompany the registration form when submitted to ASPE. Candidates with religious beliefs that preclude taking examinations on Saturday, should include a letter of explanation with their registration form. This letter should include a self-certification confirming their affiliation with a recognized body that observes its Sabbath throughout the year on Saturday.

The American Society of Plumbing Engineers or its examination service providers will send a letter confirming the special arrangements (an alternate date, if appropriate, time and location) for the examination to the candidate approximately ten days prior the examination date. **The Examination Registration Form accompanied by the required documentation, must be received by March 1.** There is no additional fee for special arrangements or accommodations.

Registration Changes

Changes, additions and modifications to registration information and data, must be made in writing, no later than five weeks prior to the examination, to the address shown above.

Be sure all requests include your name and address as shown on the assessment purchase confirmation or letter of authorization or the proctor number.

Identification for Proctoring Center

In addition to the assessment purchase confirmation, you will be required to present some form of a signed, positive photographic identification. Acceptable identifications include: a valid driver's license or a passport. A Social Security card is not an acceptable form of identification.

Test Policies

To ensure equality and quality of the CPD examination, all Proctored Exams follow the following standard procedures and policies:

- The CPD examination will be administered only on the day(s) and at the time(s) scheduled.
- Examination candidates are urged to be prompt.
- The examination will end on time; no examination candidates are permitted to continue beyond the established time limit for any reason. The examination candidate is responsible for his/her test-taking pace. Candidates leaving the examination room for personal reasons must first obtain the exam supervisor's permission; there will be no examination time extension for any reason.
- The CPD Exam is an open book exam. Exam candidates are allowed to bring in and use any printed reference materials. These materials may be professionally bound or printed by the exam candidate but they must remain bound during the exam. Loose paper, such as printed and downloaded publications, may be bound with ring binders, brads, plastic snap binders, spiral-binding, or screw posts. Staples, sticky notes, tabs and flags will not be permitted. Handwritten notes and highlighting within the reference materials are permitted. The proctor will flip through the books to ensure there are no loose notes hidden inside. Calculators will not be provided by the proctors; however, candidates can bring in and use any non-programmable battery operated calculator. The proctors will provide candidates with three pieces of scratch paper and two pencils or a writing board, such as a white board, to use while in the test session. **Visit <https://www.aspe.org/education-credentialing/cpd/cpdqa/> to read more.**
- Examination candidates may only bring and use slide rules or silent, hand-held solar or battery-operated, nonprogrammable calculators.
- Examination candidates determined to be engaging in any kind of misconduct by the supervisor will be dismissed from the examination room and not permitted to return.

It is the responsibility of the examination candidate to inform the exam supervisor of any special arrangements that have been approved. Examination candidates are encouraged to provide feedback about the CPD examination or a question. A comment section is available for each question.

Electronic Sign-in

Prior to the examination, the supervisor will give instructions for the proper access to the identification section of the examination. You will be required to enter your special proctor number for access. Carefully check all of the information shown that has been taken from your registration form. The required information includes the examination candidate's name, unique examination file number, Exam Center code and the test date. All information must be entered correctly or the examination results and final scores may be delayed.

If additional information is required the on-site proctor will guide each candidate through the necessary process.

Exam Content

The questions in the CPD examination are linked to five broad task statements that describe the job dimensions of a plumbing engineer. These task statements are:

Task 1 and Task 2: Gathering Information and Administration — The plumbing engineer identifies the scope of work, existing physical conditions, and project team contacts; determines applicable requirements of authorities having jurisdiction, utility availability and budgetary constraints; and prepares and monitors work plans and schedules, coordinates work with other members of the professional design team, e.g., HVAC, electrical, etc. (There are approximately 11 questions covering these two task statements.)

Task 3: Design — The plumbing engineer identifies the required systems; establishes the design criteria for each system; designs each system; and coordinates that system with each other and all other building elements. (There are approximately 65 questions covering this task statement.)

Task 4: Specifications — The plumbing engineer determines the format and coordinates it with the design; describes the systems to be used; and coordinates plumbing specifications with all other specifications. (There are approximately 13 questions covering this task statement.)

Task 5: Construction Services — The plumbing engineer reviews submittals for compliance with contract documents; reviews the installation for compliance with contract documents; and witnesses system test(s). (There are approximately 11 questions covering this task statement.)

Exam Taking Hints

The CPD examination score is based on the number of correct answers. There are no penalties assessed for wrong answers. Therefore, it is advantageous to answer every question, even if it is a guess.

- Once the exam has begun, use your time economically. Take the questions in order, but do not waste time on those that contain difficult or unfamiliar material.
- If a question is difficult, guess at the answer, mark the answer in the appropriate answer box. Make a note of the question number and go on to the next question. If there is time left when you have finished the test, you can go back and review the questions that you were unsure of.
- For each examination, all candidates will be presented with the same 100 questions. However, questions for the electronic examination will be presented in a random manner. No two candidates taking the same examination will be presented with the same exact question for the same indicated question number.

Taking the Electronic Exam

The Certified in Plumbing Design Examination consists of 100 multiple-choice questions. There are no written answer sheets. Each question will have a series of multiple choice answers presented with the question on the computer screen. The candidate will pick his/her preferred answer and will be directed to type in a letter or number in the answer block box or to pick on of the answers using the cursor or mouse.

For each question, decide which of the suggested answers is best and make the desired choice following each questions answering requirements (letter, number or selection). Double check to be sure that you have properly answered the question in the correct manner.

The following example illustrates question answer responses.

Electronic Examination Question

28. Which of the following is the capital of the United States?

- (A) New York, NY
- (B) Washington, DC
- (C) Chicago, IL
- (D) Los Angeles, CA

Electronic Examination Answer

For Question 28: Enter (type) the letter corresponding to your answer.

You may retype any letter at any time for a correct intended responses.

The examination is timed. Read the directions for each question on the computer screen carefully and be sure that you understand them before attempting to answer any questions.

Examination Results

Because of the statistical review process for every CPD examination, approximately six to eight weeks after the examination date, candidates will receive either a pass or fail notification. Examination results are mailed simultaneously to all candidates. (Examination results will not be given over the telephone and will not be released to anyone unless there is a written request by the candidate.)

As the certifying organization, ASPE will issue each successful candidate a Certified in Plumbing Design (CPD) certificate, approximately six to eight weeks after the examination results have been received.

The CPD Committee, under the guidance and direction of the ASPE Examination Service Provider, or contracted psychometrician established the level of overall examination performance (i.e., the cut-score) that the examination candidate must demonstrate in order to be entitled to the Certified in Plumbing Design designation. (An examination performance evaluation determined the final criteria and established the cut-score.)

The CPD examination results are confidential and reported only to the examination candidate. Successful candidates will receive only notice of passing score. Unsuccessful candidates will receive a break down of the five domains and their respective scores.

Withholding Examination Results

The Certified in Plumbing Design Program reserves the right to cancel or withhold exam results if, in its opinion, there is adequate reason to question examination validity or a candidate's conduct, such as:

1. An examination may be rendered invalid because of circumstances beyond the examination candidate's control, such as faulty exam materials or mis-timing. When warranted, The ASPE Examination Service Provider will conduct an investigation. In the event examination results are ruled invalid, arrangements will be made for a no-cost re-examination.
2. Doubts raised about the validity of an examination candidate's test results because of suspected misconduct, such as giving or receiving help, using notes or unauthorized books or papers, removing exam material or notes from the testing room, or attempting to take the test for someone else. In such circumstances, the candidate will be notified of established ASPE Examination Service Provider procedures for ensuring fair treatment. An examination candidate is expected to cooperate in a certification investigation.

Retaking the Examination

CPD examination candidates who are absent from the examination on the date for which they were registered, or who fail an exam and wish to retake it, must submit a new Examination Registration Form and include the complete examination fee.

Release of Information

The signed and submitted Examination Registration Form constitutes written authorization for a candidate's examination results to be released only to the candidate and the American Society of Plumbing Engineers. Employers will not be informed of examination results unless a candidate provides the information or gives written authorization to ASPE.

Complaints and Comments

Complaints or comments about Examination Center facilities, examination supervision, examination content, or any other matter related to the Certified in Plumbing Design program, should be reported immediately on an Examination Candidate's Comment Form available from the examination supervisor or in a letter sent to the CPD Certification Program to ASPE (the address can be found on the inside of the back bulletin cover).

When writing to ASPE regarding the CPD Examination, please be sure to identify the examination date, the Examination Center location and its code number, and your complete name, address, and examination candidate identification number. The ASPE Examination Service Provider will investigate and respond to all complaints and comments.

Practice CPD Examinations

A short 10 question practice examination is below. Additional CPD Practice Examinations can be found by signing on to the CPD examination website (go to aspe.org/CPD). Each practice test is 30 questions and is set-up to follow the experience distribution of questions as described earlier.

Registration for the practice exams is only available on the website; there is no paper registration form. There is a fee for taking each practice exam; see the registration form on the website.

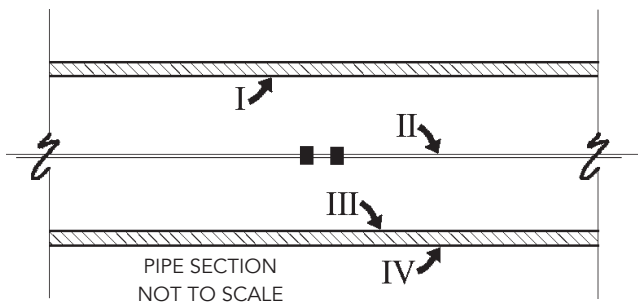
Immediately following your taking of a practice exam, you will be given your scoring (scoring percentages are given in reference to the five experience areas).

Certified in Plumbing Design – Sample Examination Questions

These sample questions are indicative of the content areas covered by the CPD examination. The questions do not represent the full range of content or the levels of difficulty found in the actual examination. The answers to the sample questions are provided on page 12.

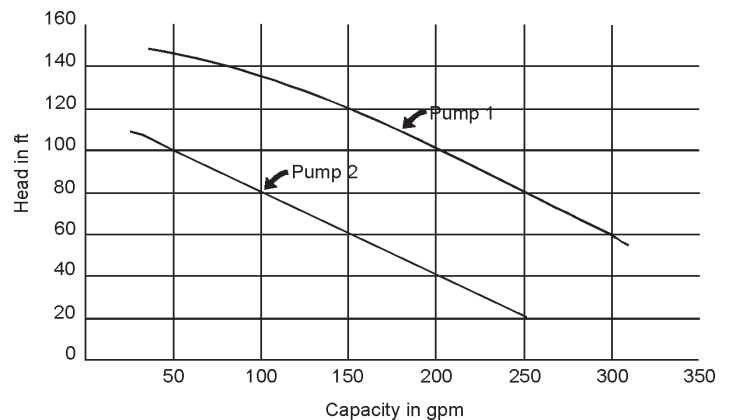
- Before starting to design a plumbing system, it is first necessary to determine which of the following?
 - The applicable codes
 - The specification format
 - The drawing size
 - The scope of the work
- How many BTU's are required to raise the temperature of 500 gal. of water from 40F to 120F?
 - 92,000
 - 300,000
 - 333,200
 - 415,000

- If a fire sprinkler head has a flow coefficient (K) of 7.6, the follow rate in gpm when the pressure at the head is 15 psi is:
 - 24.29
 - 29.43
 - 41.35
 - 57.00



- In the pipe section above, the invert is at
 - I
 - II
 - III
 - IV

- In the design of a compressed air system, the term "free air" means which of the following?
 - The volume of air discharging at the furthest outlet
 - The volume of air displaced by the pump pistons
 - Air at the compressor discharge
 - Air at standard conditions at the compressor inlet



- When the two pumps shown in the diagram above are operated in series, which of the following is their capacity/head?
 - 150 gpm at 120 ft. head
 - 200 gpm at 70 ft. head
 - 200 gpm at 140 ft. head
 - 250 gpm at 80 ft. head
- Which of the following horizontal storm drain sizes at 1/4 per foot slope is correct for a 20,000 sq. ft. roof, given a design rainfall of 4 in. per hr.?
 - 6 in.
 - 8 in.
 - 10 in.
 - 12 in.

Certified in Plumbing Design – Sample Examination Questions

These sample questions are indicative of the content areas covered by the CPD examination. The questions do not represent the full range of content or the levels of difficulty found in the actual examination. The answers to the sample questions are provided on page 13.

8. Referring to the Site Plan shown in the diagram to the right, the invert elevation of the Main St. storm sewer at the point where it connects with the building storm drain is:

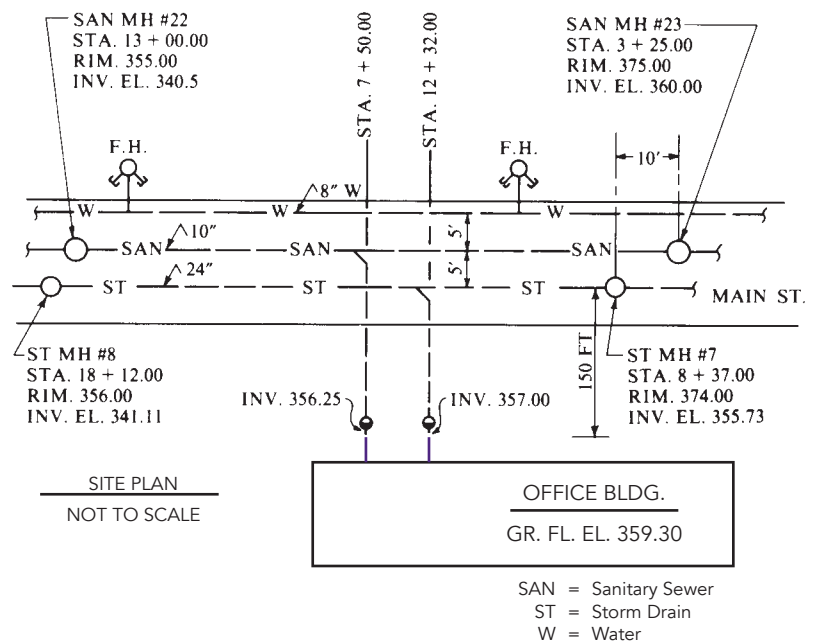
- (A) 348.35 ft.
- (B) 349.80 ft.
- (C) 351.70 ft.
- (D) 353.00 ft.

9. Referring to the Site Plan shown in the diagram to the right, the maximum slope of the building sanitary sewer is:

- (A) 1.5000 %
- (B) 2.000 %
- (C) 2.8065 %
- (D) 3.0650 %

10. If 960 labor-hours have been allocated for the production schedule of a project and an estimated 80% of the work has been completed in 640 labor-hours, which of the following statements best describes the projected labor requirements?

- (A) The project is on schedule
- (B) The project will require approximately 128 more labor-hours than budgeted
- (C) The project will require approximately 20% more labor-hours than budgeted
- (D) The project is ahead of schedule



Certified in Plumbing Design – Sample Examination Question Explanations

These sample questions are indicative of the content areas covered by the CPD examination. The questions do not represent the full range of content or the levels of difficulty found in the actual examination.

1. D) The scope of the work is the "best" answer because how can you do anything if you do not know your objective?

REFER TO: PEDH Vol 1, Chap 5 for this kind of information.

2. C) 333,200 is the "best" answer.

1 BTU will heat 1 POUND of water 1 DEGREE F, in 1 HOUR:

Two of the important formulas to remember for calculating BTUH and GPH:

- $BTU/Input = \frac{GPH \times 8.33 \times Temp. Rise \times 1.0 BTU/LB/F}{\% Efficiency of heater}$
- $Gal/Hour = \frac{BTU \times \%Efficient of Heater}{Temp. Rise \times 8.33}$

In this case, we do not have an efficiency listed so we will assume 100% (or "1") for calculation purposes:

- $500 GPH \times 80^{\circ}F \Delta T \times 8.33 (POUNDS \text{ of water per gallon}) = 333,200 BTU$

REFER TO: PEDH Vol 2, Chap 6, as well as the ASPE DOMESTIC WATER HEATING DESIGN MANUAL for this kind of information.

3. B) 29.43 is the "best" answer

The term K-Factor refers to a set of dimensionless numbers used as coefficients of discharge for fire sprinklers. Based on sprinkler "k" factor

$$q = k \times (p)^{1/2}$$

where:

- q is the flow in gpm
- k is the k factor
- p is the pressure at the sprinkler in psi

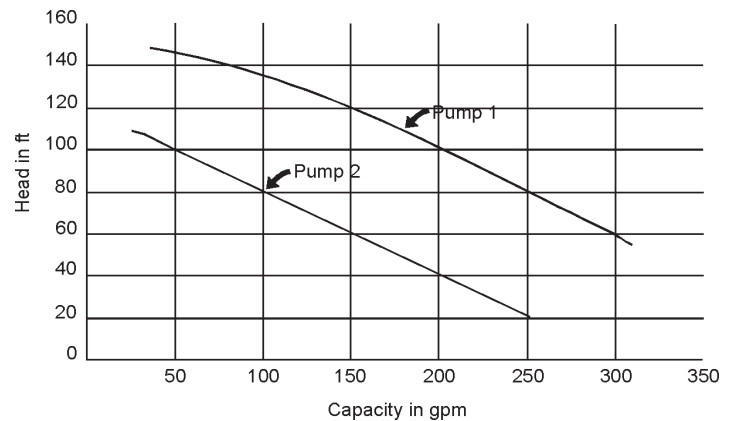
REFER TO: PEDH Vol 3, Chap 1.

4. C) is the "best" answer

REFER TO: PEDH Vol 1, Chap 1 under "Terminology".

5. D) is the "best" answer

REFER TO: PEDH Vol 3, Chap 9 under "Definitions".



6. C) 200 gpm at 140 ft. head is the "best" answer For SERIES pumps, add HEAD, not GPM. In this case we find that at 200 GPM, Pump 1 is producing 100 FT of HEAD and Pump 2 is producing 40 FT of HEAD. This is the only one of the choices that works for these pumps.

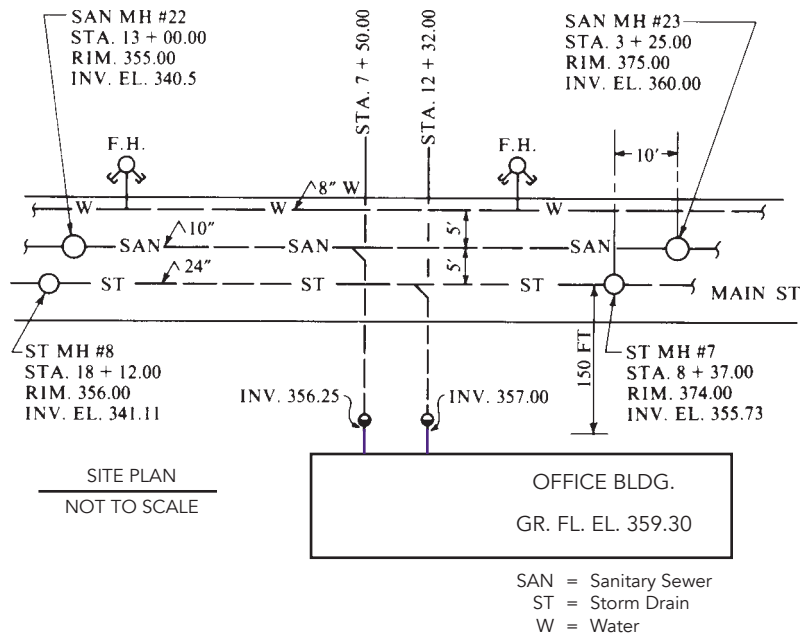
REFER TO: PEDH Vol 4, Chap 4.

7. C) 10 in. is the "best" answer There is a "typo" in the sample question: the slope is noted as "c in. per foot" when it should actually be "1/4" per foot".

REFER TO: PEDH Vol 2, Chap 4.

Certified in Plumbing Design – Sample Examination Question Explanations

These sample questions are indicative of the content areas covered by the CPD examination. The questions do not represent the full range of content or the levels of difficulty found in the actual examination.



8. B) 349.80 ft. is the "best" answer

REFER TO: PEDH Vol 3, Chap 11.

9. (D) 3.0650 % is the "best" answer

REFER TO: PEDH Vol 3, Chap 11.

10. D) The project is ahead of schedule is the "best" answer
 $640/960 = .667$ which indicated that we have used 67% of the hours but are 80% complete.

REFER TO: PEDH Vol 1, Chap 4 "Plumbing Cost Estimation".